

AE2 Future Some Options for The Future Management of HMAS AE2
Objectives: Protect, Preserve and tell the AE2 story

Considerations ▼	Option No. ▶	2				3		4	5
	Option Title ▶	1 Do nothing to AE2	Protect & Preserve In-Situ		Relocate	Relocate	Recover	Recover	
		Cathodic Protection System installation	Provide protection from Impact and Pilfering. 2 Buoys with lights, anti intruder system and power supply.	Complete Archaeological Assessment & Recover and conserve selected artefacts from AE2	Construct Scale/Sectioned Replicas	Neutralise Explosive Risk	To prepared shallow water site	To shore with "wet" preservation	To shore with "wet" preservation and eventual "dry" preservation
Preconditions							a. CP System (2A), shielding (2B), Archaeological Assess & Recover Artefacts (2C). b. Neutralise explosives.	a. CP System (2A), shielding (2B), Archaeological Assess & Recover Artefacts (2C). b. Neutralise explosives.	a. CP System (2A), shielding (2B), Archaeological Assess & Recover Artefacts (2C). b. Neutralise explosives. C. Wet preservation to stabilise.
A	Option Scope	No work on AE2 Plaques in Turkey & Australia Education program in Australia	Supply of CP system to: a. Overcome risk of rapid corrosion (recent damage) b. Pre-conditioning of wreck prior to Options 3, 4 and 5 c. Plaques & replicas in Turkey & Australia d. Education program in Australia	a. Provide maritime warnings b. Provide site intrusion monitoring & warning system c. Provide decay monitoring system. d. Possibly 1 or 2 buoys providing head/stern moorings for maintenance vessels + power + surveillance + alerts shipping to avoid. Ground tackle provides physical protection from trawling.	a. Using ROV & divers open the conning tower hatch b. Penetrate AE2 with ROV to inspect, film, collect data. c. Inspect remotely for evidence of status of explosive risk & its location d. Recover accessible / portable artefacts e. Preserve recovered artefacts ashore in Turkey and Australia f. Display and make available artefacts for study in Turkey and Australia g. Plaques & replicas in Turkey & Australia h. Education program in Australia	a. Construct five 15 - 18m scaled, vertically half sectioned replicas. b. Replicas to be available for display in Turkey (2) and Australia (3).	a. Determine location of remaining explosive risk b. Remove remaining explosive risk c. Make safe explosive risk d. Plaques in Turkey & Australia e. Education program in Australia	a. As for Option 2A, B, C b. As for Neutralising Explosive Risk c. Lift AE2 clear of sea-bed d. Transfer to prepared sea-bed location e. Provide shore to AE2 access f. Provide on-going corrosion monitoring and control measures g. Provide on-going site management, maintenance & security h. Plaques and replicas in Turkey & Australia i. Education program in Australia	a. As for Option 2A, 2B, 2C b. As for neutralising explosive risk. c. Lift AE2 clear of sea-bed d. Transfer to existing maritime museum in Istanbul e. Provide high quality dedicated museum building f. Provide on-going corrosion monitoring and control measures g. Provide support and access infrastructure at museum site h. Provide "wet" display / treatment structure i. Provide on-going site management, maintenance & security j. Plaques and replicas in Turkey & Australia k. Education program in Australia
B	Risks Before Mitigation	a. Continued decay of AE2 b. Accelerated decay due to recent damage by DSV c. Drop & Drag damage	a. Accelerated decay due to damage during MAA b. Decay leads to exposure of torpedo leads to explosion leads to death / injury to personnel c. Torpedo explosives cause damage to AE2	a. Drop & Drag damage b. Impact causes explosion leads to death / injury of personnel c. Explosives cause damage to AE2	a. Explosion of torpedo from whatever cause leads to loss of artefacts. b. Explosion leads to death / injury of personnel c. Explosives cause damage to AE2 - accelerating loss of physical focus. d. Artefacts damaged during recovery e. Artefacts damaged post recovery	Lack of physical model of AE2 restricts opportunities to tell the story.	a. Drop & drag damage to AE2 whilst neutralising explosives b. Explosion leads to death / injury of personnel c. Explosives cause damage to AE2	a. Damage to AE2 during project implementation causes loss of artefacts. b. Explosion leads to death / injury to personnel c. Explosion causes damage to AE2 d. AE2 breaks on lifting/ moving e. AE2 dropped on lifting f. Corrosion accelerates due to less favourable water conditions g. Damage/ pilferage due to easier diver access h. Divers killed or injured whilst accessing AE2 i. AE2 damaged due to storm/wave action (as per ex-HMNZS Wellington) j. AE2 re-buried in silt at preservation site k. Boat's interior not on view to public leading to less interest from public l. "Hands-on" access restricted to divers	a. Damage to AE2 during project implementation causes loss of artefacts b. Explosion leads to death / injury of personnel c. Explosion causes damage to AE2 d. AE2 breaks on lifting/ moving e. AE2 dropped on lifting/ moving f. Corrosion accelerates due to changed environmental conditions g. Damage/ pilferage due to easier access to AE2 h. Personnel killed or injured whilst accessing AE2 i. Boat's interior not on view to public leading to less interest from public j. "Hands-on" access restricted to divers
C	What Risk mitigation measures can be applied?	No mitigation applied	a. Use experienced contractor with adequate resources b. Define risk areas from torpedo and keep away from these c. Use ROVs were necessary	a. Use experienced contractor with adequate resources b. Define risk areas from torpedo and keep away from these c. Use ROVs were necessary	a. Use experienced contractor with adequate resources b. Manage explosive risk during recovery of artefacts c. Use ROVs were necessary d. Call on explosives expert advice (e.g. RN) e. Seek expert guidance and advice at all stages of recovery and preservation of artefacts f. Programme recovery as an early priority before any high risk activity is undertaken.	Displays at suitable maritime Museums or war memorials in Turkey and Australia.	a. Use experienced contractor with adequate resources b. Define risk areas and keep away from these c. Use ROVs were necessary d. Call on explosives expert advice (e.g. RN)	Option 2A, B, C, D mitigation PLUS a. Extensive "wet" storage & treatment of hull to neutralise on-going accelerated corrosion b. On-going liaison with experts in corrosion field c. Specialised separate treatment and storage for small artefacts recovered	Option 2 & 4 mitigation PLUS a. Extensive "wet" storage & treatment of hull to neutralise on-going accelerated corrosion b. On-going liaison with experts in corrosion field c. Specialised separate treatment and storage for small artefacts recovered d. Appropriate site security measures provided

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D	Remaining Risk After Mitigation is Applied	a. Continued "normal" decay of AE2 b. Accelerated decay due to recent damage c. Drop & drag damage d. Diver visitor damage	Risks reduced to As Low As Reasonably Possible (ALARP) status for as long as the anodes remain.	Risks ALARP	Risks ALARP	Risks ALARP	Risks ALARP	Visitors will not see AE2's interior at first hand	Visitors will not see AE2's interior at first hand	Display will be less desirable if display must revert to "wet" storage & treatment regime due to corrosion reactivation Size of AE2 significantly greater than previous large example (the "Holland 1")
E	Protection to AE2 from Drop & Drag, Anchors or Pilfering	Poor. On going damage from dragged or dropped objects remains. Pilfering more likely as knowledge of AE2 position spreads	Possibility of on-going damage from dragged or dropped objects remains	Reduced possibility of on-going damage from dragged or dropped objects. Reduces probability of pilfering.	Reduces effect of damage from dragged or dropped objects or pilfering.		Possibility of on-going damage from dragged or dropped objects remains	Reduced possibility of on-going damage from dragged or dropped objects. Reduces probability of pilfering.	Reduced possibility of on-going damage from dragged or dropped objects. Reduces probability of pilfering.	No possibility of on-going damage from dragged or dropped objects or pilfering.
F	Preservation of AE2 From Corrosion	Poor. Corrosion likely to continue but at an accelerated rate.	Should arrest corrosion for a defined (finite) period	Corrosion likely to continue at an accelerated rate since recent scrape damage	Reduces effect of damage from corrosion.		Corrosion likely to continue at an accelerated rate since recent scrape damage	Possibility of accelerated corrosion occurring due to loss of concretion on shell and to exposure to more aerated water environment. Also possibility of man induced damage at display site	Possibility of accelerated corrosion occurring due to loss of concretion on shell and to exposure to more aerated water environment. Also possibility of man induced damage at display site	Possibility of accelerated corrosion occurring due to loss of concretion on shell and to exposure to atmosphere. Also possibility of man induced damage at display site
G	Legislative Approvals Required	Nil	Turkish approvals to fit to AE2	Turkish approvals to fit to AE2	Turkish Authorities to approve recovery.	Approvals from institutions exhibiting the replicas.		Turkish Authorities to approve recovery.	Turkish Authorities to approve recovery.	Turkish Authorities to approve recovery.
H	Environmental factors	Possible discharge of fuel oil as wreck decays Possible detonation of torpedo	Would arrest decay avoiding discharge of stored fuel oil	Would help to avoid discharge of stored fuel oil due to impact or pilfering interaction.			Discharge of fuel oil possible if ship's tanks ruptured by explosion or by damage inflicted whilst explosives being sought	Discharge of fuel oil possible if ship's tanks ruptured Possible evolution of silt plume during recovery Asbestos may find its way to the public	Discharge of fuel oil possible if ship's tanks ruptured Possible evolution of silt plume during recovery Asbestos may find its way to the public	Fuel oil can be removed Evolution of silt plume during recovery Asbestos may find its way to the public
I	Ethical Considerations	Does not meet Australia and Turkey's interests to preserve a historically significant relic	Goes some way to making amends for recent damage	Contributes to Turkey & Australia's obligations for the preservation of a key piece of their history.	Contributes to Turkey & Australia's obligations for the preservation of a key piece of their mutual history.	Contributes to Turkey & Australia's obligations for the preservation of a key piece of their history.		Contributes to Turkey & Australia's obligations for the preservation of a key piece of their history.	Contributes to Turkey & Australia's obligations for the preservation of a key piece of their history.	Contributes to Turkey & Australia's obligations for the preservation of a key piece of their history.
J	Tells AE2 story?	Through plaques & education program only	Plaques, replicas & education program all improved by physical focus offered by AE2.	Through plaques, replicas & education program only	Significant improvement to displays telling the story in Turkey & Australia.	Through public interest generated by displays.	Through plaques & education program only	Improved access to view AE2 and tell the story. Physical security arrangements must be adequate to prevent unauthorised access.	Improved access to view AE2 and tell the story. Physical security arrangements must be adequate to prevent unauthorised access.	AE2 would require wet treatment over a prolonged period (approx 13 years) and would not be fully viewable until a considerable time after the 2015 centenary
K	Tells The Turkish Story?	Through plaques & education program only	Plaques, replicas & education program all improved by physical focus offered by AE2.	Plaques, replicas & education program all improved by physical focus offered by AE2.	Significant improvement to displays telling the story in Turkey & Australia.	Through public interest generated by display of replica and inclusion of the Turkish perspective in display explanation.		Significant improvement in public access to the site.	Significant improvement in public access to the site.	Significant improvement in public access to the site.
L	Significant progress by 2015?	Through plaques & education program only	Should be achievable within 6 months of go-ahead being received.	Should be achievable within 12 months of go-ahead being received	Results would start to be seen by the public once conservation had been completed, say 3-5 years.	Results would start to be seen by the public within a relatively short time (say within 24 months of go-ahead being received)	May be achievable within 12 months of go-ahead being received - dependant on weapon's location within AE2	Possible within the timeframe available given timely decision to go ahead	Possible within the timeframe available given timely decision to go ahead	"Dry" exhibition unlikely for a significant period of time (approx 15 - 20 years with current technology) due to time required, and complexity of, treatment involved
M	Political Risks	Low until AE2 decay becomes a matter of public concern	SoW achievable in a relatively short period of time with a relatively modest outlay	SoW achievable in a relatively short period of time with a relatively modest outlay	SoW achievable in a relatively short period of time	SoW achievable in a relatively short period of time say 2-3 years.		SoW achievable in a relatively short period of time, say 3-5 years.		Long time to reach ultimate goal of a dry display unlikely to align with political horizon, a risk that there will be a loss of interest.
N	Self Funding Potential	Nil	Nil	Nil	Limited compared with likely project and conservation running costs	Limited compared with likely project capital cost. Should cover running costs	Nil	Limited compared with likely project and running costs Access for non-divers depends on depth and design of site.	Limited compared with likely project and running costs	Limited compared with likely project and running costs
O	Establishment Costs (AE2) - NB cost include scaled values together with estimates. Confidence levels diminish with time to execute and scale of undertaking.	Nil			AUD 3.0 M (3 Recovery trips) AUD 15.7 M (Immediate & long term conservation measures) TOTAL AUD 18.7 M	Estimate A\$5 M for 5 replicas constructed from fibre glass, with computer generated holograms for internal scenes. TOTAL AUD 5.0 M	AUD 3-5 M (3 Site visits with ROVs) TOTAL AUD 5.0 M	TOTAL AUD 64.7 M	TOTAL AUD 82.1 M	TOTAL AUD 102.5M
P	Running Costs (AE2)	Nil	AUD 0.15 / year for diver & ROV inspection and annual anode replacement.	AUD 0.1M in addition to cathodic protection maintenance	5 years running costs included in "O" above	AUD 0.05/ year		15% of capital, AUD 9.6 M	15% capital costs, AUD 8.3 M	Similar to Option 4 plus additional facilities and conservation costs, AUD 11.4 M.

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Q	TOTAL COSTS (2007 AUD - incl 5 year running costs)	Nominal AUD 1.0 M allowed for establishment of an Exclusion Zone	AUD 1.645 M	AUD 2.71 M	AUD 20.57 M	AUD 5.7 M	AUD 5M	AUD 74.3 M	AUD 96.6M	AUD 123.4M
			Total for Option 2: AUD 30.63 M				Total for Option 3: AUD 79.38 M			
	Project Goals		To achieve the project goals safely							
			To protect the AE2							
			To preserve the AE2							
			To tell the AE2 story							
			To achieve significant milestone progress by Centenary in 2015							
	Project Organiser		AE2 Commemorative Foundation Ltd							