



MAJOR PROJECTS REPORT 2017

1 July 2016 – 30 June 2017

Volume 3

ISBN: 978-1-98-851504-5 (Print)
ISBN: 978-1-98-851505-2 (Online)

Published in February 2019

www.defence.govt.nz

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PART 4A: PROJECT DATA SHEETS[1]

[1] This section discusses how Defence considered interoperability. NATO broadly defines interoperability as: “the ability to act together coherently, effectively and efficiently to achieve tactical, operational and strategic objectives”.

Specifically, Military interoperability is defined as: “The ability of military forces to train, exercise and operate effectively together in the execution of assigned missions and tasks.”

There are three key dimensions to interoperability: technical, procedural and human.

Technical interoperability consists of hardware and systems. It is the ability of systems to provide information and services to, and accept information and services from, other systems, and to use the information and services so exchanged.

Procedural and doctrinal interoperability is the ability of joint and combined forces to work together on military operations toward the achievement of common objectives. Both are enabled through the formulation of appropriate doctrine, procedures and the undertaking of the necessary training.

Human interoperability is using a common language, understanding different cultures and training together. To achieve this form of interoperability is one of the key reasons military forces train with friendly military forces. It generates professional trust and confidence.

ANZAC FRIGATE PLATFORM SYSTEM UPGRADE

Project Description: The Platform Systems Upgrade (PSU) has addressed equipment obsolescence, performance degradation, operational limitations and compliance issues with the platform systems of the ANZAC class frigates. These platform systems are distinct from combat capabilities and enable the frigates to move, float, generate power and recover from damage.

Policy Value

The PSU will maintain the operational effectiveness and efficiency of the ANZAC frigates, HMNZ Ships *Te Kaha* and *Te Mana,* over their remaining lives. It will thereby sustain and enhance the Naval Combat Force's contribution toward government options for:

- defending New Zealand's sovereignty, its Exclusive Economic Zone and territorial waters
- operating with the Australian Defence Force to discharge our obligations as an ally of Australia
- contributing to peace and stability operations in the South Pacific
- contributing to whole-of-government efforts at home in resource protection
- participating in Five Power Defence Arrangements and other multilateral exercises or operations
- protecting New Zealand's interests in the Southern Ocean and Ross Dependency
- providing a physical demonstration of New Zealand's commitment to regional and global security.

Government Approval Milestones

Project Initiation: Occurs once a capability requirement has been identified by Defence and a broad assessment of the options for meeting the capability requirement has been authorised by the Chief Executives and noted by the Minister of Defence.

Approval to Initiate: Attained when Cabinet agrees to the project's inclusion on the capital acquisition plan and authorise Defence to engage with industry to refine its initial assessment with more accurate information.

Approval to Commence: Attained when Cabinet agrees to the refined capability requirement and authorises the Ministry of Defence to commence a formal tender and tender evaluation process.

Approval to Negotiate: Attained when Cabinet agrees to the preferred tender, specifies funding limits, and authorises the Ministry of Defence to enter into contract negotiations.

Approval to Commit: Attained when Cabinet agrees to the final contract and authorises the Ministry of Defence to sign the contract and commit funding.

Date	Approved By	Approval
11 September 2006	Cabinet CAB Min (06) 34/2	**Approval to Initiate.** Cabinet agreed to include the ANZAC PSU as a new project in the revised 2006 Defence Long Term Development Plan (LTDP) and authorised Defence to commence definition and options analysis.
19 November 2007	Cabinet CAB Min (07) 42/3	**Approval to Commence.** The Ministry of Defence was authorised to release the tender documentation for the PSU. Defence was also authorised to seek approval from Joint Ministers (Minister of Finance and Minister of Defence) to enter into a contract not to exceed NZ$57.6 million once the tender evaluation process had been completed.
19 May 2008	Joint Ministers	**Approval of Revised Acquisition Strategy**. Joint Ministers approved a revised acquisition strategy to break the project down into four elements and authorised the Ministry of Defence to procure long lead items and commit initial funding for project start up costs.
23 October 2008	Joint Ministers	**Approval to Commit.** Joint Ministers approved funds for the power upgrade and stability enhancement and compartment changes elements of the project.
22 December 2010	Joint Ministers	**Approval to Commit.** Joint Ministers approved funds for the Integrated Platform Management System (IPMS) and Heating, Ventilation and Air Conditioning (HVAC) elements of the project.
December 2013	Cabinet Committee on State Sector Reform and Expenditure Control, having been authorised by Cabinet to have the Power to Act CAB Min (13) 43/44	**Approved** changes to appropriations by way of a fiscally neutral adjustment of $6.0 million from Defence projects to the PSU project for completion of phase 2 work on HMNZS *Te Kaha***.** **Directed** Defence to report back in the first quarter of 2014 with a plan for commissioning phase 2 upgrade work on HMNZS *Te Mana.*
8 April 2014	Cabinet Committee on State Sector Reform and Expenditure Control having been authorised by Cabinet to have the Power to Act SEC Min (14) 4/2 CAB Min (14) 13/4	**Noted** that approximately $22.2 million (including contingency) will be required to complete phase 2 work on HMNZS *Te Mana*. **Approved** changes to appropriations as fiscally neutral adjustments of $12.4 million from identified projects and $9.8 million from reprioritisation of NZDF capital funds.

CAPABILITY DEFINITION PHASE

During the capability definition phase, capability and operational requirements are assessed and refined. Stakeholder needs are considered. Scenarios may be used to identify requirements. Hypothetical options which include a rough order of costs are used to analyse affordability and evaluate requirements.

Summary of Capability Definition Phase

Capability Requirement: a description of the ability needed to achieve the policy objective.

Operational Requirement: a description of a component of what is required to complete a task.

How Defence identified and assessed capability and operational requirements

The PSU Project was initiated following a reprioritisation of Defence's Long-Term Development Plan in September 2005, in which the PSU Project was identified as a priority. In May 2006, the NZDF's Assistant Chief of Development assembled a joint MoD and NZDF team to conduct planning for the Project. The issue that the Project sought to address was the obsolescence and wearing out of the Platform Systems on the ANZAC class frigates. The Platform Systems that the project would upgrade included the propulsion systems, electrical power generation and distribution, auxiliaries, damage control and platform management. In August 2006 a project charter and management plan were developed, and in November 2006 Cabinet agreed to include the project in the Defence Long-Term Development Plan.

Following this approval, the project team carried out an analysis to identify the technical requirements for the PSU. Operational deficiencies, maintenance requirements, and manning constraints drove the initial requirements. These requirements were subsequently analysed against policy objectives, the identified risks, and the potential risk mitigation measures. The findings of this process were presented to Defence's Integrated Capability Management Committee in the form of an internal initial gate document in May 2007.

Following the initial work, an analysis of options for the upgrade was undertaken, the findings of which were worked into a Comprehensive Capability Investment Proposal in October 2007. The Comprehensive Capability Investment Proposal formed the basis for a Cabinet paper that then sought government approval to proceed. Cabinet approved this paper, and the proposed upgrades for the ANZAC class frigates in November 2007.

The upgrade was planned to coincide with a major scheduled overhaul of the frigates' diesel engines, which was a parallel project to be funded using NZDF operating capital and to occur in conjunction with the PSU. The engine upgrade integrated new engines because this was less expensive than refurbishing the old engines.

How Defence analysed the options

The Project Team carried out analysis of various options for the project throughout 2007. The principal parameter on which these options were based was cost. These cost-based options were then assessed according to criteria that covered key areas of risk and capability associated with the upgrade project. The criteria included:

- operating profile
- environmental envelope
- training impact
- manpower reduction

- environmental compliance
- future capability
- supportability
- reliability
- affordability.

The Project Team presented the findings of the options analysis to the Defence Executive Capability Board in July 2007. The Executive Capability Board accepted the proposed options and recommended they be developed further in the Comprehensive Capability Investment Proposal that was produced in 2007. Three options were examined in detail in the Comprehensive Capability Investment Proposal, and then presented in the November 2007 Cabinet paper seeking approval to proceed. These options are detailed in the table in section 1.2.

How Defence considered interoperability[2]

Interoperability has been a key consideration for the PSU project because the ANZAC frigates are part of a joint capability programme between New Zealand and Australia. As a result, the frigates comprise New Zealand's main contribution toward naval combat force ANZAC operations and exercises.

Under the original ANZAC acquisition programme, New Zealand and Australia laid the foundations for joint management and support of the ships throughout their lives. This was formalised through the signing, in 1991, of an Implementing Arrangement for the Management of Assets and the In Service Support of the ANZAC class frigates and shore facilities.

These arrangements, coordinated through the then Australian Defence Material Organisation of the Australian Defence Force and the RNZN, provide insurance for the fleet, as well as a pool of rotables and spares for maintaining the ships.

How Defence considered 'through-life' costs and issues

The RNZN ascertained estimated 'through life' costs from a range of sources (but not from industry as consultation with industry prior to 'main gate' was not permitted). From this broad base of information a range of costs was assembled that covered the best and worse case scenarios for the upgrade. Within these costs, the most significant through-life components per ship were depreciation, fuel and personnel costs.

From this information, the net present values were calculated for the worst case scenario. This information was compared through the use of a cost-benefit analysis against each of the options to be included in the Comprehensive Capability Investment Proposal. It was estimated that option three would realise an operational expenditure savings of NZ$27 million.

[2] For definition of interoperability see note under *Part 4A: Project Data Sheets*.

Requirements Analysis in the Capability Definition Phase

Options analysis in the capability definition phase is used as a tool to compare assess and evaluate capability and operational requirements.

Whereas options analysis in the acquisition stage identifies the best procurement solution to deliver the capabilities required.

Options for Upgrading the Platform Systems on the ANZAC Frigates		
Options Considered	**Capability option**	**Description**
Option 1	Undertake the minimum amount of work required to maintain the current availability of the ANZAC frigates.	This option would include: • maintenance of the ships' 3600 tonnes displacement • maximum power output from the Propulsion Diesel Engines limited to 3.2MW • maintaining of the original HVAC system, but replacement of the type of gas (R22) used in this system • control and monitoring system replaced by an Integrated Platform Management System with simulator function.
Option 2	Undertake the level of work required to maintain availability of the ANZAC frigates and improve their ability to deploy, in support of government policy, in all operating environments.	This option would include: • an increase of the ships' displacement to 3700 tonnes • maximum power output from the Propulsion Diesel Engines increased to 3.6MW • upgrade of the HVAC system, and replacement of the type of gas (R22) used in this system • control and monitoring system replaced by an Integrated Platform Management System with simulator function.
Option 3 – **the recommended option**	Undertake work to provide the ANZAC frigates with the equivalent capability as Option 2, but incorporating improved overall operational efficiency and cost-effectiveness.	This option would include: • an increase of the ships' displacement to 3700 tonnes • maximum power output from the Propulsion Diesel Engines increased to 4.4MW (with new TB93 engines) • upgrade of the HVAC system, and replacement of the type of gas (R22) used in this system • enhanced Integrated Platform Management System with integrated bridge system, onboard operational trainer, remote monitoring capability, and battle damage control system.

ASSESSMENT	The third option was considered affordable at the time. It addressed equipment obsolescence, environmental compliance issues, overcame all identified operational constraints and provided a future growth margin. It also provided the ANZAC frigates with the ability to fill their operational profile efficiently and within the manpower constraints.

Description of the Capability and Operational Requirements

Capability Requirement	Operational Requirements – Description and Explanation
Stability of frigates after incurring damage and their reserve buoyancy	• A minimum weight growth margin of 100 tonne. • Conformance to the requirements of DEF AUST 500, Australian Defence Force Maritime Materiel Rule Set, Vol. 3, Hull System Requirements, Part 2 Stability of Surface Ships and Boats.
ANZAC Operational Profile – the propulsion configuration system	• Propulsion systems where the diesel engines shall, in combination, provide sufficient power to drive the ship not less than 20 knots under the specified design environmental conditions at a maximum displacement of 3700 tonnes.
High Temperature Operating	• Adopt the ISO 7547-2002 standard for heating, ventilation and air conditioning. • An environmental control system which is capable of controlling the ship's internal air temperatures. • A chilled water cooling capacity of not less than 986 kW.
Control and Monitoring System that delivers automated functions across all platform systems	• Integrated platform management systems. • Simplified propulsion control. • Gas turbine engine control module. • Integrated bridge system. • Onboard operational trainer. • Enhanced battle damage control system. • Remote monitoring capability.

Schedule of Capability Definition Phase

Dates	Duration	Explanation
September 2005 – October 2007	25 months	During this period Defence analysed the requirements, identified options and received approval to upgrade the platform systems on the ANZAC frigates.

Expenditure in Capability Definition/ Source Selection Phase

	Expenditure (NZ$)	
Definition Phase	2003/04	24,155.41*
	2004/05	49,145.86*
	2005/06	171 336.52*
	2006/07	136,855.58*
	2007/08	650,652.71[+]
	2008/09	(7,725.83)[+]
Explanation	In the definition phase, the above costs are classified as pre-acquisition costs and have been met from the NZDF's operating budget. *During the period FY03/04 to FY06/07, these figures included costs from the ANZAC PSU and the ANZAC Self Defence Upgrade. [+] During the period FY07/08 to FY08/09 these figures were for PSU costs only.	

History of Cost Estimates in the Capability Definition Phase

Date	2006 (NZ$ million)	2007 (NZ$ million)
Costs	50-60	49.5 - 55.7
Explanation of Variance	N/A	

Estimates of Proposed Schedule in the Capability Definition Phase

ORIGINAL ESTIMATE		30 JUNE 2017 ESTIMATE		ACTUAL	
HMNZS *Te Kaha*		**HMNZS *Te Kaha***		**HMNZS *Te Kaha***	
Start of Upgrade (part one)	January 2009	Part One Implementation	N/A	Part One Implementation	February 2010
Start of Upgrade (part two)	August 2009	Part Two Implementation	N/A	Part Two Implementation	January 2013
Upgrade complete	Not provided	Upgrade complete	N/A	Upgrade complete	September 2014
HMNZS *Te Mana*		**HMNZS *Te Mana***		**HMNZS *Te Mana***	
Start of Upgrade (part one)	Mid-2009	Part One Implementation	N/A	Part One Implementation	December 2010
Start of Upgrade (part two)	Mid-2010	Part Two Implementation	N/A	Part Two Implementation	May 2014
Upgrade complete	Not provided	Upgrade complete	June 2016	Upgrade complete	April 2016
Project closure	Not provided	Project Closure	March 2017	Project Closure	December 2017
Explanation	In May 2008 Defence sought Joint Ministers (Defence and Finance) authorisation to adopt a revised acquisition strategy to allow the propulsion systems component of the PSU to be undertaken in conjunction with the engine replacements planned for during the frigates' extended maintenance periods in 2009 and 2010. However, the tight timeframe prevented the other elements of the PSU project from being ready at that time and were, therefore, rescheduled for implementation during subsequent maintenance periods. The 2nd phase of the upgrade (Part Two) was delayed 12 months by the December 2011 meeting of the Defence Capability Management Board. This meeting decided that *Te Kaha* would be the lead ship for the installation of PSU Phase 2 in 2013 and that *Te Mana* would follow in 2014. The delay was to enable the technical solution to be developed further and proven before implementation.					

ANZAC FRIGATE SYSTEMS UPGRADE

Project Description: The primary objective of the ANZAC Frigate Systems Upgrade (FSU) Project is to restore the frigates' ability to fulfil credible combat roles and provide high quality surveillance products in the contemporary and emerging security environment. This will ensure that the Government retains the ability to deploy the ANZAC frigates to the Pacific and beyond, enabling them to operate with confidence in low- to medium-threat environments.

Policy Value

The FSU will maintain the combat effectiveness and efficiency of the ANZAC frigates, HMNZ Ships *Te Kaha* and *Te Mana,* over their remaining lives, thereby sustaining and enhancing the Naval Combat Force's contribution toward government options for:

- defending New Zealand's sovereignty, its Exclusive Economic Zone and territorial waters
- operating with the Australian Defence Force to discharge our obligations as an ally of Australia
- contributing to peace and stability operations in the South Pacific
- contributing to whole-of-government efforts at home in resource protection
- participating in Five Power Defence Arrangements and other multilateral exercises or operations
- protecting New Zealand's interests in the Southern Ocean and Ross Dependency
- providing a physical demonstration of New Zealand's commitment to regional and global security, including protecting sea lines of communication.

The *Defence White Paper 2010* reiterated the Government's requirement that the frigates will provide effective, credible combat capabilities, and for the frigates to be given a self-defence upgrade by 2017[3] to address obsolescence and to improve their defensive capability against contemporary air and surface threats.

[3] Since publication of the *Defence White Paper 2010* the completion date has been updated (see the ANZAC Frigate Systems Upgrade section in Volume 2, Section 2.2 Schedule of Introduction into Service)

Better Business Case Milestones

Project Charter: Defence project initiation is guided by the Defence White Paper 2010 and the 2011 Defence Capability Plan. Projects commence following notification to the Minister of Defence and approval of a project charter by the Capability Management Board.

Approval of Indicative Business Case (IBC): Attained when Cabinet agrees to the strategic context for an investment and agrees to progress a short list of capability options to the Detailed Business Case stage. May also authorise Defence to engage with industry for more detailed information (e.g. Request for Information).

Approval of Detailed Business Case (DBC): Attained when Cabinet agrees to a refined capability requirement and authorises Defence to comment formal engagement with industry (through a request for proposal or request for tender) on a preferred capability option.

Approval of Project implementation Business Case (PIBC): Attained when Cabinet agrees that Defence can conclude a contract based on the preferred supplier, the negotiated services, the maximum funding level and the arrangement to manage the project and the ongoing delivery of services.

Date	Approved By	Approval
June 2007	Secretary of Defence & Chief of Defence Force	**Original Project Charter.**
29 March 2012	Secretary of Defence & Chief of Defence Force	**Revised Project Charter.**
6 August 2008	Cabinet POL Min (08)14/6	**Approval of Indicative Business Case.** Cabinet agreed that all five options be fully developed for a main gate business case that will be prepared by officials.
12 November 2012	Cabinet CAB Min (12) 40/5A	**Approval of Detailed Business Case.** Cabinet approved Option 4[4] and authorised the Secretary of Defence to issue Requests for Tender.
14 April 2014	Cabinet CAB Min (14) 13/14	**Approval of Project Implementation Business Case.** Cabinet agreed to proceed with the FSU and authorised the Secretary of Defence to conclude contracts.

[4] Option 4 is described below.

CAPABILITY DEFINITION PHASE

During the capability definition phase, capability and operational requirements are assessed and refined. Stakeholder needs are considered. Scenarios may be used to identify requirements. Hypothetical options which include a rough order of costs are used to analyse affordability and evaluate requirements.

Summary of Capability Definition Phase

Capability Requirement: A description of the ability needed to achieve the policy objective.

Operational Requirement: a description of a component of what is required to complete a task.

How Defence identified and assessed capability and operational requirements

The FSU Project, originally known as the Self Defence Upgrade, was initiated in 2007. The Royal New Zealand Navy had advised that the ANZAC frigates were over 10 years old and that many of the surveillance and combat systems were becoming obsolete and in need of replacement. Threats in the maritime environment had also changed, with new technology once only available to larger countries now becoming available to small states and other groups. The purpose of this project is to ensure that the mission and weapon systems onboard the ANZAC class frigates continue to contribute towards their combat viability. It will address the erosion of capability through a combination of system obsolescence and emerging threats.

The project team carried out an analysis to identify the technical requirements for the FSU.

A number of mission systems were identified as facing imminent obsolescence and their support was becoming increasingly difficult and expensive. An Indicative Business Case was developed and presented to Cabinet in which a range of options of increasing complexity and cost were identified.

Cabinet agreed in August 2008 that all five options should be developed and costed in the Detailed Business Case (DBC). Shortly after work on the DBC had begun, the Government announced work on a new Defence White Paper. Work on the FSU was paused until the White Paper had been completed in 2010 and the future of the frigates had been confirmed.

The DBC developed four options. The fifth option presented in the IBC, to counter higher levels of threats, was not advanced in the DBC due to its higher cost. An additional option that closely replicated the upgrade being planned for the Royal Australian Navy was included in the options analysis as an upper bound comparator.

The systems considered for upgrade or replacement were:

- Combat Management System
- Tactical Radar Systems
- Defensive Missile Systems
- Infrared Search and Track
- Radar Electronic Support Measures
- Underwater sonar
- Tactical datalinks
- Decoys
- Torpedo Defence System

- Combat System Trainer.

How Defence analysed the requirements options in the Capability Definition phase

The project team developed a cost-benefit model in order to compare various combinations of core combat system components, user requirements and the indicative costs for each system derived from Request for Information data. It assessed the contribution of each component to the benefits and then compared costs. The most cost-effective packages were grouped into four options that presented the greatest benefit for that level of cost.

How Defence considered interoperability[5]

Interoperability was one of the key considerations of the FSU project. The frigates need to remain interoperable with our partners, especially Australia. The ANZAC frigates are part of a joint capability programme between New Zealand and Australia. As a result, the frigates comprise New Zealand's main contribution toward naval combat force ANZAC operations and exercises.

Under the original ANZAC acquisition programme, New Zealand and Australia laid the foundations for joint management and support of the ships throughout their lives. This was formalised through the 1991 signing of an Implementing Arrangement for the Management of Assets and the In Service Support of the ANZAC class frigates and shore facilities.

The Royal Australian Navy has embarked on an upgrade project for their ANZACs. There are many systems common to both navies and these were incorporated in the options considered. Each of the options was designed to retain interoperability with Australia and other partners whilst providing a useful level of complementary capabilities.

How Defence considered through-life costs and issues

In general, the FSU project is replacing existing systems with contemporary versions. In many capability areas, the systems have been simplified in both architecture and quantity whilst increasing capability. There are, however, also new technologies that will be introduced which are not currently in service.

Changes in through-life costs were estimated from a range of sources including historic costs and industry information. From this broad base of information a cost model was developed resulting in a discounted net present cost for each option allowing a financial comparison between options.

[5] For definition of interoperability see note under *Part 4A: Project Data Sheets*.

Requirements Analysis in the Capability Definition Phase

Options analysis in the capability definition phase is used as a tool to compare, assess, and evaluate capability and operational requirements.

Options analysis in the acquisition stage identifies the best procurement solution to deliver the capabilities required.

Options considered	Cost Estimates (NZ$ million)	Advantages	Disadvantages
Option 0: No upgrade	$0	No capital cost.	Does not meet policy expectations.
Option 1: Surveillance Capability This option would allow the ships to conduct surveillance missions but only in a low threat environment in the Southwest Pacific and to a limited extent elsewhere.	$253-271	Meets intelligence, surveillance and reconnaissance (ISR) requirements in low threat environments in the Southwest Pacific.	Does not meet ISR requirements, nor combat and protection roles outside the Pacific.
Option 2: Air Threat Capability This option undertakes most of the upgrades listed in Option 1 plus it provides the minimum requirements to defend the ship against air threats.	$298-318	Meets ISR requirements in all regions plus a minimum air defence capability.	Does not meet combat and protection roles outside the Pacific region.
Option 3: Limited Multi-Threat Capability This option builds on Option 2 by including an obsolescence upgrade to the existing sonar and the missile decoy system.	$313-332	Meets ISR requirements in all regions. Meets underwater surveillance and missile decoy requirements.	Does not meet combat and protection roles outside the Pacific region, including detection and defence against torpedoes.
Option 4: Multi-threat Capability In addition to Option 3, this option provides a practical and sustainable level of defence against torpedo threats and increases the number of missiles in the anti-ship missile system.	$354-374	Meets all policy expectations for ISR, combat and protection.	Higher capital cost than other options.

An additional option was developed to replicate as closely as possible the Australian ANZAC frigate upgrade. This comparator was used to compare costs, benefits and risks.

Option 5: Australian Upgrade Comparator This option matches closely the upgrade path being pursued for the Australian ANZAC frigates.	$411-431	Meets all policy expectations for ISR, combat and protection. Builds on development work undertaken by Australia.	High capital cost. Likely to incur higher support and maintenance costs. The result is an option of high cost and lower overall benefit compared to Option 4.
ASSESSMENT: Option 4 was assessed to be the best solution. It restores the frigates to their original baseline against contemporary threats and updates all obsolete equipment. It would give the Government the confidence to deploy the frigates either alone or as part of a joint task force to regions where credible threats are likely to be faced. Option 4 achieves significantly increased deployment options for the frigates, via a relatively small marginal increase in cost over Options 1-3. Option 5 would provide an upgrade at higher cost and lower overall benefit.			

Description of the Capability and Operational Requirements

Capability Requirements – The capability requirements necessary to support policy objectives include:	**Operational Requirements –** The operational requirements necessary to support the capability include:
1. Participation The Command shall be able to deliver the ability to participate in national, allied and coalition activities to the Combined Force Commander in order to maximise the effective contribution made. **2. Strategic Situational Awareness** The Command shall be able to achieve situation awareness of electromagnetic emissions to the Combined Force Commander and specified agencies in support of tactical and strategic objectives. **3. Air Threat to Others** The Command shall be able to deliver an ability for a defended surface unit to operate in an area under an air threat to the Combined Force Commander in order to undertake its designated mission. **4. Surface Threat to Others** The Command shall be able to deliver the neutralisation of a surface delivery platform prior to its weapon launch to the Combined Force Commander in order for a defended unit within 4 km to be able to continue with its mission.	Combat Management System (CMS). The CMS is the human-machine interface used to control weapons and sensors in manual, semi-automatic and automatic modes. It provides the display mechanism for all ship sensors allowing disparate information from numerous sources to be fused into a single picture. The ship cannot operate in an ISR, intelligence or combat role without the CMS. Intelligence Systems. These are highly sensitive radio and radar receivers able to direction find and analyse emissions to aid in identification. They contribute to both tactical and strategic outputs. Radar Systems (Surveillance and Reconnaissance). Military radars use sophisticated technologies that allow the tracking of small and fast objects against a background of land and in the presence of a cluttered electromagnetic environment. Optronics (Surveillance and Reconnaissance). The use of both the visible and infrared spectra provides a significant passive means of detection, tracking and identification. Infrared Search and Track

5. Effects Ashore The Command shall be able to deliver effects ashore from organic weapons to the Combined Force Commander in order to support land operations. **6. Through Life** The Logistics Commander (Maritime) shall be able to deliver availability characteristics to the Commander Joint Forces NZ in order to enable completion of a mission throughout the life of the platform.	(IRST) systems provide near continuous 360° observation. The infrared component of these sensors allows a high level of capability to be maintained at night and in poor atmospheric conditions. Air Defence. Air defence against attacking aircraft or missiles is local area and point defence. They span a range from approximately 2km to 30km from the ship and can include the ability to defend protected units (usually other vessels) within a limited range. This defence is considered credible for a general purpose frigate and is achieved using Point Defence Missile Systems. Closer in defence is conducted at ranges less than 2km and uses systems such as the Phalanx Close-in Weapons System (CIWS) and missile decoys such as chaff. Anti-Surface. Existing weapons provide strike capability for anti-surface warfare. The FSU project will need to bridge the capability gap in the sensors necessary to optimise the performance of these weapons. Under Sea Warfare. The FSU User Requirements are for the detection of and defence against a torpedo launched at the ship. The frigates' sensor-sharing capability will usually deter a submarine from undertaking surveillance near the ship. Support to Joint Task Force (JTF). The *Defence White Paper 2010* placed an emphasis on the NZDF being able to respond to security events in the Pacific region and further afield into Asia. The NZDF frigates have an important role to provide defence for a task group and to provide multi-source high quality surveillance and reconnaissance data.
NOTE: The operational and capability requirements listed here were those identified in the suite of requirement documents produced during the Capability Definition Phase. During the tender and contract negotiation process these requirements are converted into function and performance specifications (FPS) that become the contracted deliverables. During the contract negotiation process the operational requirements have to be balanced against cost or viability considerations.	

Schedule of Capability Definition Phase

Dates	Duration	Note
June 2007 to February 2009. November 2010 to November 2012.	44 months	Work on the project was suspended from about February 2009 to November 2010 pending the outcome of the Defence White Paper.

Expenditure in Capability Definition/ Source Selection Phase

	Expenditure (NZ$)	
Life of Type Study	N/A	
Definition Phase	Up to June 2011 +	$69,772
	2011/12	$604,739
	2012/13	$930,477
	2013/14	$745,290
	Total	**$2,350,278**
Explanation		

History of Cost Estimates in the Capability Definition Phase

Date	2004	2008	2012	
Costs (million)	$300	$287-845	354-374	
Explanation	The early estimate was based on an assumed scope for the upgrade, before any planning work had been undertaken. The 2008 range included a high end option as a comparator that was not proceeded with.			

Estimates of Acceptance Date made in the Capability Definition Phase

Estimates	Initial	Estimate at Contract Signing	30 June 2017 Estimate/Actual
Date	Around 2010	Ship 1: March 2017 Ship 2: February 2018	Ship 1: September 2018 Ship 2: September 2019
Explanation	The June 2017 amendments reflect the changes to the refit start date but the actual acceptance dates remain under review and will only be confirmed once the installation Contract Change Proposal has been agreed in May 2017.		

INDIVIDUAL WEAPONS REPLACEMENT

Project Description: The purpose of the Individual Weapons Replacement project is to replace the existing New Zealand Defence Force (NZDF) 5.56mm Steyr rifle and the 40mm grenade launcher with a new individual weapon and grenade launcher. To meet the needs of future operating environments, the Individual Weapons Replacement Project requires a move from a closed to open architecture design, to provide an individual weapon that delivers a modular capability.

Policy Value

The primary tool for all military personnel, whatever their specialisation, is their individual weapon.

The current Steyr individual weapon was introduced into service in the late 1980s, and needs to be replaced with a modern weapon. The project to replace the Steyr is founded on the ability to deploy rapidly in task groups tailored to requirements. This concept was set out in the *Defence White Paper 2010*. The Defence White Paper 2016 was released after the weapons project had been approved. The Future Joint Operating Concept (which describes how the NZDF will meet this policy) and the Annual Plans and Statements of Intent describe the outputs required by Government.

The organisational benefits of addressing these issues are, in summary:

- an increased ability to effectively detect, recognise, identify and engage targets
- increased individual weapon fleet reliability and operator confidence.

In practical terms, these benefits lead to increased soldier performance, which in turn leads to better operational performance. Soldiers are confident in knowing that their rifle is modern and reliable. They are able to out-match their opponents, and reduce the risk of engaging the wrong targets. This generates a higher likelihood of mission success.

Better Business Case Milestones

Project Charter: Defence project initiation is guided by the Defence White Paper 2010 and the 2011 Defence Capability Plan. Projects commence following notification to the Minister of Defence and approval of a project charter by the Capability Management Board.

Approval of Indicative Business Case (IBC): Attained when Cabinet agrees to the strategic context for an investment and agrees to progress a short list of capability options to the Detailed Business Case stage. May also authorise Defence to engage with industry for more detailed information (e.g. Request for Information).

Approval of Detailed Business Case (DBC): Attained when Cabinet agrees to a refined capability requirement and authorises Defence to comment formal engagement with industry (through a request for proposal or request for tender) on a preferred capability option.

Approval of Project implementation Business Case (PIBC): Attained when Cabinet agrees that Defence can conclude a contract based on the preferred supplier, the negotiated services, the maximum funding level and the arrangement to manage the project and the ongoing delivery of services.

Date	Approved By	Nature of Approval
7 March 2014	Capability Management Board	**Project Charter.** Co-signed approval of Individual Weapon Replacement by the Secretary of Defence and the Chief of Defence Force.
27 May 2014	SEC Min (14) 9/2	**Single Stage Business Case.**[6] Cabinet's committee on State Sector Reform and Expenditure Control approved the Business Case under a power to act (ref CAB Min (14) 18/22).
7 December 2015	CAB-15-MIN-0272	**Implementation Business Case**. Cabinet authorised the Secretary of Defence to conclude a contract with Lewis Machine Tool Company.

CAPABILITY DEFINITION PHASE

During the capability definition phase, capability and operational requirements are assessed and refined. Stakeholder needs are considered. Scenarios may be used to identify requirements. Hypothetical options which include a rough order of costs are used to analyse affordability and evaluate requirements.

Summary of Capability Definition Phase

Capability Requirement: a description of the ability needed to achieve the policy objective.

Operational Requirement: a description of a component of what is required to complete a task.

How Defence identified and assessed capability and operational requirements

The current Steyr rifle was originally purchased for the NZDF over the period 1987-1991. The total NZDF procurement was 18,000 rifles, and the original planned 'life of type' was through to 2011.

The rifle has exceeded its planned life, in part because the quantity originally procured is greater than currently required. This has allowed the progressive retirement of 8,000 rifles. However, as the fleet shrinks, the wear on the remaining stock increases.

Continuous operational experience has further highlighted the key issues with the Steyr. The greatest deficiency is the ability to effectively detect, recognise, identify and engage targets at requisite ranges. Improving this requires advanced sighting systems, which cannot be fitted to the Steyr. Its closed design architecture does not allow this.

In addition, as the rifles age, reliability decreases. This can affect soldier confidence in their weapon. This issue is not unique to Steyr – all rifles that are well-used will wear over time.

[6] For low-risk projects Treasury Better Business Case guidance recommends combining the Indicative and Detailed Business Cases in to a Single Stage Buiness Case.

Because of this (and to benefit from technology advances), the NZDF has replaced its rifles approximately every 20 years.

The major technical advance in military rifles over the last 20 years has been the move to 'open architecture'. This allows for the easy mounting, optimisation and replacement of sophisticated sights (both day and night), along with other ancillaries such as laser aiming devices. These give much greater accuracy and allows the intrinsic capability of the rifle to be effectively exploited across the full range of combat situations.

A parallel advance in rifle technology is the ability to make the rifle adaptable for different body sizes and the wearing of different personal equipment such as body armour. A rifle that can adjust to different users is easier for the individual to have confidence in and use effectively.

Both the lack of, and desirability of, these characteristics has been reinforced over the last decade of operational experience. This is especially so in Timor-Leste and Afghanistan, where New Zealand service personnel have been exposed to current combat conditions.

These issues have been recognised and led to a partial upgrade of 385 rifles over 10 years ago. Because they have better combat attributes, these particular rifles have been used more intensively than others, both for operations and training (as it is desirable to train using the configuration of rifle that will be used on operations). As a result they are wearing faster, and are at greater risk of failure, than the unmodified rifles.

A longer-term approach to tackling the known performance issues with the Steyr was first articulated in 2007. At that time the NZDF initiated the in-service weapon replacement and upgrade programme [CAB Min (08) 36/2]. The proposed solution for the Steyr was to comprehensively upgrade 3,000 rifles. This was intended to carry the fleet through until about 2018, when full replacement was planned to commence. Although early responses from the market indicated that this was achievable, a formal Request for Tender process undertaken in 2012 failed to solicit any viable upgrade proposal.

Careful analysis of both the current market, and individual weapons under development, confirmed that there was no advantage in waiting to replace the Steyr. Western militaries remain committed for the foreseeable future to the current standard military ammunition calibre (5.56mm for individual weapon rifles and 7.62mm for more specialised weapons that deliver heavier firepower).

How Defence analysed the requirements options in the Capability Definition phase

The options examined were:

- Addressing the age and capability gap of the current individual weapon fleet through upgrading existing rifles.
- Finding an alternative to a rifle as an individual weapon.
- Delaying the project.
- Trade price for performance.
- Full versus partial fleet replacement.
- Weapon fleet size to meet 20 year operational effectiveness.

In evaluating the options, the overall criteria used for assessment are set out below. They are graded as low, medium or high. As any option must be both a strategic fit and be achievable, these mandatory considerations were not included in the evaluation.

Criteria	Description
Efficiency	Does the option minimise resource impacts (time, money, skills and people)? Is efficiency improved or, at minimum, maintained?
Effectiveness	Does it maximise combat effectiveness in the simplest way?
Affordability	Can it be done within planned capital and operating allocations?
Sustainability	Is overall effectiveness maintained for the life of the individual weapon fleet?
Value	Is the NZDF getting the best value for money?
Risk	What is the possibility that the project will not proceed as planned?

- Addressing the age and capability gap of the current individual weapon fleet through upgrading existing rifles was eliminated as an option, as the earlier project to achieve this was unable to deliver a feasible solution.

- Delaying the project was eliminated as an option. The capability shortfalls had been identified. The Chief of Army has stated on more than one occasion that should a medium/large operational deployment for anything other than a low intensity situation arise, an urgent operational requirement for a contemporary rifle would need to be undertaken.

- There was no real ability to trade price for performance, as there is a minimum performance standard below which the rifle would be unacceptable from a risk perspective. This option was eliminated.

The options analysis was therefore confined to an examination of a full versus partial fleet replacement, and the quantities required.

Overall Conclusion

1. Based on the options analysis, it was recommended that the entire fleet be replaced and the legacy Steyr rifles be disposed of as soon as the new fleet is in place. The recommended size of the new fleet was 8,800 rifles.

2. It should be noted that the Single Stage Business Case had as out of scope an assault rifle fleet for Special Operations Forces unless the Individual Weapon Project matched the Special Forces user requirements.

3. In the event, the selected individual weapon did match the Special Operations Forces user requirement, and the final acquisition and funding reflects this.

How Defence considered interoperability[7]

Defence had previously considered the Australian Defence Force Thales F90 proposed future rifle in lieu of an upgrade. This approach was not supported, however, because:

a. the cost of 3,000 new rifles was considerably higher than the amount approved;
b. the F90 was not going to be produced and fielded within the stipulated timelines; and
c. the F90 was not actually in-service and proven.

Defence considered the calibre of the future individual weapon. It was determined that it would remain the NATO standard 5.56 mm.

Interoperability was not held to be a risk.

The Trijicon advanced combat optical gunsight was pre-selected as it is currently in service with the NZDF.

The user requirements set out in the Request for Tender specified a proven, in-service system.

How Defence considered through-life costs and issues

The introduction of the Modular Assault Rifle System - Light (MARS-L) rifle will reduce maintenance costs by comparison with the current Steyr. Ammunition costs (which are the largest consumable) remain constant.

The overall weapons training approach does not alter. Given that military personnel utilise a rifle as a basic professional tool, the transition from one to another is straightforward. The basic principles of operation and use remain the same.

Operating costs were summarised in the Single Stage Business Case and updated for the Project Implementation Business Case. No additional operating funds are required with all operating costs intended to be met from current and approved projected baselines.

The impact on both depreciation and capital charge were already included in Defence's four year operational funding plans and long-term operational funding projections.

The Whole-of-Life costs are calculated as follows:

	NZD ($ million)
Initial Capital Investment	$59.234
Total Capital	$59.234
Operating Expenses	$56.400
Depreciation	$59.234
Whole-of-Life Cost	$115.634
Whole-of-Life Cost (Net Present Value)*	$81.970

*Discounted at 8% and useful life of 20 years

[7] For definition of interoperability see note under *Part 4A: Project Data Sheets*.

Requirements Analysis in the Capability Definition Phase

Options analysis in the capability definition phase is used as a tool to compare, assess, and evaluate capability and operational requirements.

Whereas options analysis in the acquisition stage identifies the best solution to acquire that will meet the capabilities required.

Options considered	Cost Estimate (NZ$ million)	Advantages	Disadvantages
Partial fleet replacement	In short term, within overall budget – longer term uncertain	Lower cost (cost not fully developed as operational disadvantages outweighed potential cost savings, especially over a whole-of-life)	Split fleet (support, maintenance and training issues), uncertainty over how balance will be replaced and whether future fleet would be identical.
11,000 total individual weapons	Greater than approved $58.4 million	Nominally one rifle for every uniformed person in the NZDF (including all Reserves).	Actually, only about 5,000 personnel would have a rifle at peak demand. Not everyone will need a rifle simultaneously. Costs of managing an excessive fleet are high.
16,000 total individual weapons	Greater than approved $58.4 million	Nominally one rifle for every uniformed person in the NZDF (including all Reserves) and allowances for attrition over time.	As above.
7,000 total individual weapons	Within $58.4 million	Based on actual numbers. Includes modest maintenance and attrition pool. Lowest capital cost, does not utilise people and money managing a very large fleet, and maintaining unnecessary spares holdings.	Risk over life of type.
8,800 total individual weapons	Within $58.4 million	As above. Experience has suggested that around 45% of strength could be depleted over life of type, so allows for this. Within capital cost, does not utilise people and money managing a	No disadvantage within projected future Army size.

		very large fleet, and maintaining unnecessary spares holdings, best manages life of type availability risk.	
ASSESSMENT: On the basis of benefit delivery, meeting of requirements and managing availability risk, the 8,800 individual weapons option was selected.			

Description of the Capability and Operational Requirements

Capability Requirements- The capability requirements necessary to support policy objectives include:	**Operational Requirements-** The Operational Requirements Necessary to support the capability include
• Increase ability to effectively detect, recognise, identify and engage targets; • Increase individual weapon reliability and operator confidence.	• When fitted with a suitable sight, allows the detection, identification and effective engagement of adversaries at all ranges out to at least 600 metres by day and 300 metres by night; • Is effective in all military operations by day and night in all weather and all environments (including alpine, desert and marine) for prolonged periods; and • Is able to be used in accordance with NZDF concepts of use and training techniques and procedures.
NOTE: The user requirements on the Request for Tender specified in greater detail how these operational requirement would be met.	

Schedule of Capability Definition Phase

Dates	Duration	Explanation
7 March 2014 – 7 December 2015	21 months from Charter to Project Implementation Business Case approval by Cabinet	The interval between Single Stage Business Case and Project Implementation Business Case Cabinet decisions was 19 months. This interval allowed for : • a two part tender process (RFP/RFT) • evaluation and down-select of 14 initial responses • comprehensive in-country trials and evaluation of eight contenders, (including all ancillaries) • contract negotiations with preferred provider.

Expenditure of Capability Definition/Source Selection Phase

	Capital Expenditure (NZ$ million)	
	2015/16	$15.539
Explanation	Cabinet approved $0.440 million of pre-acquisition costs in May 2014 and $59.234 million of capital expenditure in December 2015.	

History of Cost Estimates in the Capability Definition Phase

Date	2014	2015
Capital Costs ($NZ million)	$58.4	$59.2
Explanation of variance	Slight variance due to additional rifles being purchased for Special Forces. Variance was funded via an allocation from the Special Operations Forces Weapons budget.	

Estimates of Acceptance Date made in the Capability Definition Phase

Estimates	Initial Estimate	Estimate at contract signing	30 June 2017 Estimate	Actual
Date	March 2016	July 2017	November 2017	N/A
Explanation of variance	The final Cabinet approval was made in December 2015. Contracts were finalised in December 2015. Time has been allowed for robust quality assurance and acceptance measures.			

STRATEGIC BEARER NETWORK

Project Description: This project will provide a high capacity military satellite communications equipment to the New Zealand Defence Force. This Strategic Bearer Network will access the United States Department of Defense Wideband Global Satellite Communications system, a constellation of nine satellites that will enable deployed forces to meet current and future strategic information exchange requirements and meet the growing demand for bandwidth. The Network is made up of two fixed anchor stations and a number of maritime terminals fitted to the Navy fleet.

Policy Value

Strategic Bearer Network (SBN) is an enabling project supporting a number of key NZDF functions across several capabilities including the Network Enabled Army programme, Defence Command and Control System, the P-3 Orions and the ANZAC frigates. This project will enable the Government's options for utilising the NZDF for the principal tasks set out in the Defence White Paper 2010, in particular:

- to defend New Zealand sovereignty
- to contribute to and where necessary lead peace and security operations in the South Pacific
- to make a credible contribution in support of peace and security in the Asia – Pacific region
- to protect New Zealand's wider interests by contributing to international peace and security, and the international rule of law
- to contribute to whole of government efforts at home and abroad in resource protection, disaster relief, and humanitarian assistance
- to participate in whole of government efforts to monitor the international strategic environment.

Better Business Case Milestones

Project Charter: Defence project initiation is guided by the Defence White Paper 2010 and the 2011 Defence Capability Plan. Projects commence following notification to the Minister of Defence and approval of a project charter by the Capability Management Board.

Approval of Indicative Business Case (IBC): Attained when Cabinet agrees to the strategic context for an investment and agrees to progress a shortlist of capability options to the Detailed Business Case stage. May also authorise Defence to engage with industry for more detailed information (e.g. a Request for Information).

Approval of Detailed Business Case (DBC): Attained when Cabinet agrees to a refined capability requirement and authorises Defence to commence formal engagement with industry (through a request for proposal or request for tender) on a preferred capability option.

Approval of Project Implementation Business Case (PIBC): Attained when Cabinet agrees that Defence can conclude a contract based on the preferred supplier, the negotiated services, the maximum funding level and the arrangements to manage the project and the ongoing delivery of services.

Date	Approved By	Approval
6 July 2011	Project Charter	**Project initiation.** Following the *Defence White Paper 2010* requirement for "Improved Offshore Communications" the NZDF's Strategic Assessment and Investment Concept Brief identified a requirement to improve capacity and access to a wider range of common and reliable communications paths. A project charter to initiate the SBN project was approved "to provide global connectivity into the NZDF networks of sufficient capacity and reliability to enable deployed forces to meet information exchange requirements". The project team was directed to write the Indicative Business Case.
19 September 2011	Cabinet CAB Min (11) 9/4	**Approval of Indicative Business Case (IBC).** Following submission of the IBC to Cabinet approval was given to develop a Detailed Business Case (DBC) to examine the recommended three short listed options.
14 November 2011	Cabinet CAB Min (11) 41/13	**Approval of Detailed Business Case (DBC).** Following submission of the DBC, Cabinet confirmed the preferred option was through a Memorandum of Understanding (MoU) with the US DoD Wideband Global Satellite Communications System (WGS). The NZDF was authorised to sign the MOU and the Chief of Defence Force signed this agreement on 4 December 2011. Cabinet also approved capital expenditure of $83.3 million and a contingency of $5.6 million totalling $88.9 million. The preferred option was effectively contracted when the MoU was signed with the US DoD. This included the payment milestones required by the MoU. NOTE a percentage of the capital expenditure was set aside for investing in the NZDF infrastructure necessary to access the WGS satellites. This consists of mobile (land-based) terminals, maritime terminals and fixed anchor stations. The NZDF was to administer the budget for the MoU, and the MoD was to administer the budget for infrastructure acquisition.

25 July 2012	Minister of Defence, Minister of Finance SBN financial appropriations	**Approval to Commit (joint note in lieu of a Project Implementation Business Case).** An appropriation of $18.31 million to Vote Defence, Ministry of Defence for Defence Equipment was approved by Joint Ministers. (NOTE a further $14 million for additional purchases in 2022-2025 has not yet been appropriated.) This equipment will be delivered over three tranches.
16 June 2014	Minister of Defence, Minister of Finance SBN financial appropriations	**Approval to Commit (joint note in lieu of a Project Implementation Business Case).** A technical adjustment was made to the existing appropriation to bring forward $8 million of the out-year funding. (NOTE a further $6 million for additional purchases in 2022-2025 has not yet been appropriated.)
11 July 2016	Cabinet Business Committee CBC-16-MIN-0010 SBN financial appropriations	Approval to transfer funding: Cabinet Business Committee approved transfer of funding from various projects in the Defence portfolio that had delivered under budget to the Strategic Bearer Network project to complete equipment acquisition.

CAPABILITY DEFINITION PHASE

During the capability definition phase, capability and operational requirements are assessed and refined. Stakeholder needs are considered. Scenarios may be used to identify requirements. Hypothetical options which include a rough order of costs are used to analyse affordability and evaluate requirements.

Summary of Capability Definition Phase

Capability Requirement: a description of the ability needed to achieve the policy objective.

Operational Requirement: a description of a component of what is required to complete a task.

How Defence identified and assessed capability and operational requirements

In 2010 Defence began formally considering options for replacing its strategic communications[8].

The NZDF developed an Investment Concept Brief (ICB) and fed this into the Strategic Assessment of the SBN project. This identified the problems to be addressed, the alignment with defence policy objectives (as identified in the Policy Value section above) and the benefits to be derived from investment in strategic communications. These are summarised as:

Problems	Benefits
Inadequate and unreliable networks and systems	More agile and knowledge-led operations
Increasing obsolescence of the communications infrastructure	Improved ability to develop critical future capabilities
Fragmented and ad-hoc network management	Improved value from government investment

The ICB provided the investor (Commander Joint Forces) with sufficient confidence to progress the project.

An initial study was undertaken to identify the scope of the strategic communications required. This analysed NZDF deployments over the previous ten years. It identified the need to:

- support up to six deployed maritime units simultaneously
- support up to six deployed missions simultaneously (at the time the NZDF was deployed to Afghanistan, Iraq, Middle East, Republic of Korea, Sinai, Solomon Islands, Sudan and Timor Leste)
- deliver increased capacity to support growing information exchange requirements
- deliver increased capacity to enable the delivery of new services on the network.

The US DoD proposed their WGS system as a potential solution for NZDF strategic SATCOM requirements in a visit to New Zealand in 2010. Once further information was

[8] Strategic communications are generally inter theatre between deployed units and their Headquarters in New Zealand where access to the services and information on the defence networks is required. Tactical communications are generally intra-theatre between individual units.

gathered on this proposal a Project Charter was approved to stand up the Strategic Bearer Network project team to develop the Indicative Business Case.

How Defence analysed the requirements options in the Capability Definition phase

Six options were considered in the IBC, with three of these discarded for not meeting one or more of the investment objectives or critical success factors. The remaining three options were:

- Status Quo, effectively do nothing and included for comparison reasons only.
- Enhanced Status Quo, investigate improving on the current model, adopt better business practices and leverage off improvements in commercial SATCOM.
- WGS, sign the MoU to gain global access to the US DoD owned SATCOM constellation. This would include the improvements to NZDF practices and procedures.

A Multi-Criteria Decision Analysis (MCDA) was conducted and WGS was identified as the preferred solution. Cabinet approved the IBC and directed Defence to develop a detailed business case to further examine the shortlisted options.

A model was produced of the NZDF demand for SATCOM based on an extrapolation of previous years' consumption. A comparison of how the two options would deliver this model was made including capacity, cost, coverage and reliability. The benefits and risks of each option were then analysed and a Monte Carlo analysis was conducted against 19 variables for each option. WGS was identified as the preferred option for the following reasons:

- Known cost with reduced uncertainty.
- Delivers the capacity required of the NZDF model.
- Requires more capital expenditure up front but has significantly reduced through life costs.
- Reliable global access with redundancy built into the system.

How Defence considered interoperability[9]

The SBN project will provide interoperability through common equipment, procedures and support across the NZDF and with the other MoU nations of Belgium, Canada, Denmark, Luxemburg, Netherlands, the United States and also with Australia, which has a separate bilateral MoU with the US. Other types of interoperability (for example of networks, systems and information) are enabled by the increased bandwidth capacity of the network bearer. These systems and services are being provided by other projects such as the Defence Command and Control System (DC2S) and Network Enabled Army (NEA). The global coverage provided by WGS means the Defence Force can be assured of access whereever it deploys.

How Defence considered through-life costs and issues

Defence has been operating satellite communications equipment for over 10 years. And while there is an existing effort to improve coordination of these activities the assumption was made in the business case that personnel costs would remain within the Defence baseline, that is, there are no additional personnel requirements linked to this project.

The Defence share of the through-life costs of the WGS satellite are detailed in the WGS MoU. These are an average of US$400k annually for the years 2018 to 2031.

[9] For definition of interoperability see note under *Part 4A: Project Data Sheets*.

In terms of the infrastructure required to access the WGS satellites, the equipment suppliers are asked to provide their recommendations for through life support. The MoD and NZDF then agree on the approach to take. Typically this will include an up-front purchase of spares, warranty, operator and maintainer training and documentation and some form of through-life support agreement.

The detailed business case estimated $460,000 a year for the maintenance and support of the WGS infrastructure. The NZDF are refining these costs as more terminals are delivered, spares consumption is monitored, and terminal repair/overhaul/maintenance cycles are confirmed. However, the early success of the system is attracting more users so the system configuration is continuing to change, as well as the cost of operation.

A number of the WGS terminals will not last as long as the satellite constellation does. Estimates for mobile (land-based) terminals range from 5 to 15 years but will be dependant on the frequency of their use and the conditions under which they operate. To this end a second round of infrastructure acquisition has been included in the years 2022 – 2025.

Requirements Analysis in the Capability Definition Phase

Options analysis in the capability definition phase is used as a tool to compare, assess, and evaluate capability and operational requirements.

Whereas options analysis in the acquisition stage identifies the best procurement solution to deliver the capabilities required.

Options assessed for delivering the SBN capability and operational requirements

Option	Cost estimates (NZ$ million)	Advantages	Disadvantages
Status Quo	87-144	• Achievable. • No change required. • Cheaper infrastructure. • Flexible.	• All missions continue to be managed in an ad hoc fashion. • All bandwidth has to be purchased and all changes have to be negotiated. • As demand grows so do costs, particularly in congested areas. • Requires a mixture of contracts, equipment and suppliers. • Bandwidth provided to Defence is constrained by the budget available.
Enhanced Status Quo	71-128	• Achievable. • Centralised SATCOM Management and Control. • Cheaper infrastructure. • Flexible.	• Access to commercial SATCOM can be contended (demand is greater than supply and access becomes limited or very expensive). • Coverage may not be available (either there is no satellite in sight, or all available bandwidth has been sold). • May not meet future demand without further investment.

WGS MoU	112-114	• Achievable with known costs. • Capacity to meet future demand is included. • Guaranteed access. • Reliable, certified equipment. • Global access.	• High up-front capital costs. • Committed to a single supplier. • More expensive infrastructure.
Hosted Payload (NZDF buys a portion of a satellite's capacity)	200+	• High capacity. • Dedicated.	• Global coverage is not provided by one hosted payload (would need a payload on four satellites). • Unaffordable.
Non-satellite option	Less than WGS	• Less equipment to manage. • Not reliant on satellites.	• Does not meet bandwidth requirements and would not enable other defence projects.
Modified WGS MoU	More than WGS	• Greater customisation for NZDF.	• Due to the multinational nature of the MOU it was not able to be renegotiated.
ASSESSMENT	The WGS MoU option was recommended.		

Description of the Capability and Operational Requirements

Capability Requirements – The capability requirements necessary to support policy objectives include:
The key capability requirements: • Provide a computer network infrastructure with global reach, high capacity and robust design. • Enable the Command and Control of deployed forces. • Meet the growing demands for information exchange with our deployed forces. • Provide greater levels of interoperability with the NZDF single services and with our security partners. • Provide value for money from investment in SATCOM.

Operational Requirements – The operational requirements necessary to support the capability include:

The operational requirements cover both the capability of the WGS Satellite and those of the user terminals required to access the Satellite.

- The primary focus for SBN will be the South Pacific but the required support area is global.
- SBN will facilitate the transfer of information and data:
    - to support deployed forces;
    - to conduct network enabled operations (all deployed forces on the network); and
    - to support Command and Control of the deployed forces (primarily through systems such as DC2S).
- SBN will provide connectivity into the deployed maritime and land environments by providing these units with SATCOM terminals.
- SBN must operate within New Zealand and international radio frequency regulations governed by the International Telecommunications Union.
- SBN will need to support a minimum of three networks on the strategic bearer (an intelligence network, the defence network, and the internet).
- SBN must provide the data throughput requirements for maritime and land units as provided in the NZDF Strategic Communications Operational Requirements Document.
- SBN deployed terminals must be capable of meeting a minimum E1 (2.048 Mbps) data throughput for each user.
- NZDF will establish the Satellite Communications Management Cell within the NZDF Network Operations Centre.
- SBN will support up to six deployed maritime and six deployed land units simultaneously.

NOTE: The operational and capability requirements listed here were those identified in the suite of requirement documents produced during the Capability Definition Phase. During the tender and contract negotiation process these requirements are converted into functional and performance specifications that became the Statement of Work and contracted deliverables. During the contract negotiation process the operational requirements have to be balanced against cost or viability considerations.

Schedule of Capability Definition Phase

Dates	Duration	Note
15 November 2010 to 19 March 2012	16 Months	This project was funded from depreciation and the full budget allocated to Vote Defence Force in November 2011. In December 2011 the NZDF signed the MoU with the US DoD officially making WGS the solution for SBN. In March 2012 the NZDF passed responsibility for the acquisition of terminals to the MoD whilst retaining the budget required to implement the MoU. The MoD was appropriated the first part of the project budget on 25 July 2012.

Expenditure of Capability Definition/ Source Selection Phase

	Expenditure (NZ$million)
Definition phase	0.57
Explanation	During the definition phase, the above costs were classified as pre-acquisition costs and were met from the NZDF's operating budget. These were primarily used to provide professional assistance with the development of the IBC and DBC.

History of Cost Estimates in the Capability Definition Phase

Date	July 2011	September 2011	November 2011	2012
Costs (NZ$ million)	75 – 115	114	90.2	88.9
Explanation of variance	The first two estimates included both SATCOM and HF replacement projects. The first estimate was from the Strategic Assessment and Investment Logic Mapping. The second estimate was from the Indicative Business Case. The third estimate was from the Detailed Business Case. The fourth figure is the approved project budget from Cabinet including $5.6 million of contingency.			

Estimates of Acceptance Date Made in the Capability Definition Phase

Estimates	Initial	Estimate at Contract Signing	30 June 2017 Estimate/Actual
Early Access	June 2013	August 2013	Early Access was delivered and accepted in August 2013.
Initial Operating Capability (IOC)	June 2014	June 2014	IOC was declared in September 2014. Delays have been in the development of support documentation and processes.

Full Operating Capability (FOC)	June 2015	December 2016	It may take longer than expected to have the maritime terminals installed and operational. Current estimates have the maritime terminals arriving in August 2017.
Explanation of variance	Delivery and customisation of documentation have taken longer than originally estimated. The selection and acquisition model for the maritime terminals plus their manufacture and delivery schedule is longer than expected.		

MARITIME SUSTAINMENT CAPABILITY

Project Description: The Maritime Sustainment Capability (MSC) will replace the Navy's existing replenishment tanker HMNZS *Endeavour*. The replacement vessel will provide an enhanced capability which is better able to support land operations and is polar code compliant, allowing the ship to operate to Antarctica in the summer season.

Policy Value

HMNZS *Endeavour* plays a key supporting role in the delivery of the Defence Force's principal roles, articulated in the Defence White Paper 2016. ***Endeavour's*** role is particularly significant due to New Zealand's unique geostrategic environment. No other country of comparable size and political and economic standing has at a minimum to be able to deploy equipment and personnel from the equator to Antarctica. The naval tanker extends the endurance and range of the Defence Force's naval vessels, significantly increasing the utility of the Defence Force's naval combat capability.

The Maritime Sustainment Capability will maintain Government's options to contribute to operations outside New Zealand's immediate region by providing a continued ability to sustain Defence Force and coalition platforms deployed further afield.

The overarching benefits of the Maritime Sustainment Capability are:

- the provision of an independent and complementary Maritime Sustainment Capability to New Zealand and its security partners
- an improved ability to shape and react to events in New Zealand, Australia and the South Pacific
- the provision to government of a greater flexibility in response options to threats and emergencies
- the provision to government of support to New Zealand's civilian presence in Antarctica.

Government Approval Milestones[10]

Project Initiation: Occurs once a capability requirement has been identified by Defence and a broad assessment of the options for meeting the capability requirement has been authorised by the Chief Executives and noted by the Minister of Defence.

Approval to Initiate: Attained when Cabinet agrees to the project's inclusion on the capital acquisition plan and authorise Defence to engage with industry to refine its initial assessment with more accurate information.

Approval to Commence: Attained when Cabinet agrees to the refined capability requirement and authorises the Ministry of Defence to commence a formal tender and tender evaluation process.

Approval to Negotiate: Attained when Cabinet agrees to the preferred tender, specifies funding limits, and authorises the Ministry of Defence to enter into contract negotiations.

[10] These are generic titles for Cabinet approval points in the capability definition process. Whilst the actual titles of Cabinet Papers have varied, the approvals and direction they were seeking from Cabinet has been broadly consistent with the definitions provided.

Approval to Commit: Attained when Cabinet agrees to the final contract and authorises the Ministry of Defence to sign the contract and commit funding.

Date	Approved By	Approval
26 Jan 2011	Deputy Secretary (Policy), Ministry of Defence & Vice Chief of Defence Force	**Approval of Original Project Charter**
23 October 2012	CAB (12) 37/4	**Approval of Indicative Business Case** Cabinet invited the Minister of Defence to progress to a Detailed Business Case, which would present Cabinet with a short-list of options.
30 June 2014	CAB Min (14) 22/9	**Approval of Detailed Business Case** Cabinet agreed that a medium-level capability option be taken forward for detailed design as part of a Project Implementation Business Case
4 July 2016	CAB-16-MIN-0313	**Approval of Project Implementation Business Case** Agreed that the replacement Maritime Sustainment Capability include winterisation and ice-strengthening, and authorised the Secretary of Defence to conclude contracts.

CAPABILITY DEFINITION PHASE

During the capability definition phase, capability and operational requirements are assessed and refined. Stakeholder needs are considered. Scenarios may be used to identify requirements. Hypothetical options which include a rough order of costs are used to analyse affordability and evaluate requirements.

Summary of Capability Definition Phase

Capability Requirement: a description of the ability needed to achieve the policy objective.

Operational Requirement: a description of a component of what is required to complete a task.

How Defence identified and assessed capability and operational requirements

Originally called the Maritime Projection and Sustainment Capability project, preparatory work lasting several years led to the issue of a Project Charter in 2011. The project seeks to procure and introduce into service a Maritime Sustainment Capability that satisfies user requirements. This would replace the Defence Force's current naval tanker HMNZS *Endeavour*.

Introduced into service in 1988, *Endeavour* had an expected service life of 20 years. Non-compliance with international maritime regulations and obsolescence of critical

ship systems means that *Endeavour* will need to retire from service in 2018. Without a replacement capability the retirement of *Endeavour* would result in the Defence Force being unable to conduct maritime sustainment, and support maritime projection for both its own operations and those conducted with partners.

The 2010 Defence White Paper signalled that a capability to replace *Endeavour* would be acquired. It also signalled the possibility that the replacement vessel would incorporate some sealift capability to supplement HMNZS *Canterbury*, the Defence Force's multirole vessel.

An Indicative Business Case was approved by Cabinet in October 2012. This paper outlined two broad options for the project; a like-for-like replacement of *Endeavour*, or a replacement which would provide both sustainment and sealift capabilities.

A Detailed Business Case was approved by Cabinet in June 2014, eliminating the option of including sealift capability to allow funding to be prioritised to other capital projects. If additional sealift was required by the Defence Force this would be met through commercial charter. After this decision the project became the Maritime Sustainment Capability.

The option selected by Cabinet in the Detailed Business Case enhanced the Defence Force's maritime sustainment capability by providing a ship with:

- increased fuel storage over that provided by *Endeavour*
- the ability to transport ammunition
- the ability to operate and support helicopters up to the size of an NH90, and
- the ability to transport aviation fuel allowing it to sustain operations by multiple helicopters.

The estimated capital cost was $452 million.

Cabinet also noted that Defence were in discussion with Antarctica New Zealand on the benefits and costs of winterisation, and that the estimated additional cost of this would be $15 million.

In the Defence White Paper 2016 Ministers took a decision to ice-strengthen and winterise the replacement for *Endeavour* to increase New Zealand's ability to replenish New Zealand and other countries' Antarctic programmes.

Cabinet selected a medium-level Maritime Sustainment Capability, as recommended in the Detailed Business Case, with the addition of winterisation and ice strengthening. The estimated capital cost $493 million, including $64 million for winterisation of the vessel.

How Defence analysed the requirements options in the Capability Definition phase

Options available for the replacement of *Endeavour* were assessed against the key benefits identified during the business case process.

Each of the options available for the replacement of *Endeavour* was assessed against its ability to deliver these benefits.

The cost of each option, indicated through a Request for Information and other unsolicited proposals, was then compared with the deliverable benefits.

This lead to the selection of the replacement option that offered the greatest level of benefits for the Defence Force within the available funding.

How Defence considered interoperability[11]

Interoperability was considered a key attribute for the MSC project. *Endeavour* makes an important contribution to the defence alliance with Australia as one of only three replenishment tankers in the combined fleets. Just under 40% of fuel delivered by *Endeavour* has been provided to Australian ships.

The replacement capability has a requirement to operate seamlessly with Australian assets and those of other security partners. As such the capability was required to have NATO compliant replenishment at sea capacities, and to transport NATO standard fuels.

How Defence considered through-life costs and issues

The Maritime Sustainment Capability through-life costs have been based on the historical average operating costs of *Canterbury* and *Endeavour*. These historic costs were applied to the Maritime Sustainment Capability platform expected utilisation of 160 days a year.

[11] For definition of interoperability see note under *Part 4A: Project Data Sheets.*

Requirements Analysis in the Capability Definition Phase

Options analysis in the capability definition phase is used as a tool to compare, assess, and evaluate capability and operational requirements.

Whereas options analysis in the acquisition stage identifies the best procurement solution to deliver the capabilities required.

Options assessed for delivering the Maritime Sustainment Capability and operational requirements

Option	Cost estimates (NZ$ million)	Advantages	Disadvantages
Option 1: 'Renew' naval tanker	$358-$418 million	• Delivers the same level of capability as *Endeavour* provided when it entered into service in 1988. It would be a new commercial naval tanker, optimised for military operations, able to replenish multiple naval vessels and, to a lesser extent, deployed land forces. Additional sealift would be provided by commercial charter if needed.	• Does not provide for the expected fuel needs associated with deploying a full scale, amphibious-capable Joint Task Force. It has a limited aviation capability, reduced number of supply classes and lack of ability to support the use of landing craft.
Option 2: 'Renew' off-the-shelf tanker	$355-$410 million	• Delivers a new commercial naval tanker with selected features designed for Norwegian military. It is not optimised for the New Zealand Defence Force and comes with limited equipment and system installation (in order to reduce its capital cost), although these systems could be fitted at a later date if required. Additional sealift would be provided by commercial charter if needed.	• Provides a lower level of capability than Option 1. Should the strategic environment change, this option has the advantage of providing Government with an ability to increase the ship's capability in the future because of its 'fitted for but not with' design. The cost of retrofitting later, however, would be significantly more than if the systems were included during the initial build.

Option 3: 'Enhanced' naval tanker	$389-$452 million	• Delivers a commercial naval tanker with selected military features. It would effectively upgrade the New Zealand Defence Force's maritime, land and air replenishment capability to be able to support large-scale, amphibious-capable Joint Task Force. In addition to the capabilities offered by Options 1 and 2, it could transport ammunition, operate and support a helicopter up to the size of an NH90, and store a comparatively larger amount of fuel, including sufficient aviation fuel to sustain the deployment of multiple helicopters. Additional sealift would be provided by commercial charter if needed.	• It could not support amphibious sealift operations and would not have the ability to operate in Antarctic waters.
Option 4: 'Enhanced' naval tanker with organic, amphibious sealift	$429-$495 million	• Builds on the capability of option 3, adding design features that allow the ship to also act as an organic, amphibious sealift and Humanitarian Assistance and Disaster Relief response vessel. This includes 260 lane metres for vehicle or container transport, faster vessel speed, a role 2 medical facility, two Landing Craft Medium (LCM) to enable the amphibious lodgement of equipment and personnel, and a deck crane to enable the lifting and stowage of the two LCMs. This option would supplement *Canterbury's* sealift capabilities and capacities, and provide an alternative deployment option to *Canterbury* if it was unavailable.	• It would not have the ability to operate in Antarctic waters. Higher capital cost than other options.

Option 5: Additional bolt on option (Antarctic support option)	Additional $64 million for ice features - total of $493 million	• The addition of winterisation and ice strengthening features to Options 1, 3 and 4 would increase the versatility of the vessel to support operations in Antarctic waters, including resupply of New Zealand and American bases.	• Highest capital cost out of all the options. Would present a potential opportunity cost as employment of the ship in this way would need to be balanced against other tasks, such as support to other New Zealand Defence Force vessels or responding to a Humanitarian Assistance and Disaster Relief event.

Description of the Capability and Operational Requirements

Capability Requirements – The capability requirements necessary to support policy objectives include:

The roles of the Maritime Sustainment Capability (MSC) are derived from the Operational Concept Document with the exception of Operational Need 4, which is derived from the requirements for support to Antarctica New Zealand. The roles are categorised as:

- **Operational Need 1** - Conduct maritime force logistic support.
- **Operational Need 2** - Maintain deployable bulk fuel reserves.
- **Operational Need 3** - Provide an effective and appropriate maritime platform.
- **Operational Need 4** - Support to other government agencies with specific fitted capabilities.

MSC Vessel Roles

- The primary roles of the MSC are:
  - Replenishment of naval ships.
  - Sustainment of land/air forces.
  - Maintain naval fuel reserves.
  - Sustainment of New Zealand Antarctic base
- The secondary roles of the MSC vessel are:
  - Assistance to civil authorities.
  - Aviation training.
  - Collection of environmental data.
  - Defence diplomacy.
  - Defence training exercises and activities.
  - Generic at sea Core Mariner training.
  - Humanitarian Assistance and Disaster Relief (HADR).
  - Maritime disaster pollution control assistance.

- Multi-Agency Operations and Tasks.
- Search and Rescue.
- Surveillance.

- Logistic support primarily exists to ensure that combat forces can meet readiness levels and be deployed, sustained and re-deployed to meet the operational aims of Command. Logistic support includes provision of the stores and spare parts required by units, the supply and resupply of fuel and lubricants, ammunition and food, and provision of medical support, maintenance support, personnel support and hotel services.
- An Auxiliary Oiler Replenishment Helicopter (AORH) platform of the New Zealand Defence Force enables all Royal New Zealand Navy platforms to have greater endurance and to remain 'on station' longer by the provision of fuels, stores, rations and ammunition. The endurance of both the ANZAC frigates and the Offshore Patrol Vessels are limited both by the space available to carry food (maximum of 28 days) as well as their fuel capacities. While both vessels have relatively long endurance the support of an AORH allows Command greater operational flexibility when employing these vessels.

Operational Requirements – The operational requirements necessary to support the capability include:

The key operational requirements are:

- Conduct Maritime Force Logistic Support/Maintain Deployable Bulk Fuel Reserves
  - Replenishment at Sea (RAS), including light jackstay, and RAS(L) systems.
  - Organic Aviation systems, including Vertical Replenishment (VERTREP), Helicopter In-flight Refuelling (HIFR) and maintenance support systems for organic helicopter.
  - Stowage and distributions systems for bulk supply Classes:
    - 1 (food and water)
    - 2 (general stores)
    - 3 (petroleum, oils, liquids)
    - 5 (ammunition)
    - 9 (repair parts)
- Provide an Effective and Appropriate Maritime Platform.
  - Endurance, speed and range.
  - Navigation and manoeuvring systems.
  - Communications systems.

- Engineering and logistics management systems.
- Basic Damage Control systems.
- Role 1 Medical Facility.
- Quality of Life systems.

- Provide a Maritime Platform that can integrate effectively with a military force.
  - Self protection systems.
  - Local Intelligence, Surveillance Reconnaissance (ISR) systems.
  - Military communications/network systems.
  - Advanced Damage Control systems.
- Provide support to Land Operations
  - Support to Embarked Force systems.
  - Stowage and distributions systems for bulk supply Classes:
    - 1 (food and water)
    - 2 (general stores)
    - 3 (petroleum, oils, liquids)
    - 5 (ammunition)
    - 9 (repair parts)
- Support maintenance systems for non-organic helicopters.

NOTE: The operational and capability requirements listed here were those identified in the suite of requirement documents produced during the Capability Definition Phase. During the tender and contract negotiation process these requirements are converted into function and performance specifications (FPS) that become the contracted deliverables. During the contract negotiation process the operational requirements have to be balanced against cost or viability considerations.

Schedule of Capability Definition Phase

Dates	Duration	Note
23 October 2012 to 30 June 2014	**20 Months**	Cabinet Approval of IBC to Cabinet Approval of DBC
1 July 2014 to 29 June 2016	**24 Months**	Cabinet Approval of DBC to Cabinet Approval of PIBC – included Capability and Industry Review Activity

Expenditure of Capability Definition/ Source Selection Phase

	Expenditure (NZ$ million)	
Life of Type Study	Not Applicable	
Definition phase	FY 2012/13	1.00
	FY2013/14	0.33
	FY 2014/15	0.62
	FY 2015/16	0.44
Explanation	Cabinet approved $1.016 million for FY 2014/15 and $1.403 million (including $0.783 million of Capital) for FY 2015/16 (CAB Min (14) 22/9).	

History of Cost Estimates in the Capability Definition Phase

Date	30 June 2014	29 June 2016	Contract Signing
Costs (NZ$ million)	467	493	492
Explanation of variance	The DBC estimate of $467 million included a provision of $15 million to upgrade the vessel for Antarctic support. The cost of the Antarctic support option at source selection was $64 million of the $492 million.		

Estimates of Acceptance Date made in the Capability Definition Phase

Estimates	Initial	Estimate at Contract Signing	30 June 2017 Estimate / Actual
Contract Award	October 2015	July 2016	July 2016
Ship Delivery/ Acceptance	April 2019 Ship Delivery	May 2020 Ship acceptance	May 2020 Ship Acceptance
Explanation of variance	The initial estimate was taken from the MPSC Detailed Business Case, which did not have an Antarctic Support Option and so the estimate of acceptance date was April 2019. At the Cabinet Minute of Decision dated 29 June 2016, Cabinet considered the MSC PIBC dated 14 Jun 2016 and agreed that the replacement Maritime Sustainment Capability was to include winterisation and ice-strengthening. This is the Antarctic Support Option in the PIBC, for which the estimated acceptance date is May 2020. As the Antarctic Support Option has additional features, the complexity of design and construction extended the design and build duration.		

SPECIAL OPERATIONS VEHICLES

Project Description: The Special Operations Vehicle (SOV) project is to provide the NZDF with a fully supported special operations (SO) land mobility capability to enable the conduct of New Zealand Special Operations Forces core tasks. The project will focus on the enabling of special reconnaissance and direct action operations to meet the challenges of the contemporary operating environment, emerging threats, and future operating concepts.

Policy Value

The benefits of the project are ensuring that the New Zealand Special Operations Forces can continue to do their job with improved capability, via increased effectiveness (through having vehicles that are better suited to the range of tasks undertaken), increased efficiency (through vehicles that are more fit for purpose) and with reduced risk.

The specific benefits identified are:

a. Reduced constraints on directed tasks

b. Reduced risk of avoidable harm to personnel

c. Improved Special Operations Forces performance.

Government Approval Milestones[12]

Project Initiation: Occurs once a capability requirement has been identified by Defence and a broad assessment of the options for meeting the capability requirement has been authorised by the Chief Executives and noted by the Minister of Defence.

Approval to Initiate: Attained when Cabinet agrees to the project's inclusion on the capital acquisition plan and authorise Defence to engage with industry to refine its initial assessment with more accurate information.

Approval to Commence: Attained when Cabinet agrees to the refined capability requirement and authorises the Ministry of Defence to commence a formal tender and tender evaluation process.

Approval to Negotiate: Attained when Cabinet agrees to the preferred tender, specifies funding limits, and authorises the Ministry of Defence to enter into contract negotiations.

Approval to Commit: Attained when Cabinet agrees to the final contract and authorises the Ministry of Defence to sign the contract and commit funding.

Date	Approved By	Approval
16 Feb 2012	Chief Executives	SOV Charter (Project Initiation) (CAP/6/01101/02-2 LTCP SOV refers)
22 June 2015	Cabinet	SOV SSBC (Cab Min (15) 21/3 refers) Approval to negotiate and commit in part

[12] These are generic titles for Cabinet approval points in the capability definition process. Whilst the actual titles of Cabinet Papers have varied, the approvals and direction they were seeking from Cabinet have been broadly consistent with the definitions provided.

11 August 2016	Minister of Defence	Approval to commit (Supacat) (MoD 108/16 refers)

CAPABILITY DEFINITION PHASE

During the capability definition phase, capability and operational requirements are assessed and refined. Stakeholder needs are considered. Scenarios may be used to identify requirements. Hypothetical options which include a rough order of costs are used to analyse affordability and evaluate requirements.

Summary of Capability Definition Phase

Capability Requirement: a description of the ability needed to achieve the policy objective.

Operational Requirement: a description of a component of what is required to complete a task.

How Defence identified and assessed capability and operational requirements

The *Defence White Paper 2010* confirmed the need for the NZDF to have contemporary combat capabilities. It stressed the need for strategic mobility and interoperability, both within our own forces and with partners. Special Operations Forces have a range of responsibilities in New Zealand (and in those territories that we are responsible for), including support for counter terrorist operations and explosive ordnance disposal. This range of missions, coupled with the requirement for high readiness, necessitates personnel and equipment that are operationally capable at reduced notice.

Vehicles are vital to the Special Operations Forces. Without the tactical mobility that vehicles provide, the range of tasks that can be conducted is reduced. As with the personnel, the vehicles have to be fit for purpose and at a high level of operational preparedness.

The types of missions that Special Operations Forces undertake have expanded over the last two decades, driven particularly by Government expectations and extensive operational experience. This has resolved into four core tasks forming the basis of our Special Operations Forces, as follows:

- Special Reconnaissance. The purpose of this task is to inform.
- Direct Action. The purpose of this task is to defeat the adversary.
- Combating Terrorism. The purpose of this task is to protect.
- Support and Influence. The purpose of this task is to enable other activities.

All of these core tasks have an equal weighting. New Zealand's Special Operations Forces are required to be at high states of readiness. Lead times for deployment are very short. By their nature, Special Operations Forces are a finite resource. In common with the wider NZDF, the attributes that give them their combat capabilities also suit them well for operations other than combat; for example, providing information and intelligence to allow effective decision making.

Overall, Special Operations Forces capability is a combination of people and equipment, empowered by leadership, doctrine, training and support. All of these aspects must be provided at a very high level to allow them to function effectively in their many roles. Above all, their key attribute is their ability to provide a disproportionate effect in relation to the force size and the effort involved. Vehicles are an important enabler for most operations.

How Defence analysed the options

Given the core tasks explained above, a 'one vehicle fits all' solution is no longer satisfactory. Nor is it satisfactory to rely on the ad-hoc provision of vehicles when a particular operational situation arises. The high readiness and trained state requirements for Special Operations Forces mean that they need to be trained on what they fight with, and have what they need available when they need it.

Conversely, there is a limit to the number of vehicle types a relatively small organisation like New Zealand's Special Operations Forces can realistically afford, maintain and train on. Therefore, vehicles do need to have utility and be adaptable to a wide range of roles

Broadly, the seven vehicle categories break down into three generic groups, as follows:

Category	**A** **Mobility Heavy**	**B** **Mobility Medium**	**C** **Protected Heavy**	**D** **Protected Medium**	**E** **Protected Light**	**F** **Low Profile**	**G** **Low Profile Utility**
Key Design Driver	**Mobility**		**Protection**			**Low Profile**	

Each category was assessed against each of the mission types.It was apparent that no one vehicle perfectly fitted all missions. The Category A vehicle was the most versatile, although it is unmistakeably a military vehicle; is an expensive way of undertaking less demanding tasks; and has some shortfalls if armour protection is important to the specific task.

The C Category vehicle was also quite versatile, and provides the all round protection that the mobility dominant vehicles lack. Its space and capacity to support weapons and electronics make it a better choice than the smaller protected (D and E) vehicles.

The modified civilian vehicles (F and G) scored well in the combating terrorism and support and influence roles. They are less suitable for special reconnaissance and direct action. Vehicles of these types are considerably cheaper to acquire and operate than specialised military vehicles.

The two types of modified civilian vehicles (low profile/utility) are effectively interchangeable from an operational perspective.

The analysis found that future Special Operations Vehicle fleet should specifically include four types of vehicle:

- Mobility heavy (high endurance reconnaissance)
- Protected heavy
- Low profile/utility.

How Defence considered interoperability

New Zealand Special Operations Forces do not have the capability to develop vehicles. They remain reliant on what the market can provide. In order to ensure that the project investment delivers maximum capability for minimum risk and the best value for money, the following attributes are essential in any vehicle:

- In production
- Proven in combat operations with peer forces (reliability, combat effectiveness)
- Meets basic mission requirements without modification ('off the shelf')
- Have sufficient weight, space and power to accept current and potential future equipment such as weapons, communications and electronic support equipment
- Easily operated by New Zealand personnel
- Proven support arrangements, both in New Zealand and on global deployment
- Compatible with our own and partners' missions, doctrine and equipment
- Compatible with our own and partners' strategic and tactical transportation capabilities
- Economical to own and operate.

Partner compatibility is a vital attribute. It helps ensure that there is support on deployment, and can minimise the amount of additional support equipment that needs to be deployed with the vehicle. It ensures that there is a high level of mutual understanding around mission methods and capabilities. It ensures that New Zealand can leverage from partners' developments, especially in mission-specific equipment, such as electronics. It also means that essential compliance requirements such as load cases (how equipment is safely stowed), loading cases (for example, for transporting in aircraft), protection options, mobility standards, and safety cases have all been conducted. This is a major saving in time and effort, especially for a small number of vehicles.

Stepping outside the choices made by our close partners is to invite undue risk, especially in view of the small numbers involved. New Zealand's Special Operations Forces need vehicles that can be taken into service with the minimum of time and effort, and that share a development path with others – for example, in terms of fitting new electronic and protective equipment over time. As noted earlier, developing, proving and certifying a modification to vehicles is expensive and time consuming. Overall, New Zealand requires strong reasons not to select vehicles operated by peer partners.

How Defence considered through-life costs and issues

The key financial assumptions made in the Single Stage Business Case were:

- There will be an increase in the operating costs for the new special operations vehicle fleet as the total vehicle numbers will increase. This will be reflected in an increase to the NZSAS Regiment baseline from FY 2016/17.
- Detailed rough order of magnitude costs provided are based on the project meeting existing production runs with preferred vendors, as set out in Annex B.
- The life of type for the low profile commercial off-the-shelf vehicles and military off-the-shelf vehicles is 10 years (2026).
- There is a midlife upgrade planned for the military off the shelf vehicles. Funding for this is estimated at up to $7 million with an identified funding stream of the Land Transport Capability Programme Light Tactical Vehicle (Protected) Project.
- This business case is priced in New Zealand dollars, however it should be noted that during the contract negotiation process there will be a common foreign exchange risk.
- The current special operations vehicle fleet is recommended for disposal, following the introduction into service of replacements, due to sustainability and maintainability issues.

The maintenance costs were based off the average cost of in service equivalent vehicles:

- There is $1.5 million operating costs allocated each year across the life of the new Special Operations Vehicles. This funding commenced in the 2015/16 financial year and comes from the Land Transport Capability Programme during that financial year and is represented in the Four Year Resource Plan.
- The incremental operating costs changes from the current vehicle fleet to the recommended vehicle fleet. The estimated additional costs of $0.717 million are less than the amount provisioned in the current Four Year Resource Plan.
- To support the management of this mixed fleet two additional full-time personnel are required to be funded out of the allocated operating costs.
- Because of the different life of type for the varying asset categories, the depreciation amount changes over the life of the capability, with an average of $1.94 million in the first eight years and $1.58 million for the remainder.
- The calculated Whole-of-Life Cost is approximately $34.2 million.

Requirements Analysis in the Capability Definition Phase

Options analysis in the capability definition phase is used as a tool to compare assess and evaluate capability and operational requirements.

Whereas options analysis in the acquisition stage identifies the best procurement solution to deliver the capabilities required.

Table One: Special Operations Vehicles Options			
Options Considered	**Advantages**	**Disadvantages**	**Cost Estimate[13] (NZ$ million)**
1. Replace current fleet 'like for like'	• Lowest cost	• Least flexibility	25.3
2. Adopt a Minimum mixed fleet	• Flexibility across all mission types	• No vehicles to cover unavailability and training	24.8
3. Adopt a Balanced mixed fleet	• Flexible fleet, allows for unavailability and training	• No real disadvantages	28.0
4. Adopt a Maximum mixed fleet	• Allows all mission types on one specialised vehicle	• Cost and resourcing	38.3

[13] Note all costs throughout the options are rough order estimates.

ASSESSMENT	The Option 1 (Like for Like) fleet was heavily optimised towards the Special Reconnaissance mission, but less effective in the other three. This leaves the same limitations that the current fleet imposes, with the major difference being that new vehicles would be more capable and more reliable than those they replace. The Option 2 (Minimum) fleet is across the four types. This covers all the missions, but increases the probability that for any given mission the number of vehicles could be inadequate, especially if even one is unavailable due to damage or breakdown. There are also no additional vehicles to allow for training, as any mission deployment would probably involve all vehicles. Capital cost is $24.8 million. The Option 3 (Balanced) fleet allows for training in the event of deployment and provides limited cover to the possibility of loss. It also minimises the need for excessive support and other costs associated with vehicle fleets. Capital cost is $28 million. Option 4 (Maximum) provides the maximum number of vehicles in each category. This would allow for a significant deployment based on just one particular vehicle type, while maintaining a New Zealand-based training and replacement capability. However, the last decade of operations experience proves this is unlikely – the preference is always to deploy a vehicle mix to provide more flexibility. The downsides of this option are the cost of acquisition. The ongoing cost of supporting and maintaining the additional vehicles would exceed the current resourcing of the Special Operations Forces. Option 3, for a Balanced Mixed fleet, was recommended and accepted.

Description of the Capability and Operational Requirements

Capability Requirements	Operational Requirements - Description and Explanation
The following vehicle types are best suited to the tasks performed by New Zealand's Special Operations Forces:	The New Zealand Defence Force's most capable, agile and prepared combat troops are its Special Operations Forces. They are selected, trained, equipped and led to deploy across a broad spectrum of operations, from long-range reconnaissance to counter-terrorism. They are unique in the New Zealand Defence Force in that they are mandated to maintain a 'Fully Prepared' status across all employment contexts. This means that Special Operations Forces' lead times for deployment are very short by comparison with most New Zealand Defence Force force elements. The core operational tasks that the Special Operations Forces undertake are listed below. These missions can take place in every sort of terrain, from open country to cities. A range of vehicles with a combination of mobility, protection, firepower, stealth, and utility is needed to perform all missions.
• **Mobility Heavy** – provides endurance, mobility, and has ample capacity for personnel, weapons and equipment.	• **Special Reconnaissance:** The traditional long-range reconnaissance task, where the primary objective is intelligence gathering rather than contact with the enemy. These missions can involve weeks away from base with no external support.
• **Protected Heavy** – provides better protection for direct action and counter-terrorism tasks.	• **Direct Action:** Engaging an adversary, rather than observing or avoiding them.
• **Low Profile/Utility** – allow Special Operations Forces to adopt a low profile and undertake less overt operations, whilst retaining some combat capabilities.	• **Combating Terrorism:** Includes responding to hostage incidents and/or protecting civilians from terrorist attack, often in populated and urbanised environments.
	• **Support and Influence:** Activities such as maintaining a presence, gathering information, mentoring, and training.
NOTE: The operational and capability requirements listed here were those identified in the suite of requirement documents produced during the Capability Definition Phase. During the tender and contract negotiation process these requirements are converted into function and performance specifications (FPS) that become the contracted deliverables. During the contract negotiation process the operational requirements have to be balanced against cost or viability considerations.	

Schedule of Capability Definition Phase

Dates	Duration	Explanation
Feb 2012 – June 2015	40 months	SOV Charter – SSBC approval (project initiation to SSBC approval through Cabinet)
June 2015 – August 2016	14 months	SOV SSBC Approval to negotiate to final approval for major contract

History of Cost Estimates in the Capability Definition/ Source Selection Phase

Date	2012 (Charter)	2015 (SSBC)	2016 (Initial contract)
Costs (NZ$ million)	$30 – 31	$28	$28
Explanation of Variance	Cost estimates refined over time		

Estimates of Acceptance Date made in the Capability Definition Phase

Estimates	Initial Estimate	2017 Updated Estimate	Actual
Date	2017	2017	
Explanation of Variance			

UNDERWATER INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE

Project Description: The Underwater Intelligence, Surveillance and Reconnaissance project is being undertaken to restore the underwater surveillance capabilities of the P-3K2 Orion to contemporary standards.

Policy Value

The identified problem for the project was the inability to locate and track submarines. This leads to a reduced ability to protect maritime activity, and limited deployment options for Government (both for national tasking and coalition contributions).

The policy benefits that will be delivered by an UWISR capability include an improved ability to protect maritime activity. This includes ability to protect commercial shipping, national and foreign military maritime vessels, and underwater natural resources.

It also provides increased assurance to Government about ability to respond. This includes the ability to credibly contribute to coalition operations, the ability to demonstrate a credible UWISR capability, and provide a range of response options, e.g. from surveillance to attack.

Better Business Case Milestones

Project Charter: Defence project initiation is guided by the Defence White Paper 2010 and the 2011 Defence Capability Plan. Projects commence following notification to the Minister of Defence and approval of a project charter by the Capability Management Board.

Approval of Indicative Business Case (IBC): Attained when Cabinet agrees to the strategic context for an investment and agrees to progress a short list of capability options to the Detailed Business Case stage. May also authorise Defence to engage with industry for more detailed information (e.g. Request for Information).

Approval of Detailed Business Case (DBC): Attained when Cabinet agrees to a refined capability requirement and authorises Defence to comment formal engagement with industry (through a request for proposal or request for tender) on a preferred capability option.

Approval of Project implementation Business Case (PIBC): Attained when Cabinet agrees that Defence can conclude a contract based on the preferred supplier, the negotiated services, the maximum funding level and the arrangement to manage the project and the ongoing delivery of services.

Date	Approved By	Approval
23 June 2014	Cabinet	Single Stage Business Case CAB Min(14)21/8

11 June 2016	Cabinet Business Committee (with power to act)	Project Implementation Business Case CBC-16-MIN-0011

CAPABILITY DEFINITION PHASE

During the capability definition phase, capability and operational requirements are assessed and refined. Stakeholder needs are considered. Scenarios may be used to identify requirements. Hypothetical options which include a rough order of costs are used to analyse affordability and evaluate requirements.

Summary of Capability Definition Phase

Capability Requirement: A description of the ability needed to achieve the policy objective.

Operational Requirement: a description of a component of what is required to complete a task.

How Defence identified and assessed capability and operational requirements

The *Defence White Paper 2010* set out the Government's policy intent for the NZDF to be a deployable and sufficiently self-reliant force, concluding that maintaining a credible intelligence, surveillance and reconnaissance (ISR) capability was important to New Zealand. It noted that the six P-3 Orion aircraft "…may progressively be fitted with…anti-submarine sensors, improving their combat capability and enhancing the ability of New Zealand to contribute more robustly to global efforts".

Submarines are covert platforms that are used for clandestine operations; collecting intelligence, inserting Special Forces, striking shore targets and shipping, and more generally causing insecurity by their uncertain location. Globally, 41 countries operate over 300 submarines, of which around 200 are in the Asia-Pacific region. Submarines themselves are increasing in capability – especially in submerged speed and endurance, mission systems, and ability to avoid detection.

The direct security risk to New Zealand of submarines is low. Of more concern is the growing deployment of conventional submarines in maritime areas where New Zealand and its partners operate. Having a demonstrated capability to locate submarines provides a powerful deterrent. It removes the element of doubt in their location and surprise in their appearance, rendering them susceptible to attack.

The ANZAC frigates have underwater detection abilities, but this is limited to the immediate area surrounding the frigate and is largely for self-defence. The P-3 Orion aircraft provide a broader coverage and being globally deployable, can enhance the ability of New Zealand to contribute to international coalition security initiatives.

The current Underwater Intelligence, Surveillance and Reconnaissance (UWISR) equipment fitted to the P-3 fleet is obsolete and is increasingly difficult to support. At the current rate of deterioration, the capability will no longer work within 2-4 years, and this project seeks to restore a contemporary capability to the NZDF through upgrading the obsolete UWISR equipment on the P-3 Orion aircraft.

UWISR is a fundamental component of an anti-submarine warfare capability. An UWISR capability is used to search for, detect, classify, locate, track and identify sub-surface targets. Each of these steps is progressed through prior to target engagement, which is intended to deny the enemy effective use of their submarine. These capabilities can also be used for

other tasks where processes involve generating, detecting and interpreting acoustic information, such as search and rescue, and marine science.

An investment logic mapping exercise was undertaken by Defence to determine the nature of the problem, the benefits that would occur from addressing that problem, and the strategic response that would achieve the benefits. This identified:

1. **The Problem:** inability to locate and track submarines over a broad area in which they may be suspected of operating.
2. **The Benefits:** improved ability to protect maritime activity and an increased assurance to Government about the ability to respond.
3. **The Strategic Response:** improve underwater detection, location, classification and tracking capability to a level acceptable to the Government and coalition partners.

How Defence analysed the requirements options in the Capability Definition phase

Options analysis included methods of capability delivery, platform options, and the capabilities required. In summary, the options analysis was as follows:

Options for Capability Delivery: this choice drives all other options or eliminates them from further consideration. The broad choices are:

- No capability
- NZDF-delivered capability
- Capability delivered by partners
- Commercially-delivered capability.

No capability: this would be a reduction in the current level of capability provided by the P-3 aircraft.

Reliance on partners: this would be dependent on our partners' ability and willingness to assist, other than as part of a coalition taskforce.

Commercially-delivered capability: this concept was also considered. A service to locate and track submarines is not currently available. Effective UWISR relies on classified and sensitive inputs by participating nations and the technologies involved are some of the most heavily classified of all military capabilities.

For New Zealand to retain a sovereign UWISR capability, it will need to be provided by the NZDF.

Table 3: Capability Delivery Options

	No Capability	NZDF	Partner	Commercial
Strategic Fit	Fail	Met	Fail	Fail
Operability	Met	Met	Partial	Fail
Achievability	Met	Met	Fail	Fail
Affordability	Met	Met	Partial	Fail
Risk	Fail	Met	Fail	Fail

Value	Met	Met	Partial	Fail
Sustainability	Met	Met	Fail	Fail
Conclusion	***Fail***	***Met***	***Fail***	***Fail***

Options For Platform Choice

UWISR must be undertaken by a platform that can operate over the sea or at sea. This limits the functional choices to the following:

- Sea-based (e.g. ship or seafloor sensors)
- Airborne (e.g. aircraft)
- Space-based (e.g. satellite)
- Sub-surface (e.g. submarine)
- Hybrid (e.g. a helicopter-borne capability based on a ship).

Analysis of Platform Options

Of these alternatives, **space-based** and **sub-surface** platforms or systems can be dismissed on cost and policy grounds.

Surface vessels lack the strategic mobility and responsiveness of aircraft, although they can have greater persistence.

A **hybrid** model requires ship-based helicopters with sophisticated on-board UWISR capacity. The current and future NZDF shipboard helicopter does not have these systems, although it is well equipped to act as a fast response weapons carrier in support of anti-submarine warfare operations.

The NZDF currently operates the P-3 Orion aircraft as an airborne UWISR platform. The P-3 has desirable characteristics for UWISR, including high transit speed, long endurance, excellent low level manoeuvrability and the room to carry the personnel, systems and weapons required for the task.

Table 4: Platform Options

	Sea-based	Airborne	Space-based	Sub-surface	Hybrid
Strategic fit	Met	Met	Fail	Fail	Met
Operability	Met	Met	Fail	Fail	Met
Achievability	Partial	Met	Fail	Fail	Partial

Affordability	Partial	Met	Fail	Fail	Partial
Risk	Partial	Met	Fail	Fail	Met
Value	Partial	Met	Fail	Fail	Partial
Sustainability	Partial	Met	Fail	Fail	Partial
Conclusion	***Partial***	***Met***	***Fail***	***Fail***	***Partial***

In conclusion, an upgrade to the existing UWISR capabilities of the NZDF's fleet of P-3 Orion aircraft is the recommended option.

Options to upgrade the P-3 Orion

There are a number of methods generally used to detect submarines: detection on the surface through visual and electronic surveillance, detection of above-water transmissions, detection using underwater active and passive acoustic sensors, and magnetic signature detection. The P-3 Orions have good surface and above-water detection capabilities but lack suitable underwater detection capabilities. A Multi Criteria Decision Analysis (MCDA) was used to determine a preferred UWISR level of capability with supporting options.

Three investment options with varying levels of functionality and one non-investment option were developed. Option 0 captured the impact of not investing in an UWISR capability. Investment options 1 – 3 were based on increasing levels of acoustic processor and sonobuoy sophistication, and detection capability. Whole Of Life Cost (WOLC) (Net Present Cost (NPC)) was calculated over 10 years.

In summary, the MCDA concluded that the best value solution was an advanced acoustic processor, with matched planning, training, and analysis tools. A critical component of the sonobuoy delivery system, the air compressor, should also be upgraded. A lower specification acoustic processor saved money, but delivered less capability and has higher overall operating costs. Magnetic Anomaly Detection (MAD) equipment is required for Options 1 and 2 to compensate for limitations in acoustic processor capability. It would be a useful addition to Option 3, but not at the expense of acoustic sophistication, as acoustics is the primary UWISR detection method.

Option 3 (no MAD) provided the best benefit / cost ratio when compared with Options 1 and 2. The initial capital cost is lower than Option 2, operating costs are the lowest per annum and best overall performance is gained through use of an advanced acoustic processor.

How Defence considered interoperability[14]

UWISR involves interpreting acoustic information both above the surface and below it. Not only is it essential to detecting submarine activity, but the submarines operated by our partners rely on the acoustic information we collect to monitor and track ships of interest.

But collecting this information is a niche capability. Few countries have the required skilled operators, access to very sensitive acoustic intelligence, and the requisite onboard equipment. Of the operations undertaken by the P-3 Orion fleet, UWISR is the most difficult and demanding, requiring expertise that has been built and maintained over many decades in a very co-operative manner. Having a credible UWISR capability strengthens our reputation as a valued partner.

[14] For definition of interoperability see note under *Part 4A: Project Data Sheets*.

How Defence considered through-life costs and issues

The Defence Capital Plan agreed by Cabinet in December 2013 [CAB Min (13) 43/3 refers] includes a capital cost provision of up to $31m for UWISR. This allows the recommended Option 3.

Current operating costs for the systems are estimated at $11.86 million per year. Following the operational release of the new systems, operating costs are expected to increase by $0.55 million per year. This increase is due to Defence seeking a Through Life Support Agreement. The cost of the support agreement is partially offset by improvements in simulation training, which will reduce annual sonobuoy usage.

The *Defence White Paper 2016* indicative funding envelope provides an additional $0.40 million in funding for this capability. The balance of $0.15 million per year will be managed within existing Defence Force baselines.

No reductions in personnel cost or flying hours with the new system are anticipated. The Defence Force's assumption is that the new system will cost less to maintain than the current system due to improved reliability. However, these savings cannot be quantified as the cost of maintaining the current system is not currently captured separately from overall P-3 maintenance. No savings have therefore been factored into the figures.

Requirements Analysis in the Capability Definition Phase

Options analysis in the capability definition phase is used as a tool to compare, assess, and evaluate capability and operational requirements. Options analysis in the acquisition stage identifies the best procurement solution to deliver the capabilities required.

Options considered	Cost Estimates (NZ$ million)	Advantages	Disadvantages
Option 0: Remove UWISR Capability	0.12m (to remove equipment)	Cost savings	No capability
Option 1: Entry Level UWISR	22.0-25.1	Lower cost	Entry-level systems lack the detection, tracking and classification tools offered by more capable systems.
Option 2: Contemporary UWISR Capability	29.5-31.3	Adequate performance	Probable longevity. There is a significant risk that this technology would not be sustainable for the remaining life of the aircraft. MAD is desirable with this option. The combined performance of MAD and this level of acoustic suite is not as good as that available from a more sophisticated acoustic suite without MAD
Option 3: Advanced UWISR Capability	26.1-28.0	High performance Future proofed	
ASSESSMENT: On the basis of delivery of benefits, meeting all safety requirements and affordability (capital and operating), option 3 was selected.			

Description of the Capability and Operational Requirements

Capability Requirements- The capability requirements necessary to support policy objectives include:	**Operational Requirements-** The Operational Requirements Necessary to support the capability include:
The *Defence White Paper 2010* noted that the six P-3 Orion aircraft "…may progressively be fitted with…anti-submarine sensors, improving their combat capability and enhancing the ability of New Zealand to contribute more robustly to global efforts". The actual capabilities needed to achieve this included: • Advanced acoustic processing equipment • Simulation systems • Analysis facilities, and • Support equipment, such as new air compressors to deploy sonobuoys	Key user requirements drawn out of the policy documents are summarised below: • Airborne ASW is a combat capability that is intended to be used to enhance New Zealand's ability to contribute robustly to global security efforts. • Provide effective force protection for maritime assets from sub-surface threats. • Provide direct support in eliminating the sub-surface threat to friendly maritime forces and open Sea Lanes of Communication. Benefits summary: • Improve ability to protect maritime activity, and • Increase assurance to government regarding maritime response options.
NOTE: The operational and capability requirements listed here were those identified in the suite of requirement documents produced during the Capability Definition Phase. During the tender and contract negotiation process these requirements are converted into function and performance specifications (FPS) that become the contracted deliverables. During the contract negotiation process the operational requirements have to be balanced against cost or viability considerations	

Schedule of Capability Definition Phase

Dates	Duration	Note
August 2012 – June 2014	22 months	Charter to SSBC approval by Cabinet – includes development of SSBC and options
June 2014 – July 2016	25 months	SSBC approval to PIBC approval by Cabinet Business Committee (with power to act) – includes tender selection and contract negotiations

Expenditure in Capability Definition/ Source Selection Phase

	Expenditure (NZ$ million)	
Definition Phase	2016/17	17.12
	2017/18	13.15
	2018/19	5.84
Explanation	Cabinet approved $0.440 million of pre-acquisition costs in June 2014 and $36.11 million of capital expenditure in July 2016.	

History of Cost Estimates in the Capability Definition Phase

Date	2014 (SSBC)	2016 (PIBC)
Costs (NZ$ million)	31.0	36.8
Explanation of Variance	2016 figure was within 2016 Capital Plan estimate of $36.8 million. The increase from 2014 includes a $3.28 million provision for contingency, and incorporates escalation across planning years.	

Estimates of Acceptance Date made in the Capability Definition Phase

Estimates	Initial	Estimate at Contract Signing	30 June 2017 Actual
Date	April 2016 (Acceptance test and evaluation ends)	January 2018 (First aircraft installation accepted)	
Explanation of Variance	The initial schedule assumed development of the Project Implementation Business Case would take six months from Single Stage Business Case (SSBC) approval. SSBC was not approved until June 2014. It also assumed installation would take 15 months from contract signature to aircraft ready to accept. The actual installation schedule (17 months) was		

	developed during contract negotiations leading up to the PIBC approval and Approval to Commit Funds in July 2016.

PART 4B: PROJECT INFORMATION SHEETS

DEFENCE COMMAND AND CONTROL SYSTEM

Introduction: The 2010 Major Projects Report included the Joint Command and Control System Programme. It reported that of the four projects identified in that programme, only the Defence Command and Control System Project had commenced, and that the other three were still in the concept stage.

On 18 July 2011, Cabinet cancelled the Joint Command and Control System Programme. It did so because the capability gaps identified in the 2008 Business Case, which were to be addressed by the three projects other than Defence Command and Control System, had significantly reduced. The previously agreed scope and structure of the Programme were therefore no longer appropriate.

Accordingly, this Project Information Sheet reports on the Defence Command and Control System Project only.

At the same time as the Cabinet decision, the lead for the acquisition of the Defence Command and Control System Project transferred from the New Zealand Defence Force to the Ministry of Defence. Governance remains with a MoD/NZDF Capability Steering Group that is accountable to the Capability Management Board.

The project team engages closely with the NZDF's Command Information Systems (CIS) Branch and the NZDF Intelligence Community to progress and develop the project.

Description of acquisition work

As reported under "Next Steps" on page 194 of the 2010 Major Projects Report, it was concluded in June 2010 that:

- The Global Command and Control System - Maritime (GCCS-M) Version 4 supplied by the US Navy would meet the project's basic requirements for the Multi-Agency Network, operated by the National Maritime Coordination Centre (NMCC) in Wellington.
- The results of the NMCC implementation would inform a decision on whether GCCS-M Version 4 could fulfil requirements on higher classification networks.

Because of uncertainties concerning access to GCCS-M V4, the project was originally managed in spirals, as follows:

- Spiral 1: the implementation of GCCS-M Version 4 including Intelligence features onto the Multi-Agency Network – Restricted at the NMCC National Maritime Co-ordinating Centre located at Headquarters Joint Forces New Zealand in Trentham.
- Spiral 2: the implementation of GCCS-M Version 4, including Intelligence features, onto the NZDF Secure Wide Area Network (SWAN).

Cabinet approved the adoption of GCCS-J on 29 October 2013, as the Maritime variant was no longer considered by Defence to be the optimum variant of the US Global Command and Control System (GCCS), for the whole of the New Zealand Defence Force. The project is now managed in phases as follows:

- Phase 1 : the pilot of GCCS-J at a small number of sites, and as ship trials.
- Phase 2: the rollout of GCCS-J across the New Zealand Defence Force.

GCCS-J provides systems for improving the effective command and control of Joint Forces of the New Zealand Military, and includes Integrated Imagery and Intelligence (I3).

Next Steps

The rollout of phase 2 has begun with the pilot to continue in parallel. Other remaining steps include the following:

- Complete the Navy approved permanent fit of GCCS-J on-board HMNZS *Te Mana*. Perform remediation to HMNZS *Te Kaha* and HMNZS *Canterbury*, to align these fitouts with *Te Mana*.
- Conducting a trial of the Global Lite application on-board HMNZS *Otago* during Operation Calypso in June, to prove its suitability as a solution for synchronising data from ships sensors into GCCS-J on smaller ships, such as offshore and inshore patrol vessels.
- Install limited GCCS-J functionality on to the other RNZN ships including inshore patrol vessels.
- Develop and build a deployable land GCCS-J system that can be used by deployed land elements of the NZ Army and RNZAF.
- Rectify Radiant Mercury capability gaps discovered during the pilot and OpEval.
- Complete implementing the remaining international data feeds.
- Complete the transfer of the MAN-R network to the Defence Information Exchange System.
- Complete phase 2 scoping and then rollout of GCCS-J clients across the New Zealand Defence Force.

Full Operating Capability is forecast for December 2018.

NETWORK ENABLED ARMY TRANCHE ONE

Introduction: Network Enabled Army (NEA) Tranche 1 is to deliver modern communications to the land force units most often deployed by the Government – Special Operations Forces (SOF); and a land force commitment of around 200 personnel, including infantry, a Task Group Headquarters and communications personnel. It is part of the wider NEA Programme.

Background

The NEA Programme addresses the limitations of current Army and Special Forces Command, Control, Communications, Computers (C4), Intelligence, Surveillance and Reconnaissance (ISR) capabilities. The importance of modern networking capabilities has been underscored by recent operational experiences, particularly in Afghanistan.

The Programme will provide the technology the Army needs, along with the concepts, training and support that are needed to make it work. It prioritises the needs of the front line soldiers and their commanders. It gives them the capabilities they need without burdening them with unnecessary equipment and capability. It allows for expansion and development over time.

The strategic C4 benefits of the NEA Programme are:

1. Improved interoperability
2. Improved Common Operating Picture (COP)
3. Improved ability to plan
4. Improved information management
5. Improved ability to pass data
6. Improved situational awareness
7. Improved ability to exercise C2.

The Programme is planned to roll out in four discrete tranches through to 2025 - 2026. Each tranche will provide a capability increase in itself, as well as building more capability on what is already in place. Managing NEA in successive tranches allows new technologies to be introduced as they mature, ensures that there are ongoing ‘off ramps’ to evaluate progress and if necessary change priorities, and ensures that the programme progresses at a rate that can be managed effectively and does not overwhelm the users.

The Tranche One Project equips Special Operations Forces, a deployable Task Group Headquarters, and a Light Infantry Company. This covers the requirements of most deployments. It also includes smaller headquarters units, and training rotation forces for extended deployments. It puts in place the overall architecture to allow expansion and development over time; provides support, evaluation and testing processes; and establishes key supplier relationships.

Tranche One has capital funding of $106 million and operating costs of $36.4 million approved in 2015 to spend over the next four years.

Description of acquisition work

In April 2015, Cabinet approved the NEA Tranche One Project funding for new digital radios and associated equipment as part of the Network Enabled Army programme [CAB Min (15) 11/7 refers].

Tranche One comprises five related capability sets, as summarised below:

1. Integration, Testing, Training, Evaluation and Experimentation

This includes most of the programme services that support the overall development of NEA, such as testing and evaluation of potential hardware and software, integration between capability sets, training for the operation and support to NEA, configuration management for the overall system and related services. It includes a physical test, reference and evaluation centre, based initially at Linton Camp (the main operational unit base) and with staff at Devonport and Papakura providing training, capability systems support, and transition services. A new User Centre will be built at Linton to directly support reference and evaluations and training.

An Engineering Centre has been established at Trentham Camp (as this is the site for the broader support elements for the Army) to provide deeper support to acquisition, integration and test and evaluation activities; including research and integration of NEA capabilities with Land, Air, Maritime, and Special Forces. A new Engineering Centre will be built at Trentham and is expected to be completed in the second half of 2018.

2. Common Universal Bearer System (CUBS)

The CUBS system essentially combines strategic and tactical communications systems with computer infrastructure to provide the means of transmitting and receiving voice and data communications between the command posts, command teams and liaison teams within the land force Task Groups and deployed SOF elements. It interconnects force elements through terrestrial and/or satellite bearer systems and provides the necessary infrastructure to host collaboration and information services. The CUBS computer infrastructure will be, in essence, a deployable node of the Defence Information Environment.

Tendering for ruggedised (fit for military use in a theatre environment) deployable server hardware to be evaluated during a pilot has commenced. Acquisition of deployable wideband satellite communication terminals using the United States Government Foreign Military Sales processes has resulted in all terminals being shipped on 14 June 2017. Training,testing and evaluation activities will commence in the second half of 2017. Test and training will be conducted over the latter part of 2017.

3. Common Command Post Operating Environment (CCPOE)

The CCPOE project establishes a set of standard operating procedures, equipment, and service applications suitable for land forces and SOF and that are interoperable with the NZDF and other allied systems. These will be underpinned by an information infrastructure that hosts a set of information services over a number of different networks. The key components of CCPOE are:

a) The IT systems (e.g. computers, displays and software required to access, manage and display the information carried across the CUBS).

b) The operational and tactical core services that will provide a battle management system for use at the Task Group and Sub Unit Headquarters layer.

c) The command post infrastructure, including shelters, generators, environmental management and furniture. Tendering for the remaining CCPOE capability is advancing with the last major package posted on the Government Electronic Transaction System (GETS) on 15 June 2017. This is for the Medium Accommodation Shelter Trailer System (MASTS) that provides trailers, environmental and power generation.

d) A training environment that will enable skill levels across the Army. This includes establishing a training centre of excellence, the delivery of training to Headquarters staff and providing access to battle management systems to officers and soldiers when they are in garrison and during field training.

4. Mobile Tactical Command Systems (MTCS)

The MTCS capability consists of enhanced network-capable digital combat radios and their peripherals, combined with a battlefield management system, to allow secure mobile communications networks in support of high tempo, dispersed operations. The digital combat radio environment includes line of sight and beyond line of sight technology to connect soldiers, platforms and command post at all levels of a Task Group/Battalion Group. MTCS will deliver a mobile tactical internet providing voice, data and position location indication. Interoperability with the NZ Army's Command Post level C4 systems, and joint partners is of particular importance.

Registraion of Interest (for the core radios) were received on 29 May 2017 and now being evaluated. Request for Proposals (RFP) are scheduled to be sent to the market imminently. The Minister's office has provided dates available for SEC Committee for us to request authority to purchase core radios. This will occur in early to mid August 2017.

5. Special Forces Electronic Warfare Refresh

This Electronic Warfare refresh was handled as an Urgent Operational Requirement, with the NZDF Defence Capital Acquisitions staff undertaking acquisitions. This work has now been completed.

All Tranche One NEA capabilities are being delivered concurrently to the Special Forces. This ensures functional interoperability whilst allowing the specific Special Forces requirements to be met. It also ensures that the experience and learnings from Special Forces operations feed back through NEA to support the wider Army.

In Summary

Each of the above capability sets are in turn broken down into smaller projects, to ensure that a functional capability that meets user requirements is delivered, that risk is mitigated, advantage can be taken of ongoing technical developments, and to ensure that capability development occurs at a rate that the users can absorb.

Where relevant, NEA builds on extensive work and experience already resident within the NZDF, including the Army's experimental networking system (TANE), operational experience, and the experiences of New Zealand's key partners.

The broad breakdown of the $106 million approval by Capability Set is shown below. These ratios may change as the Tranche evolves.

Tranche One Capability Sets	NEA Reference	Capital Cost (NZ$ million)
Integration, testing, training, and evaluation	Programme Services	17.4
Mobile satellite terminals, routers, and servers	CUBS	26.5
Headquarters equipment and full network software	CCPOE	5.0
Mobile Tactical Radios	MTCS	46.8
Special Forces electronic warfare refresh	NZSOF EW	3.5
Contingency	Contingency	6.8
Total		106.0

Note that contingency is held within the appropriation baseline and is not subject to drawdown approvals.