



Ref: FOI2021-019

Email

21st December 2021

Dear [REDACTED]

Further to our email of 24 November 2021, regarding your request for information:

Could I ask the following Questions with Respect to AWE & Ageing Assets
1) *Has the Licensee complete their Self Assessment & can I have a copy?*

Your request has been handled as a request for information under the Freedom of Information Act 2000 (the Act).

A search for the requested information within the Atomic Weapons Establishment (AWE) has now been completed, and we can confirm that information in scope of your request is held.

We are able to disclose a redacted copy of the requested document. It has been redacted to maintain an appropriate level of classification.

After careful consideration we have decided that the redacted information is exempt from disclosure under the following sections of the Act:

- Section 24(1) – National Security
- Section 26(1) – Defence
- Section 27(1)(a)2(3) – International Relations
- Section 43(2) - Commercial Interests.

These are qualified and prejudice based exemptions subject to a Public Interest Test (PIT) which means that the information requested can only be withheld if the public interest in doing so outweighs the public interest in disclosure. We can confirm the PIT has been conducted and it has concluded that the redacted information should be withheld in full.

For each of the exemptions applied, we will now set out arguments for and against disclosure in terms of the public interest with the reasons for our conclusion.

Section 24(1) – National Security and Section 26(1) - Defence

These exemptions are qualified and, as such, it has been necessary to decide whether, in all the circumstances of the case, the public interest in maintaining the exemption outweighs the public interest in disclosure.

Section 24(1) of the Act states that information is exempt if it is required for the purpose of safeguarding national security. AWE considers that the redacted information in the document meets this exemption, on the basis that releasing information regarding our infrastructure, both the commercial and research



contracts, could disclose sensitive information to the world at large, and could be pieced together by potential adversaries to cause harm to the UK's national security.

Releasing details of AWE's arrangements with our commercial and research partners would supply adversaries with valuable and highly sensitive data on the identity and nature of our partners, and the nature of the specialised contracts in which we engage. The very nature of our deterrent requires information on its scope, scale and potential vulnerability to be withheld so that it remains effective in its role as a strategic defensive weapon. Therefore, providing the requested document in an unredacted format would highly likely impinge on the national security of the United Kingdom (UK).

Although the FOIA contains a presumption towards disclosure, there is a strong public interest in withholding the information requested on the grounds that knowledge of the precise details within the document could assist parties with malicious intent in the planning and execution of attacks against the infrastructure behind the continuous at sea deterrent (CASD).

Section 26(1) applies to information which if disclosed would, or would be likely to prejudice the defence of the British Isles or the capability, effectiveness or security of the armed forces of the United Kingdom (UK) or its allies. Section 26(1) has been applied to the redacted information because its release would be prejudicial to the defence of the United Kingdom and her allies as it details the capability, effectiveness and security of CASD which would enable adversaries to assess the nature and scope of current projects and future thinking, allowing a better understanding of defence capabilities and reducing the operational benefits of these projects.

AWE is also required to abide by the Government Classification guidance.

Section 27(1)(a) – International Relations

Section 27(1)(a) of the Freedom of Information Act provides that information is exempt if its disclosure under the Act would, or would be likely to prejudice relations between the United Kingdom and any other State. Some of the redacted information contained within the requested document falls under this exemption.

It is acknowledged that the release of the information would demonstrate the Government's commitment to openness and transparency, however the disclosure of highly sensitive research partnership information would assist an adversary, a non-nuclear weapon state or any third party looking to compromise CASD. Any disclosure of the sensitive information contained in this document would provide potential adversaries with invaluable information and be prejudicial to the UK's interests in the non-proliferation of nuclear weapons as well as leaving us in breach of our international obligations. Breaching these agreements would significantly damage the UK's international reputation and critically damage trust in the UK's ability to protect sensitive information provided in confidence by our allies.

We have weighed the factors in favour of disclosure against the public interest in protecting the UK's international relations and the balance of public interest was found to be in favour of withholding the redacted information in full.



Section 43(2) – Commercial Interests

Section 43(2) also is applicable to some of the information requested, because disclosure under the Act would or would be likely to prejudice the commercial interests of any person (including the public authority holding it). The information contained within the document which applies to section 43(2) is in relation to commercial and research contracts, which if released would be highly likely to prejudice the contractor's commercial interests.

This is because of the very specialist nature of the work that some of our suppliers conduct on our behalf and the limited number of parties there are in this space. Apart from compromising the identity of the parties, there is a risk that giving an indication of who the suppliers are could be used by adversaries and their competitors. We therefore consider there is a risk to both AWE's and third parties' commercial interests.

Information disclosed under the FOIA is considered to be public information, and while there is a presumption towards disclosure, consideration needs to be given as to who will have access to this information beyond the requestor and the purposes for which they could use the information. AWE has assessed the impact of releasing the requested information under the exemption section 43(2), and requested the opinion of both the Ministry of Defence and the Office for Nuclear Regulation in order to decide whether disclosure would, or would be likely to, prejudice their commercial interests or those of any third party(ies). All parties have agreed the redactions in the document.

If AWE were to release the requested information it would be highly likely to impact on the contractors and also prejudice its ability to effectively negotiate and achieve best value for the public purse. It is AWE's view therefore that, at this time, the public interest in withholding the information outweighs the public interest in disclosing it.

Section 16 (1) – The Duty to Provide Advice and Assistance

You may find it helpful to note that the Office of Nuclear Regulation will be releasing a report which is not specific to the findings in this document, but based on the findings of this document in Q2 2022, the precise date is unknown.

Please remember to quote the reference number above in any future communications. If you have any queries regarding the content of this letter, please contact this office in the first instance.

If you are unhappy with the way your request has been handled you have a right to request an internal review within 40 days of receiving this letter, by writing to information.requests@awe.co.uk or our postal address: Information Requests Team, AWE Aldermaston, Reading, RG7 4PR. If you are still unhappy after an internal review has been completed, under the provisions of Section 50 of the Freedom of Information Act 2000 you have the right to take your complaint to the Information Commissioner's Office. Please note the Commissioner will generally not consider a complaint until you have exhausted AWE's internal complaints process.

Yours sincerely,

AWE Information Requests Team

Reference: ONR111-115b	AWE Sites	Issue: 02
	Ageing Management Plan Self-Assessment	Date: 16/02/21



AWE Self-Assessment of Ageing Management Plan Against RGP

Review Report

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Document Approval

Originator	Checked	Reviewed	Authorised
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Issue 01G	21 Jan 21	Final signatory review
Issue 01	1 Feb 21	Issued for NSC information
Issue 02	16 Feb 21	Updated with NSC comments, SGM for noting.

Previous issues of this document are to be destroyed or marked Superseded

This document will be re-issued in its entirety following amendments

Distribution / Notification

Name	Position	Method (e-mail, hard copy, notification)	Date
[REDACTED]	ONR	email through RICC	On issue
AWE Executive	AWE Executive	email	On issue
[REDACTED]	MOD	email	On issue
Signatories	As determined	email	On issue
ES&A Leadership	Engineering (Sites & Assets)	email	On issue
[REDACTED]	Head of Asset Management	email	On issue
[REDACTED]	Head of Estate Strategy	email	On issue
[REDACTED]	Head of Site Operations	email	On issue

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Executive Summary

This report has been developed in response to the ONR Chief Nuclear Inspector request [Ref. 1] for an AWE themed inspection on the subject of Ageing Management. The inspection seeks to determine whether the condition of the plant is adequately understood, there is an adequate plan to manage plant condition and to what extent the plan is being adequately implemented. The request considers various topics, including:

- The AWE's self-assessment of the current status of their plant
- The existence, adequacy and timeliness of the licensee's ageing management plan
- The implementation of the plan on site
- The extent and nature of proactive and reactive work

AWE's self-assessment is structured around the themes suggested by guidance from the ONR and will inform future regulatory engagement and considers:

- The identification of Relevant Good Practice (RGP)
- A review of AWE's performance against this practice
- The evidential basis of the review
- Appropriate internal assurance of the claims, arguments and evidence presented

The scope covers engineered systems recognised as relevant to nuclear safety, plus some conventional systems, and samples current practice in the Technology Centres. It includes reference to ongoing regulatory engagement on the subject of Ageing Management and related responses. The report describes the site optimisation strategy, planning, challenges and continual improvement activities. This recognises that AWE is currently in transition to alignment with the BS EN ISO 55000 Asset Management standard, which promotes through-life asset management as a cornerstone. It details and assesses improvements highlighted by operational experience and output from other reviews that relate to, or improve ageing management across the site. Appropriate evidence is either detailed, pictured or referenced and the AWE Lead Facility Assurer has provided assurance of the claims, arguments and evidence presented.

The self-assessment noted that AWE now has a good and comprehensive level of standards and procedural guidance in the areas of design and operational maintenance and there are ongoing improvements with regard to transition into full through-life asset management. The main processes and procedures are developed, implemented and in continuous improvement through experience of use. However, the supporting organisational changes required to embed the move to a reliability and compliance based asset management model are still in process. To ensure robust improvement, the changes will require proportional application and focus as it moves through the resultant cultural change to sustainment.

In conclusion, the review finds that AWE adequately understands that ageing and obsolescence are key risk factors for continued safe and reliable plant operations. There is a plan in place to assess and manage plant and infrastructure condition and the plan has been implemented, which is demonstrated by new and refurbished facilities being delivered to sustain capability.

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Abbreviations and Acronyms

ALARP	As Low As Reasonably Practicable
AMIT	Asset Management Improvement Team
AM-LTA	Asset Maintenance-Lead Technical Authority
AMP	Asset Management Plan
AMS	Asset Management System
AP	Approved Person – could be Electrical or Mechanical or Specialist
[REDACTED]	[REDACTED]
BAT	Best Available Techniques
B2E	Beginning 2 End
CBM	Condition Based Maintenance
CE(S&A)	Chief Engineer (Sites & Assets)
C&I	Control & Instrumentation
CMRP	Certified Maintenance Reliability Practitioner
CMS	Company Management System
CUI	Corrosion Under Insulation
DA	Design Authority
DAP	Duly Authorised Person
DFDA	Delegated Facility Design Authority
EA	Environment Agency
EIA	Evaluation International Association
EMIT	Examination Maintenance Inspection Test (Nuclear safety related assets)
ES&A	Engineering Sites & Assets
ESH	Environment, Safety & Health
ESIP	Electrical Safety Improvement Programme
FDA	Facility Design Authority
FDCTAG	Facility Design Compliance Technical Advisory Group
HSE	Health & Safety Executive
IAEA	International Atomic Energy Agency
IPR	Intellectual Property Rights
LFA	Lead Facility Assurer
LTA	Lead Technical Authority
MA	Management Arrangements
MED	Mandatory Elements Document

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MM	Maintenance Manager
M&RE	Maintenance & Reliability Engineer/ing
MPF	Main Production Facility
MSS	Management System Standard
MSP	Management System Procedure
NEDF	Nuclear Engineering Director Forum
NPP	Nuclear Power Plant
NRM	Nuclear Risk Management
NSC	Nuclear Safety Committee
ONR	Office for Nuclear Regulation
PAE	Principal Asset Engineer
PEM	Principal Engineering Manager
RGP	Relevant Good Practice
RIO	Risks Issues Opportunities (list)
SAP	Senior Authorised Person – could be Electrical or Mechanical
SED-DEM	Safety and Environmental Detriment - DEMolition
SGM	Site Governance Meeting
SIP	Structured Improvement Programme
SME	Subject Matter Expert
SSC	Structures Systems Components
SQEP	Suitably Qualified Experienced Person/nel
TA	Technical Authority
[REDACTED]	[REDACTED]
WO	Work Order
WSO	Work Supervising Officer

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1 GENERAL INFORMATION AND RELEVANT GOOD PRACTICE

1.1 Introduction

The purpose of this self-assessment report is to collate and present the AWE response to the ONR Chief Nuclear Inspector's (CNI) themed inspection on ageing management [Ref. 1]. The report is structured in accordance with subsequent ONR advice of 4 specific theme titles [CM9 Ref: 2020/307740]. Against each of those 4 themes, the assessment considers:

- The identification of good practice
- A review of AWE's performance against this practice
- The evidential basis of this review
- Independent validation of the claims, arguments and evidence presented

The AWE estate is ageing, resource intensive to run and there are strategic plans to streamline the business and make efficiencies. Therefore, in considering AWE's self-assessment of plant condition with respect to ageing effects, this report details the site strategy and how that flows through the site objectives to deliver an integrated site plan. This in turn drives the actions in upgrading the capability of the infrastructure and organisation to deliver to the programme whilst complying with the requirements of operating under a regulatory framework and nuclear site licence.

The CNI themed inspection is based the ENSREG Topical Peer Review on Ageing Management [Ref. 2]. The question set was reviewed and relevant sections summarised as:

- Ageing management programmes
 - External peer review services
 - International cooperation
 - Methodology for scoping nuclear SSCs subject to ageing management
 - Delayed NPP projects and extended shutdown
 - [REDACTED]
- Concealed pipework
 - Use of results from regular monitoring of the condition of civil structures
 - Performance checks of new or novel materials
 - Inspection of safety related pipework penetrations
 - Scope of concealed pipework included in ageing management plans
 - Opportunistic inspections
- Reactor pressure vessel – glovebox containment more relevant to AWE
- [REDACTED]

Whilst some of the ENSREG question set is relevant to AWE as a nuclear site operator, the nature of the questions related to reactor pressure vessels, containment and indeed pipework penetrations are specific to power/research reactors, which AWE no longer has. Although the term containment is used at AWE, it is not applicable in the same context as the ENSREG question set. Moreover, peer review and international cooperation will be subject to national defence security restrictions.

Consequently, an important element of this review is to consider what is deemed to be RGP for application across the AWE sites, therefore, the review will identify British Standards (BS), Codes of Practice (CoP) and guidance from a variety of sources and also the interactions with other Nuclear Licensed Sites and wider industries.

To provide an evidential basis, this review includes summaries of previous AWE reviews and associated improvement recommendations, ongoing improvements and planned implementation activities. The self-

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assessment element will include proportional sampling of the suitability of AWE's management arrangements, periodic review of safety forward action plans, nuclear System Structure & Components (SSC) engineering assessments and ongoing internal facility Licence To Operate (LTO) assessments. However, it will not delve into the detail of programme or project schedules or assess delivery dates.

1.2 Exclusions

As the themed inspection focusses on nuclear SSCs and, with a view to both report classification and client advice, the following areas were excluded:

- Warhead engineering
- Production engineering – although some infrastructure elements will be included
- Trials and research engineering – although some infrastructure elements will be included
- Scientific equipment – although scientific facilities and plant are included
- [REDACTED]
- [REDACTED]
- Security Systems

1.3 Industry Relevant Good Practice

Relevant Good Practice (RGP) for ageing management has been developed by various organisations and continually updated over many years. Such examples are the British Standards (BS) that have been integrated with international standards to form the BS EN ISO range but also include Codes of Practice from regulatory bodies and guidance from industry bodies. AWE is a complex and diverse business with nuclear, chemical, explosive and ionising radiation hazards, which creates an exceedingly broad range of what might be considered RGP with respect to ageing management. However, this review focusses on the key RGP identified by application at AWE specifically with respect to management of nuclear plant and directly supporting infrastructure.

1.3.1 AWE Customer Guidance

AWE's client, the MOD, also produce procedures and standards that have an impact on their supply chain and are to some extent applicable at AWE. For example, certain Joint Service Publications are applied and some Defence Standards may be relevant for specific operations related to the product. However, the baseline requirement is compliance with legislation, British Standards and Licence Conditions (and Authorisation Conditions where applicable).

1.3.2 British Standards

Ageing and obsolescence management are implicit elements of any framework for plant design, maintenance and operational management, consequently, some harmonised British Standards that have been used as RGP for development of AWE asset management procedures over the years typically are:

- a) BS EN ISO 60300-1:2014 Dependability Management, guidance for management and application
- b) BS 7671:2018 Wiring Regulations
- c) BS ISO 27001 Information Security Management
- d) BS ISO 13374 Condition Monitoring and Diagnostics of Machines
- e) BS ISO 61508 Functional Safety of Electrical, Control & Instrumentation Safety Systems
- f) BS EN ISO 62402 Obsolescence Management
- g) BS ISO 55000 Asset Management
- h) ISO 19650 Building Information Modelling

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1.3.3 Conditions, Regulations and Guidance

The phenomena of ageing has long been recognised across the nuclear industry due to the long service life of nuclear plant and associated safety systems, devices and circuits. Similarly, other high hazard industries, such as oil & gas and aviation, also recognise the increasing cost and risk in respect of extending the operational life of plant beyond the initially envisaged end of service date.

The 36 Nuclear Site Licence conditions do not mention ageing specifically but do include the lifecycle of design, construction, manufacture, commissioning, operation and decommissioning phases, which will inherently include ageing management.

The Provision and Use of Work Equipment Regulations (PUWER) require work equipment and plant to be inspected prior to use, for which asset ageing factors and deterioration monitoring is implicit. Also, Pressure Systems Safety Regulations (PSSR) Approved Code of Practice (ACOP) Regulation 12 and Lifting Operations and Lifting Equipment Regulations (LOLER) Regulation 9 note examination for deterioration/ageing.

Consequently, there are a wide range of guides on the subject from the HSE and International Atomic Energy Agency (IAEA) as well as technical assessment guides from the ONR that are recognised as examples of ageing management RGP at AWE:

- a) HSE Summary Guide to Managing Ageing Plant
- b) Research Report 363/2001 – Best Practice for Risk Based Inspection (RBI) as part of plant integrity management
- c) Research Report 509/2006 – Plant Ageing, Management of equipment containing hazardous fluids or pressure
- d) Research Report 823/2010 – Plant Ageing Study – Phase 1 Report
- e) Research Report 912/2012 – Management of Ageing – A framework for nuclear chemical facilities
- f) COMAH Ageing Plant Operational Delivery Guide
- g) NS-TAST-GD-009 – Examination, Inspection, Maintenance and Testing of Items Important to Safety
- h) NS-TAST-GD-016 – Integrity of Metal Structures, Systems and Components
- i) IAEA Safety Specific Guide-48 – Ageing Management and Development of a Programme from Long-Term Operation of Nuclear Power Plants
- j) IAEA Specific Safety Requirements 2/1 – Safety of Nuclear Power Plants: Design - Requirement 31 Ageing Management
- k) IAEA Specific Safety Requirements 2/2 – Safety of Nuclear Power Plants: Commissioning and Operation - Requirement 14 Ageing Management
- l) WANO GL 2018-02 Equipment Reliability

As can be seen from the following example extracts from the list above, the guidance is a variation on a theme and cites ageing management as a fundamental element of a site operator's asset management strategy. It is recognised that such RGP needs to be assessed against the context of AWE operations and therefore might not be fully applicable in all cases:

- List item a) HSE Summary Guide to Managing Ageing Plant:

Section 3.0 - Management of Ageing

Plant ageing should be managed as part of a well-structured Health, Safety and Environment Management System (HSEMS). In many cases the term "ageing" may not be mentioned explicitly but management of ageing issues should be catered for in the management of system integrity and functionality and covering all asset types.

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- List item h) NS-TAST-GD-016 – Integrity of Metal Structures, Systems and Components:

Ageing and degradation

Paragraph 5.120 Of particular importance are degradation mechanisms in SSCs that are difficult or impractical to inspect in service. In these cases, conservative estimates of the minimum safe working life of the SSCs should be included in the design and appropriate surveillance schemes specified.

- List item k) IAEA Specific Safety Requirements 2/2:

Requirement 14: Ageing Management

The operating organization shall ensure that an effective ageing management programme is implemented to ensure that required safety functions of systems, structures and components are fulfilled over the entire operating lifetime of the plant.

Paragraph 4.50. The ageing management programme shall determine the consequences of ageing and the activities necessary to maintain the operability and reliability of structures, systems and components. The ageing management programme shall be coordinated with, and be consistent with, other relevant programmes, including the programme for periodic safety review. A systematic approach shall be taken to provide for the development, implementation and continuous improvement of ageing management programmes.

Paragraph 4.51. Long term effects arising from operational and environmental conditions (i.e. temperature conditions, radiation conditions, corrosion effects or other degradations in the plant that may affect the long term reliability of plant equipment or structures) shall be evaluated and assessed as part of the ageing management programme. Account shall be taken in the programme of the safety relevance of structures, systems and components.

1.3.4 Industry Guidance

AWE maintains corporate membership and engages with multiple pan-industry organisations who are also developing RGP with respect to plant ageing and obsolescence management, such as Engineering Equipment and Materials User Association (EEMUA), Society of Maintenance Reliability Practitioners (SMRP) and International Council on Systems Engineering (INCOSE). For example, some technical RGP documents available on the EEMUA website are used as RGP information when updating AWE standards and practice documents:

- EEMUA Publication 206: Risk Based Inspection, a guide to the effective use of the RBI process – used as a guide for updating AWE RBIs for Pressure Systems and Mechanical Piped services
- EEMUA Publication 231: The mechanical integrity of plant containing hazardous substances, a guide to periodic examination and testing – used to determine SQEP management example for intelligent client review activities
- EEMUA Publication 159: Above ground flat bottomed storage tanks, a guide to inspection, maintenance and repair – to be used as reference for updating the AWE work instruction on environmentally sensitive equipment bund and gully inspections

1.3.5 Forums and Working Groups

AWE attends multiple and various forums, working groups and seminars [REDACTED]

[REDACTED]. For example, at the [REDACTED] the ONR highlighted issues with water hammer identified from an accident at Heysham Power Station and referred to HSE bulletin STSU2-2019 and the related 5-

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point action plan detailed in the SAFed fact sheet on 'Potential hazards created by water hammer in steam systems'. AWE subsequently produced a site-wide Amber Alert based on the external OpEx and instigated actions to assess the risk across the AWE distribution systems and make improvements. Further detail on OpEx is provided in Section 6.3.

It should be noted that the forums and working groups also gain representation from various other cross industry operators and SMEs, such as [REDACTED]. The main fora known to maintain interactive discussions and knowledge sharing on plant ageing and obsolescence are:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

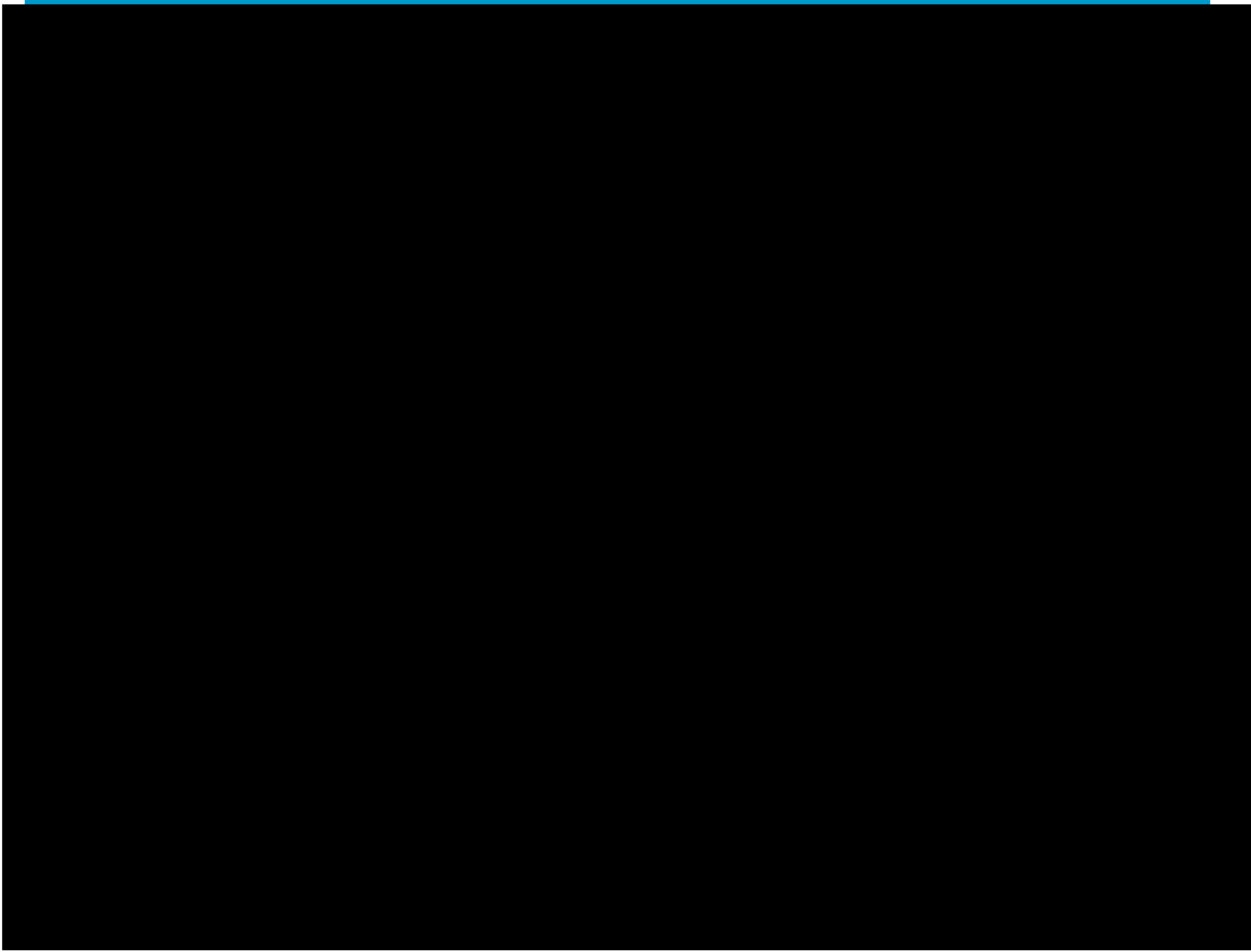
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2 IDENTIFICATION OF LEGACY AND AGEING ISSUES

The long history of AWE includes many phases from the Atomic Weapons Research Establishment taking over the wartime RAF airfield in 1950 and Royal Ordnance Factory Burghfield in 1987. Indeed, it only became a Nuclear site licensee in 1997 when the then Nuclear Installations Inspectorate granted nuclear site licenses for A & B sites. As such, depending on the scientific or production need at the time, the facilities on the sites range in age, design and purpose but have also seen changes in usage and configuration or become a legacy. Moreover, the site management has also changed to a Government Owned Contractor Operated model since 2000, although the sites and assets are still wholly owned by the MOD. This provides AWE PLC with a relatively unique and complex set of ageing issues to understand and manage on behalf of the MOD client. Consequently, the site strategy has been reviewed in the past 10 years and optimised to reduce the site footprint commensurate with the planned needs. Enactment of this strategy will see transition from facilities and areas that do not support the current and forward programme. Recent organisational change information is that 2021 will see the site transition back under the MOD as an Arm's Length Body; it is not expected that management board level changes will adversely affect the site strategy.

2.1 Site Optimisation Strategy and Plan

The Site Optimisation Strategy and Plan [Ref. 3] is intended to support AWE's and the MOD's aspirations in line with the challenges (Fig. 1) by facilitating a more efficient estate and addressing risk from aged facilities, plant and equipment.



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The Site Optimisation Strategy and Plan is regularly reviewed and updated and will guide and direct our estate/asset management activities in the future. There are two elements:

Part A: Site Optimisation Strategy sets out the strategic direction and optimisation outcomes for the AWE estate for the period to [REDACTED]. Optimisation is defined as those activities which lead to the development of a more efficient, effective and sustainable estate. It sets out the current state of the estate, notably its ageing nature, and [REDACTED]. AWE’s vision for an optimised estate is founded on the creation of strategic development zones and changes to how services are delivered (including the adoption of a new service delivery model in most of the estate). The strategy then describes how we propose to achieve the vision, including the governance model and the principles which will guide decisions about the estate. The contributory strategies are shown in Figure 2.



Figure 2 – Optimisation and Related Strategies

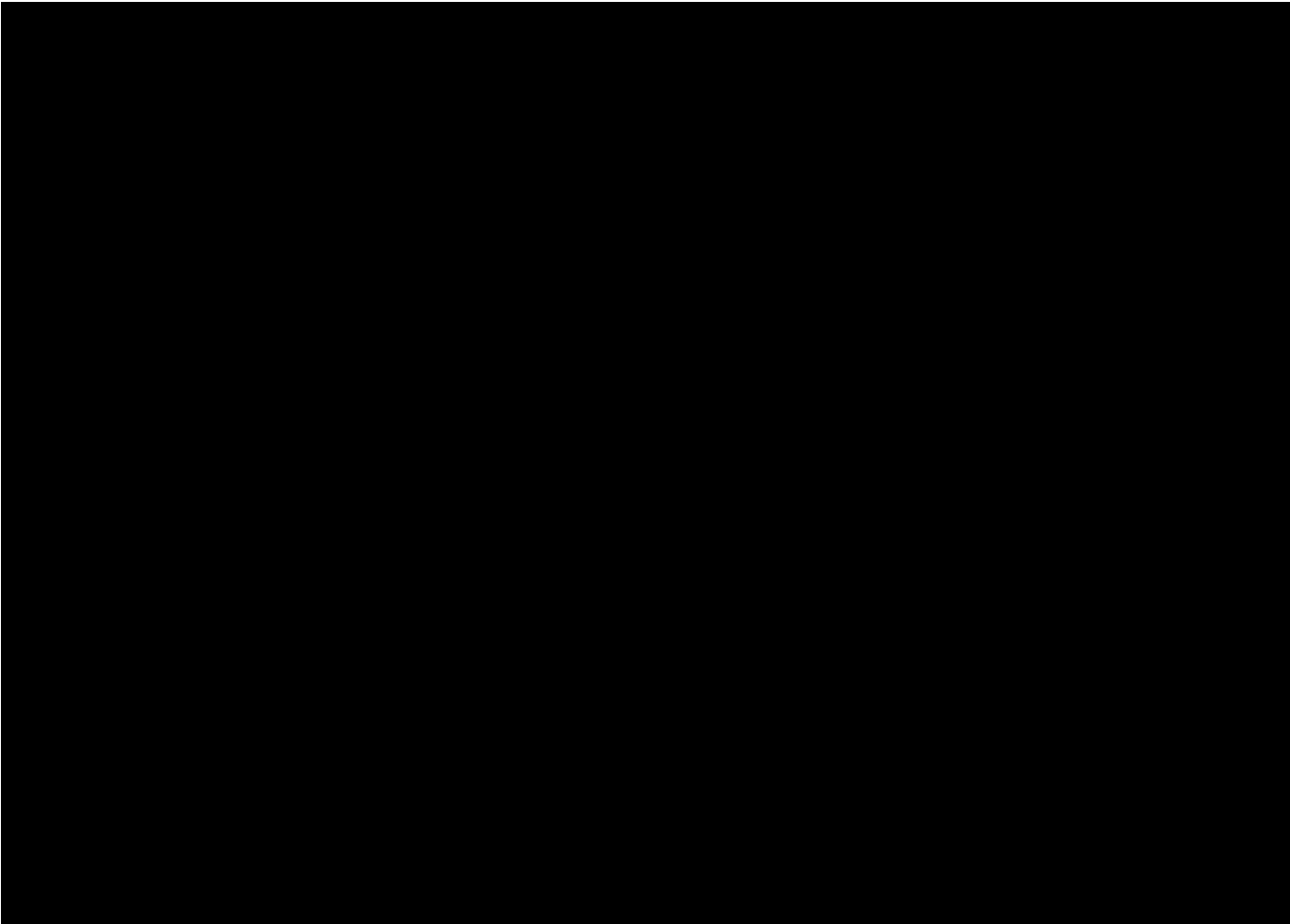
Part B: Site Optimisation Plan describes key steps which will need to be taken over the [REDACTED] to deliver the Optimisation Strategy outcomes. It also describes the specific work which will be undertaken in the short term to [REDACTED]. This breaks down into 4 themes:

- The first element will focus upon the management, organisation and ownership of the Asset Management Programme. This will drive benefit realisation and outcomes and will ensure alignment across the entire AWE (A) and AWE (B) sites, providing common work controls and a reinvigorated approach to maintenance engineering.
- The second element will see an enhancement and development of the extant Asset Management System (AMS). This will lead to a more effective use of the AMS tool to become the single source of asset information to inform investment decisions.
- Thirdly, there will be a development of focussed and effective metrics and performance measures to support the key milestones elements of the Asset Management Programme.
- The final element is focussed on the maintenance strategy itself. This will see the implementation of a structured, holistic approach to through life asset management which is driven by [REDACTED].

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2.2 Asset Management Programme Metrics

In support of providing the data to monitor progress to the site optimisation strategy, the AM metrics were implemented in 2016 and have been driving the improvements towards meeting the mission and strategic objectives and are presented at Figure 3. Although ageing is recognised as one of the risks to be managed, it is not a specific metric; however, the effects are evident in various of the metrics such as maintenance schedule adherence and whole-life operating costs.



2.3 Asset Management Review

As noted in Part B of the Site Optimisation Plan, a transformation of the approach to Asset Management was required to help de-risk the upcoming production programme, whilst providing appropriate availability of assets to deliver future needs. Post in-house policy and strategy development between 2015 and 2017, a collaborative review was undertaken with [REDACTED] which included activities at a comparable installation ([REDACTED]) including ISO 55000, leading to a series of 21 recommendations being made for phased implementation over a five-year period that, if successful, would then transition into Business as Usual (BaU):

- 1) Create an Asset Management Improvement Team (AMIT)
- 2) Improve communications / collaboration between estates
- 3) [REDACTED]
- 4) Establish an O&M systems engineering function
- 5) Consolidate the work control function

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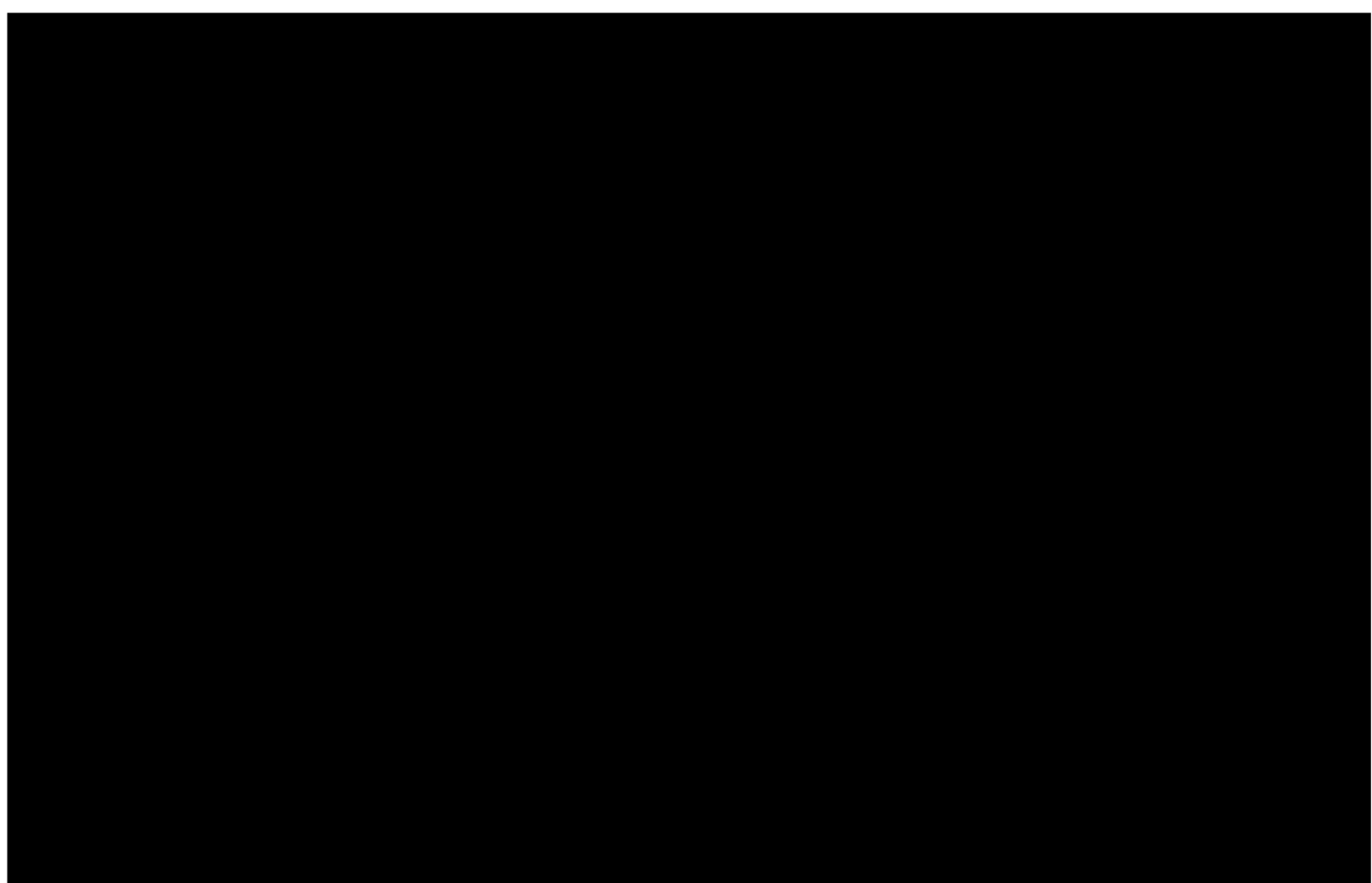
- 6) Asset Management change control board
- 7) Metrics
- 8) Maintenance strategy optimisation (In-service FMEA activities)
- 9) Implement integrated master schedule
- 10) [REDACTED]
- 11) Failure reporting – problem, cause, remedy
- 12) Perform root cause analysis failure analysis
- 13) Develop an RCM plan
- 14) Establish definition of an asset
- 15) Logistics / inventory management
- 16) [REDACTED]
- 17) Predictive testing and inspection insertion
- 18) Workforce development / training
- 19) Asset Management Plan improvements
- 20) AMS improvements
- 21) Conduct asset management assessments
- 22) *Post report addition - Other scope that comes to light during implementation*

On review of the findings, the AWE Chief Operating Officer (now Executive Director Operations) authorised [REDACTED], and appointed the Asset Management Improvement Team (AMIT) as the principal body in AWE for the assessment, evaluation, and implementation of improvements in the delivery of all aspects of the Asset Management programme in accordance with industry best practices and ISO 55000 guidelines; within the scope of delivery terms of the framework contract with the MOD; and consistent with maintaining compliance with all existing Site Licence Conditions. The key outcomes of [REDACTED] are to ensure programme certainty, [REDACTED]. The introduction of Asset Management Plans and improving [REDACTED] will highlight ageing issues requiring management and a [REDACTED] workstream entitled ‘Ageing and Obsolescence’ was included in 2019 under recommendation 22 to review and improve the management arrangements with respect to ageing management.

2.4 Site Development Plan

As noted earlier, the journey towards an optimised site is predicated on the implementation of a zoning model; reduced footprint [REDACTED]. The principle behind this is the creation of an estate management and operational framework which consolidates and rationalises land uses with similar regulatory and security needs. Zoning enables services to be delivered in a different way enabling facility capabilities to be managed more sustainably. This in turn can facilitate appropriate application of processes, procedures and standards, whilst accommodating the unique operational constraints that apply to nuclear licensed sites. The resultant plan against the strategic goals (Figure 4) reflects the acknowledgement of the large and ageing estate with a set of measures designed to make future management of the estate more efficient.

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[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

2.6 Legacy Building and Area Management

As buildings become surplus to requirements, in line with the [REDACTED] they follow through 4 preparatory phases before demolition:

- Post-Operative Clean Out (POCO) (empty of all mobile and non-hazardous equipment)
- Care and Surveillance (includes both systems maintenance and RA monitoring)
- Decommission (Removal of contamination, contaminated and hazardous equipment)
- Care and Maintenance (Essential maintenance of remaining infrastructure only)
- Demolition

Each phase is discrete and there may be gaps before transitioning to the next phase, depending on risk, funding availability and resource capacity. Where a group of legacy facilities are no longer required, they may be subjected to POCO and placed in Care and Surveillance but zoned off as an area of no investment until such time it can be fully decommissioned and demolished.

At the time of writing, Zonal facilities area on AWE(A) site has [REDACTED]. Demolition of the legacy buildings is necessary to reduce demand on site services, such as electrical distribution, steam heating and resource, which correspondingly enables focus on programme essential buildings and infrastructure. As a matter of note, with regard to electrical safety management improvements, the procedure and guidance for electrical services disconnection for buildings no longer in use has been implemented [REDACTED].

2.7 Building Condition Surveys

As part of the legacy building surveillance activity, AWE schedules and carries out periodic Building Condition Surveys (BCS). These surveys are driven by a procedure [REDACTED] scheduled through AMS and delivered by [REDACTED]. Once the survey is completed in accordance with a Maintenance Instruction [Ref. 6], the BCS report is issued to the [REDACTED] for review of deterioration and ageing risks, recording and informing the site asset risk reviews.

2.8 Ageing Infrastructure and Plant Replacement Plan Progression

Evidence of footprint reduction and progression of the demolition and land repurposing is visually apparent on [REDACTED]

[REDACTED] This will further reduce utilisation on the ageing site electrical, water and steam distribution networks.

In the past decade the site optimisation strategy for addressing ageing facilities and infrastructure has resulted in many new facilities built, some modified for alternative use, areas of site vacated and decommissioning works. A snapshot of examples are:

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- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Other facilities and services have been subjected to mid-life update/life-extension/capability upgrade projects:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

2.9 Summary

The ongoing review and update of the site optimisation strategy, now on Issue 4, and related asset management and estate management activities demonstrate that the cost and risk associated with management of ageing is recognised across the sites at the Executive level. This is essential to enable sanction of investment planning for replacement facilities from the MOD customer and funding of the improvements required to manage the ageing plant and infrastructure now known to be essential to the programme, known as value stream. The subsequent investment is evidenced by the new facilities coming on line and progressive closure, decommissioning and demolition of the aged facilities. There is a clear plan and it is progressing.

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3 THEME 1 - EFFECTIVE STRATEGIES FOR THE CHARACTERISATION, MONITORING TRENDING AND ANALYSIS OF AGEING, AT FACILITY SYSTEM AND COMPONENT LEVEL ARE PRESENT

3.1 Estate Ageing Risk Characterisation

It should be noted that asset age itself does not necessarily directly equate to increased risk, as some aged assets are still able to deliver their function or capability with appropriate management. Therefore, at the strategic estate management level, ageing is characterised as a potential risk likely to impact safety, continuous improvement to performance, [REDACTED]. This is assessed and managed through the [REDACTED] which describes the requirements for capture when undertaking a review of [REDACTED] (any buildings/ plant & equipment/ infrastructure that are integral to the relevant value stream processes) within Estate areas. The outcomes of the procedure [REDACTED] [REDACTED] relevant assets to support investment planning, through life management and maintenance scheduling. The process is depicted in Figure 5.

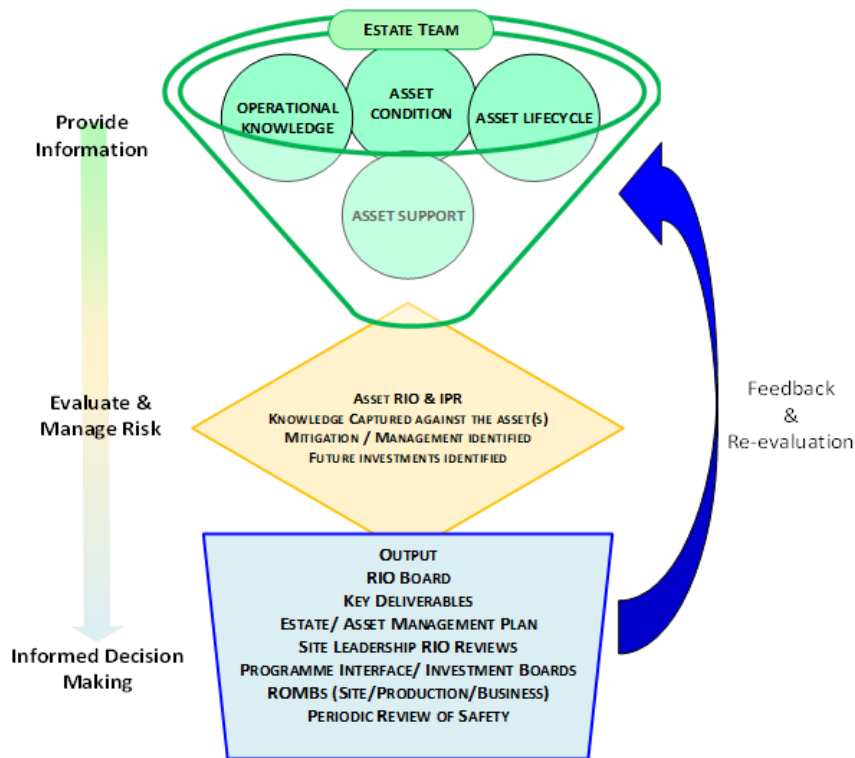


Figure 5 - Investment Planning Review

3.2 Asset Management Strategies

The guiding company strategies for Asset Management (AM) are contained in the site Strategic Asset Management Plan (SAMP) [Ref. 8]. The SAMP key high-level strategies aligned to management of ageing during the operational phase are maintenance [Ref. 9], obsolescence [Ref. 10] and spares management [Ref. 11]. As part of continuous improvement, [REDACTED] reviewed the strategies on the formation of the Ageing & Obsolescence Workstream and identified a gap with respect to informing on expectations and responsibilities in establishing ageing management. Consequently, the Asset Integrity Management (AIM) strategy [Ref. 12] was developed and rolled out in September 2019. The aim of this strategy is to identify and mitigate for life-limiting factors during operations and challenges presented by ageing throughout an

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asset life-cycle. It provides direction to all who engage with establishing and maintaining the integrity of assets for the whole life-cycle. The training package associated with embedding this ethos is in development and planned for roll-out in [REDACTED] to designers, project managers, operators, maintainers, assurance specialists and all others who would benefit. This aligns with the timings for planned rollout of the organisational updates required to support the move to an AM model.

3.3 Through-life Investment Planning

As noted in 3.1, AWE plans all asset investments and work on the basis of through-life investment planning (both in project and business as usual processes). AWE uses the following lifecycle guidance:

- [REDACTED] (essentially a 'procurement' lifecycle),
- Building/large asset use lifecycle (Lifecycle Status Guidance document),
- Plant & equipment lifecycle guidance is in [REDACTED]

AM Activities	Comment	[REDACTED]
Asset Acquisition	Procurement of AWE assets (of all sizes) are managed through AWE's procurement processes and these are integrated to the Asset register, project, finance and works planning systems.	[REDACTED]
AM Prioritisation	Investments (asset work) are prioritised to realise best asset value at the optimal balance of performance, cost and risk. The costs and outcomes of Asset Management activities and work are recorded in AMS, irrespective of investment decisions, so as to support performance monitoring and continuous improvement.	[REDACTED]
Asset Registration	There is a strategic requirement for all relevant assets to be registered in a configured asset register. This register is held within [REDACTED]	[REDACTED]
Asset Importance	AWE uses Asset importance to drive effective Asset Risk management and inform the resulting AM activities required to effectively manage that asset.	[REDACTED]
Asset Maintenance	The most appropriate Asset Maintenance for an asset is defined through the completion of the Asset Optimisation process.	[REDACTED]
Asset Enhancement	The requirement to Refurbish (improve building life, quality or size), Re-kit (improve plant/system capability) or renew (e.g. replace old with new) an asset or group of assets is documented in the respective EMP / AMPs.	[REDACTED]
Asset Decommissioning and Disposal	AWE's Decommissioning and Demolition Programme for site defines the overall schedule of activities for decommissioning and disposal of AWE's facilities. The Programme considers [REDACTED], [REDACTED], AWE site end state considerations and inherent asset value.	[REDACTED]
Management of Change	All AM activities completed as part of the AM improvements are subject to, and comply with, the corporate arrangements for change control.	[REDACTED]
Outsourcing	Outsourced AM activities and management of outsourced AM activities are managed in accordance with AWE's Outsourcing Management Plan.	[REDACTED]

Table 1 - AM Activities in the Asset Lifecycle and associated processes and procedures

Asset planning is supported by the modelling of forecast scenarios and is based upon:

- Configured asset status (performance & condition)
- Works required (capital change or maintenance)
- Cost vs. benefit

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- Capability demand and resource availability data
- Balancing of resource across Strategy and Operations
- Through Life Cost
- Total Cost of Ownership

Accurate modelling, based upon total cost of ownership and knowledge of associated asset risks, will enable AWE to maximise the value from its investments in assets.

3.3.1 AM Performance Evaluation Activities

AM performance evaluation, comprising monitoring, measurement, analysis and assessment, is completed through a series of integrated activities (Table 2), each scheduled in accordance with the AM performance evaluation schedule as part of the Strategic Asset Management Plan [Ref. 8 Table B-7].

Performance Evaluation Activity	Description
AM KPI Dashboard	Core AM KPIs used to demonstrate achievement of AM Objectives and AM Mission <i>Key tool for Estate Strategy & Planning and AM mission achievement has been in place since 2016 and updated monthly. Comprises an A3 sheet showing key 7 leading and 8 lagging KPIs linked to AM objectives. [REDACTED]</i>
AM Maturity Assessment	AWE's assessment tool to determine the current AM maturity against the requirements of the AM Arrangements <i>An annual assessment as a pre-cursor to development of the AMP. It enables Estate Areas and Estate Strategy & Planning to understand the AM maturity and assist with setting future goals and improvement activities.</i>
Management Review	Structured annual review of effectiveness and performance of the AMF and associated elements <i>To understand current performance and effectiveness and identify opportunities for improvement as a pre-cursor to the annual Estate Strategy & Planning meeting.</i>
State of the Estate	Annual review of estate performance <i>Annual report in accordance with and coordination with Office of Government Property (part of the Cabinet Office) as part of the contracted deliverables. Provides a look back at the estate changes of previous year and anticipated next year. September 2020 report in evidence [01AAHE-846718701-18] on Ozone SharePoint.</i>
AM KPIs	Strategic and tactical KPIs used for monitoring AM performance developed in accordance with AWE processes and procedures for the development and governance of KPIs [REDACTED] <i>AMIT has developed a book of [REDACTED] to be selected, applied and measured. They are intended not for blanket application but as a pick list to cover various scenarios. At the time of writing, they were in review and will be implemented in line with the Maintenance & Reliability Engineering Organisation standing up.</i>
Asset condition & Health	Reviews to understand and score the current condition of the respective assets <i>A baselining of AMS condition data activity being delivered through the implementation of [REDACTED]. These FMEA type assessment activities are being [REDACTED]</i>
Cost management	Application and monitoring of Control Accounts with Finance and Business Management <i>In line with the Asset Lifecycle KPI and enable investment or retire decisions. An as required activity in support of Asset Management Plans.</i>

Table 2: AM performance evaluation activities

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3.4 Plant and Asset Condition Management

There is historical evidence, such as AMS breakdown records, LC22 modification records and legacy procedures, that site infrastructure maintenance activities have managed ageing and deterioration of assets, either centrally or in-facility, depending on the site operators and requirements at the time. Therefore, the extant AWE ageing management plan is intrinsically linked to the current oracle database Asset Management System (AMS) where site nuclear plant and infrastructure maintenance activities have been centrally collated, controlled and managed. As is normal in an ISO 9001 compliant business, the AMS is subject to periodic review and improvement and, in its current InforAM database form, has been in operation since 2008. However, as discussed in Section 2, it is understood by AWE that a significant amount of the facilities, plant and equipment is beyond its envisaged design life and a move to a through-life management model such as ISO 55000 is essential to enhance asset performance management. Consequently, the AMS procedural updates from 2013 onwards have been focussed on a more proactive reliability based philosophy in order to better align to an ISO 55000 framework. Indeed, the company Maintenance Strategy [Ref. 9] requires a Reliability Centred Management approach to maintenance and advocates the use of Condition Based Monitoring (CBM) for some assets and systems.

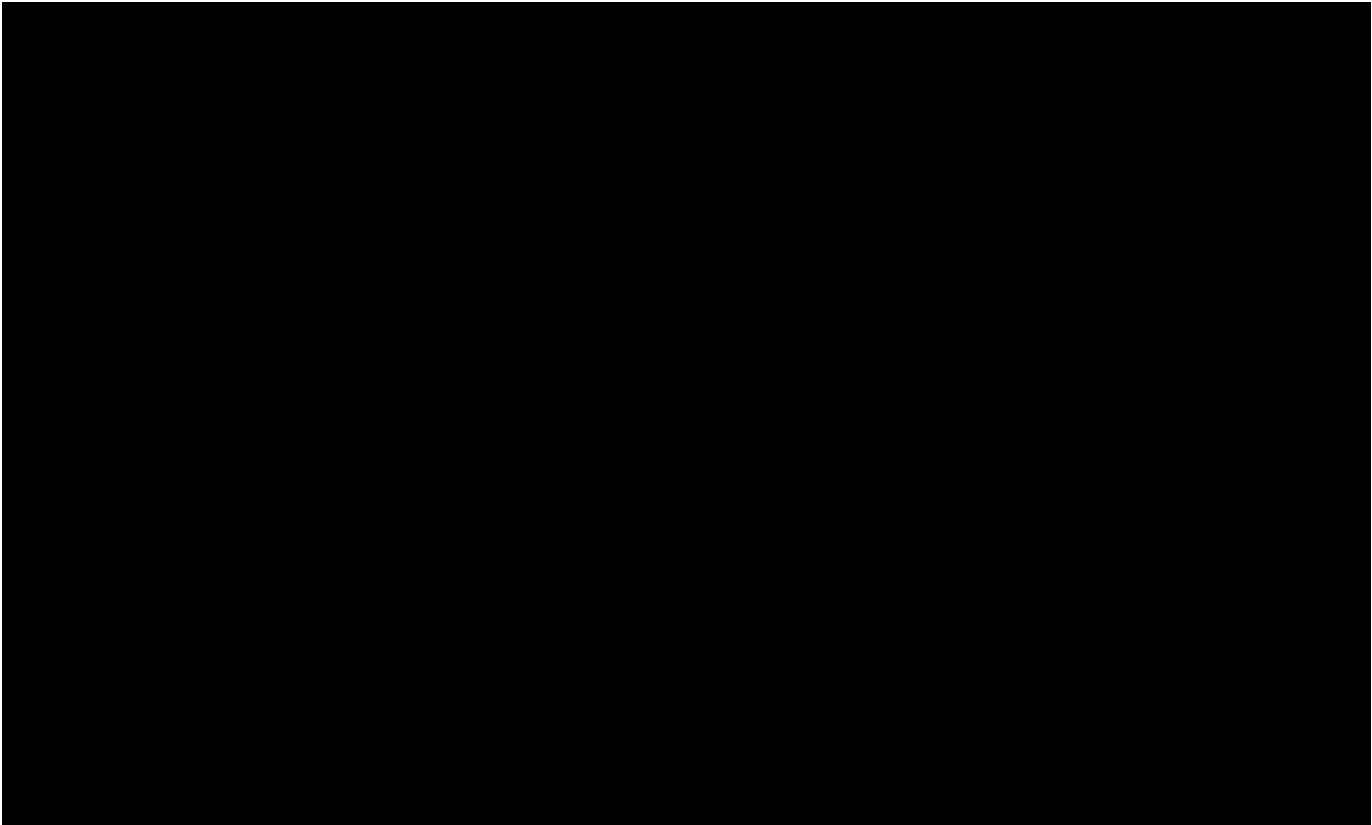
This maintenance framework, depicted at Figure 6, is designed to facilitate consistent and proportional approach to all aspects of infrastructure maintenance throughout AWE and thereby underpin future compliance with industry RGP for management of ageing nuclear production facilities. This is to ensure that all maintenance is either:

- Planned
- Preventative
- Condition Based
- Breakdown (including Service Requests)

It should be noted that AWE has employed CBM on an as required basis over the years but, as part of the AMIT, recently created a dedicated CBM team. The team is expanding the use of CBM technologies to more areas of plant than before, all scheduled through AMS. The team has various CBM technologies at their disposal, such as:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

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3.5 Asset Performance Monitoring

Asset Performance procedure [REDACTED], provides an overview of the monitoring, reviewing and improvement activities associated with the asset performance and maintenance delivery. The objective is to achieve continuous improvement through feedback into the project and operating phases of the asset life cycle. This procedure describes the activities and tasks associated with managing Asset Performance. Overall, the arrangements can be grouped into three main areas of activity:

- **Active Risk Management** - Processes and tools to set and monitor specific Asset Performance metrics and manage risks
- **Monitoring and Reporting** - Processes and tools for measuring, monitoring, and reporting asset performance
- **Performance Improvement** - Processes and tools for achieving, both short term and long term, sustainable improvements in asset performance

3.6 Performance Reporting

[REDACTED] defines the required reporting, monitoring and review of Asset Performance for corporate Key Performance Indicators (KPIs), cross company reporting and local reporting. It has been developed to drive corporate maintenance reporting on nuclear safety specific faults (known as EMIT) and breakdowns, alarm data and LC28 safety maintenance related task compliance. The output drives actions to address local or corporate trends. The maintenance backlog and LC28 compliance is reported monthly to the leadership and has been presented to the ONR at the Level 4 Engineering RIM. The report generated by the maintenance planning team is a point in time update and as such, does not have a reference.

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[REDACTED]

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Facility WMG	GENERIC 205 LTR DRUM INSPECTION	EMIT
CLASS 1,2 & 3 EMIT		

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

3.9 Periodic Review of Safety

Under Licence Condition 15, the licensee shall make and implement adequate arrangements for the periodic and systematic review and reassessment of safety cases.

The second round of PRS since site licensing (PRS2) has designated a programme related Control Account to take ownership of the wholesale review and update of the safety cases and associated engineering design assessment and substantiation documentation, including managing the design and implementation of fixes for identified key shortfalls in order to maintain operations for each nuclear facility. As part of these 10-

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year periodic reviews, all the engineered controls relating to the safety case claims are reviewed and assessed as far as possible. This includes the design of SSCs that provide a safety function, the predicted life remaining and the extant maintenance.

Review of the output from PRS2 as a 'Review Learn & Improve' exercise highlighted several areas for improvement. The area identified with respect to ageing management was that, although the design aspects were assessed, [REDACTED]

[REDACTED]

3.9.1 Site Safety Case Development

As part of the PRS review, it was recognised that the demands placed by facility safety cases on site services were not adequately understood, communicated and controlled. Consequently, a team was stood up to re-develop the site safety case by collating the demands and better understanding the reciprocal reliability capability of site services such as electricity distribution, steam network, water network, alarms, PA system, IT etc. The re-development of the Site Safety Case will highlight

[REDACTED]

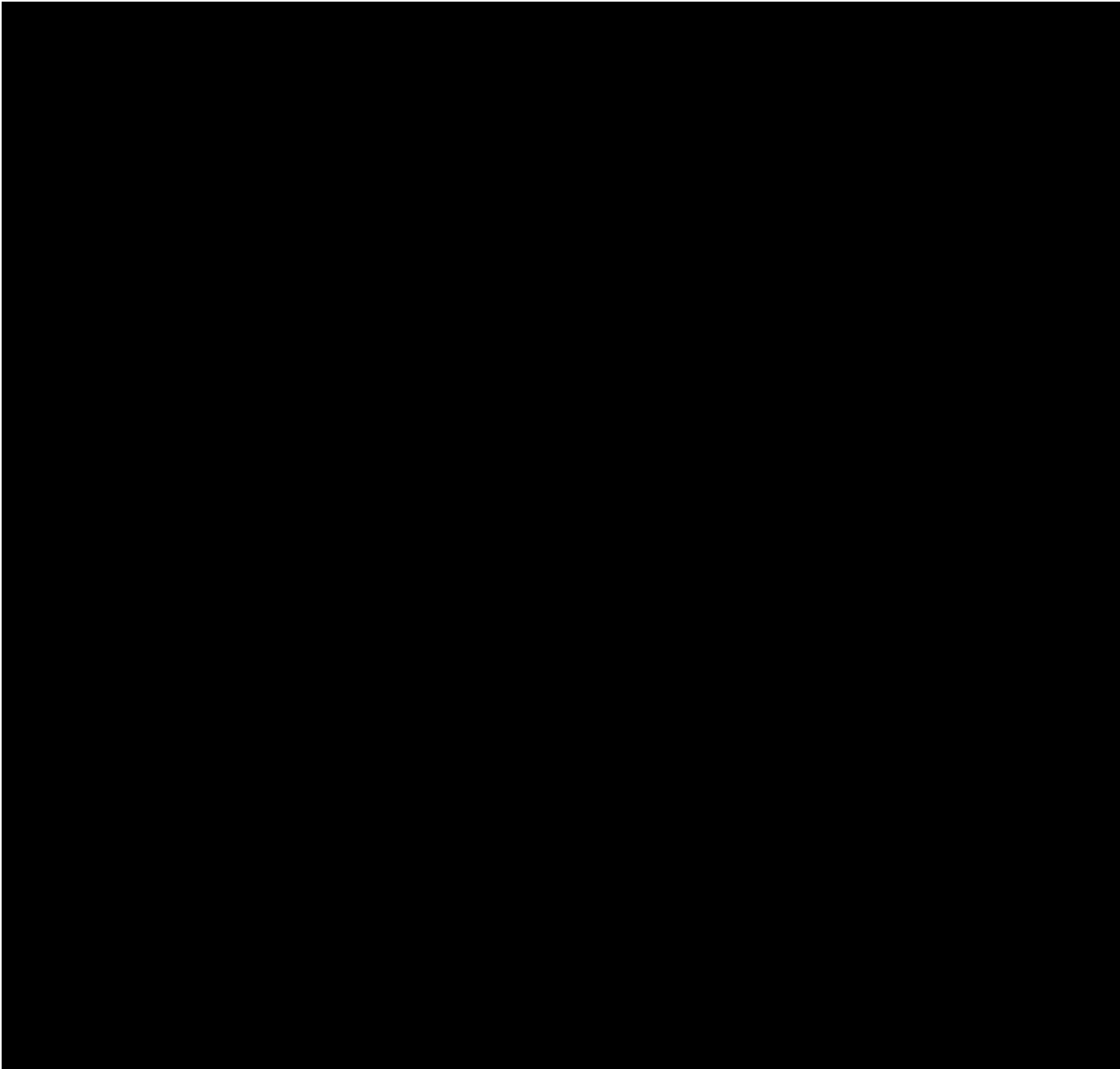
[REDACTED]

3.9.2 [REDACTED]

[REDACTED]

[REDACTED]

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3.10 Electrical Safety Improvements and Ageing Electrical Infrastructure Maintenance

AWE has been operating, managing and maintaining ageing electrical infrastructure against the relevant electrical standards, including BS 7671 wiring regulations, for many decades as part of business as usual. Recognition of periodic changes in the regulations have also led to changes in AWE risk mitigation activities. For example, electrical cables with VIR (Vulcanized India Rubber) insulation were typically installed until the late 60s. The cable typically consists of a tinned conductor that features a rubber coating. To help protect the conductor against moisture damage, a cotton braiding is placed over the rubber insulations. Due to the age of these cables, the rubber usually becomes brittle and is liable to fall away, leaving exposed conductors. Consequently, AWE has reviewed the installations periodically as part of the maintenance activities scheduled through the AMS and identified where VIR cabling is used. This has gradually been replaced where possible or is added to the RIO list and closely monitored by the [REDACTED]. [REDACTED] The majority of this is in closed buildings or buildings already under decommissioning and therefore the risk is considered low.

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3.10.1 Electrical Safety Improvements Programme

As part of improvements to better align to modern electrical management practice, such as HSG65, ISO 45001, IET and indeed updated AWE company standards and procedures, the Electrical Safety Improvement Programme (ESIP) was set up and implemented. The core intent was to incrementally improve electrical safety on site by collating the various electrical standards, procedures, guidance and work instructions into a cohesive Electrical Safety Management System (ESMS), roll it out through the Engineering Safety Organisation to the wider business, including 3rd party contractors, monitor improvement and address issues. The electrical improvements have also led to reciprocal improvements in consistency of key control and work control for access and maintenance of electrical installations. It is expected that this model will be paralleled to mechanical services with the bolstering of the Engineering Safety Organisation (ESO).

With respect to ageing, ESMS [REDACTED] includes a section on ageing management for electrical installations and one dedicated to VIR. As part of this improvement activity, the Electrical Installation Health Integrity Check MI [Ref.17] was also developed and scheduled in AMS as a vehicle to improve monitoring of the deterioration of electrical systems and application of appropriate risk mitigation activities in line with the company procedure. The health check MI is in addition to the statutory periodic electrical testing maintenance.

3.11 Building Condition Surveys

As noted in Section 2, BCS are carried out to inform on investment planning and risk management and the driving procedure is [REDACTED] [Ref. 18], which also includes periodic specific structural safety surveys that are carried out to a Mandatory Elements Document (MED) standard [REDACTED] by a structural SME, recorded and actions addressed.

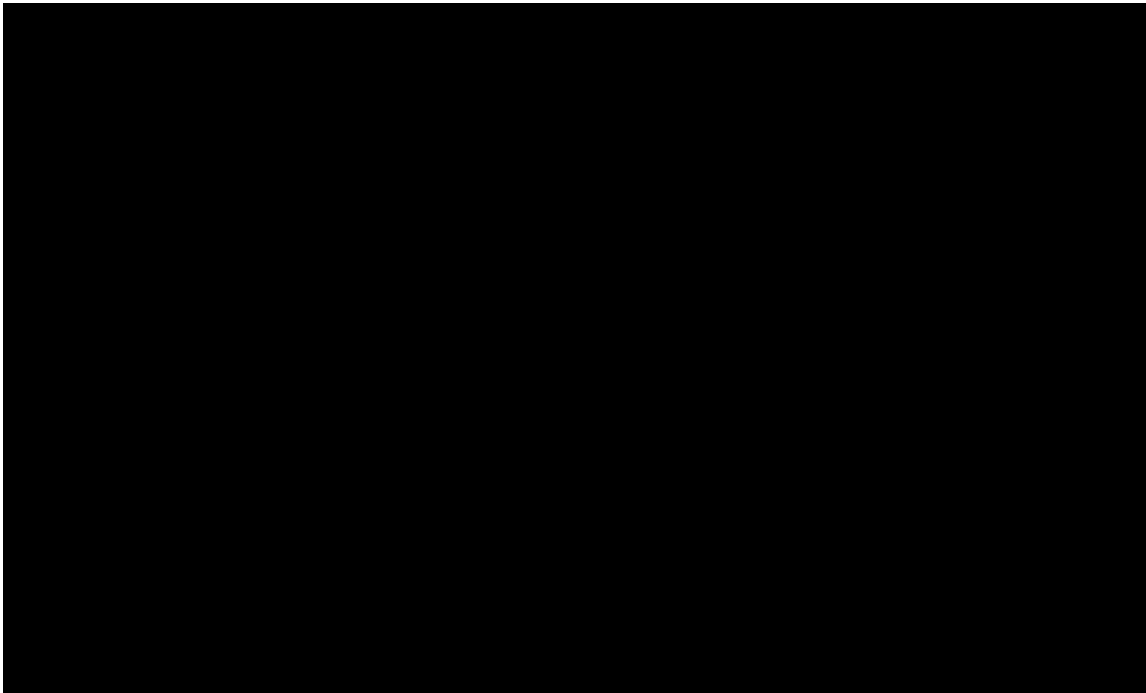
3.11.1 Ageing and Obsolescence Workstream Improvements

The [REDACTED] Ageing & Obsolescence workstream lead recognised that the BCS reports provide ageing and deterioration monitoring data as a result of on-site environmental conditions and could be used to better effect on ageing management. Also, the periodic structural surveys process could also be [REDACTED] thereby providing an holistic survey that would enhance understanding of the whole system, provide confidence of future operational reliability by identifying deterioration of areas not specifically inspected and feed into the PRS requirement. Consequently, there are activities in the AMIT Ageing & Obsolescence workstream to develop a system integrity health survey Work Instruction, update [REDACTED] schedule its application and produce relevant [REDACTED]

3.11.2 Introduction of Innovative Survey Technologies

As a further enhancement of surveys, another workstream was added to the AMIT scope under [REDACTED]. The workstream gained authorisation to fly camera drones in the controlled airspace over the MOD sites, procured industrial standard camera drones and trained drone pilots. [REDACTED]. The safety and cost benefits of using drones to photograph or video areas of site difficult to access, such as roofs, stacks and confined spaces, rather than placing personnel at risk is significant. The capability enables areas to be efficiently surveyed or monitored on request and with minimal disruption, which greatly enhances the ageing monitoring of difficult to access areas. Indeed, the capability is rapidly expanding and has recently procured a thermal measurement camera that can quantify heat loss through insulation. [REDACTED]

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3.12 Engineering Standards Periodic Update

In accordance with the quality process, the site engineering facility design standards developed by the Facility Design Compliance Group are periodically reviewed and updated to maintain alignment with relevant modern standards. Full detail on the development and maintenance of AWE standards with respect to ageing and deterioration is provided in [REDACTED] which has been issued to the ONR.

A similar procedure is in development for standards related to operational maintenance activities. The first iteration of AM(PE) 2075 (Legislative Change Procedure) describes the procedure for reviewing changes in external legislation, industry codes of practice and proposed updates based on a monthly bulletin provided by an external [REDACTED]. The procedure and supporting guidance is in development to establish how a baseline of maintenance practice might be managed.

3.13 Facility Monitoring Tools

As well as AMS maintenance activities, MSP 503 [Ref. 20] is a process whereby the facility management and ESH functions monitor compliance in the facilities and processes through 5 mutually supportive activities:

- **Senior Management Walk-Through** - A Senior Management Walk-Through (SMWT) is a planned interaction between a senior manager and those workers who carry out an operational task or undertake first-line supervision of an operational task. It is not an interaction between a senior manager and a more junior manager. The aim of the SMWT is for the senior manager to better understand the risks associated with an operation. Traditional monitoring arrangements such as inspections and audit can result in people being reluctant to speak openly due to the fear of highlighting a deficiency and then being given formal actions.
- **ESH Evaluation** - ESH Evaluation is a formal assessment of an area's ESH management arrangements. It examines leadership engagement and management commitment, employee involvement, and ESH implementation. An ESH Evaluation can provide a baseline of ESH management arrangements or can be used as a health-check on short-term activities.
- **Process Surveillance** - Process Surveillance is a review of a specific process for its correct application by the operator as defined by the process instruction documentation. Process Surveillance is carried out after a Process Walk-Down has been completed, and when the process is in operation. Process Surveillance should be applied with the same team who will be responsible

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for operating the process. The aim of surveillance is to ensure disciplined operation of the process, to remove variation in its application, and to reveal the true process variation. When correctly applied surveillance will identify poor application of the process and identify improvements for inclusion in the process instruction documentation. Process Surveillance also seeks to ensure that actions taken to improve or correct a process are effective and applied by all users.

- **Process Walkdown** - A Process Walk-Down is a review of the process requirements for their completeness in readiness for restart of operations. It is used where the process is not operational at the scheduled time or has not been operational for greater than three months. The walk-down should be applied with the same team who will be responsible for operating the process. The aim of a walk-down is to ensure that the full requirements for a process to operate safely, securely, and cleanly are in place, and clearly understood by all personnel involved.
- **Risk based inspections (RBIs)** - RBIs are inspections which can focus on aspects of compliance related to a specific hazard type or topic. There are [REDACTED] and a further 70 questionnaires covering topics for construction sites.

These activities often pick up on and place actions related to ageing plant and equipment; for example, the electrical RBI includes a question specifically related to the age and legacy standards of the installation to enable raising the risk for assessment in the Asset Risk process described in 3.1 and further detailed in 6.3.

[REDACTED]

3.14.1 [REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

3.14.2 [REDACTED]

[REDACTED]

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[REDACTED]

3.14.3 [REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED] at AWE Governance Reviews

All of the AWE internal reviews are subject to governance review and, if appropriate, authorisation to implement the recommendations presented. For example, a Nuclear Ventilation Review of Management Arrangements [Ref. 21] was submitted to the Nuclear Safety Committee and Site Governance Meeting prior to submission to the ONR. The ageing and obsolescence issues noted were recognised by the committees and is a common theme of questioning in subsequent governance meetings and submissions for periodic facility Authority To Operate approvals.

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The governance process itself is subjected to periodic management review and continuous improvement by the Assurance Function.

3.16 Summary

All of the strategies and related procedures, guidance and instructions described in this section form the components of an ageing management plan aligned to RGP. It is recognised that some of the improvements are in progress and the benefits of improved management of ageing and obsolescence will require an integrated approach to realise, such as the supporting organisational changes, including appropriate training and full communication to both company and supporting supply chain partners. However, the management arrangements for the characterisation, monitoring, trending and analysis of ageing at facility system and component level are in place and are being worked to. It is also evident that continual improvement of the processes and procedures related to the strategies is being enacted, which will ensure that they are fit for purpose.

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4 ONGOING REGULATORY AGEING MANAGEMENT ENGAGEMENT

Ageing management has been a regulatory engagement focus across the both conventional and nuclear industries for several years. Consequently, with an ageing nuclear site like AWE, there are several streams of engagement and ageing related Regulatory Issues being managed. The key engagements and related activities are described.

[REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]

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- [REDACTED]
[REDACTED]
[REDACTED]

- [REDACTED]
[REDACTED]
[REDACTED]

- [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

- [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

- [REDACTED]
[REDACTED]
[REDACTED]

- [REDACTED]
[REDACTED]

- [REDACTED]
[REDACTED]
[REDACTED]

- [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]

- [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

- [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

4.3.1 **EMIT PSSR Review**

As part of the response to [REDACTED] review was carried out of all the assets tagged on the [REDACTED] [REDACTED] with respect to corrosion [Ref. 26]. The report reviewed the systems for corrosion and found that maintenance inspections are carried out and include checks for corrosion. It found that the systems identified were at low risk from corrosion under insulation due to either material construction or location internal to the facilities.

The review made the following recommendations:

- Recommendation 1 - It is recommended that [REDACTED] with systems incorrectly categorised as PSSR shall be requested to raise an ACR to correct [REDACTED]
 - Information passed to relevant maintenance teams for addressing.
- Recommendation 2 – It is recommended that clarity on categorisation of EMIT is provided by the Maintenance Authority and rolled out across the company.
 - In progress with the site LC28 technical owner through update of the procedure.
- Recommendation 3 – It is recommended that the Engineering Safety Organisation prescribes the level of detail required for closure of 3rd party independent inspection WOs in order to enable the asset performance and deterioration monitoring and follow up with periodic checks for compliance.
 - In progress with a process developed and enacted and following up with updates to the WO management procedures (AM(PE)3020 and 3030)

4.4 **Structured Improvement Programme**

The two licensed sites controlled by AWE (AWE Aldermaston and AWE Burghfield) have been in enhanced regulatory attention for circa five years. AWE recognised that a safety or environmental incident could

[REDACTED] This includes incidents caused by the [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Although it is understood that management of ageing requires an integrated approach, the key elements of the SIP workstreams (Fig. 11) directly related to ageing are assessed to be Safe Operations, specifically

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Competencies and Periodic Review of Safety improvement known as Nuclear Risk Management, and Change, specifically configuration of key asset information.

At the time of writing, SIP SharePoint relays the following information about each of the key areas related to ageing:

- Competencies expected outcomes include:
 - Clearer, simplified and understood processes
 - Everyone knows what it means to work on a nuclear licensed site and lives up to the nuclear professionalism standard
 - A single competency framework and assessments
- Nuclear Risk Management expected outcomes include:
 - Introduction of a new safety audit model with an enhanced annual review and three yearly peer reviews in addition to the 10 yearly PRS
 - Identification of the safety case baseline documentation, and their relationships, for each nuclear facility
 - All safety case baseline documentation stored in the agreed document management location with correct metadata
 - Introduction of a tool to monitor the real-time configuration status of the safety case baselines
 - Procedural changes and updates giving clear guidance on how to maintain a safety case
 - Full understanding of the effect of change in a facility (cost, impact & accurate forecasting)
 - Development of detailed, resourced safety case management plans for each nuclear facility
 - Definition of the organisation reporting structure that enables the new safety audit model whilst maintaining the safety case baseline.
- Change Control & Configuration expected outcomes include:
 - All change is impact assessed and managed using a single, auditable process
 - Change has predictable outcomes - delivers what you expect it to
 - Baseline configuration information collated, securely stored and maintained
 - Decision-making is informed by accurate and up to date safety-related information
 - Clear personal ownership of safety information and knowledge, securely stored and easily accessed.

4.5 Environment Agency Regulatory Audit

The Environment Agency has a remit to regulate AWE for compliance with the environmental permit for discharges, emissions and holdings. In the course of these regular engagements, the EA regulators visit site and carry out walk-downs in much the same way the ONR carries out its regulatory duties. With respect to ageing infrastructure, there are ongoing engagements with respect to visual inspections of storage tanks and bunds in line with a recommendation from the EPC Compliance Assessment Report dated 13 June 2019:

Recommendation EAREC190613-01: *We recommend that AWE considers reviewing the adequacy of supporting guidance and training provided to maintenance staff involved in undertaking activities where visual inspection is used as the sole means of assessing asset condition*

AWE had previously identified an improvement related to the review and update of the extant guidance for ESE bunds, sumps and gullies, which will include training requirements. This has been included in the [REDACTED] Ageing & Obsolescence workstream asset health integrity check improvements noted in 3.11.1 and also cited as the response to [REDACTED] for progression management.

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4.6 Summary

Previous site strategies have included ageing risk management with plans for replacement of key infrastructure. Delays in provision of the replacement facilities has resulted in more ageing facilities requiring remediation and [REDACTED]

[REDACTED] Consequently, ageing management is receiving more focus and driving strategic Asset Management improvements. Coupled with the increased regulatory engagement on ageing management from both ONR and EA, there is a corresponding increase in AWE's application of resource to investigate and address highlighted concerns or recommendations. As noted earlier, it is not a short-term fix and will require continued efforts to embed the improvements and ongoing assurance review to confirm adequacy. It is considered that the strategic improvements in areas such as [REDACTED] and PRS will ensure that AWE identifies ageing earlier and manages risks in the future.

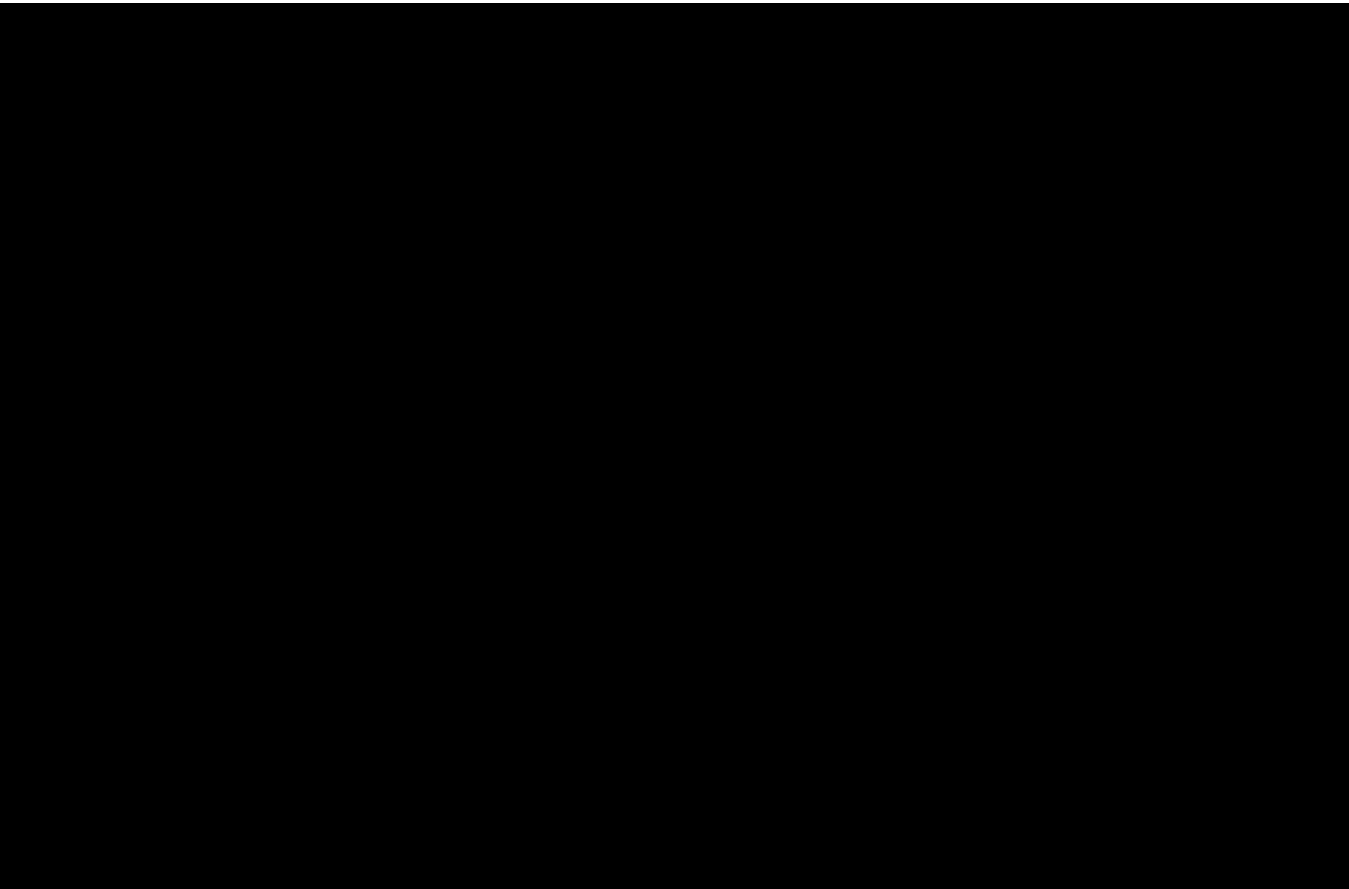
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5 THEME 2 – COMMITMENT TO ENSURE THAT THE RIGHT LEVEL OF ORGANISATIONAL CAPABILITY TO SUSTAIN SPECIALIST SAFETY CASE AND OTHER TECHNICAL CAPABILITY TO SUBSTANTIATE ON-GOING SAFE OPERATION

The AWE organisation has changed over the years depending on the site operating model, product and infrastructure programme phase, site licence and legislative requirements. In 2016, to further improve efficiency, establish better strategic visibility and deliver to the vision of being ‘A *high-performing, streamlined business delivering extraordinary products*’, the Site function was re-organised and an Organisational Change Assessment Form [REDACTED] submitted and approved. The background and need cited recognition that site provided facilities and services to enable the safe and secure delivery of science, engineering and production programmes in support of CASD. The drivers for change were:

1. Site needs to get better at understanding and managing demand
2. Site is unsure that the right people are in the right place and right roles, now and for the future
3. Site is not good at joining things up

The Site engaged with an external organisational design specialist and embarked on a structured organisational design programme. The proposal was authorised for implementation in Oct 2016. The current business strategy runs to 2022 but the product programme extends out [REDACTED] [REDACTED] Figure 11 provides a schematic of how the organisational functions link within the Asset Management sphere.



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5.1 Safety Culture and ESH Procedure Improvements

A variety of ESH reviews have been implemented over the years, including review of industry RGP such as [REDACTED] which have subsequently driven several safety management improvements.

A company-wide Safety Culture Survey was undertaken in early 2020 which highlighted a number of areas of vulnerability within the organisation. One of the key areas of concern identified through a site Stop For Safety was around the usability of procedures. As a result of workstreams initiated to address these issues, a ‘procedures’ workstream is aiming to target four areas initially: procurement, work control, the asset change process and safety case procedures. Work is being done to analyse why the use of procedures scored negatively in the survey and consideration is being given to how procedures could be improved, including looking at presenting the information in different forms as well as produced on paper, e.g. prepared as videos, or electronic work instructions.

This is particularly relevant to the wide-spread procedural changes being undertaken with respect to ageing and through life management. AWE needs to ensure that all the concurrent procedural updates are holistic, useable, embed correctly and deliver the required improvements.

5.2 ESH Function

For the ESH procedures and safety assessment specialism, a Training Needs Analysis was initiated in 2016 [Ref. 28] and an annual progress review takes place. The review assessed the needs of the specialist assessment community but also those in facility roles and project roles that also need to be aware of safety cases development and enactment. The annual review leads to development and provision of Minerva recorded training course such as:

- Safety Case Leadership and Ownership – rolling out to the leadership currently
- ALARP Awareness – ALARP principles in line with safety case development
- Safety Case Awareness for Facility Teams – working with a safety case
- Safety Case Awareness for Project Teams – developing a safety case and engineered controls
- Nuclear Hazard Risk Assessment - specifically for specialists

In order to [REDACTED] there is also an LC36 submission in development to address perceived shortfalls in the organisation and enable improved engagement with the supply chain to better communicate the forward plan for contracted support.

[REDACTED]

The [REDACTED] states that the project intent is to provide AWE with programme certainty, enhanced safety and improved value for money delivered through improved asset availability. This necessarily requires some organisational changes to support the capability and the reasons behind this change are presented.

5.3.1 Maintenance & Reliability Engineering Organisation

AWE is working at [REDACTED] it is essential that all critical assets required to deliver the core programme are available, reliable and have an adequate level of resilience to ensure programme certainty. [REDACTED]

- [REDACTED]
- [REDACTED]

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The intent of introduction of the Maintenance & Reliability Engineering (M&RE) Organisation is full-time engaged personnel who understand the benefits of Reliability Engineering and effective Asset Management. This will ensure maintenance is appropriate, maintenance plans are consistent, but tailored to demand, risk analysis methods are applied uniformly, data analysis and corrective actions are undertaken to ensure the needs of the Estate are met.

The key drivers for this change are:

- Recommendations and outputs from [REDACTED] and the business appetite to see programme and safety benefits
- Other organisational changes within the Site Function
- Introduction of modern maintenance technologies, processes and procedures.

Recommendations. This implementation for the M&RE Org Structure is to:

- Establish and appoint Reliability Engineers from the current pool of Facility Engineers who will be responsible for identifying system reliability and propose improvements to improve operational availability of their assets
- Re-structure the remaining Operations Engineering group to deliver a more effective and efficient Site Engineering Services (SES) maintenance delivery service
- Introduction of Maintenance & Reliability Engineering Managers to support the PAE. Allowing the PAE to focus on strategic, projects such as NRM and DFDA activities
- Greater focus on work planning and co-ordination for maintenance and engineering teams.

Key Benefits of the Implementation

- Encourages complete culture change switch from reactive to proactive maintenance and reliability engineering approach
- Reliable plant is safer plant through optimising maintenance touch-time and operator usage
- Enables closer working relationships between maintenance and engineering – providing a coherent/consistent approach to asset management
- Will gradually improve confidence in our plant and equipment with greater uptime for users
- With the introduction of the modern technologies to execute maintenance delivery there will be greater opportunities for team members to progress and develop greater skills
- Provides programme certainty to the business
- Greater integrated planning will increase utilisation and understand true cost of maintenance and engineering
- Allow the PAE to act fully in a strategic role and dedicating the correct amount of time to the DFDA appointment.

The M&RE Organisation is currently progressing through the LC36 approval process prior to implementation planned for [REDACTED]

5.3.2 Reliability Maintenance Practitioner Training

In order to support the organisational change noted in 5.3.1, [REDACTED] has implemented a Certified Reliability Maintenance Practitioner (CMRP) training and certification workstream. The training is provided and certification administered by the Society for Maintenance & Reliability Professionals and is an American National Standards Institute accredited programme that aligns to the ISO standards for accreditation. To date, over [REDACTED] personnel have been trained and are certified as CMRP. This training will be included as part of continuing SQEP for the M&RE organisation.

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5.3.3 Ageing and Obsolescence Management workstream

This workstream was created and accepted as an addition to the original [REDACTED] scope to update management arrangements with respect to ongoing ageing plant issues, such as [REDACTED]. The subjects were joined together to enable an holistic Asset Management life-cycle view of potential improvement solutions, make efficient use of project management capability and integrate with the plan for implementation of improvements. Achievements and progress is presented:

- Ageing & Obsolescence Management Arrangements Review [REDACTED] - Completed 2019
- Asset Integrity Management (AIM) Strategy [REDACTED] - Completed 2019
- Obsolescence Management (OM) Guidance Note [REDACTED] - Completed 2020
- C&I Designer OM Guidance [REDACTED] - Completed 2020
- Project Phase Maintenance Development Procedure [REDACTED] - Completed 2020
- Maintenance Strategies Guidance [REDACTED] - Completed 2020
- AIM training package - [REDACTED]
- C&I OM Operational Management Improvements - [REDACTED]
- C&I Obsolete Equipment Assessment Management - [REDACTED]
- Value Stream Eqt/Safety System Health Survey Procedure - [REDACTED]

Although the workstream is developing new management arrangements to better link design and operational management of ageing and obsolescence, it has been recognised that much of what is being produced is resurrection, update and re-issue of previous procedures and guidance that had fallen out of use a decade or so previously. For example, the maintenance development and strategy is based upon a previous Maintenance Authority Procedure developed in the 2000s and the obsolescence management guidance note [REDACTED] highlighting how BS62402 should be applied at AWE and details the extant applicable procedures.

In parallel, other [REDACTED] workstreams have been updating procedures, introducing new processes and delivering training. One of these is [REDACTED] that assess the potential failure modes for process plant and offer up optimised maintenance solutions for continued safe and reliable operations. The training is adding the Asset Care Strategy facilitator competence to the asset maintenance teams skill set and the teams are gaining valuable experience in carrying out asset maintenance reviews. To date, 11 full Asset Care Strategies have been completed on value stream equipment and enhanced maintenance activities implemented. For example, the main production facility has had one of the ageing ventilation system fan sets fitted [REDACTED]

As noted in Section 4, much of the workstream deliverables are being monitored through the L4 Engineering RIM and L4 Corrosion & Ageing RIM.

5.4 [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

5.5 Engineering Safety Organisation (ESO)

The ESO consists of discipline engineers appointed relative to their SQEP in order to oversee that operations are carried out with due regard to relevant statutory requirements, such as PSSR, LOLER, Electricity At Work etc. Under the authority delegated from the Chief Engineer (Site & Assets) the Senior Electrical and Senior Mechanical Authorities appoint Senior Authorised Persons (SAP), who appoint Authorised Persons (AP), Nominated Persons (NP) and Instructed Persons (IP) for both electrical and mechanical disciplines.

[REDACTED]

5.6 Process Safety and COMAH

AWE Aldermaston is a Lower Tier COMAH site. The ESH Process Safety team lead compliance monitoring on COMAH against [REDACTED] inventory management and in line with the Major Accident Prevention Policy [REDACTED] which states:

- We systematically identify and assess hazards and situations to prevent a major accident and ensure risks are adequately controlled
- We ensure that adequate resources are made available for preventing and responding to major accidents
- We perform all activities requiring the use of hazardous materials according to approved procedures appropriate to the nature of the hazard present
- We manage and reduce where practicable the holdings and use of hazardous materials

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- We develop, exercise and maintain appropriate arrangements to respond effectively to any major accident which may occur
- We periodically review the arrangements for preventing and responding to major accidents in order to verify their effectiveness
- We take account of new information on best practices as they become available

The policy reflects HSE Guidance COMAH 2015 and is signed onto by the AWE CEO. As enactment of the policy, the Process Safety team have also recently developed process safety metrics that company performance is monitored against and reviewed at board level monthly to ensure that AWE manages its dangerous substances appropriately and acts on developing issues or trends.

To promote process safety awareness, the team organise monthly ‘lunch-and-learn’ events open to all on relevant process safety subjects such as learning from the Nimrod crash, Buncefield, Challenger and Texas City plus talks by industry experts or survivors of industrial accidents. The events are always well attended and raise awareness across all of AWE of what can happen if safety focus is lost. The process safety intranet website provides COMAH applicability information, links to the procedure, other relevant information sites, such as HSE COMAH website and Q&A on the subject.

5.6.1 DSEAR Compliance – Process Engineering

DSEAR arrangements at AWE are described within [REDACTED] where roles and responsibilities are clearly identified. All DSEAR assessments are held within the facilities [REDACTED] and are readily accessible. The Facility Manager is responsible for ensuring that DSEAR assessments exist and are within date for their facilities. However, the Facility Design Compliance Process Engineering team maintains a database which identifies risk assessment review dates and then schedules the updates of these assessments. Most assessments are reviewed every 3 years, some assessments where changes are not expected are reviewed every 5 years. In addition to this, the Process Engineering team, selects two assessments at random per month to check that the controls within the selected assessments are adequate and are being appropriately implemented. The output of this audit is fed into the Process Safety metric, which is reported at an Executive level.

From an ageing management perspective, the DSEAR risk assessments will identify zones that require ATEX rated equipment and FDCTAG Process Engineering team review that the ATEX equipment is appropriately maintained as per the conditions identified in the ATEX certificate.

5.7 Nuclear Professionalism

Post the introduction of ISO 9001:2015 moving expectations of leadership from supporting to participating and update of the related ONR Technical Assessment Guide [NS-TAST-GD-093 Revision 2], industry RGP on safety management has been expanded to include all personnel as a key determinant of safety culture and nuclear safety outcomes. The ONR expectations of nuclear licensees are demonstrable performance against each of the four Leadership and Management for Safety themes:

- MS.1 Leadership: “Directors, managers and leaders at all levels should focus the organisation on achieving and sustaining high standards of safety and on delivering the characteristics of a high reliability organisation”
- MS.2 Capable organisation: “The organisation should have the capability to secure and maintain the safety of its undertakings”
- MS.3: Decision making: “Decisions made at all levels in the organisation affecting safety should be informed, rational, objective, transparent and prudent”

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- MS.4: Learning: “Lessons should be learned from internal and external sources to continually improve leadership, organisational capability, the management system, safety decision making and safety performance”.

In order to increase understanding across all of AWE that the tasks they deliver are executed accurately, with integrity and diligence without compromising safety on a nuclear licensed site, a package of training was developed and implemented in FY19/20. Every employee must carry out the training to establish a minimum standard so that all personnel:

- Share a common definition of what it means to work on a Nuclear Licensed Site
- Have clarity on the behavioural standards required of us all
- Understand what we do supports compliance with our Licence Conditions, improves our business performance and keeps our people safe
- Play our part in demonstrating compliance to our regulators

The training was implemented in FY19/20 through a mix of web-based applications and facilitated workshops providing different levels of detail to different levels of the business; level 1 for all and level 2 for senior leadership. The certification in Minerva consists of:

- Licence Condition Compliance
- Regulatory Framework
- ALARP, An Introductory Level
- Introduction to Leadership
- Leadership in Nuclear (Senior Leaders Only)

5.8 Summary

The section provides a snapshot of the ongoing work to commit to updating the safety and engineering organisation and refresh the focus on safety through alignment to the Leadership and Management for Safety RGP from ISO 9001-2015 and the ONR TAG 093. It is by no means all of the improvement activities at AWE but focussed on the technical capability that will be most closely related to management of risk and demonstrates commitment to sustainment of safe operations. It is holistically considered that the improvements will address previously identified shortfalls in specialist safety assessments, technical capability and enable effective ageing and performance deterioration management.

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6 THEME 3 – METHODS TO IDENTIFY AND MANAGE OBSOLESCENCE IN FACILITIES FOR THEIR OPERATIONAL DESIGN LIFE AND ANY POTENTIAL LIFETIME EXTENSIONS

6.1 [REDACTED]

[REDACTED]

6.2 [REDACTED]

[REDACTED]

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6.4 Site Strategy and Value Stream Capability Sustainment

Ageing and obsolete plant is assessed on a periodic basis within the TCs through development and review of the strategic Estate Management Plans (EMP) and operational Asset Management Plan (AMP), introduced as part of [REDACTED]. The EMPs/AMPs are on their 2nd iteration, directly linked to the RIO list and accessible from the company intranet AM SharePoint site.

6.4.1 Estate Management Plan Purpose and Objectives

An EMP forms part of the company Asset Management (AM) arrangements delivery and implementation strategy (aligned with ISO 55000). Their purpose is to translate strategy into actions that will ensure the company's assets deliver the programme and continuous improvement in performance. This EMP and associated AMP's are also consistent with the requirements of the company Asset Management System (AMS) and the company AM Arrangements, assisting AWE in achieving its AM Mission and Objectives.

The specific objectives of the EMP are:

- Define the AM Activities within TC to deliver the [REDACTED]
- Define the resource requirements to deliver these AM Activities.
- Identify a program of activities and improvement actions to deliver these activities at an optimal balance of performance, cost and risk.

6.4.2 AMP Purpose and Objectives

The purpose of the AMP is to define the current operating boundaries of the respective Asset Group (AG); that are required to achieve programme (Value Stream) delivery. This baseline assessment includes all estate, infrastructure, utilities, activities, resources and their required performance criterion to operate and manage assets effectively throughout their life-cycle.

The AMP not only determines the AG operating baseline but also identifies risks, issues and opportunities that can deliver continuous improvement for the effective Asset Management Planning (AMP) for Assets within the AG. This process is undertaken in accordance with Company Asset Management Arrangements.

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The assets within the scope of the AMP are grouped together into logical AG, these AG are aligned to either the Financial Control Account or TC Estate Work Breakdown Structure (i.e. a group of buildings that are associated by process and/or function).

6.5 Lifetime Extension

Facilities, process plant and equipment have a predicted life and it is understood that some assets may have to be operated beyond that predicted life. Once the EMP, AMP and RIO process have identified that an ageing asset is also an enduring asset, funding will be requested for an optioneering review. As part of that optioneering, 'Do Nothing' is always an option. However, in this case, 'Do Nothing' is taking account of the periodic maintenance review and optimisation, in which case, an asset may have an extended life managed by enhanced monitoring, such as CBM. If Do Nothing is not the preferred option, it may fall to modification or replacement. For example, the Main Production Facility is currently undergoing an enhanced review and substantiation exercise, with a view to extending the life of the facility infrastructure beyond that originally envisaged. This life extension will require a combination of data driven re-substantiation, modification and renewal. All change is subject to Asset Change Control in accordance with AM(PE)6020.

6.6 Summary

Obsolescence is managed proportionately through the AWE Asset Risk Management process, EMP and AMP. It aims to manage obsolescence in line with the British Standard (BS 62402) and the process is embedded in AMS for assets registered as having a high safety or business importance. It is recognised that bespoke value stream equipment can lead to an obsolescence risk, especially for [REDACTED] assets, and work is ongoing to assess how maintenance delivery can support how obsolescence is identified and mitigated on extant plant.

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7 THEME 4 - SUSTAINED FOCUS AND COMMITMENT TO ONGOING INVESTMENT IN PLANT, PEOPLE AND PROCESSES CONCERNED WITH AGEING MANAGEMENT.

AWE has a significant current and forward investment plan to renew ageing plant and infrastructure and improve how key ageing plant and infrastructure is maintained. This level of investment has necessarily required improvements in investment planning and management, therefore, although some improvements may not directly relate to ageing management, they will have a positive effect.

7.1 Establishing a Programme Management Office (PMO)

In order to deliver to the current requirements and also develop the new capabilities required by the client, the AWE PMO was set up in 2015. The PMO acts on behalf of the Programme Director to integrate programme elements across AWE, develop a unified view of the business for the AWE Executive and the Customer and make informed decisions to avoid unintended consequences. The PMO has the following accountabilities:

- Provide Programme direction and leadership to deliver on time, to budget and at the required quality
- Provide appropriate funding for personnel, infrastructure and operations
- Coordinate performance reporting for all programmatic activities
- Integrate, de-conflict and prioritise programmes and projects, and
- Undertake stakeholder management and maintain vital relationships

AWE's Programme scope is set out in the Management & Operations contract framework. This has changed the way work is planned, controlled, measured, risk managed and progress reported, both internally and to our customers. The major deliverables from the PMO include:

- Maintaining an integrated programme baseline to meet the target cost;
 - In year management of the programme to meet target Estimate at Completion (EAC);
 - Future year "Rolling Wave" planning (a feature of how we implement our updated contract); 10 year planning and long term capability management.
- Producing and communicating management information to the AWE Executive (e.g. Executive Committee (ExCom); Corporate Change Board (CCB); Investment Committee(s), etc.) and Customers (e.g. Programme Delivery Review (PDR); Customer and Annual Review Meetings, etc.)

The bulk of the PMO requirements are delivered via 5 pillars, which are sub-divided into Control Accounts (CA). CA are the level at which budget responsibility and performance reporting lies to deliver in scope requirements. Each CA is the responsibility of an accountable AWE Director:

- Product
- Site (including Asset Management improvements)
- Nuclear Threat Reduction
- Capital Projects
- Leadership & Integration

The 5 pillars deliver sustained focus and investment in people, plant and process to meet the Programme safely. Some investment examples are:

7.2 Capital Projects Pillar – Investment in Plant - MENSA

Project MENSA is a significant investment in continued capability to assemble, refurbish and disassemble

[REDACTED]

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[REDACTED]

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7.4 Leadership & Integration Pillar – Investment in People - People Programme

As previously noted in 4.4, the People Programme improvements have resulted in a range of Human Resources function improvements. These improvements will enable better support for the ageing management training and application of skilled resources to where they are needed. HR has recently undertaken a comprehensive refresh of the people process and HR systems, including recruitment and job change:

- Streamlined processes with fewer steps and approvals
- Systemised offer, contract and Job Change letters
- A refreshed external candidate home page when searching and applying for jobs
- Improved help text and notifications
- [REDACTED]
- Simplified and more meaningful system values
- Enhanced reporting capability
- Lots of minor adjustments to our systems (e.g. automatic assignment of probation and notice periods)

7.5 Leadership & Integration Pillar – Investment in People and Process - Competencies

The company competency framework was recently updated and will be linked through a [REDACTED] application, HR record keeping and the [REDACTED]. The competency framework depicted in Figure 16 has been developed as part of a comprehensive revamp of the LC10 Standard associated Management System Procedure 1510 [Ref. 34].

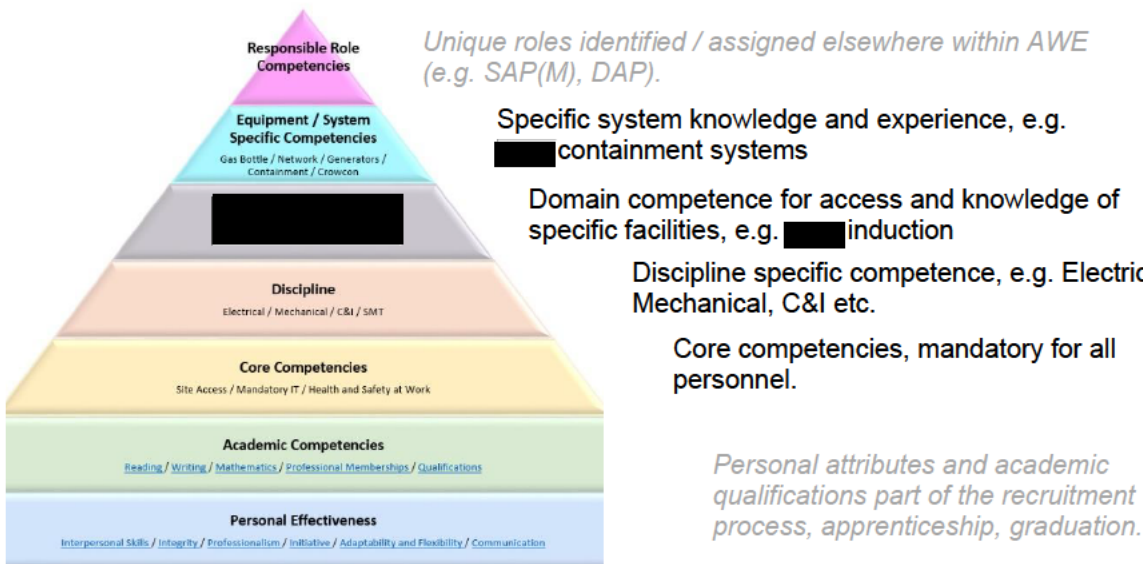


Figure 16 - Competency Framework

For ES&A, the procedure [REDACTED] highlights the process for implementing new training and resource requirements for Operations Engineering personnel to ensure safety and programme delivery. This procedure also details development through personal training programmes to ensure that these are centrally managed, agreed and provide a link to the overall resource strategy. There is a parallel SQEP assessment procedure for project and operational engineering design personnel [REDACTED]. To support these procedures and promote consistency across the engineering functions, the Chief Engineers have developed a common [REDACTED]. To establish organisational

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capability and staff development, all engineers will be evaluated against this set of competencies regardless of engineering discipline or function they reside in. For example, this has been rolled out in the electrical discipline as part of the Electrical Safety Management System process updates as [REDACTED]. A [REDACTED] also going through the process to align all engineering job profiles to a core set of disciplines to provide a single and consistent set of profiles for all engineers at AWE.

Each person also has a set of objectives related to their role linked to the business objectives and drives a professional development plan for performance management with their line manager through another online system [REDACTED]. If the development plan identifies gaps, then training is requested, provided and recorded back in the developing [REDACTED].

7.5.1 Ageing Management Competence Management

The [REDACTED] Asset Management strategic review recognised that the workforce had suffered skill fade between product development phases and required training in AM, asset performance and reliability, which naturally includes ageing and deterioration management. As previously noted in 5.3.2, CMRP has been adopted as an industry recognised standard for training and certification of maintainers for reliability management. However, the Ageing & Obsolescence workstream recognised a specific lack in training on potential threats to asset through-life reliability, which include procedural, usage, damage and especially corrosion. Consequently, a training package is in development for upload to Minerva and delivery to:

- Project Managers
- Designers
- Construction & Commissioning
- Operators
- Maintainers
- Safety Assessors
- Anyone else who would benefit

7.6 Leadership & Integration Pillar - Investment in People and Process - Cultural Change and ESH Reporting

AWE is committed to achieving excellent ESH performance and it is accepted that a positive culture is vital to achieve excellent ESH performance. Consequently, AWE has invested in continual improvement with respect to the company safety culture. It is often described as the assumptions, values, attitudes and behaviours, related in this instance to ESH, which are shared by a group of people in an organisation. The changes can be evidenced by:

- Increased focus on leadership and management training
- Nuclear professionalism training for all
- Electrical safety awareness training
- Regular engagement with personnel at all levels through surveys and acting on feedback
- Learning lessons from incidents at AWE and in wider industry and promulgating through company alerts or updating process
- Development of a behaviours framework 'Leadership by Everyone'
 - Follow rules
 - Speak up
 - Be mindful
 - Get involved

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The monthly internal ESH reporting in Table 4 bears witness to some of the recognised issues, responses and improvements in ESH performance (August 2020 report):

Have we caused harm or had significant near misses?	<ul style="list-style-type: none"> In August there were 3 environmental incidents; all refrigerant gas losses – a site-wide review is to be undertaken. OSHA tri rate has reduced for the 6th month in a row and is currently at 0.269 (OSHA World Class ranking 0.350). [REDACTED]. Whilst COVID measures are robust the planning for potential second wave continues. One loss of containment incident for the month when a 10" Steam Valve failed. The failure mechanism is yet to be determined. Local supplies isolated with no impact to facilities. The investigation is ongoing.
Are we compliant & or holding significant risk?	<ul style="list-style-type: none"> Focus continues on work control (LC26), safety submissions (LC14 and LC15), capability and programming (LC36) as well as investigations to refrigerant, contamination and steam main losses. INF1 reporting (9 in month) is high for the third month in a row
Are we delivering to our commitments?	<ul style="list-style-type: none"> Focus continues on [REDACTED] Outcomes agreed for LC14 and LC15 Level 2 Issues. Continuing to deliver Process Safety training to support WSO accreditation both on and off site.
Are we improving?	<ul style="list-style-type: none"> A number of Licence Condition scores have moved to GREEN this month, including LC 9 for Implementation, LC 12 for Arrangements and LC26 for Implementation.

Table 4 - ESH Aug 2020 Report

7.7 Nuclear Baseline Sustainment

AWE must ensure and be able to demonstrate that we are actively managing and accurately recording our nuclear capability under all foreseeable circumstances. This is to ensure that we operate safely, protect our people and meet our statutory compliance requirements.

The company list of nuclear baseline roles was refreshed by the 3 Chief Engineers in Q1 2019, which this time included the recently recruited Lead Technical Authority for Asset Maintenance (AM-LTA) to bridge between design and operations intelligent customer oversight. Consequently, to ensure sustainment of the capability, the role shall be amalgamated into the ESO, as noted in 3.5, and a deputy recruited. The [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

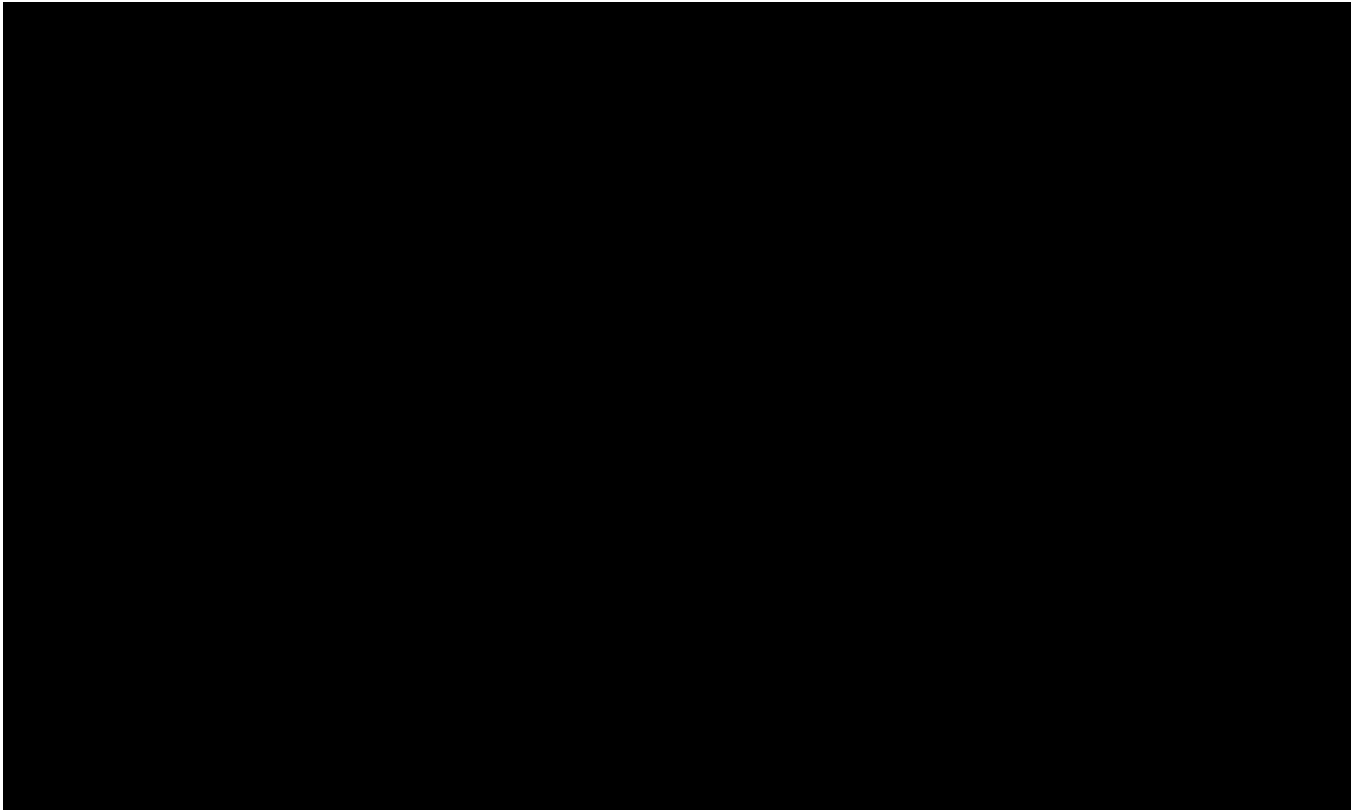
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7.8 Operational Experience (OpEx)

OpEx comes in many forms; through the prior experience people bring to AWE, industry papers, guidance, training and forums. As noted in 1.4.5, AWE engages in nuclear industry forums and beyond into other relatable industries. For example, at the time of writing, we have a senior C&I maintenance leader in tenure as [REDACTED]

[REDACTED]

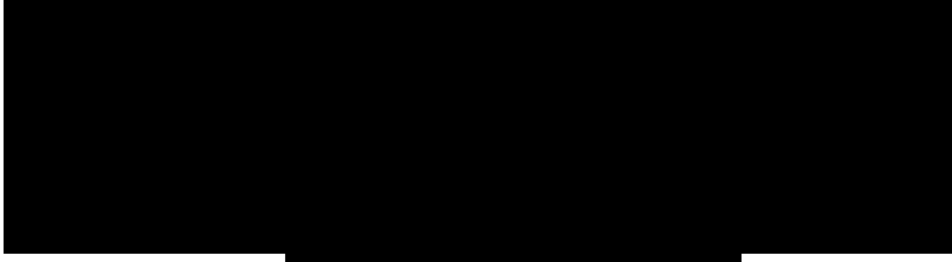
Recent improvements have seen the creation of a Learning From Experience (LFE) intranet webpage (Fig. 17) that provides a central resource for internal and external learning. External OpEx and examples of good practice are monitored across industry portals such as HSE and collated by the LFE team. OpEx is promulgated directly to various relevant personnel depending on the source and content for action or information. For example, after an event concerning overheating of a wall-mounted hydroboil, the AM-TA instigated a review of extant hydroboil maintenance against manufacturer’s recommendations and AWE conditions of use. The subsequent Amber Alert and actions resulted in establishment of a 10 year operational life to offset the high periodic maintenance costs due to gradual scale build-up, disassembly, clean and reassembly with inherent risk of maintenance induced errors against lower safe-life no



As part of the corporate improvements to LC7, the NSC requested a quarterly update in the form of a briefing note. The purpose of the Briefing Note is to share information with the NSC regarding event and investigation trends. The NSC is asked to take note of the information presented and, at the formal meeting, cross reference with the details provided by Facility/TC management and subsequently seeking answers to any questions that may arise. The report provides a comprehensive breakdown of Events by

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category and sub-category against Support Facilities, Operations and Integrity of Plant. It then identifies the trends and provides dialogue on what AWE is doing to prevent reoccurrence. The Q3 2020 report Integrity of Plant trends are presenting in Table 5. The report also provides many other views of the information contained in [REDACTED] enable discussion by the NSC and development of further improvement actions as appropriate.



In response to the [REDACTED] identified, a review learn and improve activity has been instigated by the LC28 Licence Condition owner. The [REDACTED] already been reviewed and found that the majority of the [REDACTED] were related to known faults with an [REDACTED] system that is already in the process of being replaced. However, it did also identify potential issues with [REDACTED] settings. Consequently, [REDACTED] are being reviewed to establish if there is a corporate issue with [REDACTED] setting, maintenance and reporting and address any issues accordingly.

Moreover, there are many facility and discrete asset performance reviews carried out that feed into risk registers and associated action plans. High level event visibility is provided to electrical safety and mechanical safety personnel through links to the output of discipline specific [REDACTED] shown on the ESO webpages. As a procedural example, the [REDACTED] describes how the Senior Electrical Authority requires Monitoring and Measurement to be carried out for the ESMS document suite and also events and incident investigations.

7.9 Summary

The sustained commitment of investment in continuous improvement in the areas of people, infrastructure, plant and process is evident. The creating of the PMO to provide an integrated investment plan is creating a resultant improvement in forward planning. The upcoming new facilities will provide better and safer working environments and the competencies will enable improvements in training and skill application. The Asset management improvements are becoming more apparent across the sites as communication and training is instigated to raise awareness of through life management and related risks of ageing and deterioration.

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8 AWE ASSESSMENT OF AGEING MANAGEMENT PLAN

The self-assessment necessarily includes review of the progress of already identified improvement activities due to the recognition that the sites ageing management plan is work in progress. However, elements of process update progression and ageing plant condition understanding at operational level are sampled by the Asset Maintenance-Lead Technical Authority (AM-LTA). Descriptive text is in black with [sampling examples in blue](#).

8.1 Company Management Arrangements (MA) for Ageing

The Ageing Nuclear Ventilation Review [Ref. 21] noted in 4.1 carried out a comprehensive review of the AWE MA with respect to ageing management and was submitted to the ONR. Consequently, little further value would be gained in reassessing the MA at this point and progression of the improvements are already captured in Regulatory Issues being progressed through Level 4 Regulatory Interface Meetings.

8.2 AMIT Progress

The AMIT project plan was reviewed to confirm progress to plan and expected end dates. Progress is reported monthly to the steering committee with expected transfer to Business as Usual (BaU) dates

[REDACTED] The current workstreams and dates are presented below:

- *Maintenance and Reliability Engineering (M&RE)* [REDACTED]
- *Ageing & Obsolete Infrastructure* [REDACTED]
- *Reliability Centred Maintenance Plans* [REDACTED]
- *Maintenance FMEA* [REDACTED]
- *Condition Based Maintenance* [REDACTED]
- [REDACTED] [REDACTED]
- *Needs Based Criticality Analysis* [REDACTED]
- *Maintenance Coordination* [REDACTED]
- *Inventory Management* [REDACTED]
- *Metrics* [REDACTED]
- *Electronic Asset Management, Digital Resource Management & Mobile Devices* [REDACTED]

The progress is broadly in line with expectations but also balancing the demands of the business on resource support to high priorities. It is expected that the [REDACTED] will deliver the updated process and organisational structure but it will be down to continual business focus to ensure efficiencies are realised.

8.3 Asset Management Plans (AMP)

In order to ascertain whether ageing management of SSCs is adequately understood and recognised by facility management, a couple of the extant AMPs were reviewed:

8.3.1 [REDACTED]

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[REDACTED]

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8.3.2 ■ [REDACTED]

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8.4.1 [REDACTED]

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8.4.2 [REDACTED]

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- [REDACTED]
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[REDACTED]

8.5 Technology Centre SSC Condition Sampling

In order to ascertain whether ageing management of SSCs is adequately understood at facility operational engineering level the AM-LTA developed and sent a question set to some of the accountable TC PAEs. This was supplemented by some site visits and sampling relevant areas where possible. The responses received from PAEs have been repeated verbatim, summarised and any highlighted issued considered against ongoing improvement activities. The question set was:

- What does each PAE believe to be your current position with respect to corrosion/age related deterioration on SSCs?
 - Structures SSCs
 - Glovebox SSCs
 - HVAC SSCs
 - Process plant SSCs
 - Mechanical services SSCs
 - C&I SSCs
 - Electrical infrastructure SSCs – *Examples might be knowledge of VIR pre IP2X/XXB dbs, corrosion to earthing straps, UPS battery bank corrosion etc?*
 - Lifting equipment SSCs
 - Trolleys, tooling, equipment SSCs
 - RA waste storage and containment SSCs
- Confirmation that the PRS has reviewed this and there are relevant shortfalls in the DARs/related FAP?
- Examples as evidence, such as MI's scheduled and carried out, PRS DAR entries and related FAP entry, RIO list, AMP etc.
 - *An example might be... structural survey by SQEP structural surveyor scheduled on AMS [Ref #] every 5 years. Inspection includes corrosion assessment. Work Order remediation of ## due to spalling concrete from corroded rebar [Ref #]*

8.5.1 [REDACTED]

[REDACTED]

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8.5.2 [REDACTED]

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[REDACTED]
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[REDACTED] The findings were:

- *There was an [REDACTED] event raised [REDACTED] due to issues with lack of maintenance delivery under project control on the [REDACTED] installed process plant highlighted during the staged handover*
 - *An action was placed on the [REDACTED] to clarify the requirements on designers, projects and Asset Change Managers with regard to maintenance development and delivery in the project phase. This was addressed by Ref. 16 and Ref. 17.*
- *On walking down the installation, it was found to be:*
 - *Constructed from high integrity materials with high resistance to corrosion*
 - *Use of COTS equipment wherever possible*
 - *Ease of access to maintainable equipment*
 - *Chilled water pipework was fully insulated with no apparent inspection plugs installed, which may create a CUI inspection issue in 10+ years. This was highlighted to the facility maintenance team.*
 - *Systems well understood by the maintenance team due to the post event actions in support of the project; forced early integration*
 - *The handover process has been de-risked by the maintenance integration activities*

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8.5.3 [REDACTED]

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8.5.9 Mensa

With respect to ageing and obsolescence, it was recognised that the extended construction period was causing potential for ageing and obsolescence before handover to the facility management and operations teams. For example:

- *Boiler flues installed on the energy building have corroded beyond the operational life limit prior to use and have had to be re-designed and replaced before commissioning of the boiler system.*
- *3 different types of solenoids installed have become obsolete prior to commissioning in several areas of the build.*
- *Diesel standby generators failed on commissioning due to a lack of preservation maintenance since installation and have had to be refurbished at significant extra cost.*

These and other issues raised during the Mensa build have resulted in development of a maintenance strategy by the designate operations team with support from asset management. The learning has been included in the development of the company maintenance development procedure and supporting guidance released in Oct 2020 and noted in 6.1.

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]

[REDACTED]

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8.8 RBI Sampling

As part of the enhancement of the ageing management arrangements noted in 6.1, a site walkdown of a recent Pressure System RBI carried out in accordance with the company [REDACTED] (Facility Monitoring Tools) procedure was carried out. The Pressure Systems RBI of the A1 Decommissioning complex carried out in May 2020 was selected and walked down by the AM-LTA and SAP(M), the findings were recorded and relayed back to the engineering team for discussion and update:

[REDACTED]. The review highlighted concerns against each question number of the RBI question sheet:

1. *Ensure sufficient trained pressure systems personnel – score 4; however text notes that appointment letter is out of date, [REDACTED] We would consider that a 3 at best.*
2. *All pressure systems should be registered for inspection on AMS – score 4; [REDACTED] we would consider this more of a 2 and some dialogue acknowledging this ongoing improvement work.*
7. *Pressure systems pipe work should be in good condition and adequately supported - score 4, [REDACTED]*
11. *All assurance alerts for pressure systems actioned – score 4; [REDACTED]*

It was suggested that the RBI scoring is reconsidered and risks raised on the RIO list. The findings were also escalated to the CE(S&A), ESH Lead for [REDACTED] records and discussed at the Oct 20 L4 Ageing & Corrosion RIM. Further review found that the insulation issues noted in the compound actually came under utilities ownership and the AM-LTA confirmed that they had open breakdown work orders to rectify. Subsequent discussions provide confidence that the issues noted are being addressed by the facility team.

8.9 Summary

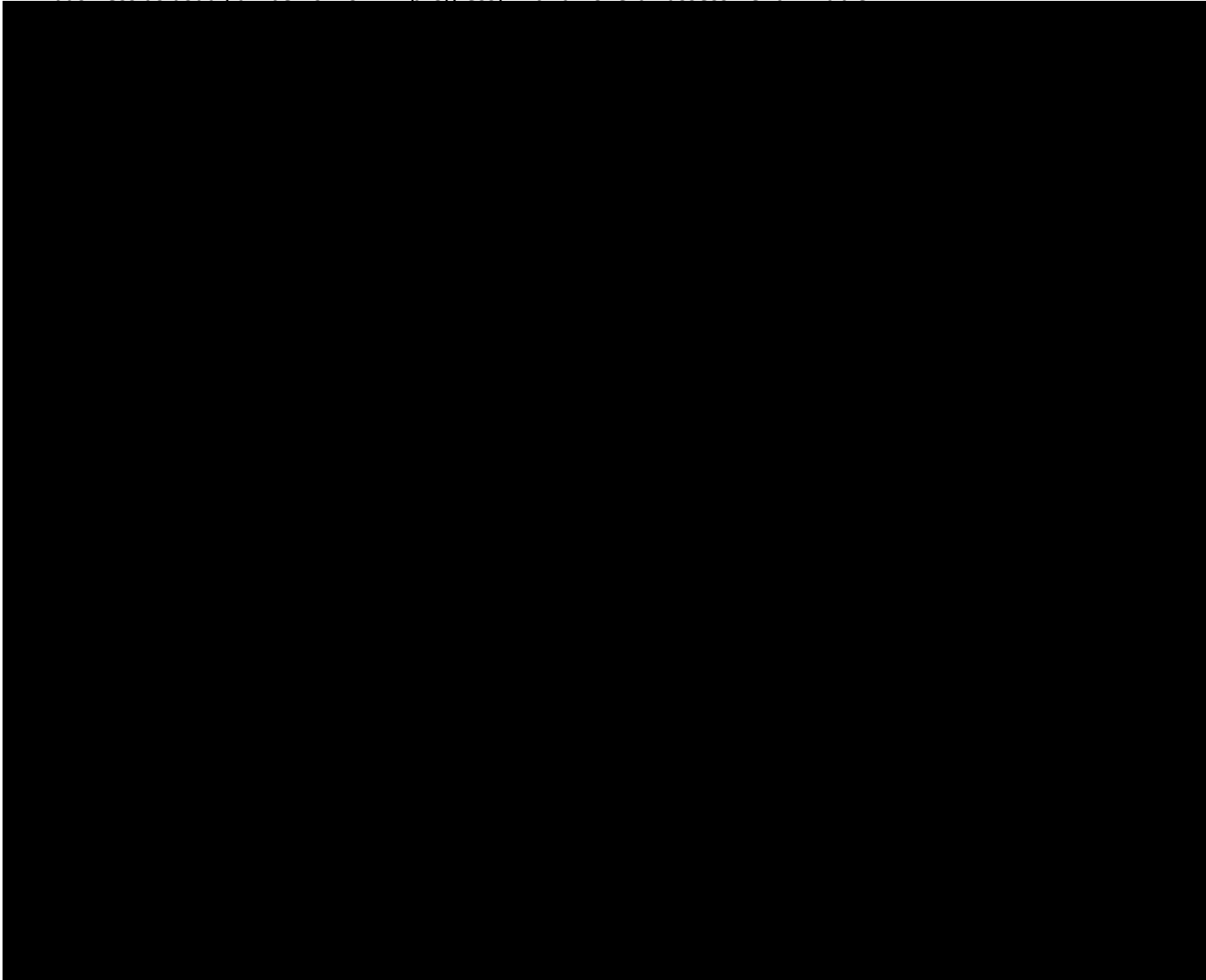
The sampling assessments confirm that SSCs are inspected for deterioration in performance and raised on a RIO list where necessary for mitigation activities or remediation funding. The LTO process in development recognises ageing as a factor for assessment and PRS activities are driving procedural improvements with respect to corrosion management. The RBI process has exhibited flaws in application but steps to address this have been taken. Overall, it is considered that appropriate mechanisms are being implemented that will drive greater focus on ageing management.

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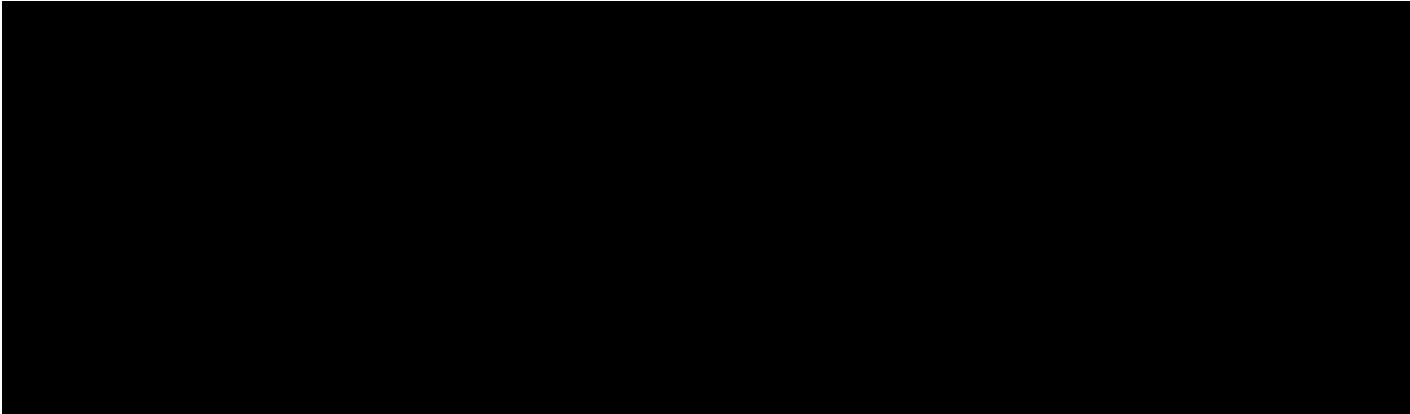
9 SUMMARY OBSERVATIONS OF AGEING MANAGEMENT SELF-ASSESSMENT

This review was carried out by the AM-LTA due to independence of line management from the asset management, operations, maintenance and safety assurance functions.

This review finds that the company is investing in modernisation of key infrastructure related to the programme, whilst also in transition to embedding an improved set of overarching asset management procedures, aligned to industry RGP, that should enable the organisation to better manage its assets through life and safely assure achievement of business objectives. The current roadmap milestone for completion of the management system documentation development phase of alignment to the ISO 55000 Asset Management standard is forecast [REDACTED], with full digital asset management capability predicted to be in [REDACTED]. Implementation of the updated asset optimisation procedures has been initiated and the benefits of reduced risk, improved maintenance effectiveness and reduced cost will be a gradual realisation of concurrent supporting improvement activities. Current position against each of the themes is assessed and presented as ‘BMW’ diagrams in Table 6 (Green depicts the position of being business as usual, amber is work in progress) with an overall assessment in Table 7.



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At the time of this review, it is apparent that there are multiple improvement workstreams in progress with differing implementation dates and focus, for example, pilots have been run in [REDACTED] improved asset condition reviews but will not roll out across the estates until mid-2021. This highlights the importance of focus on integration, communication and training for the coming months and years. For example, obsolescence management guidance has been developed and briefed to project engineering personnel, but will take some time to filter down to designers, embed into the design delivery ethos and result in obsolescence management plans being delivered with the new assets. Again, the Asset Management Plans evidence recognition of historical ageing and obsolescence issues to be managed but also highlights that the associated maintenance strategies need regular review in the future.

In summary, the asset management alignment to ISO 55000 duly recognises the need to manage ageing and the supporting ESH improvements will improve integration between the ESH and ES&A communities. This will improve AWE’s understanding of its plant and recognition of the need to be proactive in reliability and safety management. However, the self-assessment did identify the current reactive response rather than proactive planned management, due to the previous lack of clear arrangements for ageing being deployed. This indicates that there is a potential historical gap in ageing management for site infrastructure that will require some focussed short-term investment until the new arrangements become Business as Usual. Therefore, to ensure implementation of the new arrangements, it is essential that leadership focus is deployed to ensure that the principles are successfully embedded across site.

In conclusion, the review finds that AWE adequately understands that ageing and obsolescence are key risk factors for continued safe and reliable plant operations. There is a plan in place to assess and manage plant and infrastructure condition and the plan has been implemented, which is demonstrated by new and refurbished facilities being delivered to sustain capability.

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10 APPROPRIATE INTERNAL ASSURANCE OF THE CLAIMS, ARGUMENTS AND EVIDENCE PRESENTED

This internal assurance statement, by AWE's Lead Facility Assurer (LFA), comments against the expectations contained within ONR's letter [REDACTED]. This statement focuses upon the claims, arguments and evidence presented, whilst also encompassing the other aspects mentioned in this report.

This inspection seeks to determine

1. *whether the condition of your plant is adequately understood by AWE as the licensee;*
2. *whether there is an adequate plan to manage plant condition, and*
3. *to what extent the plan is being adequately implemented.*

This will be determined through consideration of various topics, including:

1. *your self-assessment of the current status of your plant;*
2. *the existence, adequacy and timeliness of your Ageing Management Plan (AMP);*
3. *the implementation of the plan on site, and*
4. *the extent and nature of proactive and reactive work.*

Where claims have been made within this report, the evidential basis (auditable trail) of arguments and evidence has been referenced herein. A proportional sample of the auditable trail has been conducted, and the sample was found to be available and robust. This sampling has included both procedural arrangements and output artefacts relating to ageing.

The general conclusions within this report reflect the experiences and expectations of the LFA, based upon his independent observations of AWE. This report is considered to be an honest review that reflects reality.

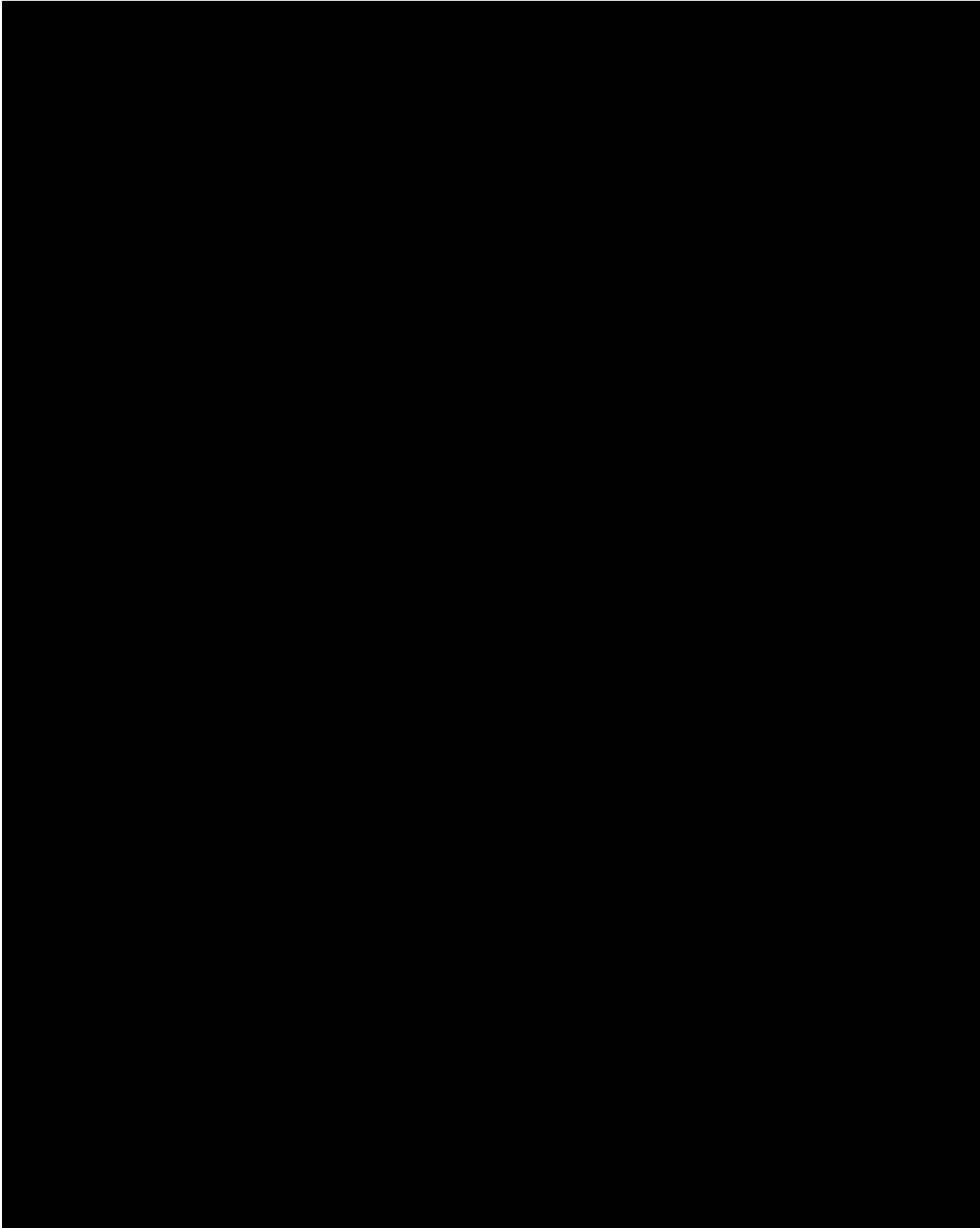
Although there is probably further RGP available, it's unlikely to change the conclusion of this report.

It is considered that AWE is on a journey to adequately understanding the condition of AWE's nuclear safety related plant. Any shortcomings in understanding are being adequately risk managed. The focus has historically been upon the Production facilities. The Site Infrastructure is currently being reviewed, as part of the uplift to a Safety Case. The implementation plans exist, are considered appropriate and viable and are being delivered.

The LFA will continue to provide 3rd Line Of Defence, focusing upon proportionate and disciplined application of processes, metrics to monitor this and responses to KPI findings.

It is noted that, historically, AWE's systems did not integrate efficiently; this work will drive coherent and integrated arrangements. This work is also assessed that it will transform AWE Asset Management from a primarily reactive focus, to a proactive focus.

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