



# Devonport

## A Nuclear Information Service Briefing



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*Front cover image:  
Devonport Naval Base and Dockyard from the air in 2012  
Credit: Ministry of Defence (OGL)*

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# Introduction

This briefing gives an overview of the Devonport Royal Dockyard and its role in servicing the UK's submarine fleet, including its nuclear-armed submarines.

Nuclear Information Service (NIS) is an independent, not-for-profit research organisation, founded in 2000. We investigate the UK nuclear weapons programme and publish accurate and reliable information to stimulate informed debate on disarmament and related issues.



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*Astute-class submarine alongside at Devonport, December 2023*

## The Devonport site and its history

Devonport is the second oldest of the UK's historic dockyards, dating back to the 1690s.<sup>1</sup> It is situated on the edge of the River Tamar, at the western edge of Plymouth. The oldest part of the dockyard is today known as the South Yard. The area now known as the North Yard was built in the mid-19th Century to build and maintain steam ships.<sup>2</sup> It was further extended between 1895 and 1907, doubling the size of the dockyard.

Today the Devonport site contains both Devonport Royal Dockyard, owned and operated by a subsidiary of Babcock International, and His Majesty's Naval Base (HMNB) Devonport. The Naval Base accommodation area and amenities are known as HMS Drake.

Although surface ships are also maintained at the dockyard, this briefing focusses on the work carried out on submarines, which takes place in the nuclear licensed part of the site. This covers the area around

the two largest Basins in the North Yard, numbers 4 and 5, and roughly corresponds to the part of the dockyard built during its final extension.<sup>3</sup>

This part of the site was originally used for building and servicing the dreadnought battleships of that era. While seven submarines were built at Devonport during World War 1,<sup>4</sup> the site otherwise produced and serviced surface ships. In the early years of the UK's nuclear submarine programme other dockyards were intended to be used for nuclear submarine maintenance. In 1964 a government committee decided against using Devonport due to the potential risk to nearby residential areas from an accident involving the release of airborne radioactive material.

However, by 1969 Devonport had been identified as the UK's third nuclear dockyard. Government papers to explain this decision appear to still be withheld from disclosure by the MOD.<sup>5</sup> In 1981, work on the Submarine Refit Complex was completed,<sup>6</sup> and in 1993 it was decided that Devonport would be used as the sole site for refitting and refuelling the UK's nuclear submarines, including the Vanguard-class Trident submarine fleet, which were then coming into service.<sup>7</sup>

Figure 1. Boundary of the Nuclear Licensed site at Devonport<sup>8</sup>



# Key facilities

## 9 Dock

Deep maintenance of Vanguard submarines is carried out in 9 Dock, one of the larger dry docks set around 5 Basin in the north of the site. The dock, which is around 200 metres in length, was adapted for nuclear submarine maintenance and refuelling from 1997 to 2002 as part of the D154 project, with the original floor of the dock being replaced and the walls strengthened.<sup>9</sup> The project was subject to delays and cost overruns that saw its budget nearly quadruple to £933m.<sup>10</sup>

The dock can be closed with a hollow concrete caisson, a structure that can be floated into place and then filled with water, sealing the dock and allowing the water inside to be pumped out so that work can be carried out on a submarine. Cradle blocks built into the floor of the dock hold the submarine once the water has been removed.<sup>11</sup>

Piping and electrical supplies built into the dock wall are attached to the submarine, with duplicate systems on both sides of the dock to minimise the risk from a single point of failure. The pipe systems are connected to the primary circuit decontamination and alternative core removal cooling (PCD/ACRC) building at the southern end of the dock, and provide coolant for the submarine's nuclear reactor.<sup>12</sup>

Three large cranes are mounted on rails on the dockside for use in submarine maintenance. For fuel operations a rail-mounted structure spanning the dock, called the Reactor Access House (RAH), is moved above the submarine reactor. The reactor is then accessed through a hole cut in the hull and refuelling work is carried out inside the RAH. The purpose of this arrangement is to minimise the height to which the reactor fuel and its containers need to be lifted, in case of an accident. A simulation reactor compartment is situated underneath the RAH resting position at the head of the dock for training purposes, and rail lines are used to carry fuel containers to and from the RAH.<sup>13</sup>

Following the unplanned refuelling of HMS Vanguard between 2015 and 2023, it is not expected that any of the Vanguard submarines, or the Dreadnought class which will replace them, will be refuelled. The H-generation reactor cores currently being used are supposed to last for the entire life of the submarines. However, the equipment in the dock will presumably be used to defuel the Vanguard submarines when they come out of service.

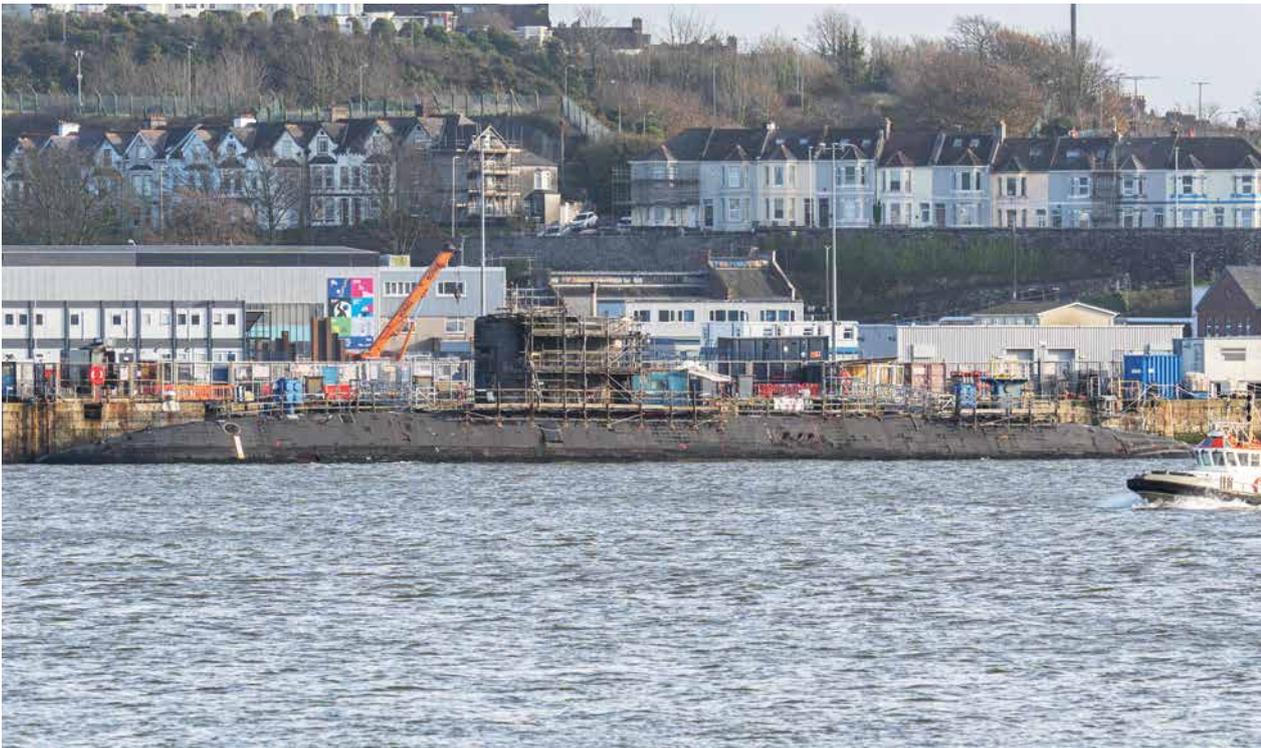
9 Dock is currently being refurbished, as part of the larger Devonport Submarine Infrastructure Programme. The work has been described as 'maintenance, life extension and facility improvements to the dock',<sup>14</sup> and includes repairs to the caisson and protection for the bottom of the dock edge.<sup>15</sup> Volker Stevin are contracted to carry out work on the project, which is expected to complete in 2024.<sup>16</sup>

## Low Level Refuelling Facility

The Low Level Refuelling Facility (LLRF) sits on an artificial island built into 5 Basin itself, protected by a ship impact barrier. The main part of the LLRF is used for the storage of fuel removed from submarines and it can also be used to store fuel that is destined to be loaded onto submarines. A connecting bridge links the facility to the dockside and the rail connection.<sup>17</sup>

The name of the facility refers to the design philosophy of minimising the height to which the fuel is raised during operations, rather than the waste category of the removed fuel. The exact characteristics of spent submarine reactor fuel is not in the public domain, but it will be classed as High Level Waste as it generates heat.<sup>18</sup>

The spent fuel is stored in cooling ponds within the facility, before being moved to longer-term storage in Sellafield.<sup>19</sup> The rail line, known as the nuclear transport route, connects each of the docks used for nuclear fuel operations to the LLRF, and is linked to a wider rail network within the dockyard,<sup>20</sup> which was used for internal transportation within the site from the 19th Century onwards.<sup>21</sup> A spur from the Cornish main railway line runs to the edge of the dockyard site and allows the spent fuel to be transported on to Sellafield. At the time of writing, the most recent rail transport appears to have taken place in September



CREDIT: AARON GOLDEN/NIS

HMS Victorious waiting to enter dry dock, December 2023.

2020,<sup>22</sup> which followed a train in 2017.<sup>23</sup> These most likely contained used fuel from HMS Vanguard and HMS Vengeance respectively.

## 14 and 15 Docks, Submarine Refit Complex

These two parallel docks on the north of 5 Basin were adapted for nuclear submarine maintenance and refuelling in the second half of the 1970s. At around 125 metres in length, they are shorter than 9 Dock and only suitable for work on the UK's attack submarine fleet, which are not nuclear-armed so do not include the large ballistic missile compartments.

Further work was undertaken on the two docks as part of the D154 project, and there were plans to install an RAH on both docks. However, this work was deferred,<sup>24</sup> and only one RAH was belatedly built on 14 Dock, in around 2016.<sup>25</sup> It is not clear when the decision was taken not to build an RAH for 15 Dock, but it presumably reflects the expectation that the current generation of reactor cores and their successors will last the full-service life of the submarines, meaning there is no need for refuelling.

In between 14 and 15 Docks is the Submarine Refit Complex, built between 1970 and 1981<sup>26</sup> to service maintenance and refuelling operations in the docks either side. A significant feature of the complex was the huge crane mounted in the centre of the building, which was originally used for lifting nuclear fuel containers. In 2004 the Office for Nuclear Regulation declared that defuelling operations in the complex did not meet modern safety standards, in part because of the additional risk from lifting operations using the crane.<sup>27</sup> The crane was removed in 2008.<sup>28</sup>

Since 2007, the government has had an ongoing project to upgrade the complex and the two docks to modern regulatory standards, including many of the measures that had originally been envisaged as part of the D154 project, which was first proposed around 1993.<sup>29</sup> No defuelling of submarines has taken place in the complex since 2004.<sup>30</sup>

The upgrade project was delayed for two years as a 'savings' measure in 2016 and re-started in 2018, despite the defuelling facility apparently being 90% complete at the time. The cost increases resulting from this delay may have been as large as the £19m of deferred spending, given that the cost of the project rose £100m between 2007 and 2018. In 2019



HMS Vengeance in 9 Dock, 2012

the National Audit Office described the project as suffering from 11 years of delays.<sup>31</sup> This does not take into account that major elements were part of the D154 project and were originally expected to be complete by 2004,<sup>32</sup> an additional delay of eight years.

The upgrades to the docks and Submarine Refit Complex are now part of the Devonport Submarine Infrastructure Programme. In November 2023 the government stated that it expects to be using 14 and 15 Dock in 2024,<sup>33</sup> a full 20 years after the D154 completion date. The current budget for the project was not divulged, but it is probably substantially higher than the £275m figure from June 2018, which was itself £100m higher than the 2007 budget.<sup>34</sup>

## 10 Dock

The final part of the Devonport Submarine Infrastructure Programme is upgrading 10 Dock for nuclear submarine maintenance. 10 Dock is alongside 9 Dock at the southern end of 5 Basin. 10 Dock was adapted for nuclear submarine maintenance in the 1990s, but does not meet current regulatory standards.<sup>35</sup>

The project involves narrowing the dock, strengthening the walls and increasing the height of the barrier in anticipation of climate-change-linked sea-level rise.<sup>36</sup> Within the dock a new headwall will be constructed at the opposite end from 5 Basin, and new electrical and mechanical subways will be constructed within the dock walls.<sup>37</sup> A new caisson will be built, as well as a docking cradle to support the submarine, five telescopic cranes, and a new production building

in the triangular area to the west of 10 Dock, hosting 'workshops, storage, temporary accommodation, welfare, plants rooms and offices'.<sup>38</sup>

The project commenced in 2022 when existing buildings west of 10 Dock began to be demolished<sup>39</sup> to make way for the new production building. Several companies have been named as contractors on the project: Volker Stevin,<sup>40</sup> a joint venture between Costain and Mott MacDonald<sup>41</sup> and another joint venture between Kier and Bam Nuttall.<sup>42</sup> The area between 10 Dock and the river will be used as a compound during construction, as will a storage area and some buildings to the east of 4 Dock.<sup>43</sup>

The government has refused to publish budgets for the individual projects within the Devonport Submarine Infrastructure Programme, but says the overall cost of the programme will be about £2.5bn.<sup>44</sup>

## 3 Basin

The failure of the government to make progress on the defuelling and decommissioning of submarines has meant that decommissioned submarines have continued to accrue at Devonport. The majority of these submarines are moored in 3 Basin, but due to the limited capacity, some of the more recently decommissioned submarines have been stored wherever there is dock space, chiefly in 5 Basin, or the surrounding docksides.

Currently 15 out-of-service nuclear submarines are stored at Devonport. If the larger Vanguard submarines are not able to be taken directly to 9 Dock for defuelling and dismantling as they leave service from around 2030, space will need to be identified for their storage.<sup>45</sup> Submarines that are still carrying fuel require dockside cooling facilities to keep their reactors safe until they can be defuelled.

# Future plans

The 2021 'One Devonport Blueprint' document, published on Babcock's website,<sup>46</sup> sets out the vision that the MOD and Babcock have for the Devonport site between now and 2050. Much of the South Yard will be handed over to Plymouth Council and leased for corporate usage, a process that has been in train for several years.<sup>47</sup> However, it is envisaged that the Navy will retain part of the South Yard as its first base for Underwater Autonomous Vehicles (UAV), some of which will be used as anti-submarine warfare targets during training. The area around 5 Basin will continue to be used for submarine support.

The following projects are planned in the submarine support area:

## 2020–2030

- Deep maintenance of Astute-class submarines using 'upgraded facilities'
- Scoping the submarine dismantling programme

## 2030–2040

- A 'new and improved' Nuclear Fuel Facility
- Carrying out life extension work or replacing the cranes and other infrastructure at 9 Dock, and refitting the RAH
- Deep maintenance of the Dreadnought submarines

No projects are yet planned in the 5 Basin area between 2040 and 2050, but the document envisages that, as decommissioned submarines are dismantled, 3 Basin can be used as a surface ship 'Fleet Time Engineering Zone'. Progress on submarine dismantling beyond the scoping work is not planned or envisaged in the document.<sup>48</sup>

# Operator

Devonport Royal Dockyard Ltd. (DRDL) is a wholly owned subsidiary of Babcock International. Between 1987 and 1997 the dockyard was government-owned but managed by a private company, Devonport Management Ltd. (DML).<sup>49</sup> In 1997 the dockyard was fully privatised and sold to DML, which was then owned by Brown & Root, Weir Group and Balfour Beatty. The MOD was obliged to pay for cost overruns within the D154 project, due in part to an unclear contract and because the costs were large enough to have made DML insolvent.<sup>50</sup> In 2007 DML was sold to Babcock International and renamed Babcock Marine. Babcock Marine is the parent company of DRDL and also of Rosyth Dockyard in Scotland.

At the time of writing, Babcock International has faced a difficult recent financial history, with its share price falling to almost one sixth of its 2014 peak by early 2021 and posting a £1.6bn loss in 2020/21. However, after selling off some assets and a profitable subsidiary the situation seems to have stabilised.<sup>51</sup>

Babcock has also had a difficult recent regulatory history. The nuclear licensed site at Devonport has been under enhanced regulatory attention from the Office for Nuclear Regulation (ONR) since 2014.<sup>52</sup> Babcock have been subject to a series of improvement notices in relation to work at Devonport and elsewhere in the UK nuclear programme,<sup>53</sup> and in August 2019 they were fined £666,667 plus costs for breaches of crane safety regulations at Devonport.<sup>54</sup> As a result of the lack of progress on 'leadership and organisational capacity' issues at DRDL, the ONR recently took the unusual step of going over the head of DRDL's leadership and contacting the board of Babcock International to register their concerns.<sup>55</sup>

## Vanguard submarine deep maintenance

The table below shows the deep maintenance periods of the Vanguard submarine fleet.

The Vanguard submarines are now intended to be in service far beyond their originally planned 25-year lives, and will probably be required to remain in use for 37 years or more. The phenomenon of extremely long patrols points towards a fleet that is suffering serious reliability problems due to ageing and maintenance issues. Recent incidents, such as the fire on one submarine<sup>56</sup> and an unplanned dive caused by a faulty depth gauge that reportedly saw a submarine approach an unsafe depth,<sup>57</sup> demonstrate that some of these issues pose serious risks to submarine crews. It is the government’s policy to keep one nuclear-armed submarine on patrol at all times, but it is by no means certain that the MOD will be able to do this until the Dreadnought submarines come into service in the 2030s. Any delays to the infrastructure projects at Devonport, or to the submarine maintenance and dismantling schedules have the potential to exacerbate these problems.

## Submarine dismantling and defuelling

The 15 out-of-service nuclear submarines stored at Devonport, and a further seven that are at Rosyth, together comprise every nuclear submarine the Navy has ever fielded.<sup>58</sup>

Aside from the long-overdue upgrades to 14 and 15 Docks, and the Submarine Refit Complex, the only progress on submarine dismantling is the government’s ‘demonstrator’ project to fully dismantle HMS Swiftsure.<sup>59</sup> This work is being undertaken at Rosyth and is currently forecast to be complete at the end of 2026 at a cost of £298m.<sup>60</sup> Three more submarines at Rosyth have had low-level waste removed from them,<sup>61</sup> but it is not clear if work to defuel the nine submarines at Devonport that are still carrying nuclear fuel will begin before completion of the demonstrator project. In 2016 the MOD estimated that fully dismantling 27 submarines would cost £2.4bn.<sup>62</sup>

Although the risk to in-service submarine availability from delays to submarine dismantling and defuelling is lower than from delays to the maintenance schedule, the history of problems with the project and with infrastructure work at Devonport suggests that delays are more likely to materialise than not.

**Figure 2. Vanguard submarine deep maintenance schedule<sup>63</sup>**

Submarine	Long Overhaul Period and Refuel	Deep Maintenance Project
HMS Vanguard	2002–2004	2015–2023
HMS Victorious	2005–2008	2023–
HMS Vigilant	2008–2012	–
HMS Vengeance	2012–2015	–

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