Australian Government
Department of Defence

FSM BASING STUDY

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15 December 2011

Release Information

Issue Number	Issue Date	Description of Amendment
1.37	22SEP11	DRAFT Release
1.40	15DEC11	Feedback incorporation – Formal Release

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Table of Acronyms and Abbreviations

Air Force Air	Aircraft assets operated by the Air Force
ASC	Australian Submarine Corporation or ASC Pty. Ltd.
Brownfield	Development – the incremental repair or improvement to an existing site, facility or capability
CAPT	Captain, Royal Australian Navy
CMDR	Commander, Royal Australian Navy
CNSAC	Chief of Navy Senior Advisory Committee
CCSM	Collins Class Submarine(s)
Daily Running	Where a vessels sails in the AM and returns in the PM
EAXA	East Australia Exercise Area
EO	Explosive Ordnance
FBE	Fleet Base East including Garden Island Dockyard Sydney (leased currently to Thales)
FBW	Fleet Base West (HMAS STIRLING)
FCD	Full Cycle Docking
FIMA	Fleet Intermediate Maintenance Activity
FSM	Future Submarine(s)
FSU	Fleet Support Unit
Greenfield	Development – the new creation or construction of a facility or capability
HMAS	Her Majesty's Australian Ship
ID	Intermediate Docking
IMAV	Intermediate Maintenance Availability
LCDR	Lieutenant Commander, Royal Australian Navy
LHD	Landing Helicopter Dock
MCD	Mid Cycle Docking
Naval Air	Aircraft assets operated by the Navy
NBCD	Nuclear Biological and Chemical Defence
NPS	Nuclear Propelled Submarine(s)
NPW	Nuclear Propelled Warship(s)
PMKeyS	Personnel Management Key Solution (the individualised Defence personnel database)
RAAF	Royal Australian Air Force
RADM	Rear Admiral, Royal Australian Navy
RAN	Royal Australian Navy
RANRAU	RAN Ranges and Assessing Unit
SAXA	South Australia Exercise Area
SERC	Submarine Escape and Rescue Centre
SETF	Submarine Escape Training Facility
SMA	Senior Medical Adviser
SMP	Supported Maintenance Period
Special Forces	Special Air Service Regiment or equivalent Service's units
SPO	System(s) Program Office
STSC	Submarine Training Systems Centre
SUBMED	Submarine Medicine
SUMU-W	Submarine & Underwater Medicine Unit - West
WAXA	West Australia Exercise Area

Executive Summary

1 The development of the twelve submarine capability stipulated by the Defence White Paper 2009, is a concept weakened at its outset by long-running criticism of Collins Class Submarine (CCSM) availability and Defence's ability to staff fully these submarines, a fleet that is half the required future size. Substantial change to the manner in which the ADF manages its six *Collins Class* submarines is required if sufficient confidence is to be generated that the twelve future submarines capability is both achievable and sustainable. This Study pre-dates by about a decade the need for FSM related facilities construction activity but serves as an information platform upon which related decision making can be based as the decade counts down.

2 RADM Moffitt's 2008 Review of Submarine Workforce Sustainability[1] recognised that the placement of Australia's submarine force solely in Western Australia weakened its ability to recruit, but once recruited and trained, also exacerbated the skilled staff discharge rate[2]. Exposure locally to alternative mining industry opportunities[3],[4] East Coast – West Coast extended-family separation issues, and the lack of available mobility for the many submarine personnel who seek it, are significant (but not the only) causes. HMAS *Stirling* in Western Australia, a well equipped and purpose designed operational naval base, could be home to all of Australia's Future Submarines (FSMs) but the risk of not being able to adequately staff them there is too high.

3 Australia's two ocean basing policy provides many benefits to the Nation, but common to all of them is the word diversity. Strategic, tactical and industrial support diversity, to name a few, enables a more flexible enhanced Defence capability than otherwise. Creation of posting diversity similarly enhances management of Navy's human resources, but creation of an additional FSM homeport on the East Coast will also recognise that this is where most Australians live and from where 80% of CCSM uniformed personnel originate. This will facilitate an increased capacity to staff FSMs with qualified uniformed personnel and support them with qualified civilian industry personnel.

4 This study has determined a set of characteristics of an ideal Australian submarine base and used them objectively to assess available East Coast homeport opportunities. The characteristics are wide ranging and include multiple factors relating to the well-being of the human element, as well as expected strategic and operational factors necessary for this sophisticated naval platform to perform to expectations. From a personnel perspective homeports are where the families are, but more than that they are where the submarine force itself integrates into a support community that includes access to all necessary human resources, administration, technology, logistics, operations, research, and the local civilian community generally. Only major population centres can provide this mix of support characteristics.

[1] Review of Submarine Workforce Sustainability–31st October 2008–Rear Admiral R.C. Moffitt AO, RAN
[2] The Australian – 22SEP2011 – "Navy's $80k bonus to keep sailors"
[3] GFK Bluemoon – Navy Submariners: Understanding the appeal of a Submariner Career – June 2011
[4] Economic Resurgence Project: ADF Impacts-Phase II: A Focus on Flexible Career Management as Mitigation – Directorate of Workforce Intelligence – 14th April 2011

5 Comparative cost and environmental impact assessments are not yet included in this study although ultimately they will enable the final basing decisions. Significant potential benefits may be gained by appending a submarine base to an existing functional naval establishment, including reduced cost, an immediate sense of community, and a shorter time span to achievement of full operational capability[5].

6 Sydney Harbour is the natural initial focus for any new Navy East Coast presence, and besides Fleet Base East (FBE) examination of HMAS *Penguin,* HMAS *Waterhen* and Cockatoo Island is undertaken. Heading north, examination of Newcastle Port and the Port of Brisbane occurs in some detail, and in the other direction similarly, Jervis Bay and Westernport Bay near Melbourne. Examination of many other ports and harbours is discussed but all are discounted because of their marine pilotage limitations or because they are too remote from the major population centres of Brisbane or Sydney or Melbourne. Darwin's role as a forward operating base for submarines is important and for the FSM this capability should be enhanced.

7 Submarines are stealth platforms and acknowledgement of this factor does influence the basing analysis process. Similarly, proximity to the surface fleet and its associated resources, including training assets, exercise areas, ammunitioning and medical facilities, and the necessary docking and industry technology support, also exert significant influence on the assessment outcomes.

8 Fleet Base West (FBW) gains the highest overall ranking from the assessment process; however, as is the current experience, Defence cannot recruit, train and sustain adequate crew numbers there to enable the existing submarines capability, let alone a larger FSM capability.

9 Prior to the potential application of any weighting factors Sydney Harbour provides the best three[6] currently available options for a sustainable East Coast FSM homeport.

10 If for any reason Navy becomes obliged to look elsewhere for the creation of this new FSM capability then the two options discussed for Jervis Bay represent the next best overall value, notwithstanding any intuitive inclination towards Newcastle and its closer proximity to Sydney. Newcastle has its strengths, but the edge that it has with respect to positive people factors disappears under the influence of its isolation from any other naval infrastructure, its susceptibility to river flooding, and its sometimes-difficult harbour entrance; which for submarines on the surface in a queue of large bulk coal carriers is particularly significant.

11 Both Brisbane and Westernport Bay suffer s47C [redacted] and from their distances to existing East Coast exercise areas and other operating assets. Brisbane is also very remote from the ammunitioning facility at Eden.

12 Determination of the most cost-effective Sydney Harbour solution is recommended as the next phase that will further enable FSM Programme decision-making.

[5] As well as being sympathetic with the strategic basing principle; "*Defence should consolidate units into fewer, larger and sustainable multi-user bases*" - Defending Australia in the Asia Pacific Century: Force 2030 – Defence White Paper 2009 – Australian Government - Department of Defence
[6] FBE, Cockatoo Island and HMAS *Waterhen* Extended

Key Findings

Recruiting & Retention

KEY FINDING: 14% of specialist RAN submarines (SM) officer and sailor billets[7] were vacant at September 2011, but the vacancy numbers have been significantly higher.

KEY FINDING: The sole basing of the SM force at Rockingham in WA is an impediment to sustainable recruiting, notwithstanding the ability of ADF recruiting processes to deliver reliably against 80% of specified SM recruiting targets.

KEY FINDING: 80.7% of all SM recruits for FY2010 and FY2011 were from East Coast states.

KEY FINDING: The issues that cause SM specialist personnel to prematurely separate from the submarine service and the Navy in general are complex.

KEY FINDING: 39.6% of RAN submarine personnel across all ranks have indicated via their first posting preference that they want to be somewhere other than the sole submarine base at FBW.

KEY FINDING: The three most popular SM personnel posting preferences in descending order are Perth Outer Suburbs, Sydney and the ACT.

KEY FINDING: For a relatively small number, the geographic distance from the East Coast population centres becomes reason enough to request separation from the SM Service but importantly, when combined with those who leave simply because they 'need a change'[8], the numbers who may directly benefit from an East Coast SM base become significant, potentially to Navy's direct advantage.

KEY FINDING: The creation of an additional submarine homeport in or close to a major East Coast population centre would enhance Navy's ability to recruit and retain its uniformed SM workforce.

What Would An Ideal SM Homeport Provide?

KEY FINDING: A modern Australian submarine force ideal homeport has many individual component functions that all combine to enable the capability that Force 2030[9] has stipulated the ADF must provide. They include:

Strategic location	Tactical Survivability	Sea States / Weather
C2 Integration	Integrated with SURFOR	Workup Resources
Protected Wharves	Alongside Services	Ammunitioning Services
Maintenance Services	Docking Services	Physical Security
Crew Facilities	Training Facilities	Recruiting & Retention
Location Attractiveness	Posting Preferences	G/Weapons Maintenance
Medical & Dental	Housing	Integrated with NPW

KEY FINDING: None of the existing or potential homeports can satisfy all ideal FSM requirements.

[7] As at 22nd September 2011 – Source Dept. of Workforce Planning
[8] Economic Resurgence Project: ADF Impacts – Department of Workforce Planning / Directorate of Workforce Intelligence – Department of Defence – 14th April 2011
[9] Force 2030 – Defence White Paper 2009

Analysis of Relevant Australian Ports and Harbours

KEY FINDING: Within twenty and forty minutes driving time of any of the FSM homeport options, Newcastle as a region has the cheapest housing.

KEY FINDING: Sydney Harbour FSM homeport options and FBE in particular, provide the worst commuter driving experiences.

KEY FINDING: Brisbane was the most attractive port in 2003 for all three NATSEM[10] categories; ie single, married members without children and families.

KEY FINDING: All of the East Coast ports experience better overall weather conditions than Fremantle, the existing submarine squadron homeport.

KEY FINDING: There are just three berth positions at HMAS *Stirling* that are normally available to the CCSM. Whenever more than three of the six submarines require berths, they double-up, or are placed outboard[11] of another submarine.

KEY FINDING: More than six submarines at HMAS *Stirling* will require construction of a new wharf to accommodate the surface ships relocated from Diamantina Wharf.

KEY FINDING: Of the three-homeport options that have existing wharves potentially available to the FSM:

- Newcastle Port and Cockatoo Island wharves would at least require some refurbishment, and
- FBE will require the construction of a new wharf if it is to act as both the FSM East Coast docking facility as well as the FSM homeport.

KEY FINDING: CCSM alongside reticulated power supplies and air services are currently available only at HMAS *Stirling* and Fleet Base East.

KEY FINDING: For contingency planning purposes at least, FSM alongside facilities will need to adapt to increasing sea levels.

KEY FINDING: An East Coast homeport will be required to provide undercover workshop environments for both uniformed and civilian contractors, as well as a substantial hardstand area with temporary power supplies in close proximity to the submarine berths. Naval stores buildings, motor vehicles and administration could all be located further afield.

KEY FINDING: Sydney is a location of most naval systems industries.

KEY FINDING: The creation of an industry support network similar to that of the CCSM will be required for the FSM. Each of the relevant companies will find it easier to recruit, train and retain key staff in the major cities of Sydney, Brisbane and Melbourne than in more remote places.

KEY FINDING: Conventional submarines require the ability to operate diesel engines for a variety of reasons whilst in their homeport.

KEY FINDING: Close proximity to a facility that can either remove a submarine from the water, such as the ship lifts at Henderson and Adelaide and the floating dock

[10] "Developing an index for assessment of the attractiveness of ADF base locations to ADF members" – NATSEM – University of Canberra – Susan Day, Anthony King, Carol Farbotko, Elizabeth Taylor – 30 September 2003
[11] Or alongside

in Newcastle, or remove the water from around the submarine, as with the graving docks at Melbourne[12], Sydney and Brisbane, is important to FSM planning.

KEY FINDING: Facilities to enable three submarines[13] to be clear of the water concurrently for planned maintenance purposes will be required independent of any similar facilities that may be associated with the construction of submarines[14]. For every four FSM a docking cradle will be required.

KEY FINDING: The ability to conduct docking activities under cover is highly desirable, both for the removal of weather as a cause of delay, and to enhance visual security for some repair activities.

KEY FINDING: Reasonable proximity to ammunitioning replenishment facilities is fundamental to all ADF war-fighting capabilities. There are just two permanent facilities on the East Coast currently at Eden[15] and Point Wilson[16], and one temporary facility at Port Alma.[17] s33(a)(i) [redacted].

KEY FINDING: Westernport Bay is the East Coast homeport option that is closest to an ammunitioning facility (Point Wilson). Additionally it has sufficient land mass to be able to house substantial weapons ordnance replenishment stores thus reducing its dependence upon external ammunitioning facilities.

KEY FINDING: For transits to the Indian Ocean, north, and as far east as Manila, submarines from FBW have shorter transit distances than submarines that may be based on the East Coast. Conversely, for transits to the Pacific Ocean, Guam and Hawaii, submarines from the East Coast have shorter transit distances than those that may be based at FBW.

KEY FINDING: When a submarine transits on the surface, it is vulnerable to both detection and attack – this is a critical operational parameter. s33(a)(i) [redacted]

KEY FINDING: The Sutherland Dock area of Cockatoo Island, with the cliff face at its northern boundary, appears the most available opportunity for a homeport that may provide multiple covered berths.

KEY FINDING: Jervis Bay is the best harbour option for unrestricted pilotage.

KEY FINDING: The best sites for relative isolation and visual security are at Jervis Bay and HMAS *Cerberus* at Westernport Bay.

KEY FINDING: Existing Command & Control (C2) infrastructure at FBE or HMAS *Waterhen* would require incremental capacity upgrades only to accommodate an integrated FSM homeport. All other homeport options would require substantial upgrades or new systems installations.

[12] The Alfred Graving Dock in Melbourne is 143 metres in length, 24 metres wide, and 8 metres deep – which should enable it to dock a CCSM but not a submarine with an 8 metre draft.
[13] For 12 submarines with FCDs of no longer than 2 years and an 8 year operating duration, 3 submarines may be in docking facilities concurrently.
[14] Assuming the maintenance philosophy described at - Annex U: Usage Upkeep Plan/Cycle
[15] South Coast New South Wales
[16] Port Phillip Bay Victoria
[17] North Queensland coast

KEY FINDING: When a submarine emerges from a maintenance period it must exercise and train to attain or regain (depending upon how long and intensive the maintenance duration was), its operational readiness. A structured and well-defined process takes the submarine through tasks that incrementally prove the capability of its systems and increase the collective skills of its crew.

KEY FINDING: Conventional submarines are slower than most if not all other Defence weapons platforms. They usually depart their homeport(s) earlier and return later from training and operational work-up serials than the other participating Fleet and air assets. From this perspective, Jervis Bay has the highest rating as a potential FSM homeport because whether or not the submarine is working up itself, or acting as a support asset to other Fleet units, it can be ready to participate in as little as an hour after departing its homeport, and similarly be alongside at day's completion. The workload on submarine crews would become therefore more equitable with surface fleet assets that may depart daily from Sydney.

KEY FINDING: A key assumption of this East Coast basing study is that core submarine skills training will remain at HMAS *Stirling*. Platform and combat systems skills however, as well as general career progression courses will be undertaken as close to the location of the East Coast submarine squadron as practicable.

KEY FINDING: The convenience to submarine crews of potentially having training resources located within the same base environment, such as exists at HMAS *Stirling*, is assessed more highly than having to travel to another facility, sometimes in dense traffic environments.

KEY FINDING: The physical and mental well-being of submarine crews includes provision of ready access to recreational and sporting facilities, provision of the club atmosphere that can exist in naval mess facilities, and integrated sleeping accommodation when needed.

KEY FINDING: HMAS *Cerberus* and HMAS *Creswell* already have a high crew facilities current capability, which is reflective generally of their training establishment roles.

KEY FINDING: For any East Coast FSM homeport, "the medical support could be provided from existing garrison health facilities wherever they may be located. SMA SUBMED[18] would provide the 'specialist' advice regarding submarine medicine as required and can do this remotely . . . This might require an increase in resources and facilities in which ever location the FSM are likely to be based . . "[19]

KEY FINDING: Four of the FSM homeport options under consideration directly involve East Coast naval bases. This is no accident. Not only is it more convenient and generally less costly to consider building upon a naval capability that already exists, it is generally also a less demonstrative method of introducing a new capability to a sometimes resistant public than to consider a Greenfield site alternative. The most operational of these existing naval bases are FBE and HMAS *Waterhen*, and an East Coast FSM squadron would gain most from being integrated firstly with FBE or secondly with HMAS *Waterhen*.

[18] Senior Medical Adviser Submarine Medicine
[19] CAPT S. Sharkey RAN, Fleet Medical Officer – 25th March 2011.

KEY FINDING: Australia is host to visiting nuclear propelled warships (NPW) from time-to-time, and the strengthening relationship with the United States suggests that the frequency of USN submarine visits may increase[20]. If any of the FSM homeport options under consideration already is, or could also be a NPS facility, co-location may be beneficial.

KEY FINDING: FBW has the highest unweighted ranking of all potential FSM homeports considered. The top three East Coast options are FBE, HMAS *Waterhen* and Cockatoo Island. The table below illustrates the assessment detail.

Criteria	FBW	BNE	NEW	HEN	FBE NBY	CIs	JBN	JBS	WPT
Recruitment-1	0	0	0	0	0	0	1	2	3
Recruitment-2	0	2	2	3	3	3	0	0	1
Posting Preferences	3	2	1	3	3	3	1	0	0
Housing Price	0	0	3	0	0	0	2	2	1
Commute<26 mins	1	1	0	0	0	0	3	3	2
Commute>26 mins	1	0	2	0	0	0	3	2	1
Attractiveness-S	3	3	1	2	2	2	1	1	1
Attractiveness-M	3	3	2	2	2	2	1	1	1
Attractiveness-F	2	3	1	1	1	1	1	1	0
Wave Heights	1	3	3	3	3	3	3	3	2
Available Wharves	1	0	2	0	1	2	0	0	0
Alongside Services	3	0	0	1	3	0	0	0	0
Maintenance Facilities	3	0	0	2	3	0	0	0	1
Industry Support	2	1	1	3	3	3	1	0	2
Run Diesel Engines	3	3	2	2	0	2	3	3	3
FCD Docking Proximity	0	0	2	3	3	3	1	1	0
ID/MCD Docking Proximity	3	3	3	3	3	3	1	1	3
s47C									
Harbour Constraints	0	0	0	1	2	1	3	3	0
Covered Berths Potential	0	3	0	0	0	3	0	0	3
Public Isolation	2	1	0	0	0	0	2	3	2
Availability C2 Facilities	3	0	0	3	3	0	0	2	2
Existing Physical Security	3	0	0	3	3	0	0	1	3
Routine Access Fleet, Air Arm & XA	2	-1	3	2	2	2	3	3	-1
Training Fac. Potnl	3	1	1	1	1	2	2	2	2
Existing Crew Facilities	3	0	0	1	1	0	0	1	3
Navy Medical Facilities	3	0	1	3	3	2	2	2	2
SURFOR/Air Arm Support Resources	3	0	0	2	3	2	1	0	1
NPW Facilities	3	3	0	0	0	0	0	0	1
Marine Park Factor	0	0	0	0	0	0	-3	-2	0
TOTALS	**61**	28	35	**50**	**54**	**45**	39	42	33

[20] Weekend Australian – 6thNovember2010-Page 1-Brendan Nicholson Defence Editor

Recommendations

13 Recommendation 1: The risk of Navy not being able to adequately recruit and retain sufficient uniformed submarine workforce personnel for a submarine fleet that is only based in Western Australia, is believed to be too high based upon available research data. Recommend targeted statistically representative survey data be collected and analysed, to either reinforce or qualify this belief.

14 Recommendation 2: The three Sydney Harbour FSM basing considerations rank higher than all other East Coast FSM basing opportunities. A Sydney Harbour solution will inevitably therefore be a shortlisted consideration in the ultimate FSM basing decision. Recommend the most cost-effective Sydney Harbour FSM Basing solution be determined to inform the ultimate FSM Basing decision process.

15 Recommendation 3: Darwin as a forward operating base for FSM operations will enhance FSM capabilities. Recommend planned development of Defence capabilities in Darwin include FSM considerations.

Introduction

16 Defending Australia in the Asia Pacific Century: Force 2030, the Defence White Paper presented by the Government in 2009, prescribes a twelve new Future Submarine capability for the Australian Defence Force. These submarines are to have enhanced capabilities when compared with the smaller fleet of CCSM that they are to replace.

17 As a part of the FSM Program process the, "Government will also consider matters such as basing and crewing, and will seek early advice from Defence on those and other issues."[21] [22] This study forms part of associated Defence research.

18 The Submarine Workforce Sustainability Review[23] identified a number of issues relating to the establishment and sustainment of the uniformed workforce necessary for the successful operation of the CCSM. The implementation of most of the recommendations from that review has addressed some of those issues; regardless, Navy has not yet achieved a sustainable four CCSM crew capability. There is little confidence consequently that the status quo CCSM capability environment can be extended to generate and sustain a uniformed FSM workforce of more than twice the existing size.[24]

19 The foundation of this study is the premise that the creation of an East Coast homeport-posting alternative in addition to the existing HMAS *Stirling* submarine base in WA will be the single most effective action that will mitigate the recruitment and retention of submarine workforce issues[25].

20 RADM Moffitt recommended that Navy investigate the crewing of one CCSM submarine in Sydney[26], with an implied intent to monitor the resulting, hopefully positive impact, on recruiting and retention generally in the submarine force. The related observations would either consolidate the premise that Navy should homeport some FSMs on the East Coast, or not. Navy did investigate RADM Moffitt's recommendation but concluded that although the concept was achievable in theory it was impractical at present[27].

21 In reviewing current and prospective sites on the East Coast that could have a FSM homeport capability, extensive consultation with retired and serving submarine qualified personnel was undertaken. A homeport specification evolved from those discussions that forms a template for the objective comparison of one potential site or port with another.

[21] Clause 9.7 - Defending Australia in the Asia Pacific Century: Force 2030 – Defence White Paper 2009 – Australian Government - Department of Defence
[22] Clause 15.16 – Strategic Basing Principles - Defending Australia in the Asia Pacific Century: Force 2030 – Defence White Paper 2009 – Australian Government - Department of Defence
[23] Review of Submarine Workforce Sustainability – RADM R.C. Moffitt AO, RAN – 31st October 2008
[24] Crew for at least ten potentially larger submarines.
[25] Creation of an East Coast FSM base is also consistent with the first strategic basing principle ie, "…and ensure critical capabilities are suitably dispersed for security reasons" - Clause 15.16 – Defending Australia in the Asia Pacific Century: Force 2030 – Defence White Paper 2009 – Australian Government - Department of Defence
[26] Recommendation 13 – Review of Submarine Workforce Sustainability – RADM R.C. Moffitt AO, RAN – 31st October 2008.
[27] CNSAC 16th April 2010

22 The summary requirements of a modern submarine homeport are complex. A modern submarine homeport is where the families are, but more than that, it is a part of a complex support community that supports the crews and their families, as well as the maintenance and operation of the submarines and their systems. Homeports for modern submarines consequently must essentially be in, or close to major population centres. The existing submarine homeport at HMAS *Stirling* acts as a benchmark to gauge the requirements of a prospective future East Coast FSM homeport[28].

Previous RAN Fleet Basing Studies

23 RADM A.L. Beaumont RAN presented a substantial study of Australian East Coast ports in 1988[29]. It had been undertaken because ammunitioning in Sydney Harbour was to be no longer possible and there was pressure upon the RAN to move its fleet out of Sydney.

24 To quote[30], *"Location options for a fleet base, to replace Sydney as the eastern fleet base in the longer term, are [..] addressed. The report indicates that the only ports in south eastern Australia, which could be made suitable as fleet bases, are again Jervis Bay and Twofold Bay. However, Jervis Bay would be superior to Twofold Bay from all operational aspects; would have lower operating costs and would cause less personnel upheaval. Jervis Bay is therefore the preferred alternative location for an East Coast fleet base."* More detail from that report is at Annex W: 1988 Fleet Base Relocation Study.

25 In 1992 a formal review was presented of previous work relating to Armaments and Fleet basing and extracts are quoted following.[31]

"The Minister for Defence Science and Personnel initiated a Study of alternative locations for an East Coast Fleet Base and Naval Armaments Complex in October 1989, following the Prime Minister's undertaking to the Australian Conservation Foundation to implement further detailed considerations of alternative locations for the armaments complex and fleet base."

"Currently, there is little Defence or strategic priority, or economic justification, for relocating the fleet base. Much of Navy's support and training infrastructure is in Sydney, the Woolloomooloo Fleet base was recently modernised at a cost of some $30 million and the important civil support infrastructure is in Sydney. The harbour is well protected, major warships can enter and leave in all conditions, and deep water ranges and exercise areas are close by."

"Pressures to move the fleet base from Sydney are largely those of increasing urbanisation. All foreshore land is at a premium, there would be little room for expansion and some redevelopment, maintenance and testing work is constrained by public environmental considerations. Recreational use of the harbour waters is

[28] Refer - Annex A: WA - Fleet Base West
[29] Eastern Armament Depot and Fleet Base – A Study of Location Options – RADM A.L. Beaumont RAN – December 1988
[30] Ibid – executive summary
[31] Executive Summary - Fleet Base and Armaments Complex Locations Review – Department of Defence – July 1992

increasing and Navy personnel have accommodation and transport problems consistent with being in a large and relatively expensive city. However, these pressures are unlikely to make Sydney untenable for the fleet base in the foreseeable future."

"Sixty locations ranging from North Queensland to South Australia were identified in previous studies. Apart from Jervis Bay, only two reasonably meet basic operational requirements and offer the prospect of sufficient available land, environmental acceptability and compatibility with other uses. These are Port Curtis (Gladstone) and Twofold Bay (Eden). However, there are major engineering problems to be overcome at both locations and both have significant operational deficiencies and likely economic and possible social penalties. There do not appear to be any other potentially suitable sites."

"Given these considerations, and the effects of the likely cost of relocation on Defence priorities (estimated at $1.1 billion for Jervis Bay in 1986 prices), the Study recommends that the fleet base remain in Sydney." More detail from that report is at Annex X: 1992 Fleet Base Relocation Study.

26 In assessing the relevance of the outcomes of these previous studies, it is apparent that many expert minds over many years concluded that there were just two realistic options on the eastern coast of Australia for the Australian Navy Fleet homeport, either Sydney Harbour (status quo) or Jervis Bay.

27 For State and Federal Governments alike at that time, the choice was either to accept that the Navy must remain at Garden Island in Sydney or else pay the capital cost, lose the associated City of Sydney revenues, and withstand the environmental pressures that would be associated with establishing a new homeport at Jervis Bay. Sydney, not surprisingly, and Garden Island in particular remained the Navy's eastern fleet base.

Sydney Harbour

28 Warships and submarines like the communities that they support, have become technologically more sophisticated and typically require less people to operate them. They are otherwise however; equivalent to the fleet that was the subject of the above studies. Whilst parts of the fleet may operate from time-to-time from other ports for operational or other time-limited requirements[32], those previous studies underpinned the assumption at the outset of this study that the only viable East Coast homeport alternatives for the whole Australian Navy Fleet[33], including submarines, were Sydney, and potentially Jervis Bay[34]. Only these two ports could provide an acceptable mix of operational capability, sufficient capacity, industrial support and workforce sustainability for the whole East Coast Fleet.

29 The submarine force is a part of the Australian Fleet, and the default position has been to plan to base its East Coast expanded elements within Sydney Harbour along with the surface force elements. The former submarine base at Neutral Bay,

[32] Forward operating base examples are Darwin - Timor conflict, Townsville - regular Joint Exercise commitments and Pacific deployments.
[33] Where Australian Navy Fleet means all surface warships and support vessels
[34] Because of the conclusions of previous studies

now under de-contamination from the long-term effects of the domestic gas facility that had been located on the cliff edge above, is believed no longer available. FBE, the obvious alternative, is under considerable stress. The forthcoming requirements of a surface fleet that comprises physically larger ships, challenges available wharf space and the surrounding residential community that is seemingly intolerant of daily FBE activities. FBE is additionally under pressure for future access by an envious and influential cruise ship industry.

30 The extremely limited capacity of FBE to accommodate a squadron of FSMs[35] as well as to undertake its docking commitments, combined with the appreciation that a working dockyard environment under the direct gaze of the population of Sydney is not ideal as a homeport for operational submarines, promotes the examination of other alternatives. The homeport conclusion reached for the surface fleet via previous studies is not necessarily valid for a newly created submarine homeport; new thinking is required.[36]

Figure 1 - HMAS *Collins* - Sydney Harbour[37]

31 Sydney Harbour also includes two other naval bases with water frontages, HMAS *Penguin* and HMAS *Waterhen*. The depth of water in both locations is currently too shallow for the FSM; however, approaches to seabed surveying companies indicate that the rock layer below the silt may be deep enough to enable a straightforward dredging process that could enable submarines to berth at either base.[38] An alternative concept to extend HMAS *Waterhen* wharves into the deeper waters adjacent to Balls Head is also considered[39].

32 Cockatoo Island, once a commercial shipyard that refurbished the *Oberon Class* of submarines, is now a civilian historical and holiday site. Some parts of that dockyard environment remain unused however, and one of these is a potential FSM base.

[35] Refer Annex G: NSW - Fleet Base East.
[36] Refer Chapter - Analysis of Relevant Australian Ports & Harbours
[37] Image - Defence Archives
[38] Refer Annex I: NSW – HMAS Penguin
[39] Refer Annex H: NSW - HMAS Waterhen Extended

North of Sydney Harbour

33 Eighty nautical miles north of Sydney Harbour is the Port of Newcastle. With the population centre of the Central Coast region between there and Sydney, and Newcastle's history of naval shipbuilding and refit support, it is a natural inclusion for consideration as an FSM homeport[40].

34 Brisbane is Australia's third largest city; it has a significant Defence Industry base, and is much closer to submarine areas of operation in the Pacific Ocean and the seas of Asia than the other homeport considerations. Major flooding of the Brisbane River early in 2011 however, was a discouraging influence to development of a river based FSM homeport concept. The Port of Brisbane concept developed alternatively satisfies many FSM operations requirements[41].

South of Sydney Harbour

35 Jervis Bay is an attractive harbour, both from naval shipping and environmental perspectives. Two potential FSM homeport concepts are developed, one to the North-East, and one to the South-West that has the intent of creating minimum change to the Jervis Bay environment,[42] noting the significant sensitivities associated with it being a gazetted Marine Park.

36 Melbourne is Australia's second largest city, with a resident naval shipbuilding capability[43], an ammunitioning wharf[44], and other major Defence Industry activities. Westernport Bay is just over an hour's driving from Melbourne with many residential suburbs in between. Vacant oil refinery land adjacent to Crib Point Jetty remains available; however, a more functional FSM homeport concept developed using HMAS *Cerberus* as its foundation[45] is considered.

Other Ports

37 Significant ports examined but not considered as potential FSM homeports are:

- Darwin – refer Annex B: NT - The Role of Darwin for the FSM
- Gladstone – refer Annex C: QLD - Gladstone
- Adelaide – refer Annex O: SA - Adelaide
- Hobart – refer Annex P: TAS - Hobart
- Botany Bay – refer Annex K: NSW - Other Harbours near Sydney

Other NSW Harbours

38 Other NSW harbours examined but not considered as potential FSM homeports are:

- Port Stephens – refer Annex E: NSW - Port Stephens
- Twofold Bay – refer Annex M: NSW – Eden Twofold Bay
- Broken Bay – refer Annex K: NSW - Other Harbours near Sydney
- Port Kembla – refer Annex K: NSW - Other Harbours near Sydney

[40] Refer Annex F: NSW - Newcastle Port
[41] Refer Annex D: QLD - Port of Brisbane
[42] Refer Annex L: NSW - Jervis Bay
[43] At Williamstown
[44] At Point Wilson
[45] Refer Annex N: VIC - Westernport Bay

- Bass Point – refer Annex K: NSW - Other Harbours near Sydney

Other Considerations

39 The extent to which Navy relies on contracted industry support is increasing, and the FSM will likely have no less dependence upon local industry than the CCSM. The associated civilian support base will need to recruit, train and sustain its own local skilled staff in order to meet its Defence contract commitments, and proximity to East Coast major population centres will be as important to these industries as it will be to the uniformed Navy.

40 Homeport definition is fundamental to FSM implementation planning, but homeports alone will not satisfy the full operational needs of the FSM. Brief consideration is included also of Darwin as a forward operating base – refer Annex B: NT - The Role of Darwin for the FSM.

41 Defence Estate strategic basing principles[46] apply to this study – refer Annex Y: Defence Estate Strategic Basing Principles.

42 There has apparently been a mean increase in sea level over the past century of 1.8 mm per year.[47] Detailed analysis of prospective FSM basing options will need to consider whether floating wharves may be more relevant than fixed wharves, and whether the local terrain could accommodate a local sea level increase over the projected fifty-year life span[48] of the FSM platform.

Report Structure

The many detailed annexes to this study form supplementary reading. Relevant conclusions from the annexes are included in the main “Conclusions” chapter. The chapter “Recruiting and Retention” explores Navy workforce elements that drive consideration of East Coast basing options for the FSM. The chapter “Analysis of Ports and Harbours” is essential reading for those who wish to understand the influence of each element of the homeport specification on the homeport ranking outcomes.

[46] Clause 15.16 - Defending Australia in the Asia Pacific Century: Force 2030 – Defence White Paper 2009 – Australian Government - Department of Defence
[47] 18.0 cm total - Bruce C. Douglas (1997). "Global Sea Rise: A Redetermination". Surveys in Geophysics 18: 279–292
[48] Based upon 12 FSM being constructed at 2 yearly intervals and each having a total life of 27.5 years.

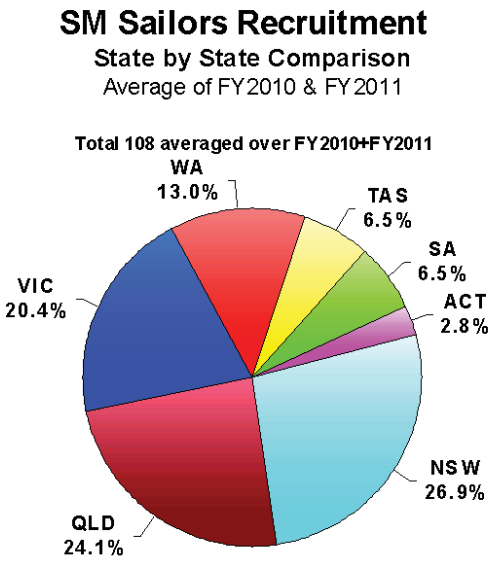
Recruiting and Retention[49]

43 The inability of the Australian Navy to recruit and retain sufficient submarine (SM) qualified personnel has been at the core of publicised issues involving the Collins Class submarines (CCSM). The associated uncertainty relating to its ability to sustain a core force of skilled SM personnel for the existing CCSM fleet and of a projected larger FSM fleet is a substantial risk to the FSM Programme and Australia's defence capability.

44 **Recruiting**: The RAN submarine force had 14% unoccupied specialist officer and sailor billets[50] at September 2011, but the vacancies, particularly with experienced SM qualified personnel have been significantly higher.

45 The sole basing of the submarine force at Rockingham in WA does act as an impediment to sustainable recruiting notwithstanding the ability of ADF recruiting processes to deliver reliably against 80% of specified recruiting targets. For the 20% of recruits that currently have to be found via means other than ADF recruiting, the sheer distance between Rockingham WA and their home on the East Coast, is a significant enough disincentive to cause many otherwise volunteer recruits, and some established trainees, to not proceed with a prospective submarine career. Under the inverse recruiting scenario, this large distance appears to have influenced many WA citizens over many past years not to join the ADF because the ADF has historically mostly been located on the East Coast.

46 The prospective siting of a permanent submarine base in or close to a major East Coast population centre would not only assist the development there of sustainable recruiting outcomes, just through its very existence, but also entice those who need the knowledge that they could 'get a posting home' at some future point, to join.



47 The most likely major East Coast population centres that could host a permanent submarine base from a recruiting perspective are those that currently supply most SM recruits, namely Greater Sydney, South East Queensland and Melbourne.

48 **Retention**: The issues that cause SM specialist personnel to prematurely separate from the submarine service and the Navy in general are complex. In past

[49] Refer "The RAN Submarine Service Recruiting and Retention" – CMDR D.L.Stevens RANR – 1st November 2011
[50] Ibid - As at 22nd September 2011

years, posting stability for family orientated personnel became a significant driver of administrative change within Navy's approach to its people, and for the submarine force now, with just the one operational facility at Rockingham; posting stability is easily achievable for those who want it.

49 Related research[51] by the author however, has shown that posting stability is just one element of a complex equation of personnel influences that on an individual basis may demand different solutions. Posting stability around Rockingham WA is not the panacea for all SM personnel.

50 This study examined SM personnel "first-posting-preferences",[52] and has determined that 39.6% of SM personnel across all ranks have indicated that they want to be somewhere other than the sole submarine base at FBW – refer Figure 2.

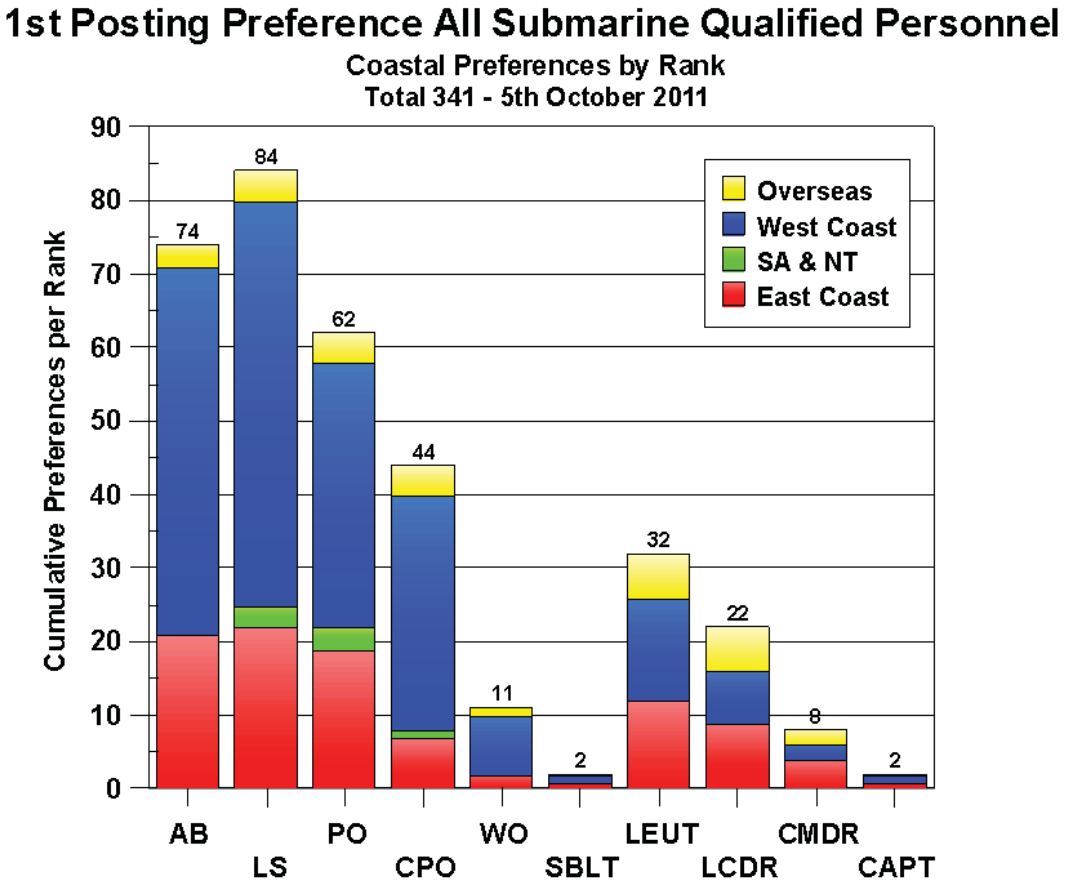


Figure 2 - First Posting Preferences - SM Qualified Personnel - 5th October 2011

51 The most popular posting preference locations for SM qualified personnel in descending order are[53]:

- Perth Outer Suburbs – 191 of 938 (20.5%) - [HMAS *Stirling*]
- Sydney Metro – 83 of 938 – (8.9%) - [Fleet Base East & four shore bases/shore establishments]

[51] ibid
[52] Ibid - Most recently on 5th October 2011
[53] 938 posting (all) preferences were analysed and 501 of those were for the places listed. The balance of 437 preferences were for a large number of individual places distributed across the whole of Australia with a relatively small number each of SM personnel who wanted to be posted there.

- ACT – 77 of 938 (8.2%) - [ADF HQ]
- Cairns – 51 of 938 (5.5%) - [HMAS *Cairns*]
- Overseas Exchange – 44 of 938 – (4.7%)
- Nowra – 27 of 938 – (2.9%) - [HMAS *Albatross*]
- Melbourne Outer Suburbs – 27 of 938 – (2.9%) - [HMAS *Cerberus*]

52 The aggressive recruiting environment in WA for appropriately skilled people heightens the awareness of possible alternative employment opportunities, and probably stimulates relevant members of the uniformed workforce to become more observant and more critical of their own local SM specialist domains.

53 The Defence Employment Offer (DEO) sub-elements that Navy has failed to deliver adequately[54] then become causes of expressed discontent, namely:

- REWARD – Retirement Benefits
- ORGANISATION – Coordination
- OPPORTUNITY – Fair and Transparent Promotion, and

- WORK-Recognition
- WORK-Resources
- WORK-Deployment Opportunities
- ORGANISATION-Technology
- ORGANISATION-Communication
- OPPORTUNITY-Career

and may cause significant numbers to request postings away from the SM operating environment, and some to request separation from Navy altogether.

54 For a relatively small number, the geographic distance from the East Coast population centres becomes reason enough to request formal separation but importantly, when combined with those who leave simply because they 'need a change'[55], the numbers who may directly benefit from an East Coast SM base become significant, potentially to Navy's direct advantage.

55 The creation of posting diversity for the SM workforce is one possible strategic decision that could at least mitigate, if not directly address some of the SM workforce issues identified by the DEO analysis process and other studies. The creation of an additional submarine homeport in or close to a major East Coast population centre would enhance Navy's ability to recruit and retain its uniformed workforce.

[54] Ibid – sourced from "Information Brief for Directorate of Navy People Strategy and Reporting : Defence Employment Offer Project – Preliminary Results of Phase 2 – Navy – Directorate of Workforce Intelligence (DWIntel) – 2nd September 2011"
[55] Economic Resurgence Project: ADF Impacts – Department of Workforce Planning / Directorate of Workforce Intelligence – Department of Defence – 14th April 2011

What Would an Ideal RAN FSM Homeport Provide?

56 A modern Australian submarine force ideal homeport has many individual component functions that all combine to enable the capability that Force 2030[56] has stipulated the ADF must provide. The significant compromise of any one homeport key criterion can make it difficult for the submarine force to deliver fully its intended capabilities. HMAS *Stirling* in Western Australia for example rates very highly in terms of an ideal Australian submarine base; it nevertheless has far less than ideal access to the open ocean and suffers in terms of recruiting and retention of its uniformed submarine workforce.[57]

57 From a personnel perspective homeports are where the families are, but more than that they are where the submarine force itself integrates into a support community that includes access to all necessary human resources, administration, technology, logistics, operations, research, and the local civilian community generally. Provision of all of these in sufficient depth is only achievable in close proximity to major population centres.

58 Force 2030[58] capabilities identified for the FSM include, "*[.]greater range, longer endurance on patrol, and expanded capabilities compared to the current Collins Class submarine.*[59] *Long transits and potentially short-notice contingencies in our primary operational environment demand high levels of mobility and endurance in the Future Submarine."*[60] The requirement for greater endurance than the CCSM in a yet-to-be-designed conventionally powered submarine implies that the new submarine will need to be larger in order to store additional fuel and food. The nominal dimensions assumed for the purposes of this study are:

Dimension	***Collins***	FSM Nominal
Length	76.3 metres	90.0 metres
Displacement Dived	3,350 tonnes	4,200 tonnes
Draft	7.0 metres	8.0 metres
Diameter	7.8 metres	8.5 metres

59 For each of the homeport prospects considered in this study, key assessment criteria determined from stakeholder interviews are:

- Recruiting/retention – will it enhance Navy's recruiting and retention needs?
- Posting Preferences – have RAN SM personnel indicated a preference for this location?
- Accommodation (families) – will it provide reasonable access for submarine families to Defence-Housing-Australia and private rental accommodation?
- Daily commuting – can most people reach work within about an hour from home?
- Base location attractiveness – will a base here be attractive to ADF members?[61]

[56] Force 2030 – Defence White Paper 2009
[57] Review of Submarine Workforce Sustainability – RADM R.C. Moffitt AO, RAN – 31st October 2008
[58] Defence White Paper 2009
[59] Paragraph 9.3 – Ibid
[60] Paragraph 9.5 – Ibid
[61] Developing an index for assessment of the attractiveness of ADF base locations to ADF members – NATSEM – University of Canberra – 30 September 2003. NATSEM was contracted by the

- Sea State – are the normal local weather patterns and sea states acceptable?
- Wharves – are there existing wharves available for submarine use?
- Alongside Services – will it provide all necessary services for all submarines and their crews whilst at their homeport – will it adapt to gradual sea-level increase?
- Alongside Maintenance Facilities – will it facilitate all necessary alongside maintenance activities, including the ability to run diesel engines?
- Industry Support – is it close to industrial support for the submarine and its systems?
- Proximity to Docking Services – is it close to a suitable docking facility?
- Proximity to Ammunitioning Services – is it close to an ammunitioning wharf?
- Proximity to Guided Weapons Maintenance services – how far will guided weapons stocks need to travel by road to reach the nearest storage facility?
- Strategic – will it strategically enhance the existing submarine force?
- Tactical – will it enhance the survivability of the submarine force?
- Command and Control – will it accommodate a local submarine administration and operations headquarters organisation?
- Security – will it provide adequate physical, visual and communications security for a modern submarine squadron?
- Workup Resources – will it provide adequate access to relevant exercise areas, together with all necessary supporting infrastructure and mission relevant Defence assets?
- Training – will it provide convenient access to Navy's structured training programmes, particularly for core submarine skills training, as well as for specific platform and combat systems training?
- Crew Facilities – will it provide general crew facilities, transit accommodation and have the potential to accommodate a developing fly-in/fly-out crew rotational concept?
- Medical and Dental – will it provide convenient access to specialised medical and dental services for submarine crews?
- Integrated – will it be a part of or close to a surface fleet naval base?
- Visiting Nuclear Propelled Submarines (NPS) – is the port accredited already for visiting nuclear powered warships or submarines, or does it have potential to acquire that accreditation?

60 All of these criteria are directly relevant to the successful creation and sustainment of an RAN submarine force. There is no single port amongst those potentially available however, that can fully satisfy all of these requirements. The homeport assessment process inevitably becomes therefore a task of identifying the option that delivers most of the significant[62] specified facilities and services capabilities. This study will attempt to assess each homeport option objectively against these assessment criteria; however, the subjective 'weighting' of any of the above selection parameters could change the assessment outcomes.

Directorate of Strategic Personnel Planning & Research on behalf of the Force Disposition Project to produce an index or other composite measure that permits the relative ranking of Australian Defence Force (ADF) bases for socio-economic attractiveness.

[62] Significant in this context implies the ability of relevant decision makers to subjectively 'weight' one or more of the specified facilities and services capabilities in order to emphasise their relative significance.

Analysis of Relevant Australian Ports & Harbours

61 From a personnel perspective homeports are where the families are, but more than that they are where the submarine force itself integrates into a support community that includes access to all necessary human resources, administration, technology, logistics, operations, research, and the local civilian community generally. Provision of all of these in sufficient depth is only achievable in close proximity to major population centres.

62 The major East Coast population centres are the capital cities of:

- Brisbane
- Sydney
- Melbourne

63 Potentially appropriate ports or bases that are effectively part of a major East Coast population centre are:

- Port of Brisbane – refer Annex D: QLD - Port of Brisbane
- FBE – refer Annex G: NSW - Fleet Base East
- HMAS *Penguin*[63] – refer Annex I: NSW – HMAS Penguin
- HMAS *Waterhen* – refer Annex H: NSW - HMAS Waterhen Extended
- Cockatoo Island – refer Annex J: NSW – Cockatoo Island
- HMAS *Cerberus* – refer Annex N: VIC - Westernport Bay

64 Other ports examined in some detail are Newcastle, (refer Annex F: NSW - Newcastle Port) which is just over two hours from Sydney via toll roads and motorways and Jervis Bay, (refer Annex L: NSW - Jervis Bay), which is just over three hours from Sydney. Jervis Bay is included within this analysis, if for no other reason, because previous Fleet relocation studies firmly concluded that if the RAN Fleet had to move from Sydney then Jervis Bay was the preferred location[64].

65 This study must identify homeport options that will enable future submarines to operate effectively, but that includes staffing them with a sustainable workforce. At least two homeports integrated into major population centres, one on each side of Australia is the optimum organisational mechanism to facilitate this.

66 Cost inevitably is a significant factor in determining a short list of East Coast FSM homeport options. Consideration of existing Defence assets that have a water frontage on the East Coast consequently becomes a natural preference over potential Greenfield[65] sites developments, not that many exist anyway. Extending the capability of existing Defence facilities may also be an easier process than creating a new naval base (for example), because public perception will generally be more accepting of modifications to existing facilities than a separate apportionment of land

[63] HMAS *Penguin* is not considered further in this study because its water depth is too shallow.
[64] Refer - Annex W: 1988 Fleet Base Relocation Study and Annex X: 1992 Fleet Base Relocation Study
[65] Greenfield developments are new, unencumbered developments on ‘greenfield’, sites whereas Brownfield’s development modify or refurbish existing assets as a part of the new development process.

in the same area, (Jervis Bay for example). That said, the objection of some communities to any expansion or variation to existing Defence bases within their neighbourhood, may make the task of creating a FSM homeport in the location(s) that best satisfy the selection criteria, very difficult.

Family Housing Comparison

67 "Homeports are where the families are", is a fundamental element of this study. In comparing house prices of where families may live in selected suburbs within a driving time of one hour from each of the homeport options there is significant variation. This is not so evident from the greater metropolitan East Coast capital city median house prices[66]:

- Brisbane - $465,000
- Melbourne - $501,000
- Sydney - $610,000

68 Table 1 correlates median house prices for selected suburbs around each homeport option against the driving time duration alternatives of twenty, forty and sixty minutes. For each of the driving duration categories in the left column the lowest "Median Regional Price" of the right-most column determines the listing sequence of the homeport options.

69 Within twenty and forty minutes driving time of any of the homeport options Newcastle as a region has the cheapest housing. The same would also be true for the "sixty-minute" driving category, except that by driving south of Jervis Bay for one hour the regional median house price there (Ulladulla) is less than for the Newcastle region.

70 Of the forty-two suburbs or towns examined in Table 1 only four have median house prices below $300,000 (highlighted in grey) – they are:

- Blackalls Park ($279,000) – forty minutes from the Port of Newcastle
- Nowra ($250,000) – forty minutes from HMAS *Creswell*
- Brookdale ($280,000) – forty minutes from Fleet Base West (FBW)
- Wyong ($290,000) – sixty minutes south from Newcastle

71 For comparison, the city of Gosford in the Central Coast region between Sydney and Newcastle is seventy-three minutes driving via toll roads from FBE[67]. It has a median house price of $280,000, and the broader Central Coast region of which it is a part has a median price of $365,000.

[66] Australian Bureau of Statistics - December 2010
[67] Calculated via Google Maps – April 2011

Table 1- Comparison of Median Housing Prices within Commuting Distance

Drive Time (mins)	Homeport Option	Suburb / Town	Median Suburb Price	Median Region Price
20 mins	Newcastle	Cardiff Heights	$403,000	$361,000
	Creswell	Huskisson	$404,000	$378,000
	Cerberus	Red Hill	$728,000	$460,000
		Somerville	$369,000	$460,000
	FBW	Bertram	$375,000	$465,000
		Port Kennedy	$383,000	$465,000
	Brisbane	Wynnum	$520,000	$455,000
		Eagle Farm		$480,000
		Tingalpa	$425,000	$588,000
	FBE	Chatswood West	$1,038,000	$790,000
		Enmore	$805,000	$875,000
		Five Dock	$850,000	$875,000
40 mins	Newcastle	Blackalls Park	$279,000	$361,000
	Creswell	Nowra	$250,000	$378,000
	Cerberus	Cranbourne	$318,000	$390,000
		Rye	$445,000	$460,000
	Brisbane	Acacia Ridge	$331,000	$445,000
		Ormiston	$580,000	$455,000
	FBW	Halls Head	$430,000	$403,000
		Brookdale	$280,000	$460,000
	FBE	Blacktown	$355,000	$405,000
		Sutherland	$537,000	$700,000
		Hornsby	$651,000	$790,000
		Warriewood	$877,000	$1,030,000
60 mins	*Creswell*	Ulladulla	$365,000	$310,000
		Barrengarry		$310,000
		Gerringong	$533,000	$378,000
	Newcastle	Belford		$361,000
		Nelson Bay	$407,000	$361,000
		Wyong	$290,000	$365,000
	FBE	Helensburgh	$515,000	$378,000
		Blaxland	$419,000	$385,000
		Camden	$405,000	$395,000
		North Richmond	$385,000	$405,000
	FBW	Lake Clifton		$375,000
		Greenmount	$435,000	$437,000
	Cerberus	Pakenham	$330,000	$390,000
		Ferntree Gully	$440,000	$520,000
		Mount Waverley	$760,000	$520,000
	Brisbane	Caboolture	$320,000	$400,000
		Ipswich	$320,000	$445,000
		Helensvale	$500,000	$457,000

Source: www.domain.com.au on 4th April 2011

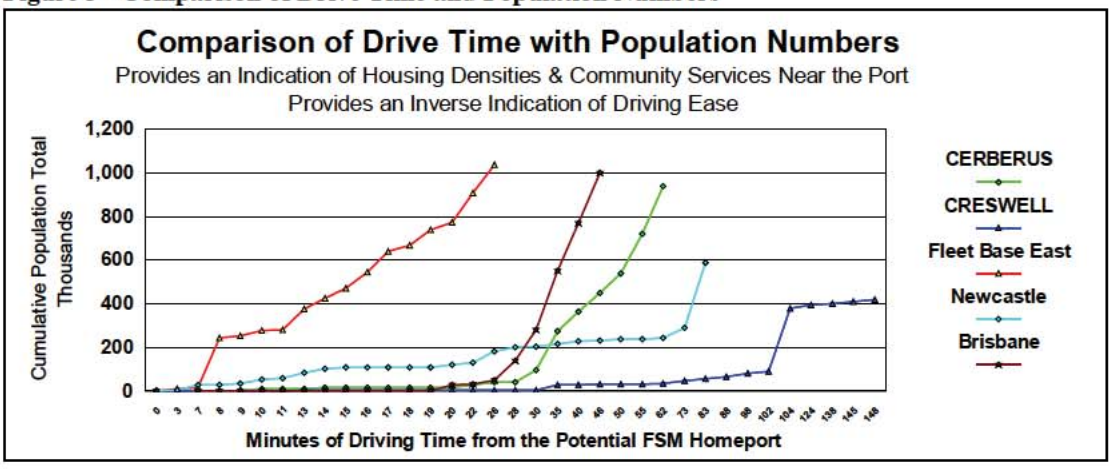
Daily Commuting Stress Comparison

72 An informally accepted norm is that individual stress levels can become intolerable and promote job and life instability if the drive commuting time to the work environment is too long, but how long is too long depends upon the individual and the driving experience. Many people can tolerate long commuting durations, particularly if they have adopted a lifestyle routine around the commuting commitment, (such as undertaking academic study whilst travelling by train from Gosford for example) but conversely others can suffer stress symptoms for short commuting durations of ten minutes or so.

73 Workplace and workforce stability does depend to some extent upon the daily state of mind of the workforce as it arrives at the workplace, and the workforce state of mind does suffer from the daily commuting experience. One reference book[68] states, "Several studies have demonstrated that longer commutes predict more lost work days, more late arrivals at work and higher employee turnover, although not all studies have supported this conclusion". Consideration of the commuting experience is an important element of selecting an FSM homeport, for the general wellbeing and sustainability of both its uniformed and its civilian support workforce.

74 Figure 3 relates the drive duration from each of the listed potential FSM homeports with the cumulative population numbers radiating outwards from each port.[69] High population numbers close to a port are important for ensuring that housing densities will provide submarine families with options for finding accommodation and family community services, however with high population numbers come high house prices, increased traffic delays and driving frustration.

Figure 3 - Comparison of Drive Time and Population Numbers



75 About one million people live within twenty-five minutes driving time to FBE in Sydney's Potts Point suburb, with similar numbers for HMAS *Waterhen* at Waverton. For Port of Brisbane and HMAS *Cerberus*, the equivalent times to encompass one million people are about forty-six and sixty-five minutes respectively.

[68] Page144 - Urban Sprawl and Public Health – Howard Frumkin, Lawrence Frank, Richard Jackson – Island Press 2004

[69] For each of the ports listed the Web tool Google Maps was used to calculate the drive time duration to each suburb radiating outwards from the Port. Australian Bureau of Statistics 2006 Census data, via the Wikipedia interface tool, provided the population numbers of each suburb. For HMAS WATERHEN Extended assume the graph is similar to FBE.

76 FBE is actually within Sydney's CBD and is eight minutes from its centre, but Port of Brisbane is thirty-five minutes from the Brisbane CBD and HMAS *Cerberus* is seventy-six minutes from Melbourne's CBD. Freeways play a significant role in providing speedier access than otherwise. Most of Brisbane's population for example is accessible within one hour of leaving the Port of Brisbane for this reason.

77 The overall lower relative population numbers associated with Newcastle Port and Jervis Bay (*Creswell*) are obvious from Figure 3. The large relative increases at seventy-three and one-hundred-and-two minutes respectively relate to the regional population centres of Central Coast and Wollongong.

78 Of particular relevance to the general aim of minimising commuting stress for the FSM workforce, is the observation from Figure 3 that all of the homeport options except FBE offer the best prospects of minimising stress, if accommodation could be available within twenty-six minutes of the relevant port. Commuting to FBE is always going to be stressful however because it actually is located within Sydney's CBD. If all of the FSM workforce hypothetically could find accommodation within twenty-six minutes of the relevant homeport option, then in decreasing order of driving stress the assessed options are[70]:

- FBE – highest driving commuting stress
- HMAS *Waterhen*
- Newcastle
- Brisbane
- HMAS *Cerberus*
- HMAS *Creswell* – lowest driving commuting stress

79 If FSM workforce accommodation was to extend to an hour or more distant from the relative homeport options however, then in decreasing order of driving stress the assessed options are[71]:

- FBE – highest driving commuting stress
- HMAS *Waterhen*
- Brisbane
- HMAS *Cerberus*
- Newcastle
- HMAS *Creswell* – lowest driving commuting stress

80 This assessment provides a relative indication only, and the prioritisation outcomes could change depending upon where individuals may choose to live relative to motorways and other traffic enhancements. With this qualification and acknowledging the assumptions of Footnote 70, the worst driving commuting experience is FBE. HMAS *Creswell* at Jervis Bay would generally be the best, however low traffic volumes encourage drivers to live further away, and at some point, the additional distance and driving time would match and potentially exceed the stress provided by high traffic volumes over shorter distances.

[70] Assuming that driving stress relates directly to the number of cars on the road, driving duration and is indirectly related to the number of motorways/toll roads – all of this being relative to general road conditions in existence at April 2011.
[71] Ibid.

Base Location Attractiveness

81 The attractiveness of ADF base locations to ADF members is generally a subjectively assessed topic. In 2003, the ADF commissioned the University of Canberra to undertake an objective study[72] of this topic and attempt to create an index that would rank the attractiveness of existing ADF base locations to an involved 39,500 ADF members. Three different index categories were defined:

- Attractiveness to single ADF members
- Attractiveness to married ADF members without children, and
- Attractiveness to ADF families

82 "The indexes are tailored to identified requirement and preferences of ADF members belonging to different demographic profiles.[73] The indexes are therefore not comparing locations for the purposes of the general community but according to ADF requirements. . . . . The Puckapunyal region is the least attractive to all ADF profiles, and the Melbourne region the most attractive."[74]

83 The indexes relevant to this study follow – an index of one is least attractive, an index of five is most attractive. Brisbane is the only port now under consideration that was most attractive to all three categories; ie single, married members without children and families. Darwin was the least attractive. Although the Port of Melbourne is not considered as an FSM basing option, it is included in the tabulated results because it completes the capital cities' assessments and because Melbourne's outer suburbs (eg. Cranbourne), are within one hour's driving of Westernport.

Region	Index for Singles	Index for couples with no children	Index for Families
Brisbane	5	5	5
Newcastle	3	4	3
Sydney	4	4	3
Nowra-CRESWELL	3	3	3
Melbourne	5	5	5
Westernport	3	3	2
Hobart	5	4	3
Adelaide	4	4	4
Perth	5	5	4
Darwin	2	3	2

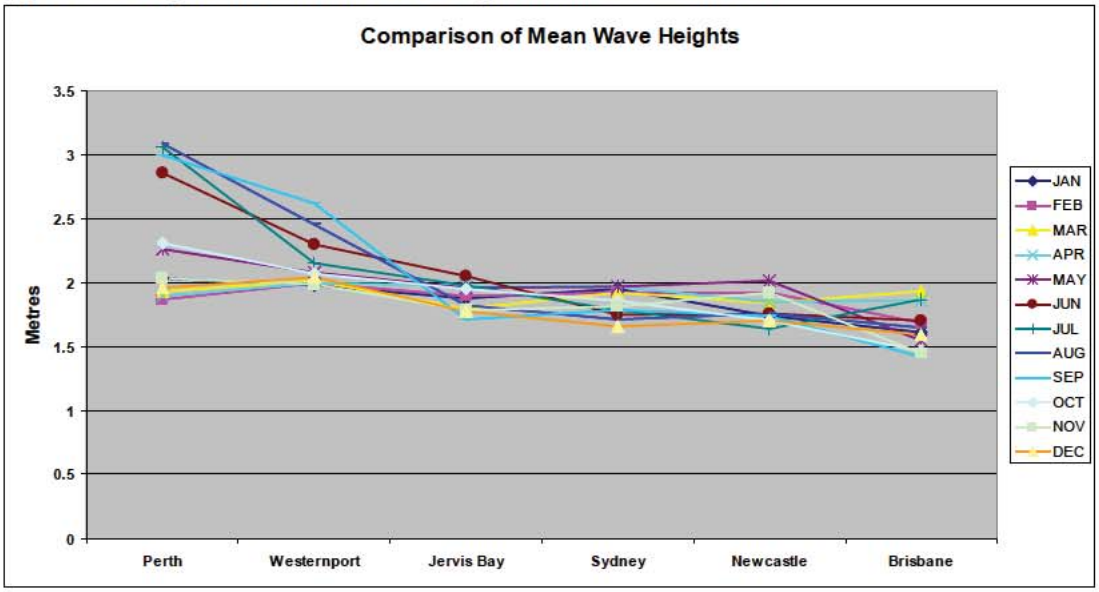
Local Weather Comparison

84 Weather conditions local to the entrance of each potential FSM homeport are significant to a conventional submarine's ability to transit safely on the surface, and its ability over a protracted period to gradually workup to full operational status. For example, substantial wasted time results when a submarine has to wait during its

[72] "Developing an index for assessment of the attractiveness of ADF base locations to ADF members" – NATSEM – University of Canberra – Susan Day, Anthony King, Carol Farbotko, Elizabeth Taylor – 30 September 2003
[73] Ibid - in 2003
[74] Page 4 – Executive Summary - ibid

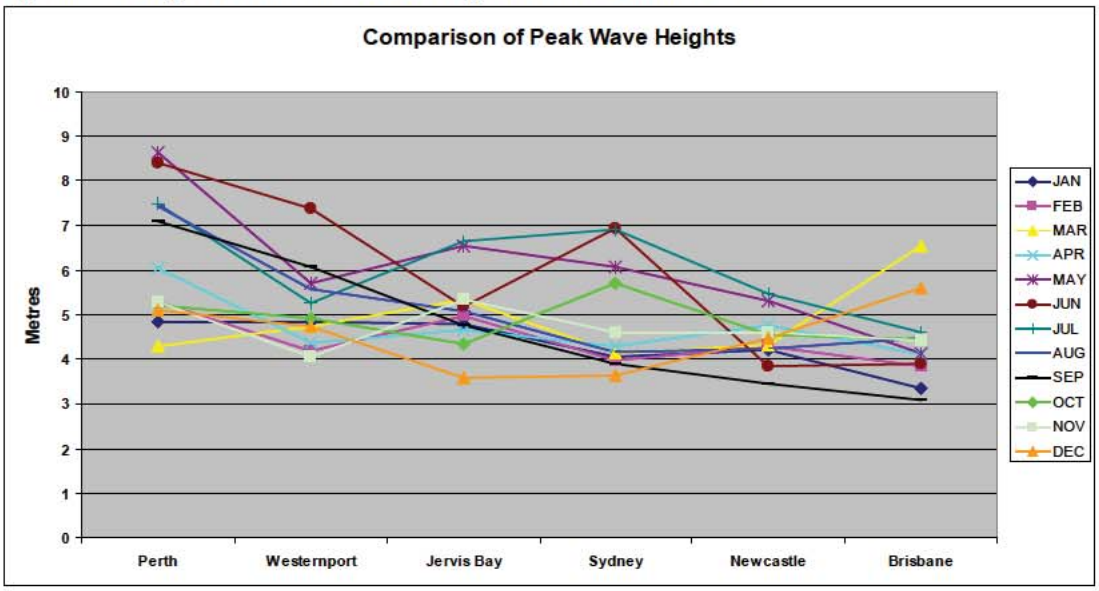
phased workup programme for the sea state to be low enough to enable specially equipped small vessels to recover the practice weapons that it has fired.

Figure 4 - Comparison of Mean Wave Heights outside Selected Ports



85 Figure 4 and Figure 5 illustrate the mean and peak wave heights respectively for a specific position[75] outside each nominated port.[76]

Figure 5 - Comparison of Peak Wave Heights outside Selected Ports



86 In both graphs, the wave heights off the coast of the existing submarine base at FBW are generally higher than for any of the East Coast ports under consideration. Of significance also is the observation from Figure 5 that the variation of peak wave heights is significant at all ports through the course of a year with Newcastle

[75] Perth (-32.12/115.38),Westernport(-38.63/145.12),Jervis Bay(-35.12/150.87),Sydney(-33.88/151.37),Newcastle(-33.38/151.62),Brisbane(-26.88/153.62)
[76] Refer RAN Hydrographic Service Web site www.metoc.gov.au/products/wms_M10_swh.php

recording the minimum variation of 2.01 metres. The largest variation of 4.35 metres is at Fremantle (Perth).

87 Based upon the mean wave height data of Figure 4 the ports of Jervis Bay, Sydney and Newcastle have the most consistent mean wave heights year round of between about 1.6 to 2 metres, with Brisbane having a slightly larger variation but the lowest mean of all ports for the months September, October and November. All of the East Coast ports experience better overall weather conditions than Fremantle, the existing submarine squadron homeport.

Availability of Wharves Comparison[77]

88 Wharf access is a fundamental input to functional capability that is becoming more challenging to deliver for the Australian Navy. Planned new ship and submarine dimensions are generally larger than the ships and submarines that they will replace, and deepwater berths are scarce. Doubling the number of submarines within the Force 2030 fleet compounds the facilities infrastructure planning challenge. For planning purposes, relevant hull dimensions assumed for the FSM capability are length ninety metres and draft eight metres.[78]

Figure 6 - Submarine Berthing at Fleet Base West[79]

[77] Adopting the current practice of placing two submarines at each wharf berth, the number of berths required to support a fleet of twelve submarines is six, or in general terms six hundred "wharf-metres"[77]. This total length is required regardless of whether one squadron of twelve, three squadrons of four, two squadrons of six or two squadrons one of eight and one of four are to be created
[78] C.f. CCSM dimensions of 78.25 metres and 7.0 metres respectively-refer paragraph 55
[79] Image courtesy Defence Archives

89 Submarines typically have different wharf interface requirements to surface ships because they sit lower in the water. Figure 6 illustrates a fender arrangement for a CCSM. Close examination reveals additionally how steep a normal surface ship gangway would be if it were to be used to match the difference in height between the submarine (pedestrian) casing and the height of the wharf. This FBW wharf satisfies submarine berthing requirements however, by providing a lower pedestrian level that enables use of access gangways that have a reasonable gradient.

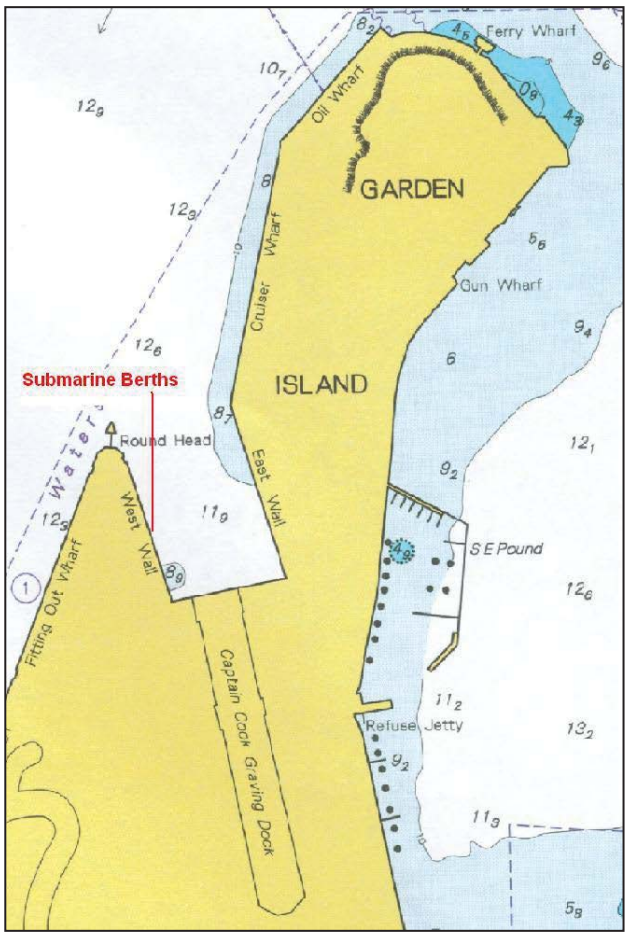
90 HMAS *Stirling* has the current capacity to berth six CCSM, along with its other surface warships commitments. There are three alongside berth positions at HMAS *Stirling* normally available to the CCSM. Whenever more than three of the six submarines require berths, they double-up, or are placed outboard of another submarine. Increasing the length of the submarines potentially by about 14 metres and/or increasing their numbers will stress the existing Diamantina Wharf capacity and will probably require construction of a new wharf. Annex A: WA - Fleet Base West addresses this topic.

Figure 7 - Diamantina Wharf HMAS *Stirling*

91 Visiting NPS, which typically are larger than the CCSM, usually berth also at Diamantina Wharf at a berth normally used by surface warships. Figure 7 shows a submarine at berth "D1", one of the three wharf positions reserved for submarine use. The FFG (surface warship) astern of that submarine is where visiting NPS often berth.

92 EAST COAST WHARF OPTIONS: Three of the East Coast homeport options ostensibly have existing wharves that may be useable for the FSM capability; they are FBE, Cockatoo Island and Newcastle Port.

93 FBE: Annex G: NSW - Fleet Base East discusses the FBE FSM homeport option and concludes for a combination of reasons that the opposite East Wall would provide a better future for the FSM than the existing West Wall. More than four submarines at any one time requiring berths however would demand additional wharf capacity. The berthing situation becomes further complicated assuming Captain Cook Dock is used for all East Coast submarine



docking activities, because in order to maintain adequate management flexibility with the graving dock, submarines in extended maintenance will probably need to be placed on floating docks or slave docks[80] which use wharf berths that otherwise would be used for ships or submarines[81].

Figure 8 – *Farncomb & Waller* at West Wall[82] & Garden Island Dockyard Chart

94 Cockatoo Island: Annex J: NSW – Cockatoo Island discusses the Cockatoo Island FSM homeport option. Sutherland Dock potentially offers a protected berth for four submarines, however additionally there is the adjacent external wharf that could also berth up to four submarines – refer Figure 9.

Figure 9 - Cockatoo Island - South Western Wharf & Sutherland Dock

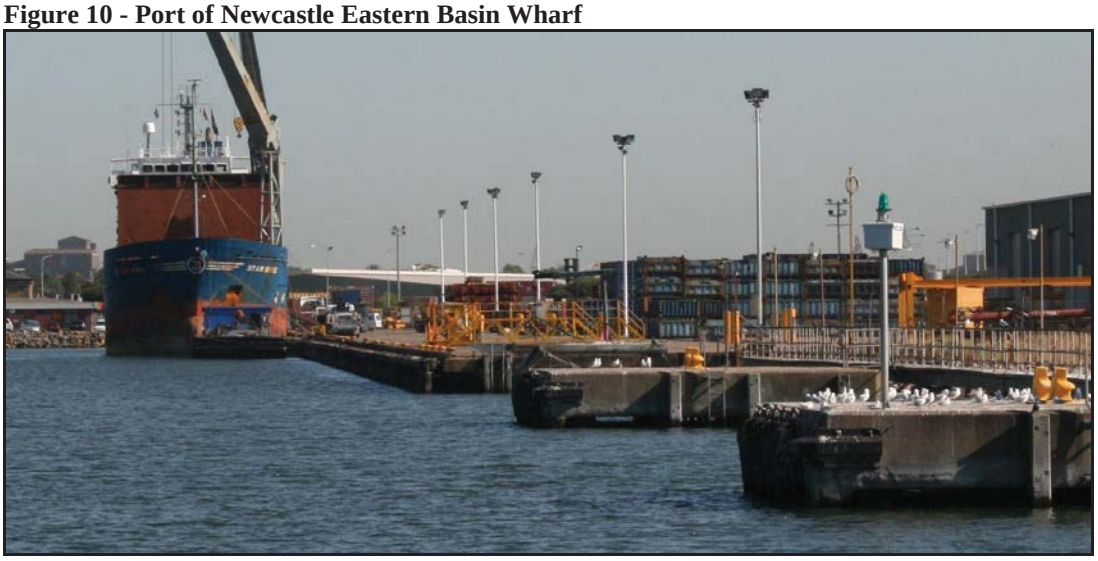
95 Port of Newcastle: Discussion of an FSM homeport concept for Newcastle is at Annex F: NSW - Newcastle Port. The Port of Newcastle basin environment accommodates large merchant ships but it could berth future submarines with some restoration and alteration to the existing wharf interfaces. The Basin has three sides, two of which have wharves and the third a rock wall.

96 Eastern Basin Wharf (Figure 10) is approximately 350 metres in length, has rail access and a water depth of 11.6 metres. Each of the finger dolphins extends the

[80] Floating Barges
[81] Refer Annex G: NSW - Fleet Base East.
[82] Image courtesy Defence Archives

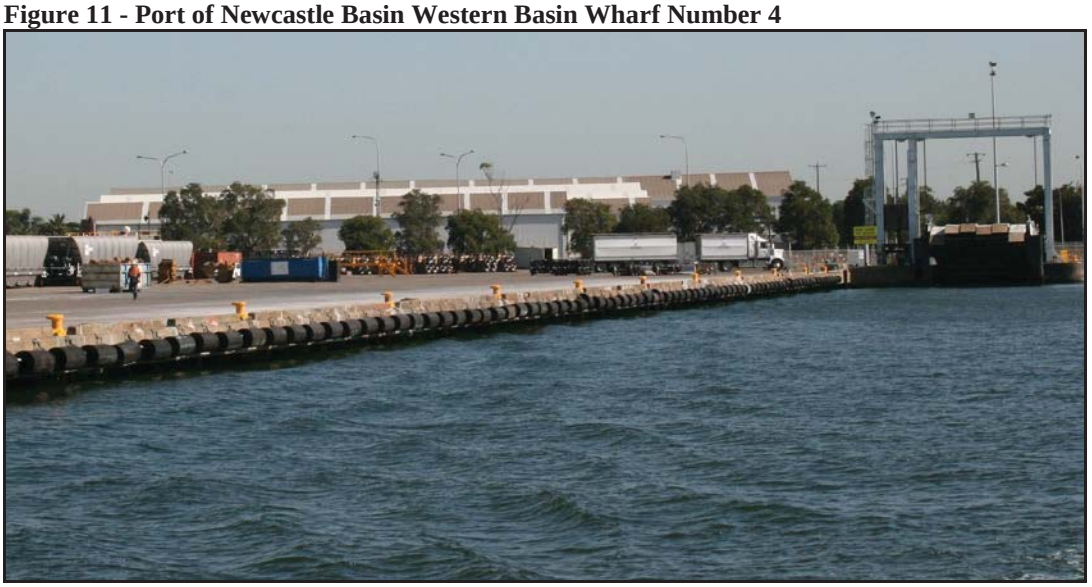
wharf connections by a further 70 metres. Eight future submarines could berth at this wharf.

Figure 10 - Port of Newcastle Eastern Basin Wharf



97 Western Basin Wharf (Figure 11) is 500 metres in length including the grain terminal at the southern end, and has rail access and a water depth of 11.6 metres. At the northern end is a roll-on roll-off vehicle loading facility. Up to ten future submarines could berth at this wharf.

Figure 11 - Port of Newcastle Basin Western Basin Wharf Number 4



98 Of the three-homeport options under consideration that have existing wharves potentially available to the FSM:

- Newcastle Port and Cockatoo Island wharves would at least require some refurbishment, and
- FBE will require the construction of a new wharf if it is to act as both the FSM East Coast docking facility as well as the FSM homeport.

Availability of Alongside Services Comparison

99 Annex V: Homeport Alongside Services summarises the range of alongside services typically required by a submarine at its homeport. These services are available at HMAS *Stirling* (FBW) for the CCSM, and at Garden Island Dockyard West Wall (FBE). Many of them are available also at HMAS *Waterhen*; however, the high capacity DC power supplies are not.

100 At all other sites these facilities would need to be supplied and installed as part of the homeport construction activities; those sites are:

- Cockatoo Island
- Port of Brisbane
- Port of Newcastle
- Jervis Bay
- Westernport Bay

101 Sea levels have apparently risen by an average of 1.8mm per year in the last century[83]. For contingency planning purposes at least, FSM alongside facilities will need to adjust to increasing sea levels.

Alongside Maintenance Facilities & Industry Support Comparison

102 Modern submarines rely extensively upon external support for maintenance and repair activities, both scheduled and unscheduled. Design of the FSM is not complete nor is its Usage Upkeep Plan defined, but by using CCSM maintenance methodologies and practices as reference, the capabilities and capacities of the FSM homeport options are comparable.

103 There are a number of books that formalise the structure and requirements of Royal Australian Navy maintenance and repair doctrine[84] but for this study primary reference has been made of Department of Defence Technical Directive TM181 045/10, the subject of which is, “Collins Class Submarine – 10 Year Usage Upkeep Cycle”.

104 Some scheduled maintenance periods use a minimum of external contractor resources and occur at the homeport, and others use a minimum of uniformed crew resources and occur at an external facility. The defined maintenance periods with their indicative[85] durations are:

- Supported Maintenance Period (SMP) – two weeks – at the homeport - uses uniformed crew, uniformed homeport resources (FSU), and occasional civilian contractors
- Intermediate Maintenance Availability (IMAV) – eight weeks – may be either at the homeport or at an external facility, or both - uses uniformed resources and civilian contractors

[83] 18.0 cm total - Bruce C. Douglas (1997). "Global Sea Rise: A Redetermination". Surveys in Geophysics
[84] ABR6291 – Collins Class Submarine Logistic Support Manual
ABR5230 – Ships Maintenance Administration Manual
ABR6492 Volume 2 Naval Technical Regulation Manual
[85] The actual maintenance period durations will be finalised and agreed by Chief of Navy and promulgated in the Integrated Master Schedule. One role of this document is to define the best balance of platform availability, reliability, safety, crew availability and cost.

- Intermediate Docking (ID) – twelve weeks – conducted at an external docking facility – focussed on hull preservation and activities that require the submarine to be out of the water, with civilian contractor resources, and with other maintenance activities and essential repair activities undertaken also by both uniformed resources and civilian contractors.
- Mid Cycle Docking (MCD) – eighteen weeks - conducted at an external docking facility – focussed on hull preservation and activities that require the submarine to be out of the water, with civilian contractor resources, and with other maintenance activities and essential repair activities undertaken also by both uniformed resources and civilian contractors.
- Full Cycle Docking (FCD) – one hundred and four weeks – major platform and systems overhaul and refurbishment - conducted currently at the ASC[86] submarine building facility in Adelaide entirely with civilian contractor resources, except for the transition periods at the commencement and conclusion of the FCD period when uniformed crew also participate.

105 Homeports must therefore be able to host SMPs and IMAVs.

106 Homeport facilities required to support the maintenance of future submarines capability are identifiable from those in use at HMAS STIRLING. The maintenance related facilities at STIRLING, most of which are available to submarines but on a share basis with all Fleet units are:

- Naval Stores – Buildings B0005, B0006, B0076, B0007, B0014 and B0095
- Shipwrights Workshop – Building B0008
- Engineering Workshop – Buildings B0018 and B0075
- Electronics Workshop – Building B0019
- Hull Maintenance Workshop – Building B0077
- Powerhouse and Utilities Building – Building B0017
- Contractors Hardstand
- Periscope Workshop – Building B0126
- Motor Transport Compound – Building B0029
- Car Parking
- FSU[87]
- Perimeter Fence

107 Increasingly contractors bring containers loaded with specialist tools and basic office capabilities, and request temporary hardstand access and power supplies to enable them to fulfil their contracted roles. An East Coast homeport will be required to provide undercover workshop environments for both uniformed and civilian contractors, as well as a substantial hardstand area with temporary power supplies in close proximity to the submarine berths. Naval stores buildings, motor vehicles and administration could all be located further afield.

[86] ASC Pty Ltd.
[87] FSU – Fleet Support Unit (FSU) – formerly – Fleet Intermediate Maintenance Activity (FIMA) – uniformed maintenance support resources who are not directly attached to the submarine

Table 2 - Comparison of Maintenance Facilities Achievable at FSM Homeports

	BRIS	NEW	FBE	*Waterhen*	C'TOO	*Cres*	*Cerb*
Stores							
Shipwrights							
Engineering							
Electronic.							
Hull							
Powerhouse							
Hardstand							
Periscope							
Motor T							
Parking							
FSU/FIMA							
Fence							
LEGEND							
Current	**Capability**		Fully	Achievable			
Part Current	**Capability**		Fully	Achievable			
Achievable	**Capability**		Fully	Achievable			
Partly Achievable	**Capability**		Partly	Achievable			

108 Table 2 compares the projected ability to provide at each of the FSM homeport options the facilities and capabilities listed. FBE already has a number of the required FSM maintenance capabilities, and *Waterhen* as an operational Mine Warfare base, could incrementally adopt relevant FSM maintenance capabilities. *Cerberus*, with its waterfront and history of supporting patrol boats has some existing capability and infrastructure that could be adapted to support FSM. Cockatoo Island has previously been a fully functioning submarine overhaul facility but all of those capabilities have been removed. Provision of additional parking capacity will be problematic at FBE, *Waterhen* Extended and on the mainland adjacent to Cockatoo Island. Creation of a secure perimeter around an FSM base element within the relatively porous borders of FBE may be an issue due to space constraints and World Heritage List requirements pertaining to visual amenity within 2.5 Kilometres of the Sydney Opera House.

Availability of Industry Support

109 Apart from provision of docking services, numerous industry support contracts will be required to sustain the FSM. For the CCSM, prime sustainment support contracts exist between DMO with ASC, Thales, BAE Systems and Raytheon Australia and each of these has supporting original equipment manufacturers (OEMs). The creation of a similar support network will be required for the FSM. Each of the relevant companies will find it easier to recruit, train and retain key staff in the major cities of Sydney, Brisbane and Melbourne than in more remote places. Most of them will likely already have other contracts in support of other Defence systems to which the FSM will reinforce their business critical mass.

110 Sydney is the principal location of most naval systems industries. There are some naval systems' companies represented in Melbourne, but some other Defence systems' vendors (ie Army and Air Force), are represented in both Melbourne and Brisbane. Nowra and the Fleet Air Arm have a relatively small Defence industrial support presence.

The Ability to Run Diesels

111 Conventional submarines require the ability to operate diesel engines for a variety of reasons whilst in their homeport. The minimum requirement is that they can operate without restriction during normal daylight working hours, and if a submarine is scheduled to depart or return to its homeport outside of normal working hours, that it be allowed to operate its diesels as a part of associated processes. Emergency use is to be allowable at all times.

112 There are seven relevant Federal and State policies and standards relating specifically to gaseous and noise emissions from diesel engines. Whilst Defence is not bound by these regulations, it does generally attempt to be compliant wherever practicable.[88]

113 FBE is currently unable to meet the minimum requirement because of the close proximity of West Dock Wall to the Garden Island naval residences.[89] [90] For occupational health and safety reasons also, when submarines at West Wall run their diesels the dry dock caisson is not available to pedestrians, which inconveniences many dockyard activities. To quote the Port Services Handbook - all diesel runs are "*to be cleared through the Port Services Manager Sydney (PSM-SYD) prior to commencement. With the exceptions of emergencies, main engine runs or similar noisy activities are only to be conducted between the following hours:*

- *Weekdays:* *1600 to sunset*
- *Saturdays* *0800 to 1600*
- *Sundays & Public Holidays:* *NIL"*

114 Four of the ports under consideration are likely to satisfy the minimum requirements because of their relative isolation from populated areas- they are:

- Port of Brisbane
- Newcastle Port
- Jervis Bay (North East and South West)
- Westernport – *HMAS Cerberus* (Sandy Point)

115 Although there are no diesel engine running restrictions at HMAS *Waterhen* currently, some form of restriction there, and also at Cockatoo Island may be necessary if the FSM exhaust noise is as loud as for the CCSM.

Proximity to Docking Facilities Comparison

116 Proximity to docking facilities is an important factor in the life of a submarine. The CCSM Usage Upkeep Plan requires removal of each submarine from the water every two years of its life for planned maintenance and overhaul activities, and systems failures may demand additional emergency dockings. For the FSM proximity to a facility which can either remove a submarine from the water, such as the ship lifts at Henderson[91] and Adelaide and the floating dock in Newcastle, or

[88] Refer report - SEA 1000-REP-251-R8741591 Rev05 dated 23JUN11 – Assessment of Submarine Exhaust Emissions When Alongside Populated Areas
[89] Clause 0507 - Port Services Sydney-Handbook for Ships – 10th Edition – January 2008
[90] The recommended FSM berths are at East Dock Wall which are closer to the naval residences.
[91] Refer Figure 12

remove the water from around the submarine, as with the graving docks at Melbourne[92], Sydney and Brisbane, is important.

117 Removing a submarine from the water, as for any seagoing vessel, is a relatively straightforward exercise. Removal of a submarine for anything other than hull preservation and treatment activities however is not. A significant difference in capability exists between a facility that solely provides dry access to a submarine hull for its preservation, and another that can undertake a FCD.

Figure 12 - CCSM - Henderson Ship Lift Facility[93]

118 The conduct of a FCD at the end of an eight-year operating period for a CCSM requires the systematic removal, refurbishment and replacement of most internal components in the submarine. The submarine hull on some occasions requires penetration for essential repairs, and the processes for restoring its full watertight and pressure-tight integrity are meticulous.

119 The only Australian docking facility conducting FCDs currently is ASC's shipyard in Adelaide. Based upon other existing substantial infrastructure on the East Coast, potential FCD capabilities may one day develop also at BAE Systems - Willliamstown Shipyard – Melbourne, but is expected anyway to develop at the Captain Cook Dock – Sydney – New South Wales

120 The ASC Henderson Shipyard in Western Australia also conducts IDs and MCDs, but the capability may develop there with time to conduct FCDs also.

121 The Forgacs docking facilities at both Brisbane and Newcastle have limited supporting infrastructure, but in time may expand their relevant capabilities to also contest for FSM docking support roles.

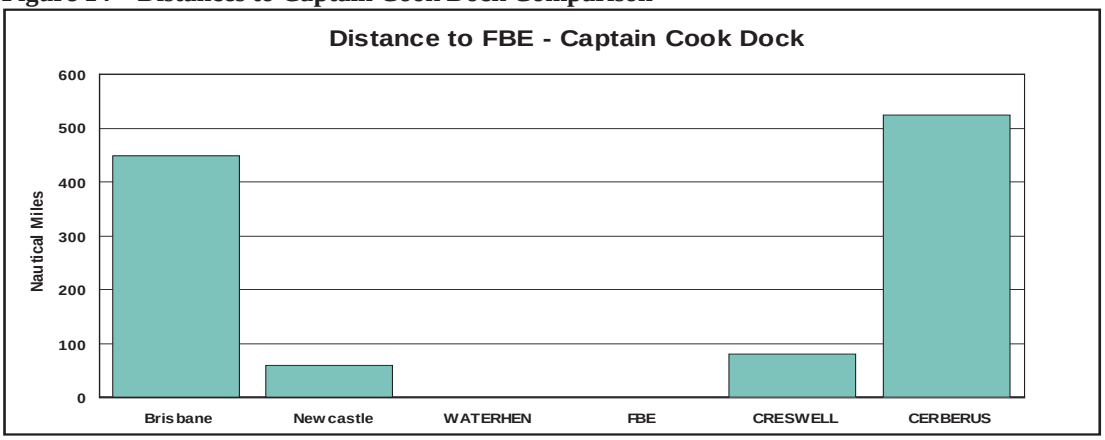
122 Facilities to enable three submarines[94] to be clear of the water concurrently for planned maintenance purposes will be required independent of the submarine building facility[95]. A highly desirable capability is the ability to conduct docking activities under cover, both to isolate weather as a cause of delay, and to enhance visual security for some repair activities. Only the ASC facilities at Adelaide and Henderson currently have this capability.

[92] The Alfred Graving Dock in Melbourne is 143 metres in length, 24 metres wide, and 8 metres deep – which should enable it to dock a CCSM but not a submarine with an 8 metre draft.
[93] Image courtesy Defence Archives
[94] For 12 submarines with FCDs of no longer than 2 years and an 8 year operating duration, 3 submarines may be in docking facilities concurrently.
[95] Assuming the maintenance philosophy described at - Annex U: Usage Upkeep Plan/Cycle

Figure 13 - Captain Cook Graving Dock - Sydney[96]

123 On the East Coast, establishment of a new submarine maintenance and docking capability will be required if submarines are to be homeported there. Commercial forces will determine whether the BAE Systems shipyard at Melbourne[97] or the Forgacs docking capabilities at Newcastle and Brisbane will still be viable circa 2030 when the first FSM platform emerges from its builder's yards. Defence planning regardless will focus upon the continued availability and direct control of Captain Cook Dock in Sydney's FBE – refer Figure 13.

Figure 14 – Distances to Captain Cook Dock Comparison



124 Figure 14 illustrates that FSM homeport options FBE, WATERHEN Extended (and Cockatoo Island) have the best access to Captain Cook Dock. Newcastle and then HMAS CRESWELL are the next two in sequence. Both Brisbane and Westernport Bay are about one and half days sailing distant. For the sake of

[96] Image courtesy Defence Archives
[97] Refer - Annex S: Docking

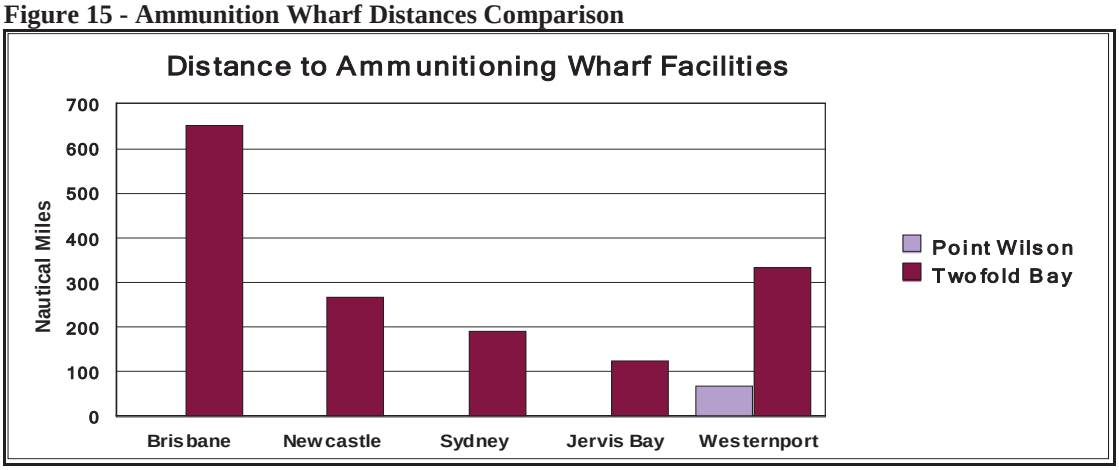
comparison between the homeport options however, proximity to Captain Cook Dock is not critical because experience has shown that vertical ship lifts and floating dock facilities can be created quite quickly and flexibly providing that deep water and adjacent land is available.

125 Annex U: Usage Upkeep Plan/Cycle, concludes that for a squadron of four FSM with a usage upkeep cycle of nine years, and ID, MCD and FCD durations as defined, that one docking facility (cradle) would be required, but for a squadron of six or eight submarines two docking facilities (cradles) would be necessary. In other words, for every four FSM a docking cradle will be required.

Proximity to Ammunitioning Wharf Comparison

126 A reasonable proximity to ammunitioning replenishment facilities is fundamental to all ADF war-fighting capabilities. There are just two permanent facilities on the East Coast currently at Eden[98] and Point Wilson[99], and one temporary facility at Port Alma.[100] The Eden facility is well placed to support EAXA Fleet activities, as is HMAS *Stirling* similarly placed to support WAXA activities, however neither will be sufficient in any imagined war-fighting scenarios – refer Annex B: NT - The Role of Darwin for the FSM.

Figure 15 - Ammunition Wharf Distances Comparison



127 Figure 15 illustrates the transit distances from each harbour to the Eden Twofold Bay ammunitioning facility and for Westernport also, the transit distance to the Point Wilson facility within neighbouring Port Phillip Bay. Based upon current ammunitioning facility availabilities, the long transit from Brisbane to Eden is a substantial disadvantage to any concept of a Queensland FSM homeport.

128 There is one East Coast homeport option that could provide an alongside ammunitioning replenishment capability from weapons storage facilities within its own land footprint[101] similar to FBW – HMAS CERBERUS at Westernport Bay[102]. CERBERUS already stores live ammunition for the West Head Gunnery Range.

[98] South Coast New South Wales
[99] Port Phillip Bay Victoria
[100] North Queensland coast
[101] Mr. M. Walker, Director Explosive Ordnance Logistic Reform – Explosives Ordnance Branch
[102] Noting that replenishment of weapons stores does not include weapons maintenance.

Strategic Comparison

129 The two elements of strategic planning relevant to this basing study are:

- Transit distances – how long will it take a submarine to reach its areas of operations, and
- Vulnerability – how close is the prospective base to potential threat?

130 Australia has a vast coastline and has defence obligations ranging from the Indian Ocean, north through the Indonesian Archipelago and beyond, and the Pacific Ocean. It effectively sits at the apex of an inverse triangle with the other two points being the south Asian subcontinent and North America. Its North American commitments are those of ally to the United States but from a basing policy perspective, this still requires its submarines to transit to United States territories for joint training and other activities. Closer to home Australia has key national strategic assets on both coasts including off-shore oil and gas platforms, and ports through which much of its national wealth passes.

[103] Refer Figure 16 - Strategic Transit Distances Comparison

133 In terms of vulnerability however, the further south a base is the less vulnerable it is. Whilst modern long-range weapons mean no place is invulnerable, the further a place is from an enemy's supply lines and routine areas of operation, the less vulnerable it typically is.

Tactical Comparison

134 The site chosen for a submarine homeport and its subsequent construction style(s) can enhance the survivability of the associated submarine squadron(s). Factors such as:

- Short transit distances to dive depth,
- Covered or reinforced submarine berths,
- Absence of restrictive channels,
- Visual security, or some visual isolation from high density population centres,

- all enhance the mission effectiveness of submarines.

135 Dive Depth Transits When a submarine transits on the surface, it is vulnerable to both detection and attack – this is a critical operational parameter. Figure 17 compares transit distances to three different water depths from various Australian ports. s33(a)(i) [redacted] .

s33(a)(i) [redacted]

s33(a)(i) [redacted]

137 Covered Berths None of the FSM basing options under consideration currently has covered berths. Covered berths may be unfeasible at FBE due to World Heritage List requirements pertaining to visual amenity within 2.5 kilometres of the Sydney Opera House. In Jervis Bay, a gazetted Marine Park, covered berths may be opposed by the public due to the potential effect on visual amenity.

138 The Sutherland Dock area of Cockatoo Island, with the cliff face at its northern boundary, is probably the most likely opportunity for multiple covered berths. The relative isolation of Sandy Point within HMAS CERBERUS and the eastern end of the Port of Brisbane Fisherman Islands complex, may also be good prospects for achieving covered berths.

139 Absence of Restrictive Channels Table 3 effectively compares the tactical 'quality' of the harbours that are a fundamental element of each homeport option. Jervis Bay and Sydney Harbour clearly provide the top three options but beyond them, the ranking process becomes quite subjective.

Table 3 - Harbour Entrance and Channel Constraints

s33(a)(i)

s33(a)(i)

140 Visual Security - Public Isolation FBE at Garden Island and HMAS *Waterhen* in Balls Head Bay, both in Sydney, are highly visible public viewing locations. A covered Cockatoo Island site would provide routine visual security except when submarines were transiting Sydney Harbour. Newcastle Port, now surrounded by residential dwellings is also a highly visible public viewing location. The best sites for relative isolation and visual security are at Jervis Bay and HMAS *Cerberus* at Westernport Bay.

Command and Control Resources Comparison

141 Headquarters Joint Operational Command exercises command and control (remotely) for operational elements of the Australian Submarine Force. Administration, command and control of submarine and other forces that collectively are working to achieve full operational status is the domain of the Fleet Commander who delegates some elements to local force commanders. Where the local force commander is collocated with other naval force elements, sharing of the communications and resources infrastructure occurs. If an FSM homeport is to be created in isolation of existing naval infrastructure, then new command and control infrastructure and personnel resources will be required. The implications for each of the homeport options considered are:

- Port of Brisbane – new infrastructure and resources required
- Newcastle – new infrastructure and resources required
- HMAS *Waterhen* – incremental increases to existing capabilities required
- FBE – incremental increases to existing capabilities required
- Cockatoo Island – new infrastructure required
- HMAS *Creswell* – substantial increases to existing capabilities required
- HMAS *Cerberus* – substantial increases to existing capabilities required

Physical Security Comparison

142 Defence establishments such as FSM homeport(s) require physical security. The most visible form of this requirement is a perimeter fence that is twenty metres distant from all buildings, but it also includes the patrol and enforcement of naval waters boundaries seaward of the submarine berths. The implications for each of the homeport options considered are:

- Port of Brisbane – achievable
- Newcastle – achievable
- HMAS *Waterhen* Extended – not achievable at Balls Head Wharf
- FBE Garden Island – marginally achievable (regarding the perimeter fence)
- Cockatoo Island - achievable
- HMAS *Creswell* – achievable for FSM infrastructure
- HMAS *Cerberus* - achievable

Workup Resources Access Comparison

143 When a submarine emerges from a maintenance period it must exercise and train to attain or regain (depending upon how long and intensive the maintenance duration was), its operational readiness. A structured and well-defined process takes the submarine through tasks that incrementally prove the capability of its systems and increase the collective skills of its crew.

144 Some of the tasks undertaken are achieved without any external support but others, especially those in the final stages of operational workup training and which involve weapons firings, require extensive involvement by other Defence resources. Most of these activities take place within designated naval exercise areas. For the CCSM, the relevant exercise areas currently are the South Australian Exercise Area (SAXA)[105] and the Western Australia and Albany Exercise Areas (WAXA/AXA)[106].

145 Other Defence resources that mobilise to assist each submarine achieve its operational readiness are:

- (Home) Port Services
- Surface warships
- Other submarines
- Naval air
- Air Force air
- RANRAU
- Joint Logistics Command
- DSTO
- Special Forces
- Submarine Force Command
- Fleet Headquarters
- Joint Operations Command

146 On the East Coast, workup exercises of this type currently occur within the East Australia Exercise Area (EAXA)[107]. This area is large and is accessible directly by the Air Force from RAAF Williamtown, the Fleet Air Arm from Nowra and naval assets from Sydney, or temporarily from Jervis Bay.

147 The Port of Newcastle, the Sydney naval bases, Cockatoo Island and HMAS *Creswell* at Jervis Bay all directly access the EAXA. The two FSM homeport

[105] SAXA – within by 133°to 140°E and 32° to 40°S
[106] WAXA/AXA – within 113° to 119°E and 31° to 37°S
[107] EAXA – within 150° to 155°E and 31° to 37°S

options that require a transit to reach the EAXA are Port of Brisbane and HMAS *Cerberus*, which are 275 nautical miles and 300 nautical miles distant respectively.

148 Submarines are slower than most if not all other Defence weapons platforms, and consequently submarines usually depart their homeport(s) earlier and return later than the other participating Fleet and air assets. From this perspective Jervis Bay has the highest rating as a potential FSM homeport because whether or not the submarine is working up itself, or acting as a support asset to other Fleet units, it can be ready to participate in as little as an hour after departing its homeport and similarly be alongside at day's completion. The workload on submarine crews would become therefore more equitable with surface fleet assets that may depart daily from Sydney.

Access to Training Resources Comparison

149 A key assumption of this East Coast basing study is that core submarine skills training will remain at HMAS *Stirling*. Platform and combat systems skills however, as well as general career progression courses will be undertaken as close to the location of the East Coast submarine squadron as practicable.

150 Using the number of simulators needed to support the six CCSM as a guide, twelve FSM will require procurement of multiple platform and combat systems simulators. These will satisfy test platform requirements,[108] and enable achievement of the necessary trainee throughput volumes. Procurement of multiple simulators enables development of a multiple basing concept.

151 The platform and combat systems simulators for the CCSM occupy substantial buildings at HMAS *Stirling* and the FSM equivalent systems will probably require similar dedicated facilities. HMAS *Stirling* dedicates up to eighteen classrooms for submarine training, however instruction that relates to the platform and combat systems only uses some of them. Research is necessary to determine exactly how many East Coast classrooms are required. The number of East Coast submarines will influence this assessment, a decision not yet made.

152 Comparison of training resources approaches for each of the FSM homeport concepts is:

- Brisbane – Bulimba Barracks, or similar land outside of the port environment, is an essential element of the Port of Brisbane FSM homeport concept. Buildings to house simulators and classrooms could be constructed within the grounds of Bulimba Barracks, noting that part of Bulimba Barracks may be disposed in future, which may reduce construction and development options.
- Newcastle – The land potentially available adjacent to Eastern Basin Wharf is substantial and it is conceivable that construction there of training facilities for a squadron of FSM may be practicable. This would be convenient to the submarine crews. Alternatively, RAAF Williamtown could potentially host these facilities.
- FBE and HMAS *Waterhen* – The pending Garden Island Strategic Accommodation Management Plan involves the relocation of all simulator and training assets from Garden Island to Randwick Barracks. Either Randwick Barracks or HMAS *Watson*, or both, would be the venue for FSM platform and combat systems training if an FSM squadron homeports at either of these options.

[108] For progressive systems upgrades to be tested prior to operational implementation

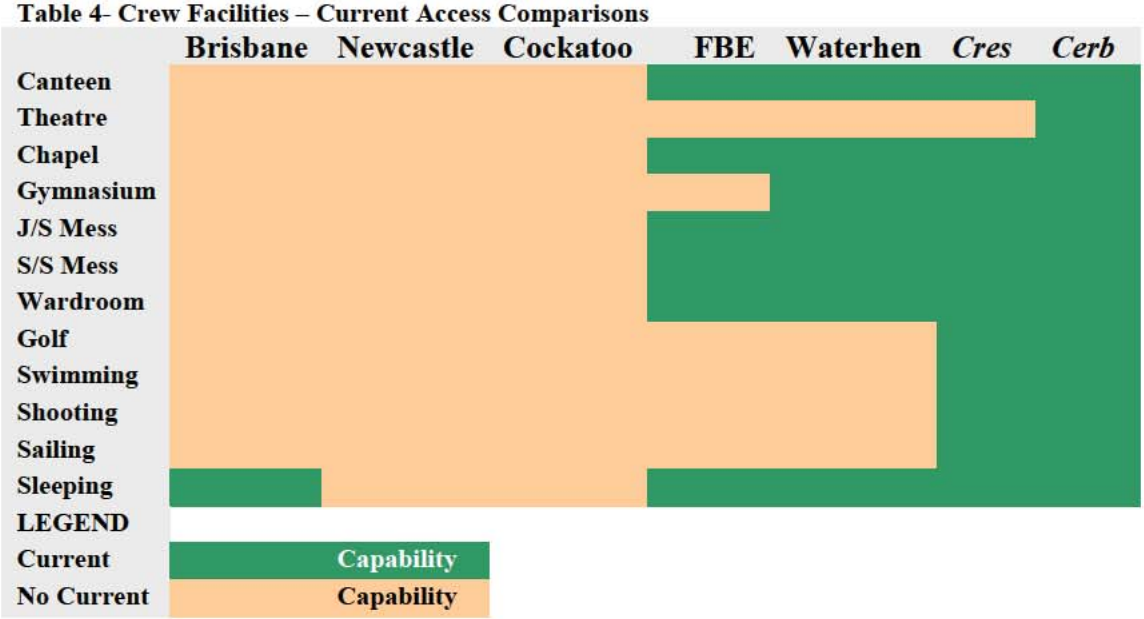
- Cockatoo Island could be the location of submarine specific training simulators or else they could be located at Randwick Barracks or HMAS *Watson* as a part of the greater Sydney plan.
- Jervis Bay – new training buildings would be included within the new shore based infrastructure constructed at Green Point or adjacent to HMAS *Creswell* to support a local FSM squadron. This would be convenient to submarine crews.
- HMAS *Cerberus* – either new training buildings or an adaptation of existing buildings would be included within the new shore based infrastructure constructed to support a local FSM squadron. This would be convenient to submarine crews.

153 The convenience to submarine crews of potentially having training resources located within the same base environment, such as exists at HMAS *Stirling*, is assessed more highly than having to travel to another facility, sometimes in dense traffic environments. Cockatoo Island, Jervis Bay, and HMAS *Cerberus* rate more highly as a result. All homeport options will need to build new facilities however, HMAS *Watson* in Sydney and HMAS *Cerberus* at Westernport may already have buildings that can accommodate simulators and allow classroom access for some FSM courses.

Access to Crew Facilities Comparison

154 The physical and mental well being of submarine crews includes provision of ready access to recreational and sporting facilities, provision of the club atmosphere that can exist in naval mess facilities, and sleeping accommodation when needed.

Table 4- Crew Facilities – Current Access Comparisons



155 Table 4 illustrates at a glance that HMAS *Cerberus* and HMAS *Creswell* already have a high crew facilities current capability, which is generally reflective of their training establishment roles.

Access to Specialised Medical Resources Comparison

156 A key assumption of this East Coast basing study is that core submarine skills training will remain at HMAS *Stirling*. New recruits seeking to acquire their "Dolphins" badge will expect to spend considerable time at FBW to undertake the

relevant training, and in particular submarine escape training, where meticulous attention to the medical condition of each person who participates occurs.

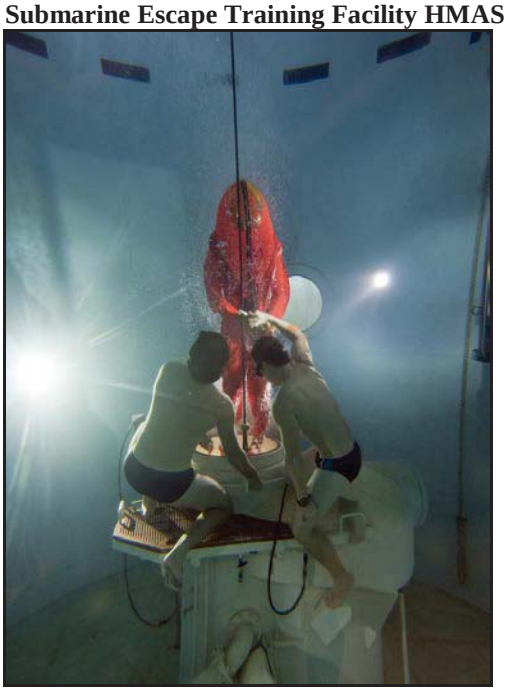
157 The Senior Medical Adviser Submarine Medicine (SMA SUBMED), at HMAS *Stirling* is responsible for the operation of the Submarine and Underwater Medicine Unit – West (SUMU-W), and reports to the Fleet Medical Officer. This unit provides dedicated high-quality on-site emergency medical support to pressurised submarine escape training and acts as the primary health provider for the submarine community.[109]

158 For any East Coast FSM homeport, "the medical support could be provided from existing garrison health facilities wherever they may be located. SMA SUBMED[110] would provide the 'specialist' advice regarding submarine medicine as required and can do this remotely . . . This might require an increase in resources and facilities in which ever location the FSM are likely to be based . . "[111]

159 FSM homeport options that do not already have a nearby Navy or Defence medical capability will have either to establish one or contract relevant civilian support. The comparisons are as follows:

- Port of Brisbane – a new capability is required
- Port of Newcastle – RAAF Williamtown – potential existing capability
- HMAS *Waterhen* – existing capability
- FBE – HMAS *Kuttabul* – existing capability
- Jervis Bay Green Point – a new capability is required, HMAS *Creswell* – existing capability
- HMAS *Cerberus* – existing capability

Figure 18 - Submarine Escape Training Facility HMAS *Stirling*[112]



[109] CAPT S. Sharkey RAN, Fleet Medical Officer – 25th March 2011
[110] Senior Medical Adviser Submarine Medicine
[111] Ibid.
[112] Image courtesy Defence Archives

Integration with Surface Navy Comparison

160 Four of the FSM homeport options under consideration directly involve East Coast naval bases. This is no accident. Not only is it more convenient and generally less costly to consider building upon a naval capability that already exists, it is generally also a less demonstrative method of introducing a new capability to a sometimes resistant public than to consider a Greenfield site alternative.

161 Existing naval bases typically have water frontage, which is becoming incredibly difficult and expensive to access Australia wide, and a wide range of embedded support facilities that could incrementally expand to be available also to a squadron of FSM. Annex A: WA - Fleet Base West examines in some detail the changes needed at Fleet Base West to accommodate a fleet of twelve CCSM instead of the existing six.

162 Given that significant capital expenditure would be needed to incrementally increase the capacity of a broad range of facilities at FBW to enable it to host an extra six submarines, it is reasonable to consider instead, use of those same capital funds to increase the capacity of a selected East Coast base for the same purpose.

163 The four East Coast bases involved, (from north to south) are:

- HMAS *Waterhen* – Refer Annex H: NSW - HMAS Waterhen Extended
- FBE – Refer Annex G: NSW - Fleet Base East
- HMAS *Creswell* – Refer Annex L: NSW - Jervis Bay
- HMAS *Cerberus* – Refer Annex N: VIC - Westernport Bay

164 The most operational of these existing naval bases are FBE and HMAS *Waterhen*, and an East Coast FSM squadron would gain most from being integrated firstly with FBE or secondly with HMAS *Waterhen*.

Visiting Nuclear Propelled Submarine Facilities Comparison

165 Australia is host to visiting nuclear propelled warships (NPW) from time-to-time, and the strengthening relationship with the United States suggests that the frequency of USN submarine visits may increase[113]. If any of the FSM homeport options under consideration already is, or could also be a NPS facility, co-location may be beneficial.

166 s47C [redacted]

Summary Comparison of All Homeport Options

167 Analysis of each of the topics of this chapter that form together an ideal FSM homeport specification generates a relative ranking for each homeport. Table 5 individually scores the three highest-ranking ports under each category and at the bottom of the table, totals the results. The footnotes beneath the table enable a quick

[113] Weekend Australian – 6thNovember2010-Page 1-Brendan Nicholson Defence Editor

reference to each line item analysis, but more in-depth discussion is available earlier in this chapter.

168 Significantly FBW has the highest overall ranking, however, as is the current experience, there is little point in having a smart highly functional basing facility there if the collective Defence organisation cannot recruit and sustain adequate crew numbers to enable the required submarines capability. The next highest rankings are for Sydney Harbour and FBE in particular.

169 FBE, followed by *HMAS Waterhen* and Cockatoo Island represent the best three currently available options for a sustainable FSM homeport.

Table 5 - Rankings based upon 1st, 2nd & 3rd Assessments[114]

Criteria	FBW	BNE	NEW	HEN	FBE NBY	CIs	JBN	JBS	WPT
Recruitment-1[115]	0	0	0	0	0	0	1	2	3
Recruitment-2[116]	0	2	2	3	3	3	0	0	1
Posting Preferences[117]	3	2	1	3	3	3	1	0	0
Housing Price[118]	0	0	3	0	0	0	2	2	1
Commute<26 mins[119]	1	1	0	0	0	0	3	3	2
Commute>26 mins[120]	1	0	2	0	0	0	3	2	1
Attractiveness-S[121]	3	3	1	2	2	2	1	1	1
Attractiveness-M[122]	3	3	2	2	2	2	1	1	1
Attractiveness-F[123]	2	3	1	1	1	1	1	1	0
Wave Heights[124]	1	3	3	3	3	3	3	3	2
Available Wharves[125]	1	0	2	0	1	2	0	0	0
Alongside Services[126]	3	0	0	1	3	0	0	0	0
Maintenance Facilities[127]	3	0	0	2	3	0	0	0	1
Industry Support[128]	2	1	1	3	3	3	1	0	2
Run Diesel Engines	3	3	2	2	0	2	3	3	3
FCD Docking Proximity[129]	0	0	2	3	3	3	1	1	0

[114] FBW (Fleet Base West), BNE (Brisbane), NEW (Newcastle), HEN (*HMAS Waterhen*), Fleet Base East (FBE)/Neutral Bay (NBY), CIs (Cockatoo Island), JBN (Jervis Bay North), JBS (Jervis Bay South), WPT (Westernport)

[115] Cerberus graduates 100 recruits / month; Creswell graduates 100 recruits / year – the close proximity of an FSM homeport would positively influence recruiting to the SM Force

[116] 80% of SM recruits come from East-Coast States, Greater Sydney most, SE Queensland 2nd and Victoria via Melbourne 3rd.

[117] Sydney is most popular East Coast posting preference, followed by ACT, Cairns, Nowra, Melbourne - however proximity to Sydney boosts the retention rating of Newcastle. Nowra ranks well in its own right and its proximity to Creswell influences that rating.

[118] Within 40 minutes the median house prices are as scored.

[119] Commuting stress ranking as described in the chapter, "Analysis"

[120] Commuting stress ranking as described in the chapter, "Analysis"

[121] Singles-Base location attractiveness – NATSEM – University of Canberra – 30 September 2003

[122] Ibid - married no kids - the minimum score of "2" has been subtracted from all indexes to make the scoring consistent with the other parameters.

123 Ibid - Families

[124] Ranking of Median Wave Heights

[125] Assesses availability of vacant wharves, noting that the available East Cost wharves need refurbishment

[126] FBE is the only East Coast homeport option with an existing set of alongside services (SM Power supplies, HP air etc), *Waterhen* has some.

[127] Maintenance facilities and capabilities" are best provided now by FBE.

[128] Sydney has the greatest naval systems Defence industry presence, followed by Melbourne and Brisbane. There is a small presence in support of the Fleet Air Arm at Nowra and the Air Force at Newcastle.

ID/MCD Docking Proximity[130]	3	3	3	3	3	3	1	1	3
s33(a)(i) s33(a)(i) s33(a)(i)									
Harbour Constraints[135]	0	0	0	1	2	1	3	3	0
Covered Berths Potential[136]	0	3	0	0	0	3	0	0	3
Public Isolation[137]	2	1	0	0	0	0	2	3	2
Availability C2 Facilities[138]	3	0	0	3	3	0	0	2	2
Existing Physical Security[139]	3	0	0	3	3	0	0	1	3
Routine Access Fleet, Air Arm & XA[140]	2	-1	3	2	2	2	3	3	-1
Training Fac. Potnl[141]	3	1	1	1	1	2	2	2	2
Existing Crew Facilities[142]	3	0	0	1	1	0	0	1	3
Navy Medical Facilities[143]	3	0	1	3	3	2	2	2	2
SURFOR/Air Arm Support Resources[144]	3	0	0	2	3	2	1	0	1
s33(a)(i)									
Marine Park Factor[146]	0	0	0	0	0	0	-3	-2	0
TOTALS	61	28	35	50	54	45	39	42	33

170 If for any reason Navy is obliged to look elsewhere for the creation of this new FSM capability then the two options discussed for Jervis Bay represent the best overall value, notwithstanding any intuitive inclination towards Newcastle and its closer proximity to Sydney. Newcastle has its strengths, but the slight edge that it has with respect to positive people factors is compromised by its isolation from any

[129] Assumes ASC Adelaide and Captain Cook Dock Sydney

[130] s33(a)(i) s33(a)(i) s33(a)(i)

[135] Relative assessment of the best harbour for opposed exits.

[136] Relative assessment of best prospects for achieving covered berths.

[137] Relative assessment of immunity from public viewing of submarine movements – considers the length of time an exiting submarine would be in potential public gaze, and the density of that public gaze.

[138] Relative assessment of the existing C2 communications facilities that could be incrementally expanded.

[139] The presence or not of existing Defence physical security

[140] An assessment of access to an exercise area and the availability there of other Fleet, Fleet Air Arm and Air Force assets – locations not directly adjacent to the EAXA are assessed as negative.

[141] Reflects a composite assessment of existing training facilities with a potential for simulators training facilities to be collocated with the FSM homeport

[142] Reflects relative access and available scope of existing crew amenities

[143] Reflects relative access to specialised naval medicine and general dental services

[144] Reflects the availability of support resources used by other arms of Navy that may be shared

s33(a)(i) Jervis Bay North (Green Point) is within a "no-take zone" and the whole of Jervis Bay is a gazetted marine park. Navy has demonstrated at all of its facilities that it is a caring and responsible tenant of environmentally significant lands and waterways. This assessment parameter is included to reflect the additional process steps required in order to assess Jervis Bay options at the next level.

other naval infrastructure, its susceptibility to flooding, and its sometimes difficult harbour entrance.

171 s47C [redacted].

The Importance of the Partnership with Industry

172 Defence Industry sustainable support will be critical to the successful through-life operation of the FSM. FSM systems suppliers and the support contracts that they establish to enable their systems to be correctly maintained and upgraded, in many respects face the same challenges as the uniformed Navy in recruiting and retaining its skilled workforce.

s47C

174 Providing that there is an opportunity for them to be profitable, the relevant companies will staff their businesses appropriately and locate them geographically to suit whichever of the five East Coast ports that this study has evaluated as the potential FSM homeport host. For the same reasons as the Australian Navy uniformed operators of the FSM, through-life support contractors should find the recruitment and retention of civilian staff easier with the existence of FSM homeports on both coasts.

Conclusions

175 The Collins Class workforce is not at full complement and the associated recruiting process, whilst apparently able routinely to deliver against 80% of set targets, cannot be responsible for sustainment of full complements in an uncertain SM workforce retention environment. The absence of any SM force presence on the East Coast is an inhibitor to SM Force recruitment, which recruiting practice can apparently overcome, but "*the presence of military installations would appear to assist recruiting effort . . . "*[147] and the creation therefore of an East-Coast FSM homeport, depending upon its location[148], should assist. Similarly, SM workforce retention is compromised by close proximity of the only SM homeport to the WA resources industry, by the stress to relationships caused by the geographic separation of FBW from the East Coast States, and by the lack of availability of East-Coast postings for those who have registered a posting preference for East-Coast locations. All of these factors combined represent a substantial risk to the success of the FSM Programme that can only be mitigated by the creation of a permanent East-Coast FSM presence.

176 A modern Australian submarine force ideal homeport has many individual component functions that all combine to enable the capability that Force 2030[149] has stipulated the ADF must provide. The significant compromise of any one homeport key criterion can make it very difficult for the submarine force to deliver its intended capabilities.

177 From a personnel perspective homeports are where the families are, but more than that they are where the submarine force itself integrates into a support community that includes access to all necessary human resources, administration, technology, logistics, operations, research, and the local civilian community generally. Provision of all of these in sufficient depth is only achievable in close proximity to major population centres.

178 All of the specified criteria of the chapter, "What Would an Ideal RAN FSM Homeport Provide?" are directly relevant to the successful creation and sustainment of a submarine force. There is no single port amongst those potentially available however, that can fully satisfy all of these requirements. The homeport assessment process inevitably becomes therefore a task of identifying the option that delivers most of the specified facilities and services capabilities.

179 Defence Estate strategic planning principles as defined in Defence White Paper 2009, apply to this study's analysis approach and the conclusions reached[150].

[147] Force Disposition Review – Personnel Issues – Enclosure to HDPE Response HI/OUT/2003/234 of 1st September 2003
[148] Ibid - *"A large proportion of younger applicants are keen for a reasonable level of mobility, however, older applicants, similar to ADF members in the middle to late cohorts, seek locational stability. The common theme being however, that all groups desire an attractive posting location."* P 5
[149] Force 2030 – Defence White Paper 2009
[150] Refer Annex Y: Defence Estate Strategic Basing Principles

180 Cost inevitably is a significant factor in determining a short list of East Coast FSM homeport options. Consideration of existing Defence assets that have a water frontage on the East Coast consequently becomes a natural preference over potential Greenfield[151] sites developments, not that many exist anyway. Extending the capability of existing Defence facilities may also be an easier process than creating a new naval base (for example), because public perception will generally be more accepting of modifications to existing facilities than a separate apportionment of land in the same area, (Jervis Bay for example). That said, the objection of some communities to any expansion or variation to existing Defence bases within their neighbourhood, may make the task of creating a FSM homeport in the location(s) that best satisfy the selection criteria, very difficult.

181 Sea levels have apparently risen by an average of 1.8mm per year in the last century[152]. For contingency planning purposes at least, FSM alongside facilities will need to adjust to increasing sea levels.

182 FBW facilities at HMAS *Stirling* could accommodate twelve FSM instead of its complement of six, but would require significant increase to the capacity of some of its related infrastructure and services. The transition from the CCSM to the FSM may require the temporary doubling of some facilities and services.

183 The Port of Brisbane FSM homeport concept, supported by Port management involves leasehold access by Defence of hardstand and water frontage to Moreton Bay, onto which construction of a submarine harbour would take place. This Greenfield development[153], supplemented with Defence owned Bulimba (or equivalent) land for homeport functions not necessary at the wharf, could provide most functionality required. Remoteness from combined exercise areas, ammunitioning facilities and the Captain Cook Dock however, constrains its ability to function fully as an FSM homeport. If designation of a closer exercise area eventuates, if a Port Alma (north Queensland) ammunitioning capability evolves, and if local submarine docking functionality is developed, remoteness from Sydney would be a much lesser constraint. This Port of Brisbane concept otherwise better suits a forward operating base role.

184 The Newcastle Port concept is largely a Greenfield development but is supported in concept by both Newcastle Port management and the NSW State Government. Newcastle is at the northern end of the EAXA with RAAF Williamtown nearby, and Sydney is easily accessible by water, road and rail. Housing in the Newcastle region and in the nearby Central Coast region is generally the cheapest of all housing regions applicable to this study. However, the planned increase of coal carrier shipping traffic, the highly visible Eastern Basin location, and the sometimes-hazardous Port entrance, (due to inclement sea conditions), are basing decision inhibitors.

[151] Greenfield developments are new, unencumbered developments on ‘greenfield’, whereas brownfield development modify or refurbish existing assets as a part of the new development process.
[152] 18.0 cm total - Bruce C. Douglas (1997). "Global Sea Rise: A Redetermination". Surveys in Geophysics
[153] Except for the Defence owned land at Bulimba

185 A seabed survey of HMAS *Waterhen* will determine whether *Waterhen* could be either a Minor War Vessels homeport, status quo, or an FSM homeport a decade hence, since the existing water is too shallow for the FSM. An opportunity may exist for an extension to HMAS *Waterhen* via the construction of a new wharf that effectively replaces the existing coal loader wharf, and construction of additional wharves (possibly floating) that replace the existing dolphins parallel to Balls Head promontory, and which link the existing *Waterhen* base to the new structures. Such an extension to *Waterhen* would enable a Sydney Harbour berthing option other than FBE for FSM. The associated shore based facilities would involve a rationalisation of space and buildings with the existing *Waterhen* lodger units, and additionally may require outplacement of some support functions to a mix of FBE, HMAS *Penguin*, HMAS *Watson* and Randwick Barracks.

186 FBE is an intuitive location for an East Coast FSM homeport. Initial assessment of the viability of such a concept is favourable in that there is a status quo berthing capacity for four CCSM, and the redevelopment concept for Garden Island promises to provide spare capacity within existing buildings. A closer examination however reveals that the combination of a homeported FSM squadron, together with the commitment to undertake all of its scheduled docking activities, almost certainly exceeds the capacity of Captain Cook Dock and of the FBE wharves, when combined with legacy commitments to the surface fleet.

187 Capital expenditure to build more flexibility into the management of Captain Cook Dock would address submarine scheduled docking capacity limitations, but that newly acquired flexibility would probably demand, as part of its implementation cost, the status quo berthing capacity now available to submarines. This study assumes that Garden Island and its Captain Cook Dock is the venue for an East Coast FSM docking capability because it is the East Coast docking facility most likely to be still operational in 2026/2027. There are alternatives to FBE for an FSM homeport however. This study concludes that for FBE to act also as an FSM homeport, new wharf capacity would be required.

188 HMAS *Penguin* offers some potential as an FSM homeport. A seabed survey would determine the viability of deepening its waters, and if positive *Penguin* may provide Navy with many more future use options, not just for submarines. A breakwater or similar structure would however be required to protect any substantial vessels berthed within *Penguin*'s waters, but approval to build such a structure within this desirable area of the Sydney Harbour foreshore may be very difficult to obtain. For this reason at least, HMAS *Penguin* is not considered further as a potential FSM homeport.

189 Chowder Bay is Navy's oil fuel installation in Sydney and it is a strategic asset. Its role will extend to support the FSM platform in Sydney. The capability to capture compensating salt water that is displaced from submarine fuel tanks during the refuelling process would probably best be provided via an alongside lighter that has a fitted oily water separator.

190 The management of AIP fuels at each potential FSM homeport is likely to be an individual case study, but if an FSM refuelling capability is ultimately endorsed it is likely that the relevant AIP bulk fuelling process will utilise a purpose equipped

lighter vessel; either for replenishing shore based storage facilities or else refuelling submarines directly.

191 Jervis Bay is a valid potential site for consideration as a future submarine homeport despite it being about three hours drive from Sydney's CBD. The significant population centre and developing high skills workforce that centre on the University of Wollongong in Wollongong, mitigate the distance to some extent. The median price for housing in Nowra, forty minutes distant, is the lowest surveyed at $250,000[154].

192 Jervis Bay is an established region of high environmental significance and popularity, and those factors dictate the approach necessary in developing any concept for a local FSM homeport. The preferred site is Green Point on Defence land, which is within close proximity to the Callala Bay Township at the northeastern end of Jervis Bay. Another concept that generates least perceived change to Jervis Bay and its environs is to integrate a new FSM homeport onto land that is adjacent to the existing HMAS *Creswell* naval base, in either NSW or Jervis Bay Territory.

193 The resulting capability from either of these two options would facilitate ready access by FSMs to water of dive depth, the EAXA, relevant operational assets and ammunitioning at Eden, all of which are significant contributors to the desirability of the concept.

194 Twofold Bay and its town of Eden are too remote from major population centres for in-depth consideration as a potential FSM homeport.

195 Broken Bay, Botany Bay, Port Kembla and Bass Point are all ports or FSM harbour opportunities that are within two hours driving duration of Sydney, however none of them provides sufficient merit as a potential FSM homeport opportunity to be considered in depth within this basing study – refer Annex X.

196 Westernport Bay satisfies a key FSM homeport selection criterion in that it is close to the City of Melbourne. There are two readily identifiable general sites for a potential FSM homeport, one that utilises the existing bulk liquids wharf and adjacent lands at Crib Point, and the other being HMAS *Cerberus*. The Crib Point opportunity could draw upon the nearby resources of HMAS *Cerberus*, but because its wharf is already committed in concept to the strategic development of the Port of Hastings, it is not as attractive as a solution based entirely upon the lands and resources of HMAS *Cerberus* alone.

197 As the principal new recruit training establishment for the Australian Navy, HMAS *Cerberus* has most of the necessary organisational and people related support facilities already in existence, and may only need incremental modifications to accommodate the additional personnel associated with a submarine squadron. Integration of an FSM homeport into the *Cerberus* initial recruit training environment could boost submarine recruitment in a sustainable manner. Wharf and portside infrastructure would be new developments but the existing availability of infrastructure assets such as the on-site ammunition storage facility could enable a

[154] Refer Table 1- Comparison of Median Housing Prices within Commuting Distance

lower cost of implementation than other homeport alternatives. The favoured port location is Sandy Point at the southeastern extremity of HMAS *Cerberus* however; Hann's Inlet may also become favourable with further investigation.

198 s47C [redacted]

199 Two dedicated East Coast ammunitioning wharves will be available to future submarines for all ammunitioning evolutions:

- Twofold Bay (Eden, NSW), and
- Point Wilson (Port Phillip Bay, Vic)

Ammunitioning at other ports can occur by arrangement; however, proximity to population centres at those ports would determine whether ammunitioning at a buoy was the only capability (usually) available.

200 All submarine guided weapons maintenance occurs at Garden Island in Western Australia and there are no plans to change this policy. The striking of a decision to base future submarines on the East Coast as well as the West Coast may cause a review of this policy however, with the intent of initiating appropriate capital works at Orchard Hills or its equivalent facility.

201 Adelaide is a major population centre that is very important to Australia's defence capability; however, it is not an East Coast city, and does not satisfy the posting preferences of most submarine qualified personnel[156]. It would not therefore significantly reduce the recruiting and retention risks recognised as a challenge to the success of the FSM Programme. Its location additionally has the worst weather of any Australian port[157] and its distance from both the West Coast and the East Coast would inhibit strategic deployment of the submarine force.

202 Hobart has a population of just 212,019[158]; this relatively low population base and the absence of a substantial industrial base from which to develop appropriate levels of FSM support, plus its isolation from the main East Coast population centres, cause it to be discounted as a potential FSM homeport.

203 Navy career management posting preference data reinforces the hypothesis that enhancement of Navy's ability to recruit and retain its submarine workforce personnel is achievable by creating posting options for them on both the West and East Coasts of Australia.

204 Brisbane is the only East Coast port under consideration as a potential FSM homeport already certified to host NPS visits. Sandy Point (HMAS *Cerberus*) on Westernport Bay is one new East Coast submarine homeport consideration that offers some potential for NPS visits.

s47C [redacted]

[156] Refer - Annex P: TAS - Hobart
[157] Refer RAN Hydrographic Service Web site www.metoc.gov.au/products/wms_M10_swh.php
[158] Ibid.

205 A minimum of six alongside berths and up to six outboard berths with all reticulated facilities will be required for a fleet of twelve future submarines if a full cycle docking duration of fifty-two weeks only can be achieved and sustained. Whether the fleet of submarines groups into three squadrons of four, one of four and one of eight, or else two squadrons of six, the number of alongside berths required remains at six.

206 The ability to dock three submarines concurrently is the minimum requirement for local docking facilities for twelve future submarines if at each docking facility they are to undertake:

- Intermediate dockings – currently 12 weeks duration
- Mid cycle dockings – currently 18 weeks duration
- Full cycle dockings – currently 104 weeks duration, but considered here as 52 weeks duration[159]

207 From a docking resource management perspective, and assuming that submarines will be home-ported on the East and West Coasts, the optimum distribution of submarines would be a squadron of four on one coast and a squadron of eight, (or two collocated squadrons of four) on the other coast.

208 The analysis process of the chapter, "Analysis of Relevant Australian Ports & Harbours" ranked the East Coast FSM homeport options under consideration as:

- One – Sydney Harbour (FBE)
- Two - Sydney Harbour – HMAS *Waterhen* Extended
- Three – Sydney Harbour – Cockatoo Island
- Four – Jervis Bay – South Western option
- Five – Jervis Bay – North Eastern option
- Six – Newcastle Port – Newcastle Port Corporation
- Seven - Westernport Bay (HMAS *Cerberus*)
- Eight – Port of Brisbane – Port of Brisbane Incorporated

Quantitative costing and relevant environmental impact analysis of all alternatives, suitably weighted, may generate a different outcome.

209 An objective comparison of one port opportunity with another was the intent of this ranking process. A significant factor in the assessment method was the direct influence of proximity to Fleet assets in Sydney, and the importance currently for slow moving submarines of proximity to the East Australia Exercise Area and associated defence infrastructure.

210 The value of utilising existing naval bases with their established organisations and infrastructure also influenced the ranking scores. The validity of the result is subject to the viability of the homeport concepts described in the annexes to this report. Some of these concepts will be challenging to implement; however, without them there would be too few options from which ultimately to make a robust FSM homeport decision.

[159] Assuming that submarine "sustainment" functions are separated from "building functions" unlike the status quo FCD docking philosophy whereby the builder also conducts FCDs.

211 Defence Industry sustainable support will be critical to the successful through-life operation of the FSM. FSM submarine systems suppliers and the support contracts that they establish to enable their systems to be correctly maintained and upgraded, in many respects face the same challenges as the uniformed Navy in recruiting and retaining their skilled workforces. The creation of an East Coast homeport for the FSM should be as valuable to the civilian workforce employers, as is expected also for the uniformed workforce employers.

212 Major Defence contracting companies are resident in all three of the capital cities that are the subject of this study, and to a lesser extent, in the cities of Nowra and Newcastle also. Providing that there is an opportunity for them to be profitable, relevant companies will staff their businesses appropriately and locate them geographically to suit whichever of the five cities of this study becomes the FSM homeport host.

s33(a)(i)

s33(a)(i)

Annex A: WA - Fleet Base West

Introduction

214 HMAS *Stirling* (FBW) is currently the only Australian operational submarine homeport. If the ADF becomes confident that it can sustain both civilian and uniformed workforces necessary in Western Australia for twelve submarines, it may remain so. It successfully integrates the training and specific support needs of the CCSM force with other RAN force requirements. Some facilities within HMAS *Stirling* exist solely to support submarines; others share their capability with all lodger units.

Figure 19 - Fleet Base West Port Environment[161]

Discussion

215 FBW was designed in part to service a submarine squadron comprising six CCSM, and although there are some identifiable shortcomings in terms of the requirements that are listed at the chapter, "What Would an Ideal RAN FSM Homeport Provide?" it meets its design requirements well.

216 If the submarine fleet at FBW were to increase to twelve submarines of the size of HMAS *Collins* or larger, substantial modifications would be necessary to many FBW infrastructure assets to enable sustainment of current service levels. This annex examines those changes that would be necessary at FBW if the CCSM fleet was to double in size, as a means of indicating the minimum scope of infrastructure change that this new FSM capability will require of the ADF. This assessment process would be much more complex if a hypothetical FSM design baseline was to be used instead of the CCSM status quo, particularly with respect to the transition period when both classes of submarine would be operating from the one homeport.

[161] Image courtesy of Fleet Port Guide

217 In reviewing East Coast basing opportunities elsewhere in this study, the assumption is made that core submarine skills training necessary for the awarding of an individual's "Dolphins" badge will remain at HMAS *Stirling*. Provision on the East Coast of platform and combat systems simulators sufficient at least for continuity training, will be necessary, along with appropriate buildings to house them and classrooms for associated theoretical training.

Fleet Base West Facilities Relevant to the Submarine Force

218 The FBW facilities that exist solely for the submarine force are:

- The Submarine Escape Training Facility (SETF) – Building B0055
- The submarine force administration building – Building B0080
- The Submarine Training Systems Centre (STSC) – Building B0081
- The periscope workshop – Building B0126
- Diamantina Wharf (Building B0086) berths D1, D2 and D3
- Submarine guided weapons maintenance and dedicated storage facilities

219 The FBW facilities that are shared between all fleet lodger units and their personnel are:

- CCSM SPO – shares Building B0036
- Ammunition jetty
- Contractors hardstand
- Oil fuel installation
- Magnetic Measurement Range – Building B0100
- Port Services Centre – Building B0079
- Hull Maintenance & Shipwrights' Workshop – Buildings B0077 & B0008
- Joint Operations Command – Building B0036
- Motor transport compound – Building B0029
- Electronics workshop/FSU – Building B0019
- Engineering workshop/FSU – Building B0018
- Powerhouse & Utilities – Building B0017
- HMAS *Stirling* Command administration – Building B0015
- Bulk naval stores building – Building B0006
- Naval Stores building – Building B0005
- Warehouse and administration – Building B0076
- Dangerous Goods Stores – Buildings 7, 14 and 95
- Canteen & theatre – Building A0034
- Chapel – Building A0033
- Gymnasium – Building A0014
- Health Centre – Building A0013
- Junior Sailors Mess & Canteen – Building A0010
- Junior Sailors Galley and cafeteria – Building A0006
- Officers Wardroom – Building A0004
- Senior Sailors Mess – Building A0002
- Diamantina Wharf (Building B0086) berths D4, D6 and D5

Review of Submarine Related Fleet Base West Facilities

220 SERC/SETF – Building B0055 The submarine escape training facility comprises a water tower, machinery plant rooms, external storage shed, a classroom, administration offices and medical facilities. Existing SERC/SETF facilities have proved to be generally suited to supporting six CCSMs where four are intended to be at sea, and two in some form of maintenance[162].

221 "The existing medical facility and personnel at SETF (SUMU-W)[163] are being utilised beyond its maximum capacity with the current (CCSM) dependency. A significant increase in facility and personnel resources would need to occur for it to provide the same level of services to a larger SM[164] Force."[165]

222 Specialist underwater medicine support to the submarine force is reportedly operating in excess of its staff and facilities capacity limits, indicating that doubling the number of submarines will at least require a doubling of the facilities, and probably also a doubling of the specialist underwater medicine qualified staff.

223 The single escape training tank should suffice for a submarine fleet twice the size.[166]

224 Submarine Administration – Building B0080 The existing submarine administration building is recognised as being inadequate for its existing commitments[167] [168]. A building estimated to be approximately three times the current size is required for a squadron of 12 submarines.

225 STSC – Building B0081 The Submarine Training Systems Centre is inadequate for the training workload that will be associated with twelve submarines. The number of instructors, support staff, classrooms and simulation equipment will all need to increase[169]. If there were to be more than one crew for each operating platform the required resources will be larger still.

226 Table 6 - Submarine Training Systems Resources column "FBW 6 CCSM Current Capability" defines the existing STSC resources assigned to the training of submarine qualified personnel at FBW. There are six submarines, with a theoretical four being available at any point in time, however in recent years training volumes have been limited to just three crews.

227 Column "FBW 12 CCSM All at FBW" estimates the resourcing that will be required if twelve CCSM are to be homeported at FBW.

[162] CMDR L. King RAN – former Submarine Escape and Rescue (SERC) Manager – 17th March 2011
[163] Submarine Underwater Medicine Unit - West
[164] Submarine
[165] CAPT S. Sharkey RAN – Fleet Medical Officer – 25th March 2011
[166] CAPT B. Sampson RAN– Submarine Force Commander - 24th November 2010
[167] CAPT B. Dowsing RAN– Commanding Officer HMAS STIRLING – 24TH November 2010
[168] CAPT B.M. Sampson RAN– Submarine Force Commander – 24th November 2010
[169] Mr. P. Bullock ASC Contract Manager, LCDR M. Hoffman RAN Head of Submarine Warfare Training HMAS STIRLING

228 The next two columns estimate the training resources that will be required at FBW and at the new East Coast FSM base if twelve FSM platforms were to be split into one four submarine squadron at FBW and one eight submarine squadron on the East Coast[170].

Table 6 - Submarine Training Systems Resources

Submarine Systems Training Resources	FBW 6 CCSM Current Capability	FBW 12 CCSM All at FBW	FBW 4 CCSM But some Training Assets for 12	East Coast 8 CCSM
Classrooms	18	36	24	10
Platform Systems Instructors	36	72	45	25
Platform Training Simulators	1	3	2	2
Combat Systems Instructors	30	60	40	20
Combat Training Simulators	3	6	4	2
Support & Mntnce. Staff	10	30	20	10
Propulsion Control Ref Centre	1	1	1	0
Integrated Ship Control Monitoring Management System	0	1	1	0
Weapons Handling & Discharge Training Rig	1	2	1	0
Diesel Engine	1	1	1	0
HP air compressor	1	1	1	0
Reverse osmosis unit	1	1	1	0
Air purification unit	1	1	1	0
Main Storage Battery mock up	1	1	1	0
Manoeuvring Control & Dive Safety Console	1	3	2	1
Towed array handling system	1	1	1	0
Buoyant wire antenna	1	1	1	0
Sewage automation system	1	1	1	0
Submerged signal ejector	1	1	1	1
Communication Centre	1	1	1	1

229 Periscope Workshop – Building B0126 The periscope building is available for unforecast remedial work on periscope optics. Periscopes removal from submarines routinely occurs elsewhere during the extended duration full-cycle-dockings, but not otherwise unless they are defective. On the rare occasion that repair action is needed contractor specialists may use this FBW facility, but given that its existing use is infrequent this building would not require any capacity expansion due to a doubling of the local submarine fleet.

[170] This split ratio is based upon later discussion that highlights from a docking services perspective the most efficient split is 4 on one coast and 8 on the other. East Coast is chosen for the 8 submarines because the larger population base is more likely to be able to sustain the civilian workforce necessary to conduct MCDs and FCDs for 8 submarines than on the West coast.

230 Berthing CCSM berth allocations at FBW are currently Diamantina Wharf berths D1, D2 and D3[171]. Whenever more than three of the six submarines are at their homeport they are normally berthed outboard of one of the other three, which does slightly diminish the range of services that are available to them.

231 The Usage Upkeep Cycle (refer Annex U: Usage Upkeep Plan/Cycle) could generate a maximum demand for berths for eleven submarines at any one time.[172] The supply of this number of alongside submarine berths at FBW, without reducing existing berthing obligations to the surface fleet, will demand an increase in available wharf capacity. Diamantina wharf can accommodate twelve CCSM[173] but the surface units displaced will need alternative berths. An increase in the length of the FSM relative to the CCSM may also dictate an extension of Diamantina Wharf.

232 There are currently eleven alongside berths for major fleet units distributed between the three wharves:

- Diamantina Wharf – six
- Parkes Wharf – three
- Oxley Wharf – two

233 If the submarine fleet was to double to twelve submarines of the same size as the CCSM, then HMAS *Stirling* would be tasked with providing a maximum nineteen berths for eighteen vessels:

- *Anzac* Class Frigates – six
- CCSM/FSM submarines – eleven
- HMAS *Sirius* - two (standard berths)

234 If Diamantina Wharf is dedicated entirely to submarine berthing,[174] five berths for the surface units that require eight berths would remain. This may be manageable for a short duration but would be inadequate ultimately. *Anzac* Class ships may berth outboard of each other except when both require significant maintenance support, but HMAS *Sirius* or its future equivalent, would require a new wharf to be constructed for manoeuvrability and water depth reasons.

235 Visiting vessels will place additional demands on FBW berthing infrastructure, and given the forecast increase in visits by units of the United States Navy[175], should be included in any consideration of planning for FBW wharf capacity.

236 Figure 20 illustrates a wharves concept, which subject to appropriate expert analysis, may generally address the forecast growth in demand for FBW berths. The extension of Diamantina Wharf by approximately 100 metres, (subject to examination of the impact of a possible FSM increase in hull length), Oxley Wharf also by about 100 metres, and the creation of a new major wharf running generally parallel with

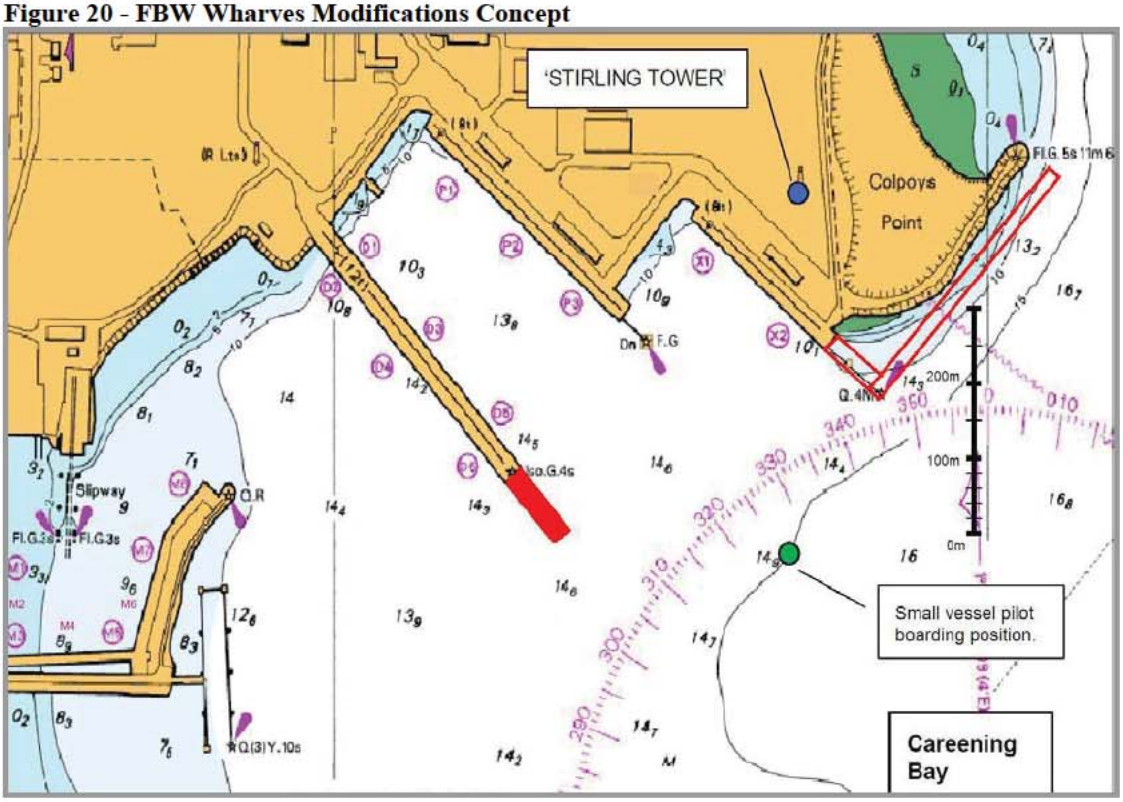
[171] CMDR R.J. Spencer RAN – Port Services Manager West
[172] Note – this does not imply that this many submarines are 'available' in an operational sense but rather that they are not in a dock, and will therefore require a berth somewhere.
[173] With appropriate addition of wharf fittings and support systems such as DC electrical rectifiers.
[174] Six inboard/alongside submarines and five outboard
[175] Weekend Australian – 6th November 2010 – Page 1 – Brendan Nicholson Defence Editor

Colpoy's Point to accommodate *Sirius* (or equivalent large ship), would satisfy most berthing demand forecasts.

237 Submarine Guided Weapons Maintenance and Storage facilities are within segregated secure areas to the north of the main *Stirling* base infrastructure. The Guided Weapons In-Service Sustainment Office (GWEO – Team Torpedo) is located about two-thirds of the distance to the ammunition wharf from the main base.

238 Ammunition Stores - s33(a)(i) [redacted]

Figure 20 - FBW Wharves Modifications Concept



239 Guided Weapons Maintenance Assuming that the twelve submarines have the identical weapons outfit of the CCSM, no increase in buildings will be required for submarine guided weapons maintenance; however, two new test sets and another team of eight to ten skilled staff will be required.[177] [178]

[176] Mr. M.Walker – Director Explosive Ordnance Logistic Reform Explosive Ordnance Branch
[177] Mark Remmers – Director Naval Guided Weapons Support Project Office – 20th March 2011
[178] Ibid – the situation becomes much more complex however when consideration shifts to an actual FSM with possibly different weapons, existing weapons but different modifications status, and managing the transition from CCSM to FSM.

240 CCSM SPO – A doubling of the CCSM fleet would require some additional staff to be employed at the SPO which may cause Building B0036 to be wholly dedicated to that purpose instead of shared as it is currently. When the new FSM Class is introduced an additional building may be required during the transition when both the Collins and FSM Classes both need local SPO support.

241 Ammunition Jetty The existing ammunition jetty length and its charted water depth will be suitable for twelve CCSM[179]. The potential addition of a "T" section on the end of this wharf however may significantly reduce the existing sea state and tidal limitations that constrain ammunitioning activities now. This new "T" shaped wharf extension would sit parallel with the tidal stream.[180]

242 Contractors Hardstand – There is inadequate hardstand adjacent to Diamantina Wharf for the contractor support of submarines. A new contractors' hardstand area near to Diamantina Wharf will need identification and construction. The defined hardstand area used to support surface force elements berthed at Parkes and Oxley wharves is barely adequate for existing contractor volumes.

243 Oil Fuel Installation – Assuming that any future submarines will have similar fuel capacity to 24,000 litres of the CCSM, the existing OFI with its 36 million-litre capacity is adequate.

244 Magnetic Measurement Range – Building B0100 – by the time the first FSM platform is delivered the Magnetic Measurement Range will have the capability to provide relevant services to LHD sized vessels and will be able to accommodate the dimensions of the planned submarine requirements. Ranging of FSM in this facility once per usage-upkeep cycle will not generate any capacity increase requirements to MMR capability.[181]

245 Port Services Centre – Building B0079 – If a new wharf was to be constructed adjacent to Colpoy's point as recommended, then the Port Services Centre building height will need to increase to maintain status quo vision of Cockburn Sound and FBW Careening Bay approaches[182].

246 Hull Maintenance & Shipwrights' Workshop – Buildings B0077 & B0008– Submarine staff only occasionally directly access these buildings. No increase in the capacity of the hull maintenance or shipwrights' workshop is necessary.

247 Joint Operations Command – Building B0036 No increase in the capacity of this building is envisaged.

248 Motor transport compound – Building B0029 – six cars for submarine commanding officers and six general- purpose utilities will require twelve additional car parks adjacent to Diamantina Wharf.

[179] And also twelve FSM.
[180] CMDR R.J. Spencer RAN – Port Services Manager-West
[181] Mr. Damian Kneale, Technical Officer Signature Analysis and Ranges Group, Ranges & Assessing Unit – 25th November 2010
[182] CMDR R.J. Spencer RAN – Port Services Manager-West

249 Electronics workshop/FIMA – Building B0019– No increase in the capacity of this building is necessary.

250 Engineering workshop – Building B0018– No increase in the capacity of this building is necessary.

251 Powerhouse & Utilities – Building B0017 No increase in the capacity of this building is envisaged because some existing equipment is being removed and replaced elsewhere. New rectifiers will be needed for the increased number of submarine cope points on Diamantina Wharf.

252 HMAS *Stirling* Command administration – Building B0015 No variation to this building is envisaged due to doubling the number of submarines based at FBW.

253 Naval stores buildings – Building B0005, B0006, B0007, B0014 and B0095 These buildings do not have capacity to accommodate additional stores associated with double the number of submarines at FBW, nor does the Joint Logistics Unit facility at Palmer Barracks Guildford South. New stores warehousing capacity will be required. The warehouse and administration building B0076 however will remain adequate for the increased number of local submarines.

254 Canteen & theatre – Building A0034 – No increase in the capacity of the canteen or the theatre is necessary.

255 Chapel – Building A0033 – Whilst referrals to the Chaplain may increase there is no anticipated requirement to increase the dimensions of the Chapel.

256 Gymnasium – Building A0014 – The FBW gymnasium is well patronised and the doubling in submarine sea-going crew numbers will generate additional demands, however only minor building modifications combined with flexible management practices would mitigate them.

257 Health Centre – Building A0013 – Submarine qualified personnel typically use the SETF medical facilities for all of their medical concerns because underwater medicine qualified medical staff, who operate from there, are required for so many of their routine medical checks and processes. The SETF medical facilities are too small however to service the medical capacity requirements generated by 12 submarines[183] (and resident clearance diving teams). Submarine personnel medical facilities and resources will need to at least double to accommodate twice as many submarines and this may be achievable to some extent by increasing the size and scope of activity of the FBW Health Centre.

258 Naval Messes & Canteen – Buildings A0002, A0004, A0006 & A0010– The current Defence Accommodation Policy requires all submarine qualified staff to live ashore when alongside in their homeport. Assuming this policy remains extant then the impact on all messes of doubling the number of submarines homeported at FBW will be observed at lunchtime when most staff dine at their various mess facilities.

[183] CAPT S. Sharkey RAN, Fleet Medical Officer – 25th March 2011

The existing buildings and catering capabilities are believed adequate, but local management practices may direct the establishment of two or more meal sittings to reduce stress on contract staff, galley and dining room resources generally.

259 Summary Buildings Changes Table 7 tabulates the estimated changes to buildings required at FBW due to a doubling there of the CCSM fleet to twelve submarines.

Table 7 - Capital Works Necessary at FBW Arising from Doubling the CCSM Fleet

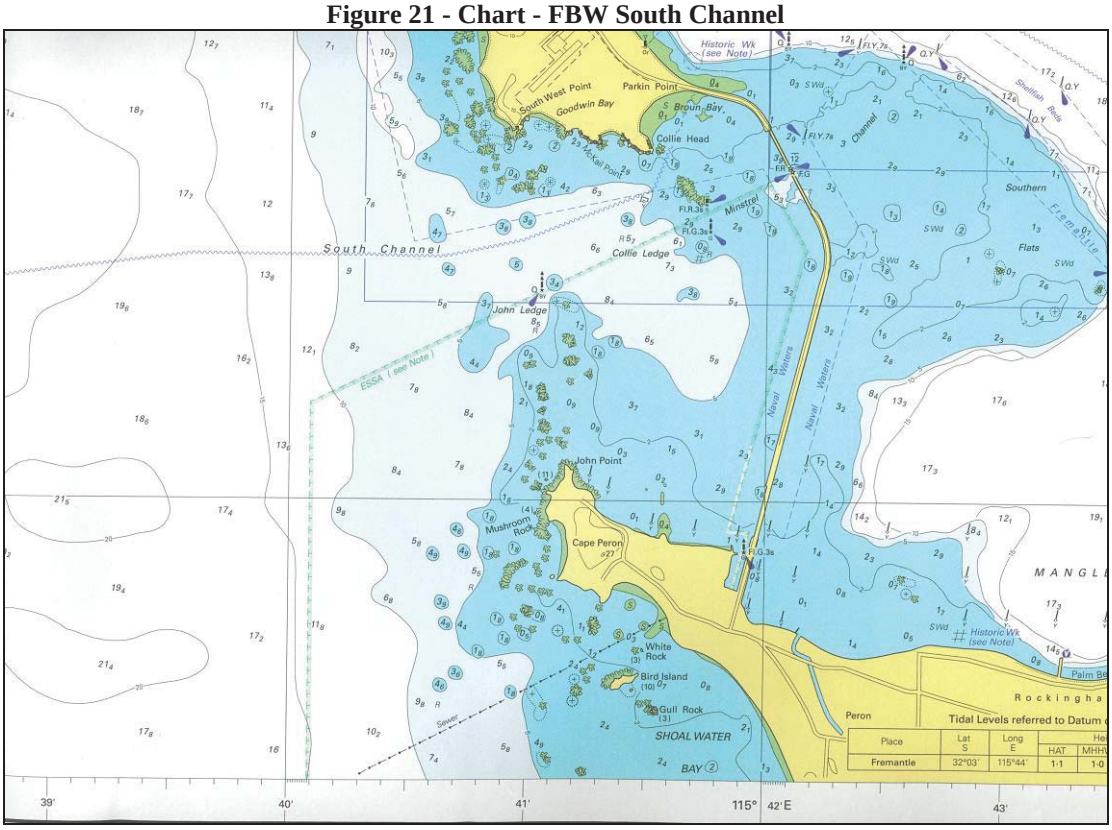
Building	Function	Estimated Changes Needed
B0055	SETF	Double medical facilities
B0080	SUBFOR (Admin & C2)	Triple size of building/ Facilities
B0081	STSC (Training)	Double classrooms / Facilities
B0126	Periscope Workshop	NIL
B0086	Diamantina Wharf	NIL
Not Numbered	New SURFOR Wharf	New Wharf
Not Numbered	Ammunition Stores	2x23metre earth covered bldgs.
Not Numbered	Ammunition Wharf	NIL
Not Numbered	Contractors' Hardstand	Increase by 50%
Not Numbered	Oil Fuel Installation	NIL
B0100	MMR	NIL
B0079	Port Services	Height Increase
B0077	Hull Maintenance Workshop	NIL
B0008	Shipwright's workshop	NIL
B0036	Joint Operations Command	NIL
B0029	Motor Transport	12 additional vehicles
B0019	Electronics Workshop	NIL
B0018	Engineering Workshop	NIL
B0017	Powerhouse	Additional Jetty Rectifiers
B0015	FBW C2 and Administration	NIL
B0006	Bulk Naval Stores	New Building(s) required
B0005	Naval Stores	New Building(s) required
B0076	Warehouse & Administration	NIL
B0007	Hazardous Materials Store	New capacity required
B0014	Hazardous Gases Store	New Capacity required
B0095	Dangerous Goods Store	New Capacity required
A0034	Canteen & Theatre	NIL
A0033	Chapel	NIL
A0014	Gymnasium	Capacity increase to be defined
A0013	Health Centre	Possible capacity increase
A0010	Junior Sailors Mess & Canteen	NIL
A0006	Junior Sailors Galley & Cafe	Lunchtime dining increase
A0002	Senior Sailors Mess	Lunchtime dining increase
A0004	Wardroom Officers Mess	Lunchtime dining increase
Not Numbered	Fleet Carparks	An extra 360 carparks

s47C [redacted]

s47C [redacted]

261 There are at least two possible remediation actions worthy of investigation for provision of route diversity for entering and existing FBW. To the south lies the Causeway Bridge and the South Channel[185], which subject to dredging may be able to accommodate the passage of a submarine. Known capacity limits and structural degradation, which may eventually generate major renovation or replacement of the Causeway Bridge, may provide an opportunity to address this FBW access alternative.

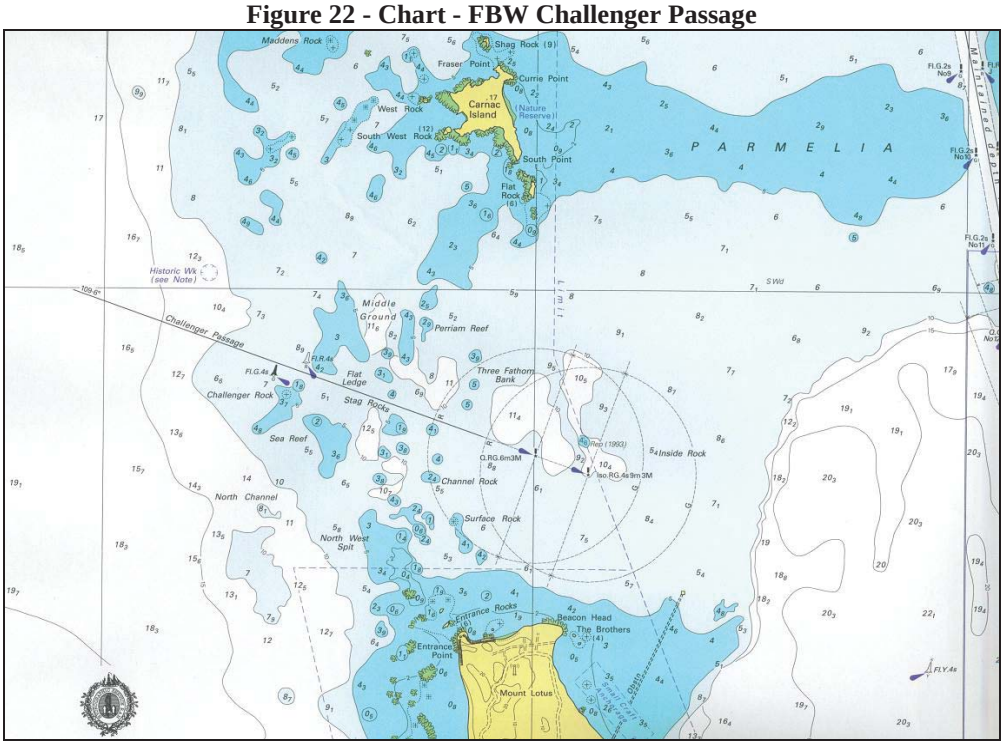
Figure 21 - Chart - FBW South Channel



262 To the north lies The Challenger Passage. Informal but expert advice received indicates that this passage is potentially clearable by the blasting and removal of relevant rocks. Once approved via normal approvals processes creation of this FBW access alternative could additionally provide a valuable explosives training opportunity for Navy clearance divers.[186]

[185] Refer - Figure 21 - Chart - FBW South Channel
[186] Refer - Figure 22 - Chart - FBW Challenger Passage

Figure 22 - Chart - FBW Challenger Passage



Conclusions

263 Fleet Base West at HMAS *Stirling* could accommodate twelve future submarines instead of its complement of six, but would require significant increase to the capacity of some of its related infrastructure and services. The transition from the CCSM to the FSM may require the temporary doubling of some facilities and services.

264 Discretionary enhancement of submarine operations at HMAS *Stirling* is achievable if modifications to the ammunition wharf that will allow submarines to lay alongside in the tidal stream instead of abeam it are undertaken, and if an alternative exit route from Cockburn Sound is developed.

Annex B: NT - The Role of Darwin for the FSM

Introduction

265 Darwin is not considered within this report as a potential future submarine homeport because:

- It does not have a large enough population base
- It is located within a cyclonic weather zone
- It is not on the East Coast, and
- Because it is Australia's northern most capital city, it is believed to be inherently more vulnerable to hostile attack than any other city[187]

266 Notwithstanding these factors exclude Darwin from immediate consideration as a potential FSM homeport; it may nevertheless have an important role as a forward operating base in structured operations of the planned FSM platform.

Discussion

267 Australia has a vast coastline and has defence obligations ranging from the Indian Ocean, north through the Indonesian Archipelago and beyond, and the Pacific Ocean. It effectively sits at the apex of an inverse triangle with the other two points being the south Asian subcontinent and North America. Its North American commitment is those of ally to the United States but from a basing policy perspective, this still requires its submarines to transit to United States territories for joint training and other activities. Closer to home Australia has key national strategic assets on both coasts including off-shore oil and gas platforms, and ports through which much of its national wealth passes.

268 The capability specified in the Defence White Paper for the FSM "results in large on-board energy storage requirements: long time periods away from local support infrastructure: and a demanding crew workload. Other than in time of conflict, these characteristics are not common to most other navies operating conventional (ie non-nuclear) submarines."[188]

s47C [redacted]

[187] Notwithstanding the fact that with modern long-range weapons no place is invulnerable
[188] Forward Support of the Australian Submarines – Consideration of Options – Commonwealth of Australia (DSTO) – June 2010

s47C [redacted]

Forward Support Scenarios

270 Outbound: The simplest forward support scenario is for submarines that are outbound from Australia. The ability to replenish food and fuels prior to continuing the mission could significantly extend the particular submarine's sustainment and reach. Some outbound missions will also seek to embark as late as practicable, mission specific systems and people.

271 Inbound: More complex forward support scenarios exist for submarines that are inbound to Australia. One example could include:

- The replenishment of fuels, including AIP liquids,
- The replenishment of ammunition,
- The conduct of relevant SMP activities, and
- The "fly-in / fly-out" change-out of some crew.

272 The primary benefit gained would be the significantly reduced turnaround time for redeployment to its area of operations compared with a full return transit to its (southern) homeport. If the returning submarine required docking or access to other substantial technical services, it would necessarily be obliged however to return to its homeport.

Darwin Naval Base Facilities

273 Some Darwin Naval Base facilities would need supplementation or extension in order to facilitate the capabilities described above. Specifically:

- Provision of an appropriate submarine berth, preferably at a floating wharf
- Provision of compatible mechanical fuelling connections
- The removal and treatment of compensating water from submarine fuel tanks
- The removal of liquid sullage
- Storage and reticulation to an alongside submarine of AIP liquid(s)
- Provision of a crane ammunitioning stores lighter for ammunitioning at the designated submarine buoy
- Provision of transit accommodation for exchange crew

Conclusion

274 s47C [redacted]

s47C [redacted]

Annex C: QLD - Gladstone

Introduction

275 Gladstone is one of three ports that provides alongside berths for visiting NPS[191], could it also be an FSM homeport?

Discussion

276 Gladstone is 550 km by road north of Brisbane and at the 2006 Census indicated a population of 28,800 people[192.] The (Queensland) Department of Infrastructure and Planning is projecting increases to between 64,470 and 75,430 by 2016 and then to between 90,060 and 114,530 by 2031.[193]

Figure 23 - Gladstone City, Auckland Point & Barney Point[194]

277 Gladstone is a fast growth regional centre, the economic future of which appears based upon liquefied natural gas (LNG) based businesses. Seven LNG projects using coal seam gas as feedstock are proposed for the Port of Gladstone (in Queensland).[195] Out of the total A$66.4 billion dollars worth of infrastructure projects, $51.8 billion or 78% of the projects are LNG related.

278 Gladstone has a tropical savannah climate that has distinct wet and dry seasons with rain in excess of 100mm during each of the months of December, January and February. It is exposed to cyclonic weather patterns.

[191] Refer
[192] Australian Bureau of Statistics (25 October 2007) – 2006 Census QuickStats. Retrieved 17th May 2010
[193] Liam Butterworth – Observer – 28th August 2009
[194] Image courtesy of Queensland Government
[195] "Gas Today Newsletter" – May 2009

279 The previous concept[196] for the creation of a base facility within Gladstone Port focused on the southern shores of Facing Island. A green field site development, it was to require major infrastructure works, including the construction of a new bridge between Curtis Island and Facing Island. Facing Island has now been, "acquired by the Port of Gladstone as reserve in order to prevent potential erosion and degradation (from grazing) that would adversely affect the navigational channels through Port Curtis. Development on Facing Island will not be encouraged and it is intended to leave the area in a natural state – "[197]

280 Port Curtis (Gladstone) was eliminated from the last extensive fleet relocation study[198] because of:

- Poor strategic location (more vulnerable)
- Entrance channel is long (10nm)
- Too far to deep water (64nm)
- Too far from Garden Island Dockyard (a relevant docking facility)
- Too far from training and supply support facilities in Sydney
- Located in the cyclone belt
- The possibility of social integration problems considering its small size

Conclusion

281 Gladstone is not a major population centre and although it is growing rapidly, it will still be too small in 2025 to provide the population benefits and technology support that can be available from the major cities of Brisbane, Sydney and Melbourne – for these reasons primarily it is not a potential FSM homeport.

[196] Fleet Base and Armaments Complex Locations Review – Department of Defence – July 1992
[197] Port of Gladstone Land Use Plan 2010
[198] Fleet Base and Armaments Complex Locations Review – Department of Defence – July 1992

Annex D: QLD - Port of Brisbane

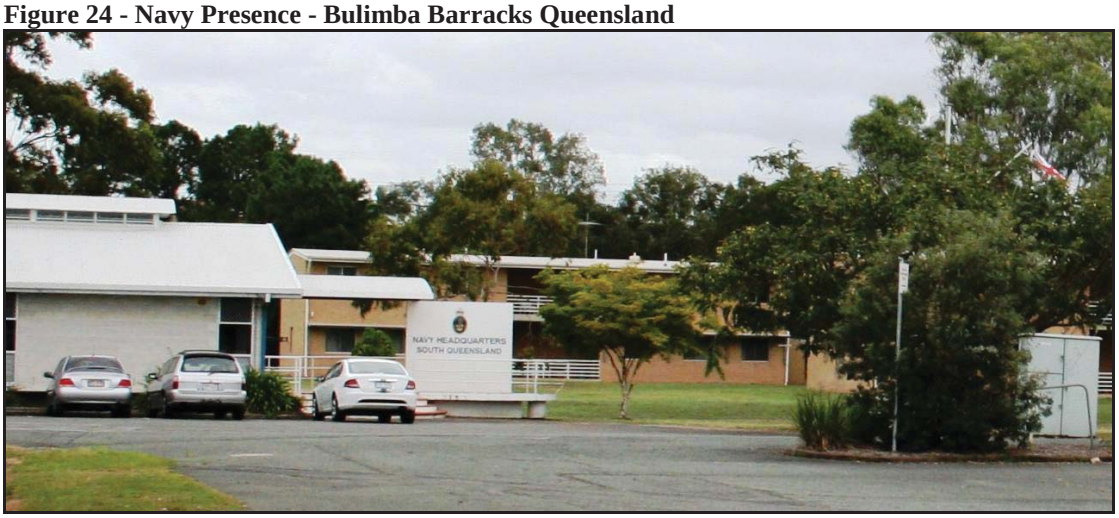
Introduction

282 Brisbane is the most northern capital city on the Australian East Coast, and the only one approved to place visiting NPW at wharves. American submarines patrolled the Coral Sea and the Pacific Ocean from Brisbane during the Second World War and operated from New Farm Wharf on the Brisbane River over the period 1942 – 1945. Local Brisbane dockyards contributed significantly to their maintenance and repair[199].

283 Brisbane's proximity to potential operating areas alone warrants development of an FSM homeport concept for comparison against the options that exist in New South Wales and Victoria. For a number of reasons however, the concept of a homeport located within the Brisbane River is far less than ideal for RAN future submarines (FSM), and the development of another concept has been necessary.

Discussion

Figure 24 - Navy Presence - Bulimba Barracks Queensland



284 The existing Navy presence within Brisbane is at Bulimba Barracks[200] on the Brisbane River and within the limits of the Port of Brisbane. This is an administrative centre for Navy in Southern Queensland and represents the devolution of its presence after the closure of HMAS MORETON. The 50-metre Navy (floating) wharf (Figure 25), used to very good effect in supporting Brisbane during the 2011 floods, is 2.7 nautical miles upstream of the Gateway Bridge and 9.5 nautical miles from the entrance to Moreton Bay at the end of the Fisherman Islands reclamation area[201]. Being within the Port limits provides the benefit that the Queensland Government and the Port of Brisbane currently maintain the river depth at 9.1 metres.

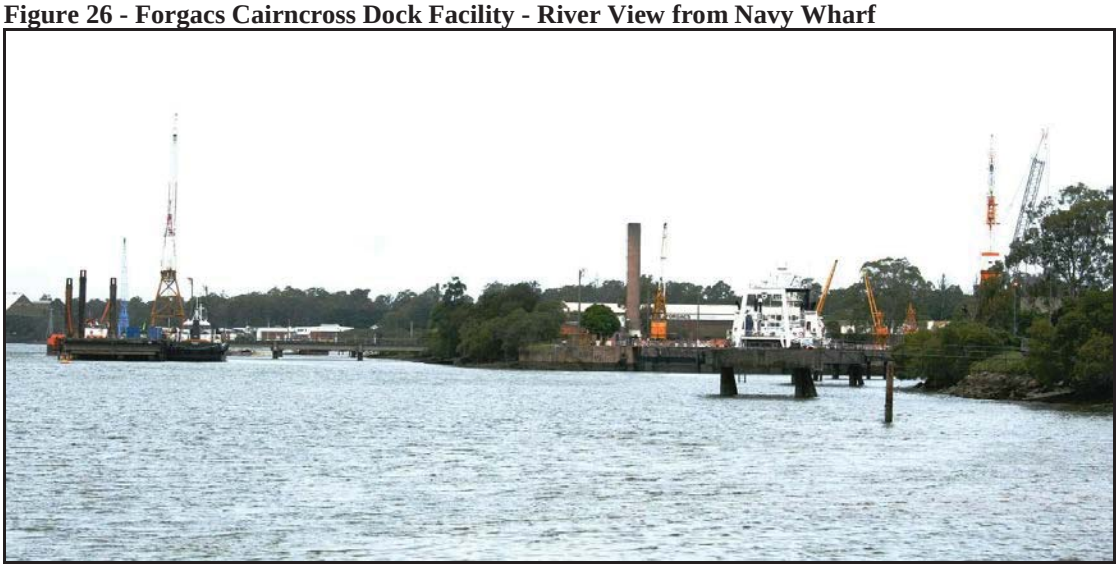
[199] US Subs Down Under – Brisbane 1942-1945, David Jones and Peter Nunan, Naval Institute Press
[200] Figure 24 - Navy Presence - Bulimba Barracks Queensland
[201] Refer Figure 27 - Port of Brisbane Submarine Harbour & Hardstand Concept

Figure 25 - Navy Wharf Bulimba

285 In 2018 or 2021[202] however, Government sponsored dredging will cease upriver of the Gateway Bridge. The FSM will require a reliable bottom depth of at least 9.0 metres and more preferably 9.5 metres, and for this reason at least, a river focussed FSM homeport concept upstream of the Gateway Bridge is not considered.

286 Notwithstanding the unsuitability of Brisbane River sites for FSM homeport consideration, Cairncross Dock, about 2.5 nautical miles upstream of the Gateway Bridge, could potentially have relevance to FSM docking services if it is at that time commercially viable and it maintained an appropriate river access depth – refer Figure 26. Captain Cook Dock at the RAN FBE in Sydney will nevertheless provide the default East Coast docking service support for the FSM.

Figure 26 - Forgacs Cairncross Dock Facility - River View from Navy Wharf



[202] Mr. Peter Keyte – GM Port Operations – Port of Brisbane – 29th March 2011-subject to ongoing discussions between QLD Government and Port of Brisbane

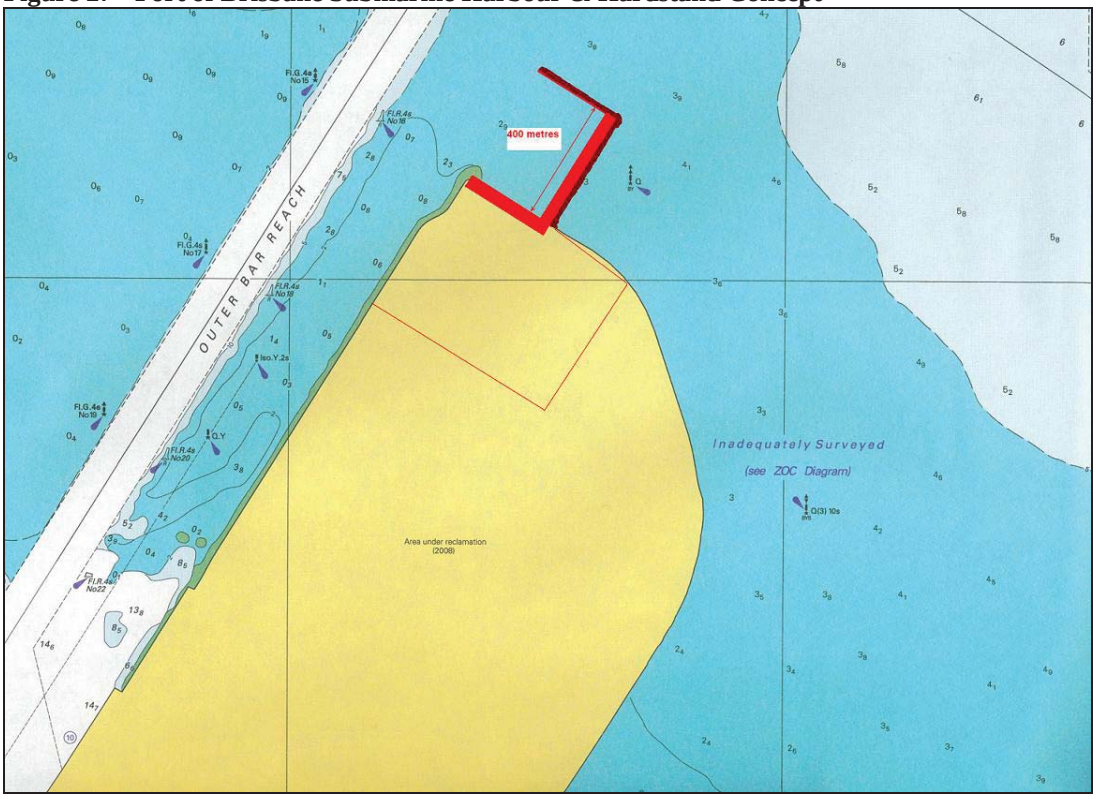
The Port of Brisbane Concept

287 The Brisbane FSM homeport concept centres upon the key Port of Brisbane asset, Fisherman Islands. The wharves and existing land mass that progressively is being reclaimed with spoil from the continuous river dredging process, is about 30% utilised[203]. Reclamation will complete by 2020 around when FSM related capital works need to commence.

288 Figure 27 illustrates a submarine harbour concept discussed with Port of Brisbane Managers[204] at their Port headquarters, and agreed as a concept that they would support. Defence would build the harbour facility and could access hardstand necessary for construction of the essential alongside facilities and services. A commercial lease arrangement would be the formal transaction, and struck on a cost-recovery sub-lease basis for the remaining duration of the Port of Brisbane ninety-nine year lease with the Queensland Government. The proposed wharf adjacent to the hardstand is approximately 300 metres long, and the wharf perpendicular to the hardstand is approximately 400 metres long.

289 As for all of the Port of Brisbane wharves, the proposed submarine harbour would need dredging. Buildings infrastructure and resources not essential to the functioning of the operational port environment could utilise existing Defence land at Bulimba Barracks, which is about twenty-five minutes drive from the Port. These could include training and naval stores facilities – refer Figure 24, Figure 25 and Figure 29.

Figure 27 - Port of Brisbane Submarine Harbour & Hardstand Concept



[203] Mr. Peter Keyte – GM Port Operations and Alan Turner - Senior Manager Operations – 29th March 2011
[204] Ibid.

290 The Fisherman Islands port complex is very much a controlled zone, with extensive video surveillance of the complete facility and all approaches to it. This surveillance, combined with Port Control Tower monitoring of the whole Moreton Bay Port Zone, provides a high level of commercial security. Pedestrian and cycle traffic is not allowed within the port complex.

291 The Queensland Government is ultimate property owner of the facility with Port of Brisbane owning a ninety-nine year lease. The Port of Brisbane sub-lets port land and wharves to tenants such as stevedoring companies who construct their own cranes and related facilities. The Port of Brisbane manages the reticulation of utilities such as electricity.

Figure 28 - View Southeast from Port of Brisbane Headquarters

292 The view at Figure 28 is to the southeast from the Port Headquarters building on the Fisherman Islands complex. Beyond the trees is Moreton Bay and to the left of the image are multiple containers. Beyond those containers is the land under reclamation and at the tip of that land boundary is the site of the potential FSM homeport complex concept – refer Figure 27.

293 A disadvantage of Brisbane as an FSM homeport concept is the long transit north through Moreton Bay, the final stages of which are in a narrow channel that emerges at Caloundra Head[205]. Previous naval basing in Brisbane has been on the Brisbane River and that has extended the already long exit transit duration significantly. This FSM concept focuses on the eastern end of the Fisherman Islands complex that protrudes well into Moreton Bay and at least removes the need to navigate the Brisbane River.

Demographics

294 Brisbane is Australia's third largest city with a population of 2,004,262[206].

[205] Refer Figure 30
[206] Australian Bureau of Statistics (2009-04-23). "3218.0 – Regional Population Growth, Australia, 2007–08".

Figure 29 - Navy, Cairncross, Pinkenba and Fisherman Islands

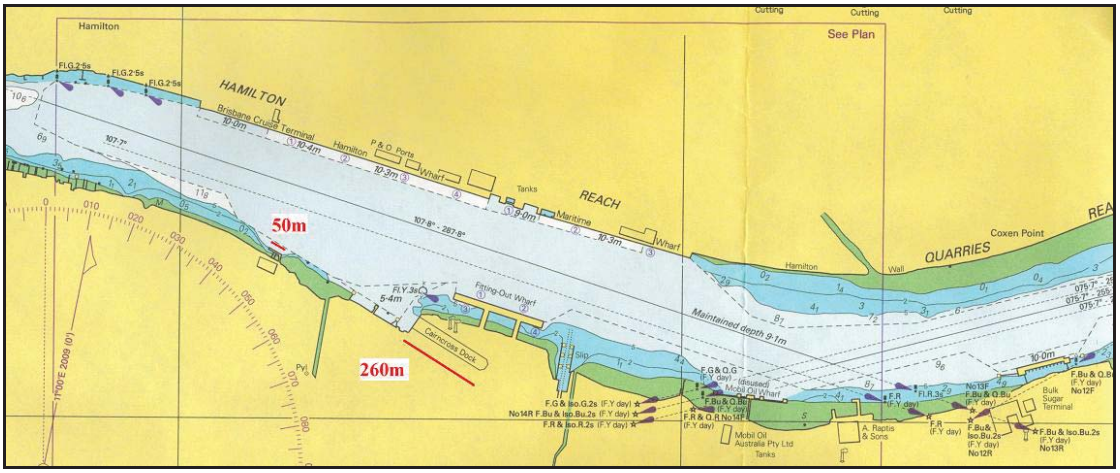
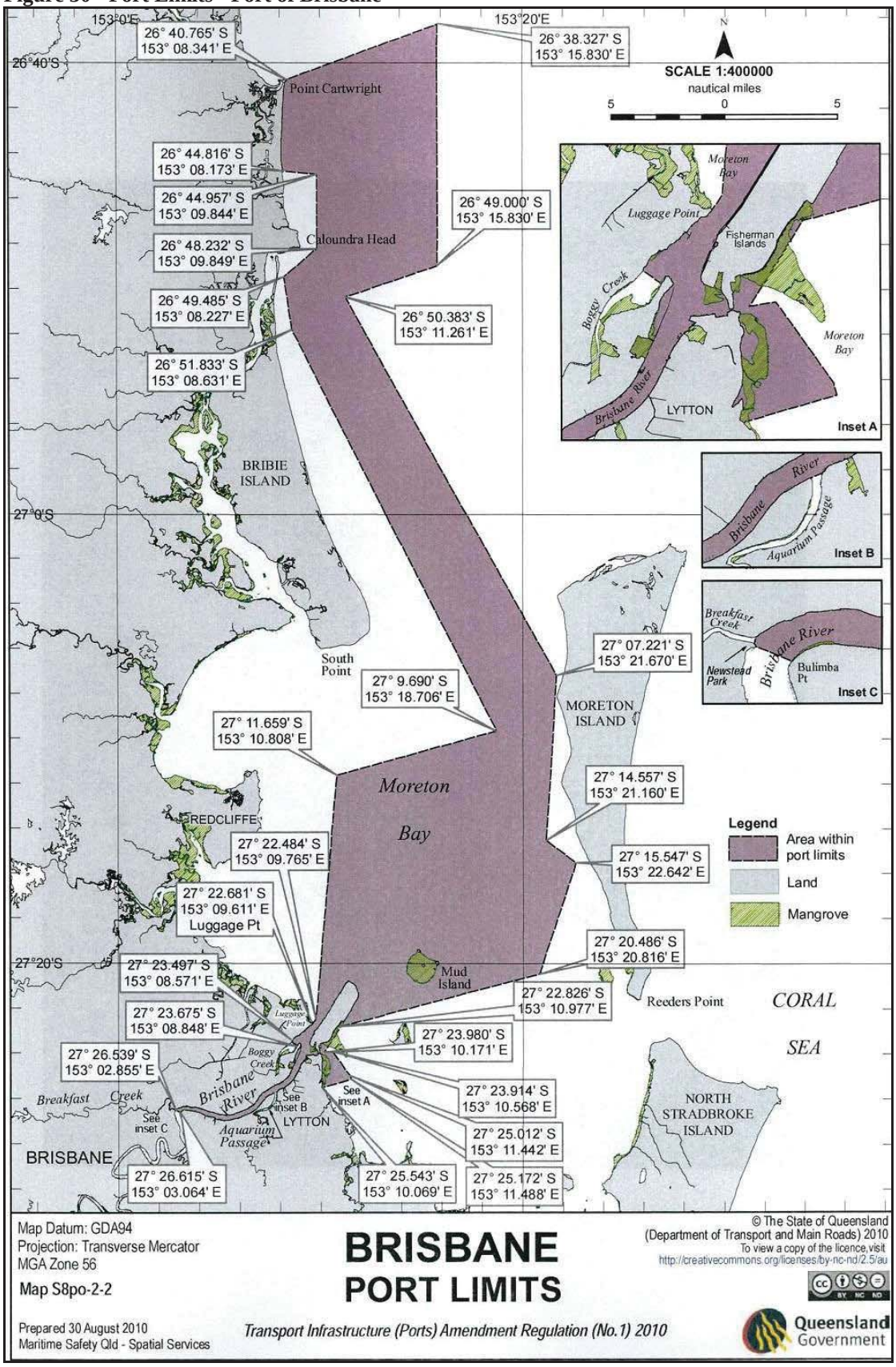


Figure 30 - Port Limits - Port of Brisbane[207]



[207] Image courtesy Queensland Government

295 Population Growth "More than 60,000 people move to Queensland annually, this includes both interstate and international migrants. Queensland's annual population growth is the second largest in Australia at 2.0%, just 0.2% behind Western Australia and exceeding Australia's average population growth of 1.7%. The Australian Bureau of Statistics forecasts continual population growth in Queensland in the coming decades, to approximately 6.1 million by 2026 (24.8% of Australia's total population)".[208]

296 "Cost of Living Brisbane's cost of living is cheaper than other East Coast Australian cities based on Mercer Human Resources Consulting, Worldwide Cost of Living Survey 2010 ie, Sydney (24) is Australia's most expensive city followed by Melbourne (33) and Brisbane (55)."[209]

297 "Housing Affordability Figures released by the Australian Bureau of Statistics in December 2010 show that the median house price in Brisbane was $465,000, less than Melbourne ($501,000) and significantly less than Sydney ($610,000)."[210]

298 Defence Industry "Queensland is now home to 23% of all Australian employees working in the aviation, aerospace and defence industry. Queensland's defence industry represents 26% of the national defence industry, followed by South Australia at 25% and New South Wales at 17%.[211] The Queensland Government recognises defence industry as a priority industry and has developed the Queensland Industry Sector Action Plan. This plan provides an industry development framework."[212]

299 "Queensland based companies operating in the Defence sphere include:

- Airbus Military
- Asia Pacific Aerospace
- Australian Aerospace
- BAE Systems Australia
- Boeing Defence Australia
- Boeing Research and Technology
- Combat Clothing Australia
- GE Aviation Systems Australia
- TAE (Subsidiary Air New Zealand)
- Thales Australia
- Haulmark Trailers
- Insitu Pacific Limited
- Mack Trucks
- MAN Military Vehicle Systems
- QANTAS Defence
- Raytheon Australia
- Rosshaven Marine
- Sikorsky Aircraft Services (Helitech)
- Tropical Reef Shipyard"[213]

300 Port Alma is a deep-sea port near Rockhampton on the southern tip of the Fitzroy River Delta, currently used by Defence for the temporary importation of explosive ordnances stocks.[214]

[208] Queensland Government Defence Industry demographics report 28th March 2011-D.Belham
[209] Ibid
[210] Ibid.
[211] Ibid.
[212] Ibid.
[213] Ibid.
[214] Mr. D. Belham – Mngr. Defence Strategy-Dept.of Employment, Economic Development and Innovation

301 ADF In Queensland "With a geographic location complementing the ADF's strategic need to base and deploy forces in northern Australia, Queensland is home to approximately 25% of ADF personnel."

302 "Queensland is the second largest location for ADF employment in the country with HMAS CAIRNS, four Army Brigades, Army Aviation Centre Oakey, RAAF Base Amberley – the designated future 'mega base', RAAF Base Townsville and a major training facility at Shoalwater Bay in central Queensland."[215]

303 Queensland provides dedicated military training areas at:

- Shoalwater Bay (Rockhampton)
- High Range (Townsville)
- Wide Bay (Tin Can Bay)
- RAAF Base Scherger (Weipa)
- Cowley Beach (Innisfail)
- Jarrah Creek (Tully)
- Canungra"[216]

304 "Universities in Queensland that provide qualifications directly suited to the (Defence) industry are:

- University of Queensland (UQ)
- Queensland University of Technology (QUT)
- Griffith University
- Central Queensland University"[217]

Conclusion

305 The Port of Brisbane FSM homeport concept, supported by Port management involves leasehold access by Defence of hardstand and water frontage to Moreton Bay, onto which construction of a submarine harbour could take place. This Greenfield development[218], supplemented with Defence owned Bulimba land for homeport functions not necessary at the wharf, could provide most of the functionality required. Remoteness from combined exercise areas, ammunitioning facilities and the Captain Cook Dock however, constrains its ability to function fully as an FSM homeport. If a closer exercise area is designated eventually, if Port Alma (north Queensland) is consolidated as a Queensland ammunitioning port, and if local submarine docking functionality is developed, remoteness from Sydney would be a much lesser constraint. This Port of Brisbane concept otherwise better suits a forward operating base role.

[215] Ibid.
[216] Queensland Government Defence Industry demographics report 28th March 2011-D.Belham
[217] Ibid.
[218] Except for the Defence owned land at Bulimba

Annex E: NSW - Port Stephens

Introduction

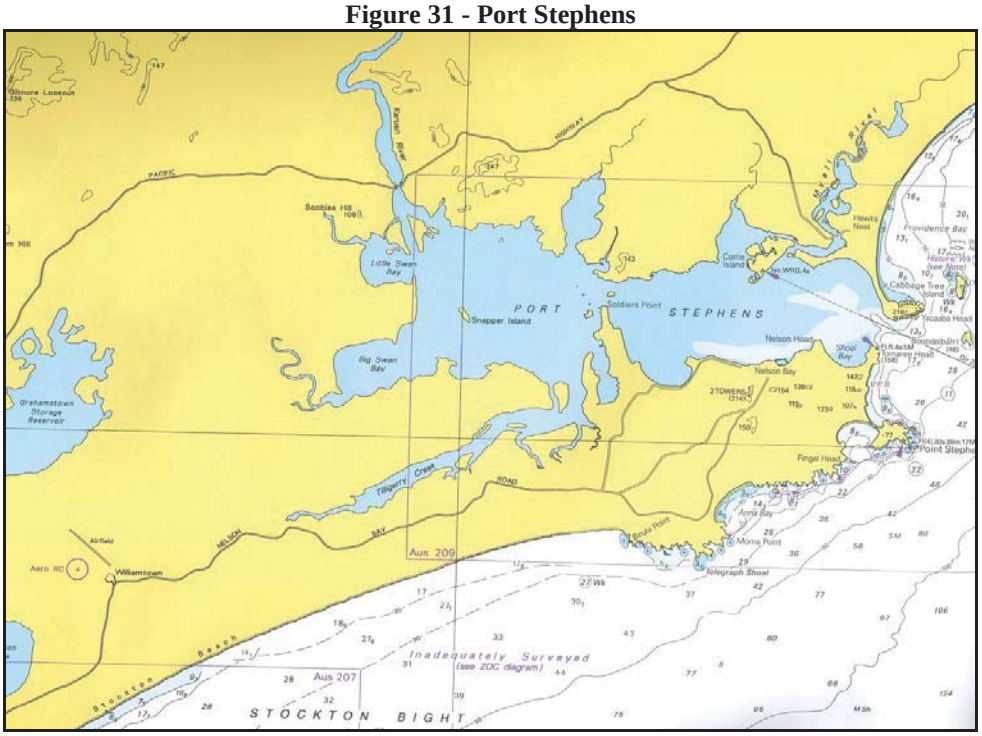
306 Port Stephens is a large natural harbour about three hours driving north of Sydney and about an hour north of Newcastle. Its regional population is 32,000.[219]

Discussion

307 Port Stephens was considered to be potentially suitable as an alternative fleet base location in the 1992 study[220] although "it had significant drawbacks, in particular:

- The entrance channel was too shallow (5m deep in places) and would require extensive initial dredging and continual maintenance dredging
- Access is difficult in adverse weather
- The tidal stream is undesirably strong (5kts)
- Local industry would probably be significantly affected (major oyster farming operations, tourism, leisure and fishing industries)
- Dredging and reclamation would be required for alongside berths
- Private land (with possibly some houses) would have to be acquired for the shore facilities

Figure 31 - Port Stephens



Conclusion

308 Port Stephens has not been actively considered as a potential East Coast FSM homeport at least because it is not a part of, or close to a major population centre and therefore could not reasonably satisfy the requirements of the chapter "What Would an Ideal RAN FSM Homeport Provide?"

[219] Australian Bureau of Statistics 2006 census
[220] Fleet Base and Armaments Complex Locations Review – Department of Defence – July 1992

Annex F: NSW - Newcastle Port

Introduction

309 Newcastle is a city of 288,732[221] people that is one-hundred-and-fifty-eight kilometres north of Sydney. Sydney's northern suburbs are about two hours drive away and routine train travel to Sydney takes about 3 hours. Although it is not a major population centre it is within reasonable travelling time of the Central Coast region that is about half way between Sydney and Newcastle. The Central Coast is a popular housing location for people wishing to commute to either Sydney or Newcastle.

310 The Newcastle Port Corporation is in rapid growth phase, and is keen to include Navy in the evolution of its planning concepts.[222]

Figure 32 - Newcastle Port - Southern End

Discussion

311 Coal and wine are both well-known products of the Hunter Valley region. Both are relevant to Newcastle Port Corporation growth. Hunter Valley black coal is the primary export through the Newcastle Port and is its primary focus. The grape industry however indirectly adds depth to Port revenues via the attraction that it provides to the visiting cruise ship industry.

[221] Australian Bureau of Statistics (25 October 2007). "Newcastle (Urban Centre/Locality)". 2006 Census QuickStats.
[222] Mr. M. Baudinette–GM Trade & Port Development–Newcastle Port Corporation–1stFebruary2011

312 RAAF Williamtown is a significant contributor to the Newcastle economy and acts as host to the local civilian airport business. Air Force FA-18 aircraft operate from RAAF Williamtown.

Commuting

313 Most Newcastle suburbs are within thirty minutes driving time of the Port of Newcastle. Gosford at the Central Coast of Newcastle is seventy-six minutes driving time south via the Newcastle-Sydney expressway.[223]

Housing Affordability

314 The median house price in the Newcastle region is $361,000[224]. The median house price in the Gosford (Central Coast) region is $365,000[225].

Education

315 The University of Newcastle and the Hunter Institute of Technology are the primary tertiary educational institutions in Newcastle.

Figure 33 - The Mouth of Newcastle Harbour

The Newcastle Port Concept

316 The southern end of the Newcastle Port, refer Figure 32 is the primary area of interest, and in particular the Eastern Basin berths 1 and 2, identified in Figure 36 by the highlighted number "12". The highlighted number "1" shows the mouth of Newcastle Port in the same Figure and its view at sea level is at Figure 33.

317 Eastern Basin No.1 and No.2 have an alongside water depth of 11.6 metres and each of these berths will suit ships with a length overall of up to two-hundred-and-sixty-two (262) metres with a maximum beam of thirty-five (35) metres. The adjacent area currently provides for 10,000 square metres of uncovered storage as well as a 7,120 square metre storage shed – refer Figure 34.

318 Alternatively, Western Basin No.4, shown as the highlighted number "11" in Figure 36 is of secondary interest. It similarly has a water depth of 11.6 metres and can berth ships with length overall of up to two-hundred-and-sixty-two (262) metres with a maximum beam of thirty-five (35) metres.

[223] Calculated via Google Maps
[224] Source: www.domain.com.au on 4th April 2011
[225] Ibid.

Figure 34 – Newcastle Eastern Basin No.1 and No.2 with 7,120 m2 Storage Shed

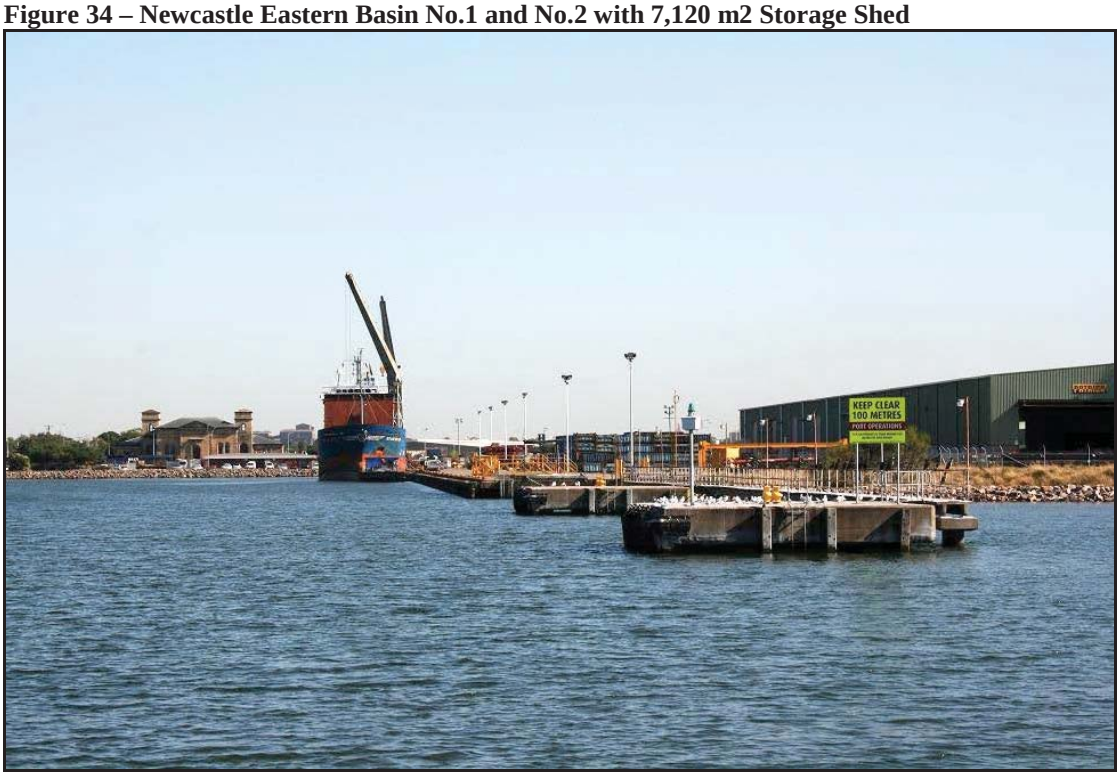


Figure 35 - Newcastle Western Basin No.4

319 The Newcastle Port Basin has the benefit of being reasonably isolated from debris that floats down the Hunter River and away from the routine coal carrier and occasional cruise ship traffic that traverses the Port. Submarines entering or leaving the port would nevertheless have to merge with relevant merchant ships traffic in the main channel from or to its mouth respectively.

Figure 36 - Newcastle Port Southern Zone Defined[226]

320 Defence access to whichever wharf and land combination may be agreed ultimately, would be on commercial terms, via outright purchase or lease.[227] The land and shed now associated directly with the Eastern Basin berths would be sufficient in size to accommodate all anticipated alongside facilities and services

[226] Image courtesy Port of Newcastle
[227] Mr. M. Baudinette–GM Trade & Port Development–Newcastle Port Corporation–1stFebruary2011

required for an East Coast FSM homeport, however a decade hence it would probably be demolished to make way for a purpose built facility.

321 The capacity of RAAF Williamtown medical, dental and some other services may increase to service the needs of a Newcastle Port based FSM squadron.

The Newcastle Port

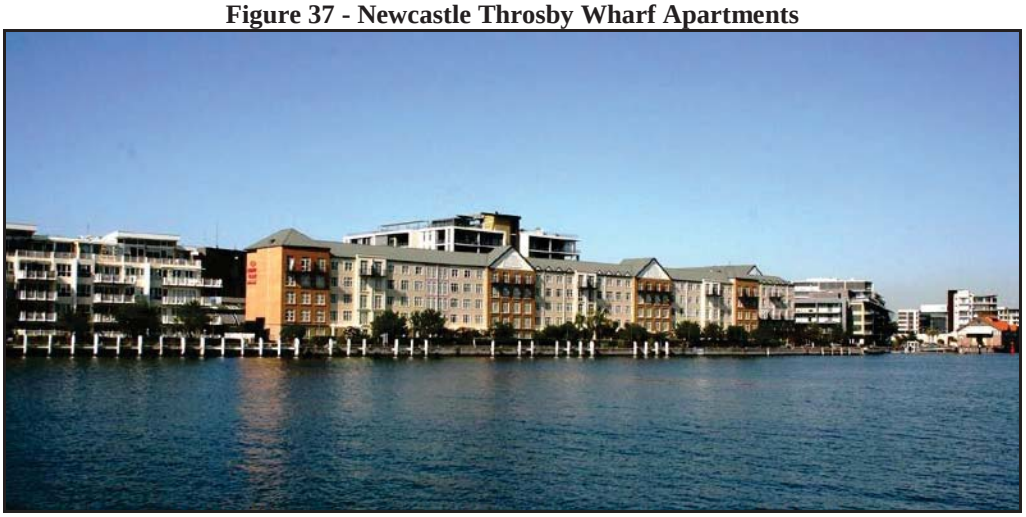
322 The Newcastle Port is growing rapidly. The present 3,000 ship movements per annum will grow to about 5,500 by the year 2020. The port operates 24 hours per day and the current average 8.3 daily ship movements is forecast to reach 15.2 daily ship movements by 2020. The largest ore carriers are grouped so that three or four enter or leave the Newcastle Port during a short window that includes high tide. If six large ore carriers were to leave in the four hours of each of two daily high tides, that would leave about 9 ships to be moved into or out of the port daily within the remaining 20 hours. The potential movement of submarines within this level of shipping density should be manageable.

323 "The port closes for about 144 hours per annum due to southeast weather, sea-state and tide combinations at the mouth."[228]

324 Tugs in Newcastle are typically too large and too powerful for use with submarines and either Navy or a local contractor would need to purchase a smaller more appropriate one that would minimise the prospect of hull and hull systems damage.

325 The proximity of residential buildings will limit the visual security and privacy attainable by an FSM base at Newcastle Port Basin – refer Figure 37.

Figure 37 - Newcastle Throsby Wharf Apartments



[228] CMDR M. McIntosh RAN Navy Master Attendant – Senior Pilot - The principle concern is loaded Panamax and Cape vessels due to draught with respect to available water depth. For smaller vessels, the more dangerous conditions are when the south easterly prevails, and a heavy swell meets an ebb tide. This produces steep waves in both the channel and approaches. Waves in the harbour approaches can give a wave height of up to 7 metres in these adverse conditions. From a submarine perspective such conditions would prevent upper deck movement other than conning from the fin.

326 Compared with FBE however, there should be no restrictions imposed upon normal submarine alongside routines, including the running of diesel engines. The noise from these activities is likely to be insignificant compared with the general noise and industrial activity levels of Forgacs and the Newcastle Port in general.

327 Newcastle Port Corporation is developing solutions for the cruise ship industry that will enable the convenient berthing of the larger cruise ships forecast, and for the prompt immigration processing of associated passengers. Figure 38 illustrates a cruise ship coming alongside the berth with highlighted number "17" in Figure 36. This berth "Dyke No.2, is just north, but nevertheless quite close to the East Basin area that is the focus of this Newcastle Port concept; further weakening the visual security aspiration. Newcastle Port planning identifies this berth also for future Navy ship visits when Throsby wharf eventually is declared derelict.[229]

Figure 38 - Aerial Image - Port of Newcastle[230]

328 Re-development planning for Newcastle Port Land has identified an area to be zoned light industrial[231], which could serve the businesses that would be encouraged to establish a nearby presence in support of relevant FSM platform systems.

329 The primary business of Newcastle Port Corporation understandably is to process ships as expeditiously as practicable to earn revenue with minimum cost overheads. A new coal-loading wharf under construction now will significantly increase the daily volumes moveable through the port. The daily challenge for Newcastle Port Corporation is to ensure that every fully loaded ship is able to exit the port promptly and that a waiting one can take its place with minimum delay. Where ship movements depend upon high tide, the ongoing challenge will be to use technology and improved coordination to move more and more ships at the high tide 'window'.[232]

330 The adjacent Forgacs floating dock facility at Carrington[233] is significant to the inclusion of Newcastle in possible East Coast homeport sites for future submarines; however, this study is unable to project whether it will be in viable commercial operation in 2026/2027. "The Newcastle Port Corporation strategic plan identifies the Carrington suburb as a marine precinct which includes ship building, ship repairs etc."[234] If an equivalent facility is available when FSMs operate on the

[229] Mr. M. Baudinette–GM Trade & Port Development–Newcastle Port Corporation–1stFebruary2011
[230] Image courtesy Port of Newcastle
[231] North west of the Basin area if The Port, about 10 minutes drive time.
[232] Mr. M. Baudinette – Ibid.
[233] Refer Figure 39
[234] Ibid.

East Coast, it will enhance prospects for a Newcastle Port role. Captain Cook Dock (FBE) is the default docking services provider for East Coast FSM planning nevertheless, and its proximity eighty nautical miles south is reasonable for normal submarine operations planning.

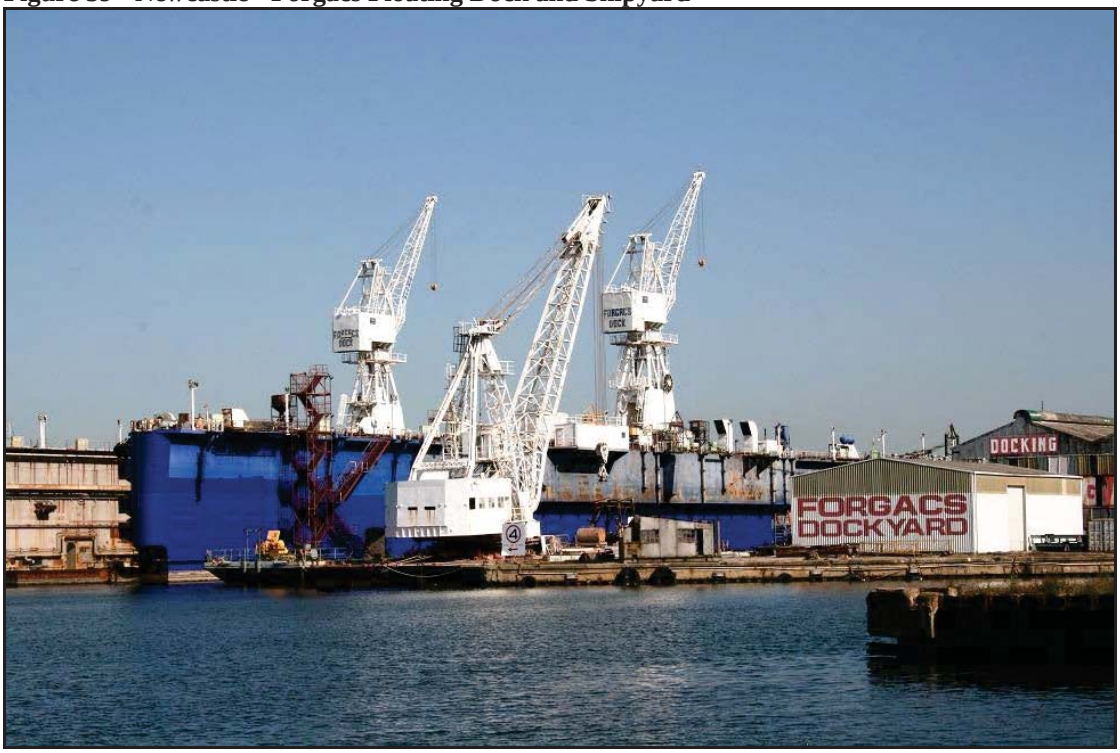
Defence Industry

331 The Hunter Valley region has its own Defence Marketing organisation generated by the Hunter Economic Development Corporation. The NSW Department of State and Regional Development is a key member of the organisation.

332 Major ADF bases in the region are RAAF Base Williamtown and the Singleton Military Area – Lone Pine Barracks. Significant Defence projects undertaken locally include:

- Construction of six Huon Class Minehunters (MHC) – ADI Limited, Carrington
- Assembly of 21 Lead-in-Fighter (Hawk) aircraft for the RAAF – BAE Systems, Williamtown
- Upgrade of the F/A 18 Hornet – BAE Systems, Williamtown
- Docking of HMA Ships Kanimbla and Manoora – Forgacs Shipbuilding, Carrington
- Refit of HMAS Parramatta – Forgacs Shipbuilding, Carrington
- Major Upgrade of F/A 18 Hornet – Boeing Australia
- Participation in the Joint Strike Fighter Project – Varley
- Construction of AWD hull components – Forgacs Shipbuilding, Carrington

Figure 39 - Newcastle - Forgacs Floating Dock and Shipyard



Conclusions

333 The Newcastle Port concept is largely a Greenfield development but it has an advantage of available wharves and a basin that is separate from the main river traffic. Newcastle Port is at the northern end of the East Australia Exercise Area and Sydney is easily accessible by water, road and rail. Housing in the Newcastle region and in the nearby Central Coast region is generally the cheapest of all housing regions applicable to this study. Defence contractors should readily support an FSM squadron homeported in Newcastle.

334 Newcastle Port and the NSW State Government support the concept of an FSM homeport within the Newcastle Port environment. The planned increases of coal carrier shipping traffic, the highly visible Eastern Basin location, and the sometimes-hazardous Port entrance, (due to inclement sea conditions), are decision inhibitors; these may be manageable however.

Annex G: NSW - Fleet Base East

Introduction

335 FBE centred on Garden Island and its dockyard in Sydney, is under stress. Encroaching urbanisation, the procurement of larger warships and the challenges presented by lobby groups such as the Cruise Ship Industry, make Fleet Base planning very difficult for those tasked with that responsibility. The concepts of also basing future submarines and undertaking their docking activities there are just two more elements to the overall stressful planning equation.

336 Notwithstanding the challenges however, there perhaps is no more intuitive location for the potential East Coast homeport of future submarines than Garden Island Sydney.

Figure 40 - The Cruiser Wharf and Buildings of FBE

Discussion

337 Sydney is the most popular East Coast posting preference location for submarine qualified personnel[235]. It is currently Australia's largest city and offers many of the services and experiences sought by naval families. Although travel to and from home to all Sydney naval bases is lengthy, (typically 1-2 hours), it nevertheless is recognised as being the heart of the Fleet and from a young populist perspective, is a relatively exciting place to be.

Commuting

338 There are few opportunities for new naval families to live close to the harbour because of the high cost of residential dwellings, but if adequate naval car parking remains available close to the work environment, and if motorway tolls are generally acceptable, then transit times to/from the outer suburbs are generally reasonable albeit stressful. Examples (calculated via Google Maps) are:

- Kingswood – 51minutes
- Richmond – 52 minutes
- Rosemeadow – 58 minutes
- Wollongong – 1 hour 26 minutes
- Emu Plains – 52 minutes
- Campbelltown – 54 minutes
- Central Coast – 1 hour 14 minutes

[235] Refer -

339 Train travel also provides viable travel alternatives. Many commuters daily make the two-hour train trip from Gosford located in the central coast region north of Sydney.

Defence Industry[236]

340 The NSW Government made a $75 million commitment in its 2010/11 Budget to build the State's Defence industry and has set a target to secure 30 per cent of Australia's in-country defence spend by 2019. It aims to create more than 1,500 new jobs in defence-related industries by 2013.

341 The NSW Government is focusing on a number of key areas, including the targeting of major defence projects and sustainment opportunities from the Commonwealth's Defence Capability Plan.

342 It is developing the Macquarie Park Defence Technology Hub in Sydney's north-West. Benefits of the Macquarie Park Defence Technology Hub will include:

- Highly competitive rates
- Prime business location for high technology companies
- Clustering and consortium building opportunities
- Strategic base for targeting Commonwealth defence contracts
- Excellent transport links including to the M2 Motorway and Macquarie Park Railway
- Large population of highly skilled workers
- A Greenfield site providing opportunities to develop customised facilities
- Close to research and education facilities

343 This Hub aims to strengthen NSW's focus on winning high technology Defence projects which can employ the State's research and educational strengths, and create high quality skilled jobs.

Status Quo FBE Submarine Capability

344 FBE has a status quo capability to berth four CCSM at West Wall[237]. The number of submarines that may form an East Coast squadron has not been determined, however more than four would require creation of additional wharf capacity in order to accommodate surface ships displaced from berth(s) by the additional submarines.

345 The four berths at West Wall comprise two inboard and two outboard berths, but only the two inboard submarines have access to the normal minimum set of alongside services expected as standard in a homeport environment. The outboard berths may also interfere with vessel movements into or out of Captain Cook Dock, and cause the temporary relocation of those submarines. These West Wall berths however are simply berths that are located within a dockyard environment, and do not on their own form a submarine homeport.

[236] Extracts from NSW Government Web site; < http://www.defence.nsw.gov.au/nsw-defence-industry/strategy>
[237] Also known as West Dock Wharf or West Dock Wall – Refer Figure 48.

346 Unlike surface warships that typically have an onboard and resident administration capability whilst alongside, submarines do not, and their homeport berths should be reasonably close to the building that forms the administrative and operational ‘heart’ of the squadron.

FBE Homeport Concept(s)

347 In seeking to create a submarine ‘base atmosphere’ within the confines of the Garden Island Dockyard the following considerations are significant:

- Water depth must be at least 9.5 metres
- Four submarines (as a minimum) would simultaneously require alongside berths with all relevant facilities
- The berths must be sheltered from easterly / north-easterly weather
- All submarine berths should be within easy walking distance of their squadron headquarters and administrative centre

348 Consultation with the architects of the Garden Island Redevelopment Plan, Power Initiatives Pty Ltd[238], has provided an early informal indication of possible FBE-centric homeport solutions.

349 That consultation identified two prospects for the creation of an FSM homeport environment within Garden Island under its proposed redevelopment plan. One is to use existing weather-protected berths on the Western side of the complex and the other is to create a new protected basin on the eastern side. Adjacent buildings would house necessary submarine-force support activities

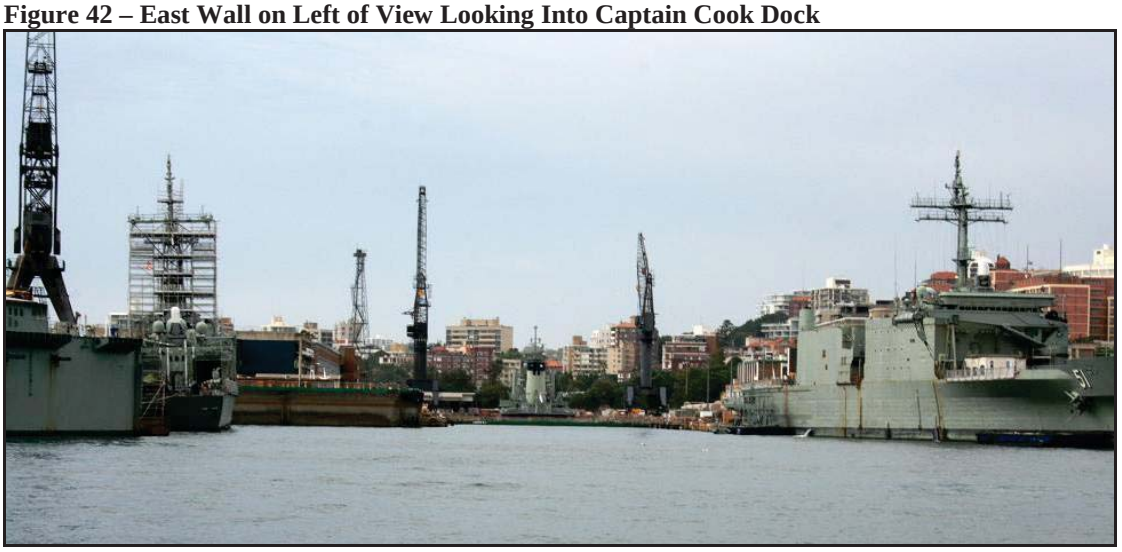
Figure 41 - Building 89/90 Garden Island Sydney

[238] Power Initiatives Pty Ltd – Mr. Mark Power, Director

Western Side Berths

350 If four submarines alone are to be homeported at FBE, the favoured concept is to berth all four at East Wall[239] (East Dock Wharf) or the adjacent Cruiser Wharf[240].

Figure 42 – East Wall on Left of View Looking Into Captain Cook Dock



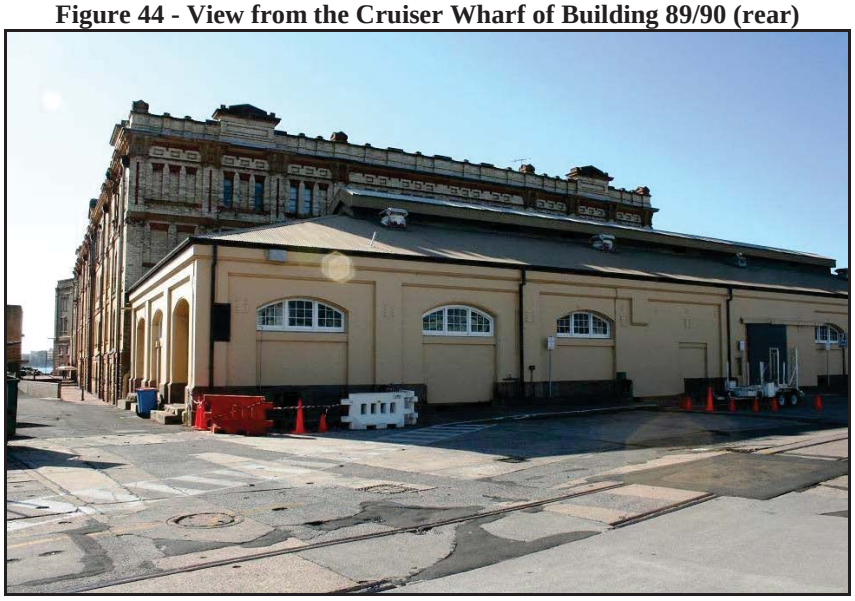
351 Figure 42 reveals an FFG Class ship with scaffolding erected around its masts, berthed at East Wall. Evident also in this image is the depth of the berth, and that outboard submarines would not require relocation because of dock movements.

352 The building complex nominated here to support the future submarine force is building 89/90. This combined building has over 10,000 square metres of floor space and has direct access either from the eastern or western sides of Garden Island. Refer Figure 41 and Figure 44.

Figure 43 – Cruiser Wharf Garden Island Sydney

[239] Refer Figure 42
[240] Refer Figure 40 and Figure 43

Figure 44 - View from the Cruiser Wharf of Building 89/90 (rear)

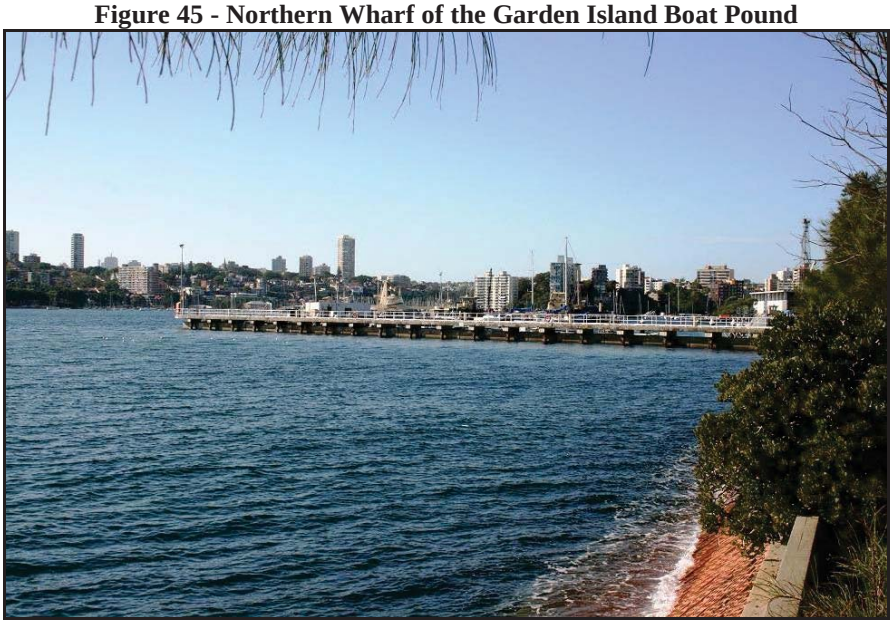


Eastern Side Berths

353 All eastern side (of Garden Island) berth options would require the construction of a protective wall or wharf that would shield berthed submarines from easterly weather conditions.

354 Figure 48 includes a simply sketched concept for a new wharf on the eastern side of Garden Island, that could provide appropriate weather protection of submarines berthed within the enclosed waters, as well as eastern side berthing for surface ships. The manoeuvring of submarines into and out of similar berths under tug assistance requires a minimum water distance from the wharf's inside edge to the edge of Garden Island of about 75 metres.[241] The northern wharf of the existing Garden Island boat pound shown at Figure 45 provides a ready example of a wharf of this dimension.

Figure 45 - Northern Wharf of the Garden Island Boat Pound



[241] Based upon discussions with the RAN Pilot (LCDR G. Savvakis RAN) at FBE – January 2011

Submarine Docking Issues

355 Captain Cook Dock is an Australian Defence strategic asset and at the conclusion of the current Thales contracted stewardship in 2013, is to revert to direct ADF control[242]. Regardless of its ownership or management status however, it is the East Coast docking facility most likely to be operational when the future submarines require their first sustainment docking services in 2026/2027.

356 Sustainment docking of the CCSM occurs typically in two different places. Intermediate and mid-cycle dockings, of twelve and eighteen week durations respectively, occur at Henderson in Western Australia. Full cycle dockings, theoretically 104 weeks duration, occur at Osborne a suburb of Adelaide. It is not yet known how docking services will be managed for the FSM; however, it is reasonable at least to plan for intermediate and mid-cycle dockings to be conducted near to the FSM homeport, and possibly also the full cycle docking.

357 Annex U: Usage Upkeep Plan/Cycle examines the demands that an FSM fleet of twelve submarines will make upon homeport berths and upon docking facilities. It concludes that for a fleet of 12 FSM, the ADF will need a minimum capability and capacity to have three submarines clear of the water concurrently, regardless of whether the full cycle docking duration is the theoretical status quo 104 weeks or an aspirational duration of 52 weeks. This conclusion assumes that the docking facilities would each undertake:

- Intermediate dockings, and
- Mid-cycle dockings, and
- Full-cycle dockings

358 The CCSM approach of undertaking FCD dockings at a great distance from the homeport and separating them from the local site of intermediate and mid-cycle dockings, and contracting the Class building entity to undertake the FCD work package, is not examined in this study.

359 The term “docking facility” as used here does not necessarily mean a separate dockyard. It does mean that from time to time according to the maintenance planning for the FSM that three submarines will need to be clear of the water and undergoing maintenance, repair or upgrade activities. This could all be in one location with each submarine mounted in a structural frame on a hardstand area, such as at Henderson for example. Similarly, it could be all in one conventional graving dockyard with each submarine mounted on a floating barge[243], or in a floating dock, or in the graving dock; or a combination of each. Alternatively, three different shipyards or commercial docking entities could be involved.

360 Prior to any consideration of basing or docking future submarines on the East Coast, an assessment of Captain Cook Dock (the graving dock) determined that it has the capacity to meet the planned needs of the future surface fleet.[244] An informal assessment of its capacity to accommodate also the FSM identifies some significant issues, and requires an acceptance that additional investment would be required for

[242] Mr. A. MacKinnon – Director Naval Infrastructure Planning
[243] Refer Figure 46.
[244] Mr. J. Blansjaar - MSD Garden Island Development Plan Integrator

the graving dock. The issues relate principally to maintaining flexibility with management of the dock such that it can intrinsically dock two vessels of any RAN Class concurrently.[245]

Figure 46 - Submarine Slave Dock (or Barge)[246]

361 Captain Cook Dock is large by any standards, and is equipped with a caisson[247] that can divide its length into two sections to enable two vessels to separately be held clear of the water. The outer section however is only long enough for a vessel of 100 metres, and although this is theoretically long enough for an Australian submarine, the conduct there of a full cycle docking (52-104 weeks) would probably constrain the inner section vessel to being non operational for that same period[248]. This would be operationally unacceptable.

362 A concept has existed for about thirty years of modifying the dock so that the caisson (or a new one), could be positioned such the dock could be divided more equitably and enable two destroyer sized (at least) vessels to be docked concurrently. If this was achieved then any vessel of destroyer size or less that required a long period clear of the water, could be docked in the inner section whilst still enabling vessels of similar dimension to be docked more frequently in the outer section. The cost of undertaking this modification is significant.

363 Another approach, which may be required regardless of the caisson modification, is to use the dock briefly to mount submarines on barge platforms[249] and then tow them outside of the graving dock to appropriate dockyard berths where the necessary maintenance or upgrade work can be undertaken. This approach enables submarines that are to be docked to enter and leave the graving dock quite quickly and in so doing maintain schedule flexibility for the dock management. Cost impacts of this approach however are the acquisition of the floating barge(s), and the commitment of sheltered berth(s) within the dockyard that are reasonably close to the relevant workforce resources, further compounding the shortage of FBE berths.

364 A squadron of four future submarines could conceptually be homeported at FBE without substantial new investment in buildings or wharves, or an East Coast squadron of future submarines could undertake its scheduled docking activities there subject to new investment in the dock. A squadron of four submarines however could not both be homeported there and undertake its docking activities without substantial investment in both the dock and construction of a new berth. Based upon

[245] Mr. J. Blansjaar – MSD Garden Island Development Plan Integrator – 23rd March 2011
[246] Image courtesy Mr. J. Blansjaar, Ibid.
[247] Moveable wall that holds the water out
[248] Assuming that the submarine hull was not watertight and the dock could not be flooded for the full duration of its docking activity.
[249] Known also as “Slave Docks” – refer Figure 46.

Navy infrastructure planning[250], more than four submarines homeported at FBE would require new wharf investment regardless of any commitment to undertake docking activities at the same facility.

New Wharves

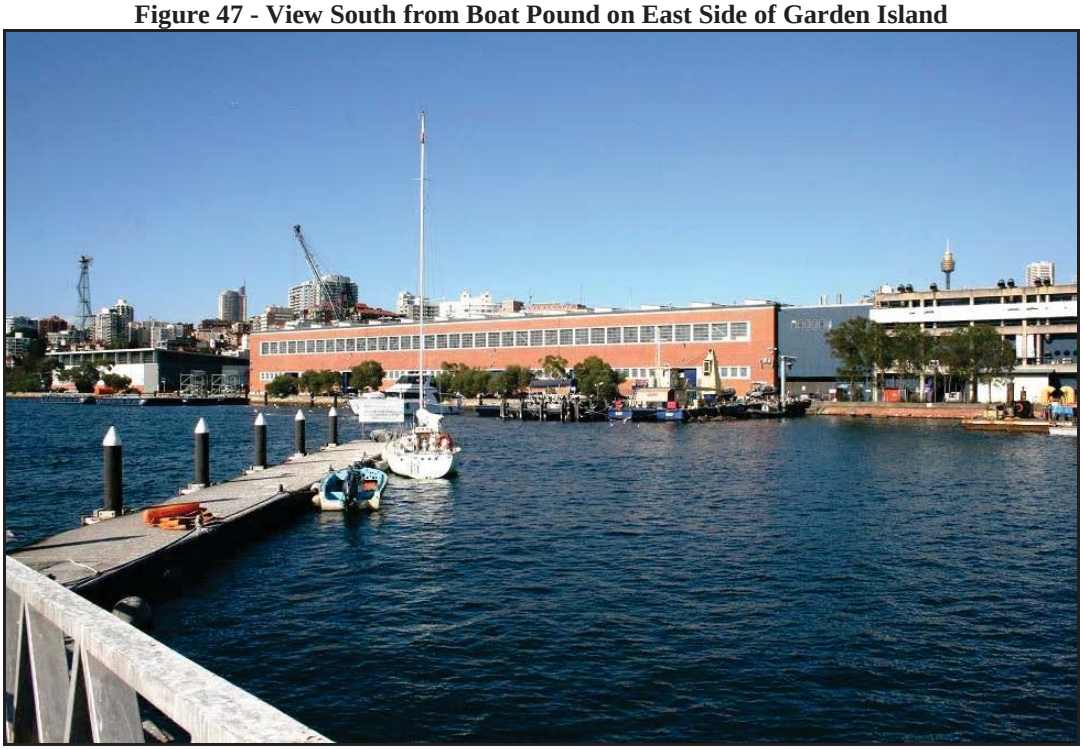
365 FBE has a status quo capability to berth four CCSM at West Wall, a dedicated berthing location collocated with the adjacent wharf building constructed specifically for submarines, but is not currently used for that purpose. With the Garden Island redevelopment concept in mind the preferred FSM berthing for four submarines is at East Wall, immediately opposite the existing berths and adjacent to Building 89/90 which is nominated to house FSM support activities.

366 If more than four submarines are homeported at FBE then additional berths will be required. Similarly, if future submarines are to undertake all docking activities at Garden Island then additional berths to accommodate the barges or floating docks upon which they sit will be required.

367 If FSM berths were to be provided at FBE via the construction of a new basin or boat harbour on the eastern side of Garden Island, then the number of berths potentially available for surface ships would also increase because some could be berthed on the eastern side of the new wall or wharf.

368 If FSM berths were to be provided at FBE from existing berths on the Western side of Garden Island (say Cruiser Wharf) however, then compensating berths elsewhere would be required.

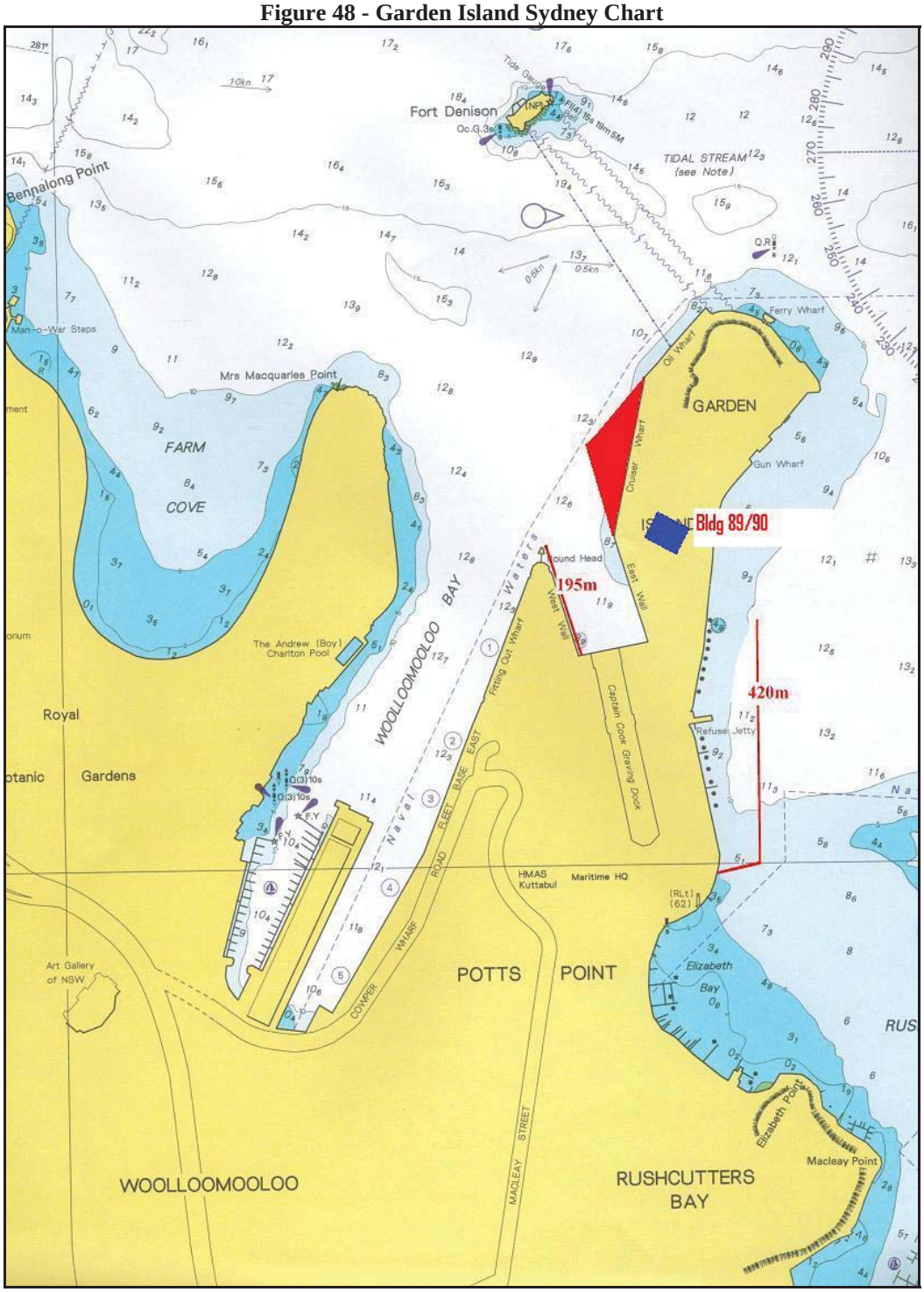
Figure 47 - View South from Boat Pound on East Side of Garden Island



[250] Mr. A. MacKinnon – Director of Naval Infrastructure Planning

369 A number of new wharf concepts for Garden Island exist that could satisfy this obligation - Figure 48 illustrates two of them, one on the West and one on the eastern side. Perhaps the least intrusive concept in terms of public perception would be to modify the wharves on the Western side of Garden Island. The extension of East Dock Wharf and the extension of the Oil Wharf until they both meet at a point roughly in line with The Fitting Out Wharf, would create limited additional berths – refer the red triangle graphic of Figure 48. A detailed analysis by those who understand the complete demand for FBE berths is required to determine whether this additional wharf length would be sufficient.

Figure 48 - Garden Island Sydney Chart



370 The many other design concepts for new wharf space at Garden Island are based either upon wharves that extend from the eastern edge of Garden Island, or else upon a wharf that effectively reclaims some land from the adjacent naval waters. Any building activity undertaken on the eastern side of Garden Island would likely attract the attention of Rushcutters Bay residents, and would require careful management. Figure 47 illustrates the view towards the southern Garden Island boundary that would be affected by the construction of a new wharf on the eastern side.

Conclusions

371 FBE is an intuitive location for an East Coast FSM homeport. Initial assessment of the viability of such a concept is favourable in that there is a status quo berthing capacity for four CCSM, and the redevelopment concept for Garden Island promises to provide spare capacity within existing buildings.

372 A closer examination however reveals that the combination of a homeported FSM squadron, together with the commitment to undertake all of its scheduled docking activities, almost certainly exceeds the capacity of Captain Cook Dock and of the FBE wharves, when combined with legacy commitments to the surface fleet.

373 Capital expenditure to build more flexibility into the management of Captain Cook Dock would address submarine scheduled docking capacity limitations, but that newly acquired flexibility would probably demand, as part of its implementation cost, the status quo berthing capacity now available to submarines.

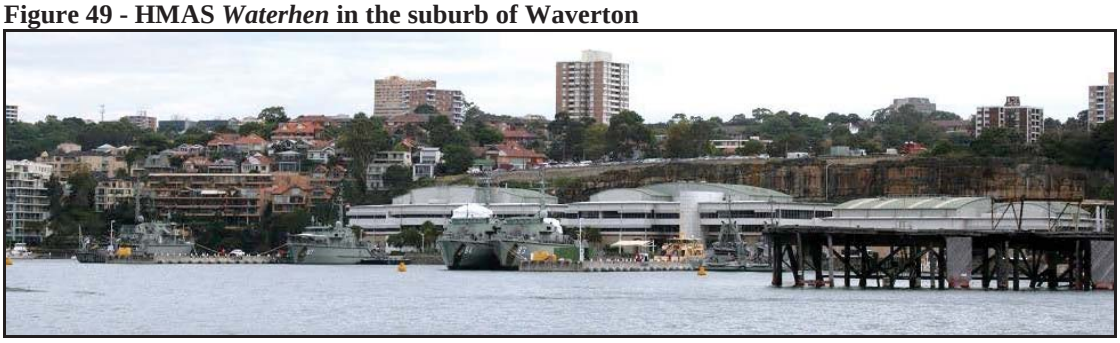
374 This study assumes Garden Island and its Captain Cook Dock is the venue for an East Coast FSM docking capability because it is the East Coast docking facility most likely to be still operational in 2026/2027. There are alternatives to FBE for an FSM homeport however, and this study concludes that for FBE to act also as an FSM homeport, new wharf capacity would be required.

Annex H: NSW - HMAS Waterhen Extended

Introduction

375 HMAS *Waterhen* in Balls Head Bay Sydney Harbour is home to Navy's Sydney based minor war vessels and associated teams.

Figure 49 - HMAS *Waterhen* in the suburb of Waverton



376 The potential for *Waterhen* to be an East Coast FSM homeport has been assessed at two levels which are:

- The role of *Waterhen* changes and it exclusively becomes a submarine base, or
- *Waterhen* is extended and it becomes a base for mine countermeasures, and related small craft, LHD landing craft, and an FSM squadron.

Figure 50 - HMAS *Waterhen* & Northern Wharf

Discussion - *Waterhen* as an FSM Base

377 HMAS *Waterhen* is a substantial purpose designed naval base. Its wharves are of modern construction and its buildings are both smart and aesthetically consistent with the general environment. Its command team enjoys a good

relationship[251] with the local residential neighbourhood that is close to its boundaries[252]. Its Sydney Harbour site provides good access to dive depth water outside of the harbour and to the East Australia Exercise area.

378 About 800 people routinely commute to *Waterhen* daily, including the contractors who support the vessels and their specialised systems.

379 The two finger wharves would be appropriate for four alongside submarines if the water were to become deep enough. They are not however large enough to jointly berth mine warfare vessels and the forthcoming LHD landing craft, as well as (say) four submarines. There is insufficient space within the existing naval waters at *Waterhen* to construct additional wharves.

Figure 51 - HMAS *Waterhen* Wharves

380 Buildings infrastructure at *Waterhen* would generally be adequate and appropriate for a squadron of submarines but would probably need supplementation if they were to continue as well to support existing capabilities. Although the Defence car park land at the top of the cliff edge is available for construction theoretically, planning resistance from the residential neighbourhood may occur.

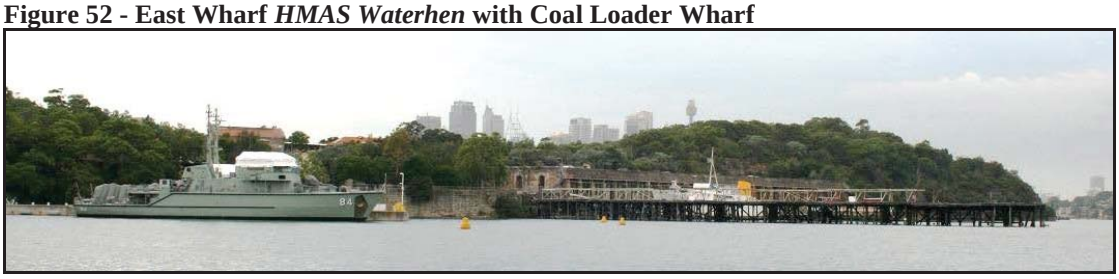
381 Consequently, if the buildings and wharves infrastructure were to remain unchanged but the water depth increased to at least 9.5 metres, *Waterhen* could either be a mine counter-measures and small craft base or it could be submarine base, but it could not be both together.

[251] CMDR J. Sears RAN – Commanding Officer HMAS *Waterhen* – 2nd February 2011
[252] Refer Figure 50, Figure 51 and Figure 52

382 Hydrographical survey will determine whether a water depth of 9.5 metres is readily achievable for *Waterhen* naval waters[253]. If that survey reveals that a 9.5 metre depth is achievable via routine dredging activities then the existing *Waterhen* FSM homeport assessment will be positive, albeit at the exclusion of the current mine countermeasures and small boats roles. If the bottom assessment determines the underlying rock layer of the harbour bottom is at less than 9.5 metres depth then the existing *Waterhen* wharves will be unsatisfactory for FSM platforms.

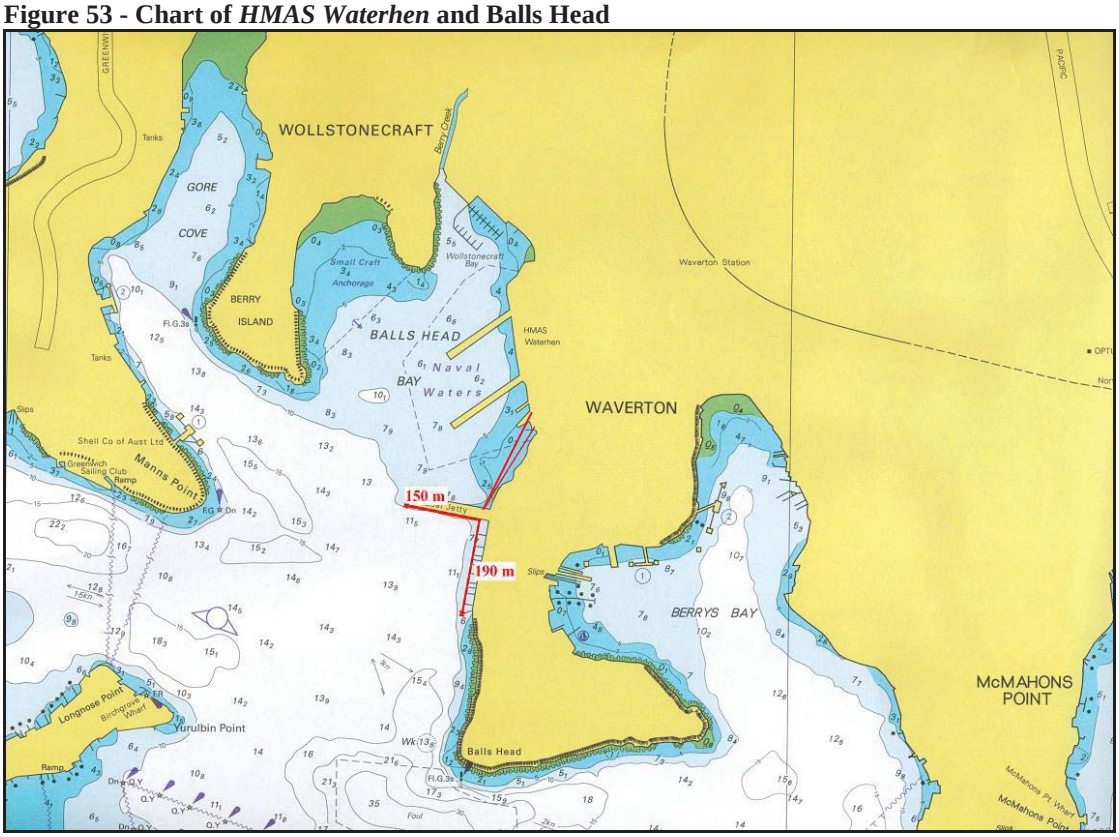
An Extended *Waterhen* Concept

Figure 52 - East Wharf *HMAS Waterhen* with Coal Loader Wharf



383 The existing water depth immediately adjacent to *HMAS Waterhen* naval waters is already eleven metres however, and this study has examined a scenario that would provide naval access to those waters and minimise any impact on the adjacent Balls Head Reserve and its historically registered sandstone brick structures.

Figure 53 - Chart of *HMAS Waterhen* and Balls Head



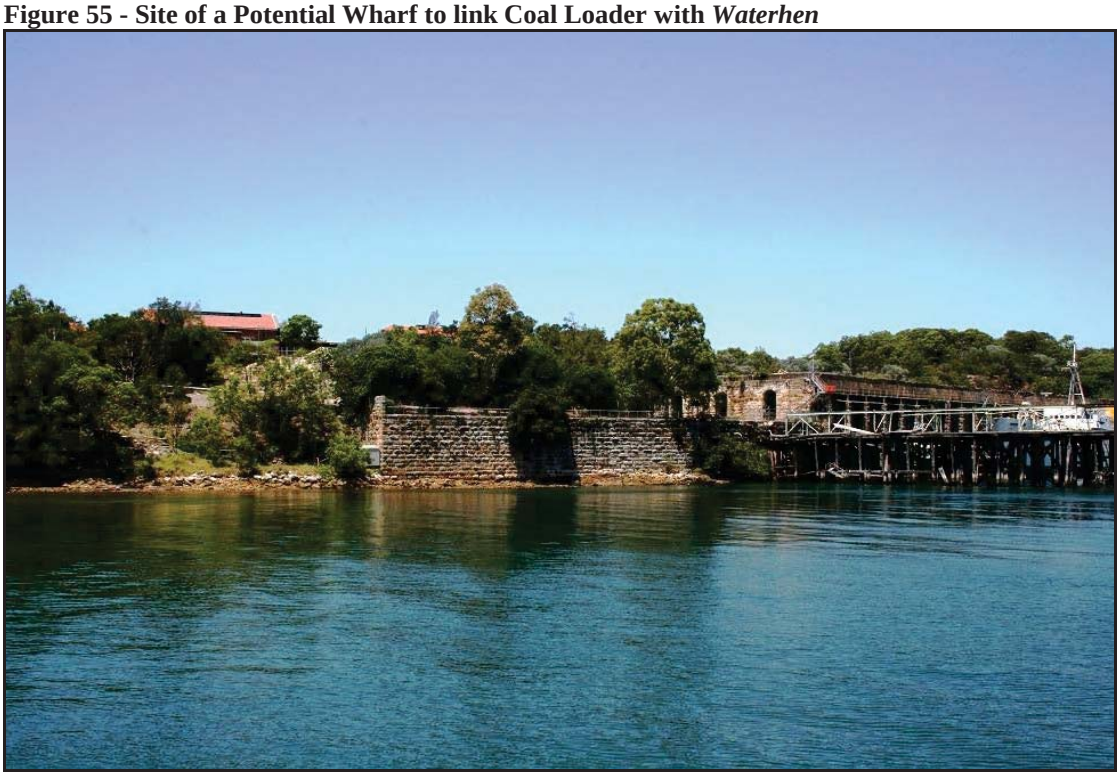
[253] Local Sydney contracting companies are available to undertake this work and have established contact with the author.

384 As shown at Figure 53 the dimension of the coal loader wharf that runs approximately east-West is approximately 150 metres, and the wharf which runs approximately north-south is 190 metres, the total of both being sufficient to place three future submarines directly alongside. This would be sufficient wharf access theoretically for an East Coast FSM squadron of up to six submarines. The low profile of submarines would generate a much lesser visual impact against the sandstone structure than the surface vessel shown at Figure 54 and may facilitate environmental support.

Figure 54 - Coal Loader - Ship Berthed at "NSW Maritime" owned Dolphins

385 A means to link *Waterhen* with these new extensions would need to be determined. Perhaps the easiest approach that would not interfere with any established flora and fauna on the peninsula would be the construction of a freestanding wharf that hugs the coastline (refer thin red line shown Figure 53 and the image at Figure 55).

Figure 55 - Site of a Potential Wharf to link Coal Loader with *Waterhen*



386 Balls Head peninsula to the south of HMAS *Waterhen* is a well-used natural park, and it now incorporates the heritage listed sandstone structures that are

progressively being refurbished by North Sydney Council[254] and opened to the public. Control of the adjacent waterways below the mean high water mark however belongs to NSW Maritime[255].

387 The derelict Coal Loader Wharf[256] is owned by NSW Maritime and is listed as part of the North Sydney Local Environmental Plan (LEP) but **is not** heritage listed at a State Government level. It is understood that the wharf may be stripped and be redeveloped as a commercial site. NSW Maritime may contribute to the demolition of the wharf.[257]

Figure 56 - Derelict Coal Loader Wharf - Balls Head Bay[258]

388 Via a meeting convened at HMAS *Waterhen* during February 2011, at which *Waterhen* command staff and Defence Support Group representatives were present[259], NSW Maritime revealed its plans for the coal loader wharf and the waterway adjacent to the coal wharf. Its concept essentially is to gain planning approval for a two level wharf and marina complex. Particular care to prevent access to naval waters by marina vessels was included in the marina design process.

389 The top level of the wharf would in part provide parking for the owners of the Marina vessels, whilst the lower level would provide access to the boats as well as a public walk way. Vehicle access to the wharf would be via a five-metre wide easement over adjacent North Sydney council land.[260]

[254] With the assistance of Commonwealth financial assistance – David Banbury – Landscape Architect North Sydney Council.
[255] Mr.M.Freeland – Strategic Projects Manager Maritime Property Strategic Development – NSW Maritime
[256] Figure 56
[257] Mr. S. Kerlander (via M.J.Westgarth)- Senior Manager Investment Attraction-NSW Government- 17th January 2011
[258] Image courtesy of NSW Government
[259] Present were; CMDR J.Sears, CMDR A.Westwood, Mr.M.Freeland NSW Maritime, Mr.B. Munns Incoll, H.Bersten TLB Engineers, D.Speight, W.Smith & J.Reid Defence, and the author.
[260] Mr.M.Freeland, Ibid.

390 The path ahead for NSW Maritime in this venture is uncertain, due principally to its strained relationships with North Sydney Council and the residents of the Balls Head neighbourhood[261]. It is feasible that this planning concept may atrophy and an opportunity may exist (anyway) for Navy to register relevant interest in being able to construct deep-water conventional berths as an extension of HMAS *Waterhen*.

Figure 57 - Waters Shared between Proposed New Marina and HMAS *Waterhen*

391 Captain Cook Dock and FBE generally would complement the overall *Waterhen* and FSM Homeport environment. Intermediate (ID), Mid-Cycle Dockings (MCD) and potentially Full Cycle Dockings would all be undertaken using Captain Cook dock.

Figure 58 - Site of a Potential FSM Wharf replacing the Existing Dolphins

392 FSM systems support would be provided by Sydney contractors, either directly alongside the extended *Waterhen*, or when appropriate at FBE.

[261] CMDR J. Sears RAN – Commanding Officer HMAS WATERHEN

393 This concept addresses the berthing requirements for an FSM squadron in Sydney Harbour at other than at FBE, but inclusion within the existing *Waterhen* base environment of necessary alongside FSM shore facilities, collocated with the resources necessary to support the Minor War Vessels, may be challenging.

394 The increase in car parking requirements would probably demand construction of a multi-level car park within the cliff face, and a rationalisation of lodger units and existing buildings would be necessary. Construction of new buildings, including consideration perhaps of a return to the existence of buildings on the cliff top may be relevant.[262]

395 Although less convenient to submarine crews than having all resources in the immediate base environment, a more flexible approach may be to place all training systems and classrooms at either HMAS *Penguin*, HMAS *Watson* or at Randwick Barracks. Similarly all scheduled maintenance activities could be planned for an alongside FBE berth, and all systems spares and related stores could be managed via the FBE and its general contracting environment. By outplacement of those elements of an ideal FSM homeport that are not essential alongside, combined basing of minor war vessels and submarines at an extended HMAS *Waterhen* may be achievable.

Conclusions

396 A seabed survey of the naval waters at HMAS *Waterhen* will determine whether *Waterhen* could be either a Minor War Vessels homeport, status quo, or an FSM homeport a decade hence, since the existing water is too shallow for the FSM.

397 An opportunity may exist for an extension to HMAS *Waterhen* via the construction of a new wharf that effectively replaces the existing coal loader wharf, and construction of additional wharves (possibly floating) that replace the existing dolphins parallel to Balls Head promontory, and which link the existing *Waterhen* base to the new structures. Such an extension to *Waterhen* would enable a Sydney Harbour berthing option for future submarines. The associated shore based facilities would involve a rationalisation of space and buildings with the existing *Waterhen* lodger units and additionally may require outplacement of some support functions to a mix of FBE, HMAS *Penguin*, HMAS *Watson* and Randwick Barracks.

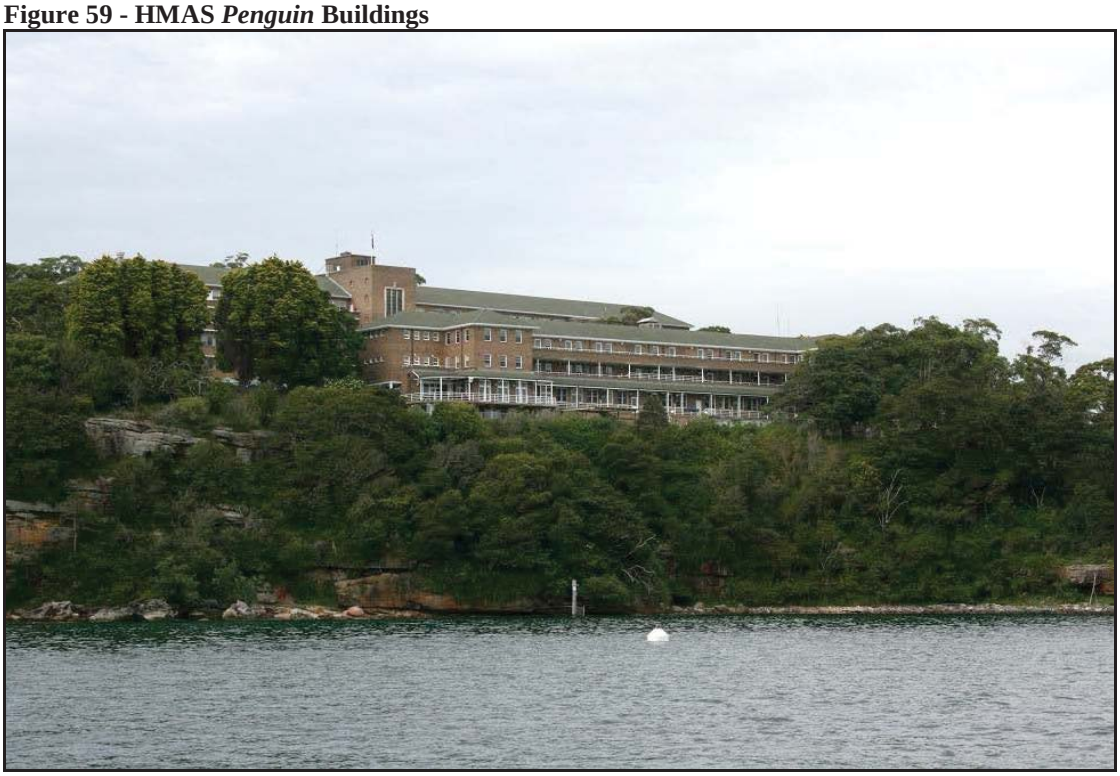
[262] Defence formerly owned buildings on its cliff top land but demolished them without replacement many years ago, with the result that local residents reportedly regard the status quo as the new “norm”.

Annex I: NSW – HMAS Penguin

Introduction

398 HMAS *Penguin* is a substantial naval facility[263] positioned on the northern side of Middle Head in Sydney Harbour. Clearance diving training in the shallow waters of Hunters Bay is its current principal focus but it is also host to Army watercraft and various specialist naval schools. *Penguin* has previously hosted Australian submarines but its naval waters are currently too shallow to enable passage by either the CCSM or the projected future submarines. If the rock layer beneath the silt is deep enough, dredging may enhance the usefulness of *Penguin*'s naval waters.

Figure 59 - HMAS *Penguin* Buildings



Discussion

399 HMAS *Penguin* is a naval base within Sydney Harbour and as such enjoys the benefits of access to FBE - Garden Island Dockyard, Chowder Bay, HMAS *Watson* and other key ADF facilities and bases in the general Sydney area. It also has ready access to Sydney Heads and deep water and is within acceptable transit distance of the East Australia Exercise Area (EAXA).

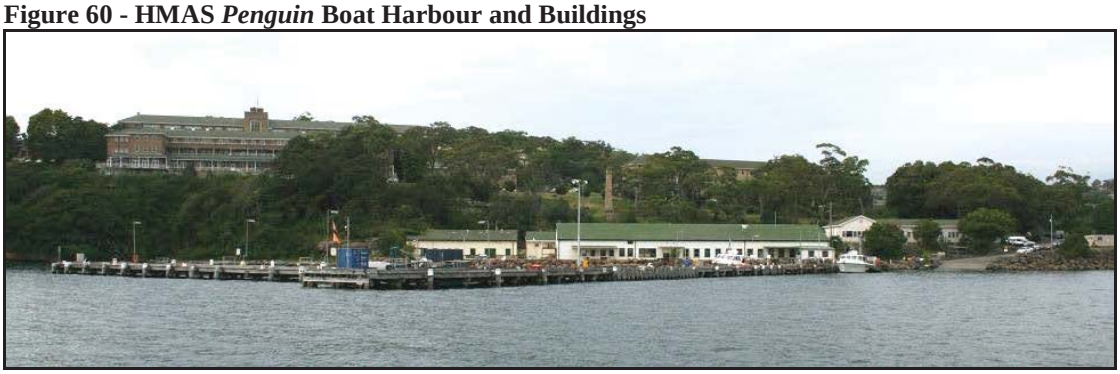
400 Commercial dredging surveyors have proposed to define the depth of the rock layer base beneath the top silt layer of *Penguin*'s Naval Waters. With this information known the potential of *Penguin* to host vessels other than small boats, including FSM, would become clearer.

401 The external surfaces of most of the buildings at *Penguin* are heritage listed but potential does exist with the former RAN Staff College building and the former

[263] Refer Figure 59

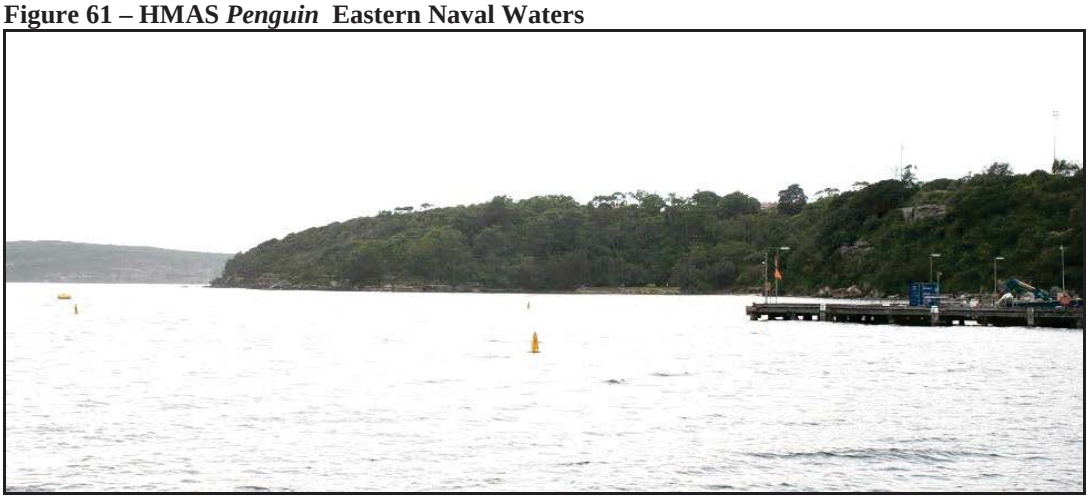
NBCD School to create new multi-storey buildings that could service a submarine homeport capability. Potential exists similarly for the assimilation of FSM crew sleeping accommodation and training facilities. As with almost all East Coast FSM homeport options the existing wharf is replaceable[264].

Figure 60 - HMAS *Penguin* Boat Harbour and Buildings



402 The northern tip of Middle Head provides very limited protection from sea swells entering Sydney Heads[265]. Construction of a breakwater or similar structure would be necessary to protect the naval waters between that headland and the HMAS *Penguin* wharf, if a protected harbour[266] was to be required.

Figure 61 – HMAS *Penguin* Eastern Naval Waters



403 Of primary concern however, is the potential impact of a submarine homeport at HMAS *Penguin* on clearance diving training? The local shallow waters are important for the initial confidence building of new clearance divers and retention of that or similar adjacent waters will be imperative.

404 Local residential neighbours of HMAS *Penguin* generally support its continued existence because of its low profile buildings, and its almost benign influence on local community life[267]. If an FSM homeport was to be announced within its boundaries however, their supportive attitudes may change.

[264] Refer Figure 60, Figure 61 and Figure 62.
[265] Refer Figure 61
[266] Refer Figure 61
[267] Anecdotal

Figure 62 - HMAS *Penguin* Boat Harbour

Conclusion

405 HMAS *Penguin* offers some potential as an FSM homeport. A seabed survey would determine the viability of deepening its waters, and if positive *Penguin* may provide Navy with many more future use options, not just for submarines. A breakwater or similar structure would however be required to protect any substantial vessels berthed within *Penguin*'s waters, but approval to build such a structure within this desirable area of the Sydney Harbour foreshore may be very difficult to obtain. For this reason at least HMAS *Penguin* is not considered further as a potential FSM homeport.

Annex J: NSW – Cockatoo Island

Introduction

406 The Australian Government Sydney Harbour Federation Trust on behalf of the people of Sydney administers Cockatoo Island[268] within Sydney Harbour. Formerly a Navy orientated commercial dockyard it most recently conducted docking repairs and overhauls of *Oberon Class* submarines. Some potential exists for it to host jointly an FSM homeport role as well as its status quo historical focus with civilian entertainment and holiday activities.

Discussion

407 Figure 63 illustrates the focus of the tourist and holiday related activities of the Sydney Harbour Federation Trust ("The Trust"). The northernmost 80% of the available land area of Cockatoo Island (approximately) is dedicated to holiday accommodation, historical exhibits and venues for major events.

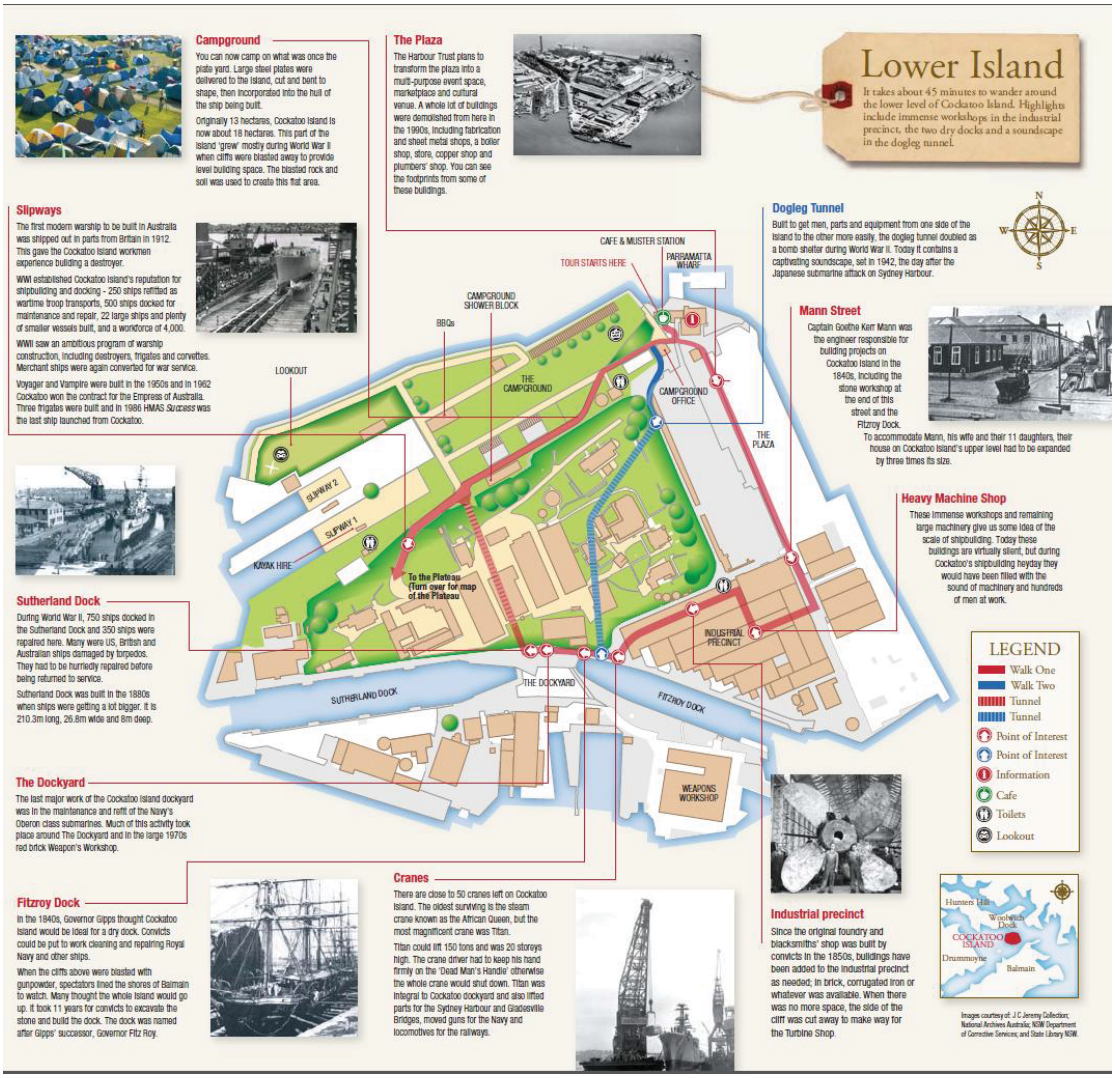


Figure 63 - Cockatoo Island Tourist brochure - Sydney Harbour Federation Trust

[268] Cockatoo Island lies within the Western reaches of Sydney Harbour surrounded by the mainland suburbs of Woolwich (North), Drummoyne (West) and Balmain (South).

408 The Trust has achieved considerable success in growing public utilisation of Cockatoo Island since decontaminating most of the accessible land. As well as opening the island to daily access via public ferries, holiday accommodation is offered and major public events are staged frequently through the year. Key to being able to stage the major events is lighter[269] berthing access via the marina berths and slipways located midway between the two docks at the southern edge of the island – refer Figure 63. Public access approaches 200,000 visits per year.

409 The FSM Basing concept for Cockatoo Island acknowledges the growing tourist and major-events focus of the island's administration, and seeks to utilise the currently unutilised Sutherland Dock area at the island's south-west corner.

410 The concept involves using Sutherland dock as a protected berth that has the potential of being fully covered or roofed. Sutherland Dock is 210.3 metres long, 26.8 metres wide and currently 8 metres deep. Submarine docking related activities would be undertaken at Captain Cook Dock at Garden Island, as discussed elsewhere in this report. The available land area bordered by Sutherland Dock to the north, the marina to the East and the wharf to the south would be adequate for the necessary supporting infrastructure – refer Figure 64. This should enable this potential FSM homeport option to be physically and visually segregated from the tourist activities on the remainder of the island.

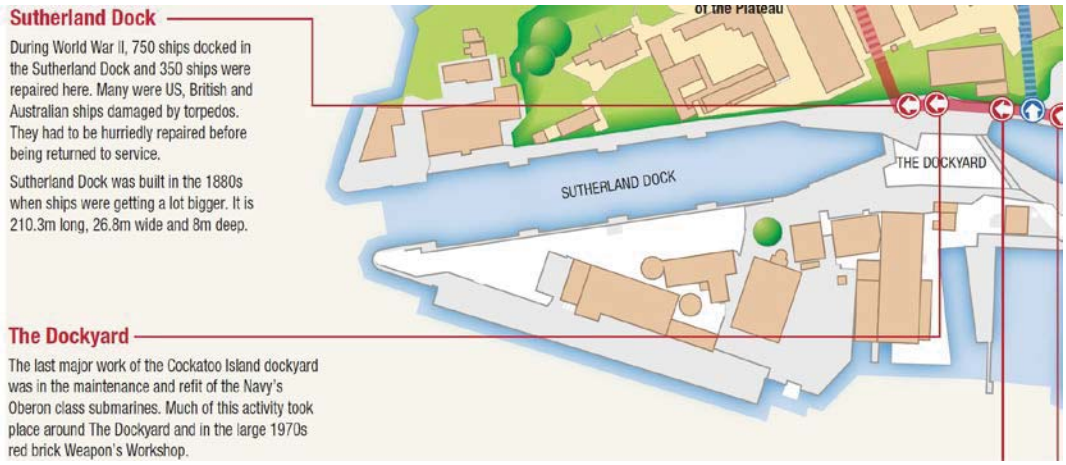


Figure 64 - Sutherland Dock Schematic

411 Alternatively, or additionally as may be determined via detailed analysis, the south-west wharf could berth up to four submarines – refer Figure 65.

[269] A marine vessel that is able to carry heavy and/or large loads of stores, equipment or other materials.

Figure 65 - South West Wharf Cockatoo Island

412 Sutherland Dock is wide enough to berth two submarines abreast, either in a submarine pen arrangement using opposite walls of the dock, or simply one outboard of the other – refer Figure 66. At 8 metres, this facility should just be deep enough to berth a CCSM, but a submarine with a deeper draught could not berth without major engineering modifications to the floor of the dock. If this proved to be unacceptable, the south-west wharf of Figure 65 may be a viable alternative.

Figure 66 - Entrance to Sutherland Dock

Conclusion

Being an island, access to Cockatoo Island would be less than ideal compared with other basing options that have land vehicle access. Nevertheless, the Sutherland Dock area of Cockatoo Island offers potential for an FSM homeport to be created there without unreasonably impacting the developing public access activities managed by the Commonwealth Sydney Harbour Federation Trust.

Annex K: NSW - Other Harbours near Sydney

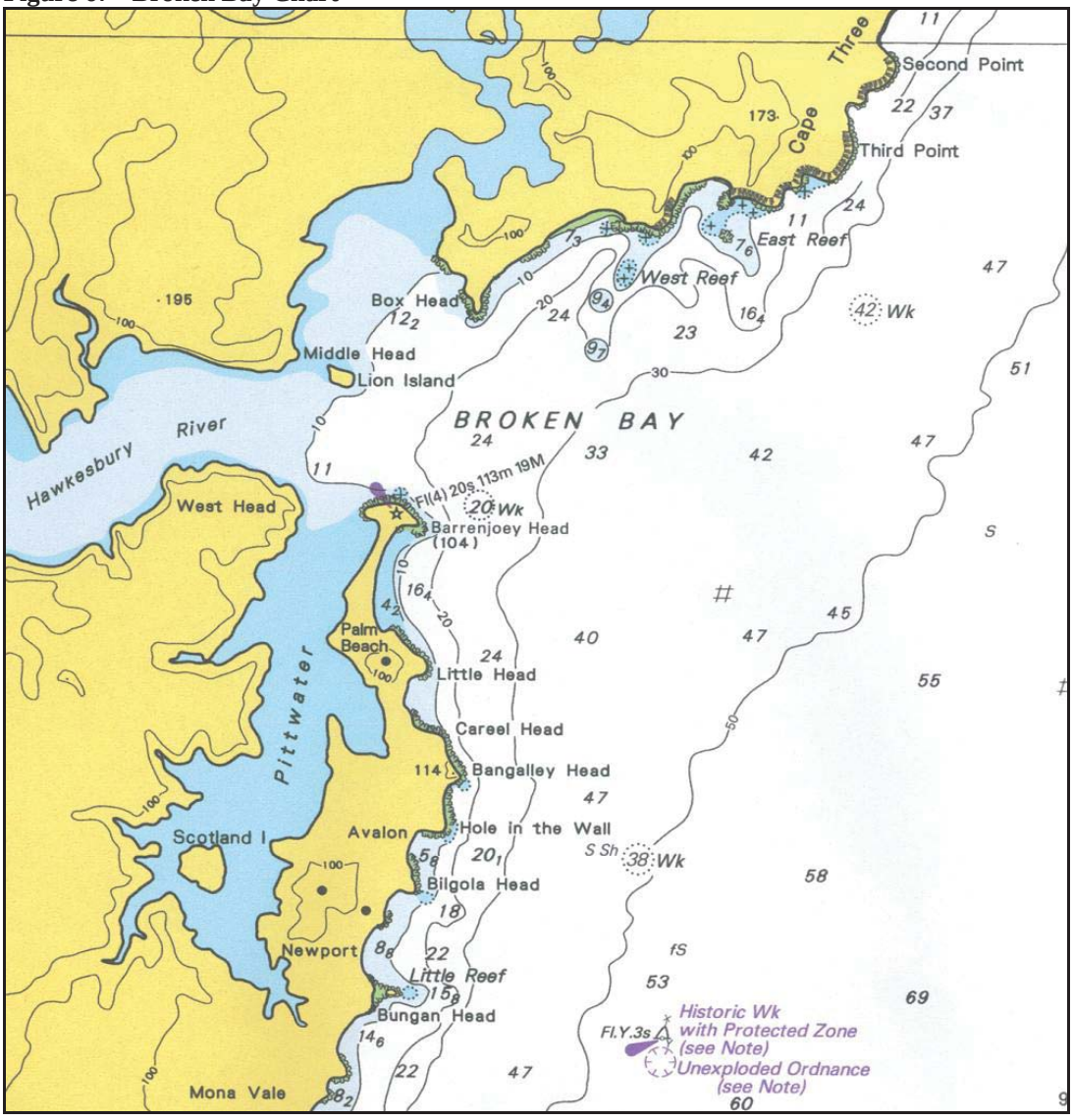
Introduction

413 Four other NSW harbour opportunities that are within two hours driving from Sydney are considered.

Discussion – Broken Bay

414 The proximity of Broken Bay to Sydney and the general availability of reasonably priced housing in the Central Coast region of NSW, cause Broken Bay to be a natural consideration as a potential FSM homeport. Broken Bay is very much however the northern maritime "playground" for the greater Sydney metropolitan area. Its headlands generally are declared nature reserves, and its waterways are heavily utilised by commercial and private pleasure craft.

Figure 67 - Broken Bay Chart



415 The 1988 Fleet basing study reported[270]; "*Broken Bay lies at the entrance to the Hawkesbury River some 34 Km north of Sydney. The entrance to the bay is open and deep with good access to the open sea. The area surrounding Broken Bay is devoted to nature and wildlife reserves, tourism, watersports and other recreation. There are many small settlements around the bay. The major residential areas of Pittwater and Brisbane Water lie on the southern and northern shores respectively immediately inside the bay entrance. The land surrounding Broken Bay falls steeply, is mainly rocky and is scrub covered.*

416 *. . . . . There are large areas of open water but they are generally shallow and unsheltered. Major dredging and construction of breakwaters would be required to provide the necessary deep sheltered water for a fleet base and armament depot. Broken Bay therefore is considered both impractical and unsuitable for development of major naval facilities.*

417 Since this earlier assessment, public use of this harbour and its foreshores has increased along with the general population growth, implying that any consideration of creating a naval facility is more remote. Nevertheless, an FSM base for (say) four submarines would be substantially smaller than a base designed to substitute for FBE. The most suitable potential sites within Broken Bay for an FSM homeport, considering such factors as:

- Water depth
- Access to the open ocean
- Shelter from prevailing south east weather conditions
- Avoidance of domestic boating activities
- Road access to Sydney based technology support;

are assessed to be at the northern end of Pittwater, either inside Barrenjoey Head or at a newly constructed breakwater protected wharf at the north east end of West Head[271].

418 Dredging and a relaxation of parkland building and access conditions would be required at both sites however, and whilst construction of a suitable wharf may not compromise the general environment significantly, construction of associated naval shore infrastructure within existing nature reserves may attract significant community resistance. There is no other Defence infrastructure within the immediate vicinity. For the reasons that this would be a Greenfields site development in a very uncertain physical environment, the earlier conclusion remains valid, ie Broken Bay is considered both impractical and unsuitable for development of major naval facilities.

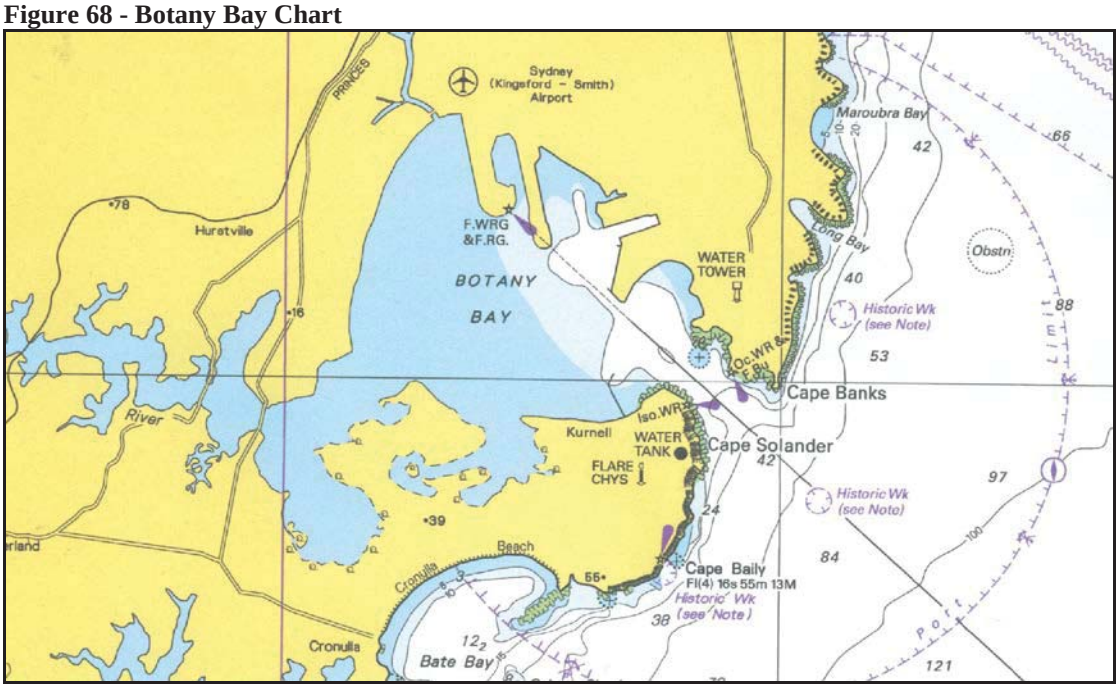
Botany Bay

419 The 1988 basing study reported[272]; "*Botany Bay lies 12 nautical miles south from the entrance to Port Jackson and serves as the second major port for Sydney. Port Botany on the northern side of the Bay has been developed as a major port complex. On the southern side of the Bay, there are berths to serve the oil industry at Kurnell.*[273]

[270] Eastern Armament Deport and Fleet Base – A Study of Location Options – RADM A.L. Beaumont RAN – December 1988
[271] Refer Figure 67 - Broken Bay Chart
[272] Eastern Armament Deport and Fleet Base – A Study of Location Options – RADM A.L. Beaumont RAN – December 1988
[273] Refer Figure 68

420 *On the southern shores of the Bay, there are areas of mangrove which are environmentally protected. Seagrass meadows and some saltmarsh areas are also in the Bay area. The Kurnell Peninsula is noted as one of the last remaining wetlands systems in the Sydney metropolitan area. Towra Point, in the south-west portion of the Bay, is noted as an estuarine wetland complex which supports some native plant and animal communities.*

Figure 68 - Botany Bay Chart



421 *Access to the open sea is good. The channel to the swinging basin and berths at Kurnell have a minimum depth of 12.2 metres. The bottom is sand. The channel to the Port Botany area is 213 metres wide and has a minimum depth of 15.2 metres. . . . The Bay is exposed to the south-easterly swell and rough conditions may occur with the wind from any quarter because of the expanse of the Bay.*

422 *The land in the vicinity of Botany Bay is highly developed and its foreshore is divided into port, industrial, dense urban residential and nature reserve zones. The port is fully utilised and further port development would involve extensive dredging that could have serious effects on the foreshores of the residential and nature reserves. Breakwaters would be required. There is no land available for naval use in the commercially developed area; and the remaining land is either residential or nature reserve.*

423 *Botany Bay has no potential as an alternative location as there is no land available for naval use on the foreshores of the Bay. A proposal to develop major naval facilities in the bay would be strongly resisted by industrial and residential sections of the community and is not compatible with the present environment. In view of these reasons it is assessed that it would be impractical to develop major naval facilities in Botany Bay.*

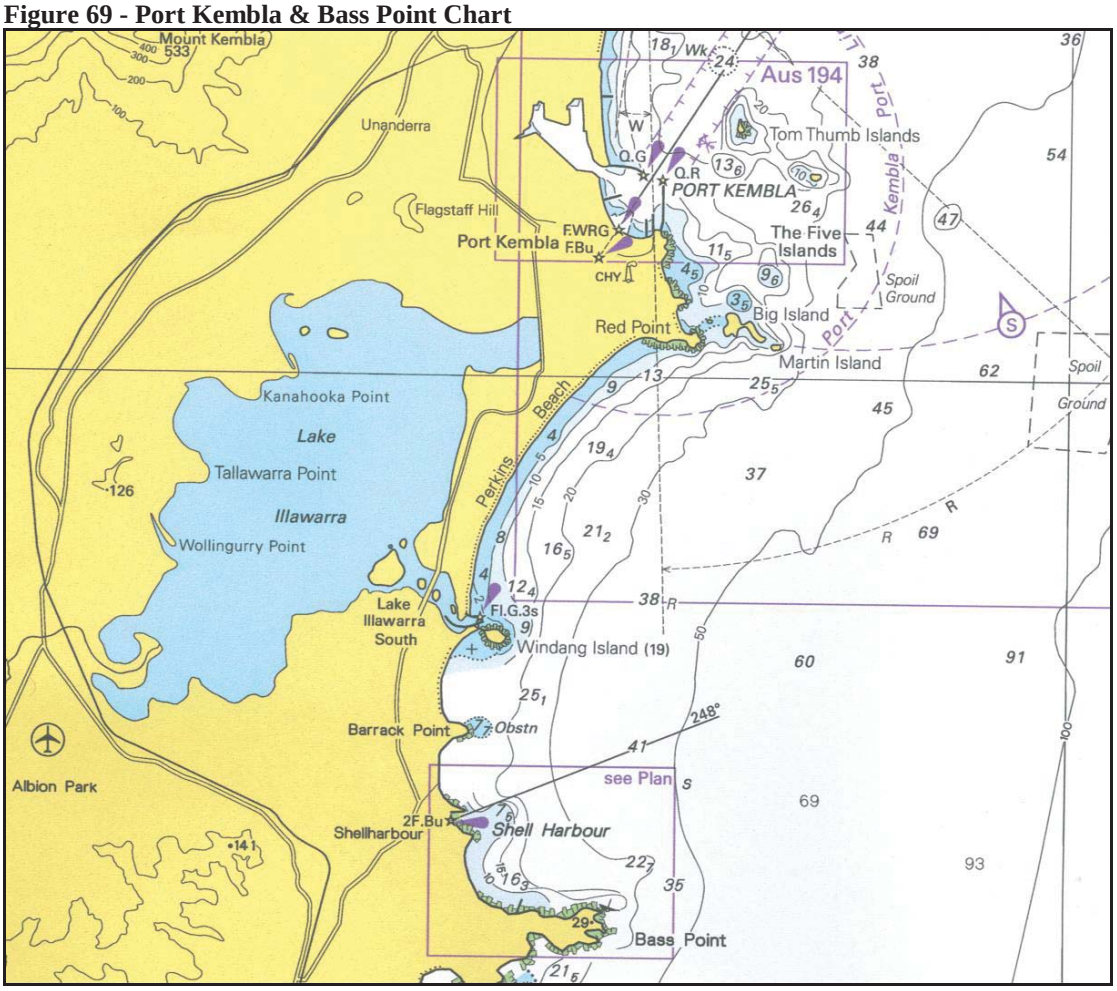
424 Since 1988, the potential of Botany Bay for naval use has diminished further by the relocation there of most container shipping traffic from Sydney Harbour, further emphasising the 1988 report conclusion, "that it would be impractical to develop major naval facilities in Botany Bay."

Port Kembla

425 The 1988 basing study reported[274]; "*Port Kembla is an artificial harbour located immediately south of the City of Wollongong (population 208,000) and north of Lake Illawarra. It is roughly 70 Km south of Sydney by road, and approximately 50 nautical miles by sea.*

426 *The harbour consists of an Outer Harbour of approximately 100 hectares, protected by breakwaters, and an Inner Harbour of roughly the same size dredged into the flat hinterland. A channel connects the Inner and Outer Harbours. The port serves the adjacent heavy industrial area, importing iron ore and other materials used in the steel making process and exporting coal and steel products.*

Figure 69 - Port Kembla & Bass Point Chart



427 *The entrance to Port Kembla between the breakwaters is 305 metres wide and 16.8 metres deep. The depth of the Inner Harbour entrance channel is 15.2 metres. The bottom of the outer harbour is mostly rock. Access to the port is difficult in*

[274] Ibid

adverse weather conditions, and large ships are often forced to anchor offshore until conditions improve.

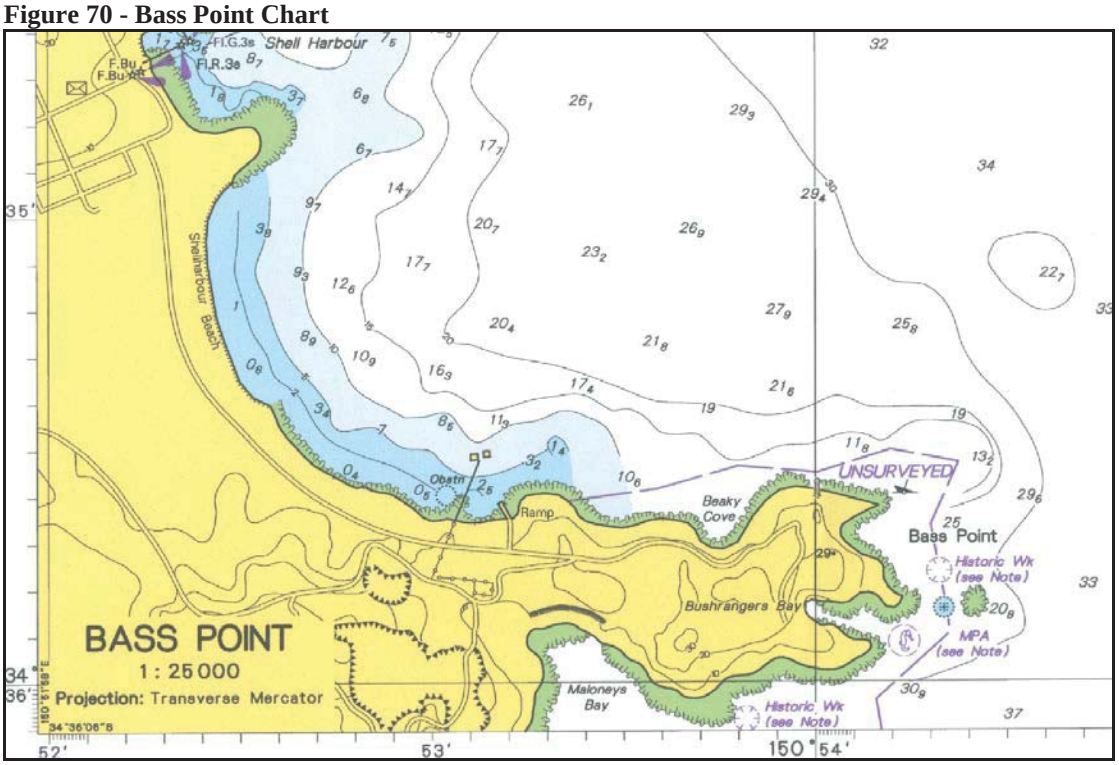
428 *Port Kembla has a small and congested harbour with little space for substantial expansion. There is no space available within either the Inner or Outer Harbour, or a suitable foreshore area, for the development of a fleet base at Port Kembla.*

429 Little has changed at Port Kembla since 1988 in terms of opportunities for naval basing. There are efforts underway to increase the diversity of products shipped from Port Kembla, with development of a grain shipping capability forecast;[275] further reinforcing the unavailability of land or wharf access within the port environment for naval use. It would be impractical therefore to develop an FSM basing capability at Port Kembla.

Bass Point

430 Bass Point is an exposed rocky peninsula located some 12-15 Km south of Port Kembla and approximately 2 Km south of Shellharbour. It does not support any marine vegetation or fish species of significance because of its exposure to sea and weather. The tip of Bass Point commencing at Mahoneys Bay[276] is a nature reserve. To the west of Mahoneys Bay is a rock quarry, the output of which supplies shipping berthed on the north side of the peninsula at the jetty shown in Figure 70.

Figure 70 - Bass Point Chart



431 The close proximity of the quarry elevates the prospect that Bass Point, despite its obvious exposure to wind and sea conditions, could host naval facilities. As

[275] Mr. M. Baudinette – General Manager Newcastle Port Incorporated.
[276] Refer Figure 70 - Bass Point Chart

reported in the 1988 armaments study[277]; *The sheltered northern side of Bass Point*[278] *could be developed for an armament wharf. A sheltered all weather wharf protected by a berm-type breakwater designed to prevailing wave conditions with an entrance channel dredged to 15.0 metres and a mooring basin could be provided. It is considered that such a facility could be economically provided at this site despite the open water conditions, principally because the supply of rock material for the breakwaters could come from a local quarry nearby. The proximity of the quarry would significantly reduce the cost of the breakwater.*

432 *Bass Point is close to both Sydney and Jervis Bay and would therefore suit naval operations. Additionally, impact on the terrestrial and marine environment is unlikely to be significant, as the complex could be designed to . . . . make full use of the area already degraded by the quarry on Bass Point.*

433 The close proximity of the working quarry however prevented further consideration of Bass Point for an armaments facility because it exists within what would have been the associated explosives safety zone. The prospect that a small naval harbour with associated shore infrastructure could be constructed at Bass Point remains a possibility however, albeit a remote one because of the exposed position and the large-scale Greenfields capital works that would be necessary. Beaky Cove on the northern side of Bass Point perhaps offers the single East Coast opportunity for a fully enclosed set of submarine berths within reasonable access to Sydney based industry support and fleet operating areas.

434 Bass Point is an exposed rocky peninsula that has some potential as an FSM base however its remoteness from other Defence infrastructure, and the magnitude of the capital works that would be necessary to compensate for its exposure, render it unsuitable for shortlist consideration as an FSM homeport.

Conclusion

435 Broken Bay, Botany Bay, Port Kembla and Bass Point are all ports or FSM harbour opportunities that are within two hours driving duration of Sydney, however none of them provides sufficient merit as a potential FSM homeport opportunity to be considered in depth within this basing study.

[277] Eastern Armament Deport and Fleet Base – A Study of Location Options – RADM A.L. Beaumont RAN – December 1988
[278] From south east swells and associated east weather conditions

Annex L: NSW - Jervis Bay

Introduction

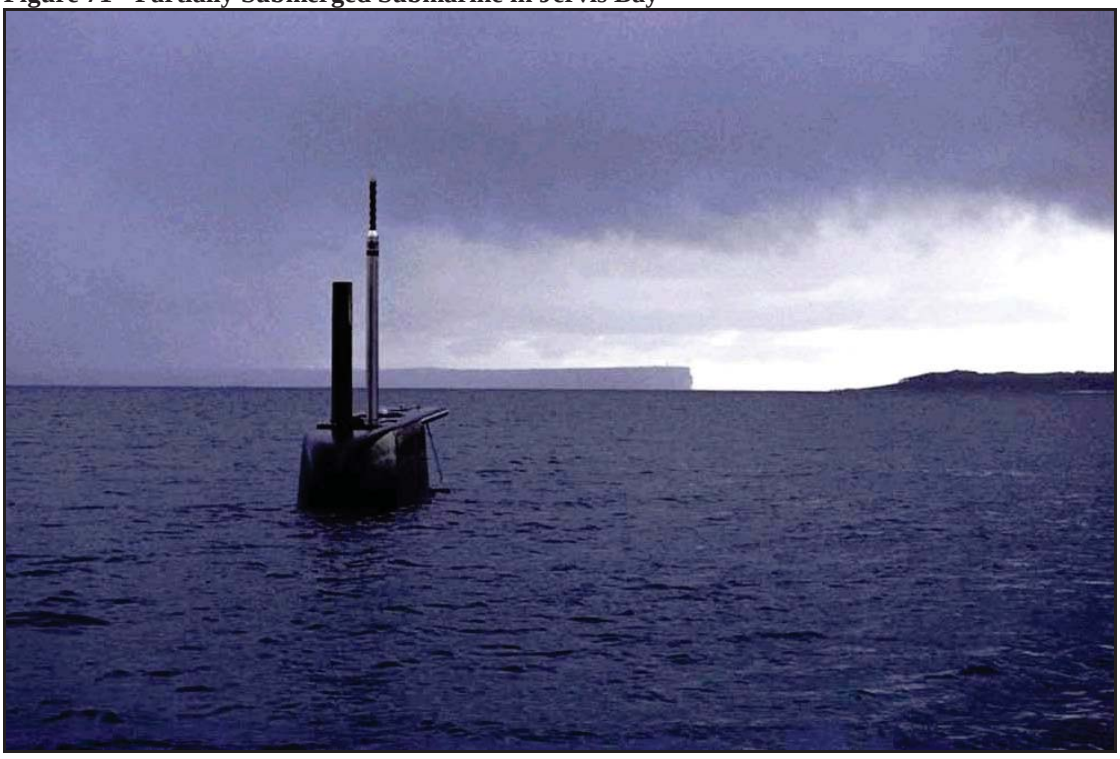
436 Jervis Bay has long been important to the Australian Navy. It is a good natural harbour and its weapons range, local airfield and nearby naval air-station are core operational elements of the adjacent east Australia exercise area (EAXA). It is also home to the Royal Australian Naval College.

437 The 1992 study[279] considered that Jervis Bay would "meet all of the Navy's essential requirements and was assessed to be the most suitable alternative to Sydney as the location for the East Coast fleet base." The Study recommended three potential sites:

- North Eastern Jervis Bay in the vicinity of Montagu Roadstead
- South Eastern Jervis Bay in the vicinity of Murray's Beach, and
- South Western Jervis Bay in the vicinity of the Naval College breakwater and Hyam's Beach

438 This Annex re-examines Jervis Bay some twenty years after the last fleet re-location study from the perspective of its potential as a future submarine (FSM) homeport. One desirable aspect of Jervis Bay is that the sandy bottom enables submarines to conduct a number of trials and training drills that require bottoming.[280]

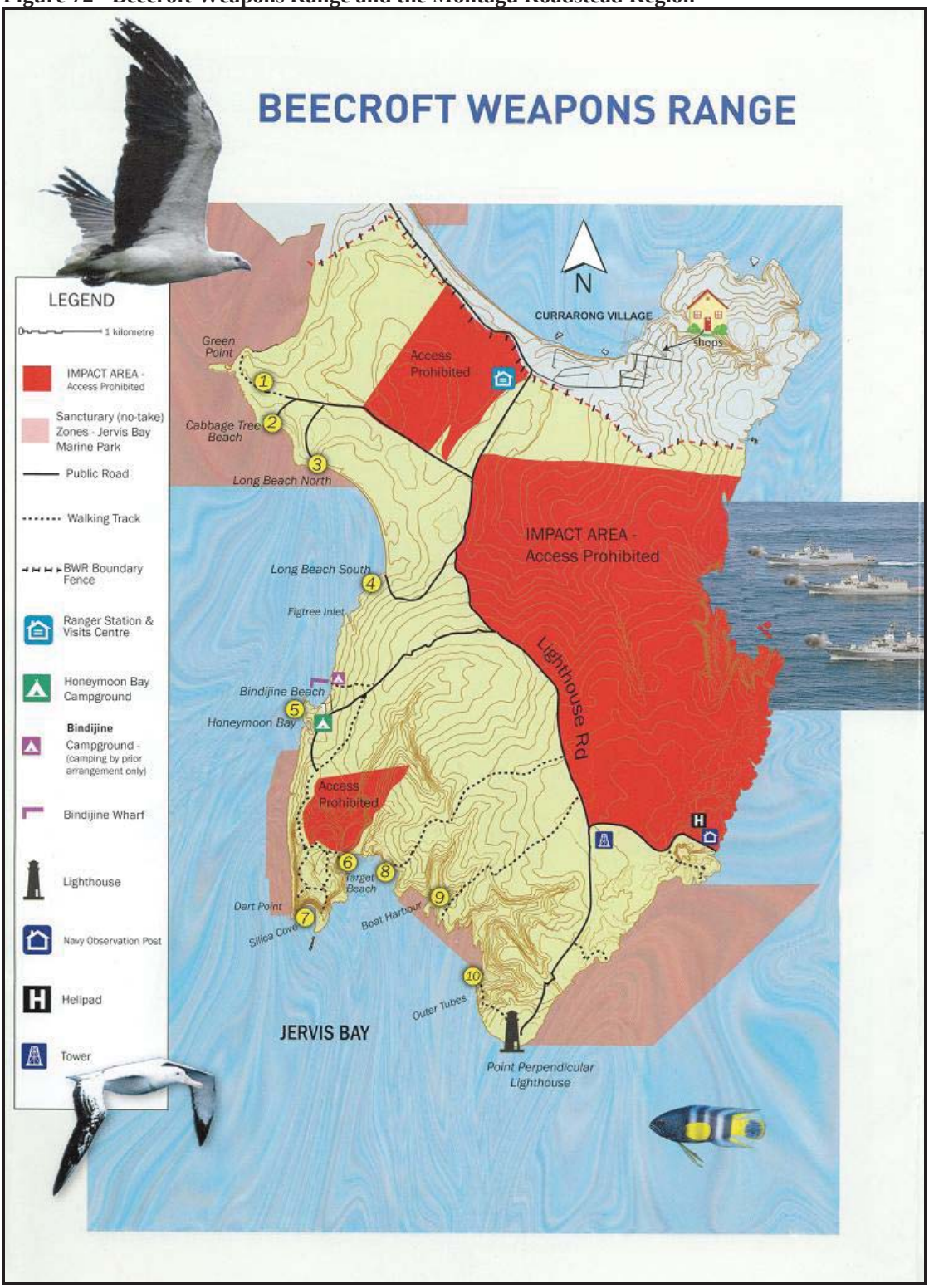
Figure 71 - Partially Submerged Submarine in Jervis Bay[281]



[279] Fleet Base and Armaments Complex Locations Review – Department of Defence – July 1992
[280] Refer Figure 71
[281] Image Defence Archives

Discussion - Montagu Roadstead Region

Figure 72 - Beecroft Weapons Range and the Montagu Roadstead Region[282]



439 Montagu Roadstead is a set of defined anchorage positions sheltered by the natural curvature of Beecroft Peninsula to the east of Jervis Bay. These anchorages

[282] Department of Defence public use brochure

lay between reference numbers 3 and 4 in Figure 72. This location was an obvious potential site for a relocated fleet base in earlier studies.

440 FSM homeport land and wharf footprint requirements are significantly less than those required for a fleet base, and it is apparent that the Montagu Roadstead region could physically provide the secure, sheltered and relatively discreet environment sought, with the bonus of it also being just 15 mins transit to the EAXA.[283] It is also in close proximity to Nowra and HMAS *Albatross* (30 minutes by road), and the necessary FSM industrial support base could be expected to develop there in existing industrial zones. HMAS *Creswell*'s small boats and other (limited) services could also reinforce a submarine base in this location.[284] New housing estates are under development at Callala Bay (10 minutes distant) and Nowra (30 minutes distant); these and a number of other housing options as far afield as Wollongong could exist for associated personnel.

441 The Montagu Roadstead anchorages can only be used however when the Beecroft Weapons Range is inactive[285] because they are in line with the weapons practice area[286]. Conversely, if ships at these anchorages have the higher priority at any particular time then the Beecroft Weapons Range will be inactive. Clearly, a Montagu Roads FSM homeport concept would be mutually exclusive with continued operation of the Beecroft Weapons Range.

442 To advocate closure and relocation of the Beecroft Weapons Range in favour of construction and operation of an FSM homeport would be to weaken the attraction of future submarines to Jervis Bay. The Weapons Range is a fundamental capability of the EAXA and it routinely attracts Fleet activity. Without local Fleet activity for mutually beneficial exercises, the attraction of Jervis Bay to future submarines would diminish.

443 There is one significant point of land to the north of the designated weapons practise hazard zone[287] that could act as potential host to the minimum of 300 useable wharf metres needed for a squadron of six submarines. Green Point[288] is well within Commonwealth Territory; however, its waters are within a declared "Sanctuary (no-take) Zone" within the Jervis Bay Marine Park. Subject to a relevant environmental impact assessment, an FSM homeport centred on Green Point and the adjacent Defence land may prove to be a viable FSM homeport concept.

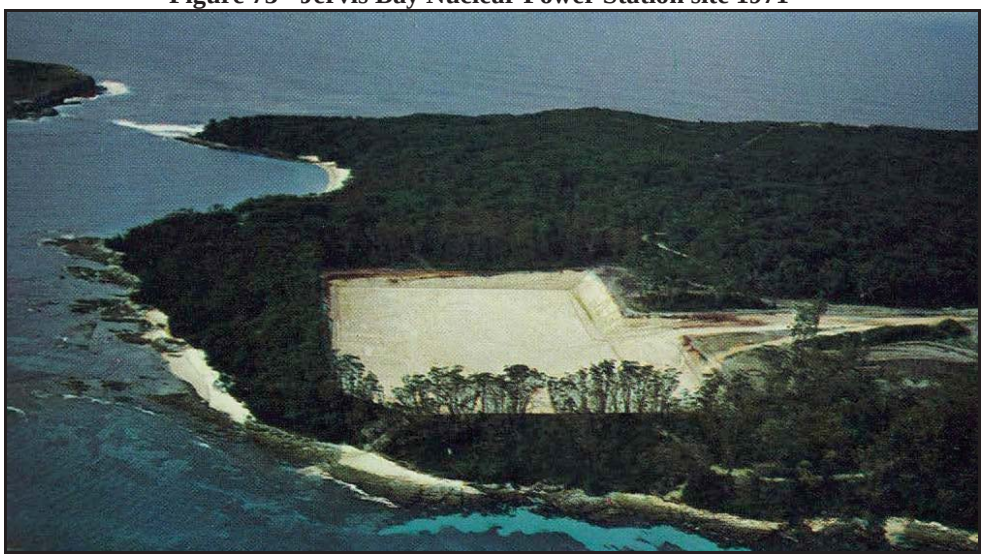
Murray's Beach Region

444 Murray's Beach in the southeast corner of Jervis Bay is within the Commonwealth Jervis Bay Territory and the local administration zone of the Booderee[289] people.

[283] EAXA – East Australia Exercise Area
[284] HMAS CRESWELL 40 minutes distant by road
[285] For safety reasons
[286] Large area shown in red in Figure 72
[287] Large area shown in red in Figure 72 – the northernmost red zone is not in use for live firings.
[288] Refer number "1" in Figure 72
[289] Australian indigenous community

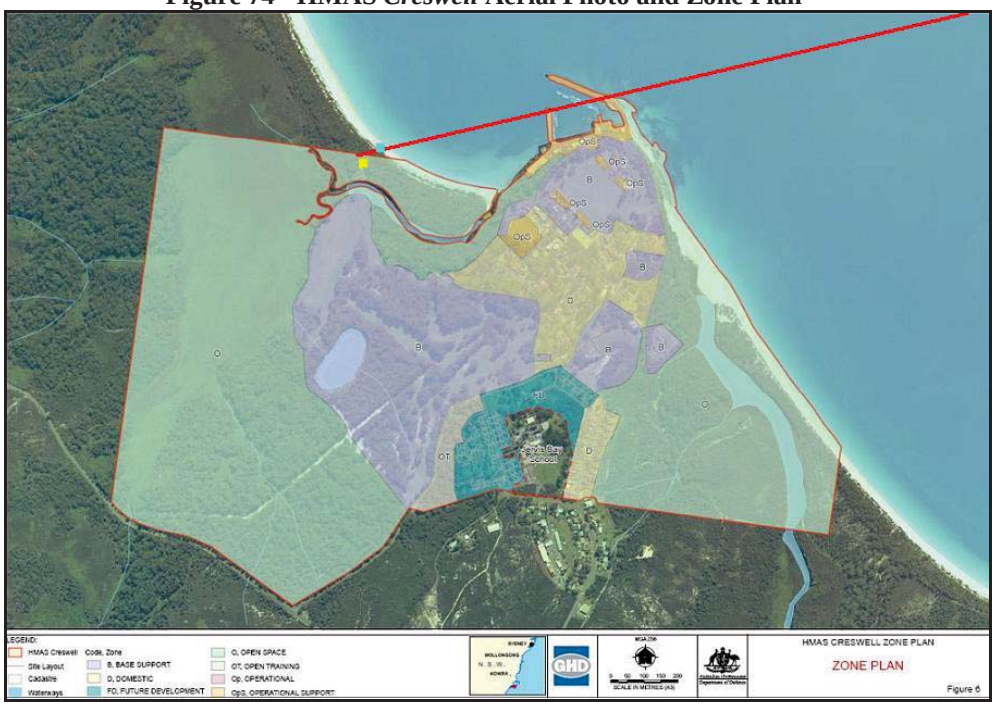
445 In 1971, work had commenced there for construction of Australia's first nuclear power station and the area excavated now forms the car park to a local boat ramp and to Murray's Beach – refer Figure 73. This region and the adjacent Green Patch public camping zone has become such a significant public access and revenue earning facility for the local indigenous community since the Fleet Relocation Studies ending in 1992, that it will not be considered further as a potential FSM homeport site.

Figure 73 - Jervis Bay Nuclear Power Station site 1971[290]



The Jervis Bay Concept

Figure 74 - HMAS *Creswell* Aerial Photo and Zone Plan[291]



[290] "Nuclear Power for Australia –Irrelevant or Inevitable" AIE Symposium, Sydney, 8 June 2005 - Clarence J. Hardy 2005
[291] Image Defence Support Group Report

446 Like the Murrays Beach region, the Royal Australian Naval College[292] (HMAS *Creswell*) is located within the Commonwealth Jervis Bay Territory. Its principal role is the provision of officer training services to the Royal Australian Navy but it also provides local operational control and support services to the Australian Fleet. Figure 74 reveals the land boundaries of the Naval College together with zone definitions as created by the Defence Support Group in its associated Zone Plan.[293]

447 The bright yellow square symbol in Figure 74 is the 8th Tee of the *Creswell* Golf Course - it and the 8th fairway are shown below. The fairway is a part of the Figure 74 purple coloured zone.

Figure 75 - HMAS *Creswell* 8th Tee and Fairway

448 The bright blue square symbol in Figure 74 represents the sign at Hyam's Beach that proclaims the boundary between Navy land and NSW State land (refer Figure 76).

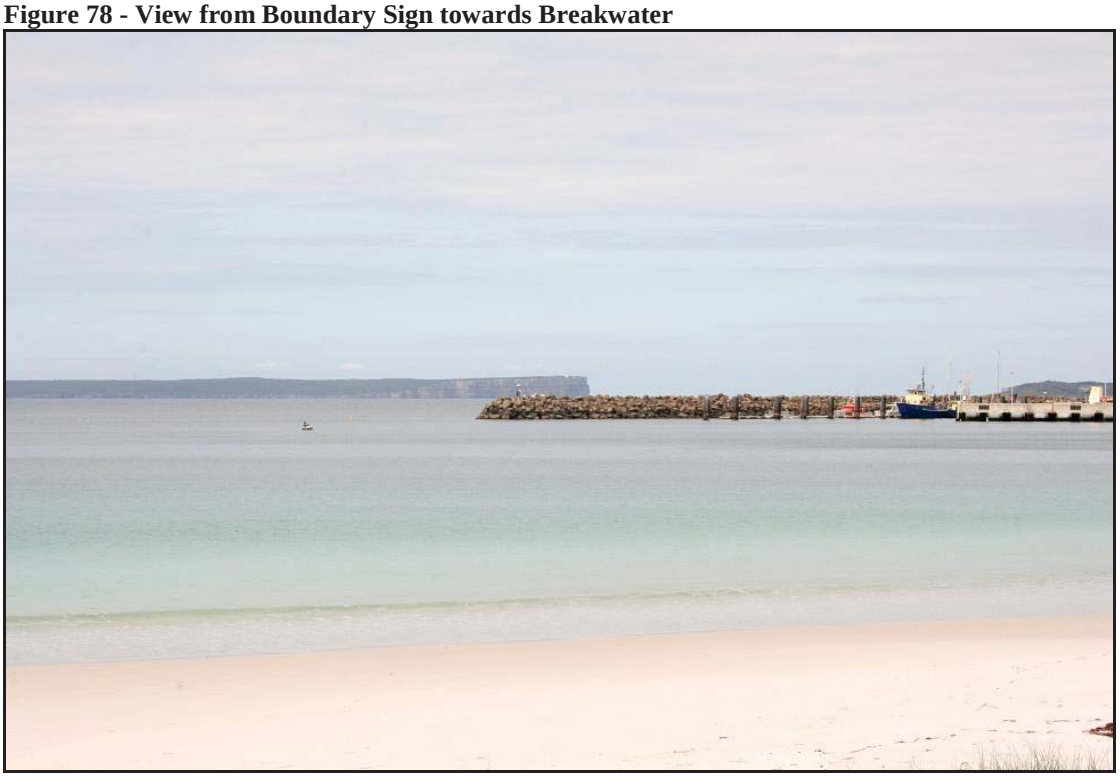
Figure 76 - Navy Boundary sign on Hyam's Beach looking Towards *Creswell*

[292] HMAS *Creswell*
[293] Department of Defence – Defence Support Group – HMAS *Creswell* Zone Plan 2009

Figure 77 - Navy Boundary Sign Looking Towards Hyam's Beach Township

449 The view southeast towards the *Creswell* boat harbour is at Figure 76 and the opposite view towards the Hyam's Beach town-ship is at Figure 77. The view from the same point towards the *Creswell* breakwater with Point Perpendicular beyond is at Figure 78.

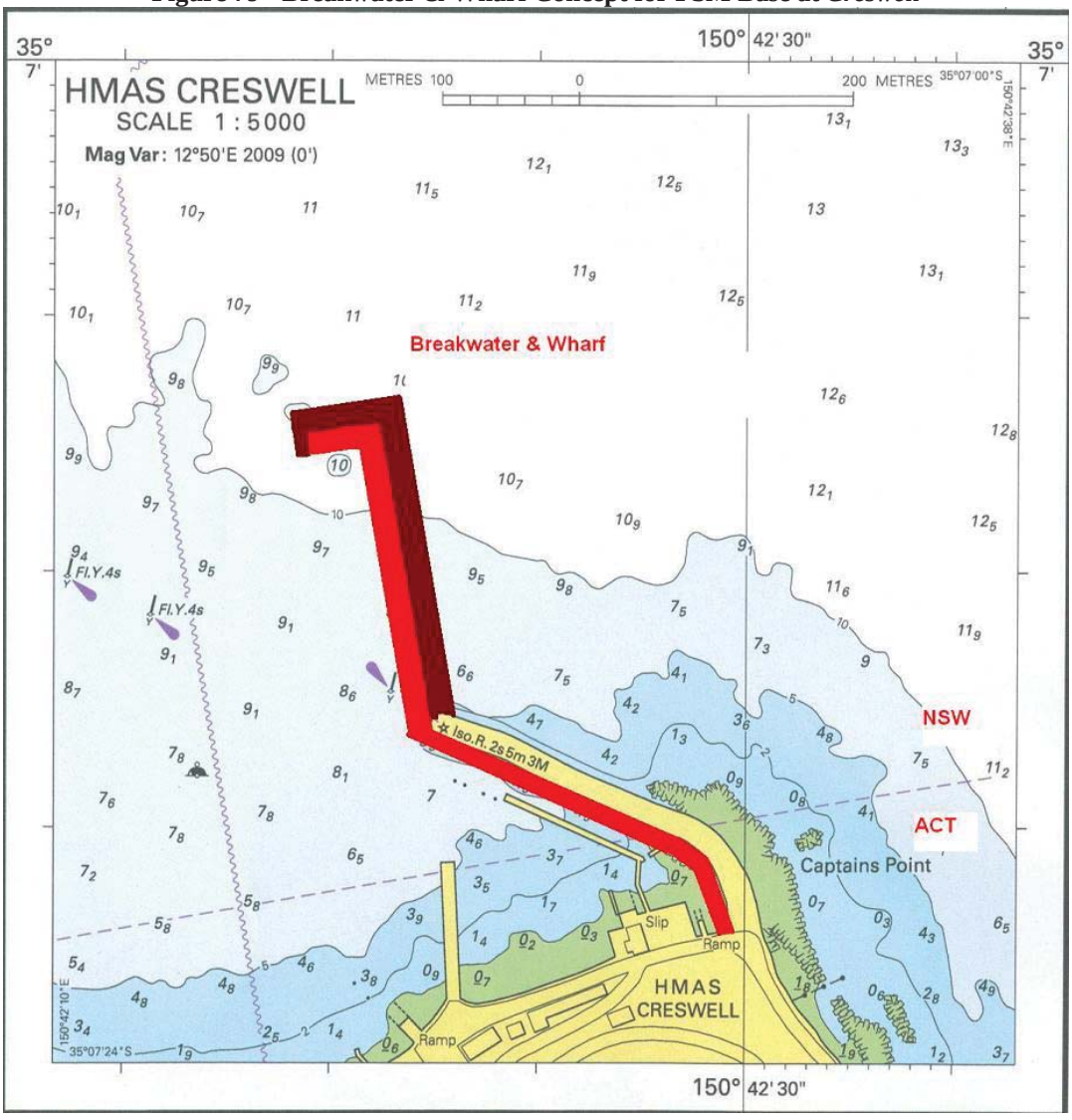
Figure 78 - View from Boundary Sign towards Breakwater



450 This general area represents an opportunity for the creation of an FSM homeport. It is sufficiently distant from the Naval College buildings and Quarterdeck to not significantly interfere with its heritage-listed image, but also close enough to be able to take advantage of naval lands and the available support services. The proximity to the NSW boundary also provides an alternative place for the location of shore based infrastructure; should its construction within the Jervis Bay Territory be deemed less desirable for any reason.

451 The wharf element of this FSM homeport concept, illustrated at Figure 79, provides a solution that has minimum visual and environmental impact and will enable a public perception of only a small change to the overall Jervis Bay image. It need not interfere with Hyam's Beach.

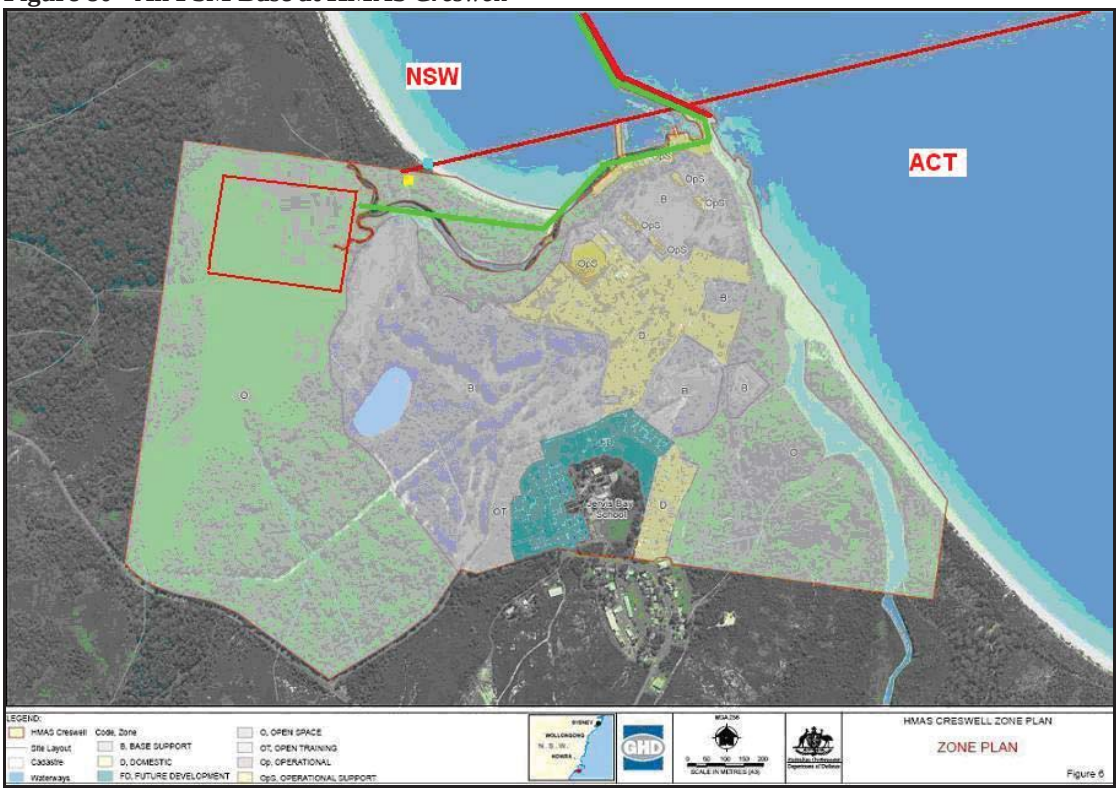
Figure 79 - Breakwater & Wharf Concept for FSM Base at *Creswell*



452 This concept utilises the existing breakwater and extends it northwards. A wharf constructed on the leeward side of this breakwater extends to connect with the existing boat harbour roadway. At the Western end of the boat-harbour roadway, a substantial new roadway/wharf construction would link the existing boat-harbour environment with the new homeport infrastructure; (shown as a bright green line in

Figure 80). The shore based homeport infrastructure would be screened from the beach by the foreshore native plants.

Figure 80 - An FSM Base at HMAS *Creswell*



The Shoalhaven and Illawarra Regions

453 Jervis Bay is within the NSW Shoalhaven Region and lies south of the Wollongong (Illawarra) Region that separates it from Sydney. The workforce for any potential submarine homeport located on Jervis Bay could come directly from the Shoalhaven Region and from Wollongong and the other significant Illawarra regional towns.

454 Nowra and Bombaderry to *Creswell* are 40 minutes travelling time and Wollongong to *Creswell* takes 1 hour 40 minutes. Any of the Jervis Bay towns from Callala Bay around to Hyam's Beach would of course be significantly less.

455 The Shoalhaven Region has a workforce of 38,945[294] and the Illawarra Region cities/towns of Wollongong, Kiama and Shellharbour have a combined workforce of 141,014[295] giving a total workforce over both regions of 179,959.

Industries

456 Its diversified economic base combines longstanding steel making, coal mining and agricultural industries with more recent manufacturing, engineering, tourism activities and knowledge based industries in ICT, business and financial

[294] March QTR 2009-Small Labour Market Australia-
[295] Ibid.

services. The area also has extensive research and development capabilities for industry.[296]

457 Manufacturing/Engineering The region has a growing number of world class manufacturers. With expertise in advanced CAD/CAM and CNC technologies, the local engineering sector has the capabilities to tackle even the most complex projects. From fabricated metal products to medical devices, Illawarra/South Coast companies are recognised leaders in design, engineering, R&D and quality assurance.[297]

458 Knowledge Services The region is becoming recognised as a hub for knowledge based industries in ICT, business and financial services. This growth is supported by the University of Wollongong (UOW).[298]

Research and Innovation

459 The region has a reputation as a centre for innovative research and development. This is led by the UOW that has a leading international profile in a range of key research fields including:[299]

- Future Materials: Nanotechnology, intelligent polymers, superconductors, battery technology and solar.
- BioFutures: Medical bionics, biomechanicals, public health planning and administration, biomolecular science, smart foods and medical school.
- Engineering Solutions: Precision manufacturing and intelligent mechatronics, electricity and power, sustainable resources, medical radiation physics and infrastructure.
- ICT: Smart internet, wireless, computer security and digital rights management, data mining and electronic commerce.
- Digital Media: Image and video coding, content based image and video retrieval, dense immersive communications environment, games technology, biometrics, telematics, animation, film and television.
- Intelligence and Security: Transnational crime prevention, finance, international maritime security, forensic accounting, IT security and encryption.

460 The recently opened Innovation Campus in Wollongong provides opportunities for businesses to undertake collaborative research activities with the UOW and other Innovation Campus tenants.[300]

Naval Air Station – Technology Hub

461 The presence of the Naval Air Station at HMAS *Albatross* (Nowra) does provide a default technology hub for the prospective development of specialist contractor support for any FSM homeport consideration in the Shoalhaven Region.

[296] NSW Government < http://www.business.nsw.gov.au/invest-in-nsw/regional-nsw/nsw-regions/illawarra>
[297] NSW Government < http://www.business.nsw.gov.au/invest-in-nsw/regional-nsw/nsw-regions/illawarra>
[298] ibid
[299] Ibid.
[300] Ibid.

Conclusions

462 Jervis Bay is a valid potential site for consideration as a future submarine homeport despite it being about three hours drive from Sydney's CBD. The significant population centre and developing high skills workforce that centre on the University of Wollongong in Wollongong, mitigate the distance to some extent. The median price for housing in Nowra, forty minutes distant, is the lowest surveyed at $250,000[301].

463 Jervis Bay is an established region of high environmental significance and popularity, and those factors dictate the approach necessary in developing any concept for a local FSM homeport. The preferred site is Green Point on Defence land within close proximity to the Callala Bay Township at the northeastern end of Jervis Bay.

464 A concept that generates least perceived change to Jervis Bay and its environs is to integrate a new FSM homeport onto land that is adjacent to the existing HMAS *Creswell* naval base, in either NSW or Jervis Bay Territory. The resulting capability would facilitate ready access by FSMs to water of dive depth, the EAXA, relevant operational assets and ammunitioning at Eden, all of which are significant contributors to the desirability of the concept.

[301] Refer Table 1- Comparison of Median Housing Prices within Commuting Distance

Annex M: NSW – Eden Twofold Bay

Introduction

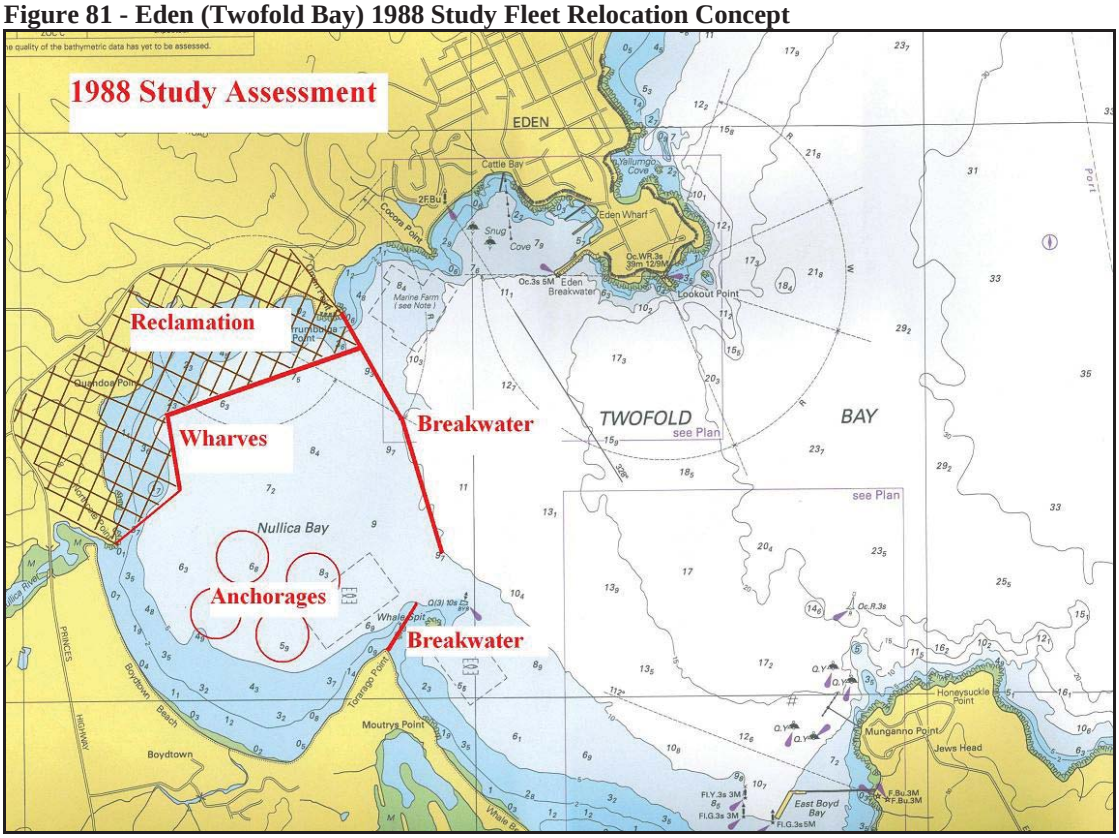
465 Twofold Bay, on which the town of Eden is located, featured significantly in previous fleet basing relocation studies.

Discussion

466 Twofold Bay was considered (for a Fleet Base relocation) in the 1992 report[302] at best to be marginally satisfactory – refer Figure 81. "Its drawbacks were particularly:

- Significant dredging, reclamation and breakwater construction would be required
- The best notional layout was constrained geographically and environmentally
- Adverse weather conditions would constrain operations at the berths and in the limited anchorage
- Entry would be difficult in adverse weather conditions
- Sufficient anchorages could only be provided at very high costs and significant technical risk
- Social and support infrastructure was inadequate

Figure 81 - Eden (Twofold Bay) 1988 Study Fleet Relocation Concept

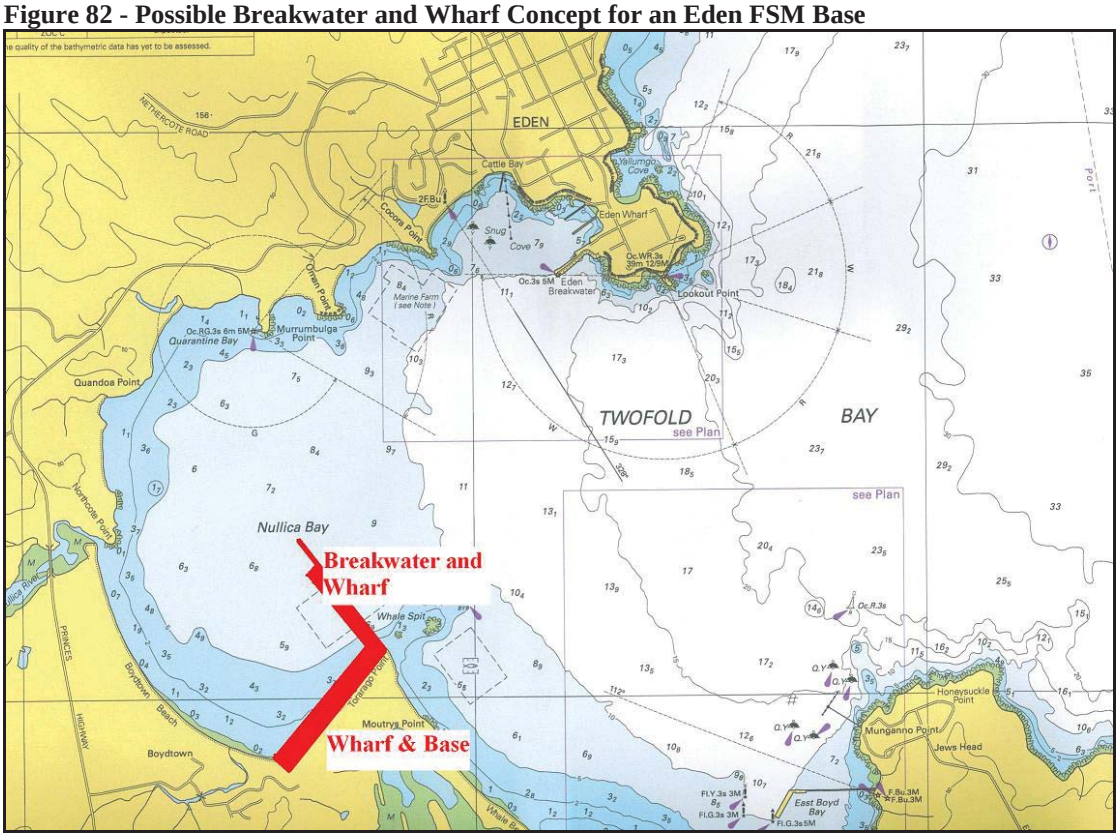


467 A submarine base however requires a much smaller land and water footprint, and Figure 82 illustrates an initial concept whereby a much smaller protective breakwater and relevant wharf to the south West of Twofold Bay, if ultimately verified by hydrological and related expert surveys, could potentially be created.

[302] Fleet Base and Armaments Complex Locations Review – Department of Defence – July 1992

468 Twofold Bay is not close to any major population or technological support centre however, and Defence would expect difficulty in sustaining the necessary uniformed and civilian workforce, as would relevant Defence contractors. Sydney is six hours forty minutes distant and Melbourne is just over seven hours away.

Figure 82 - Possible Breakwater and Wharf Concept for an Eden FSM Base



Conclusion

469 Twofold Bay and its town of Eden are too remote from major population centres for in-depth consideration as a potential FSM homeport.

Annex N: VIC - Westernport Bay

Introduction

470 Two bays serve The City of Melbourne, Port Phillip and Westernport. The Port of Melbourne is at the head of Port Phillip Bay and "the Bay" forms the lifestyle focus of much of Melbourne's population. The development of Westernport Bay has languished in relative terms. HMAS *Cerberus* (highlighted blue in Figure 83), is about one hour's driving of Melbourne's CBD (shaded yellow) and is accessible to all of the other suburbs shown on this street directory extract.

Figure 83 - Melbourne's Two Bays

471 Westernport covers an area of approximately 680km² and includes two islands, French Island and Phillip Island, which lie at the centre and entrance of the bay respectively. Approximately 40% of its total area is exposed mudflat at low tide.[303]

472 The commercial port that operates within Westernport Bay is The Port of Hastings. It is located approximately 30 km southeast of the Melbourne suburb of Dandenong and is one of four major commercial trading ports operating in Victoria. In November 2004, the Victorian Government released the *Victorian Ports Strategic Framework (VPSF)* to provide high-level strategic guidance for the development of

[303] Page 6 - Port of Hastings Land Use & Transport Strategy – August 2009

Victoria's ports system. The VPSF identified Hastings as a port suitable for expansion into international container trades to complement the Port of Melbourne, once Melbourne reaches capacity. The subsequent planning processes have generated the formally released Port of Hastings Land Use & Transport Strategy, which will be reviewed and updated every four years.[304]

473 The Naval Waters of HMAS *Cerberus* lie within the Port of Hastings control zone, which extends northwards from the entrance of Westernport for the full length of the eastern shores of the Mornington Peninsula. Potential Westernport Bay FSM homeport sites considered are HMAS *Cerberus*[305] (highlighted in blue at Figure 83), and the nearby Crib Point jetty and disused BP Oil Refinery site.

Figure 84 - HMAS *Cerberus* and Hann's Inlet - Aerial View[306]

The Region(s)

474 The Port of Hastings is located within the Mornington Peninsula region but is also very close to the South Eastern Melbourne region.

475 Mornington Peninsula[307] contains the bayside suburbs of Seaford, Frankston and Mornington, the tourist areas of Sorrento and Cape Schank and the growth areas of Carrum Downs and Langwarrin. Frankston is the major commercial, retail, educational and transport centre in Melbourne's outer south and features Monash University – Peninsula Campus, Chisholm Institute of TAFE and Frankston Hospital. Carrum Downs and Langwarrin have been the fastest growing suburbs over the period

[304] Page 4 - Port of Hastings Land Use & Transport Strategy – August 2009
[305] Refer Figure 84
[306] Image courtesy HMAS CERBERUS
[307] Victorian Government Labour Force Snapshot – Mornington Peninsula Statistical Region – January 2011.

2003-2008, due to the large amounts of available land and their proximity to Melbourne and the South-East growth corridor. The population aged 15-24 (11.2%) has experienced a large growth increase.

476 In August 2010 there were 139,500 people employed with an overall unemployment rate of 4.8%. 29,000 of those employed were in the age group 15-24 and the unemployment rate for this group was 10.1%

477 The region contains 32,808 businesses. Construction (26%) is the largest industry in business numbers; these are well dispersed throughout the region. In contrast, property and business services (22%) and retail (12%) businesses are predominantly located in more developed coastal towns. The vast majority of manufacturing is near Frankston.

478 South Eastern Melbourne[308] contains the outer Melbourne growth areas of the Cities of Cardinia and Casey. The manufacturing centre of Dandenong is located in the region, along with the industrial areas of Springvale and Keysborough. The expanding population centres of Berwick, Cranbourne and Pakenham are located here. Suburbs such as Lynbrook, Narre Warren South and Officer are some of the fastest growing in the country. The fact that adults and children reside in similar proportions suggests there are many households with young families limiting the risk of future workforce replacement issues.

479 In August 2010 there were 216,400 people employed with an overall unemployment rate of 7.2%. 38,000 of those employed were in the age group 15-24 and the unemployment rate in this group was 15%.

480 The region contains 20,469 businesses. As Melbourne's unofficial '2nd CBD'; there are 78 businesses in and around Dandenong that employ over 200 people. Construction (22%) is the largest industry by business numbers, with the majority located in the suburbs within the larger geographic area of (the City of) Casey. Property and Business Services (20%) and retail businesses (12%) are largely concentrated around Dandenong and Narre Warren.

Access – Public Transport

481 The Eastlink toll road provides access in about an hour to Melbourne CBD that is 70km distant. This road access is planned to improve further with the dual carriageway extension and upgrade to Freeway status of the road that links the Monash Freeway with Hastings. There is an existing regular train service connecting Crib Point and Hastings with Frankston, and beyond to the Melbourne metropolitan rail and tram networks.

Education

482 There are nine research based universities and nineteen training and further education institutions in Melbourne. Victoria is the most highly educated Australian state. Over 25% of Melbournians have a Bachelors degree or above.[309] In 2008,

[308] Victorian Government Labour Force Snapshot – South Eastern Melbourne Statistical Region – January 2011
[309] Australian Bureau of Statistics via "Interest Victoria MELBOURNE" brochure.

Victoria had the highest number of IT, engineering and natural and physical science graduates in the country, as well as the second highest number of management and commerce graduates.

Medical

483 There are nine hospitals currently within ready proximity to Hastings. Six are located in Frankston, two are in Mornington and one is in Cowes (Phillip Island). There currently are five medical centres and three dental centres within Hastings.

Defence Industry

484 Victoria has over 300 businesses that supply products and services to Defence. It is the lead state for the Joint Strike Fighter programme and is the largest manufacturer of munitions. Williamstown Dockyard (British Aerospace), and Defence Science and Technology (DSTO) are of particular interest to the FSM Programme. Melbourne is home to . . . Australia's Defence Materials Technology Centre and the recently established Defence Science Institute, a joint initiative between …DSTO and the University of Melbourne that will see the application of cross-disciplinary research to solve complex long-term challenges for the Australian Defence Force.[310]

485 The Maritime component of Victoria's Defence Industry sector activity in 2009-2010 was $518mil (27%), of which $442mil was with Australian domestic contracts and $77mil with exports.

486 The Victorian Government has identified the defence industry as a strategic priority for the economic development of the state.[311]

The Port of Hastings Plan[312]

487 On 8th December 2008, the Victorian Government released the Victorian Transport Plan (VTP) and Freight Futures – Victorian Freight Network Strategy. The VTP sets out the Governments' vision and plans for developing an integrated, sustainable transport system for Victoria for the next 20 years.

488 In May 2009, the Australian Government and Infrastructure Australia announced nine Priority Projects to commence immediately, and a further twenty-eight Priority Infrastructure Pipeline projects which should proceed to more detailed design development prior to investment. The development of the Port of Hastings is a priority pipeline project.

489 The Port of Hastings Port Land Use & Transport Strategy ("the PLUTS") utilises the concept of 'port precincts' which provide a geographical and functional focus for the areas earmarked for future port operations and staged development. Three precincts are identified – Long Island, Crib Point and Stony Point – each with a particular role within the Strategy – Refer Figure 85.

[310] Defence Industry Victoria broadsheet – Department of Innovation, Industry and Regional Development – State Government of Victoria
[311] Victoria – A Roadmap for Victoria's Defence Industries – Defence Industry Unit – Department of Innovation Industry and Regional Development – Government of Victoria (Formally received January 2011)
[312] Port of Hastings Land Use & Transport Strategy – August 2009 – Port of Hastings Corporation

490 Long Island Precinct: The PLUTS focuses future development of the Port of Hastings on the Long Island Precinct, an area to the northeast of Hastings Township, around Long Island Point. This area contains existing facilities serving Esso and Bluescope Steel and includes the largest contiguous parcel of Special Use Zone (SUZ1) land, providing adequate space for future development of container handling and other port infrastructure. Long Island will be the preferred location for a new port operations centre and will become the focal point for future port activity.

491 To accommodate the expected growth in trades over the next 30 years it is proposed that port infrastructure in this precinct be developed progressively as freight demands justify expansion. Three Stages of Development are proposed, with:

- Stage 1 providing for bulk, break bulk, cars and general cargo (including the potential for some Bass Strait trade) – 2010 to 2020;
- Stage 2 accommodating international containers - 2020 to 2035 and
- Stage 3 providing additional capacity by physically integrating and expanding facilities constructed at Stage 1 and Stage 2 – post 2035.

492 Crib Point Precinct: Further to the south, the Crib Point Precinct is adjacent to the Crib Point Jetty and will continue to be used as a liquid berthing facility. However, there is capacity to reassess the current SUZ1 zoning in this precinct to consider the total area devoted to port uses. This PLUTS suggests that there may be scope for community, recreational and environmental uses for some of this area. The areas of State owned land between Crib Point and Stony Point are identified for environmental rehabilitation and management in conjunction with local groups, Mornington Peninsula Shire and relevant government agencies.

493 Stony Point Precinct: Located at the southern extremity of the port and adjacent to the Stony Point Jetty, the Stony Point Precinct is currently used as the port operations centre. It is anticipated that this precinct will become available for community, tourism and recreational uses, including a continuation of passenger ferry services and potentially, a car ferry service. Management of Stony Point may be devolved to the Mornington Peninsula Shire, Parks Victoria or other appropriate entities subject to further planning considerations.

FSM Homeport Opportunities

494 The strategic plan for the Hasting Port environment identifies the planning conclusions for the Westernport Bay shoreline between Stony Point and northwards to Long Island Point and beyond.

495 Crib Point, with its jetty that has the dimensions and water to berth at least six submarines, and about 4 hectares of Crown land at the head of the wharf (on the seaward side of the public roadway), was the initial focus of this study. Refer Figure 86. Beyond the public roadway there is additionally a large area of special use (SUZ1) zoned land currently owned by Shell and Mobil, but unused and without any readily identifiable purpose. The close proximity of HMAS *Cerberus* also added significant ‘depth’ to the concept of this potentially being the focus for a FSM homeport.

Figure 85 - Hastings Port Precincts, and Sandy Point within HMAS *Cerberus*

496 Whilst the land is unused, the wharf serves currently to transfer bulk fuels and related liquids via pipeline to processing plants on the Western side of Port Phillip Bay. A similar pipeline originates at Long Island Point with the same destination. The strategic plan for Hastings Port ratifies this bulk liquids handling capability and endorses its continuation. Discussions with State Government representatives have indicated that the strategic plan was developed in the absence of any awareness of interest in this wharf or its adjacent land, implying that if a strong case for an

alternative strategic purpose could be put then reconsideration of that strategic plan could occur.

497 The Port of Hastings Plan is comprehensive however, and it will be more realistic to consider the Crib Point Jetty as a potential adhoc berth for future submarines, assuming that a negotiated sharing arrangement is possible.

Figure 86 - Crib Point Shell/Esso Facility with *Cerberus* at top left background[313]

498 Given the commitment of The Port of Hastings Land Use & Transport Strategy to Stony Point and Crib Point, and the Crown lands in between, the FSM homeport opportunities that exist from within the land boundaries of HMAS *Cerberus* appear more desirable.

The Westernport Bay Concept

499 HMAS *Cerberus* is Australia's principal naval training base for new recruits. It has a large land footprint and is not under any known local pressure to vacate any of its lands. It has the potential to satisfy many desirable FSM homeport characteristics that would be much more difficult to achieve elsewhere[314]. Covered berths, relative isolation and visual security, and a local ammunition depot[315] are just a few of the specified homeport capabilities that could potentially be available. The magnitude and role of *Cerberus* would also facilitate the ready availability of medical and dental facilities, administration, classrooms and sporting facilities for possibly incremental costs only.

[313] Image courtesy Victorian Government
[314] Refer Figure 87 - HMAS CERBERUS Wharf and Seamanship School for example
[315] Small capacity ammunitioning capability – could not accommodate a full FSM EO outfit.

Figure 87 - HMAS *Cerberus* Wharf and Seamanship School

500 Perhaps the greatest potential benefit should *Cerberus* also become an FSM homeport, would be the associated change to the submarine workforce recruiting dynamic. Location of a submarine base within the new recruit training depot would probably increase and sustain the required number of submarine force applicants.

501 The establishment of all required FSM shore based infrastructure within HMAS *Cerberus* boundaries is achievable but the question of where to create wharf facilities requires close examination.[316]

502 There are three potential *Cerberus* wharf interfaces to deep water sufficient for FSM platforms, refer Figure 85. They are:

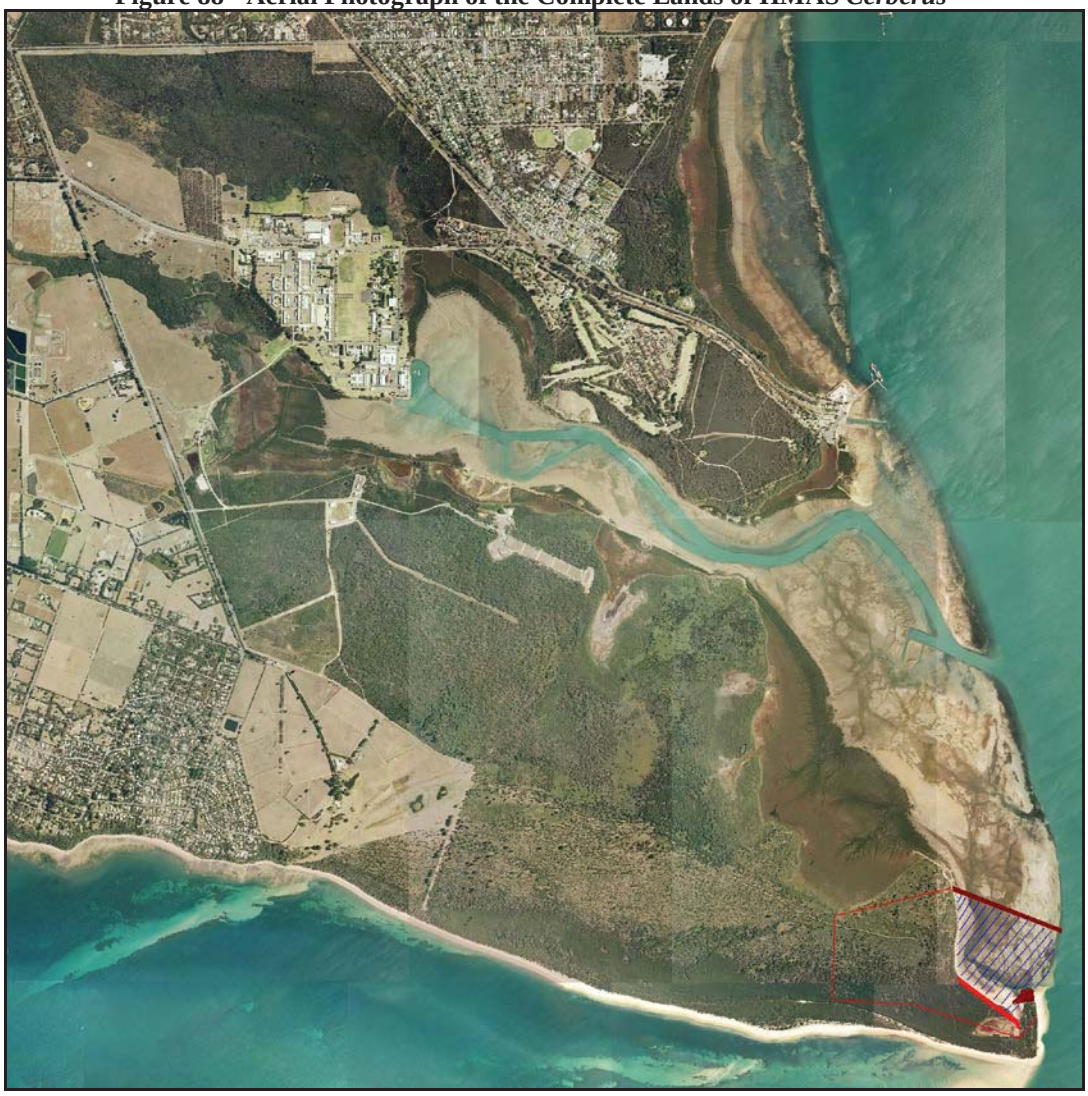
- Stony Point – from the *Cerberus* side of the railway line
- Hanns Inlet
- Sandy Point

503 A Stony Point wharf facility created via a combination of dredging and the construction of a wharf as an extension of the *Cerberus* land mass would interfere with the *Cerberus* golf course but would be close to the rail link if that was perceived to be beneficial? One significant disadvantage of this concept however is that such an FSM wharf facility would be quite close to Stony Point wharf and the tourist related development concepts mentioned in the Port of Hasting strategic planning document[317].

[316] CAPT M.D. Hill RAN– Commanding Officer HMAS *Cerberus* – 28th January 2011
[317] Port of Hastings Land Use & Transport Strategy – August 2009 – Port of Hastings Corporation

504 Hanns Inlet could be dredged[318], and a new FSM wharf could be constructed to blend with the existing *Cerberus* waterfront facilities. Hanns Inlet is fed only by a small stream and local opinion, subject to expert analysis and confirmation, is that it would not readily silt once dredged. This concept would enable a good integration with *Cerberus* buildings and resources generally and if considered relevant, would provide a ready access to the Marine Technical diesel engine training environment.

Figure 88 - Aerial Photograph of the Complete Lands of HMAS *Cerberus*[319]



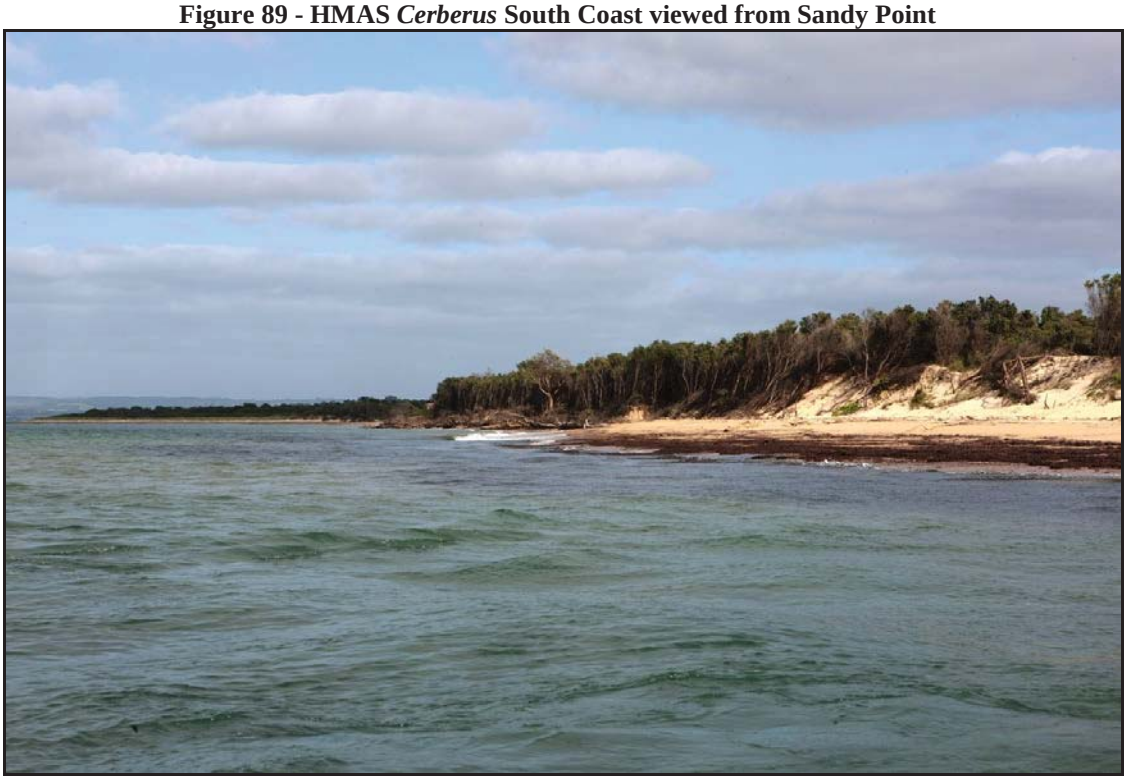
505 Mangroves border both Stony Point and Hanns Inlet however, which may require an additional level of detailed research in any associated environmental impact assessment statements.

506 Sandy Point by comparison, at the southeastern tip of *Cerberus* lands, has no mangroves. It has a number of additional natural attractions including close proximity to relatively deep water, is isolated but not remote, and provides a shorter and more-covert entry and exit from the Port of Hastings environment than available from any other local port option.

[318] CAPT M.D. Hill RAN – Commanding Officer HMAS *Cerberus* – 28th January 2011
[319] Image courtesy HMAS CERBERUS

507 Figure 88 shows the complete lands of HMAS *Cerberus*. At the lower right of this image lies Sandy Point. The brown line added represents a wall built to prevent silt from Hann's Inlet and sand entering the newly created submarine harbour. The blue diagonal lines represent the excavated tidal sand area that becomes the new submarine harbour. The bright red line represents a 500-metre long wharf. A suggested perimeter for the base environment is the thin red line.

Figure 89 - HMAS *Cerberus* South Coast viewed from Sandy Point



508 Figure 89 shows the southern coastline of HMAS *Cerberus* viewed from a boat in the channel adjacent to the southern tip of Sandy Point. From a point further north in the channel and generally looking Westwards across the northern tip of Sandy Point, Figure 90 reveals the terrain of the natural bay at Sandy Point.

Figure 90 - Northern Tip of Sandy Point and the Bay Beyond

Conclusion

509 Westernport Bay satisfies a key FSM homeport selection criterion in that it is close to the City of Melbourne. There are two readily identifiable general sites for a potential FSM homeport, one that utilises the existing bulk liquids wharf and adjacent lands at Crib Point, and the other being HMAS *Cerberus*. The Crib Point opportunity could draw upon the nearby resources of HMAS *Cerberus*, but because its wharf is already committed in concept to the strategic development of the Port of Hastings, it is not as attractive as a solution based entirely upon the lands and resources of HMAS *Cerberus* alone.

510 As the principal new recruit training establishment for the Australian Navy, HMAS *Cerberus* has most of the necessary organisational and people related support facilities already in existence, and may only need incremental modifications to accommodate the additional personnel associated with a submarine squadron. Integration of an FSM homeport into the *Cerberus* initial recruit training environment could boost submarine recruitment in a sustainable manner. Wharf and portside infrastructure would be new developments but the existing availability of infrastructure assets such as the on-site ammunition storage facility could enable a lower cost of implementation than other homeport alternatives. The favoured port location is Sandy Point at the southeastern extremity of HMAS *Cerberus* however; Hann's Inlet may also become favourable with further investigation.

511 The long Bass Strait transit in waters that have a depth between fifty and seventy-five metres, and the transit north to the EAXA, compromise the potential effectiveness of a FSM homeport at Westernport Bay.[320]

[320] Refer Figure 17 and Table 3.

Annex O: SA - Adelaide

Introduction

512 Adelaide is host to most of Australia's defence industry companies. It is a major population centre with a population of 1,203,186[321] and it hosted the construction of the CCSM, however it is not a potential FSM homeport.

Discussion

513 South Australia arguably has a higher defence industry focus than any other state of Australia. Substantial defence systems research in both the public and private sectors, and the recent ASC contract to build the Air Warfare Destroyers, having previously constructed the CCSM, contribute to the argument.

514 The 1988 review[322] of Fleet Base alternatives examined the following South Australian ports but rejected them as unsuitable in its initial review:

- Wallaroo
- Port Augusta
- Whyalla
- Port Pirie
- Port Adelaide
- Port Lincoln

515 "The principal reasons for rejection included lack of suitable land and water, strategic location, operational aspects or lack of supporting infrastructure."[323] As a capital city and significant population centre, Adelaide's role in the total Australian Defence capability development process is critical but its contribution to naval capability is primarily limited to research-and-development, and ship/submarine construction. Its potential as a naval operations port is very limited.

516 Adelaide's ports and harbours experience the worst sea states of any capital city[324]. For slow moving conventional submarines, the transit distances East or West from there to areas of exercise with other ADF units and international operations generate many wasted days, both in fuel and human endeavour. This wastage would be significantly less if operating from an East Coast (or West Coast) homeport. Additionally, although Adelaide does host an industrial base that is capable of supporting operational submarines it is not an East Coast city where most people live.

Conclusion

517 Adelaide is a major population centre that is very important to Australia's defence capability however, it is not an East Coast city and does not satisfy the posting preferences of most submarine qualified personnel[325]. It would not therefore significantly reduce the recruiting and retention risks recognised as a challenge to the success of the FSM Programme. Its location additionally has the worst weather of any Australian port[326] and its distance from both the West Coast or the East Coast would inhibit strategic deployment of the submarine force.

[321] "3218.0 – Regional Population Growth, Australia, 2009–10". Australian Bureau of Statistics. 31 March 2011.
[322] Eastern Armament Depot and Fleet Base-A Study of Location Options-RADM A.L. Beaumont RAN-December 1988
[323] Annex E, ibid.
[324] Refer RAN Hydrographic Service Web site www.metoc.gov.au/products/wms_M10_swh.php
[325] Refer - XXXXXX
[326] Refer RAN Hydrographic Service Web site www.metoc.gov.au/products/wms_M10_swh.php

Annex P: TAS - Hobart

Introduction

518 Hobart is the capital city of Australia's island state Tasmania. It has a deepwater harbour and is a popular city for visits by both Australian and international navies. It is not a potential FSM homeport however.

Discussion

519 Hobart, considered in the 1988 Fleet Relocation Study[327], received the summary assessment; "It is possible that land could be made available for a fleet base in the general vicinity of Hobart. However, Hobart is separated from the main transport and industrial infrastructure of the rest of the country which would cause logistic support and social problems of great magnitude. The development of a fleet base in the Hobart area would have a catastrophic effect on the present system of fleet support facilities and there are more suitable locations in the south-east of the continent."

520 Since the 1988 conclusion above, the Hobart population at 212,019[328] has not increased in relative terms and is a fraction of the population of the other three East Coast capital cities, which are all far in excess of one million people.

Conclusion

521 Hobart has a population of just 212,019[329]; this relatively low population base and the absence of a substantial industrial base from which to develop appropriate levels of FSM support, plus its isolation from the main East Coast population centres, cause it to be discounted as a potential FSM homeport.

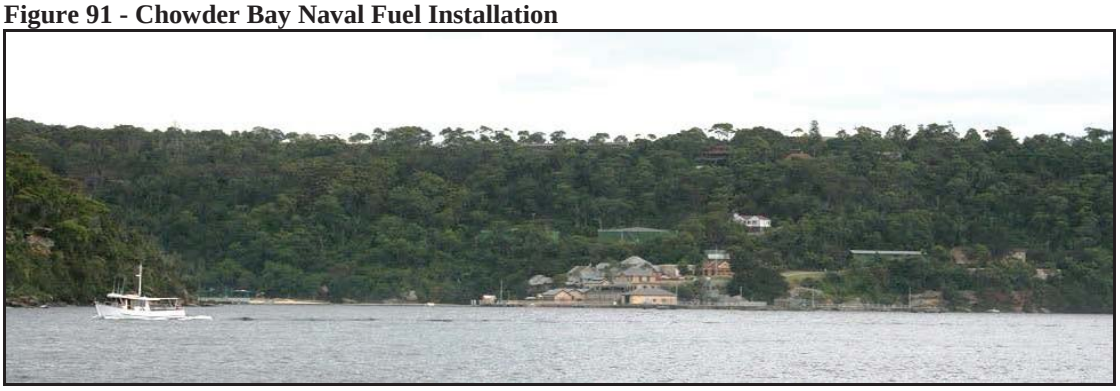
[327] Eastern Armament Depot and Fleet Base-A Study of Location Options-RADM A.L. Beaumont RAN-December 1988
[328] 3218.0 – Regional Population Growth, Australia, 2008–09". Australian Bureau of Statistics. 30 March 2010
[329] Ibid.

Annex Q: Fuelling

The Role of Chowder Bay

522 Chowder Bay is not under any consideration as a potential FSM base but it is important to any prospective Sydney based submarine operations. It complements the fuelling-via-lighter capability.

Figure 91 - Chowder Bay Naval Fuel Installation



523 Chowder Bay is Navy's oil fuel installation in Sydney and is a strategic asset. Its role will extend to support the FSM platform in Sydney. The capability to capture compensating salt water that is displaced from submarine fuel tanks during the refuelling process would probably best be provided via an alongside lighter that has a fitted oily water separator.

AIP Fuel(s)

524 There is limited ability to install additional fuel tanks at Chowder Bay however subject to expert analysis it is possible that its inventory could increase to include Air Independent Propulsion (AIP) liquid fuels if the approved FSM design requires them.

525 The management of AIP fuels at each potential FSM homeport is likely to be an individual case study, but if an FSM refuelling capability is ultimately endorsed it is likely that the relevant AIP bulk fuelling process will utilise a purpose equipped lighter vessel; either for replenishing shore based storage facilities or else refuelling submarines directly.

Annex R: Ammunitioning

Introduction

526 Reasonable access to ammunition stocks is important for all war-fighting vessels because the time taken otherwise to transit and take on the initial outfit of weapons, and then to replenish them subsequently, is effectively time wasted. s33(a)(i) [redacted]

527 Proximity to ammunitioning facilities is a significant factor in the consideration of homeport alternatives.

Discussion

528 Joint Logistics Command manages the transit, storage and delivery of guided weapons.

529 Twofold Bay (Eden) is the principal ammunitioning wharf in east-coast operational use by the RAN, with Port Alma in Queensland being the point of explosives ordnance (EO) importation. Point Wilson (Melbourne) will displace Port Alma as the single point of Defence EO importation upon completion of its refurbishment in 2014. Point Wilson will also function as an ammunitioning replenishment facility when and if required. s47C [redacted]

530 Besides these dedicated ammunitioning facilities however, small quantities of submarine guided weapons may be replenished from time-to-time in other ports by arrangement, subject to the net-explosive-quantity safety radius that is relevant on a case-by-case basis. The magazines that exist within existing defence establishments are generally available, subject to available space on an occasion-by-occasion basis, to store weapons of most types prior to delivery and loading onboard naval platforms. Examples are:

- RAAF Darwin – for Darwin port
- Australian Army in Townsville for Townsville port
- HMAS *Cerberus* for Westernport Bay

531 Whether or not the loading of weapons be they practise or war-shot, could occur alongside a wharf or must be loaded at a buoy, depends upon the total explosive load exposed upon opening the magazines of the ammunitioning vessel.

Maintenance of Submarine Guided Weapons

532 The Defence Materiel Organisation (DMO) conducts the planned maintenance of ADF Guided Weapons. The Explosive Ordnance (EO) Branch within Joint

s33(a)(i) [redacted]

Logistics Command stores the weapons and typically delivers them to DMO staff in adjacent buildings for scheduled planned maintenance activities.

533 The creation of an East Coast homeport for future submarines would at least require maintenance of submarine guided weapons to occur at Orchard Hills (NSW), (or its equivalent facility elsewhere on the East Coast) prior to despatch of the weapons to forward East Coast (short term) storage areas. The essential maintenance buildings infrastructure, previously used for East Coast Oberon Class submarine guided weapons remain available at Orchard Hills, but because there is no formalised East Coast submarine basing requirement they are under consideration for conversion to other EO maintenance applications. [331]

534 Whether or not refurbishment of existing buildings and facilities will suffice or new facilities created, capital works for the FSM programme will need to commence soon after 2020 to be able to deliver necessary capability in time for delivery of the first FSM platform in 2025.

Conclusion

535 Two dedicated East Coast ammunitioning wharves will be available to future submarines for all ammunitioning evolutions:

- Twofold Bay (Eden, NSW), and
- Point Wilson (Port Phillip Bay, Vic)

536 Ammunitioning at other ports can occur by arrangement; however, proximity to population centres at those ports would determine whether ammunitioning at a buoy was the only capability (usually) available.

537 All submarine guided weapons maintenance occurs at Garden Island in Western Australia and there are no plans to change this policy. The decision to base future submarines on the East Coast as well as the West Coast may cause a review of this policy with the intent of initiating appropriate capital works at Orchard Hills or its equivalent facility.

[331] Discussion Mr. Mark Remmers – DMO – 9th February 2011

Annex S: Docking

Images

538 A docking facility is required on the East Coast with the capability and working capacity to meet the scheduled and unscheduled dockings necessary for the number of future submarines homeported there. In 2011, there are just four recognised prospective facilities, which may be economically viable when the FSM platform needs associated docking services. Current images of all four follow.

Figure 92 - Forgacs Floating Dock - Port of Newcastle

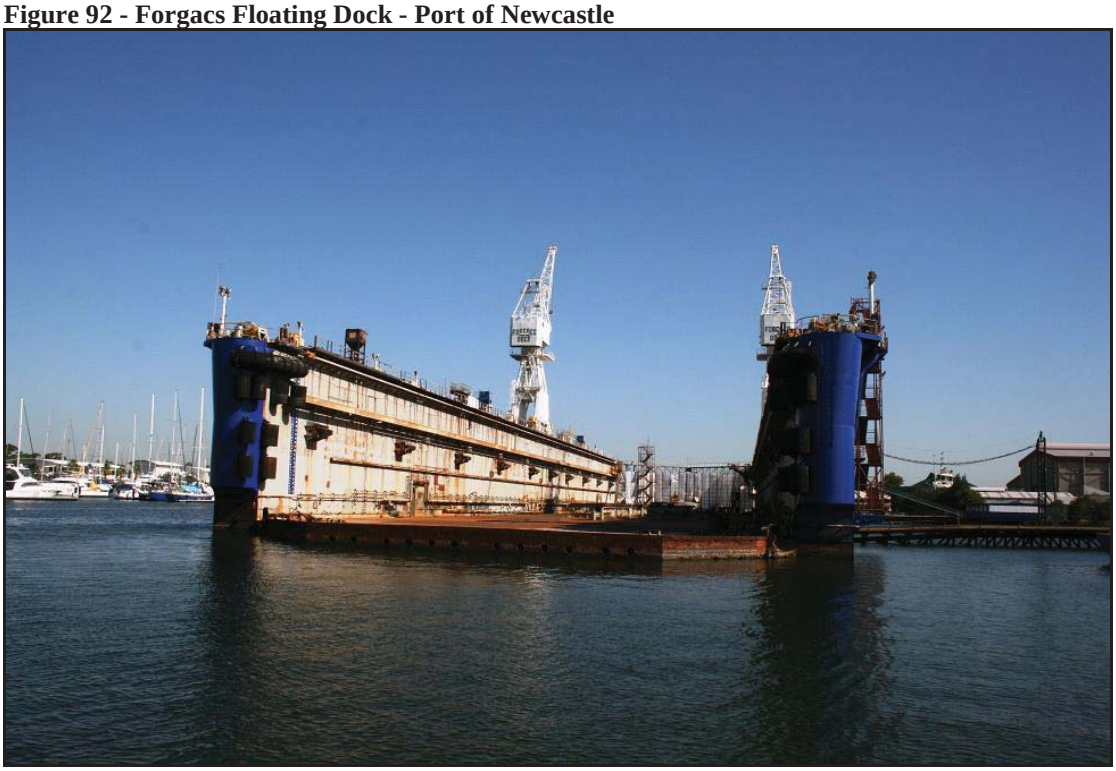


Figure 93 - Forgacs Cairncross Graving Dock - Bulimba Wharf View

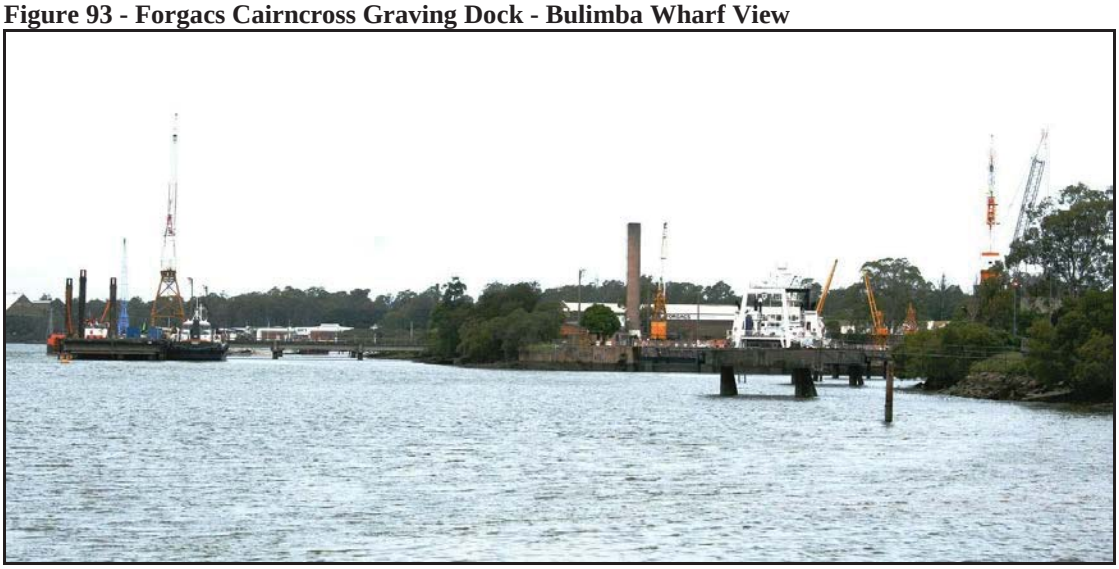
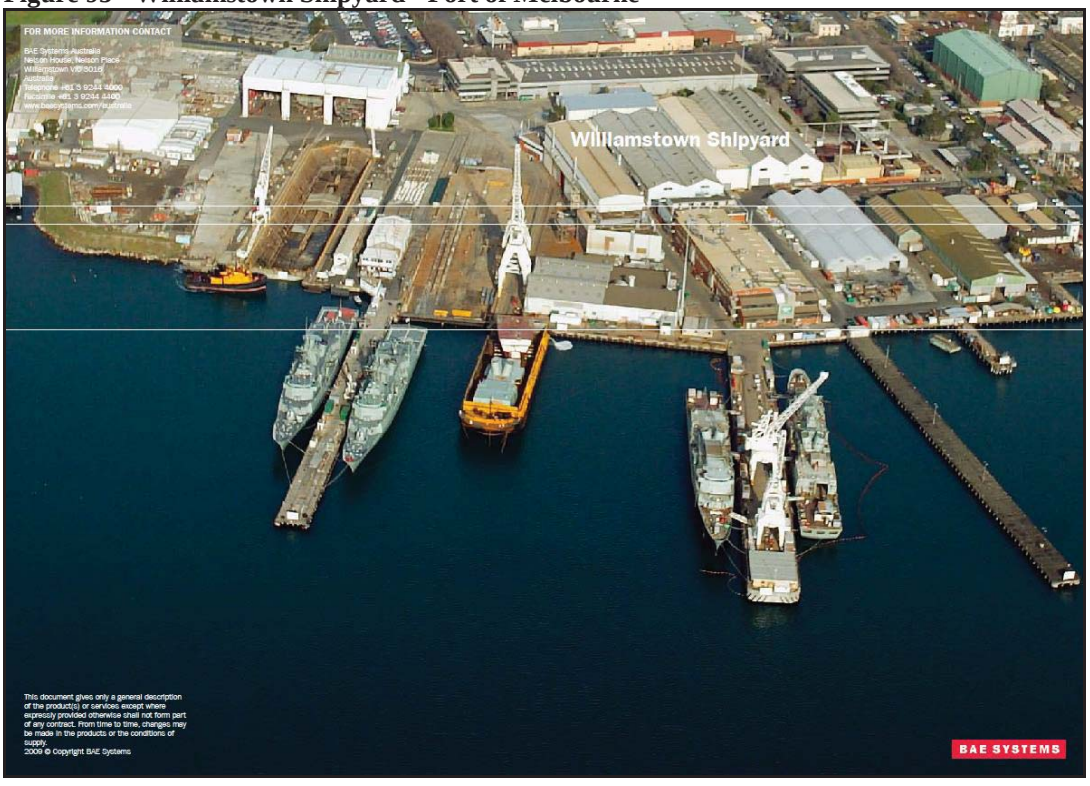


Figure 94 - Captain Cook Graving Dock - Sydney[332]

Figure 95 - Williamstown Shipyard - Port of Melbourne[333]



These four existing facilities may be commercially viable and available in 2026/2027 and if so may influence FSM docking services contracts allocations.

[332] Image – Defence Archives
[333] Image Courtesy BAE Systems

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Annex U: Usage Upkeep Plan/Cycle

Introduction

561 The number of submarines within a twelve submarine fleet that will potentially require berths[336] is determined initially by their build rate and subsequently by their Usage Upkeep Cycle. The "Usage Upkeep Cycle" not only defines the availability of submarines for non-maintenance related activities but also the periodicity of planned maintenance and refurbishment activities, and in so doing it identifies the scheduled[337] demand for submarine docking facilities. Proximity to docking facilities is a significant criterion in the determination of viable homeport options. This annex examines the number of submarines that would require concurrent berths and the utilisation that a fleet of twelve future submarines on the West Coast, or various numbers of submarines on both the east and West Coasts would make of sustainment docking facilities.

Discussion

562 The repair, overhaul and update periods of a submarine's life are important for the sustainment and progressive enhancement of its capabilities. The time spent in submarine maintenance, repair and overhaul however must be managed effectively so that it can be minimised, but without compromising submarine operational safety, efficiency and effectiveness.

563 Definition of the formal maintenance, overhaul and update periods for each RAN vessel occurs in its Usage Upkeep Cycle[338]. There is no Cycle yet defined for the FSM however the equivalent document for the CCSM provides a useful initial reference for the purposes of this study. The current CCSM Usage Upkeep Cycle[339] duration is 546 weeks[340], the last 104 weeks[341] of which are in major overhaul and update at the ASC builder's facilities in Adelaide, South Australia.

564 The operational availability of the CCSM submarines however has not met anyone's expectations and planning for the FSM will assume a greater availability. The reasons for the poor availability of Collins submarines as a class are complex. Navy's difficulties in adequately staffing those submarines that are available outside of defined maintenance commitments has been a contributing factor, as mentioned elsewhere. Submarine sustainment, as managed for the CCSM, will need to be different for the FSM because "the shareholder"[342] is not receiving an adequate return-on-investment (ROI)". How best to generate an adequate ROI however, exceeds the scope of this study.

565 Instead, an aspirational but nonetheless perceived reasonable set of submarine sustainment docking durations is used. The CCSM Usage Upkeep plan is hypothetically modified thus:

[336] Subject to operational tasking.
[337] Scheduled – ie planned maintenance as opposed to urgent defect rectification
[338] ABR5230 Ships Maintenance Administration Manual
[339] TM 181 Serial Number 045/2010
[340] 29.5 years
[341] 2 years
[342] The Australian Government

- Sustainment docking activities are all conducted away from the submarine building facility, preferably close to the homeport(s),
- The theoretical full cycle docking duration[343] (FCD) is reduced from 104 weeks to 52 weeks

Table 8- Two Usage Upkeep Cycle Alternatives

	Collins UU Cycle (Wks.)	Hypothetical UU Cycle (Wks.)
Intermediate Docking	12	12
Mid Cycle Docking	18	18
Full Cycle Docking	104	52
Number of Cycles	3	3
Total Duration	29.5years	27.5 years

Analysis

566 Assumptions - for planning purposes, the operating life of each future submarine will be 3 cycles of 494 weeks[344], except for the final cycle which does not include a major overhaul (or FCD), giving a total lifetime of 27.5 years. Assume the initial build rate of the FSM fleet is one new submarine every two years.

567 In addition to the one year period when the submarine is in major overhaul[345] there are three less intrusive docking periods in each cycle known as intermediate dockings (ID – 2x12 weeks) and mid-cycle dockings (MCD – 1x18 weeks). Commercial docking facilities at Henderson Western Australia, quite close to the CCSM homeport, usually contract to deliver these docking services currently. There may be scope within the FSM Programme for facilities like those at Henderson to also contract to undertake FCD activities on either coast.

568 Docking activities in general have far less schedule flexibility than non-docking maintenance activities and therefore more directly define both the requirement for berths at FSM homeports as well as their demand for docking facilities. Another variable in the analysis of these requirements is the number of FSM platforms that may be home-ported on each coast. Four iterations of submarine squadron size are considered; four, six, eight and twelve.

569 Berths Figure 106 summarises the theoretical maximum requirement for berths by a squadron of four future submarines, from the commissioning date of the first to the disposal date of the last. Four berths are required, and accepted practice currently is that providing fully reticulated services are available, outboard berths are as acceptable as alongside berths except when scheduled maintenance activities are underway. Two wharf-side berths and two outboard berths would consequently be required for a squadron of four future submarines.

570 Figure 107, Figure 108 and Figure 109 provide the equivalent information for squadron sizes of six, eight and twelve submarines respectively. These are summarised as:

[343] Full Cycle Docking is a major overhaul or refurbishment activity
[344] 9.5 years
[345] Known as a Full Cycle Docking (FCD)

- 4 FSM – 2 alongside berths plus 2 outboard berths
- 6 FSM – 3 alongside berths plus 3 outboard berths
- 8 FSM – 4 alongside berths plus 3 outboard berths
- 12 FSM – 6 alongside berths plus 5 outboard berths

571 For comparison purposes, the number of alongside berths required for a squadron of twelve FSM with FCD duration of 104 weeks instead of 52 weeks, is 5 alongside berths and 5 outboard berths, ie one berth less – refer Figure 111.

Docking Facilities The usage upkeep cycle also defines submarines' docking requirements. For a squadron of four future submarines Figure 111 reveals that two docks nearby to the homeport would theoretically be required. Experience and the application of limited schedule flexibility could however enable a single local docking facility to suffice. For all other larger squadron numbers however, as shown in Figure 112, Figure 113 and Figure 114, the ability to dock two submarines concurrently would be required. This has significant implications for East Coast and West Coast basing because the conceptual basing of six submarines on each coast would theoretically require a docking capacity for two concurrent submarines locally on each coast. If the fleet comprising twelve submarines were to be split into four on one coast and eight on the other however, then concurrent docking resources for three submarines only would theoretically be required.

572 For comparison purposes, Figure 115 illustrates that the number of docking facilities required for twelve FSM does not increase above three if the FCD duration doubles to 104 weeks, which is the theoretical status quo.

Conclusions

573 Six alongside berths and up to six outboard berths with all reticulated facilities will be required for a fleet of twelve future submarines if a full cycle docking duration of fifty-two weeks only can be achieved and sustained. Whether the fleet of submarines groups into three squadrons of four, one of four and one of eight, or else two squadrons of six, the number of alongside berths required remains at six.

574 The ability to dock three submarines concurrently is the minimum requirement for local docking facilities for twelve future submarines if at each docking facility they are to undertake:

- Intermediate dockings – currently 12 weeks duration
- Mid cycle dockings – currently 18 weeks duration
- Full cycle dockings – currently 104 weeks duration, but considered here as 52 weeks duration

575 From a docking resource management perspective, and assuming that submarines will be home-ported on the east and West Coasts, the optimum distribution of submarines would be a squadron of four on one coast and a squadron of eight, (or two collocated squadrons of four) on the other coast.

Figure 106 – Berths Required for a 4 FSM Squadron

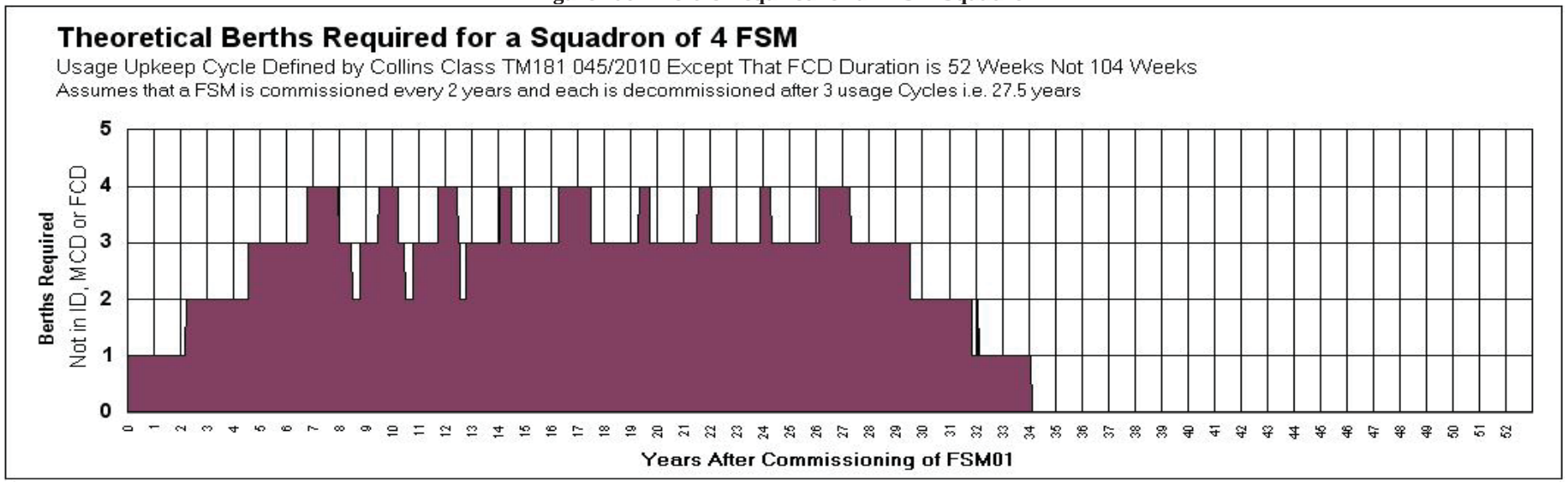


Figure 107 – Berths Required for a 6 FSM Squadron

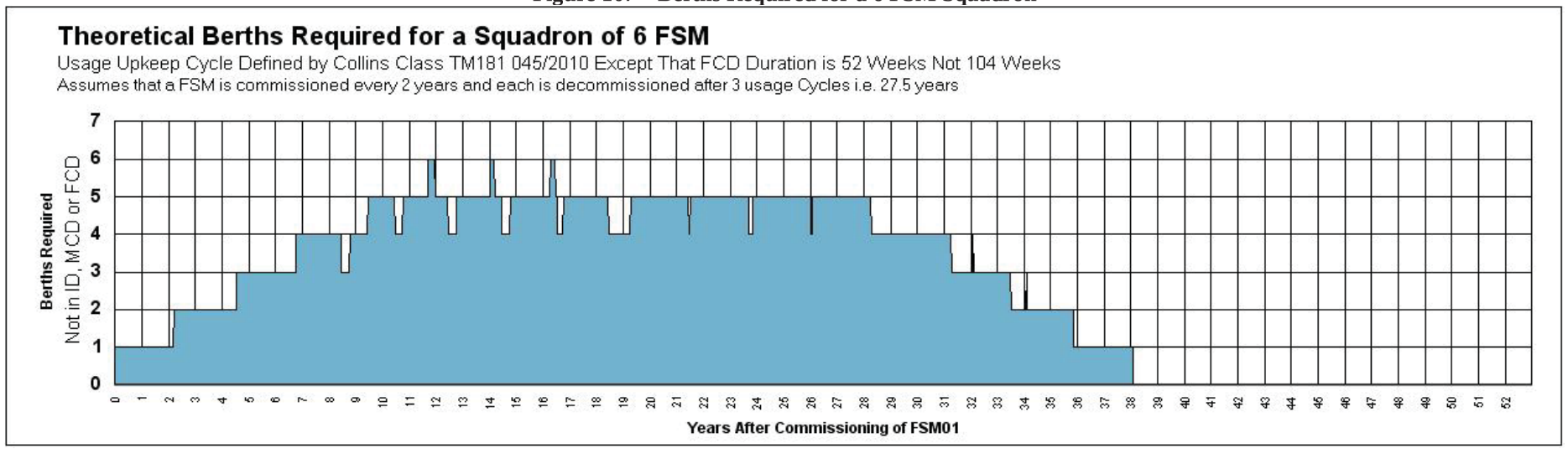


Figure 108 – Berths Required for an 8 FSM Squadron

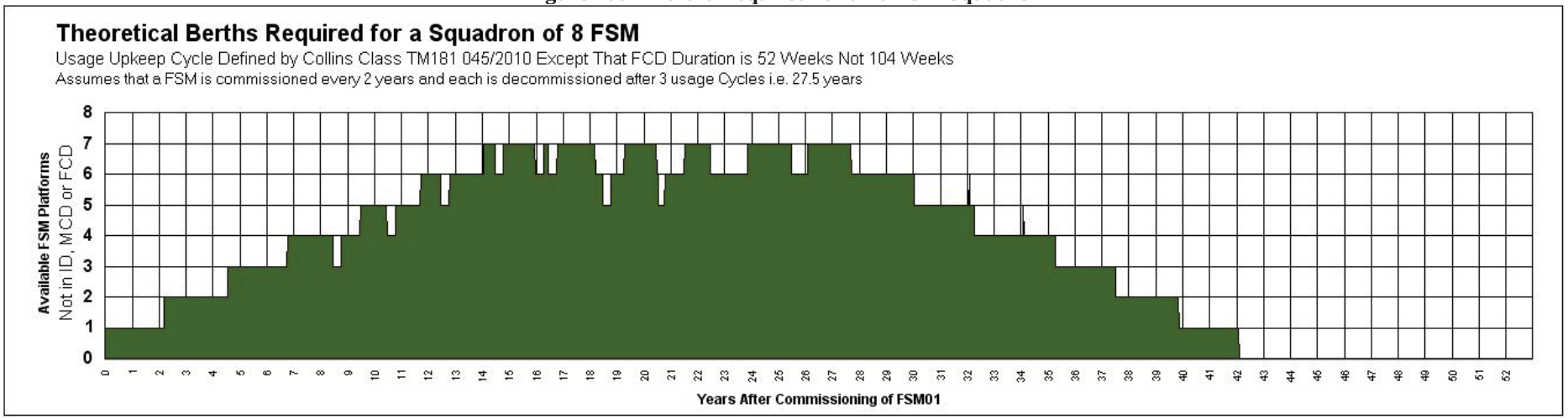


Figure 109 – Berths Required for a 12 FSM Squadron

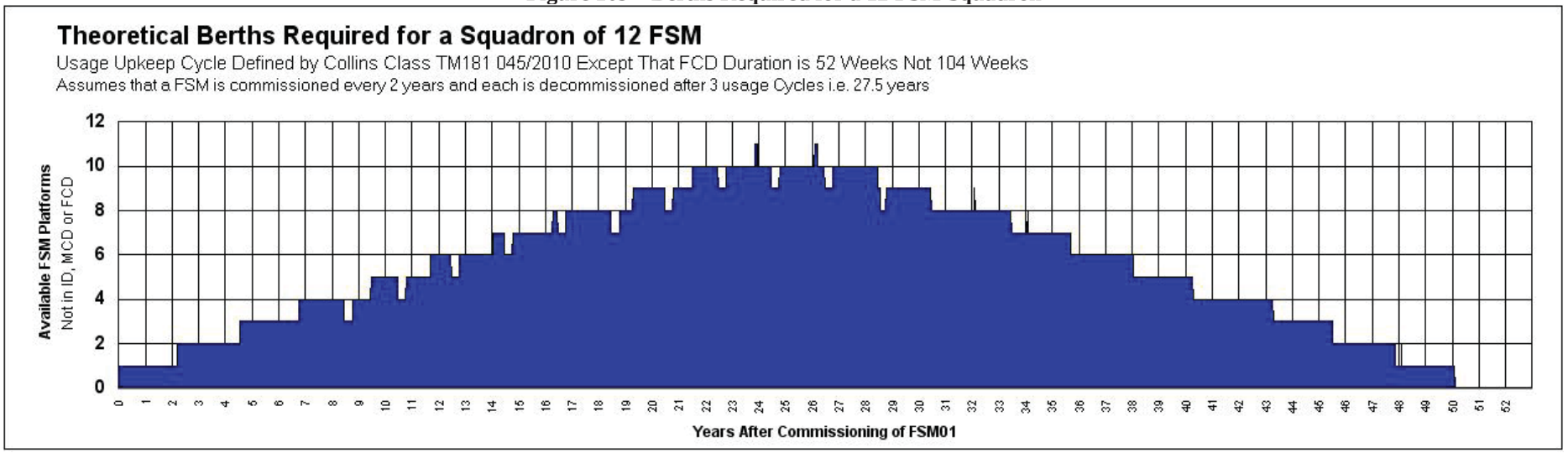


Figure 110 - Berths Required for a 12 FSM Squadron - FCD 104 Weeks

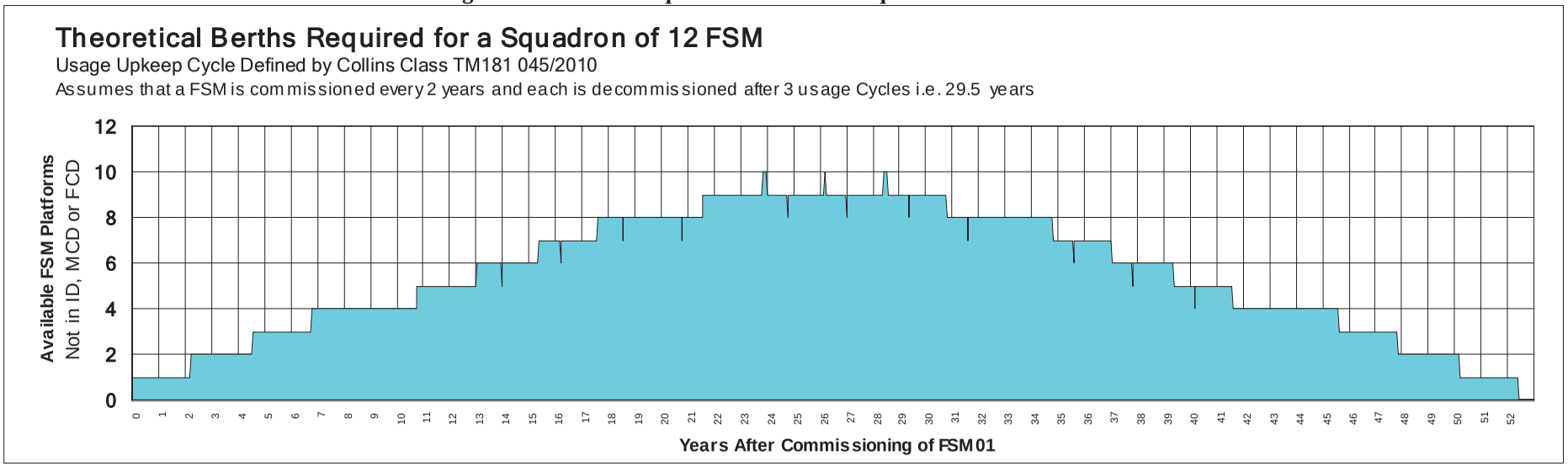


Figure 111 – Docking Facilities Required for a 4 FSM Squadron

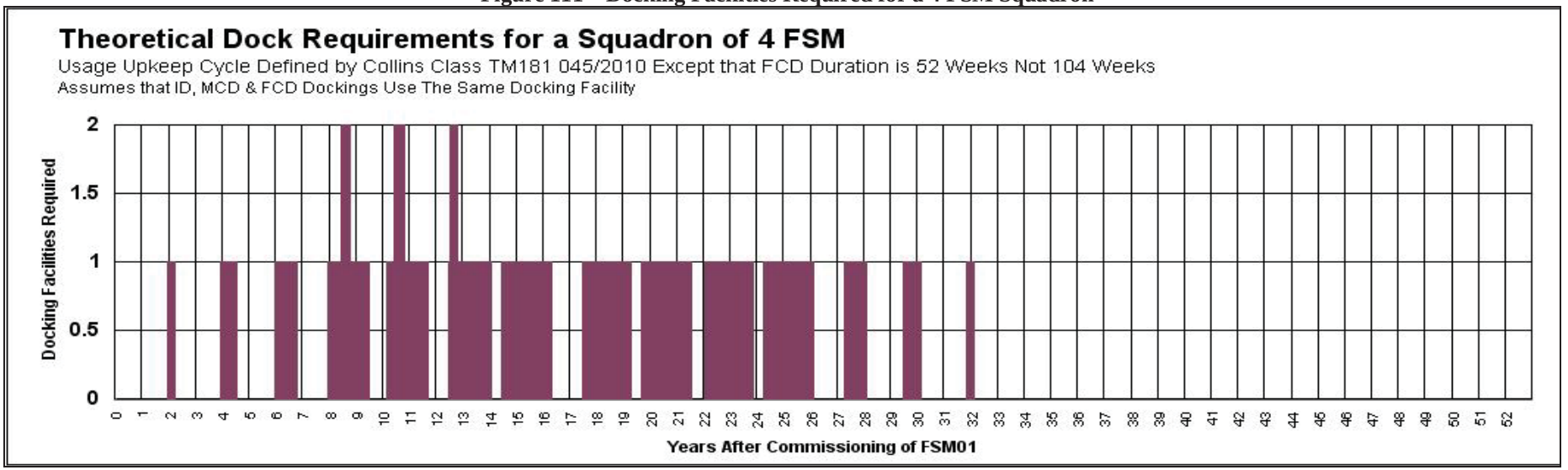


Figure 112 – Docking Facilities Required for a 6 FSM Squadron

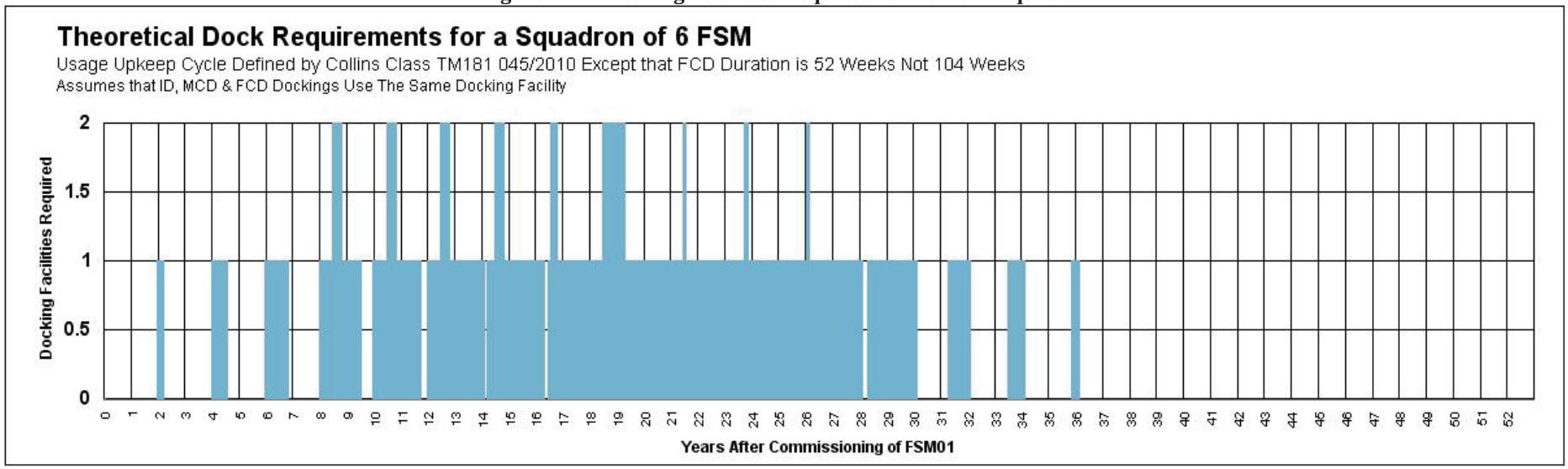


Figure 113 – Docking Facilities Required for an 8 FSM Squadron

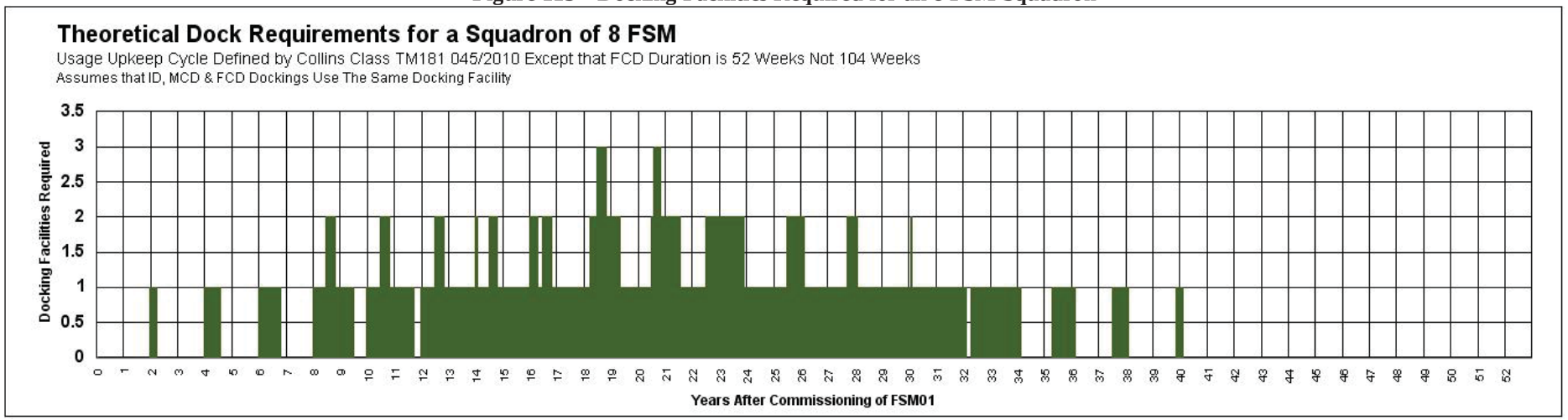


Figure 114 – Docking Facilities Required for a 12 FSM Squadron

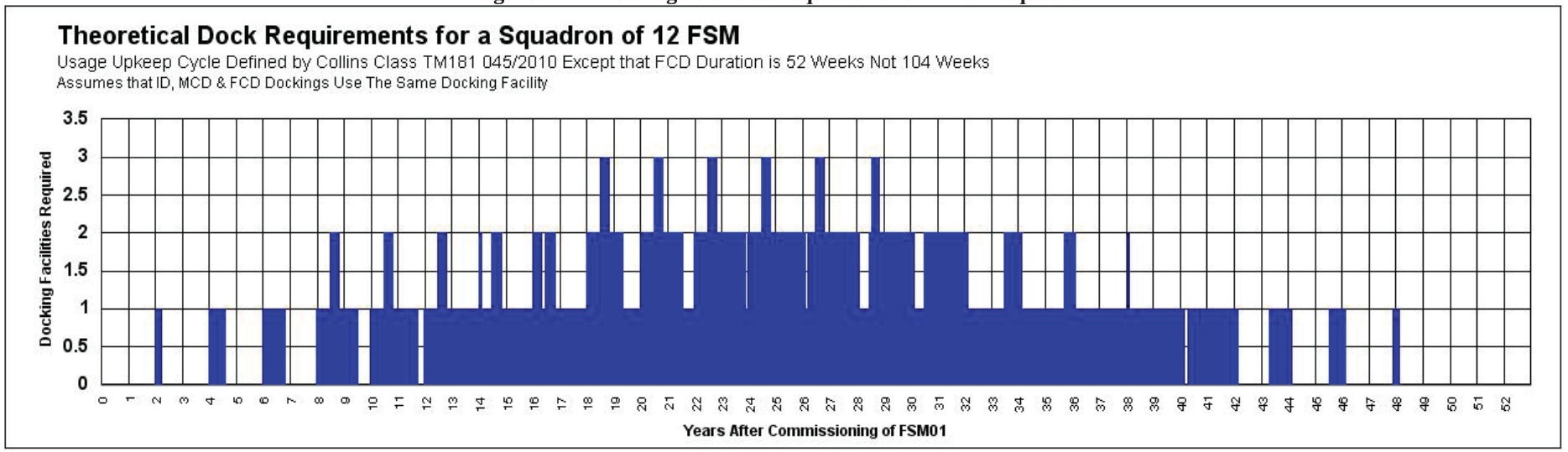
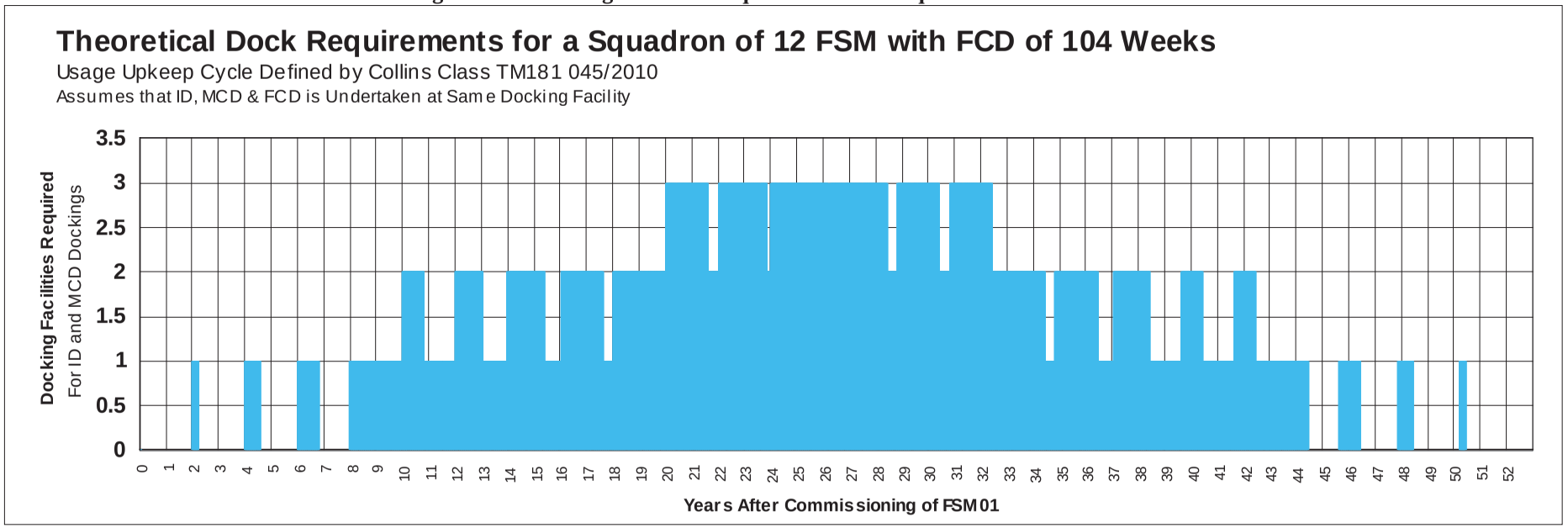


Figure 115 - Docking Facilities Required - 12 FSM Squadron-FCD 104 Weeks



Annex V: Homeport Alongside Services

576 Submarines whilst alongside a wharf in their homeport need a variety of services like ships of the surface navy, but some of them are specific to submarines. Key services needed at each berth are:

- Fuel
    - Diesel Fuel available at each berth, via a fuel lighter or at a nearby fuelling wharf
    - Tanks into which oil contaminated salt water may be pumped for cleansing – available via a pipe connection at the berth, via a lighter, or at the nearby fuelling wharf
    - Potential Air Independent Propulsion fuel connections at each berth
- Electrical Power – to be available at each berth
    - Earth bonding
    - Domestic AC 3 phase shore power 415V/50Hz
    - Naval AC 3 phase shore power 440V/60Hz
    - Submarine DC battery charging power 310V-630V
    - Submarine DC power supply 440V
    - Submarine DC power supply 220V
- Water – to be available at each berth
    - Potable (fresh) water
    - Salt water
- Air – noting that unless the air supplies are certified as suitable for breathing, the submarine will use its own compressors provided that adequate shore power capacity is available.
    - High pressure
    - Low pressure
- Sewage Disposal hose connection points
- Communications
    - Physical connections to the Defence ICT networks and systems
    - Multiple telephone connection points
- Cranes for;
    - Shipping & unshipping of gangways
    - Transfer of stores and victualling stores
    - Removal and replacement of submarine periscopes and masts
    - Loading of practice weapons (where relevant to particular port options)
- Ablutions Facilities
    - Toilets
    - Showers
    - Laundry facilities
- Administration Office (since submarines are not lived in whilst alongside and do not have office space for the conduct of routine administration)
- Car Parking adjacent to the submarine for the Commanding Officer’s vehicle and for the work vehicle allocated to each submarine
- Accommodation for alongside duty-watch personnel

Annex W: 1988 Fleet Base Relocation Study

1988 - Eastern Armament Depot and Fleet Base – A Study of Location Options – A.L. Beaumont RADM RAN[346]

Introduction

577 RADM Beaumont, commissioned to undertake this study in an environment where civilian development had encroached upon the safety zones necessary around naval ammunitioning facilities and processes, also examined options for fleet relocation. The RAN was at that time under mounting public pressure to relocate its fleet from Sydney Harbour.

Discussion

578 His "study outlines the relationship between the fleet base and its supporting infrastructure. It provides some historical information, discusses previous reports and considers the strategic imperatives concerning location of major facilities. The roles, functions and current East Coast facilities are then mentioned followed by an overview of some of the limitations on fleet operations as a result of the growth and urbanisation of Sydney."[347]

579 The many previous reports that are tabled in his study all concluded that Jervis Bay was the most suitable alternative to Sydney for a fleet base.

580 Strategic considerations by RADM Beaumont still relevant included; "The basic criterion for defence planning is that the force-in-being must be able to undertake current and foreseeable peacetime tasks; deal effectively with the kinds of military pressure which might arise in the shorter term including deterrence of such escalation as an enemy may be capable of; and provide a suitable basis for timely expansion to meet higher levels of threat if our strategic circumstances deteriorate over the longer term."[348]

581 "The predominant considerations relevant to location of bases in Australia [according to RADM Beaumont] include:

- Proximity to dependent activities and major centres of civil infrastructure,
- Access to transport and communications facilities,
- Vulnerability to military attack,
- Accessibility to community services,
- Proximity to and knowledge of areas of potential operations, and
- Operating costs

582 Government policy recognises the need for maximum efficiency, elimination of unnecessary duplication and judicious use of supporting services available in the national infrastructure to complement the specialist expertise maintained in the Defence organisation. The bulk of this commercial and community expertise, and the

[346] Defence Information Service catalogue F359.75 – 0994 - EAS
[347] Part One - Eastern Armament Depot and Fleet Base – A Study of Location Options – December 1988
[348] Para 3.1 – ibid.

accompanying industrial, transport and communications infrastructure is concentrated in the south, and especially the south-east of Australia. There is, as yet, neither a requirement, nor economic justification, for duplicating these facilities in other less developed parts of the country."[349]

583 "In warfare there is no port which could be considered invulnerable. However, attack options of an adversary are significantly reduced if major fleet bases are beyond range of ground attack aircraft and if an aggressor's naval and air assets were to be placed at risk by the requirement to undertake lengthy transits with the threat of ADF air, surface and submarine interdiction.

584 The technical complexity of modern major naval vessels requires ready access to industry and a labour force, which has the trades and skills to meet Navy's depot level maintenance requirements. There is also the need to provide ship's crews and families with access to domestic, community and recreational amenities. Consequently, Navy's main establishments are generally located at or near the principal population and industrial areas. Navy's smaller and less complex ships, such as patrol craft, mine countermeasures and hydrographic and oceanographic forces do not demand as much access to specialised industry and labour as the larger ships so these ships can be based at a wider range of locations around the coast. When considering the appropriate location of Australia's naval forces it is necessary to balance the support needs of the ships including that of the crews and families, the importance of Australia's strategic and operational assessments, the environmental impact of any new facilities, as well as the socio-economic impact upon the local civilian population and infrastructure at that location. The Sydney area presently provides the necessary interrelationship between the facilities that constitute the fleet support system."[350]

585 RADM Beaumont summarised his chapter on strategic considerations as;- "The foregoing considerations endorse the need for major fleet support facilities in the south-east and south-West, with the south-east providing the principal dockyard and training facilities (eg shore training facilities and gunnery, missile firing and technical ranges). So long as the reduced vulnerability, operating cost and infrastructure support advantages which apply from locating the major fleet operating and support bases in the south remain, these facilities should continue to be located there. The location of naval bases in the Sydney/Jervis Bay area and at HMAS STIRLING in WA is therefore, both strategically sound and responsible defence planning."[351]

Conclusion

586 With respect to the relocation of the RAN Fleet he ultimately concluded: "Apart from Jervis Bay, only Twofold Bay has any potential for development of a new fleet base in south-east Australia. However, Jervis Bay has outstanding operational advantages, could probably be developed at lower cost in view of the much better civil infrastructure in the Shoalhaven area, would incur lower operating costs and would involve significantly less difficulties for personnel. Jervis Bay is the most suitable location for an eastern fleet base."[352]

[349] Paras 3.7 – 3.8, ibid.
[350] Para 3.11 – 3.12 – ibid.
[351] Para 3.13 – ibid.
[352] Paras 14.1b & 14.1d ibid.

Annex X: 1992 Fleet Base Relocation Study

1992 – An Examination of Alternative Locations for an East Coast Fleet Base and Armaments Complex[353]

Introduction

587 Notwithstanding the many studies that all concluded that Navy's new Armaments Depot should be created in NSW State Forest just north of Jervis Bay, it now exists at Twofold Bay. Environmental lobby resistance relating to Jervis Bay was significant. With respect to fleet relocation, Sydney came to recognise the value to its economy of the Sydney fleet base and public pressure for its relocation diminished quite quickly. This report examined the relevant issues and formed a conclusion that has enabled the RAN Fleet to remain at Garden Island in Sydney.

588 The East Coast Fleet Base relocation component of this 1992 Review (i.e. excluding the Armaments Complex component) re-examined the background and the scope of three prior studies:

- 1979 – Draft Environmental Impact Statement for the Modernisation of Garden Island, NSW
- 1984 – Shore Support Facilities in South East Australia
- 1989 – Eastern Armaments Depot and Fleet Base – A Study of Location Options

Discussion

589 At the outset seven formal announcements and documents relating to this topic were summarised:

589.1 **House of Representatives Committee on Environment and Conservation Report – October 1975** – The Committee recommended that any proposal to develop RAN facilities at Jervis Bay be subjected to an environmental impact study in accordance with the terms of the Environment Protection (Impact of Proposals) Act 1974-75, and if it could be demonstrated that a more suitable alternative site for such development exists the Australian Government should not agree to the proposal.

589.2 **Garden Island (NSW) Modernisation EIS – 1979 -** . . . the EIS found that 'Subject to the completion of a modernisation programme the fleet base in Port Jackson would be capable of adequately accommodating a fleet of the present size into the twenty-first century. A major expansion of the fleet or the acquisition of nuclear-powered warships could make it necessary to develop a fleet base outside Port Jackson. Should it become necessary to construct a new fleet base, Jervis Bay is the preferred location in South-East Australia.

589.3 **Naval Shore Facilities in South-East Australia – 1984** – This report studied possible locations for major RAN support facilities (including fleet base, dockyard and armaments depot) in south-east Australia. Jervis Bay was considered the most suitable location in south-east Australia.

[353] Defence Information Services catalogue 359.70994 ANE

589.4 **Dibb Report – Review of Australia's Defence Capabilities – 1986** – The report found that there were some potential operational benefits for the RAN in the use of Jervis Bay and other sites but the substantial expenditure and dislocation involved in an accelerated move out of Sydney Harbour would not be justified by any pressing strategic imperative. . . . It proposed that the main submarine base for the submarine fleet should move to the West Coast and that the mine warfare base should remain in Sydney Harbour. The report went on to say that while major fleet elements and Fleet Headquarters were probably best relocated to Jervis Bay, other locations were appropriate for some RAN elements. For example, the main patrol boat base could be in Cairns with forward operating bases in Darwin and on the north-West Coast.

589.5 **House of Representatives Standing Committee on Environment and Conservation Report – September 1986** – In response to this Committee's report to Parliament on 7th October 1986, the Minister for Defence stated to the House of Representatives on 25th February 1987 that:. . . .. . . and went on to state that: 'There is a commitment to examining fully the environmental considerations of what is clearly the most suitable alternative location (Jervis Bay) for the major Fleet Base in the east.'

589.6 **Fleet Base Relocation Study Report – 1987** – The Fleet Base Relocation Study (FBRS) was initiated by the Minister for Defence in October 1985 . . . The report concluded that ' . . . . the infrastructure required to complete relocation from Sydney [to HMAS STIRLING and Jervis Bay] would take at least 20 years to develop . . . and cost up to about $1.34bn (1986 prices) in capital investment. . . . . The report also concluded that 'priority should be given to developing STIRLING ahead of Jervis Bay, on strategic, operational and support grounds and that options for future development of Jervis Bay should be retained irrespective of whether relocation there proceeds now'. When tabling the FBRS in the House of Representatives, on 25th February 1987, the Minister stated: 'It is timely to examine options for developing a fleet base at Jervis Bay – against longer term prospects of a need to move the base from Sydney and the suitability of Jervis Bay as an alternative location for the fleet in the east. While moving half the fleet to STIRLING will relieve problems in Sydney for the medium term, a long term perspective is necessary. . . . . '

589.7 **The Defence of Australia – 1987** – The Policy Information Paper, The Defence of Australia 1987, was presented to the House of Representatives by the Minister for Defence on 19th March 1987. The Paper referred to the report of the FBRS and to the issues considered, including strategic, operational and cost factors and the implications for the community. The paper stated: 'The study noted the advantages of Jervis Bay over other locations on the East Coast for a new fleet base. The Government is committed to examining fully the environmental considerations of what is clearly the most suitable alternative location for the major fleet base in the east, before reaching any decision.'

590 **Assessment of Alternatives** – In clauses 7.20 – 7.25 of this report the alternatives were summarised as follows:

590.1 In identifying alternatives, strategic and infrastructure considerations present a strong case for restriction of the search for suitable locations to south east Australia (ie the area between Gladstone and Melbourne). Too far north and the base would be vulnerable, restricted by the Great Barrier Reef and susceptible to cyclones. Too far south or West and it would be remote from the likely areas of operations. In any case, too far away from the infrastructure and support base in Sydney and increased operating costs would be unacceptable (particularly in the tight financial climate of the foreseeable future).

590.2 Suitable areas of deep, sheltered water and suitable available sites are essential criteria when identifying an alternative location where land might be reserved for the fleet base in the future. Experience with Jervis Bay has shown that locations with high natural environmental value should be avoided and commonsense dictates that locations with potentially incompatible uses should also be avoided. It would not be cost effective to consider locations with increasing urban pressures (as in Sydney) given the significant cost of any relocation.

590.3 Of the thirteen locations which passed initial screening in the previous studies, only Port Curtis and Twofold Bay cannot reasonably be excluded on the basis of these considerations and an aggregate of operational deficiencies. However both have major engineering difficulties to be overcome, significant operational deficiencies and likely economic and possible social penalties.

590.4 Port Curtis is a major port, about 440 km north of Brisbane, handling over 30 million tonnes of cargo annually and vessels of up to 220,000 DWT. Access to the open sea is via a deep channel about 10nm long. Distance to the 100m depth line is about 64nm. Although it is located in the cyclone belt, there is an extensive area of sheltered water behind Facing Island, which is a potential site for a fleet base. The Gladstone area, with a population of around 33,000, provides some infrastructure and is well served by rail, road and air transport. The closest dockyard capable of accepting major fleet units is at Newcastle, NSW. Major difficulties would be construction and operation of the facility on an island, which is currently accessible by boat and helicopter only. Road access would be extremely difficult and very expensive to construct (if technically feasible). Over 50 km of road and major bridges/causeways crossing the waterways between Facing Island and Curtis Island would be required. The North Channel is used extensively by trawlers and other light vessels. Both waterways are used by yachts and pleasure craft.

590.5 Twofold Bay, approximately 550km south of Sydney, is a large open bay with minor port facilities. Access to the sea and deep water is excellent but the bay is very exposed to heavy weather (from the north east to the south east). Major breakwaters would be required to provide protection for berths and a minimum of anchorages at a fleet base. Significant dredging and reclamation would also be required to provide suitable berths and sufficient land for the facility. Existing infrastructure is minimal with Eden (population around 3,300) the only settlement of any size nearby. There is no railhead, only a small airfield 30 km away and road access is via the Princes Highway, which is difficult for heavy vehicles south of Nowra.

590.6 Summary – Most locations on the East Coast of Australia, with the large areas of deep sheltered water required for a fleet base have either already been developed for other uses or are obviously environmentally sensitive. The only exceptions [excluding FBE] appear to be sites on Facing Island (Port Curtis) and at Twofold Bay. However, there are major engineering problems to be overcome at each location and both have significant operational deficiencies and likely economic and possible social penalties.

591 Fleet Base Sydney Option RAN fleet base facilities in the Sydney area have the benefit of substantial infrastructure, both civil and Defence, to support their activities. Major warships can enter or leave the harbour in any conditions of weather and tide. The harbour is well protected, no breakwaters are needed to shelter alongside berths[354] and tidal streams are low. [The] Garden Island facility, supported by local infrastructure, provides depot level maintenance for surface fleet units. Deep water with suitable exercise areas and ranges is close to the harbour entrance.

Conclusions

As quoted from the 1992 Review;

592 The natural attributes of Sydney Harbour make it well suited as a fleet base location. The necessary operational, administrative, industrial and training support needed for the East Coast fleet is well provided for by the existing naval and civilian infrastructure.

593 Although urban pressures affect the efficiency of operation of the fleet base, they do not impose unacceptable penalties. Overall, the Review is unable to find any compelling reasons for relocation from Sydney, now or in the foreseeable future.

[354] Actually submarines would require solid wall wave and wind protection if berths are to be considered on the eastern side of Garden Island.

Annex Y: Defence Estate Strategic Basing Principles

Introduction

594 There are five Defence Estate strategic planning principles listed in Defence White Paper 2009. These principles guide the analysis and conclusions reached in this study.

Discussion

595 Clause 15.16 of Defence White Paper 2009 states; "*The Government has agreed on the following strategic basing principles to meet the future needs of Defence:*

- Principle 1: *Defence base locations should be aligned with strategic requirements and ensure critical capabilities are suitably dispersed for security reasons;*
- Principle 2: *Defence should consolidate units into fewer, large and sustainable multi-user bases aimed at increasing the alignment of functions at Joint and Service level and their capacity to support operations;*
- Principle 3: *Defence should aim to group bases near strategic infrastructure and industry to promote knowledge sharing, innovation, and to maximise the effectiveness of industry support to the ADF;*
- Principle 4: *Where possible, Defence should locate bases in 'family friendly' areas which provide better employment, specialist medical and educational opportunities for families, and with the potential to reduce posting turbulence in order to improve retention; and*
- Principle 5: *Defence should maintain an urban and regional disposition to enable the continued provision of part-time capability into the future.*

596 The application of all of these principles together is an exercise in compromise, because to apply any one of them absolutely could exclude one or more of the other principles. For example, absolute compliance with Principle 1 could guide the re-location of all major bases to Australia's northern coastline; however, to do so would compromise Principles 3, 4 and 5. Similarly, it could be argued that HMAS STIRLING is already a large and sustainable multi-user base in keeping with Principle 2; however, as far as submarines in particular are concerned, it is out of step with:

- Principle 1, in that being the sole submarine base, "…critical capabilities are <u>not</u> suitably dispersed for security reasons", and
- Principle 4, posting turbulence <u>is</u> reduced however retention <u>is not,</u> partly because there is no opportunity for postings to the East Coast where most Australians live.

597 The fundamental philosophical approach of this study, which is that an East Coast FSM homeport must be either within, or close to a major capital city embeds Principles 3, 4 and 5. Similarly, the development of FSM basing concepts that seek to append a prospective FSM base to existing East Coast naval establishments embeds Principles 2 and 3.

Conclusion

598 Defence Estate strategic planning principles as defined in Defence White Paper 2009, apply to this study's analysis approach and the conclusions reached.

Detailed Table of Contents

Figures

Note: The author has created all figures except where footnotes indicate otherwise.

Tables

Note: The author has created all tables except where footnotes indicate otherwise.

QINETIQ

Prepared for SEA1000 Future Submarine Programme

BASING OPTIONS - WORKFORCE PLANNING

RFQTS 14403

23 October 2017

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1. Scope of Report

This paper provides options for basing considerations for the future submarines (FSM). It is written from the perspective of the impact the basing options would have on the submariner workforce which, in turn would affect recruitment and retention. Closely aligned to this paper are the Crewing Options paper, the Career Management, Recruitment and Retention paper and the Shore Support paper.

In order for the Royal Australian Navy (RAN) to take advantage of the crewing options, the basing options should consider the impact on the ability to recruit and retain the workforce numbers required to achieve the crewing options. Therefore, this paper considers basing options that could maximise workforce numbers. Similarly, the Shore Support paper considers the impact on recruitment, retention and posting locations and analyses a number of options that could be implemented in order to meet the strategic aims of this paper.

The Submarine Force Posture Review 2011 (SFPR) outlined the strategic context for peace and wartime roles for submarines and the subsequent Areas of Operation (AO). This paper takes into consideration the AO that the RAN patrols and how the basing options could best support this.

s47C

The 2011 study by CMDR D Stevens[1] into the base support implications of a 12 submarine force examined in detail the increased facilities and support organisation needed, and the potential East Coast base locations. This analysis of options does not replicate that report, but examines the implications of the various potential East/West basing options and their effect on workforce requirements.

This report is not intended to influence decision making, but provide the RAN with options for consideration and further study.

[1] CMDR D. L. Stevens RANR: FSM Basing Discussion Document 23 June 2011

2. Introduction

2.1. Background

The Collins Class submarine (CCSM) fleet is home ported at Fleet Base West (FBW) including operational support systems and services. The philosophy of basing all submarines out of one port has provided numerous benefits, however it has also had a detrimental effect on recruiting and retention. Therefore, this paper considers a move to dual basing with submarine home ports at both the West and East Coasts. It is anticipated that dual basing will deliver a positive effect on recruiting and retention, which is necessary to ensure that the FSMs are operationally available.

The option to home port the FSM entirely in the West has not been considered in this paper due to the known issues to the submarine workforce for the CCSM and the recruitment and retention concerns. It is anticipated that these issues would continue for the FSM if home ported in Western Australia (WA).

s47C [redacted].

3. Strategic Requirements

A number of primary strategic requirements drive the workforce and sustainability plans and provide a reference point for the RAN to assess the viability of basing options. At present there are three and they have been determined to be:

1. Geo-strategic dispersal s47C [redacted];
2. A basing option must strengthen recruiting and retention and the training pipeline for the RAN and influence and enhance the relationship with Industry; and
3. Basing options should support the Area of Operations (AO).

3.1. Geo-Strategic dispersal s47C [redacted]

The submarine fleet is a strategic asset which must be protected from vulnerabilities. This protection encompasses submarine bases, the associated infrastructure and the workforce. If all 12 of the submarines are home ported in one location, the submarine force and its fleet units, supporting infrastructure and headquarters would be vulnerable to an adversary, natural disasters, or from other political, economic, social or technological factors. Therefore, geographic dispersal of the FSM force and its infrastructure is strategically important.

In determining how the split between West and East Coasts could proceed, this paper considered the maintenance schedule as the basis for determination of locations of submarines.

s47C [redacted]

s47C

s47C

3.2. s47C [redacted]

The region to Australia's north from the Indian Ocean via the South China Seas and down through to the Pacific Ocean where the Coral and Tasman Seas exist is becoming increasingly crowded and volatile which therefore is important for foreign policy, trade and Defence. Australia's proximity to this region requires it to play an increasing role in balancing through intelligence gathering, the protection of regional partners and the defence of Australia's North. Australia achieves this with the support of key allies and through the participation in allied military exercises.

Defence has committed to expanding Australia's international Defence posture in the 2016 Integrated Investment Program (IIP). The following is an excerpt from the IIP:

> *'A more active and internationally engaged Defence posture will involve an increased operational tempo for the ADF and its enabling elements, in particular in support of the government-agreed strategic direction for international engagement. Defence will conduct a broader and deeper program of engagement with international partners, with a focus on maritime South East Asia and the South Pacific, to take a more active role in shaping Australia's strategic environment. This will involve a proactive pattern of peacetime activities, exercises and operations in the region.'*[2]

s47C [redacted]

[2] 2016 Integrated Investment Plan, Page 60, Enabled, Mobile and Sustainable Forces
http://www.defence.gov.au/whitepaper/Docs/2016-Defence-Integrated-Investment-Program.pdf

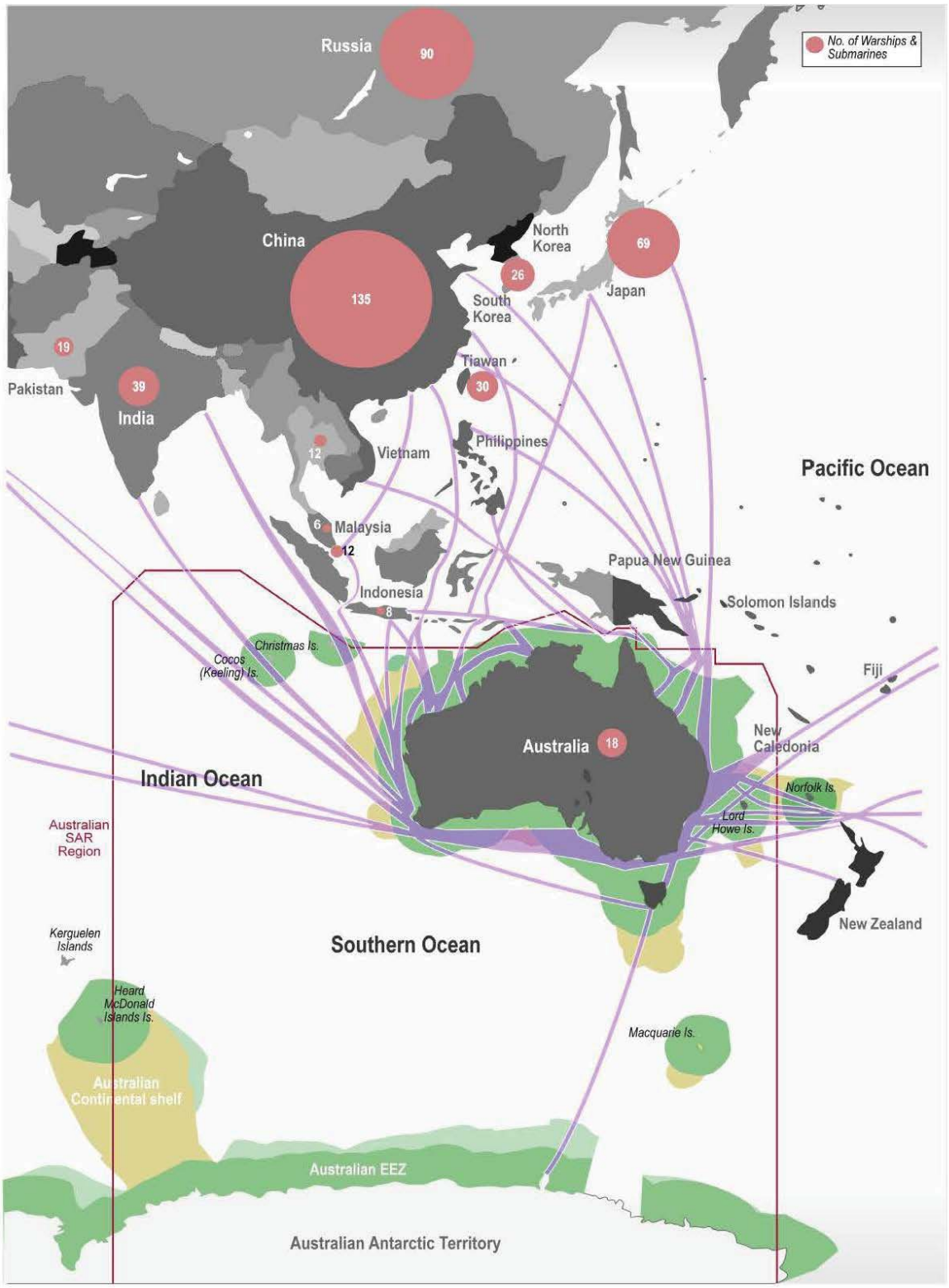

Image 1: Number of warships and submarines South East Asia and South Pacific[3]

[3] Source: A Sustainable Naval Industry Paper 2016 – ASC Pty Ltd

The Submarine Force Posture Review[4] discusses two broad groupings of roles for Australia's submarines which impact force posturing and s47C. The two groupings are peacetime and wartime. Peacetime operations are largely focused on training, often with allies, the conduct of surveillance and reconnaissance activities to gather intelligence on future adversaries and to counter terrorism as well as anti-piracy, anti-smuggling and anti-narcotics operations. These activities will require travel to allied locations, training areas and areas of operation which may be a significant distance from Australia. s47C .

s47C

s47C

[4] *Submarine Force Posture*, Rex Patrick, 2011
http://www.defence.gov.au/Publications/Reviews/ADFPosture/Submissions/Rex%20Patrick%20-%20Submarine%20Force%20Posture%20article.pdf

s47C

s47C

s47C

s47C

[redacted]

3.3. Strengthen RAN and Industry Recruiting and Retention

The RAN's response to the Submarine Workforce Sustainability Review[14] recognised the shortfall in the number of qualified submariners, in particular categories and the need to achieve a sustainable and well-structured workforce. To address this shortfall, the RAN increased recruiting activity and improved incentive packages to reduce wastage. The RAN also recognised the difficulty in recruiting and retention of its submariners due to the high percentage of recruits coming from the East Coast. The West Coast location of the submarines was/is a detractor for successful recruitment and retention of its submarine workforce.

Basing a component of the FSM force in the East and thus engaging with the larger recruiting pool will be beneficial for recruitment and retention.

Basing part of the FSM force in the East Coast will also provide for Industry engagement for submariners during shore periods, thus enhancing the use of the total workforce model (Suakin) to better suit the relationship between the RAN and Industry. This option provides for an additional recruitment and retention benefit due to the ability for the FSM force to rotate through an Industry engagement at South Australia, Western Australia and New South Wales.

The Career Management, Recruitment and Retention paper and the Shore Support paper further discuss the options available to the submariner workforce and basing locations will have a large impact on the success of any recruiting and retention strategies.

[14] Submarine Workforce Sustainability Review, RADM Rowan Moffatt, 2008

4. East Coast Basing Options

This section will discuss East Coast basing options as presented in various publications, including the Stevens Report (2011)[15] and the Australian Defence Force Posture Review (Public Version; 2012).[16]

s47C

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s47C

[15] *FSM Basing Discussion Document*, Commander D.L. Stevens RANR, 23 June 2011
[16] Australian Defence Force Posture Review, Allan Hawke and Ric Smith, 30 March 2012
http://www.defence.gov.au/publications/reviews/adfposture/Docs/Report.pdf

s47C

s47C

s47C

5. Conclusion

There have been two reports conducted for the RAN that have delivered conflicting outcomes for basing strategies. Whilst the ADF Force Posture Review has a preference for certain basing options the Stevens Report prefers others. This report aims to present basing options from both and combines them with conclusions for basing from the other workforce reports. Currently the CCSM are based out of the West Coast and due to known recruitment and retention issues, solely basing the FSM at FBW was not considered as part of this paper. Concurrently, it is understood that a 12/0 split in favour of the West Coast is considered by the RAN as the current position.

Basing considerations, particularly for the submarine workforce, are of significant importance to the RAN. Where the submarines are based will allow the RAN to draw maximum capability from the FSM and its workforce. Anecdotal evidence clearly highlights the submariner's negative opinions regarding the current location and the consequent impact on retention and recruitment. Exploring different options such as FOB, overseas basing and greater East coast presence provide attractive incentives to the workforce; current and future, which may impact positively on the wastage rate issue raised in the Crewing Option paper and improve recruitment potential.

The crewing options paper establishes three options that should be reviewed for applicability to the RAN. s47C [redacted]. Critical to the success of the implementation of the crewing options is a training pipeline. Whilst this paper highlights the current and proposed training infrastructure within Australia, the Shore Support paper addresses training opportunities, both domestic and abroad, within Defence and Industry.

Of note in the Shore Support paper, is a workforce split between the two platforms; CCSM and FSM. During the 15 year period between the first FSM's crew entering training and the last CCSM pay off, there will effectively be two workforces across the two platforms. A possible approach to this issue could be to create FSM infrastructure in the East during the build phase and during pay off convert infrastructure in the West to provide dual basing and dual training centres.

Finally dual basing allows for shorter transits to and from the AOs from which the FSMs will patrol (taking into account options for overseas posting locations and leaving platforms in the AO and flying crew in). With less time spent in transit, the platforms spend more time on target which could serve as a workforce retention strategy.

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Annex C - List of Acronyms and Abbreviations

ACPB	Armidale Class Patrol Boat	LSS	Limited Sea Swap
ADF	Australian Defence Force	MCD	Mid Cycle Docking
AFS	Average Funded Strength	MCMV	Mine Countermeasure Vessel
AJAAC	Australian Joint Acoustic Analysis Centre	MFU	Major Fleet Unit
ASW	Anti-Submarine Warfare	MIG	Maritime Intelligence Group
AWD	Air Warfare Destroyers	MISC	Maritime Intelligence Support Centre
AWA	Acoustic Warfare Analyst	MWO	Maritime Warfare Officers
AUSFBS	Australian Fleet Battle Staff	MRD	Materiel Ready Day
CASG	Capability Acquisition and Sustainment Group	MWV	Minor War Vessel
CCPB	Cape Class Patrol Boat	MOSHIP	Mother Ship
CCSM	Collins Class Submarine	NIU	Naval Imagery Unit
CMDR SM+	Submarine Commander (and above)	ODF	Operational Deployment Force
CNSAC	Chief of Navy Senior Advisory Committee	OLOC	Operational Levels of Capability
CO	Commanding Officer	RAN	Royal Australian Navy
CONOPS	Concept of Operations	RANR	Royal Australian Navy Reserve
COMWAR	Commodore Warfare	RANTEWSS	RAN Tactical Electronic Warfare Support Section
DGSM	Director General Submarines	RAP	Reduced Activity Period
DHA	Defence Housing Authority	RAAF	Royal Australian Air Force
DMO	Defence Materiel Organisation	SLOC	Sea Lines of Communication
DNWCM	Director Navy Workforce Career Management	SKT	Ship Keeping Team
DNWR	Director Navy Workforce Requirements	SMHQ	Submarine Headquarters
DSME	Directorate of Submarine Engineering	SMCC	Submarine Command Course
DSTG	Defence Science & Technology Group	SOC	Scheme of Complement
EFS	Enhanced Fleet Support	SETF	Submarine Escape Training Facility
FAS	Fleet Activity Schedule	SMP	Supported Maintenance Period
FBE	Fleet Base East	SOAG	Submarine Operational Analysis Group
FBW	Fleet Base West	STSC	Submarine Training and Systems Centre
FCD	Full Cycle Docking	SSG	Submarine Support Group
FDW	Future Distributed Workforce	SSBN	Ballistic Missile, Nuclear Powered Submarine
FOB	Forward Operating Base	SSGD	Guided Missile, Diesel-Electric Powered Submarine
FSM	Future Submarine	STRATCOM	Strategic Command
FSP	Future Submarine Program	SUBOPS	Submarine Operations
HUMINT	Human Intelligence	SUMU	Submarine and Underwater Medicine Unit
HWT	Heavyweight Torpedo	TWM	Total Workforce Model
ID	Intermediate Docking	USN	United States Navy
IMP	Intermediate Maintenance Period	XO	Executive Officer

Annex D - Glossary

Average Funded Strength	The average funded workforce measure for military personnel over a specific period
Submarine	Submarine. Also referred to as a platform
Collins Class Submarine	The existing submarine platform in the RAN of which there are six
Full Cycle Docking	A maintenance activity where the submarine is removed from the water for an extended period. Currently 24 months (once in a 12 year cycle)
Future Submarine	The next generation of submarine being acquired through Project SEA 1000 – Future Submarine
Home port	All Navy seagoing vessels have a home port of either Fleet Base East (Sydney), Fleet Base West (Rockingham), Cairns, or Darwin The home port for all Collins Class submarines is Fleet Base West The home port for the future submarine is yet to be determined (these papers will be used to assist with this decision)
Intermediate Docking	A maintenance activity where the submarine is removed from the water (currently six months twice in a 12 year cycle)
Intermediate Maintenance Period	Supported by contractors and others external to submarines crew.
Mid Cycle Docking	Currently 12 months (once in a 12 year cycle)
s33(a)(i)	s33(a)(i) [redacted]
Platform	Submarine. Also referred to as a submarine
SEA 1000	The Program established to oversee the acquisition and transition into service of the future submarine
Scheme of Complement	A list of personnel that comprise the crew of any given platform by rank and specialisation
Self-Maintenance Period	A maintenance activity of a short duration (weeks) usually undertaken in the submarine's home port (but maybe undertaken in any port) – may or may not be supported by contractor staff and other external bodies.
Ship's Company	The actual personnel posted or loaned to a ship, submarine, aircraft squadron or establishment
Support System	The sum of the existing support infrastructure and the additional support elements being generated to enable the Mission System to be effectively operated and supported so that it can meet its operational requirements. It includes the organisation of hardware, software, materiel, facilities, workforce, data, processes and services. The Support System embraces the support respons bilities undertaken by the Department of Defence, in-service support contractors and in-service support subcontractors.

Annex E - Company Details

Full legal name of company	QinetiQ Pty Ltd
Trading or business name	QinetiQ Pty Ltd
Australian Company Number	125 805 647
Australian Business Number	68 125 805 647
Registered office	Level 3, 12 Brindabella Circuit Brindabella Business Park Canberra ACT 2609
Principal place of business where contract will be administered	Level 3, 12 Brindabella Circuit Brindabella Business Park Canberra ACT 2609 Level 3, 210 Kings Way South Melbourne VIC 3205
Name of principal point of contact for this RFT	Level 3, 210 Kings Way South Melbourne VIC 3205
Contact details of principal point of contact	

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Australian Government

Department of Defence

Strategic review of Submarine Force Disposition

Final report

Prepare by:

s47F

Mr. Mark Power, Power Initiatives

Report date: 19 September 2017

File: Sub Force Disp Rpt (V17 19 Sep).docx

Limitations of the report

This report has been prepared to comply with the draft Terms of Reference as at 24 July 2017.

Consistent with the Terms of Reference, consultation has been limited to Defence, ASC and Naval Group / DCNS. All information and material related to existing ports has been sourced from Defence records or via publically available material.

No warranty of completeness, accuracy or reliability is given in relation to the statements and representations made by, and the information and documentation provided by Defence personnel consulted as part of the process or through publically available material.

The findings in this report have been formed on the above basis.

The report is dated 19 September 2017 and s47F and Mark Power accept no liability for and have not undertaken work in respect of any event subsequent to that date which may affect the report.

Other than our responsibility to Defence, neither s47F nor Mark Power has any responsibility arising in any way from reliance placed by a third party on this report. Any reliance placed is that party's sole responsibility.

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APPENDICES

1. Executive Summary

Introduction

1. The project was directed by Terms of Reference (ToR) approved by Head Navy Capability (HNC). The ToR encompassed both the Future Submarine (FSM) project and project SEA 5000 (Future Frigate or FF). This report covers the FSM component only.

2. The primary requirement articulated in the ToR was:

   The panel will conduct an independent examination of aspects, including strategic requirements, capability drivers and risks in relation to Australia's current and future submarine and frigate force disposition and its ability to meet Government directed requirements over the next fifty years.

3. The ToR outlined the broad objectives of the review as follows:

   a. optimal disposition of RAN submarines and the associated submarine workforce (both Industry and Defence);

   b. optimal levels of support (maintenance, engineering, supplies, training and operating support), including infrastructure and services, in each location (if more than one);

   c. most effective use of forward support bases to enhance operational effect and capability delivery, including the use of Support Vessels as appropriate; and

   d. optimal disposition of Submarine force during the Transition Phase of the capability (from Collins Class Submarine (CCSM) to FSM).

Assessment of the Two Ocean Basing Policy and its relevance

4. The ToR required a review of the relevance of the Two Ocean Basing Policy. The first formal articulation of policy occurred in the 1987 Defence White Paper. The 1987 White Paper also articulated the then future CCSM would be a split force operating from both the east and west coasts.

5. There is little in the way of White Paper guidance to inform a decision on submarine force disposition for the FSM. From the first articulation in the 1987 Defence White Paper of the Two Ocean Basing Policy, it is apparent that subsequent White Papers did not alter the two ocean paradigm but rather, if anything, reinforced it.

6. The time horizon in the 2016 White Paper is 2035, whereas the first of the FSM will not enter service until about 2031 and the twelfth FSM around 2053. The extant 2016 paper emphasised the region of Australia's strategic interest. Although not specifically stated, the 2016 paper implies that the defence force must be able to respond to '*deter, deny and defeat'* from both east and west coasts.

7. Any decision to either base all FSM on the west coast or to split the force on both coasts would not contravene government policy contained in the White Paper. Basing submarines on both coasts would however appear to be more in line with the strategic intent of the extant White Paper.

Review process

8. The Review commenced with a period of data collection and wide ranging consultation to inform subsequent analysis.

9. The analysis was conducted in phases. It was considered that the Review should commence by determining the steady state disposition, that is, the disposition when all 12 FSM are in service. Analysis of whether or not to split the force and, if so, the size of the split on west and east coasts was conducted before any consideration of potential east coast basing locations.

10. s47C [redacted]

11. s47C [redacted]

12. The output of the first phase was then tested against industry as a Fundamental Input to Capability (FIC), in order to refine the apparent optimal split. Following consideration of the industry FIC, a detailed consideration of the potential impact on Navy's ability to generate and sustain sufficient submariners to crew the eventual force of FSMs was conducted. The outcome was an optimal steady state disposition of 12 FSMs.

13. In order to get to the steady state, it was necessary to consider the options for disposition during the transition from a force of six CCSM to 12 FSMs. Transition was the most complex part of the review. To develop options for transition, it was necessary to consider the ramifications of the:

a. number of CCSM Life of Type Extensions (LOTE);

b. FSM delivery schedule;

c. FSM Life of Type (LOT); and

d. FSM Usage Upkeep Cycle (UUC).

14. s47C [redacted]

15. s47C [redacted]

s47C [redacted]

16. Following consideration of east coast submarine base locations and identification of an optimal solution, a related analysis was conducted to assess the options for a depot level Submarine Maintenance Facility (SMF). General features and capabilities required at or near a submarine base were identified and the possibility of using Forward Support Bases (FSB) was addressed.

Disposition review conclusion overview

17. s47C [redacted]

18. s47C [redacted]

s47F [redacted]

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2. Background

Terms of Reference

33. The project was directed by ToR approved by HNC. The ToR encompassed both the FSM project and project SEA 5000 (FF). Key aspects of the ToR as they relate to the FSM component are:

a. The panel will conduct an independent examination of aspects, including strategic requirements, capability drivers and risks in relation to Australia's current and future submarine and frigate force disposition and its ability to meet Government directed requirements over the next fifty years.

b. In undertaking this role, the Panel will direct its own study. The scope of work is to include, but is not limited to the examination and assessment of:

(1). previous basing reviews, including the strategic drivers that resulted in the RAN moving to a two ocean basing policy in 1987.

(2). the relevance of two ocean basing for the submarine capability with considered analysis to support decision making by Navy and Government.

(3). for submarines the available operational analysis regarding operational requirements and associated modelling to support expected future requirements for 'deployability' and contingency response, which may include forward basing or staging.

(4). the potential strengths, weaknesses, opportunities and or threats of single and multiple basing.

(5). regarding submarines, the potential strengths and weaknesses of options for the numerical split.

(6). regarding submarines, the options, including strengths and weaknesses, for east coast base location, cognisant of the need for industry support.

(7). the sustainability of workforce to support the submarine capability, both from a Defence and Industry perspective.

c. The broad objectives of this review are to determine the:

(1). optimal disposition of RAN submarines and frigates and the associated submarine and frigate workforce (both Industry and Defence)

(2). optimal levels of support (maintenance, engineering, supplies, training and operating support), including infrastructure and services, in each location (if more than one).

(3). Most effective use of forward support bases to enhance operational effect and capability delivery, including the use of Support Vessels as appropriate.

(4). optimal disposition of Submarine forces during the Transition Phase of the capability (from Collins Class Submarines (CCSM) to FSM).

d. The specific deliverable is to produce a report that details the optimal disposition of the Australian Submarine Capability to achieve operational outcomes (including deployability and sea training) as well as ensure ongoing sustainability of the capability through the appropriate access to, and provision of, support services, training, personnel, facilities and infrastructure.

34. A copy of the complete ToR is provided at Appendix B. This report addresses only the submarine force disposition. Frigate disposition is addressed in a separate report.

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Material reviewed and relied upon

37. The review was specified as a Disposition Review. Appendix D contains details of all material relied upon and used in the course of this review.

Terminology

38. Throughout the course of this review, the issue of language and terminology has emerged.

39. For clarity, Table 2.1 details terms that have been adopted in this report as well as outlining some commonly used alternative terms.

Figure 2.1: Review methodology

Term	Meaning and common alternatives
Garden Island Defence Precinct (GIDP)	GIDP refers to the Garden Island Defence Precinct in Sydney, which encompasses HMAS *Kuttabul* and Fleet Base East and other related facilities on the site.
HMAS *Stirling*	Stirling encompasses Fleet Base West and other related facilities on the site.
Submarine Maintenance Facility (SMF)	The facility or facilities at which submarines conduct all forms of maintenance requiring the vessel to be removed from the water. This includes: – Full Cycle Docking; – Mid Cycle Docking; and – Intermediate Docking (ID).
Docking	Removing the vessel from the water, regardless whether by ship lift, floating dry dock, graving dock or slipway, for the purpose of maintenance or repair.

Term	Meaning and common alternatives
Intermediate Maintenance Period (IMP)	Refers to planned maintenance at the homeport, requiring contractor assistance, but not involving a docking. This has the same meaning as: – Intermediate Maintenance Availability (IMAV) and – Assisted Organic Maintenance (AOM)
Through Life Support Facility (TLSF)	This term means the same as Land based Test Site (LBTS). It refers to submarine platform and combat systems located ashore for the purpose of capability testing and development, procedure and tactical development and training where dedicated training systems are not available. The TLSF is a component of Ship Zero.
Forward Support Base (FSB)	In this review, FSB refers to any port between a homeport and a submarine patrol area at which a submarine may conduct logistics support before, after or between patrols. A FSB may or may not be a Mounting Base (MB) or Operating Base (OB) as defined in Plan Beacon.

3. Analysis of the Two Ocean Basing Policy

Relevant extracts related to a review of the Two Ocean Basing Policy

40. The ToR require a review of the strategic drivers that resulted in the RAN moving to a two ocean basing policy in 1987, and the relevance of that policy for the submarine capability. The following extracts are relevant to the analysis.

The 1986 Dibb Report[1]

The military power and intentions of large Asian countries, such as China, Japan, Vietnam, Indonesia and India, are imponderable over such a long time-scale. No useful purpose, in defence planning terms, is served by speculating on these matters. Threatening trends are not evident, relevant military capacities have not been built, and political tension has not arisen. They are subjects for assessment by our intelligence community, not a basis for defence planning.[2][3]

Australia's need for submarines is dictated primarily by the need to develop skills in anti-shipping and anti-submarine operations appropriate to higher-level conflicts, and to train other units in anti-submarine warfare (ASW). But submarines are versatile and can contribute in a range of contingencies in such areas as intelligence collection, surveillance, mining and special operations.

A force of about six submarines, able to operate concurrently from both our west and east coasts, would be a major inhibition on an enemy's use of surface assets against us at all levels of threat.[4]

Establish the main submarine base at Cockburn Sound WA (HMAS Stirling), with a secondary base on the east coast.[5]

The 1987 Defence White Paper

The Royal Australian Navy will be established as a two ocean Navy. For the first time in peacetime a major portion of the Navy's surface and submarine fleet will be based in Western Australia.[6]

(2.2) Australia's defence policy has regard to an area of primary strategic interest, covering South-East Asia, the eastern Indian Ocean, and the South- West Pacific.

(4.51) The Government has recognised that the effectiveness of the submarine force would be enhanced by basing some of the submarines in the west closer to priority operating areas. HMAS Stirling is being developed as a major submarine facility.

(4.64) The homeporting of major fleet units at HMAS Stirling recognises the need for the Navy to be able to operate effectively from both coasts for the direct defence of Australia.

(4.66) The Fleet Base Relocation Study reported that the development of HMAS Stirling for up to half the fleet would be a sensible planning objective to be achieved progressively. It is now the Government's intention to move half the fleet to HMAS Stirling. This will enable the Navy more readily to develop expertise in areas in which it would need to operate in contingencies that could arise in shorter timescales. Ships operating in the strategically important areas of the north and north-west and supported from HMAS Stirling will gain a substantial increase in their effective operating time. In this further development at Stirling, there will be an emphasis on avoiding duplication of specialized support facilities already available on the east coast.

(4.117) The Government has recognised the need for our Navy to operate effectively from both coasts. HMAS Stirling will be developed as a main naval base for half the Fleet—both surface and submarine forces.

1 Commonwealth of Australia, *Review of Australia's defence capabilities* (Dibb Report), March 1986

2 Dibb Report, opcit, Pg 175

3 The reference to "such a long time-scale" related to an assessment at the turn of the century (i.e. 14 years later)

4 Dibb Report, opcit, Pg 7

5 Dibb Report, opcit, Pg 22

6 Department of Defence. The Defence of Australia (1987 Defence White Paper), March 1987, Pg viii

The 1994 Defence White Paper[7]

(5.7) We are developing facilities at HMAS Stirling in Western Australia to accommodate all of the submarine force, about half of the surface force and associated naval helicopters.

(14.13) In recent years, investment in facilities has been given high priority to develop defence infrastructure in northern and Western Australia, including completing a network of northern airfields, relocating Army elements to the north and establishing two-ocean basing for the Navy.

The main fleet operating bases are located in Sydney and at HMAS Stirling, the Fleet Base West near Fremantle, which will also be the base for the new submarines.[8]

The 2016 Defence White Paper

This Defence White Paper looks out to 2035 to identify where and what sorts of security challenges are likely to arise and what capabilities Defence – the Australian Defence Force (ADF) and the Department of Defence – will need to meet them.[9]

The Government's defence strategy will ensure that Defence is prepared to respond if the Government decides the pursuit of Australia's interests requires the use of military force. This strategy sets out three Strategic Defence Interests which are of fundamental significance for strategic defence planning.

Our most basic Strategic Defence Interest is a secure, resilient Australia. The first Strategic Defence Objective is to deter, deny and defeat any attempt by a hostile country or non-state actor to attack, threaten or coerce Australia. The Government is providing Defence with the capability and resources it needs to be able to independently and decisively respond to military threats, including incursions into Australia's air, sea and northern approaches.

Our second Strategic Defence Interest is in a secure nearer region, encompassing maritime South East Asia and the South Pacific. The second Strategic Defence Objective is to support the security of maritime South East Asia and support the governments of Papua New Guinea, Timor-Leste and of Pacific Island Countries to build and strengthen their security.

Our third Strategic Defence Interest is in a stable Indo-Pacific region and rules-based global order which supports our interests. The third Strategic Defence Objective is to provide meaningful contributions to global responses to address threats to the rules-based global order which threaten Australia and its interests.

Recognising the interconnected nature of the global environment and the fact that Australia's security and prosperity is directly affected by events outside our region, all three Strategic Defence Objectives will guide force structure and force posture decision-making in, and flowing from, this White Paper.[10]

(4.26) The Government will increase the size of the submarine force from six to 12 boats. The doubling in size of the submarine fleet recognizes that Australia will face a more challenging maritime environment in the decades ahead. By 2035, around half of the world's submarines will be operating in the Indo-Pacific region where Australia's interests are most engaged. Australia has one of the largest maritime domains in the world and we need the capacity to defend and further our interests from the Pacific to the Indian Oceans and from the areas to our north to the Southern Ocean. Submarines are a powerful instrument for deterring conflict and a potent weapon should conflict occur.

7 Commonwealth of Australia, *Defending Australia Defence White Paper 1994* (1994 DWP), November 1994

8 1994 DWP, opcit, Pg 162

9 Department of Defence, *2016 Defence White Paper* (2016 DWP), Pg 13

10 2016 DWP, opcit, Pg 17

Assessment of the Two Ocean Basing Policy and its relevance

41. The first formal articulation of the Two Ocean Basing Policy occurred in the 1987 Defence White Paper. The 1987 White Paper also articulated the then future CCSM would be a split force operating from both the east and west coasts.

42. The publication of the 1994 Defence White Paper reinforced the Two Ocean Basing Policy, but changes the 1987 intent of a split CCSM force to all six submarines being located at *Stirling*.

43. There is little in the way of White Paper guidance to inform a decision on submarine force disposition for the FSM. From the first articulation in the 1987 Defence White Paper of the Two Ocean Basing Policy, it is apparent that subsequent White Papers did not alter the two ocean paradigm but rather, if anything, reinforced it.

44. The time horizon in the 2016 White Paper is 2035, whereas the first of the FSM will not enter service until about 2031 and the twelfth FSM around 2053. The extant 2016 paper emphasised the region of Australia's strategic interest. Although not specifically stated, the 2016 paper implies that the defence force must be able to respond to '*deter, deny and defeat*' from both east and west coasts.

45. Any decision to either base all FSM on the west coast or to split the force on both coasts would not contravene government policy contained in the White Paper. Basing submarines on both coasts would however appear to be more in line with the strategic intent of the extant White Paper.

46. s47C [redacted]

Conclusions

47. From the first articulation in the 1987 Defence White Paper of the Two Ocean Basing Policy, it is apparent that subsequent White Papers did not alter the two ocean paradigm but rather, reinforced it.

48. Any decision to either base all FSM on the west coast or to split the force on both coasts would not contravene government policy contained in the White Paper.

4. Initial analysis of FSM basing

Initial screening of FSM basing east or west coast

49. The ToR requires an identification of potential strengths, weaknesses, opportunities and or threats of single and multiple basing of a 12 FSM force. An initial analysis of FSM basing considered a range of requirements derived from the ToR. The initial analysis was based on consideration of:

a. strategic and operational requirements,

b. Navy workforce requirements,

c. industry issues,

d. findings from previous reviews, and

e. facilities and infrastructure

50. s47C [redacted]

51. A general discussion of each of the initial screening criteria follows.

Strategic requirements

52. Strategic factors considered important by the review team to any basing decision included:

a. vulnerability of the Submarine Force (SUBFOR) created by the homeport location;

b. the ability of respond to unforeseen events; and

c. the relative location of the homeport to potential hostile threats.

53. s33(a)(i) [redacted]

54. Unforeseen events may demand a rapid response. The 2016 Defence White paper states:[11]

Australia's strategic outlook to 2035 also includes a number of challenges which we need to prepare for. While there is no more than a remote prospect of a military attack by another country on Australian territory in the foreseeable future, our strategic planning is not limited to defending our borders. Our planning recognises the regional and global nature of Australia's strategic interests and the different sets of challenges created by the behaviours of countries and non-state actors such as terrorists.

Our most basic Strategic Defence Interest is a secure, resilient Australia. The first Strategic Defence Objective is to deter, deny and defeat any attempt by a hostile country or non-state actor to attack, threaten or coerce Australia.

Our second Strategic Defence Interest is in a secure nearer region, encompassing maritime South East Asia and the South Pacific.

Our third Strategic Defence Interest is in a stable Indo-Pacific region and rules-based global order which supports our interests.

55. Locating all FSM on one coast minimises the opportunity to respond to an unforeseen event on the alternate coast.

[11] 2016 DWP, opcit, Pg 15, 17

56. The location of the homeport relative to hostile threats relates to strategic depth. FBW is located in strategic depth. The provision of strategic depth for a location on the east coast is dependent upon the selected site. Siting the FSM at a location with strategic depth on the east coast of Australia is possible.

Operational requirements

57. The review considered there are two primary issues regarding submarine areas of operations that influence decisions on the disposition of the FSM:

a. the most likely general areas in which they might operate in contingencies, up to and including war; and

b. consideration of exercise areas, both for submarine training and for participation in exercises with ASW forces.

58. s47C [redacted]

59. s47C [redacted]

60. s47C [redacted]

61. s33(a)(i) [redacted]

62. s33(a)(i) [redacted]

63. s47C [redacted]

64. The second aspect of operational requirements is consideration of exercise areas. Whilst submarine training could be achieved with all submarines at one homeport proximate to either the Eastern Australia Exercise Area (EAXA) or Western Australia Exercise Area (WAXA), the disposition of ASW forces presents a strong case for some submarines to be based on both east and west coasts.

65. s47C [redacted]

66. Submarines need to exercise with ADF ASW (surface and air) forces to achieve operational proficiency and vice versa. The major surface combatant ASW units are based at both Fleet Base East (FBE) and FBW. RAN ASW aviation assets are primarily based on the east coast at Naval Air Station (NAS) Nowra, although the aviation facility at FBW has undergone a recent capability expansion.

67. s47C [redacted]

68. s47C [redacted]

69. s47C [redacted]

70. s47C [redacted]

Navy workforce issues

71. Navy workforce issues were considered under three areas:

a. recruitment,

b. retention, and

c. efficiency.

72. Preliminary advice was sought on Navy workforce issues from the Director of Navy Personnel. The two predominant reasons represented to the Submarine Recruitment Team (SMRT) for not becoming a submariner are:

a. west coast basing, and

b. separation from families.

73. For sailors, 40% of reasons given for not becoming a submariner relate to CCSM only being on the west coast while 60% advise on family separation issues. For Officers, it is approximately 70% related to the west coast location and 30% due to separation. The difference in Officer trends can be related to the requirement of needing a minimum of 2.5 years' service before commencing submarine (SM) training, meaning they are generally more established in relationships than sailors.

74. The reasons for issues with the west are primarily because of family in the east, or their own partners or family not wishing to re-locate to the west.

75. Some of the other issues with the west are:

a. inaccessible (cost and time for a flight between Sydney and Perth) compared with other east coast transits (e.g. Sydney to Melbourne);

b. west coast lifestyle is tame compared to the east coast;

c. disrupts children's education; and

d. difficulty of accessing representative sport (focused mainly in the east).

76. While the above reasons were given for not recruiting into SM, these individuals were predominantly at an early recruitment stage and may have not pursued SM transfer even if an east coast basing was available.

77. Although a primary focus is often related to recruiting, the Director of Navy Personnel advised the biggest challenge is retention. Based on the assumption that the west would retain the larger number of boats and SUBFOR, the basing of some submarines on the east coast would provide the opportunity for

members to live with their close and extended families in the east. This would also lead to follow on postings inside and outside the submarine capability on the east coast.

78. A lack of east coast based submarines reduces the pool of volunteers available to transfer to submarines. The increasing competition for the available workforce will become more important as the size of the SM force increases.

79. The issue of east/west coast basing appears to affect Officers more than Sailors. The stability for family achieved through west coast basing is a positive retention measure and those that are appeased by the provision of east coast basing may be just as reticent to post west as part of their career progression (and likewise those in the west may not be keen to post to the east).

80. The changing population demographics will require the RAN to appeal to the broadest range of Australians, making east coast basing important.

Industry issues

81. Industry is a FIC. When considering industry requirements, the Review noted the Naval Shipbuilding Plan stated:[12]

> *A rolling program of acquiring submarines will provide long-term planning certainty for Australian industry, allowing those Australian companies involved in the submarine program to invest in the capabilities needed to support their involvement in the construction and sustainment activities.*

82. The Future Submarine Industry Skills Plan states:[13]

> *If we are going to build submarines in this country, we cannot afford to lose the skills and experience we already have here. Defence must understand the challenges that face industry and provide long term predictable work that allows industry to develop capabilities and make investments for the future.*
>
> *A steady work program allows shipbuilders to improve productivity through practice and, investment, and major gains are proven to be achievable. A steady work program also allows systems companies to become more efficient though practice and investment. And it is not just basic man-hour productivity that improves, a practiced industry makes savings in almost everything it does. An experienced workforce knows the pitfalls and avoids mistakes, which are complete savings not just percentage improvements.*

83. As a FIC element, a fundamental driver for the sustainment of the FSM will be the ability to have continuous work at all locations where maintenance works are undertaken. The Review considered two factors for industry:

a. the existence of a proven ship repair capability, and

b. the ability to guarantee surety of workflow.

Findings from previous reviews

84. A requirement of the ToR was to consider previous reviews. The Review determined compliance with the following reviews were relevant:

a. Disposition reviews (e.g. Plan Beacon, Force Structure review);

b. Technical reviews (e.g. Coles review); and

c. Personnel reviews (e.g. Moffit Review).

[12] Defence, *Naval Shipbuilding Plan*, 2017, Para 4.122

[13] Defence (DMO), *Future Submarine Industry Skills Plan, a plan for the naval shipbuilding industry*, 15 March 2013, Introduction, Pg 130

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5. FSM basing and industry

The 2016 Defence White Paper

(4.31) The Government will also continue to make appropriate investments in the existing Collins Class fleet, including priority capability enhancements, obsolescence management and fleet sustainment, to ensure Australia's potent and agile submarine capability is maintained until the introduction of the future submarine fleet. This will include upgrades to the Collins Class communications and sensor capabilities.15

(4 .98) Australian defence industry is a fundamental input to the Government's plan to strengthen defence capability.

(4 .101) The Government will better link our capability needs with Australian defence industry's capacity to deliver and we will ensure that the decisions we make about defence capability take proper account of Australian defence industry. For the first time, the Government will recognise the vital role of an internationally competitive Australian defence industry as a Fundamental Input to Capability. The Fundamental Inputs to Capability are those essential inputs which together combine to achieve capability – reflecting that it requires more than simply purchasing equipment to achieve capability.

(4.122) The Government will also ensure a long-term industrial capability to deliver support to Australia's submarines in both construction and a rolling acquisition program for the submarine fleet means managing the acquisition of submarines to ensure Australia maintains, over the long term, a fleet of 12 regionally superior boats that are fit for purpose in the period in which they will be operating. A rolling program of acquiring submarines will provide long-term planning certainty for Australian industry, allowing those Australian companies involved in the submarine program to invest in the capabilities needed to support their involvement in the construction and sustainment activities.

s47C [redacted]

[15] Defence, The 2016 Defence White Paper, p92

s47C [redacted]

s47F [redacted]

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6. FSM basing and submariner workforce

The 2016 Defence White Paper

(6.9) The scale of the rebalance of the ADF workforce reflects the importance of continually reviewing and matching our people to the highest priority tasks for our country's future defence. The changes will occur over the next decade and beyond:

The larger maritime and anti-submarine force will require an increase of around 800 ADF positions, with further growth beyond the decade to operate the larger submarine fleet in particular. The generation of crews with the appropriate mix of skills and experience must be carefully managed to meet the challenging growth needed to operate Navy's new submarines and surface ships.

(6.19) As our defence capabilities become more technologically complex, recruiting Australians with the right skills mix for these capabilities will be even more important. It is not enough to have the best equipment – it needs to be operated and supported by the best people.

(6.20) Attracting and retaining the future Defence workforce will be a major challenge. Being an employer of choice for Australians in a more competitive labour market will require fundamental changes to how Defence plans, manages, and supports its people. A concerted program of recruitment, training and targeted retention will be required to support this growth.

(6.32) Retaining the high-quality, experienced staff that Defence has developed over time is as important as attracting new talent.

(6 .57) The Government recognizes the importance of quality housing for ADF families. Helping to ensure Defence members and their families are suitably housed when they are posted to a new location is a key part of supporting mobility and retention within the ADF. The Government will ensure that Defence Housing Australia continues to provide high standard housing that delivers the best outcome for ADF members and their families.

The submariner force in context

128. The attempt to grow and sustain a submarine force has faltered on several occasions in the history of the RAN. Australia's first two submarines were lost in World War 1. There was then a gap with no submarines until the seven 'J' class submarines in the 1920's, which were scrapped due to poor reliability and cost, once again leaving the RAN without submarines or submariners. Two 'O' class submarines acquired in the 1930's were the victims of cost cuts during the depression era and were subsequently transferred to the Royal Navy. It was not until the 1960's, with the introduction of the Oberon Class, that the RAN began long term sustainment of a submarine force.

129. Throughout the fifty years since the commissioning of the first RAN Oberon, HMAS *Oxley*, the RAN struggled on numerous occasions to recruit and retain sufficient submariners. The MacDougall Review in the 1970's, the Drinkwater Review in the 1980's, the Dovers Review in the 1990's and the Moffitt Review in 2008, all identified causes of shortfalls in submarine personnel. The Moffitt Review is particularly germane, not only because it is the most recent, but because it has occurred since the entire submarine force has been homeported in WA.

130. More than 87 percent of RAN recruits originate from the eastern states[20]. An opportunity for east coast postings can be expected to support improved recruiting and retention of submariners, crucial to crewing 12 FSMs. This observation is consistent with the Moffitt Review[21]:

(3.6) There is no doubt that Navy people in Western Australia generally feel very isolated from the Navy.

(3.7) There is a widespread belief that the submarine capability has not recovered from the loss of people that a resulted from moving the force to Western Australia from Sydney in the early 1990's. There should not be any surprise in a country where most of the population is the East that basing the force in the West is an impediment to effective recruiting.

[20] Defence, *Plan Beacon (draft)*, 2017, Pg 9

[21] Defence, *Review of Submarine Workforce Sustainability* (Moffitt Review), 2008, Pg 24, 25

131. s47C [redacted]

132. Assuming, that with sufficient resources directed at the problem, submariners could be recruited for 12 FSMs, retention of that workforce presents a further challenge, heightened if all 12 or most submarines are homeported in WA. Even though most submariners are happy to remain in WA, a significant minority desire east coast postings, either for career experience or to be closer to extended families, noting that more than 80 percent originate from the eastern states. If this desire is not satisfied, it can manifest as higher attrition.

133. The high level of technical skills and the demonstrated experience working in a harsh environment, render submariners an attractive pool from which the resource industry can recruit. This was the experience during the resources boom up until about 2015. There will undoubtedly be future resources booms and it can be expected that the WA submariner workforce will once again be vulnerable to poaching by the resources industry. Whilst not immune to such poaching, an east coast based workforce would be less vulnerable than those in WA.

134. High levels of attrition do not only require additional effort in recruiting to replace those leaving. Additional cost is incurred throughout the training organisation, not just at the recruit school and the submarine school. The attrition will drive cost increases at relevant sailor category schools and officer training. Higher attrition will demand greater recruitment numbers. This will require higher throughput leading to more facilities and/or instructors to meet demand.

Initial personnel assessment

135. The strategic and operational requirements should be the primary influence on where submarines are homeported. Excluding such strategic and operational requirements, the personnel factor on its own would lead to a false conclusion that all or most submarines should be homeported on the east coast.

Refined impact of personnel on optimal disposition

136. s47C [redacted]

137. s47C [redacted]

s47C [redacted]

7. Transitioning from 6 CCSM to 12 FSM

Background

139. s47C [redacted]

s47C [redacted]

s47F [redacted]

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8. East coast homeport location options

The 2009 Defence White Paper (and repeated in 2013 DWP)[23]

(15.16) The Government has agreed on the following strategic basing principles to meet the future needs of Defence:

Defence base locations should be aligned with strategic requirements and ensure critical capabilities are suitably dispersed for security reasons;

Defence should consolidate units into fewer, larger and sustainable multi-user bases aimed at increasing the alignment of functions at Joint and Service level and their capacity to support operations;

Defence should aim to group bases near strategic infrastructure and industry to promote knowledge sharing, innovation, and to maximise the effectiveness of industry support to the ADF;

Where possible, Defence should locate bases in 'family friendly' areas which provide better employment, specialist medical and educational opportunities for families, and with the potential to reduce posting turbulence in order to improve retention; and

Defence should maintain an urban and regional disposition to enable the continued provision of part-time capability into the future.

2016-2036 Defence Estate Strategy

178. The 2016-2036 Defence Estate Strategy summarises disposition considerations based on an estate of the right size, in the right location. Disposition factors are described as follows[24]:

D1. ***Capability requirements***. *This is the primary disposition principle. Base location is primarily influenced by operational requirements. Basing should ensure critical capabilities are dispersed for security reasons as is required. If operational requirements are not location specific, the other principles below can inform disposition.*

D2. ***Site attributes***. *Consider the conduciveness of the site's attributes such as its size and topography to accommodate the intended purpose and also potential future intensification and / or capability enhancements and the necessary separation space between adjoining land uses. Consider environmental constraints that may restrict utility, including seasonal weather conditions and resilience to long term changes to the estate from climate change, including temperature, sea level rise, erosion, flooding, bushfire and increased frequency of extreme weather events. Consider the site's ability to provide a secure and reliable energy and water supply. Reduce excessive travel time between training areas (excluding CAT 1) and their primary users as far as practicable.*

D3. ***Consolidate into fewer, larger bases***. *Pursue estate consolidation to reduce the estate footprint, increase functional alignment and reduce estate operating costs.*

D4. ***Foster personnel retention***. *Locate properties in family friendly locations to increase personnel retention, by maximising spousal employment opportunities and access to community and social services. Consider the proximity bases and existing / potential Defence Housing locations.*

D5. ***Enable access to industry***. *Locate properties to allow access to and certainty for Industry with regard to sustainment and support. Consider 'off base' solutions that utilise non-defence owned strategic infrastructure to reduce reliance on Government Furnished Facilities arrangements where it is feasible to do so.*

D6. ***Maintain urban and regional disposition***. *Maintain an urban and regional disposition to promote community linkages to Defence and facilitate provision of reservist and cadet capabilities.*

[23] 2013 DWP, opcit

[24] Defence, 2016-2036 Defence Estate Strategy (Estate strategy), 2016, Annex C, Pg 35

Overview of previous reviews

179. The ToR for the review implies consideration of all relevant previous reviews. There have been a significant number of reviews of Navy east coast bases, primarily focussed on GIDP / FBE.

180. Plan Beacon is the RAN disposition and basing vision. [25] Under Plan Beacon GIDP / FBE is retained and includes provision for homeporting FSM. However, Plan Beacon does note that the homeporting of FSM will be subject to a separate review [26] (this review).

181. Previous reviews considered most relevant include:

a. Commander D.L. Stevens, RANR (Stevens Review), *ADF Future Submarine Basing Study*, Defence, 30 April 2011.

b. Dr. Allan Hawke, *Independent Review of the potential for enhanced cruise chip access to Garden Island Sydney*, February 2012.

c. Allan Hawke, Ric Smith, *Australian Defence Force Posture Review (ADFPR)*, 30 March 2012.

d. Defence, *Defence White Paper 2013*, 2013

Defence White Paper 2013

182. The 2013 Defence White Paper addressed the outcomes of the 2011 ADFPR and the Hawke review into enhanced cruise ship access to Garden Island, and made specific reference to the concept of a second east coast naval base in Brisbane. [27]

> *(5.38) The Government has decided not to proceed at this time with long-term planning for establishing a supplementary east coast fleet base in Brisbane (which had been recommended by the Review). The significant preliminary cost estimate (in the order of $6 billion), challenges associated with land acquisition, environmental considerations, the need for extensive dredging and the wider dispersion to a third fleet base of Royal Australian Navy personnel and training, all suggest that establishing a fleet base in Brisbane would be challenging and require significant continued investment for it to remain sustainable.*
>
> *(5.39) Further detailed analysis and feasibility studies have confirmed that the fleet bases in Sydney and Perth will continue to meet the Royal Australian Navy's needs for the foreseeable future. Should existing fleet base arrangements or operational requirements change in future, the Government may again consider the need to plan for an additional fleet base on the east coast.*
>
> *(5.40) In March 2012, the Government released the report of the Independent Review of the Potential for Enhanced Cruise Ship Access to Garden Island Sydney. The report concluded that current and future Royal Australian Navy capability requirements are essentially incompatible with cruise ship access over the long-term, except on an ad hoc basis. The recommendations of this Review remain under consideration by Government to inform a plan for the long-term needs of the cruise industry in Sydney.*

2016 Defence White Paper

183. Noteworthy, the 2016 Defence White Paper included the following statement[28]:

> *(4.70) Beyond 2025, the Defence estate footprint will need to be further developed to accommodate our new high technology capabilities and ensure that Defence is appropriately postured for future strategic requirements and the implications of climate change. This will involve developing new bases, wharves, airfields and training and weapons testing ranges. It will also include considering the long-term future of some Defence bases, such as Garden Island in Sydney Harbour, as issues such as urban development, encroachment and capacity constraints within existing infrastructure affect the ADF's ability to safely and effectively execute its mission.*

[25] Defence, *Plan Beacon (Draft)*, 2016

[26] ibid, Pg 16

[27] 2013 DWP opcit,

[28] 2016 DWP opcit,

Stevens Review

184. By far the most detailed specific review into submarine basing was the 2011 Stevens Review. The Stevens Review seemed to be unconstrained in relation to consideration of basing: considerations such as principles of fewer larger bases, a tenant of Defence Estate since 2009, did not seem to feature significantly.

185. The Stevens report makes the following statement[29]:

> *The foundation of this study is the premise that the creation of an East Coast homeport-posting alternative to HMAS STIRLING submarine in W.A. would be the single most effective action that would mitigate that risk.*

186. The risk relates to workforce sustainability and the assessment that there is little confidence that the full FSM fleet of 12 submarines could be sustained from *Stirling*.

187. Stevens made several assumptions related to the size of the FSM[30]. Table 8.1 summarises the Stevens assumptions, provides updated FSM data and identifies potential impacts of any difference may have on the relevance of the Stevens findings.

Table 8.1: Summary of assumed FSM characteristics and their changes

Parameter	Stevens' assumed measure	Updated measure	Implications on validity of Stevens' report
FSM length	90 metres	97 metres	Impacts primarily on berth space requirements. No material impact on the study's relevance.
FSM draft	8.0 metres	9 metres	Impacts FSM berthing and port transit. Increased draft may impact assumptions made by Stevens relating to capacity to berth a FSM at a particular site.
FSM beam	8.5 metres	9 metres	Impacts space at homeport when rafting an FSM. No material impact on the study's relevance.

s47C [redacted]

189. Stevens states the following in relation to East Coast dockings[32]:

> *This study assumes the Captain Cook Dock will be the default East Coast submarine docking facility regardless of whether the submarines are to be homeported at FBE or another East Coast port.*

s47C [redacted]

191. The following ports were discounted in the Stevens report as unsuitable for a FSM homeport [33]:

a. Gladstone,

b. Port Stevens,

[29] Stevens, OPCIT, Para 13

[30] Stevens, OPCIT, Para 37

[31] Stevens OPCIT, Para 38

[32] Stevens, OPCIT, Para 106

[33] Stevens, OPCIT, Para 253, 280, 414, 474, 478

s47F [redacted]

c. HMAS *Penguin*,

d. Twofold Bay,

e. Adelaide, and

f. Hobart.

192. The following ports were assessed in more detail as a FSM homeport in the Stevens report. Numbers in brackets after the site indicate the score the site achieved in the detailed assessment. [34]

a. Fleet Base West (61, ranked 1st);

b. Fleet Base East (54, ranked 2nd of 9);

c. HMAS *Waterhen* Extended (50, ranked 3rd of 9);

d. Cockatoo Island (45, ranked 4th of 9);

e. Jervis Bay (North and South) (39 and 42, ranked 5th and 6th of 9);

f. Newcastle Port (35, ranked 7th of 9);

g. Western Port (33, ranked 8th of 9); and.

h. Port of Brisbane (28, ranked 9th of 9).

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[redacted]

[34] Stevens, OPCIT, Pg 11, Para 245,246, 277, 305 to 306, 328 to 329, 366 to 369, 380, 407 to 409, 454 to 456

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Appendix A

Acronyms

Acronyms

Acronym	Meaning
ACPB	Armidale Class Patrol Boat
ADF	Australian Defence Force
ADF	Australian Defence Force Posture Review
AMWC	Australian Maritime Warfare Centre
AOM	Assisted Organic Maintenance
ASC	Australian Submarine Corporation
ASW	Anti Submarine Warfare
AWD	Air Warfare Destroyer
CAPT	Captain
CASG	Capability Acquisition and Sustainment Group
CCD	Captain Cook Dock
CCSM	Collins Class Submarine
CDRE	Commodore
CMDR	Commander
COMAUSFLT	Commander Australian Fleet (Fleet commander)
COMTRAIN	Commodore Training
COMWAR	Commodore Warfare
CO	Commanding Officer
COB	Chief of Boat
CTT	Command Team Trainer
CUF	Common User Facility
DEOH	Defence Establishment Orchard Hills
DGEM	Director General Explosive Materiel
DGFSM	Director General Future Submarine
DGNP	Director General Navy Personnel
DGNPSI	Director General Navy Plans Systems and Infrastructure
DGSM	Director General Submarines
DISSUB	Disabled Submarine

Acronym	Meaning
DMOS	Director Maritime Operational Support
DSTG	Defence Science and Technology Group
DWP	Defence White Paper
DWTR	Deep Water Tracking Range
E&IG	Estate and Infrastructure Group
EAXA	Eastern Australia Exercise Area
EM	External Maintenance
EO	Explosive Ordnance
FAS	Firs Assistant Secretary
FBE	Fleet Base East
FBW	Fleet Base West
FCD	Full Cycle Docking
FF	Future Frigate
FIC	Fundamental Input to Capability
FLSE	Fleet Logistics Support Element
FSB	Forward Support Base
FSM	Future Submarine
FSM TC	Future Submarine Training Centre
GIDP	Garden Island Defence Precinct
GMSUBS	General Manager Submarines
GWSPO	Guided Weapons Systems Program Office
HFSP	Head Future Submarine Program
HMAS	Her Majesty's Australian Ship
HMS	Head Maritime Systems
HNC	Head Navy Capability
HQ	Headquarters
HQJOC	Headquarters Joint Operations Command
HWT	Heavy Weight Torpedo
ICT	Information Communications Technology
ID	Infrastructure Division

Acronym	Meaning
ID	Intermediate Docking
IIS	Introduction Into Service
IMP	Intermediate Maintenance Period
IMS	Integrated Master Schedule
ISR	Intelligence Surveillance and Reconnaissance
JLC	Joint Logistics Command
LBTS	Land Based Test Site
LCDR	Lieutenant Commander
LEUT	Lieutenant
LHD	Landing Helicopter Dock
LIA	Living In Accommodation
LOT	Life of Type
LOTE	Life of Type Extension
MCD	Mid Cycle Docking
MOSC	Maritime Operational Support Capability
MPV	Multi Purpose Vessel
MSB	Main Support Base
MTF	Magnetic Treatment Facility
MTR	Mobile Tracking Range
NAS	Naval Air Station
nM	Nautical miles
NSW	New South Wales
OB	Operating Base
OCD	Operational Concept Document
OM	Organ Maintenance
OPTEMPO	Operational Tempo
OPV	Offshore Patrol Vessel
PERSTEMPO	Personnel Tempo
POAWASM	Petty Officer Acoustic Warfare Analysis Submarines
POCISSM	Petty Officer Communications Information Systems Submarines

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Acronym	Meaning
POEWSM	Petty Officer Electronic Warfare Submarines
PON	Port of Newcastle
PTI	Physical Training Instructor
PTT	Part Task Trainer
RAAF	Royal Australian Air Force
RAN	Roya Australian Navy
RANR	Roya Australian Navy Reserve
RANSSSS	Roya Australian Navy School of Survivability and Ship Safety
SAXA	South Australian Exercise Area
SETF	Submarine Escape Training Facility
SM	Submarine
SMF	Submarine Maintenance Facility
SMRT	Submarine Recruitment Team
SSG	Submarine Support Group
SMF	Submarine Maintenance Facility
SMRT	Submarine Recruitment Team
SPO	Systems Program Office
SPWFL	Self Propelled Water and Fuel Lighter
sqm	Square metres
SQN	Squadron
SSN	Nuclear Powered Submarine
STG	Sea Training Group
SUBFOR	Submarine Force
SWOT	Strengths Weaknesses Opportunities Threats
SWTR	Shallow Water Tracking Range
TA-SUBS	Training Authority - Submarines
TLSF	Through Life Support Facility
TMF	Torpedo Maintenance Facility
ToR	Terms of Reference
TRV	Torpedo Recovery Vessel

Acronym	Meaning
TS	Top secret
USN	United States Navy
UUC	Usage Upkeep Cycle
UWTR	Under Water Tracking range
VOO	Vessel Of Opportunity
WA	Western Australia
WAXA	Western Australia Exercise Area
XA	Exercise Area

Appendix B

Terms of Reference

TERMS OF REFERENCE FOR

STRATEGIC REVIEW OF RAN SUBMARINE AND FRIGATE FORCE DISPOSITION

Role of the Panel

The panel will conduct an independent examination of aspects, including strategic requirements, capability drivers and risks in relation to Australia's current and future submarine and frigate force disposition and its ability to meet Government directed requirements over the next fifty years.

The primary purpose of the review is to ascertain the ongoing suitability and sustainability of an increased fleet of submarines operating out of Fleet Base West and frigates operating out of the existing facilities at Fleet Bases East and West. The review would be expected to assess strategic drivers to determine areas of weakness and or potential gaps in the ability of the transitioning and future submarine capability being able to achieve and sustain operations from the existing Fleet Bases.

Membership of the Panel

The Panel will comprise the following members:

1. s47F
2. Mr Mark Power
3. CAPT Jonathan Ley RAN - Frigates

Reporting and Delegations

The Panel is supported by the Navy Capability Division, and in particular, the Submarine Branch, and the Surface Combatant and Aviation Branch. The panel will also be supported by CASG through the SEA 1000 Future Submarine Program and the SEA 5000 Future Frigate Project. The Panel will report to the Head of Navy Capability (HNC), through Director General Submarines (DGSM) and Director General Surface Combatant and Aviation (DGSCA).

The Panel has no executive authority, but may seek briefings or information from Defence relevant to its role at any time during the examination as it considers necessary.

The Panel will provide interim updates of its findings, as well as a final written report, by 29 September 2017, to the Head of Navy Capability.

The Panel is to advise the Head of Navy Capability of any issues arising during the conduct of the examination that could impact on the completeness or integrity of the examination.

Objectives and Scope

In undertaking this role, the Panel will direct its own study. The scope of work is to include, but is not limited to the examination and assessment of:

a. previous basing reviews, including the strategic drivers that resulted in the RAN moving to a two ocean basing policy in 1987.

b. the relevance of two ocean basing for the submarine capability with considered analysis to support decision making by Navy and Government.

c. for submarines the available operational analysis regarding operational requirements and associated modelling to support expected future requirements for 'deployability' and contingency response, which may include forward basing or staging.

d. for Frigates, the available operational analysis regarding operational requirements and associated modelling to support expected future requirements. Current SEA 5000 project infrastructure planning assumptions have assumed a 6 / 3 split between West and East.

e. the potential strengths, weaknesses, opportunities and or threats of single and multiple basing.

f. Regarding submarines, the potential strengths and weaknesses of options for the numerical split.

g. Regarding submarines, the options, including strengths and weaknesses, for east coast base location, cognisant of the need for industry support.

h. the sustainability of workforce to support the submarine capability, both from a Defence and Industry perspective.

The broad objectives of this review are to determine the:

a. optimal disposition of RAN submarines and frigates and the associated submarine and frigate workforce (both Industry and Defence)

b. optimal levels of support (maintenance, engineering, supplies, training and operating support), including infrastructure and services, in each location (if more than one).

c. Most effective use of forward support bases to enhance operational effect and capability delivery, including the use of Support Vessels as appropriate.

d. optimal disposition of Submarine and Frigate forces during the Transition Phase of the capability (from CCSM to FSM and ANZAC to FF)

Specific Deliverables

A report that details the optimal disposition of the Australian Submarine and Frigate Capabilities to achieve operational outcomes (including deployability and sea training) as well as ensure ongoing sustainability of the capability through the appropriate access to, and provision of, support services, training, personnel, facilities and infrastructure.

Constraints

Submarine

The Panel is to restrict its engagement to the ADO and key Submarine Enterprise Members, including ASC, Raytheon, LMA and DCNS. Any requirement to engage outside of this restriction is to be approved in advance by DGSM.

Frigates

The Panel is to restrict its engagement to the ADO and members of the Warship Asset Management Agreement. Any requirement to engage outside of this restriction is to be approved in advance by DGSCA.

Background Information for the Panel Members

Submarine Policy

The 2016 Defence White Paper affirms that "*Submarines are an essential part of Australia's naval capability*" and that "*the Government has determined that regionally superior submarines with a high degree of interoperability with the United States are required to provide Australia with an effective deterrent*". The 2016 Defence White Paper includes Government's determination to "*ensure no* [submarine] *capability gap*".

Future Submarine Background

Australia has established a Future Submarine Program (designated 'SEA1000') to deliver Australia's future submarine capability, which is centred on the acquisition of an expanded Force of 12 regionally superior future submarines. The 2016 Defence White Paper anticipates that the first of the future submarines is "*likely to begin entering service in the early 2030s*".

Beyond the Future Submarine

The 2016 Defence White Paper advises that construction of the 12 new future submarines will extend "*into the late 2040s to 2050 timeframe*". The White Paper also states, "*To ensure no capability gap and the ability to progress a replacement submarine in the 2050s, the Government has decided to implement a rolling acquisition program for Australia's submarine fleet*".

Frigate Policy

In the 2016 Defence White Paper, the Government continued previous White Paper commitments to build a Future Frigate and stated that nine new future frigates, optimised for anti-submarine warfare, would be introduced into service from the late 2020s. Anzac Class frigates will not be withdrawn from service until the future frigates enter service in around 2027–30. The first future frigate will realise operational capability by that date, with subsequent ships expected to enter service every two years after that.

Future Frigate Background

Australia has established a Future Frigate Program (designated 'SEA5000') to deliver Australia's next generation of naval surface combatants. In August 2015, the Government committed to bring forward the Future Frigate Program to commence construction in Adelaide in 2020. In November 2015, Defence sought Government approval for the proposed Competitive Evaluation Process strategy and the acquisition strategy to support the schedule required to meet the revised 2020 construction date. The new frigates will be more capable than the Anzac Class that they will replace. They will have sufficient range and endurance to operate effectively throughout maritime South East Asia and from forward areas of operation such as the Middle East. The Naval ship building plan states 'The location for the long-term sustainment of the future frigates is yet to be finalised. It is possible that the future frigates will follow the sustainment location for the Anzac Class, but the options are still being considered as part of the future frigate competitive evaluation process and are expected to be presented to Government for consideration in 2018."

Beyond the Future Frigate

The recently released Naval shipbuilding plan advises the construction of the nine new future frigates will extend until 2038-2040s before follow on builds of major surface combatants are expected under the continuous ship building plan.

Strategic Basing Principles

The 2009 Defence White Paper stated that its key concern with regards to the delivery of Defence facilities was the need to "… directly enable the generation, projection and sustainment of operational capability". Further the Government agreed on a number of strategic basing principles, including:

- Defence base locations should be aligned with strategic requirements and ensure critical capabilities are suitably dispersed for security reasons;
- Defence should consolidate units into fewer, larger and sustainable multi-user bases aimed at increasing the alignment of functions at Joint and Service level and their capacity to support operations;
- Defence should aim to group bases near strategic infrastructure and industry to promote knowledge sharing, innovation, and to maximise the effectiveness of industry support to the ADF

- where possible, Defence should locate bases in 'family friendly' areas which provide better employment, specialist medical and educational opportunities for families, and with the potential to reduce posting turbulence in order to improve retention; and
- Defence should maintain an urban and regional disposition to enable the continued provision of part-time capability into the future.

Two Ocean Navy Policy 1987

- The 1987 Defence White Paper advises that "*The Government has recognised that the effectiveness of the submarine force would be enhanced by basing some of the submarines in the west closer to priority operating areas*".

Basing Studies and Reviews

Review of Submarine Workforce Sustainability (Moffitt Review 2008)
Plan to Reform Support Ship Repair and Management Practices (Rizzo Review 2011)
Collins Class Sustainment Review (Coles Review 2011)
Submarine Basing – (CMDR Stevens, RANR 2011)
Navy Strategic Disposition and Basing Plan (Plan Beacon 2017)

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Appendix D

Material relied upon

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Table D1: Documents / material relied upon

Serial	Document title	Author/ Year	Purpose / use of document
1	Review of Australia's defence capabilities	Defence (Dibb) March 1996	Review of Two Ocean Basing Policy
2	The Defence of Australia	Defence 1987	Review of Two Ocean Basing Policy
3	Defending Australia Defence White Paper 1994	Defence 1994	Review of Two Ocean Basing Policy
4	Defence 2000 Our Future Defence Force	Defence 2000	Review of Two Ocean Basing Policy
5	Defending Australia in the Asia Pacific Century, Defence White Paper 2009	Defence 2009	Review of Two Ocean Basing Policy
6	Defence White Paper 2013	Defence 2013	Review of Two Ocean Basing Policy
7	2016 Defence White Paper	Defence 2016	Review of Two Ocean Basing Policy, Relevant policy directives
8	2016 Defence Industry Policy Statement	Defence 2016	Review of industry initiatives, Relevant policy directives
9	Plan Beacon	Power Initiatives 2017	Strategic direction for Navy fleet bases.
10	Seafarer GeoTIFF	Australian Hydrographic Office	Charts of Australian coastal waters to assist in the east coast basing options
11	Going to the next level: the report of the Defence Procurement and Sustainment Review	Defence (Mortimer) 2008	
12	Future Submarine Industry Skills Plan	Defence (DMO) 2013	Reference material related to shipbuilding industry workforce
13	Study into the business of sustaining Australia's Collins Class Submarine Capability	Defence (Coles) 2012	Review of CCSM sustainment and lessons learnt to inform FSM
14	Study into the business of sustaining Australia's Collins Class Submarine Capability – Progress Review	Defence (Coles) 2014	Review of CCSM sustainment and lessons learnt to inform FSM
15	Study into the business of sustaining Australia's Collins Class Submarine Capability – Beyond Benchmark	Defence (Coles) 2016	Review of CCSM sustainment and lessons learnt to inform FSM
16	Defence Estate Strategy	Defence 2016	Policy guidance on base planning
17	Naval Shipbuilding Plan	Commonwealth 2017	Details of the proposed shipbuilding plans for Australia
18	Submarine Workforce Transition Plan (Plan Delphinus 2.0)	Defence, 2016	
19	FSM Operational Concept Document	Defence,	Operational requirements for FSM

Serial	Document title	Author/ Year	Purpose / use of document
20	Future Submarine Basing Study	CMDR D. Stevens 2011	Review of east coast basing options
21	Review of Submarine Workforce Sustainability	RADM Moffitt 2008	Personnel issues impacting FSM basing considerations
22	Plan to reform support ship repair and management practise	Defence (Rizzo) 2011	Sustainment practices

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