FCD Transition Study

First Draft - Hypothesis Methodology

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Prepared for:
Capability Acquisition and Sustainment Group (CASG)

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1 Executive Summary

This paper has been developed in response to *CASG Letter GMSUBS/OUT/2017/090 dated 12 December 2017. 'Defence Priorities for ASC in 2017'* in addressing the overriding priority of the on-going sustainment and life-of type extension of the Collins Class submarine (CCSM) fleet to ensure the consistent delivery of materially capable submarines to the Fleet Commander. The letter confirmed ASC to:

> *'Continue work on the study concerning the potential relocations of full cycle dockings in the 2024 to 2026 timeframe as an alternative to remaining in South Australia. This work should include details on establishing long term facilities and workforce to continue support for the Collins Class.'*

The hypothesis analysis proposed in this paper is to examine the feasibility of the relocation of Full Cycle Dockings (FCD) to Western Australia (WA) as an alternative to remaining in South Australia (SA). The hypothesis methodology is a means to evaluate the transfer and/or establishment of facilities and growing a specialised sustainment capability to provide long-term support of the Collins Class submarines in WA. As an adjunct, it considers the future synergies and infrastructure required for the Future Submarine Program (FSP).

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This paper seeks feedback on the hypothesis approach proposed for evaluating the implications of FCD transition to WA, to be used for the development of a FCD transition study.

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2 Glossary

Acronyms	Definitions
CASG	Capability Acquisition and Sustainment Group
CCSM	Collins Class Submarine
FCD	Full Cycle Docking
FSM	Future Submarine
FSP	Future Submarine Program
ID	Intermediate Docking
IMP	Intermediate Maintenance Period
IMS	Integrated Master Schedule
LOTE	Life of Type Extension
MCD	Mid Cycle Docking
NSP	Naval Shipbuilding Plan
PSI	Platform Systems Integrator
RAN	Royal Australian Navy
SA	South Australia
WA	Western Australia

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3.1 Assessment Methodology

This paper proposes an 'if/then' hypothesis methodology to test the viability of establishing a CCSM facility and workforce capable of delivering a CCSM FCDs in WA in the 2024-2026 timeframe, with the potential of producing an optimal outcome for the Australian Submarine Enterprise in terms of fleet deployability, availability, and sustainment productivity.

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The arguments for a potential relocation, any specifications or solution and any necessary preconditions would be addressed against each hypothesis statement.

4 FCD Transition – Key Considerations

The Collins Class submarines are strategically important to Australia in maintaining regional effectiveness. The 2016 Defence White Paper states:

> *'The Collins Class submarine fleet will continue to be supported and upgraded to ensure that it remains a potent capability through the rest of its life and until transition to the new submarine.'*

This requires the Royal Australian Navy (RAN) to have access to effective and efficient sustainment of the Collins Class fleet at all times. Assured levels of submarine capability and availability will be a focus during the proposed FCD transition and into the future as the resource demands for the Future Submarine Program (FSP) and other Naval Shipbuilding projects grow.

ASC is the Collins Class Platform Systems Integrator (PSI), for a unique class of submarine only operated by the RAN. In that role ASC provides a range of sustainment and capability upgrade services that involve planning, engineering, supply, production (physical work on the submarine) and certification.

4.1 Comparing Full and Mid Cycle Dockings

In order to provide some perspective, the following section will focus on outlining the differences between the shorter duration and less intrusive sustainment activities and the longer and more intrusive FCDs.

The CCSMs are maintained in accordance with a scheduled Usage Upkeep Cycle (UUC). The UUC is a 12 year maintenance cycle, comprising of one FCD, a 2 year long deep maintenance period, one Mid Cycle Docking (MCD) with a planned duration of one year, two Intermediate Dockings (ID) with a planned duration of 6 months each and 4 Intermediate Maintenance Periods (IMP) typically 16 weeks duration each.

The long duration, most complex and intrusive maintenance activities, FCDs, are performed at ASC North. The shorter duration submarine maintenance activities are conducted at ASC West and at Fleet Base West in WA, 47G [redacted]

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In accordance with the Collins Class Integrated Master Schedule (IMS), an FCD is conducted following 10 years of submarine operation. The scope of work includes cyclic maintenance routines in line with the maintenance baseline, corrective maintenance, refurbishment of statutory items, plus an allowance for design change and capability enhancement implementation.

FCDs generally involve around 47G work packages on many work fronts, requiring the removal of major equipment from the hull for workshop and/or off-site refurbishment. Mid Cycle Dockings (MCDs), the largest maintenance activities undertaken at ASC West, comprise less than half the number of work packs and are of significantly smaller size and complexity.

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During an FCD the platform is completely refurbished and selected critical equipment is removed from the platform. The three diesel engines and the main propulsion motor are extracted through hull cuts, and the major systems such as air services, hydraulics, power distribution, and fluid systems are decommissioned requiring dockyard auxiliary systems to be brought on line to maintain critical services, and the re-commissioning of ship based systems near the end of the FCD.

In contrast, during a standard MCD, a large proportion of submarine equipment remains operational throughout the availability. Major equipment such as the diesel engines and the main propulsion motor are not removed from the platform and maintenance is undertaken with equipment in place.

The execution of maintenance work on a submarine is constrained by restricted access and confined spaces, which requires a disciplined and logically sequenced work program to ensure schedules are achieved and a safe working environment is maintained during the equipment removal, rebuild and set to work (STW) phases. The extent of this impact on an FCD activity is greater than for an MCD due to volume of work conducted.

Troubleshooting problems during FCDs, particularly during the STW phase requires a workforce with many years of FCD experience and the ability to balance problem resolution against schedule demands. This presents much greater complexity than that required for MCDs.

[1] This figure represents the hours directly attributable to a FCD. There are many other indirect labour hours required to support a FCD and the overall sustainment of the CCSM Fleet which is not included in this hours estimate.

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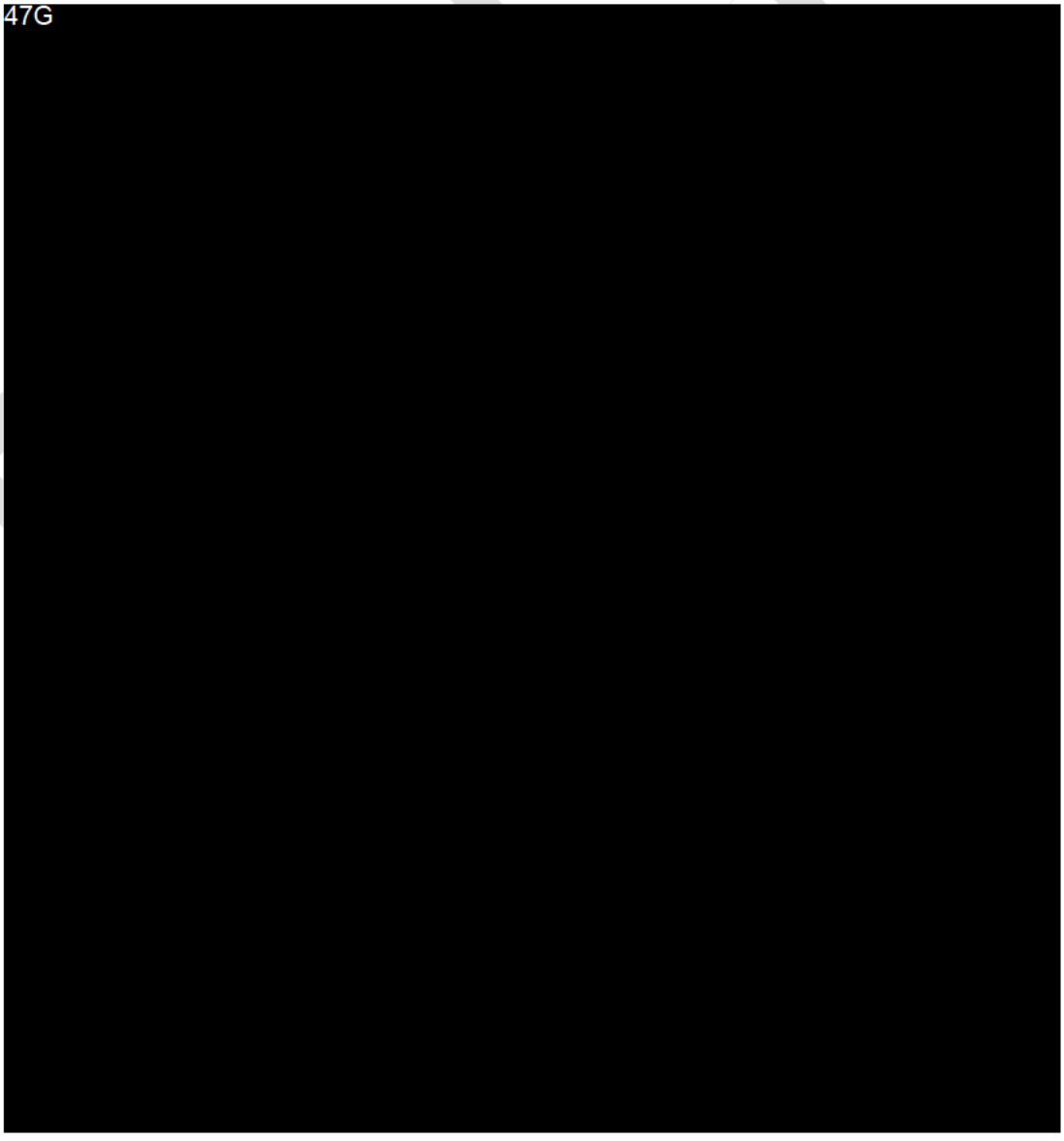

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The ASC West facility was opened in 2008 and has supported submarine sustainment ever since, providing both planned and unplanned support to the CCSM fleet. Recent infrastructure upgrades, all of which will contribute to improved productivity, include:

- The Maintenance Support Tower in the Maintenance Hall;
- Additional office accommodation and a sky bridge, linking the Maintenance Hall with the submarine hardstand access towers;
- Improvements to the electrical, mechanical and welding workshops;
- A fire system upgrade; and,
- Improved on-site dining facilities.

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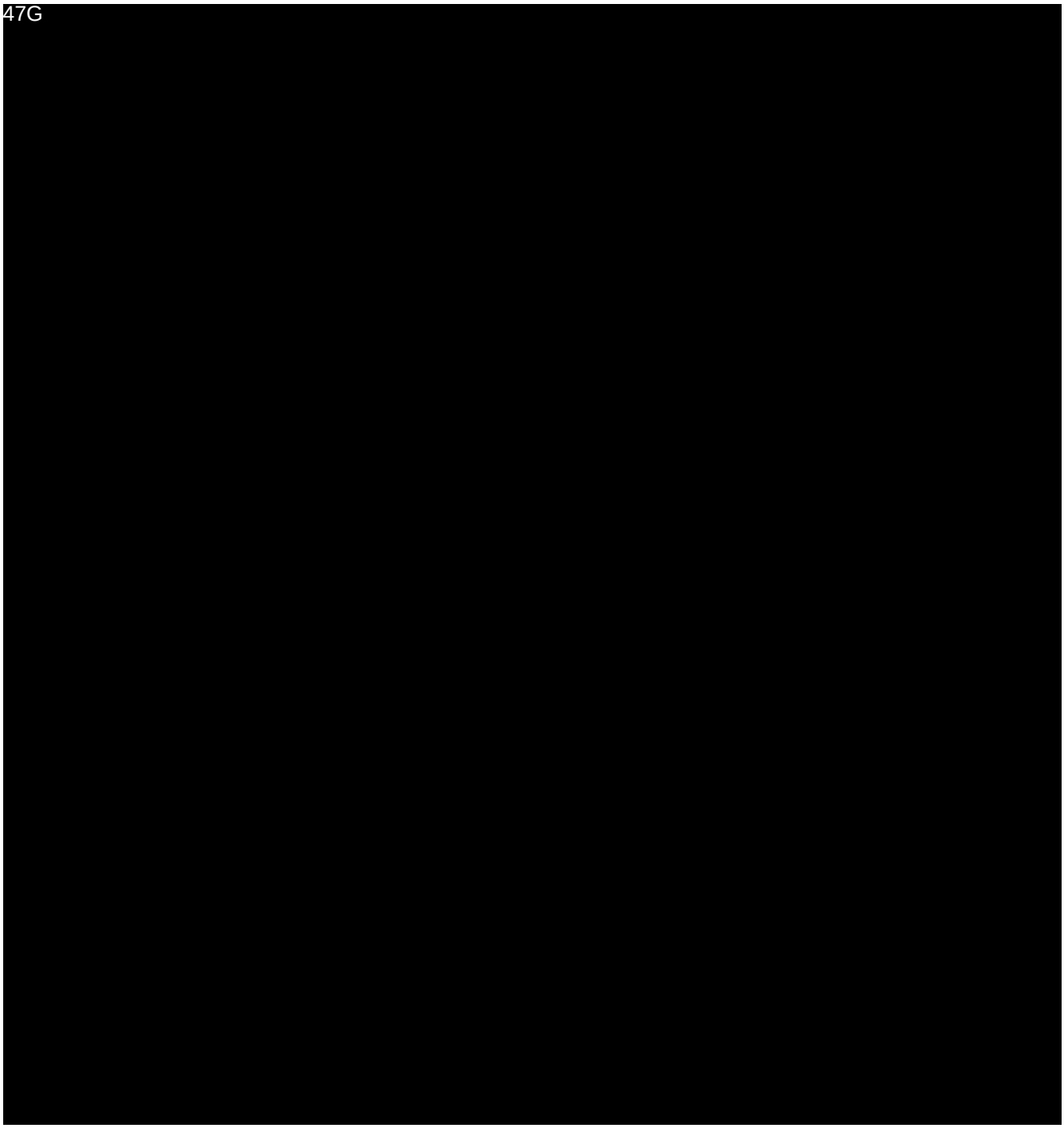

5 Hypothesis Statements

The section will focus on the evaluation of each hypothesis statement.

It will include the consideration of alternative solutions where the base hypothesis proves invalid or the risks too high.

For each hypothesis statement the list of assumptions, constraints and variables is not intended to be exhaustive, but instead highlight the key assumptions, constraints and variables and provide an overview of the intended approach.

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11 Way Ahead

This paper has been provided to seek feedback on the hypothesis method proposed for evaluating the implications of FCD transition to WA in the development of a FCD transition study. 47G

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