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ANNEX A to  
EC-14-08-02-01-04  
Dated 24 Nov 09

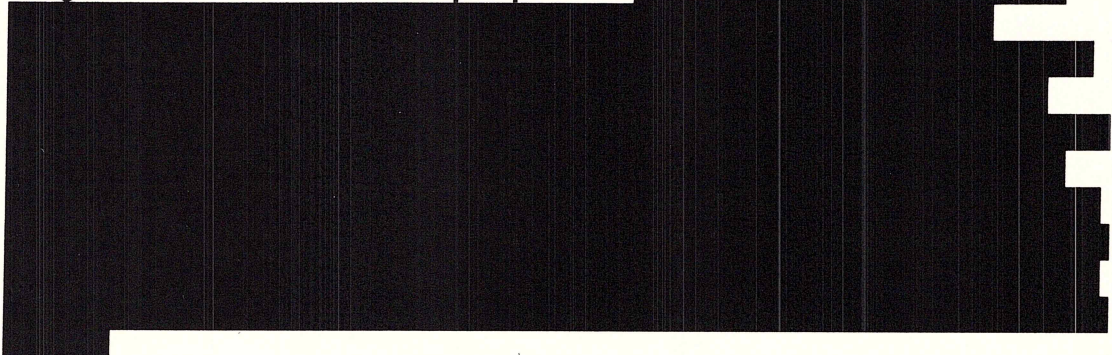
## SUCCESSOR SUBMARINE PROJECT – REVIEW NOTE

### References:

- A. Cmd 6994 - The Future of the UK's Nuclear Deterrent dated Dec 06.
- B. D/DGSR/01/08/03 dated 28 Aug 07.
- C. D/CSA/12/10 (530/07) dated 11 Oct 07.

### Summary

The Successor Submarine programme began a 2 year Concept Phase in September 2007, with Initial Gate targeted for September 2009. Work to date has identified two families of submarine design, (Adapt Astute based on an existing primary propulsion plant (PWR2) and Derived Submarine based on a new primary propulsion plant (PWR3)) offering a range of more detailed concept options.



As a result, it has not been possible to develop recommendations for Initial Gate decisions within the originally assumed timeframe for the Concept Phase. This requires an extension to the Concept Phase, with the timing of the Initial Gate submission now assumed to be July 2010, requiring additional funding (over and above approvals already given) of £260.89m, to understand fully the cost and schedule implications and to pursue wider cost reduction opportunities. This will ensure that a fully informed decision can be taken next year on completion of this work.

### Issue

1. The need to extend the Concept Phase of the Successor Submarine Project to further mature potential design options, to explore the impact of the nuclear regulatory environment associated with the propulsion system, and to continue to drive out cost in the programme.

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Recommendations

2. The IAB is invited to approve:

- a. An uplift to current Concept phase approval of £260.89m, which will fund the programme until December 2010 consisting of:

[REDACTED]

- b. An additional approval contingent for adverse exchange rate movement in USD [REDACTED]

[REDACTED]

3. And note:

- a. The uplift requested will bring total Concept Phase approval to:

	EXISTING APPROVAL	ADDITIONAL APPROVAL	TOTAL APPROVAL
TOTAL (near cash excl. CMC)	369.90	253.55	622.45
CMC	283.00	0.00	283.00
TOTAL (near cash incl. CMC)	651.90	253.55	905.45
IRDEL	1.65	7.34	8.99
TOTAL (incl. IRDEL and CMC)	653.55	260.89	914.44

\* Near cash only

- b. That the purpose of Initial Gate will be to downselect to a single submarine concept to take into full design.
- c. The package of work, described in paragraphs 9 and Annex A, which aims to develop sufficient evidence to inform an Initial Gate submission in 2010.
- d. That our intention will be to submit the Initial Gate Business Case as soon as evidence is mature and assured (with a planning assumption of July 2010 at the latest).

[REDACTED]

To mitigate the

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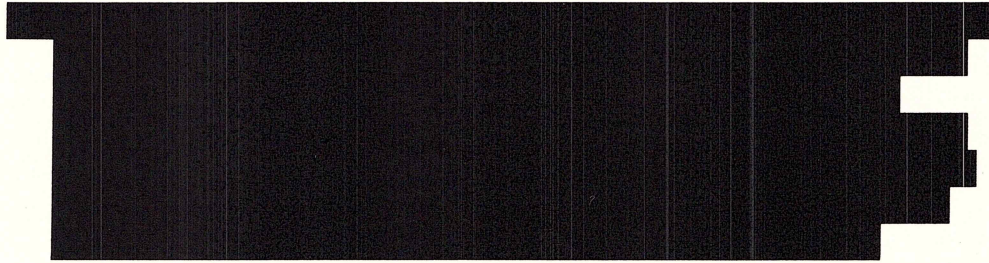
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financial risk of any delay, the approval sought in this RN is intended to fund the project to December 2010.







Background

4. The 2006 White Paper 'The Future of the UK's Nuclear Deterrent' (Reference B) set out the Government's decision to replace the existing Vanguard Class with a new class of SSBN submarines. The White Paper was endorsed by Parliament in March 2007 and the Future Submarines IPT was established in May 2007 to develop and implement an acquisition programme, with the intention of submitting an Initial Gate Business Case in Autumn 2009. Work to date has focussed on developing a range of options to meet the candidate Key User Requirements, whilst maintaining the initial acquisition cost estimate given in the White Paper of £11-14bn (at 06/07 prices) for the submarines, within the £15-20bn estimate for the overall capability.

5. Two principal families of submarine design have been developed within which there are a number of sub-options representing differing levels of capability and cost. The two families are:

a. PWR2 based (Adapt Astute). Essentially an Astute SSN with a joint UK/US Common Missile Compartment and internal systems reconfigured to cope with the larger platform size, weight and crew numbers and with primary and secondary propulsion based on systems as in Astute Boat 5 (PWR2) or significantly modified systems, to improve platform safety and survivability (PWR 2b).

b. PWR 3 based (Derived Submarine). A new design developed from Astute technologies with updates where appropriate to achieve performance or improve availability, reliability and maintainability, and incorporating a joint UK/US Common Missile Compartment and a new propulsion plant based on a US design but using UK reactor technology (PWR 3) and modern secondary propulsion systems.

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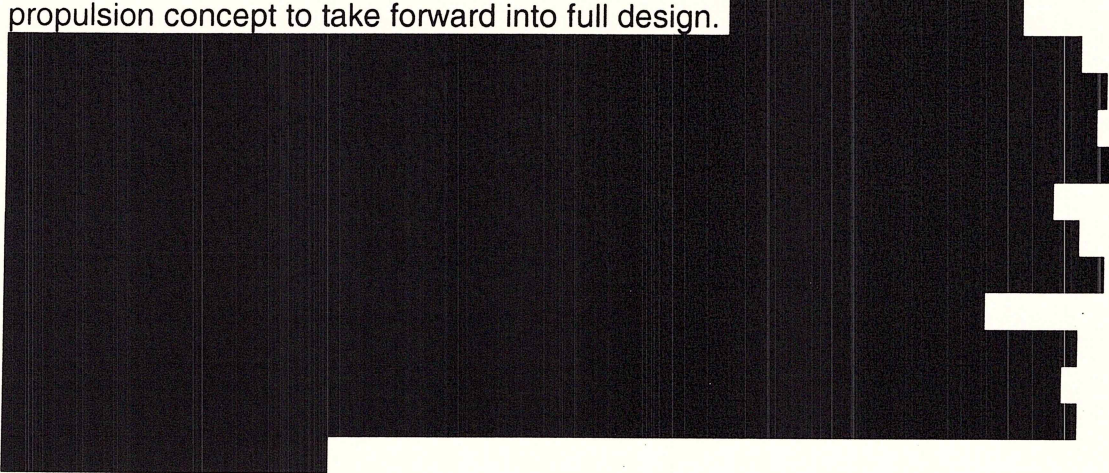


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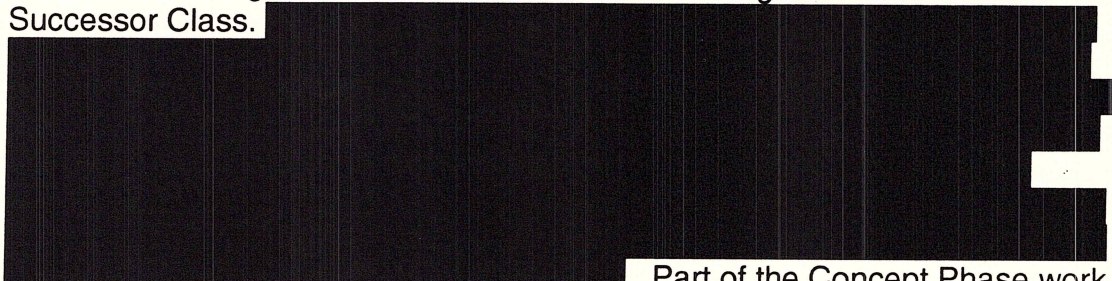
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Concept Phase Extension

6. The intention at Initial Gate is to downselect to a single submarine and propulsion concept to take forward into full design.



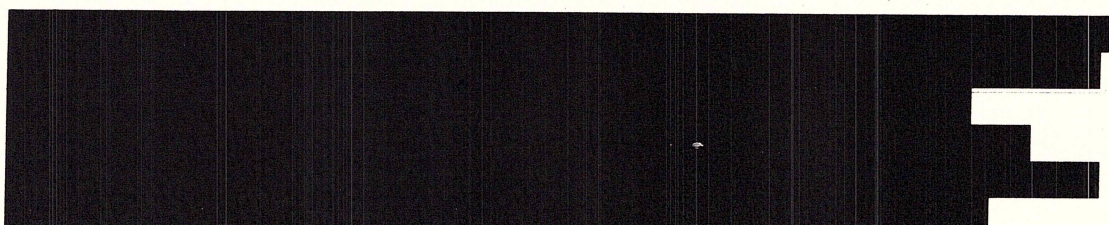
7. The requirement endorsed in the 2006 White Paper places a particular challenge on this programme to ensure that Continuous At Sea Deterrence is maintained during the transition from the current Vanguard Class to the Successor Class.



Part of the Concept Phase work has therefore been to develop general arrangements and system level designs for potential options and, although it is possible to keep two separate concept designs open an Initial Gate of mid-2010,

As stated earlier it is our intention to mitigate this risk by coming back to the IAB no later than July 2010 to get direction on the submarine and propulsion option we should pursue.

8. Within the context of the clear imperative to maintain CASD, there are 4 potential combinations of work to take the project to IG<sup>1</sup>



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<sup>1</sup> Cost Breakdown Structure Nov 09 to Dec 09 for options A to D (Evidence Repository Ref: FutureSubs-0000180801)

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[REDACTED]

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[REDACTED]

9. Further detail on the work planned under the recommended way forward is at Annex A. Briefly, however, work for the remainder of the concept phase will include:

- Refinement and cost challenge against the submarine options,  
[REDACTED]
- Exploring the technical issues around the PWR 2 family to satisfy the regulatory challenge (developing PWR 2b design and costing)  
[REDACTED]
- Exploration of cost reduction opportunities across DLODs;
- Further exploration of technology insertion opportunities;
- Development of commercial strategies to drive value for money into the programme;
- An assessment of the impact of the options on the sustainability of the submarine enterprise design and build capability.

#### Project Control

10. The management processes<sup>2</sup> developed through the Concept Phase to monitor performance against contracted milestones will continue to be applied to this work, with incentives applied against Key Performance Indicators. Earned Value Management (EVM) is used to assess schedule and cost performance down to work package level. Performance is reviewed monthly, with performance overall monitored through monthly Programme Review. Overall performance against contracted milestones is overseen by a joint MOD/Industry Operations Board, which also meets monthly.

11. A key part of the process is forecast and control of cost. Each phase of the programme is covered by one or more contracts (or contract amendments) which encompass a clearly defined scope of work and value.

12. In addition, the engineering programme will continue to use the Concept Phase decision making methodology<sup>3</sup> in order to make decisions in the

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<sup>2</sup> Set out in the FSM IPT Successor SSBN Programme Through Life Management Plan, Version 1.7 dated Aug. 2009. (Evidence Repository Ref: FutureSubs-0000190400)

<sup>3</sup> (Todd, S) Basis of Decision for Successor SSBN Concept Design, dated 11 Dec. 2008. (Evidence Repository Ref: FutureSubs-0000173113) + (Payne, G) FSM IPT Decision Management Process, Issue 3, Revision 15 dated 15 May 2009. (Evidence Repository Ref: FutureSubs-0000180883)

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context of performance, time and cost. An executive review at 2\* level will be introduced to apply further control and coherence across the wider capability and submarine enterprise.

#### Schedule

13. Our assessment is that work to develop evidence to inform an IG submission will be complete by Spring 2010, at which point it will be possible to state with more clarity which of the option families offers the best potential combination of capability, performance and value for money. We will, at this point, begin developing recommendations for Initial Gate and continue engaging with the relevant scrutiny and assurance communities. However the requirement to engage with the Nuclear Deterrence Policy Committee in the Cabinet Office and the likely General Election may make it difficult to achieve full approval of the Initial Gate business case prior to July 2010 in which case the IAB will be asked for direction as previously described.

#### Commitment and Affordability

14. Approvals being sought reflect the costs of Option D (Para 8d). Costs associated with the other options explored in para 8 are set out in Appendix A. Approvals required to meet Option D [REDACTED] will be met from the balance of current approvals [REDACTED] plus the uplift of [REDACTED] requested.

#### **Review Note Profile (£M Near Cash)** **[Redacted]**

15. The work planned within the preferred option is affordable against in year provision and the PR10 baselines and costings.

#### **Programme Affordability**

**[Redacted]**

16. The concept phase extension work will be managed within the approval requested through regular reviews of spend in the context of wider platform decision making, to minimise nugatory work during the period of parallel option study, and all major work packages and programmed against appropriate milestones and required outputs to support decisions. Coherency will also be assured via monthly reviews which ensure industry and MoD are working consistently. Furthermore individual business cases will be subject to internal scrutiny to ensure value for money.

#### Commercial Strategy

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17. The work identified within this Review Note will be managed under an extension to existing commercial arrangements between the MOD/Industry team (comprising BAE Systems, Babcock and Rolls Royce) (Reference B refers).

Way Forward & Presentation

18. Allowing for Major Project Review Group scrutiny and potential delays due to the election, the intention is to submit an Initial Gate business case as soon as analysis is complete and assured. We are working towards an internal planning timetable of submission no later than July 2010, which would lead to final approval from HMT by around October/November 2010. This differs significantly from the Department's previously stated position that Initial Gate decisions would be made in September 09 and substantial interest can be expected from Parliament and elements of the media. Presentational handling is due to be discussed by Permanent Secretaries on 30 November.

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Hd DUW

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Hd FSM

Appendix 1 - FSM Platform & NP extension of Concept Phase – Costs of Options

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## FSM PLATFORM & NP EXTENSION OF CONCEPT PHASE – COSTS OF OPTIONS

1. The extension to the Concept Phase is needed to allow additional time to fully understand the costs and regulatory issues around the agreed suite of options. The recommended way forward is designed to deliver outputs to support the analysis of submarine platform design options along with the minimum necessary resource commitment to protect delivery against the earliest possible ISD. The following summarises the costs and activities of the four options set out in the Review Note.

[illegible]

3. The following describes activities to be undertaken throughout the extension of the Concept Phase to mature the work to support a platform selection at Initial Gate. The majority (c. 80%) of costs are common to all platform concepts and are necessary to enable decision making at Initial Gate while keeping the project on track to deliver the earliest possible ISD.

4. In most cases, particularly support from Tier 1 industrial partners (BAES, Rolls Royce and Babcock Marine), resource is constrained and therefore all options seek to utilise this resource to maximum effect (i.e., the costs represents the total manpower available but is deployed as appropriate to each option). The cost difference between Option C and Option D is marginal as the impact of continuing to develop both PWR2 and PWR3 based solutions under Option D is a reduced effort and prioritisation of activities on both options due to these resource constraints. The primary impact is, therefore,



