Bureau of Meteorology's Management of Assets in its Observing Network

Bureau of Meteorology

Canberra ACT

23 January 2025

Dear President
Dear Mr Speaker

In accordance with the authority contained in the *Auditor-General Act 1997*, I have undertaken an independent performance audit in the Bureau of Meteorology. The report is titled *Bureau of Meteorology's Management of Assets in its Observing Network.* Pursuant to Senate Standing Order 166 relating to the presentation of documents when the Senate is not sitting, I present the report of this audit to the Parliament.

Following its presentation and receipt, the report will be placed on the Australian National Audit Office's website — http://www.anao.gov.au.

Yours sincerely

Dr Caralee McLiesh PSM
Auditor-General

The Honourable the President of the Senate
The Honourable the Speaker of the House of Representatives
Parliament House
Canberra ACT

Audit team

Sam Khaw
Jemimah Hamilton
Liset Campos Manrique
Jacqueline Hedditch
Corinne Horton

Contents

Audit snapshot

Auditor-General Report No.21 2024–25

Bureau of Meteorology's Management of Assets in its Observing Network

Why did we do this audit?

▶ The Bureau of Meteorology (the Bureau) manages a variety of meteorological instruments used to collect information to support weather, water, climate, and ocean services for Australia.

▶ In 2020–21, government agreed to increase funding to 'ensure the financial sustainability of the Bureau', including 'to maintain a proactive asset maintenance schedule consistent with industry best practice'.

▶ This audit provides assurance to the Parliament on the effectiveness of the Bureau's management of assets in its observing network.

Key facts

▶ The Bureau's observing network includes nearly 15,000 items of technology located across Australia and its territories, including the Australian Antarctic Territory.

▶ The Bureau estimates that observing network assets make up approximately 28 per cent of the Bureau's total non-financial asset base.

What did we find?

▶ The Bureau is partly effective in managing assets in its observing network.

▶ The frameworks and systems governing the Bureau's management of assets in its observing network are partly effective.

▶ The Bureau's arrangements to manage the lifecycle of assets in its observing network are partly effective.

▶ The Bureau's monitoring, measuring, and reporting on assets in its observing network is partly effective.

What did we recommend?

▶ There were four recommendations relating to updating and reporting against the asset management framework, updating policies, procedures and plans, the completion of asset management processes and training pathways, and fully implementing monitoring and reporting.

▶ The Bureau agreed to all recommendations.

200+
Bureau staff members responsible for operational maintenance of observing network assets.

11
categories of observing network assets.

$54.59 m
estimated operating expenditure across the Bureau's observing network for 2024–25.

Summary and recommendations

Background

1.   The Bureau of Meteorology (the Bureau) is responsible for providing weather, water, climate, and ocean services for Australia. The Bureau's weather forecasts, warnings, and analyses support decision-making by governments, industry, and the community. Australian sectors that are supported by timely and accurate weather services include emergency management, agriculture, aviation, land and marine transport, energy and resources operations, climate policy, water management, defence and foreign affairs.[1]

2.   The Bureau is established by the *Meteorology Act 1955* (Meteorology Act). Since 2002, it is an Executive Agency under the *Public Service Act 1999*. The Director of Meteorology has the powers and responsibilities of an accountable authority under the *Public Governance, Performance and Accountability Act 2013*. The Bureau's accountable authority reports to the minister or ministers responsible for administering the Meteorology Act and the *Water Act 2007* (Water Act). Since June 2022, the Director of Meteorology has reported to the Minister for the Environment and Water.

3.   The Meteorology Act and the Water Act define the Bureau's functions and the powers of the Director of Meteorology. Broadly, these are to:

- take and record meteorological observations and supply information such as forecasts, warnings, and advice on meteorological matters[2]; and
- collect, hold, manage, interpret, and disseminate Australia's water information.[3]

Rationale for undertaking the audit

4.   The Bureau manages more than $1.3 billion in non-financial assets. The Bureau estimates that observing network assets including observing network instruments and other items and systems that support the instruments' proper functioning make up approximately 28 per cent of the Bureau's total asset base.

5.   Effective management of assets in the observing network is fundamental to the Bureau's ability to provide services to the community. Meteorological instruments are highly specialised, geographically dispersed, and can require significant levels of investment to purchase, maintain, and repair to effectively support weather and climate forecasting, warnings, and research.

6.   The audit was conducted to provide assurance to the Parliament over the Bureau's management of assets in its observing network.

Audit objective and criteria

7.   The objective of the audit was to assess whether the Bureau of Meteorology is effectively managing assets in its observing network.

---

1   Bureau of Meteorology, *Annual Report 2023–24*, BOM, Melbourne, 2023, p. 31.
2   *Meteorology Act 1955*, section 6.
3   *Water Act 2007*, Division 2.

8. To form a conclusion against the objective, the following high-level criteria were applied.

- Does the Bureau of Meteorology have effective frameworks and systems governing assets in its observing network?
- Does the Bureau of Meteorology have appropriate arrangements to manage the lifecycle of assets in its observing network?
- Does the Bureau of Meteorology effectively monitor, measure, and report on its management of assets in its observing network?

9. This audit focused on the Bureau's assets in its observing network including operational maintenance practices and records, and relevant plans, policies, and frameworks for managing assets that take observations. The ANAO reviewed the Bureau's activities from 2018 to October 2024.

10. This audit did not assess:

- the accuracy or security of the measurements taken by the Bureau's observing network meteorological instruments;
- the quality or accuracy of the Bureau's forecasting in the delivery of general and extreme weather services, including the 'downstream' processing of data and the models used to develop and inform forecasting;
- the quality or accuracy of the Bureau's maintenance of the climate record;
- supporting infrastructure systems and items, such as air-conditioners, fencing, and small buildings;
- the procurement of observing network assets where the procurement represented expenditure other than operational maintenance; or
- the Bureau's provision of services to the Department of Defence and related stakeholders for civil defence exercises and operations.

Conclusion

11. The Bureau is partly effective in managing assets in its observing network. The Bureau has been implementing an asset management framework and supporting elements since 2020 however the asset management framework is not fully implemented. While the Bureau has continued to deliver weather services, key areas for further improvement include reviewing asset management planning documents, establishing medium to long term financial planning arrangements to support long term strategic planning, and establishing and embedding more extensive monitoring and reporting arrangements.

12. The frameworks and systems governing the Bureau's management of assets in its observing network are partly effective. Not all policies and plans have been completed, reviewed, and embedded as planned. The Bureau has not reviewed or updated the Strategic Asset Management Plan to reflect its current practices and does not have a financial forecast for asset intensive areas to enable long term strategic planning. Roles and responsibilities are clearly identified. The Bureau's Enterprise Asset Management System is in place and largely being used as planned. Development of asset management processes and training pathways is not complete.

13.   The Bureau's arrangements to manage the lifecycle of assets in its observing network are partly appropriate. The Bureau's asset management plans include lifecycle management activities and related cost estimates. The Bureau's budget planning process for 2024–25 did not incorporate the predicted costs presented in the asset management plans. All types of maintenance are recorded in the Bureau's Enterprise Asset Management System and triaged based on priority. The Bureau's asset management plans include outcomes to report against, however target and actual performance levels are not complete. The Bureau's guidance surrounding disposals is not complete. The Bureau's Fixed Asset Register and Enterprise Asset Management System each record assets and disposals differently and the Bureau does not have guidance to ensure records are aligned.

14.   The Bureau's monitoring, measuring, and reporting on assets in its observing network is partly effective. Information on observing network asset data availability is being recorded in Bureau systems and reported to established governance bodies. The Bureau is not reporting against the achievement of sustainability funding commitments. Three of the Bureau's newly developed observing network performance measures report whether risks have eventuated and two report whether risk controls are being implemented. Since November 2020, the Bureau has been reporting against out-of-tolerance risks relating to 'unviable' asset capabilities. Monitoring and reporting is not being undertaken to regularly review asset management maturity, as proposed in the Strategic Asset Management Plan.

Supporting findings

Governance and planning

15.   The Bureau has developed an Enterprise Asset Management Policy and a Strategic Asset Management Plan. The Bureau has not reviewed or updated the Strategic Asset Management Plan in the required timeframes. The Enterprise Asset Financial Overview has not been implemented, and the Bureau does not have a financial forecast for ongoing and capital funding requirements for asset intensive areas to enable long term strategic planning. (See paragraphs 2.3 to 2.30)

16.   The Bureau has established governance bodies that support asset management. The Bureau has established asset management roles identified as needed in the Strategic Asset Management Plan. Responsibility and accountability for asset lifecycle management is defined. Maintenance and operations responsibilities of each observing network sub-network are documented in asset management plans. (See paragraphs 2.31 to 2.45)

17.   The Bureau's procedures and systems to support the management of assets are incomplete. The Bureau's Enterprise Asset Management System is in place and largely being used as originally planned. The Bureau does not have a plan to develop all asset management processes identified as necessary in 2022. Development is not complete for training and competency frameworks for three sub-networks and two asset classes. (See paragraphs 2.46 to 2.84)

Asset lifecycle

18.   The Bureau's asset management plans include a section on lifecycle strategies, which describes the types of activities to be undertaken within each sub-network across the lifecycle, and a five- or ten-year investment profile that includes cost estimates and key activities. The

Bureau's budget planning process for 2024–25 did not incorporate the predicted costs presented in the asset management plans. Planning for renewal and disposal is not complete for all asset management plans. (See paragraphs 3.3 to 3.37)

19.   All types of maintenance are structured through work orders in the Bureau's Enterprise Asset Management System. Maintenance tasks are assigned priorities and triaged in accordance with these. For each sub-network, between 52 per cent and 79 per cent of target preventative maintenance work orders were achieved in 2023–24. The outcomes to measure performance throughout the 11 sub-networks are not complete. (See paragraphs 3.38 to 3.69)

20.   The Bureau has established policies and procedural guidance that acknowledge the necessity of disposal. This guidance is not complete as there is no guidance to support operational decision-making about when disposal is appropriate. The Bureau's Fixed Asset Register and Enterprise Asset Management System each record assets and disposals differently. The Bureau does not have a process or guidance to ensure records are aligned between the two systems. (See paragraphs 3.70 to 3.83)

Monitoring and reporting

21.   The Bureau's performance measurement strategy measures the output of the observing network through information on observing network asset data availability. This supports reporting on the achievement of corporate outcomes identified in the Bureau Strategy 2022–2027 and Data and Digital Group Plan. The Bureau is not reporting against the achievement of sustainability funding commitments. Without a strategy for investment in asset maintenance and monitoring and reporting of the impacts of investment, the Bureau cannot know whether investment is effective. (See paragraphs 4.2 to 4.23)

22.   The key performance indicator for observing network assets is data availability which is based on the risk of weather information not being available to stakeholders. Three of the Bureau's newly developed observing network performance measures report whether risks have eventuated and two provide insight into whether risk controls are available and being implemented. Since November 2020, the Bureau has been reporting against out-of-tolerance risks relating to 'unviable' asset capabilities. The addition and completion of treatment plans and controls has not reduced the reported risk level. (See paragraphs 4.24 to 4.58)

23.   The Bureau has identified corrective actions to take against assets or the asset management approach when observing network asset performance monitoring targets are not met. Monitoring and reporting is not being undertaken to regularly review asset management maturity, as proposed in the Strategic Asset Management Plan. The Bureau has not addressed the risks identified within internal audit recommendations. (See paragraphs 4.59 to 4.76)

Recommendations

Recommendation no. 1 **Paragraph 2.19**	The Bureau of Meteorology:

The Bureau of Meteorology:

(a)   review and update the Enterprise Asset Management Plan and the Strategic Asset Management Plan (SAMP) to reflect the Bureau's asset management practices and approach; and

(b)   measure and report on the progress of the implementation of asset management uplift initiatives outlined in the SAMP and its roadmap.

Bureau of Meteorology response: *Agreed.*

Recommendation no. 2
Paragraph 2.56

The Bureau of Meteorology develop procedures for asset management lifecycle activities and complete its review of processes.

Bureau of Meteorology response: *Agreed.*

Recommendation no. 3
Paragraph 2.83

The Bureau of Meteorology finalise training requirements and methods for all maintenance and repair activities across the observing network.

Bureau of Meteorology response: *Agreed.*

Recommendation no. 4
Paragraph 3.68

The Bureau of Meteorology include management outcomes in asset management planning documentation by:

(a)   agreeing on and including all selected targets in relevant documentation;

(b)   collecting data on performance;

(c)   calculating actual performance levels over time; and

(d)   documenting the impact of asset management approaches on desired outcomes.

Bureau of Meteorology response: *Agreed.*

Summary of entity response

24.   The proposed audit report was provided to the Bureau. The Bureau's summary response is reproduced below. The full response from the Bureau is at Appendix 1. Improvements observed by the ANAO during the course of this audit are listed in Appendix 2.

> Thank you for providing the Australian National Audit Office's report on the Bureau of Meteorology's Management of Assets in its Observing Network.
>
> The observing network, consisting of almost 15,000 individual assets, distributed across Australia and its territories, is one of the nation's largest and most complex data gathering endeavours. The meteorological information gathered by the observing assets, 24 hours a day every day of the year, consists of observations of the atmosphere, space weather, terrestrial waterways and oceans.

Together, they form the information base which is vital for the provision of public weather services, the specialist needs of industry and national security, the integrity of the national climate record, and Australia's contribution to international meteorological data and science.

I recognise the Bureau's significant reforms and investment in the observing capabilities over the last decade, including improvements to logistics and maintenance practices through automation of manual observations and new observations maintenance hubs, the introduction of consistent asset management and technology competency and training frameworks, and the recent implementation of a new enterprise asset management system.

The Bureau agrees with the ANAO's recommendations as further contributions to the maturity of its observing network asset management and operations, and commits to relevant actions.

Key messages from this audit for all Australian Government entities

25. Below is a summary of key messages, including instances of good practice, which have been identified in this audit and may be relevant for the operations of other Australian Government entities.

Policy/program design

- Frameworks for planning and managing assets should include consideration of all factors which contribute to capability, such as the availability of skilled staff, support systems, and maintenance resourcing for the life of the asset.

- To appropriately manage physical assets throughout the asset lifecycle, entities should prepare long-term plans that consider whole-of-life costs and strategies, including asset replacement, and that are updated to reflect changes in the operating environment.

Performance and impact measurement

- Strategic physical asset management should include developing, measuring, and monitoring asset performance indicators that are aligned to program objectives.

Audit findings

1. Background

Introduction

The Bureau of Meteorology overview

1.1   The Bureau of Meteorology (the Bureau) is responsible for providing weather, water, climate, and ocean services for Australia. The Bureau's weather forecasts, warnings, and analyses support decision-making by governments, industry, and the community. Australian sectors that are supported by timely and accurate weather services include emergency management, agriculture, aviation, land and marine transport, energy and resources operations, climate policy, water management, defence and foreign affairs.[4]

1.2   The Bureau is established by the *Meteorology Act 1955* (Meteorology Act). Since 2002, it is an Executive Agency under the *Public Service Act 1999*. The Director of Meteorology has the powers and responsibilities of an accountable authority under the *Public Governance, Performance and Accountability Act 2013*. The Bureau's accountable authority reports to the minister or ministers responsible for administering the Meteorology Act and the *Water Act 2007* (Water Act). Since June 2022, the Director of Meteorology has reported to the Minister for the Environment and Water.

1.3   The Meteorology Act and the Water Act define the Bureau's functions and the powers of the Director of Meteorology. Broadly, these are to:

- take and record meteorological observations and supply information such as forecasts, warnings, and advice on meteorological matters[5]; and

- collect, hold, manage, interpret, and disseminate Australia's water information.[6]

The Bureau of Meteorology's observing network

1.4   The Bureau's observing network consists of 11 sub-networks categorised on an operational level by the type of information being collected. Each sub-network includes assets (observing network instruments) used to observe conditions and generate data, as well as supporting assets such as data processing and communications systems.[7] The Bureau's operational plans for managing assets within the sub-networks include the following descriptions.[8]

---

4   Bureau of Meteorology, *Annual Report 2023–24*, BOM, Melbourne, 2024, p. 31.

5   *Meteorology Act 1955*, section 6.

6   *Water Act 2007*, Division 2.

7   The Bureau's observing network also includes supporting infrastructure systems and items such as air-conditioners, fencing, and small buildings. These generally support the proper functioning of observing network instruments. Infrastructure systems and items are not in scope for this audit as they are not instruments that take observations.

8   The Kennaook/Cape Grim Baseline Air Pollution Station is excluded from any sub-network as it is one of three Global Atmospheric Watch stations in the world, and utilises unique equipment.

- Flood warning — consisting of field stations, communication systems, and data instruments that collect water level and rainfall data. This network includes river and rainfall sensors that are not owned by the Bureau.[9]

- Marine — consisting of instruments that collect data at, above, and below the sea surface, including instruments on sea vessels. Instruments include buoys, floating platforms, and weather stations that collect data about air, temperature, wind, humidity, wave, and other weather phenomena at sea.

- Ozone — provides ozone-specific data from eight locations across Australia and its territories, including the Australian Antarctic Territory, collected from instruments such as spectrometers[10] and ozonesondes.[11]

- Radar — includes three broad types of radar[12] that can observe rainfall rate, wind speed and direction, accumulated rainfall, and precipitation identification depending on type (rain, hail, or snow).

- Satellite reception — provides access to satellite systems that receive visual imagery and non-visual atmospheric data transmitted from other satellites. These systems process data on-site or relay data directly to stakeholders.[13]

- Sea level — consisting of 51 stations, including six Deep Ocean Buoy–Tsunameter stations. These stations have instruments that collect a variety of information such as sea level, atmospheric pressure, wind speed and direction, and air and water temperature to support identification of coastal hazards such as tsunami, storm surge, and flooding.

- Solar — consisting of 12 locations on the Australian mainland and one offshore. Each site contains the same instruments which collect information about sunlight, irradiance, and the sun's movements.

- Space weather — consisting of different types of space weather instruments at multiple sites across the Australian mainland, offshore, and territories including the Australian Antarctic Territory.

- Surface observation — provides weather data from automatic or manual measuring stations distributed across the Australian mainland, waters, and the Australian Antarctic

---

9   This includes water and rainfall observing instruments owned by state and local governments, and the private sector. As of July 2024, the Bureau owns approximately one-third of all instruments in the flood warning network.

10 An ozone spectrophotometer or spectrometer is an instrument that measures atmospheric ozone by comparing levels of UV radiation.

11 An ozonesonde is an instrument that measures atmospheric ozone through an electrochemical process.

12 These three types are

- 'Legacy' radars built using 1980s to 2010 technology from the manufacturer Enterprise Electronics Corporation (USA);
- 'Wurrung' upgrade to Legacy radars designed by the Bureau and deployed from 2017; and
- dual-polarisation radars from Leonardo (Germany) or Vaisala (Finland), deployed from 2019.

13 The Bureau owns and manages satellite reception assets as part of the satellite reception network, which depends on satellites of international partners. Australia does not have a sovereign meteorological satellite. The satellite reception network does not generate observing data as the other networks do; rather, this network receives and can relay data for various functions. These functions include capability for manoeuvring satellite systems, assisting in triangulation activities for orbit positioning, and services specific to third-party systems.

Territory. Instruments at these stations measure temperature, humidity, wind, rainfall, atmospheric pressure, cloud, visibility, soil temperature, evaporation, and other manually collected or observed weather phenomena.

- Upper air — consisting of a variety of instruments that capture information about upper air[14] through launching balloons, supported by different mechanisms at 38 sites across Australia, including its islands and the Australian Antarctic Territory.

- Wind profiler — consisting of 13 wind profilers at 13 locations across Australia, mostly in coastal areas close to airports. There are two types of wind profiler that both collect information about wind speed and direction.

1.5   In May 2022, the Bureau estimated that its observing network instruments totalled nearly 15,000 items of technology located across Australia and its territories, including the Australian Antarctic Territory (see Figure 1.1).

---

14   Upper air is generally considered to be atmosphere above 1500 metres from the Earth's surface.

Figure 1.1:   Bureau of Meteorology's observing network
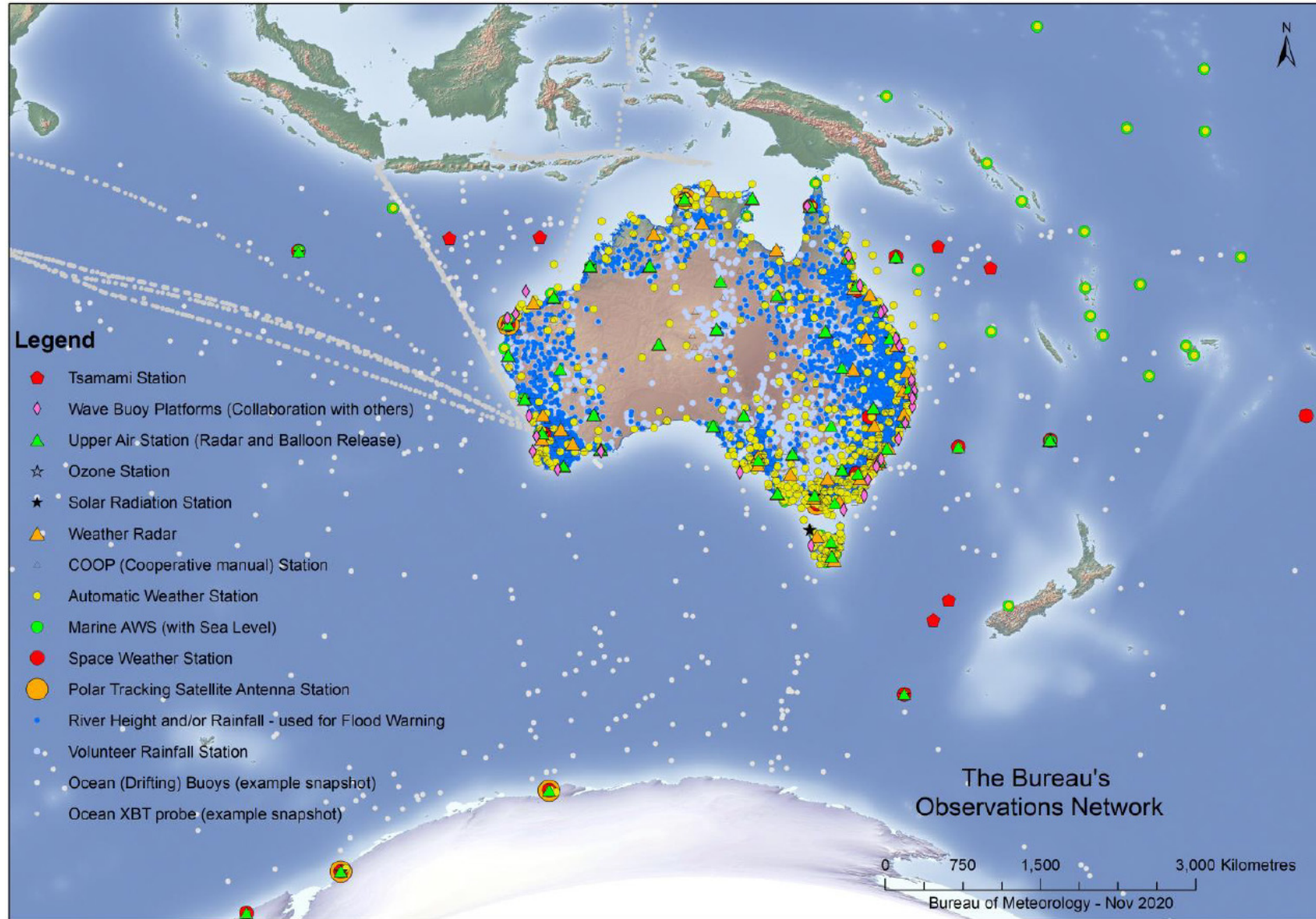
Source: Bureau of Meteorology, November 2020.

1.6   The Bureau's Data and Digital Group:

> provides the data, infrastructure and systems to underpin the Bureau's core operations from the measurement and collection through to production and dissemination to enable Bureau delivery of services and products (including data) to customers.[15]

1.7   The Observing Systems and Operations Program (OSO program) is responsible for the operation, sustainment, and lifecycle management of the Bureau's observing network and operations.[16] The OSO program budget for 2023–24 is $78.1 million.

Review of the observing network

1.8   A security, resilience and reliability risk assessment of the Bureau's observing network was conducted in 2017 (the 2017 review).[17] The objective of the 2017 review was to 'identify any high risk/low resilience vulnerabilities in the Bureau's observation network and any priorities for investment necessary to address those exposures', drawing from the findings of other technical reviews into the overarching systems architecture for Bureau ICT; the high-performance computing capability; and the observing network.

1.9   The 2017 review identified risk and resilience issues within specific observing network assets, and weaknesses in the Bureau's business continuity planning, risk assessment, documentation of corporate policies and procedures, and capability to address undocumented systems and design configurations.

1.10   Funding to 'improve the security and resilience of the Bureau of Meteorology's ICT systems and business processes' was provided in the 2017–18 Federal Budget[18], referred to by the Bureau as the ROBUST Program.[19] The Bureau subsequently progressed packages of work relating to observing network assets and asset management as part of Tranche 2 of the ROBUST Program.[20]

The Bureau of Meteorology's asset management process

1.11   The Bureau's asset management approach consists of an asset management framework and supporting elements. The following elements are included in the Bureau's asset management framework.

- Enterprise Asset Management Policy — sets out the requirements, intentions, and principles that articulate the overall framework of asset management for the Bureau.

- Strategic Asset Management Plan — sets out the asset management objectives of the Bureau, how these objectives will be achieved, and how they contribute to achieving the

---

15   The Data and Digital Group is led by a group executive (Senior Executive Service Band 2).

16   The Observing Systems and Operations Program is led by a general manager (Senior Executive Service Band 1).

17   The review was led by Mr Geoff Leeper PSM.

18   Australian Government, *Budget Paper No. 2: Part 2 Expense Measures 2017–18*, Commonwealth of Australia, Canberra, 2017, p. 94.

19   Packages of work funded through the 2017–18 Federal Budget were categorised by the Bureau as ROBUST Tranche 1. Additional packages of work were funded in two further tranches. Tranche 2 was agreed by government in the 2018–19 Federal Budget, and Tranche 3 in the 2020–21 Federal Budget.

20   Australian Government, *Budget Paper No. 2: Part 2 Expense Measures 2018–19*, Commonwealth of Australia, Canberra, 2018, p. 201.

Bureau's strategic objectives. It sets out a long-term approach that includes desired levels of asset management maturity, and strategic initiatives.

- An enterprise asset financial overview — sets out the financial forecast for strategic projects; and ongoing and capital funding requirements for each asset-intensive area of the Bureau.

- Asset management plans — specify activities to be undertaken for each sub-network across the lifecycle of assets. Asset management plans include timescales[21], costs, and responsibilities for delivery.

1.12 The asset management framework and its application to the observing network is supported by various asset lifecycle delivery documents such as operational plans, and the Bureau's software system for operational management of observing network assets, the Enterprise Asset Management System.[22]

Rationale for undertaking the audit

1.13 The Bureau estimates that observing network assets, including observing network instruments and other items and systems that support the instruments' proper functioning, make up approximately 28 per cent of the Bureau's total non-financial asset base.

1.14 Effective management of assets in the observing network is fundamental to the Bureau's ability to provide services to the community. Meteorological instruments are highly specialised, geographically dispersed, and can require significant levels of investment to purchase, maintain, and repair to effectively support weather and climate forecasting, warnings, and research.

1.15 The audit was conducted to provide assurance to the Parliament over the Bureau's management of assets in its observing network.

Audit approach

Audit objective, criteria and scope

1.16 The objective of the audit was to assess whether the Bureau of Meteorology is effectively managing assets in its observing network.

1.17 To form a conclusion against the objective, the following high-level criteria were applied.

- Does the Bureau of Meteorology have effective frameworks and systems governing assets in its observing network?

- Does the Bureau of Meteorology have appropriate arrangements to manage the lifecycle of assets in its observing network?

- Does the Bureau of Meteorology effectively monitor, measure, and report on its management of assets in its observing network?

1.18 This audit focused on the Bureau's assets in its observing network including operational maintenance practices and records, and relevant plans, policies, and frameworks for managing

---

21 The asset management plans cover periods of five or ten years, depending on the plan.
22 The software system is an IBM product called Maximo. The Bureau refer to Maximo generically as EAMS.

assets that take observations. The ANAO reviewed the Bureau's activities from 2018 to October 2024.

1.19   This audit did not assess:

- the accuracy or security of the measurements taken by the Bureau's observing network meteorological instruments;

- the quality or accuracy of the Bureau's forecasting in the delivery of general and extreme weather services, including the 'downstream' processing of data and the models used to develop and inform forecasting;

- the quality or accuracy of the Bureau's maintenance of the climate record;

- supporting infrastructure systems and items, such as air-conditioners, fencing, and small buildings;

- the procurement of observing network assets where the procurement represented expenditure other than operational maintenance; or

- the Bureau's provision of services to the Department of Defence and related stakeholders for civil defence exercises and operations.

Audit methodology

1.20   The audit methodology included:

- review of Bureau data, documentation, policies, and procedures;

- virtual walkthroughs of Bureau systems;

- observing field staff undertaking activities at Bureau locations;

- reviewing contributions made to the audit contribution facility on the ANAO website; and

- meetings with Bureau staff.

1.21   The audit was conducted in accordance with ANAO Auditing Standards at a cost to the ANAO of approximately $403,835.

1.22   The team members for this audit were Sam Khaw, Jemimah Hamilton, Liset Campos Manrique, Jacqueline Hedditch, and Corinne Horton.

2. Asset management framework

Areas examined

This chapter examines whether the Bureau of Meteorology (the Bureau) has effective frameworks and systems governing management of assets in its observing network.

Conclusion

The frameworks and systems governing the Bureau's management of assets in its observing network are partly effective. Not all policies and plans have been completed, reviewed, and embedded as planned. The Bureau has not reviewed or updated the Strategic Asset Management Plan to reflect its current practices and does not have a financial forecast for asset intensive areas to enable long term strategic planning. Roles and responsibilities are clearly identified. The Bureau's Enterprise Asset Management System is in place and largely being used as planned. Development of asset management processes and training pathways is not complete.

Areas for improvement

The ANAO made three recommendations aimed at updating and reporting against the asset management framework, the development and completion of asset management procedures and processes, and the completion of training requirements.

2.1   An asset management policy records the principles by which an entity manages its assets.[23] The approach to implementing asset management principles should be documented in a strategic asset management plan. The Bureau's Strategic Asset Management Plan identifies international Asset Management Standard (*ISO 55000:2014)* as the standard which informs the Bureau's asset management approach.[24]

2.2   Under *ISO 55000:2014*, an organisation's system of asset management relies on interrelated elements which act as tools to achieve organisational objectives. These include policies, plans, business processes, and information systems.[25]

Is there a fit-for-purpose policy and plan?

The Bureau has developed an Enterprise Asset Management Policy and a Strategic Asset Management Plan. The Bureau has not reviewed or updated the Strategic Asset Management Plan in the required timeframes. The Enterprise Asset Financial Overview has not been implemented, and the Bureau does not have a financial forecast for ongoing and capital funding requirements for asset intensive areas to enable long term strategic planning.

---

23   British Standards Institution, *ISO 55000:2014 – Asset management – Overview, principles and terminology*, BSI Standards Publication, 2014, p. 8.

24   *ISO 55000:2014 – Asset management – Overview, principles and terminology* states that it provides an overview of asset management and asset management systems. The *ISO 55000:2024 – Asset management – Vocabulary, overview and principles* replaced the *ISO 55000:2014* in July 2024. This report refers to the *ISO 55000:2014* as it was the standard in force during the development and implementation of the Bureau's asset management approach.

25   British Standards Institution, *ISO 55000:2014 – Asset management – Overview, principles and terminology*, BSI Standards Publication, 2014, pp. 4–5.

2.3   *ISO 55000:2014* states that an organisation's asset management policy should set out the 'principles by which [it] intends applying asset management to achieve its organisational objectives' and that the 'approach to implementing these principles should be documented in a strategic asset management plan'.[26]

2.4   The Bureau's asset management approach comprises an asset management framework and supporting elements. The elements included in the Bureau's asset management framework are shown in Figure 2.1.

Figure 2.1:   Bureau of Meteorology Asset Management Framework
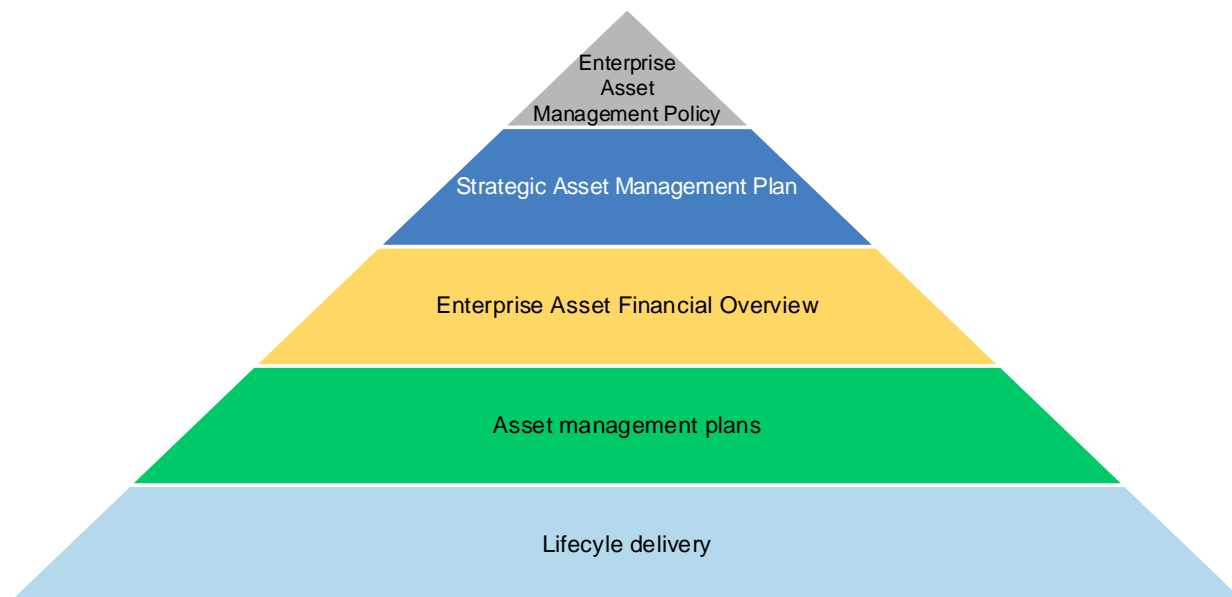
Source: ANAO representation of Bureau documentation in the Strategic Asset Management Plan.

2.5   The Asset Management Implementation Project developed the Bureau's current asset management framework based on *ISO 55000:2014*, including the Enterprise Asset Management Plan, Strategic Asset Management Plan, individual asset management plans for the observing network sub-networks, and the Bureau's software system for enterprise asset management.[27] The Bureau commenced development of its asset management framework and supporting processes in 2018. The introduction of an asset management framework was intended to improve the Bureau's enterprise asset management capability over existing and future assets.

Enterprise Asset Management Policy

2.6   The Bureau's Enterprise Asset Management Policy (EAMP) was approved in January 2020. The EAMP 'describes the Bureau of Meteorology's (the Bureau) approach to asset management'.[28] The EAMP requires that all staff 'must comply with this policy'. The EAMP comprises nine statements detailed in Box 1.

---

26   ibid., p. 8.

27   The Asset Management Implementation Project was funded as part of Tranche 2 of the Bureau's ROBUST Program, agreed by government in the 2018–19 Budget. See paragraph 1.10.

28   The EAMP excludes IP and Numeric (Weather Prediction) Models.

Box 1: Bureau of Meteorology Enterprise Asset Management Policy
The Bureau is committed to providing a sustainable and high-quality service to its stakeholders. The Bureau will: 1. link asset performance objectives with the Bureau's strategic goals, the Bureau's risk appetite and articulate asset related KPIs to deliver to customer expectations, compliance with statutory requirements and relevant standards; 2. ensure that Bureau's assets are safe, sustainably managed on a whole of life approach including financial aspects, deliver the intended service and develop service level agreements with relevant parties (including but not limited to industry groups, service users, business owners, user groups and business groups); 3. adhere to an agreed asset management framework — the Policy, Strategic Asset Management Plan and the asset management plans — to govern all asset activities; 4. communicate clear roles and responsibilities for asset management via clearly articulated job descriptions and inclusion in annual performance plans; 5. follow a risk-based approach to manage assets to meet desired asset performance levels; 6. consistently capture and manage asset related information to enable strategic decision making; 7. ensure that data about each Observing and ICT (Technology) asset is recorded and maintained to allow changes to be understood and managed to maintain the quality and integrity of the observational and ICT records; 8. enable the ongoing improvement of asset management practices through regular training and feedback sessions, so that staff have the necessary awareness, tools, competence and commitment to adopt an integrated cross functional approach to asset management; [and] 9. create, and regularly review, a continuous improvement plan to advance the level of sophistication for asset management and/or to extend the life of assets.

2.7   The EAMP was due for review in January 2023. In September 2024, the Bureau advised the ANAO that the revised EAMP is awaiting final sign-off.

Strategic Asset Management Plan

2.8   The Bureau's Strategic Asset Management Plan (SAMP) was issued September 2018 and updated in January 2020.

2.9   *ISO 55000:2014* states that an organisation's SAMP should:

- be used to guide the setting of its asset management objectives;

- describe the role of the system of asset management in meeting these objectives;

- describe the structures, roles and responsibilities necessary to establish a system of asset management and to operate it effectively;

- address stakeholder support, risk management and continuous improvement; and

- have a timeframe that extends beyond the organisation's own business planning timeframe in order to address the complete lifetimes of the assets.[29]

2.10   The Bureau's SAMP is 'a strategic planning tool that describes the asset management objectives of the Bureau, how these objectives will be achieved and how they contribute to achieving the Bureau's strategic objectives.' The SAMP states that:

> It articulates the long-term approach to asset management including desired levels of maturity and strategic priority projects, considering the Bureau's needs and objectives, stakeholder expectations and existing asset management competencies. In this way, it bridges the gap between the high-level objectives of the [*Bureau Strategy 2017–22*] and the specific asset lifecycle management activities necessary to deliver asset management maturity to a level in line with international best practice standards for an organisation of the Bureau's size, complexity and risk profile.[30]

2.11   The SAMP includes an introduction to asset management and the Bureau's assets, a discussion on the current and desired future asset management maturity, a set of eight strategic initiatives to achieve the desired maturity, and a roadmap diagram of proposed timelines.

2.12   The SAMP summarised issues with the Bureau's existing approach into four areas: asset management strategy; organisational structure and capability; information on assets and relationships with services and customers; and asset management systems.

2.13   When considering the observing network specifically, the SAMP states that:

> Most of the Bureau's assets in the observing network are nearing or are beyond the end of their useful life, which is on average 15 years. Most maintenance and operations processes are inconsistent across states and territories and lack a formal review, planning and scheduling element. Processes are also not suitably supported by an asset management system. Maintenance is heavily skewed towards reactive responses rather than preventative, planned maintenance.

2.14   The SAMP states that assessments in 2017 and 2018 of the existing asset management practices of asset intensive areas of the Bureau (including ICT, the observing network and Corporate Real Estate) found that the Bureau had:

- an ageing asset base due to under-investment in asset management;

- many asset funding requests were made without reference to baseline asset information including end-to-end lifecycle asset maintenance information;

- inconsistent asset management processes and unclear roles and responsibilities;

- disparate legacy systems to record information; and

- a lack of understanding or formal articulation of relationships between asset performance, service delivery and customer impact and value.

2.15   The SAMP identifies the initial asset management maturity levels across maturity areas and the expected asset management maturity levels at the completion of Tranche 2 and Tranche 3 of

---

29   British Standards Institution, *ISO 55000:2014 – Asset management – Overview, principles and terminology*, BSI Standards Publication, 2014, p. 8.

30   The Bureau *Strategy 2017–2022* is the predecessor to *Strategy 2022–2027*, discussed in Chapter 4, paragraphs 4.7 to 4.9.

the ROBUST Program (see Appendix 3, Table A.1).[31] The SAMP reports on a 2019 assessment which scored the Bureau's asset management maturity level under international best practice standards[32] as 0.6, with a target maturity of three. *ISO55001:2014* defines maturity on a scale of zero to five with five being 'Excellent'.[33] As of July 2024, all tranches of ROBUST have been closed. The SAMP's maturity assessment has not been monitored or reassessed to determine whether expected asset management maturity levels have been reached (see Chapter 4, paragraphs 4.67 to 4.69).

2.16   To achieve the desired future state of maturity, the SAMP presents a program of eight 'strategic initiatives' to uplift asset management capability.

> 1. Implement the Asset Management Framework.
>
> 2. Articulate clear levels of service ranging from customer facing measures to asset specific measures.
>
> 3. Identify and implement clear roles and responsibilities to enable the sustainable implementation of asset management practices at the Bureau.
>
> 4. Develop and implement [asset management plans] for all asset intensive areas of the Bureau as well as an annual planning cycle.
>
> 5. Implement a risk-based approach to asset management, including a planning and scheduling function, and set performance measures and maintenance plans in line with the risk appetite of the organisation.
>
> 6. Implement a fit-for-purpose asset management system to enable staff to consistently capture and manage asset information more efficiently and effectively.
>
> 7. Ensure the integrity of data is enabled by equipping staff with the necessary knowledge, processes and procedures to enable a successful implementation of the Asset Management Framework.
>
> 8. Regularly review maturity, progress and implement continuous improvement projects.

2.17   The SAMP includes a roadmap that presents a proposed order for activities within the strategic initiatives to occur, with all activities to be completed by 2023–24 except the development of training material and a fourth 'refresh' of the observing network asset management plans, which are scheduled for early 2025. The Bureau has not been monitoring or reporting on the implementation of strategic initiatives or actions outlined in the SAMP roadmap. Without ongoing monitoring and evaluation of the progress of the implementation of initiatives to uplift asset management and assessment of the impact that this is having on raising asset management maturity, the Bureau does not have visibility over their progress.

2.18   The SAMP states that 'a comprehensive review of the SAMP is recommended in 2021'. As of July 2024, a review of the SAMP has not occurred.

---

31   See paragraph 1.10. The ROBUST program was undertaken in three tranches, with Tranche 3 being closed in July 2024.

32   The 2019 and 2022 assessments used the *ISO55001:2014 Asset management — Management systems — Requirements* Maturity Scale.

33   British Standards Institution, *ISO 55001:2014 – Asset management – Management systems – Requirements,* BSI Standards Publication, 2014.

<div style="border: 1px solid #6ba3d6; padding: 1em;">

Recommendation no. 1

2.19 The Bureau of Meteorology:

(a) review and update the Enterprise Asset Management Plan and the Strategic Asset Management Plan (SAMP) to reflect the Bureau's asset management practices and approach; and

(b) measure and report on the progress of the implementation of asset management uplift initiatives outlined in the SAMP and its roadmap.

Bureau of Meteorology response: *Agreed.*

2.20 *The Bureau will review and update the Bureau's Strategic Asset Management Plan, ensuring that it reflects existing asset management approaches. Future asset management capability improvements will be included in the update, and subsequently tracked and reported to the Bureau's Executive.*

</div>

Enterprise Asset Financial Overview

2.21 The Enterprise Asset Financial Overview is identified as an element of the asset management framework in the SAMP. The SAMP states that the Enterprise Asset Financial Overview:

> details the financial forecast for strategic projects as well as ongoing and capital funding requirements for each asset intensive area of the Bureau. It articulates the funding requirements for strategic initiatives to uplift the capability of the Bureau, translating the broad intentions and principles of the EAMP into strategic actions and measurable objectives and establishes the approach for developing [asset management plans] for the Bureau's assets.

2.22 A timeframe for development of the Enterprise Asset Financial Overview was not defined in the SAMP.

2.23 In May 2024, the Bureau advised the ANAO that 'the Enterprise Asset Financial Overview document was not created in the way it was anticipated, and as such the Capital Portfolio FY2023–2024 is the best reference document'.

2.24 The *Capital Portfolio FY2023–24* was issued in September 2023. The Capital Portfolio FY2023–24 states that its purpose is to outline the project prioritisation process for new and existing assets, and capture decisions on projects to be funded by the Bureau's capital budget. It also states that it 'is a living document and will be updated twice yearly in line with the Bureau's budget cycle.' The document was not updated in 2023–24. In December 2024, the Bureau advised the ANAO that 'there were not material revisions to Portfolio budgets at mid-year 2023/24, therefore the production of an updated document was not required'.

2.25 The Capital Portfolio FY2023–24 includes a summary table of approved capital and operational project budgets for the relevant financial year, and detail relating to each approved project.

2.26 *ISO 55000:2014* states that integration of an organisation's strategic asset management plan with its long-term financial plans can enable the balancing of short-term financial needs with the

needs of medium-term activities and longer-term lifecycle plans.[34] The SAMP states that 'a financial model with a 20-year outlook has been developed to support the [asset management plans] and will feed into the Enterprise Asset Financial Overview and the Bureau's budget cycle.' Consideration of a 20-year outlook is not included in the Capital Portfolio FY2023–24.

2.27   The Capital Portfolio FY2023–24 includes proposed timelines up to 2028 for the approved projects. 'Ongoing and capital funding requirements for each asset intensive area of the Bureau', as identified in the SAMP, are not present in the Capital Portfolio document.

2.28   In September 2024 the Bureau advised the ANAO that 'there is not likely to be a single document-driven approach for the capital program' in 2024–25.

Asset management plans

2.29   The SAMP states that asset management plans (AMPs) 'specify the activities that are intended to be undertaken for a specific network across the lifecycle' including 'timescales, costs and responsibilities for delivery.' The Bureau has developed AMPs for the eleven observing network sub-networks. AMPs are discussed in Chapter 3, paragraphs 3.4 to 3.11.

Lifecycle delivery documentation

2.30   The SAMP defines lifecycle delivery documents as 'operational plans including maintenance plans, capital delivery plans and detailed project plans'. It states that best practice for asset management 'will include documenting and standardising processes and establishing improved guidance for asset lifecycle delivery'. Processes and guidance are discussed in paragraphs 2.47 to 2.57.

Are roles and responsibilities identified?

> The Bureau has established governance bodies that support asset management. The Bureau has established asset management roles identified as needed in the Strategic Asset Management Plan. Responsibility and accountability for asset lifecycle management is defined. Maintenance and operations responsibilities of each observing network sub-network are documented in asset management plans.

2.31   *ISO 55000:2014* states that clearly defined roles, responsibilities and authorities are essential for successfully establishing, operating and improving asset management within an organisation.[35]

2.32   The SAMP states that 'the roles, responsibilities and ownership of asset management activities are unclear'. It identified an initial state maturity level for 'roles and responsibilities' as zero.[36] The SAMP states that specific improvements under the asset management framework will 'provide role clarity for asset management and identify additional roles which are required to enable the asset management practice to be sustainable'.

---

34   ibid., p. 6.

35   ibid., p. 3.

36   Maturity level 0 is defined as 'the organisation has taken no action to establish an asset management framework.'

Observing systems and operations program governance structure

2.33   The Bureau's enterprise-level decision-making governance body is the Executive Team.[37] The Bureau's Executive Team includes the Chief Executive Officer/Director of Meteorology and the six group executives of the Bureau of Meteorology.[38] The Bureau's Executive Team:

- considers and promulgates decisions on program, policy, financial and people management issues across the Bureau;

- provides leadership under the authority of the Director as accountable authority; and

- sets strategic policies and priorities and optimises the use of resources.

2.34   The Bureau's Data and Digital Group is led by a Group Executive, and:

> provides the data, infrastructure and systems to underpin the Bureau's core operations from the measurement and collection through to production and dissemination to enable Bureau delivery of services and products (including data) to customers.

2.35   Responsibility for the operation, sustainment, and lifecycle management of the Bureau's observing network and operations sits with the Observing Systems and Operations Program (OSO program) within Data and Digital Group.[39]

2.36   Figure 2.2 illustrates the observing network governance structure.

---

37   The Executive Team is supported by the Bureau of Meteorology's Audit Committee and three enterprise-level governance bodies comprised of select members of the enterprise team and other senior leaders where appropriate: the Investment Committee, the Major Transactions Committee, and the Security, Risk and Business Continuity Committee.

38   This includes the Group Executive Director of the Australian Climate Service. The Australian Climate Service is a partnership of the Bureau of Meteorology, Geoscience Australia, CSIRO and Australian Bureau of Statistics. The Australian Climate Service is part of the Bureau of Meteorology, and the Director of Meteorology is its accountable authority.

39   As well as the Observing Systems and Operations Program the Data and Digital Group includes:
- the Data Program;
- the Planning and Architecture Program;
- the Application Services Program;
- the Digital Channels and Customer Experience Design Program; and
- the Service and Infrastructure Management Program.

Figure 2.2: Observing network governance structure
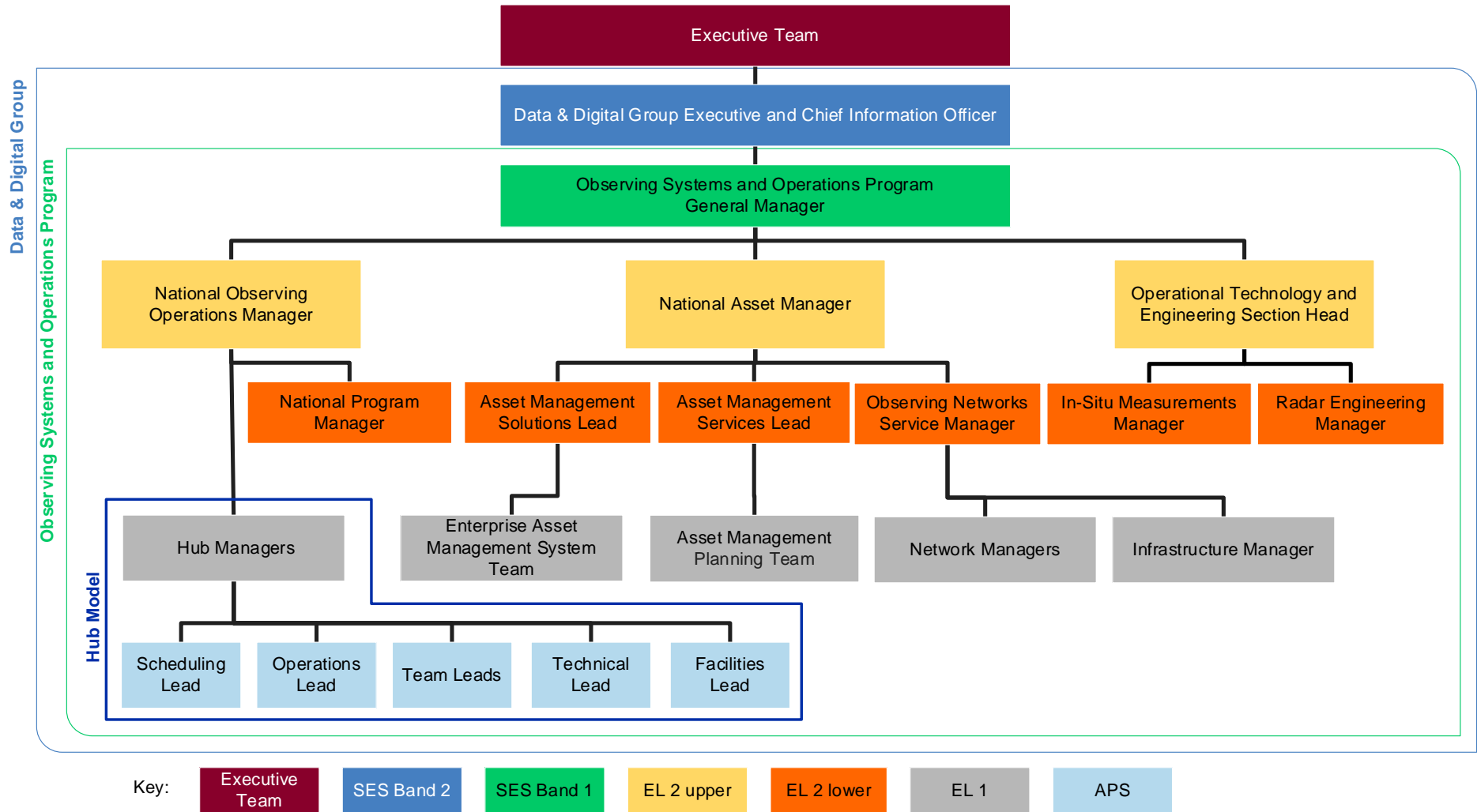
Note: The Bureau differentiates Executive Level 2 staff into 'upper' and 'lower' bands, including in the enterprise agreement, organisational chart, and spending delegations.

Source: ANAO representation of Bureau of Meteorology documentation.

Observing Systems and Operations Program General Manager

2.37   The OSO program is led by a general manager for the operation, sustainment and lifecycle management of the Bureau's observing networks. As at June 2024, the OSO program had an ASL allocation of 290.5.

2.38   The general manager of the OSO program chairs the Asset Management Reference Forum (AMRF). As set out in the 2021 charter:

> The specific responsibilities of the AMRF are to:
>
> • Make recommendations to the respective governing forums regarding maximisation of the Bureau's investment in the asset management capability
>
> • Support the Executive and General Managers by providing asset management advice, direction and oversight, and escalating matters as appropriate
>
> • Fast track the Bureau's asset management uplift and maturity journey by supporting management decisions, implementing agreed step changes, ensuring compliance and effecting cultural change
>
> • Act in good faith to promote the objectives of the Bureau (i.e. organisational strategy) with respect to the Asset Management function
>
> • Through the actions of this forum, foster an engaged workforce, challenged to master their domains and ultimately, become recognised as industry experts.

National Observing Operations Manager

2.39   The National Observing Operations (NOO) section is responsible for delivering 'a nationally consistent approach to the operation and maintenance of the Observing Networks' and includes observing network incident management, maintenance, field services, some observations, and the relevant workforce and information services. Bureau staff responsible for the operational management and maintenance of most observing network assets are based in an Observing Operations Hub (hub; see paragraphs 2.70 to 2.73).

National Asset Manager

2.40   The National Asset Manager is responsible for the Enterprise Asset Management section. The Enterprise Asset Management section includes:

• the Enterprise Asset Management System Team which is responsible for maintenance of the Enterprise Asset Management System (EAMS; see paragraphs 2.60 to 2.66);

• the Observing Network Service Management (ONSM) team which consists of Network Managers for the Bureau's observing networks.[40] Network Managers are the asset managers for the respective observing networks and are responsible for managing and

---

40   ONSM officials also serve as technical representatives with domestic stakeholders such as the Australian Antarctic Division, the Department of Defence, and Geoscience Australia; and international stakeholders such as the World Meteorological Organization and the United Nations Educational, Scientific and Cultural Organization.

monitoring the overall performance of networks.[41] Network Managers are responsible for developing the annual OSO Program of Service[42], which identifies the preventative maintenance tasks to be completed each year, and the asset management plans[43], which outline the operation, maintenance, and disposal strategies for the observing network sub-networks. Network Managers perform some maintenance activities for certain observing networks (see Table 2.4); and

- the Asset Management Services team. This contains the Asset Management Planning Team, which is responsible for planning maintenance tasks and creating work orders within EAMS.[44]

Operational Technology and Engineering Section Head

2.41 The Operational Technology and Engineering (OTE) section provides technical and engineering support to observing networks, including procurement, design, and installation of some new observing instruments. OTE also provides technical support and performs some maintenance activities for other observing instruments (see Table 2.4).

Asset management roles and responsibilities

2.42 The Bureau's SAMP includes an improvement initiative titled 'Demarcate asset management roles', which aims to outline 'the roles that will be established for asset management at a senior level'. It explains that 'the intention is that there is one position at the Bureau Executive level that holds ultimate accountability for asset management at the Bureau'. The SAMP includes a table identifying eight asset management roles at the Bureau. Table 2.1 shows the eight roles identified in the SAMP and the ANAO's assessment of whether these roles are established as at August 2024. The ANAO assessed that the Bureau has established all eight roles.

Table 2.1: Asset management roles established in the Bureau

Role	Purpose	ANAO assessment of establishment	Established role identified by ANAO
Business Leader	The Business Leader is the executive sponsor who directs the work of all other roles with particular emphasis on policy development, the analysis of strategic requirements, asset management capability development, risk management and performance improvement.	◆	Data & Digital Group Executive

---

41 The networks managed by the network managers are grouped slightly differently to the sub-networks listed in paragraph 1.4. There are network managers for the flood warning, marine, ozone, radar, satellite, sea level, solar, space weather, surface, and upper air networks. There is an additional network manager for infrastructure who is responsible for the infrastructure and facilities that support observing networks, such as supporting structures for communications and instruments, equipment shelters and buildings, power generators and systems, and physical security such as fencing and locks.

42 The OSO Program of Service is discussed in paragraph 3.26.

43 Asset management plans are discussed in paragraphs 3.4 to 3.11.

44 See paragraph 3.41.

Role	Purpose	ANAO assessment of establishment	Established role identified by ANAO
Asset Manager	The Asset Manager directs others in asset management planning, the implementation of asset management plans, risk management and performance improvement and asset information management.	🔺	National Asset Manager[a]
Asset Management Planner	The Asset Management Planner's role is to undertake activities covered by asset management planning, risk management, performance improvement and information management.	◆	Asset Management Services Lead
Asset Management Team Leader	The Asset Management Team Leader: • shows team members how to undertake activities covered in the asset management plans, and reviews progress and performance • undertakes asset management planning, asset management capability development, risk management and performance improvement • contributes to asset information management	◆	Three roles — Asset Management Solutions Lead, Asset Management Services Lead, Observing Network Service Manager
Asset Management Team Member	Asset management team members undertake activities involved in the implementation of asset management plans, risk management and performance improvement.	◆	Enterprise Asset Management Team
Planning Scheduler	Planning schedulers plan forward workload and schedule and dispatch work.	◆	Hub Scheduling Lead
Systems Administrator	The Systems Administrator is responsible for administrating the information system.	◆	Roles within the Enterprise Asset Management Team
Asset Data Administrator	An asset data administrator maintains asset reference data.	◆	

Key: ◆ Established in line with SAMP 🔺 Established however not aligned to SAMP ■ Not established.

Note a: National Asset Manager is not at the General Manager level specified in the SAMP for this role.

Source: ANAO analysis of Bureau documentation, including the Strategic Asset Management Plan.

2.43   The SAMP noted that 'traditionally' the roles and responsibilities for asset management are divided by operator; maintainer; and asset owner. It recommended that, 'once roles and responsibilities have been established', the Bureau consider the articulation of ownership of assets in accordance with the following principles:

- asset owner sets the network strategies;

- asset maintainer optimises the value of assets through ongoing routine and [return to service] maintenance, and

- asset operator delivers services at the levels defined by the asset manager (plays a minor role at the Bureau due to automation of data collection).

2.44   In January 2024, the Asset Management Reference Forum endorsed an 'Asset Management RACI' table. A RACI table identifies the roles which are 'responsible', 'accountable', 'consulted', and 'informed' for a relevant decision or deliverable within an organisation. The Asset Management RACI table lists the asset lifecycle phases, identifies activities within these phases and the relevant inputs and outputs for each activity. It assigns responsibility and accountability for these activities to roles within the Data and Digital Group.

2.45   Maintenance and operation responsibilities for each observing network sub-network are documented in the asset management plans (AMPs; see paragraphs 3.4 to 3.11) as well as the Asset Management RACI Table. Maintenance responsibilities are summarised in Table 2.4. The Bureau identifies which roles are responsible and accountable for each stage of strategic planning within the Asset Management RACI Table however the title asset owner is not specifically used.

Are appropriate procedures and systems in place to support the management of assets?

> The Bureau's procedures and systems to support the management of assets are incomplete. The Bureau's Enterprise Asset Management System is in place and largely being used as originally planned. The Bureau does not have a plan to develop all asset management processes identified as necessary in 2022. Development is not complete for training and competency frameworks for three sub-networks and two asset classes.

2.46   As well as policies and plans, such as those outlined in the Bureau's Asset Management Framework, *ISO 55000:2014* identifies business processes and information systems as elements of asset management which can be used to give assurance that activities will be delivered.[45]

Procedures and processes

2.47   Under the Bureau's Policy Governance Process Framework, procedures provide mandatory instructions on the way policies are carried out. The Bureau has not developed procedures relating to the EAMP. The Bureau has developed a procedure relating to maintaining financial records of assets, including asset reporting thresholds, capitalisation, and depreciation and amortisation. It does not provide instructions relating to other elements of asset management. The Bureau has not developed standard operating procedures for asset management lifecycle activities.

2.48   Other factors relating to asset management are reflected in different enterprise procedures, including a 'Risk Management Procedure'[46] for the Bureau's risk approach and a 'Competencies and Licences Procedure' for the Bureau's approach to recognising training. The Bureau also has 25 procedures which relate to occupational health and safety and would be relevant to asset

---

45   British Standards Institution, *ISO 55000:2014 – Asset management – Overview, principles and terminology*, BSI Standards Publication, 2014, pp. 4–5.

46   See paragraphs 4.24 to 4.25.

maintenance activities, such as a 'Mercury Procedure' which is relevant in cases involving mercury thermometers.

Asset management processes

2.49   The Bureau's SAMP identified that 'most maintenance and operations processes are inconsistent across states and territories and lack a formal review, planning and scheduling element.' It also noted that 'processes are also not suitably supported by an asset management system.' The SAMP identifies 'establish consistent maintenance processes' as a strategic initiative to be completed.

2.50   In February 2022, the Bureau's internal auditors delivered a report of the observing network asset management framework.[47] The internal audit report included one finding relating to asset management processes. The internal audit noted that 'the Asset Management Team have developed a Process Responsibility Matrix that identifies 142 asset management processes' and that:

> Due to the current position of the Bureau's asset management uplift, a large proportion of these processes are identified as immature (with only seven of the 142 processes highlighted as remediated/completed) and the Asset Management Team highlighting that they have progressed approximately 20% in maturing these processes and increasing the Bureau's asset management capability.

2.51   The internal audit found there was a 'lack of a clear approach/roadmap to uplift the remaining asset management processes'. The internal audit made two recommendations regarding this finding. Progress against these recommendations was reported to the Bureau of Meteorology Audit Committee (see Table 2.2).

Table 2.2:   Internal audit recommendations regarding observing network asset management process uplift

Internal audit recommendation	Text of closure status update	Audit Committee meeting
Recommendation 2.5.1: Develop and document a roadmap or planned approach that highlights the remediation process to uplift the 142 asset management processes currently in place at the Bureau. This could be included in the next iteration of the SAMP to further highlight the overall perspective of the asset management uplift.	An external consultancy Coras has provided a maturity assessment and developed a roadmap for the Bureau's Asset Management Maturity development.[a] This roadmap contains a recommended approach to uplifting the Bureau's Asset Management Maturity with a range of improvement measures … It is recommended this maturity assessment and roadmap be adopted as the pathway to uplift asset management at the Bureau, as an externally benchmarked maturity assessment, in lieu of tracking progress against 143 subprocesses which is less feasible.	November 2022

---

47   This internal audit is discussed further in Chapter 4, paragraphs 4.70 to 4.76.

Internal audit recommendation	Text of closure status update	Audit Committee meeting
Recommendation 2.5.2: Develop an approach to document and monitor the progress in uplifting each of the 142 asset management processes to continue to assess the Bureau's maturity level and highlight the focus areas going forward.	Complete. Twenty (20) asset management processes have now been mapped as standard templates. The Process Catalogue List has been endorsed by the GM.	August 2023

Note a: See paragraphs 4.68 to 4.69 for discussion of the 2022 maturity assessment and roadmap.

Source: ANAO analysis of Bureau of Meteorology Audit Committee papers.

2.52   August 2023 reporting to the Audit Committee included a diagram showing 20 processes for which a Process Design Document had been completed as at July 2023, and a remaining nine processes 'for later mapping' (see Table 2.3).

Table 2.3:   Processes identified in closing internal audit recommendation 2.5.1

Topic	Process	Completed
Asset strategy and leadership	Develop strategy for asset management	Completed
	Plan asset management program of work	Marked for later mapping
Plan and govern asset management	Manage asset network planning (AMPS)	Completed
	Govern asset management	Completed
	Manage asset resilience	Completed
	Manage asset risk	Completed
	Manage asset performance	Marked for later mapping
Develop and deploy assets	Plan and prioritise project portfolio	Marked for later mapping
	Deliver project	Marked for later mapping
	Design asset	Marked for later mapping
	Manage engineering change	Completed
Operate and maintain assets	Develop program of service	Marked for later mapping
	Plan and prioritise asset maintenance & return to work	Marked for later mapping
	Schedule & assign work in EAMS	Completed
	Undertake work	Completed
	Process broken item	Completed
	Manage SML calibration	Completed
	Inspect repair and salvage assets	Completed
	Manage & triage incidents or requests in EAMS	Completed
	Manage observing network event/incident	Marked for later mapping
Manage inventory	Replenish inventory	Completed
	Transfer materials	Completed

Topic	Process	Completed
	Complete financial disposal paperwork	Completed
	Perform stocktake (of obs assets, materials & equipment)	Completed
Administer asset records (EAMS)	Manage asset register in EAMS	Completed
	Manage work template	Completed
	Manage minor project requests in EAMS	Completed
	Produce global work forecast in EAMS	Completed
	Provide service and support (EAMT)	Marked for later mapping

Source: ANAO summary of Bureau records.

2.53   In August 2024, the Bureau advised the ANAO that for the nine processes marked for later mapping 'there is currently no specific schedule for completion.'

2.54   In December 2023, the Bureau introduced an additional process, the *NOO Work Management Process*, which advises hub staff on identifying, planning, scheduling, executing, and completing maintenance activities (see paragraphs 3.39 to 3.50) and instructs how these are to be recorded in the Bureau's Enterprise Asset Management System. In September 2024, the Bureau advised the ANAO that the NOO Work Management Process outlines more detailed work instructions related to the listed processes Plan and Prioritise Asset Maintenance and Routine Work, Assign and Schedule Work Tasks, and Undertake work.

2.55   The Bureau has not developed procedures for asset management lifecycle activities or completed its planned uplift of asset management processes identified in the 2022 internal audit.

Recommendation no. 2

2.56   The Bureau of Meteorology develop procedures for asset management lifecycle activities and complete its review of processes.

Bureau of Meteorology response: *Agreed.*

2.57   *The Bureau will continue to build out its substantial base of guiding procedures for asset management lifecycle management, completing its in-progress reviews. The completion of procedures will provide a more consistent approach to asset management of observations assets.*

Information systems

2.58   The SAMP states that 'asset related information was distributed across various locations and had various levels of complexity and a more effective information management strategy was required to realise efficiencies'.

2.59   Implementing an asset management system is one of the strategic initiatives identified in the SAMP. The SAMP states that 'an asset management system that is fit for purpose for the operating environment of the Bureau is instrumental for uplifting the capability of the Bureau for Asset Management' and that such a system would be used to 'consistently capture and manage asset related information'.

Enterprise Asset Management System

2.60   As part of the Asset Management Implementation Project, the Bureau commenced procurement of an asset management software system in December 2018.[48] The software system is an IBM product called Maximo. The Bureau refers to this software as the Enterprise Asset Management System (EAMS).[49] EAMS is used for observing network assets 'and related IT equipment'.

2.61   EAMS was rolled out across the Bureau between May and September 2021. The Bureau progressively transferred all existing observing asset data that was stored on its previous system to EAMS. The transfer of data to EAMS was completed in June 2022.

2.62   EAMS is an asset register which documents the 'asset hierarchy' for each site by recording the instruments and infrastructure that are present and the assets that these instruments form.[50] This allows the Bureau to use EAMS to document the transfer of instruments and infrastructure between sites, and to store metadata[51] on observing network instruments, infrastructure, and locations. The Bureau also uses EAMS to raise and issue work orders, to plan and assign asset maintenance activities, and to record the outcome of such activities (see paragraph 3.40).

2.63   Project documentation relating to the purchase and implementation of EAMS lists 13 high-level business requirements that included functional capabilities for the system to plan and execute asset management tasks, and to generate and store information about assets for further planning and analysis. The Bureau is largely using EAMS to the extent originally planned and intended, with some additional functionality yet to be utilised. Nine of 13 requirements are fully in place, one is in place for critical items, and the other three requirements are possible however not in use (see Appendix 4, Table A.2, for further detail).

2.64   EAMS contains records of service and maintenance for all observing network assets. The Bureau is in the process of leveraging information stored and extracted from EAMS to monitor and report on the performance of assets in its observing network (see paragraphs 4.39 to 4.40).

2.65   In May 2024, the Bureau advised the ANAO that it is not yet able to rely on information from EAMS to report accurately on the performance of assets in its observing network. As such, performance metrics have not been finalised. The Bureau is therefore unable to use information

---

48   See paragraph 2.5.

49   The Bureau also refers more broadly to its approach to asset management, including the software system, as its 'enterprise asset management system'.

50   A 'site' specifies a geographic location. For example, EAMS can identify information relating to the Captains Flat Radar site, near Canberra, at multiple levels.

- It is a weather radar facility.
- It contains an 'EEC WSR745S/96' radar system.
- The radar is comprised of subsystems such as the antenna system; data processing and control system; radar safety system; waveguide system; receiver; and transmitter.
- Each subsystem is comprised of individual instruments and infrastructure.
- Any rotables or smaller parts which are used for a subsystem.

51   Metadata is descriptive data about information and records. Metadata can include title, author, registration number or unique identifier, date of creation, date of received, subject matter, format, and history of use. See National Archives of Australia, *Metadata*, NAA, available from https://www.naa.gov.au/information-management/describing-information/metadata [accessed 5 July 2024].

from EAMS to develop or revise performance requirements and metrics for all observing network assets.

2.66   EAMS is considered the single source of truth for day-to-day information about, and management of, observing network assets. EAMS is the system used day-to-day by relevant staff to physically manage and understand observing network assets.

Fixed Asset Register

2.67   The Bureau also maintains a Fixed Asset Register within its enterprise resource planning software system.[52] The Fixed Asset Register contains records of observing network assets for enterprise-level financial management and planning purposes. The Fixed Asset Register contains details of asset location and value from the broader financial management perspective.

2.68   The Asset Management Unit in the Bureau's finance section is responsible for managing assets on the Fixed Asset Register, including recording details of acquisition, disposal, and transfer; and conducting and recording the results of physical inventory.[53]

2.69   EAMS does not interface with the enterprise resource planning software system. The Bureau is using both systems as separate elements of asset management.

Hub model

2.70   Between 2014 and 2024, the Bureau implemented the *Observing System Strategy 2014–2020 and Beyond* (the Observing System Strategy). The Observing System Strategy proposed reducing the number of staffed, purpose-built facilities spread across the country to a smaller number of central 'activity hubs'. The activity hubs would 'maximise transport logistics, ensure greater management support and a critical mass of staff at each location'.

2.71   The Activity Hub Implementation Project, under the Observing System Strategy, was established in 2016 and completed in 2024. The project included:

•   the automation and de-staffing of 24 field stations;

•   the establishment of eight Observing Operations Hub (hub) facilities;

•   the transition of field station staff to the established hubs;

•   the creation of nationally consistent roles and responsibilities for hub staff, including the development and implementation of Training and Competency frameworks; and

•   the transition of hub staff from shift work to day work.

2.72   Under the hub model, Bureau staff responsible for the operational management and maintenance of observing network assets are based in a hub.

2.73   There are eight hubs in total, one in each of Adelaide, Brisbane, Cairns, Darwin, Hobart, Melbourne, Perth, and Sydney.[54] Each hub is responsible for a certain number and type of observing network assets (see Table 2.4). Hub staff travel from the hub on field trips to perform maintenance and other management activities on observing network assets, shown in Figure 2.3. In April 2024,

---

52   The Bureau's enterprise resource planning software system is SAP.

53   The Bureau's Finance section is located within the Business Management Program of the Enterprise Services Group.

54   As of June 2024, there is not a single physical location for the Sydney Hub. The delivery of the site has been recategorised as a standalone project, to be delivered in 2025.

the Bureau's internal progress reporting to the Executive Team noted that 45 per cent of staff affected by the automation of field stations relocated to a hub; 35 per cent accepted a redundancy; and 20 per cent retired or left the Bureau. In August 2024, the Bureau advised the ANAO that there are 178 staff operating under the hub model.

Figure 2.3:   Bureau of Meteorology staffed observing network facilities
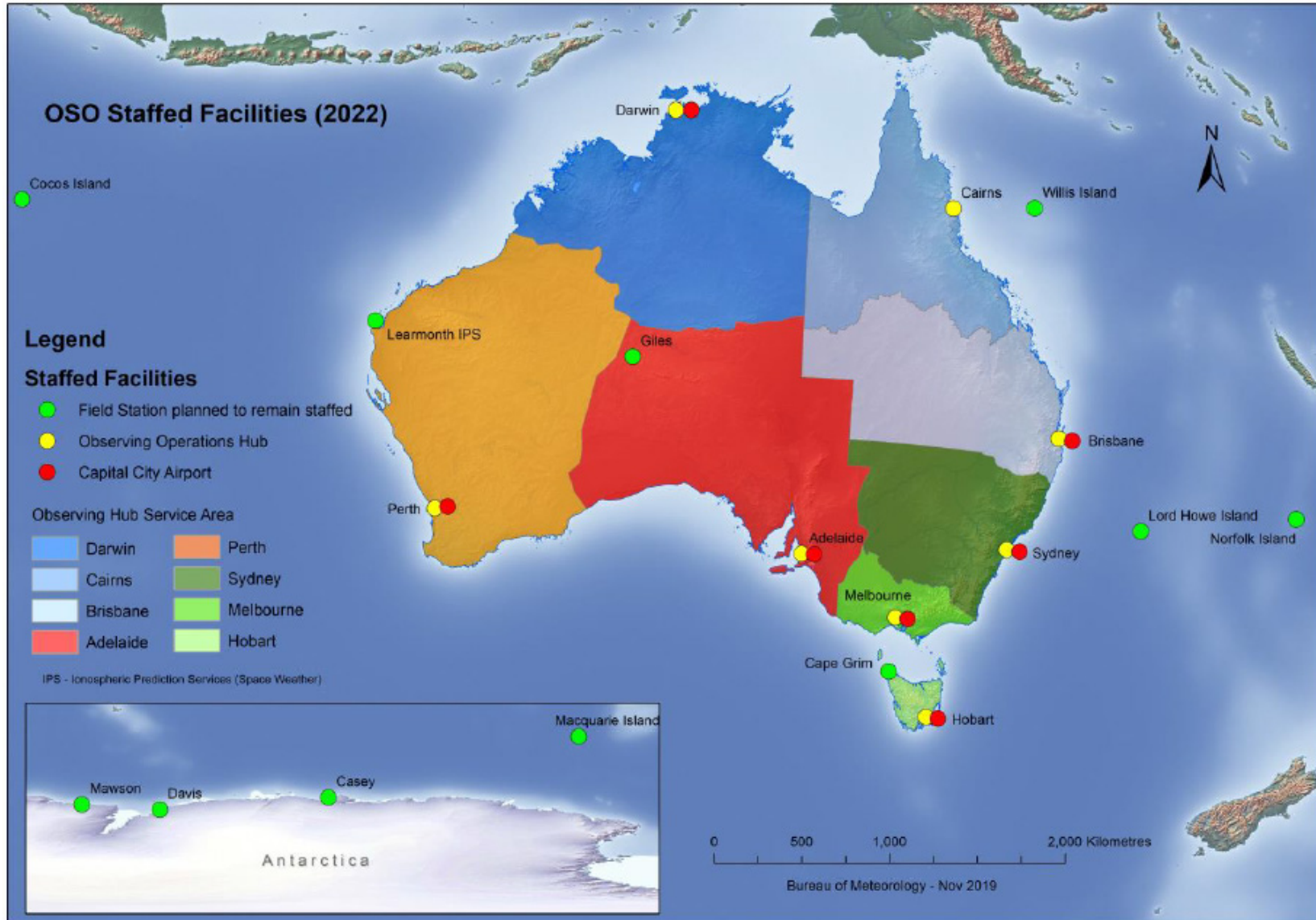
Source: Bureau of Meteorology, 2022.

Table 2.4: Observing networks by operational maintenance responsibility

Hub (NOO)	Flood	Marine	Ozone	Radar	Satellite reception	Sea level	Solar	Space weather	Surface observation	Upper air	Wind profiler
Observing network (by asset management plan)											
Adelaide	✓	✓	–	✓	–	✓	–	–	✓	✓	✓
Brisbane	✓	–	–	✓	–	–	–	–	✓	✓	✓
Cairns	✓	–	–	✓	–	–	–	–	✓	✓	✓
Darwin	✓	–	–	✓	–	–	–	–	✓	✓	✓
Hobart	✓	✓	–	✓	–	–	–	–	✓	✓	✓
Melbourne	✓	–	–	✓	–	–	–	–	✓	✓	✓
Perth	✓	–	–	✓	–	–	–	–	✓	✓	✓
Sydney	✓	–	–	✓	–	–	–	–	✓	✓	✓
Other section											
Observing Network Service Management[a]	–	✓	✓	–	✓ [b]	✓	–	✓	–	–	–
Operational Technology and Engineering[c]	–	–	–	–	–	–	✓	–	–	–	–

Key: ✓ Responsible for operational maintenance of this network   – Not responsible for operational maintenance of this network.

Note a: As noted in paragraph 2.40, ONSM is a team of the Enterprise Asset Management section within the OSO program, working with the NOO and OTE sections.

Note b: Hub personnel may assist where needed.

Note c: As noted in paragraph 2.41, OTE is a section of the OSO program, responsible for engineering, technical, and other specialist support for observing networks including the design, build, installation, and modification of certain network instruments. The In Situ Measurements team within the OTE section is responsible for maintenance of the solar network. Additionally, OTE staff provide support for complicated faults across the flood, radar, surface observation, upper air, and wind profiler sub-networks.

Source: ANAO summary of Bureau of Meteorology documentation.

2.74   In 2022, the Bureau commenced a program of work to standardise activities across hubs. This has led to the introduction of specific roles with designated manuals for Hub Manager, Operations Lead, Scheduling Lead, Facilities Lead, and Team Lead. In December 2024, the Bureau advised the ANAO that this program of work does not have a specific end date.

Training

2.75   *ISO 55000:2014* states that employees who are aware, competent, and empowered are fundamental to the successful establishment, operation, and improvement of asset management in an organisation.[55] The Bureau's SAMP included multiple projects related to training, linked to the EAMP principle 'enable the ongoing improvement of asset management practices through regular training and feedback sessions, so that staff have the necessary awareness, tools, competence and commitment to adopt an integrated cross functional approach to asset management'.

Training and competency frameworks

2.76   In 2016, the Bureau commenced developing 'Training and Competency Frameworks' for hub staff that undertake asset maintenance activities. Development of the training and competency frameworks was initiated as part of the shift to the hub model under the Observing System Strategy and Activity Hub Implementation Project (see paragraph 2.71).

2.77   Training and competency frameworks are intended to 'provide [hub] staff with clear guidance on what is appropriate for them to undertake on each asset depending on their work level and competency'. Training and competency frameworks specify which competencies are required to perform a role and which assets or equipment the staff member should be able to maintain once training is complete.

2.78   The training and competency frameworks are being developed on an equipment and activity basis. There are multiple competencies within each training and competency framework, which can be held at three levels of competency.[56]

- Competency level 1 (C1) — staff member can support hub tasks with a base standard of proficiency and may work under supervision or direct instruction.

- Competency level 2 (C2) — staff member can lead hub tasks with good levels of proficiency whilst supervising and instructing colleagues.

- Competency level 3 (C3) — staff member is considered a subject matter expert allowing them to perform nonstandard tasks such as installation activities.

---

55   British Standards Institution, *ISO 55000:2014 – Asset management – Overview, principles and terminology*, BSI Standards Publication, 2014, p. 3.

56   The Bureau has defined category C0 as 'unskilled'. This category is not utilised in the training and competency frameworks.

2.79   There is a total of 176 competencies listed across the training and competency frameworks for all sub-networks and hub operational activities. Of these competencies:

- one hundred and nine are achievable through taking courses[57];
- four would require the completion of courses which are under construction;
- fifty-eight are achievable through learning on the job and undertaking Hub Proficiency Assessments;
- four can be achieved through on the job assessment and pre- or post-trip checklists; and
- one competency has no specified method of completion.

2.80   Evidence of staff competency and qualifications are manually entered into EAMS and the Bureau's enterprise system for qualifications[58] by hub staff who are responsible for maintaining the currency of their training and competency records. Operations Leads support hub staff in this process and are responsible for ensuring that the records are current.

2.81   From February 2020, the Bureau began releasing training and competency frameworks for asset management activities. As at July 2024, the Bureau has released training and competency frameworks for seven of 11 sub-networks. Training and Competency Frameworks for two asset classes within these seven sub-networks are not complete, Tsunameters and Wave Buoys, as well as four courses required by existing Training and Competency Frameworks.

2.82   As identified in the *ISO 55000:*2014 and EAMP, and stated in the SAMP, 'effective asset management depends on staff having the requisite capabilities and understanding of their roles and responsibilities.' The development of Training and Competency Frameworks and the courses required to fulfil them is not complete.

Recommendation no. 3

2.83   The Bureau of Meteorology finalise training requirements and methods for all maintenance and repair activities across the observing network.

Bureau of Meteorology response: *Agreed.*

2.84   *The Bureau will complete residual gaps in maintenance training and related frameworks, ensuring that all observing assets benefit from the uplift to the skills and competencies of our national field operations personnel.*

---

57   Of these:
- sixty-four are available through the Bureau's an e-learning platform;
- five are provided by the Bureau of Meteorology Training Centre;
- twenty-two are available through a Nationally Accredited Provider;
- twelve are available through a third party, such as the APS Academy; and
- six are 'legacy courses' available through the Bureau on request.

58   The Bureau's enterprise system that records certification of qualifications is known as EBS. EBS is a SAP-based enterprise software system that the Bureau uses for managing staff information and processes such as leave, allowances, and professional development. All Bureau staff can upload qualifications to EBS to support professional development, work allocations, and managerial oversight of the currency of qualifications where needed.

3.   Asset lifecycle

Areas examined

This chapter examines whether the Bureau of Meteorology (the Bureau) has appropriate arrangements to manage the lifecycle of assets in its observing network.

Conclusion

The Bureau's arrangements to manage the lifecycle of assets in its observing network are partly appropriate. The Bureau's asset management plans include lifecycle management activities and related cost estimates. The Bureau's budget planning process for 2024–25 did not incorporate the predicted costs presented in the asset management plans. All types of maintenance are recorded in the Bureau's Enterprise Asset Management System and triaged based on priority. The Bureau's asset management plans include outcomes to report against, however target and actual performance levels are not complete. The Bureau's guidance surrounding disposals is not complete. The Bureau's Fixed Asset Register and Enterprise Asset Management System each record assets and disposals differently and the Bureau does not have guidance to ensure records are aligned.

Areas for improvement

The ANAO made one recommendation aimed at fully implementing a monitoring and reporting approach.

The ANAO identified an opportunity for the Bureau to include procedural guidance documenting the differences in approach between financial records and operational recording of assets.

3.1   The Bureau's *Corporate Plan 2024–25* states that the Bureau 'relies upon a large and geographically dispersed network of assets' and that 'given the Bureau's significant asset base there is a constant need to ensure a modern, fit-for-purpose fleet of assets is established and well maintained, with available resources used to deliver optimum-value products and services for customers.'[59]

3.2   The international Asset Management Standard (*ISO 55000:2014*) refers to a lifecycle management approach being key to organisations being able to realise value from assets.[60] *ISO 55000:2014* describes the use of asset management plans to establish activities to be undertaken on assets, as well as the timeframes and resources to be used for the achievement of specific and measurable objectives.[61]

---

59   Bureau of Meteorology, *Corporate Plan 2024–25*, Bureau, Melbourne, 2024, p. 22.

60   British Standards Institution, *ISO 55000:2014 – Asset management – Overview, principles and terminology*, BSI Standards Publication, 2014, p. 3.

61   ibid., p. 8.

Is planning over the lifecycle of assets fit for purpose?

The Bureau's asset management plans include a section on lifecycle strategies, which describes the types of activities to be undertaken within each sub-network across the lifecycle, and a five- or ten-year investment profile that includes cost estimates and key activities. The Bureau's budget planning process for 2024–25 did not incorporate the predicted costs presented in the asset management plans. Planning for renewal and disposal is not complete for all asset management plans.

3.3   The Bureau's asset lifecycle includes planning, acquisition, operation and maintenance, renewal, and disposal (see Figure 3.1).

Figure 3.1:   Asset lifecycle
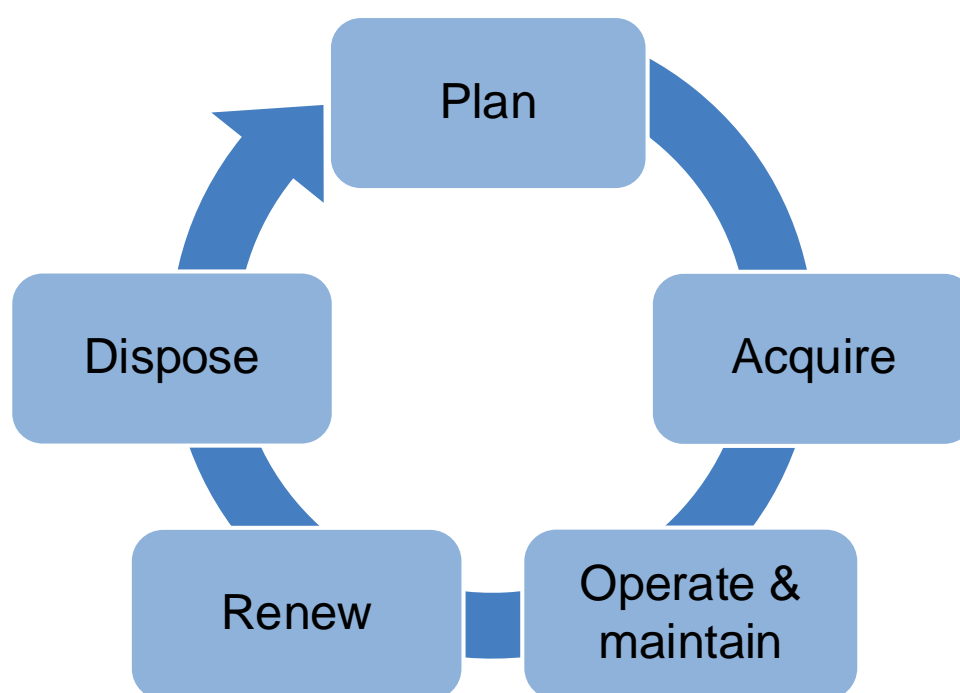
Source: Bureau of Meteorology asset management plans.

Planning and acquisition

Asset management plans

3.4   *ISO 55000:2014* describes the use of asset management plans to establish activities to be undertaken on assets, as well as the timeframes and resources to be used for the achievement of specific and measurable objectives.[62] *ISO 55000:2014* also states that the selection of objectives can provide the opportunity for alignment across organisational and operating plans.

---

62   ibid., p. 8.

3.5   The Bureau's Strategic Asset Management Plan (SAMP) identified the development of asset management plans as a strategic initiative 'to uplift the maturity of asset management at the Bureau'. The SAMP states that asset management plans 'specify the activities that are intended to be undertaken for a specific network across the lifecycle' including 'timescales, costs and responsibilities for delivery' for a period of five to 20 years.

3.6   As outlined in paragraph 1.4, the Bureau's observing network consists of 11 sub-networks categorised on an operational level by the type of information being collected (also shown in Table 3.1). Each sub-network includes assets (observing network instruments) used to observe conditions and generate data, as well as supporting assets such as data processing and communications systems.[63] All observing network assets fit into the eleven sub-networks, except for the Kennaook/Cape Grim Baseline Air Pollution Station.[64]

3.7   The Bureau introduced asset management plans (AMPs) for the observing network sub-networks in 2019. The SAMP requires that AMPs are to be updated annually. AMPs were not produced between 2019 and 2023. Seven AMPs were drafted in 2019, covering all observing network assets (see Table 3.1).

Table 3.1:   Observing network sub-network asset management plans

Sub-networks	Draft asset management plan	Current asset management plan
Flood warning network	Drafted May to November 2019	Endorsed January 2024
Marine network	Drafted May to November 2019	Endorsed January 2024
Radar network	Drafted February 2019 to June 2020	Endorsed January 2024
Wind profiler network	Wind profiler assets included within radar network asset management plan.	Endorsed January 2024
Satellite reception network	Drafted May 2019	Endorsed January 2024
Sea level network	No sea level network asset management plans at this time. Assets included in marine network asset management plan and surface observation network asset management plan	Endorsed January 2024
Ozone network	Assets combined into *Space and Atmospheric Observation Networks* asset management plan	Endorsed January 2024
Solar network		Endorsed January 2024
Space weather network	Drafted June to July 2019	Endorsed January 2024
Surface observation network	Drafted March to October 2019	Endorsed January 2024
Upper air network	Drafted April to November 2019	Endorsed January 2024

Source: ANAO analysis of Bureau of Meteorology documentation.

---

63   The Bureau's observing network also includes supporting infrastructure systems and items such as air-conditioners, fencing, and small buildings. These generally support the proper functioning of observing network instruments. Infrastructure systems and items are not in scope for this audit as they are not instruments that take observations. Supporting infrastructure is also not covered in the Bureau's asset management plans.

64   The Kennaook/Cape Grim Baseline Air Pollution Station is outside of the sub-networks as it is one of three global atmospheric watch stations in the world.

3.8   In January 2024, the asset management reference forum (see paragraph 2.38) endorsed 11 AMPs.

3.9   Each of the AMPs contains the following sections.

•   Introduction: describes the current asset network and summarises the proposed improvements.

•   Stakeholders: tables of external and internal stakeholders and their needs from the network.

•   Asset information: includes the different types of assets within the network and their number, the asset hierarchy, the age of current assets, the use of their data and demand for it.

•   Asset management outcomes: target and current performance requirements against outcomes, as well as the activities undertaken to facilitate the achievement of outcomes (see paragraphs 3.65 to 3.69).

•   Risk management: A table of key risks[65] and the resulting current risk profile are included. The risk table directs to the Observing Networks Risk Register (see paragraphs 4.37 to 4.38).

•   Lifecycle strategies: describes the types of activities to be undertaken within the network across planning, acquisition, operations and maintenance, renewal, and disposal, and who is responsible for these.

•   Improvement plan: a list of activities to be undertaken to improve management, such as developing instructions for specific maintenance tasks.

•   Investment profile: a five- or ten-year investment profile that includes cost totals across acquisition, operation, maintenance, and renewal, as well as a description of the goals of investment, the future risk profile to be achieved, and key activities.

3.10   The Bureau's budget planning process for 2024–25 did not incorporate the predicted costs presented in the AMP investment profiles. The Bureau advised the ANAO in June 2024 that the January 2024 AMPs 'represented an unconstrained budget approach to the majority of asset classes' with budget guidance to be incorporated into the AMPs in future.

3.11   As discussed in paragraphs 2.21 to 2.28, the Bureau's SAMP states that 'a financial model with a 20-year outlook has been developed to support the AMPs and will feed into the Enterprise Asset Financial Overview and the Bureau's budget cycle.' Long-term planning is not present in the Capital Portfolio document. The Bureau's 2024 *Portfolio Management Framework* (discussed in paragraphs 3.18 to 3.22) introduces a nine-year proposed investment profile through the Asset Network Plans. The Asset Network Plans do not incorporate the broad view of each sub-network covered in the AMPs, which include both sustainment and asset management considerations. In December 2024, the Bureau advised the ANAO that the next iteration of these plans is under development, with updated plans to be provided to the Bureau Executive in January 2025.

---

65   A table of key risks is not included in the space weather network.

Funding for asset lifecycle projects

3.12   In 2019–20 the Bureau undertook cost modelling that estimated cost over time to maintain and replace all assets based on the asset's installation date; expected lifespan; and expected maintenance needs. An example asset is shown in Case study 1.

Case study 1.   Example cost modelling for a 'Legacy' radar
The cost modelling for a radar may present the following 29-year outlook.   • A 'Legacy' radar installed in 1998 with an expected lifespan of 20 years would be maintained and repaired from the beginning of the analysis, in 2019.   • In 2021, it would receive a 'Wurrung Upgrade' to extend its lifespan another 10 years. It would be maintained and repaired over the next forward seven-year period.   • In 2028 the radar would be replaced with a new S1DP1 radar. It would be maintained and repaired over the next 20 years, with a mid-life refurbishment in 2038.   • In 2048, the radar would need to be replaced again.   Project costs for acquiring and installing new assets were included in the modelling.

3.13   The Bureau did not translate the assumptions of the cost model, including the asset replacement schedule, into a plan. The Bureau advised the ANAO in July 2024 that the replacement of observing network assets forms part of the asset network planning process, which inputs to the enterprise budget process.

3.14   The Bureau used this cost modelling to develop a business case to support advice to government with respect to financial sustainability in the Bureau, focused on the security, stability and resilience of Bureau assets, including the observing network.

3.15   In the 2020–21 Federal Budget, the Australian Government increased the Bureau's overall funding to 'ensure the financial sustainability of the Bureau'. This included '$225.6 million over three years from 2021–22 (and $143.7 million per year ongoing from 2024–25) to maintain a proactive asset maintenance schedule consistent with industry best practice.'[66] The funding model involved an annual increase in both capital and operating funding between 2020–21 and 2023–24, at which point the planned ongoing level of funding is set at $143.7 million per year across all assets within the Bureau.

3.16   The Bureau is not monitoring or reporting on the relationship between the federal budget funding and the maintenance schedule or the Bureau's cost modelling. The Bureau advised the ANAO in July 2024 that 'no progress update/reporting has been undertaken nor is regular reporting expected' on the 2020–21 Federal Budget funding as 'sustainability funding increases the Bureau's overall base funding levels for capital and operating on an ongoing basis - it is not a discrete program of work'. The Bureau also advised that 2023–24 is the first year that the full amount of ongoing funding has been available; and that reporting on the expenditure will occur more broadly through corporate financial reporting mechanisms such as the Annual Report and financial statements. Without translating the maintenance schedule and other assumptions of the cost model into a plan,

---

66   Australian Government, *Budget Paper No.2: Payment Measures 2020–21*, Commonwealth of Australia, Canberra, 2020, p. 46, available from https://archive.budget.gov.au/2020-21/bp2/download/bp2_complete.pdf [accessed 23 July 2024].

or monitoring and reporting whether funding is being utilised for its proposed purpose, the Bureau does not have assurance that the proposed improvements to the observation network will be delivered.

3.17   The Bureau's reporting on the relationship between the federal budget funding and performance standards in the observing network is discussed in paragraphs 4.20 to 4.23.

Acquisition

3.18   Acquisition needs vary across the observing network sub-networks. Acquisition of new assets may reflect an improvement in technology, an expansion of the scope of observations, or the need to replace existing assets at end of life. Some asset types, such as drifting buoys, must be replaced with new assets annually to maintain the same scope of observations. Others have longer expected lives and acquisition occurs less frequently, such as wind profilers which have an expected life of 15 years.

3.19   The Bureau SAMP states that a 2017 and 2018 assessment of asset management practices found the Bureau had 'an ageing asset base due to under-investment in asset management' and 'many asset funding requests were made without reference to baseline asset information including end-to-end lifecycle asset maintenance information'. As a result of this, in 2020 'most of the Bureau's assets in the observing network are nearing or are beyond the end of their useful life, which is on average 15 years.'

3.20   The Bureau's *Portfolio Management Framework,* approved by the Executive Team in June 2024, describes the intended future approach to funding asset management over asset lifecycles. It defines 'asset lifecycle projects' as projects that 'typically replace or renew existing assets on a like-for-like or incremental improvement approach'.

3.21   The Portfolio Management Framework notes that the Bureau had a 'historic practice of "bidding" for individual asset replacements on an annual basis'. Under the 'asset lifecycle project' approach, individual asset investment proposals and business cases are not required. Under this approach the investment committee issues annual planning guidance to asset network owners, which is used to update Asset Network Plans for each Bureau asset class, including the observing network.[67] Based on this guidance, Asset Network Plans include a nine-year proposed investment profile and investment proposal projects. In addition, projects commencing or continuing in the coming financial year must develop detailed costings. After this has been completed, projects are approved under the annual corporate planning process.

3.22   In December 2023, the Bureau's Investment Committee endorsed budgetary planning parameters for each asset class, which were provided to Network Managers for the development of Asset Network Plans. The Observing Network Asset Network Plan was approved in September 2024 for the Bureau's 2024–25 budget. The Bureau intends for the Asset Network Plans to be updated annually with 'incremental adjustment' as part of the annual budget process.

3.23   The procurement, construction, and installation of new observing networks assets is the responsibility of various teams within the Observing Systems and Operations Program (OSO program) depending on the size and complexity of the project. In July 2024, the Bureau's OSO Leadership Team endorsed an *OSO Equipment Handover Process* to provide structure around

---

67   The five asset classes are: observing network; information, communications and technology; high performance computing; forecasting models; and property.

handover and delineation of responsibility amongst the teams during the transition from acquisition to operation and maintenance.

Operation and maintenance

3.24   Operation refers to the use of assets for their purpose. This can include the initiation of an asset's readings, data collection, data transmission, and cessation of an asset's readings. The majority of the Bureau's observing network assets are run automatically, and operational activities relate to monitoring the status of data received. Some manual assets, such as manual weather stations or rain gauges rely on staff or volunteer interactions.

3.25   Maintenance refers to the activities necessary to ensure continued operation and desired outcomes of the observing network. The Bureau's SAMP does not set out a preference between preventative and corrective maintenance. It states that 'the primary focus of routine maintenance is to minimise asset performance deterioration and mitigate the risk of asset failure that in turn provides an acceptable level of performance through the lifecycle of the asset at an acceptable cost.'

Preventative maintenance

3.26   A list of required preventative maintenance activities is outlined in the *OSO Program of Service*. The OSO Program of Service is prepared annually by the Network Managers in Observing Network Service Management. The OSO Program of Service 2023–24 includes the desired interval at which a maintenance activity should be undertaken. Dates relating to preventative maintenance, including planned dates for upcoming activities and records of past activities, are stored in in the Bureau's Enterprise Asset Management System (EAMS).

3.27   The Asset Management Planning Team is responsible for setting maintenance tasks in EAMS with an appropriate target date, which automatically reoccur at the interval established in the OSO Program of Service. Observing Operations Hub (hub) teams are responsible for adding the scheduled and actual maintenance dates, as these occur. When complete, this information can be used for reporting on the completeness of the program of service (see paragraphs 3.53 to 3.61 for more detail on reporting).

3.28   The Bureau has documented preventative maintenance activities in a form similar to the OSO Program of Service since 2016–17. In August 2023, in response to an internal Asset Lifecycle Review, the Bureau stated that it would create a process for developing the OSO Program of Service. As at August 2024 this has not been completed (see paragraph 2.52).

Corrective maintenance

3.29   Corrective maintenance refers to non-recurring repair or improvement, which may be triggered by a data outage. Planning for corrective maintenance includes consideration of resource availability, in terms of both staff and inventory.

3.30   Corrective maintenance may be identified by technical officers in the field, Network Monitors, or internal or external stakeholders. Situations that cause a data outage, data quality issue, or potential data outage are classed as an incident. As access to EAMS is limited to Bureau

staff working on asset maintenance, other staff are able to report incidents through the Cherwell ICT portal.[68]

3.31   At each hub, the Scheduling Lead and Hub Manager are responsible for assigning maintenance tasks to staff. For corrective maintenance this may involve rescheduling work based on incident priority (see paragraphs 3.42 to 3.43 for discussion of priority).

3.32   In addition to their regular tasks, officers from each hub who are not on field trips are rostered into the role of Network Monitor. The Network Monitor is responsible for daily checks of network performance, which includes basic monitoring of the observing network assets within the relevant hub's remit; basic fault-finding; and notifying stakeholders of outages.

3.33   In November 2022, the Bureau began developing an Inventory Management Process to 'ensure there is a sufficient quantity of observing networks parts to meet demand without creating excess inventory'. As at July 2024, the Inventory Management Process is still in draft. The draft process provides instructions for Network Managers to determine the criticality of parts and spares, to calculate the level of stock at which an item needs to be replenished, and to calculate the volume of stock to purchase at that time. Without a consistent structured approach to this process, the Bureau limits its ability to prevent both shortages of critical items and costly oversupply.

3.34   Inventory can be stored at the Bureau's central store in Melbourne, or at the hubs. The location of stock available is tracked through EAMS and is summarised in a reporting dashboard available to all OSO program staff.

Renewal and disposal

3.35   The final lifecycle phases are the renewal or replacement and disposal of assets. *ISO 55000:2014* states that lifecycle asset management enables the application of analytical approaches through to its disposal.[69]

3.36   Each of the Bureau's 11 AMPs includes a section on renewal and a section on disposal. The renewal section considers the need to replace or substantially repair assets which reach the end of useful life and the relevant observation is still needed. This is differentiated from the disposal section, which considers the assets which would be removed. For example, the Radar Network AMP identifies three disposal scenarios, which are:

•   the site is no longer needed but parts of assets on-site can be salvaged;

•   the radar is at the end of useful life, but the site may be continued to be used; or

•   both the site and radar are beyond useful life.

3.37   Three of 11 AMPs include details on the asset types which need to be replaced and discusses their disposal. Six of 11 AMPs discuss the need to replace asset types however do not identify any assets for disposal. The remaining two AMPs do not propose any replacements or disposals.

---

68   Cherwell is the Bureau's enterprise system for submitting service requests and reporting incidents or issues, such as when the user is notifying of a disruption or loss of service.

69   British Standards Institution, *ISO 55000:2014 – Asset management – Overview, principles and terminology*, BSI Standards Publication, 2014, p. 3.

Is maintenance of assets effective?

All types of maintenance are structured through work orders in the Bureau's Enterprise Asset Management System. Maintenance tasks are assigned priorities and triaged in accordance with these. For each sub-network, between 52 per cent and 79 per cent of target preventative maintenance work orders were achieved in 2023–24. The outcomes to measure performance throughout the 11 sub-networks are not complete.

3.38   The National Observing Operations (NOO) section within the Observing Systems and Operations Program is responsible for the operational maintenance of assets in seven observing networks (see Table 2.4). Bureau staff responsible for the operational management and maintenance of observing network assets are based in a hub.

Maintenance processes

3.39   NOO differentiates between five types of work relating to assets in the observing network, described in Table 3.2.

Table 3.2:   National observing operations work types — summary

Type	Description	Example
Maintenance		
Preventative maintenance	Reoccurring maintenance at a specific frequency, usually determined by the Enterprise Asset Management Team.	Annual automatic weather station maintenance visit
Corrective maintenance – non-incident	Corrective maintenance is non-recurring work involving attending site, fixing, or improving the network, investigating an issue, or return to service.	Replace damaged screen
Corrective maintenance – incident	Corrective maintenance where there is a data outage, data quality issue, or potential data outage.	Automatic weather station not transmitting data
Other work types		
Capital works	Non-reoccurring work which typically improves or creates new assets and is run as a project. NOO may be tasked with an activity within the project scope.	Installation of upgraded locks at site
Service request	Requested fieldwork which is not maintenance.	Provide Telstra employee with access to the site

Source: ANAO summary of *National Observing Operations Work Management Process*.

3.40   The Bureau uses EAMS to plan and record asset maintenance activities (see paragraphs 2.60 to 2.65). The Bureau has developed EAMS processes to be used for documenting these five types of work. The *NOO Work Management Process* instructs that after identification and planning of maintenance tasks, which may vary between types, all are introduced into EAMS and follow the same process.

Planning maintenance activities

3.41   All types of maintenance are structured through work orders in EAMS. Work order creation includes determining what tasks need to be undertaken for the specified form of maintenance. For preventative maintenance and complex corrective maintenance, such as major equipment failure or maintenance requiring a rebuild, this is the responsibility of the Asset Management Planning Team. The relevant hub is responsible for simple corrective maintenance.

3.42   Corrective maintenance incidents are to be prioritised on a four-point scale (one to four) by the Bureau's IT help desk using a triage tool to reflect the impact of the data failure on the Bureau's business function. All other forms of maintenance are to be prioritised on a seven-point scale (one to seven) based on the *NOO Work Prioritisation Guidelines*. This information is attached to the work order and informs scheduling.

3.43   When an unplanned incident or a planned event involve a data outage or data quality issue, an event is created in EAMS. Where a work order relates to the planning and implementation of a work activity, an event relates to the details of an outage or issue, and where both an outage and a work activity occur, the NOO Work Management Process instructs that both records be created in EAMS. Planned events (such as down time for preventative maintenance) are not categorised with a priority. Unplanned events receive a prioritisation according to the four-point IT scale.

3.44   For work orders in 2022–23 and 2023–24, priority was included in 99 per cent of work orders, with almost all work orders without a priority being classed as 'New'.[70] For unplanned events in the same time period, 70 per cent of work orders included a priority.

Scheduling maintenance activities

3.45   Hub Scheduling Leads are responsible for the triaging, scheduling, and administrative planning of work. Scheduling leads organise field trips for hub field staff to undertake maintenance tasks by:

- selecting work orders for tasks that need to be completed at a similar time and relate to the same or nearby locations;
- assigning staff to the trip who have the relevant competencies[71];
- determining an appropriate start and end date for the trip based on the maintenance work orders, the availability of staff, and other relevant considerations; and
- preparing event notifications in EAMS to warn stakeholders of any planned data outages.

3.46   The Scheduling Lead formalises trips in EAMS as a type of work order which includes its own priority, based on the highest priority work order included. This informs any triaging of trips done by hub staff, such as where a high priority incident results in the need to reschedule planned maintenance.

Executing and completing maintenance activities

3.47   Hub staff known as technical officers are responsible for executing work orders. Technical officers are required to report their progress against work through EAMS.

---

70   See Table 3.3 for the use of work order statuses.
71   See paragraphs 2.76 to 2.79 on competencies.

3.48   In EAMS, work orders move through a series of status values during the maintenance process. The status identifies where in the process a piece of work is up to, and if the work is not completed it records why. The status options available in EAMS are summarised in Table 3.3. This table also shows the number and percentage of work orders in each status for hub or sub-network maintenance in the last two complete financial years. Status is included for all work orders in these financial years.

Table 3.3:   EAMS work order statuses

Stage	EAMS values	Description	2022–23	2023–24
Planning and scheduling	NEW	Newly created work	176 (2%)	496 (4%)
	TRIAGED	Work priority assigned	14 (0%)	23 (0%)
	PLANNED	Work planned and ready for execution	576 (7%)	1,404 (11%)
	APPR	Work approved for execution	145 (2%)	543 (4%)
Executing	INPRG	Work in progress	41 (0%)	162 (1%)
Completing	COMP	Work physically completed	49 (1%)	1018 (8%)
	REPORTED	Physical and admin work completed	54 (1%)	2281 (19%)
	CLOSE	Completed work in archive status	6,909 (81%)	5,527 (45%)
Work on hold	ONHOLD	On hold	37 (0%)	72 (1%)
	WACCESS	Waiting on site access	0 (0%)	7 (0%)
	WOTHTEAM	Waiting on other team	7 (0%)	19 (0%)
	WTOOL	Waiting on tools	0 (0%)	0 (0%)
	WMATL	Waiting on material	5 (0%)	15 (0%)
	WSERV	Waiting on external services	1 (0%)	1 (0%)
	WSITEVISIT	Waiting site visit	9 (0%)	30 (0%)
	WWEATHER	Waiting on weather	0 (0%)	3 (0%)
Not done	CAN	Work cancelled	0 (0%)	0 (0%)
	UNACH	Work unable to be achieved in time	521 (6%)	662 (5%)
	NOTDONE	Uncompleted work in archive status	0 (0%)	0 (0%)
Total			**8,544**	**12,263**

Source: ANAO analysis.

3.49   In order to facilitate the accuracy of work order status, the Bureau has produced a dashboard of work orders that have remained at a status for more than 14 days, which is available to all OSO program staff. The dashboard defaults to displaying work orders that are the responsibility of the hubs, and those at the status 'Work approved for execution (APPR)', 'Work in progress (INPRG)', or 'Work physically completed (COMP)'.

3.50   As of 15 July 2024, this reporting included 2196 work orders which are within the remit of the hubs and have remained at one of these three statuses for more than 14 days, the 15 oldest of which were last updated in 2021. Delayed finalisation of work orders impacts the use of work order

records in other monitoring and reporting documents, such as the preventative maintenance work order completion rate.

Maintenance records

3.51   EAMS captures data relating to both work orders and events. This data includes:

•   details relating to the work order or event itself, such as reference ID, description, current status, and work type;

•   information relating to the asset and its location, such as the station number, station name, asset number and asset description;

•   the priority rating of the work order or event; and

•   relevant dates, such as the reported date and the actual finish date.

3.52   For the 2022–23 and 2023–24 dataset used in the following analysis, data is complete for necessary fields such as work order status, asset location, and work type.[72]

Preventative maintenance

3.53   Preventative maintenance work orders should contain three sets of start and end dates.

•   Target start and end dates, set by the Asset Management Planning Team when creating the work order based on the intervals outlined in the OSO Program of Service.

•   Scheduled start and end dates, set by the Scheduling Lead of each hub when scheduling work trips.

•   Actual start and end dates, set by the field officers when performing maintenance activities, or afterwards if not completed on site.

3.54   In July 2024, the Bureau advised the ANAO that 'maintenance trips often need to be rescheduled' due to factors such as weather or resourcing. Figure 3.2 shows the difference between target start date and actual start date for completed[73] preventative maintenance work orders across 2022–23 and 2023–24. Figure 3.3 shows that 42.2 per cent of preventative maintenance work orders which were completed after their target date were completed within 30 days of the target date.

---

72   The ANAO received access to EAMS and records relating to all work orders and events in 2022–23 and 2023–24. The ANAO did not reperform the categorisation of information within the dataset, such as labelling of work type, or seek verification through a second information source, such as by observing maintenance undertaken, to assess for accuracy.

   The ANAO limited analysis to work orders assigned to individual hubs or to one of the sub-networks. The ANAO excluded from this assessment work undertaken at the Antarctic Stations and the Cape Grim Baseline Air Pollution Station as these are specialist research and technical stations that are staffed differently and operate differently to hubs.

73   Work orders were identified as complete if categorised as 'complete', 'reported', or 'closed'. See Table 3.3 for the full list of work order status categories.

Figure 3.2: **Completed preventative maintenance work orders for 2022–23 and 2023–24 by relationship between target start date and actual start date**
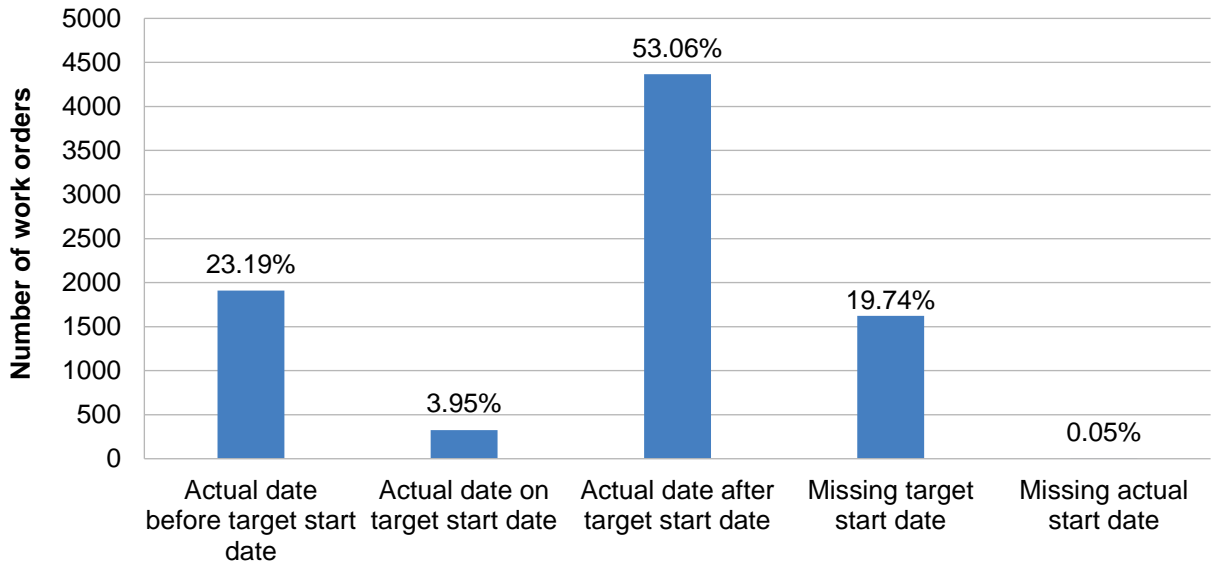
Source: ANAO analysis.

Figure 3.3: **Completed preventative maintenance work orders for 2022–23 and 2023–24 for which actual start date was after target start date**
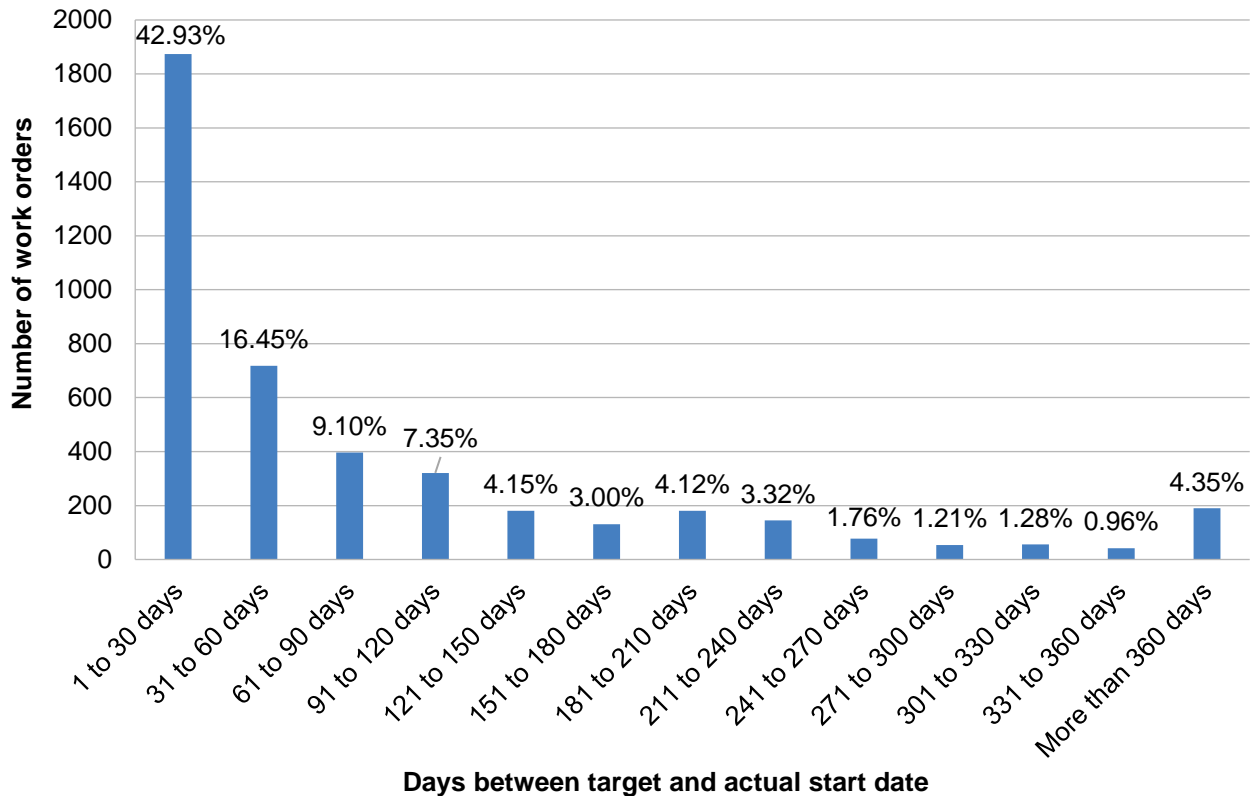
Source: ANAO analysis.

3.55   The Bureau does not have guidance on acceptable differences between target, scheduled, and actual dates, or regarding appropriate contexts in which to postpone or bring forward

preventative maintenance. As a devolved process with no procedural guidance, deviations from the OSO Program of Service are made at the discretion of individual Hub Managers.

3.56   The NOO Work Management Process instructs that work orders are to be marked as unachieved when there is a lack of resources to complete the work order, and that this is to be done when a preventative maintenance order will not be achieved before the next iteration of the same maintenance activity. In 2022–23, 521 (11 per cent) preventative maintenance work orders were marked as unachieved, and 662 (10 per cent) in 2023–24.

3.57   Additionally, 605 (13 per cent) of preventative maintenance work orders for 2022–23 were marked as new, in planning, in progress, or on hold in July 2024. As these records are not finalised it is not clear whether these activities were completed.

Bureau reporting on preventative maintenance

3.58   In 2023–24, monthly Bureau reporting to the OSO leadership team included the ratio of target to completed preventative maintenance work orders for six of the 11 observing network sub-networks.[74]

3.59   July reporting in 2023 and 2024 included the final outcome of the ratio of target to completed preventative maintenance work orders for the previous financial year (see Figure 3.4). This shows that between 23 and 69 per cent of target preventative maintenance work orders for each sub-network were achieved in 2022–23, and between 52 per cent and 79 per cent were achieved in 2023–24. Completion improved between the two financial years, though is still below the target of 100 per cent.

Figure 3.4:   Preventative maintenance work order completion rate by sub-network
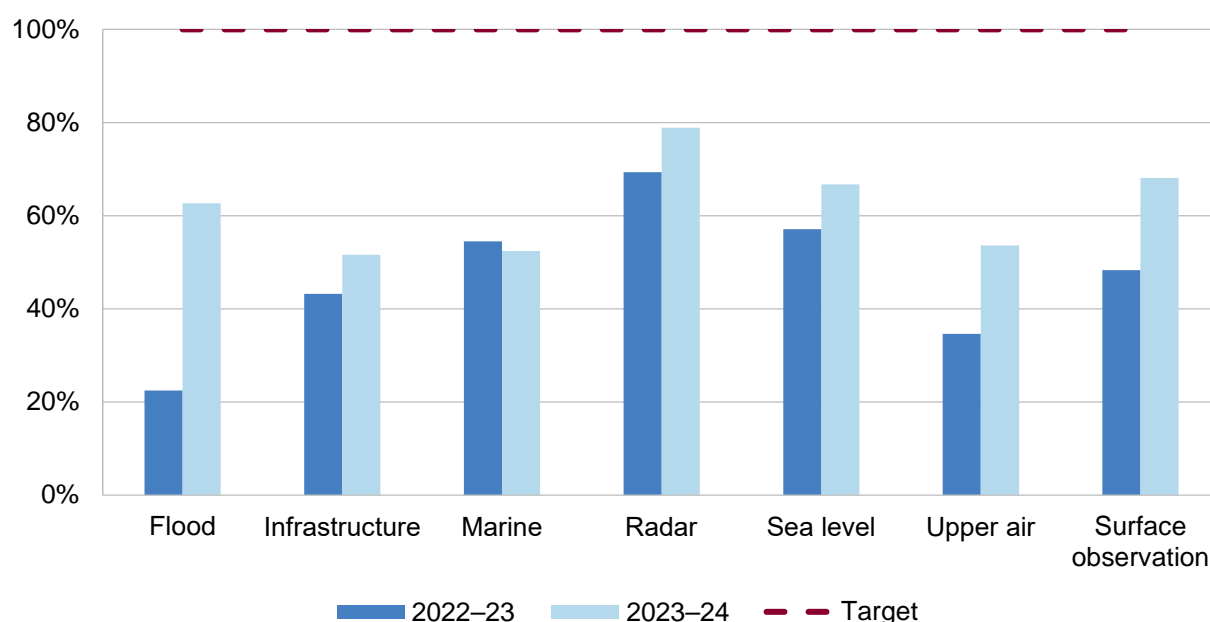
Source: ANAO analysis.

---

74   The included sub-networks are flood warning, marine, radar, sea level, surface observation, and upper air. Reporting against this metric also includes preventative maintenance performed on infrastructure not necessarily associated with one sub-network. Reporting does not cover the following sub-networks: ozone, satellite reception, space weather, solar, and wind profiler.

3.60   The Bureau increased the number of preventative maintenance tasks in the 2023–24 OSO Program of Service compared to the 2022–23 OSO Program of Service. The OSO Program of Service does not state whether this is due to increased maintenance requirements or additional clarity around tasks. For example, where the 2022–23 OSO Program of Service states that maintenance is to be performed on the 'Base Radar Network' and 'Externally funded radars' every six months, the 2023–24 OSO Program of Service lists six-monthly routine radar maintenance by the three types of radars and adds major maintenance to occur at 24 month, 60 month, and 10 year intervals as well.

3.61   The OSO Program of Service does not define how incomplete preventative maintenance in prior years is accounted for in preventative maintenance planning.

Corrective maintenance

3.62   As it is reacting to maintenance need as it occurs, corrective maintenance may not be planned as far in advance as preventative maintenance. The key dates associated with corrective maintenance work orders are the actual start and end dates and the reported date.

3.63   ANAO analysis over EAMS records identified that the gap between corrective maintenance reported dates and actual dates is more likely to be smaller for higher priority work orders. For 38 per cent of priority one and 50 per cent of priority two work orders the actual start date was on the same day as the report.[75] The gap between corrective maintenance reported dates and actual dates is more likely to be larger for lower priority work orders, as shown in Figure 3.5. In 14 per cent of cases the reported date was after the actual start date, reflecting concerns with the completeness and accuracy of data input into EAMS.

---

75   See paragraphs 3.42 to 3.43 for description of priority.

Figure 3.5: **Corrective maintenance work orders for 2022–23 and 2023–24 by priority and time elapsed between reported date and actual start date**
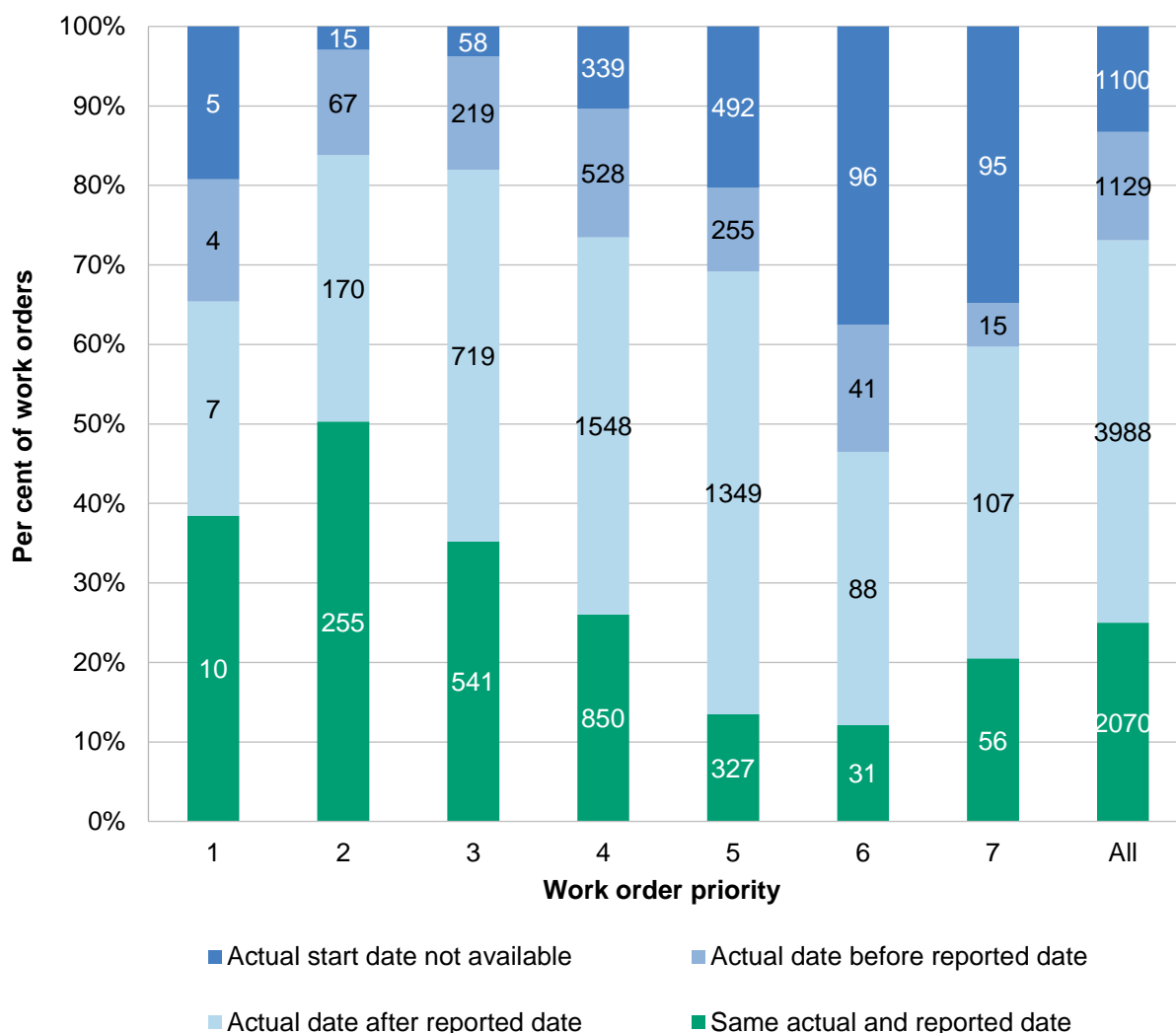
Source: ANAO analysis.

3.64   Observing network asset sites vary in their complexity including the number of assets of different types located at each site. Across the 2022–23 and 2023–24 EAMS records analysed by the ANAO, 1565 stations were associated with at least one corrective maintenance work order. Of these, 72 per cent were associated with five or less work orders. Twelve stations (less than one per cent) were associated with more than 40 corrective maintenance work orders each. These stations had between 11 and 84 preventative maintenance work orders in the same time period, 80 per cent of which were complete.

Observing network asset management outcomes

3.65   The Observing Network Asset Network Plan contains a table of asset management outcomes and the 12 types of evidence that would demonstrate them (see Table 3.4).

**Table 3.4:** **Observing Network Asset Network Plan — management outcomes**

Asset management outcomes[a]	Demonstrated by
Delivering quality observations data aligned to agreed customer requirements	Data availability (as an output of network availability)
	Data quality (% data that meets quality requirements)
	Asset Reliability (expressed as weighted mean time between failures — MTBF)
A sustainable asset base to meet current and future needs	30-year network investment profile
Effective delivery of asset management activities	Ratio between corrective and planned maintenance cost (CM/PM)
Efficient delivery of asset management/support activities	Maintenance cost as % of asset value, compared to industry averages
Asset management activities fully resourced	Annual work allocation balanced by resource availability
Safety risks associated with assets are identified and managed	Documented safety incidents
	Ratio of hazards to incidents reported
	Equipment safety management compliance
Environmental risks associated with assets are identified and managed	Documented environmental incidents
Asset lifecycle management will be managed in an environmentally sustainable manner	Environmental sustainability actively pursued in AM processes

Note a: In addition to the listed outcomes included in the Observing Network Asset Network Plan, the surface and upper air AMPs include a 'Data Timeliness' outcome, and the Surface AMP includes an 'Asset Performance Collaboration' outcome. Data timeliness is defined as the per cent of data which arrives within five minutes by the surface network and as the per cent of data that meets timeliness requirements for the upper air network. Asset Performance Collaboration is defined as 'routine meetings with saved minutes'.

Source: Observing Network Asset Network Plan.

3.66 The AMP for each observing network sub-network includes a section on these asset management outcomes, which can include a target for the outcome and the actual performance of the sub-network. As shown in Figure 3.6, the AMPs do not always include this information.

Figure 3.6: Sub-network asset management plan — management outcomes
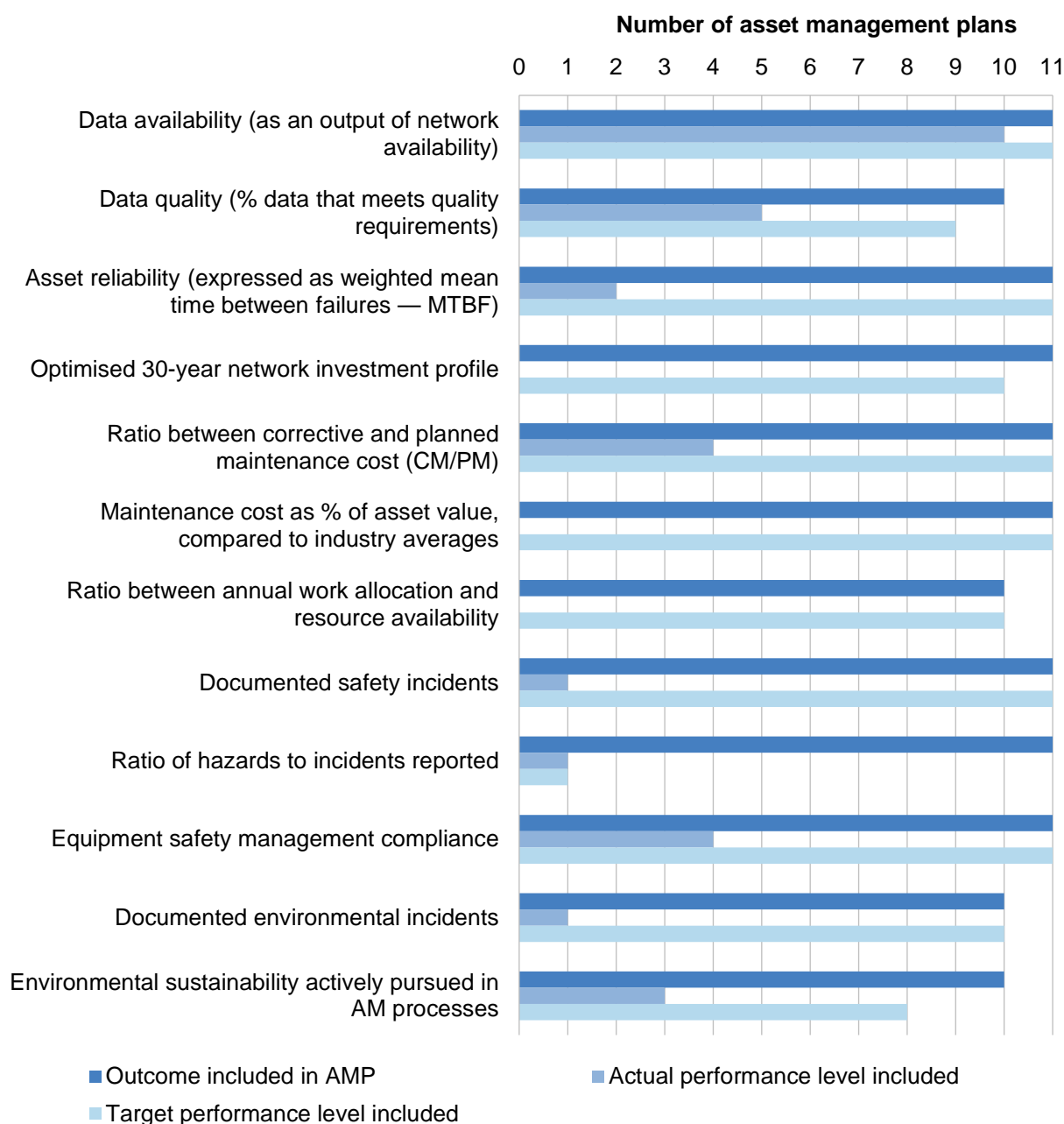
Note: For nine AMPs 'Ratio between Annual work allocation and resource availability' is present and 'Annual work allocation balanced by resource availability' is not. These two measures have been treated as one for this analysis.

Source: ANAO analysis.

3.67 Where target performance levels or actual performance levels are unavailable, the Bureau is unable to assess whether the chosen asset management outcomes are being achieved.

> ## Recommendation no. 4
>
> 3.68   The Bureau of Meteorology include management outcomes in asset management planning documentation by:
>
> (a)   agreeing on and including all selected targets in relevant documentation;
>
> (b)   collecting data on performance;
>
> (c)   calculating actual performance levels over time; and
>
> (d)   documenting the impact of asset management approaches on desired outcomes.
>
> **Bureau of Meteorology response:** *Agreed.*
>
> 3.69   *The Bureau will review how the performance of its observing network assets is measured, including agreeing and setting relevant targets, measuring those statistics over the life of assets, and better understanding the impacts of its asset management approaches on asset performance and availability.*

Are assets disposed of appropriately?

> The Bureau has established policies and procedural guidance that acknowledge the necessity of disposal. This guidance is not complete as there is no guidance to support operational decision-making about when disposal is appropriate. The Bureau's Fixed Asset Register and Enterprise Asset Management System each record assets and disposals differently. The Bureau does not have a process or guidance to ensure records are aligned between the two systems.

3.70   Disposal of assets is required when assets have reached end of life. Assets may reach end of life when they are determined to be under-utilised, unserviceable, non-compliant with legislation or regulation; or otherwise not meeting operational and technical requirements and not fit for purpose. Determining that assets should be disposed of will involve an assessment of value, including maintenance and replacement costs. An organisation should document and review its practical and strategic approach to disposal to enable assessment of whether desired outcomes are being met.

Disposal of parts and instruments

3.71   The Bureau has developed documentation relating to the disposal of broken parts or instruments. The Bureau has developed processes for 'process broken items' and 'inspect, repair, and salvage assets', each of which can result in an asset or part being disposed. For example, if a repair is unsuccessful, the 'inspect, repair, and salvage assets' process directs that parts that are not suitable for salvage are disposed of.

3.72   The processes have a focus on the labelling and relocation of asset parts both physically and in EAMS. The documents do not provide decision-making guidance, such as how to determine if an asset could be repaired by the supplier under warranty. The documents refer to separate 'Repair/Salvage/Disposal Guidelines' for this. The inspect, repair and salvage assets process also presumes the use of an Engineering Maintenance Support 'dashboard' to 'prioritise [Engineering Maintenance Support] work and determine which work to perform in the upcoming week'. The Bureau advised the ANAO that neither of these documents been developed as of December 2024.

Retirement and disposal of whole observing network assets

3.73   The Bureau has no procedures or processes relating to the planned retirement and disposal of whole observing assets. In July 2024, the Bureau advised the ANAO that as each component within an asset has its own useful life 'it would be very unusual to replace a whole asset unless we were relocating the equipment'.

3.74   The processes relating to 'process broken items' and 'inspect repair and salvage assets' allow for assets to be deconstructed into components to retain all useful parts. Case study 2 describes the upgrade of the Carnarvon radar and how the replacement of an asset at a site does not necessarily result in disposal of the parts that comprised that asset.

> **Case study 2.   Reuse of asset parts in Wurrung radar transitions**
>
> In 2017, the Bureau deployed an upgrade protocol to a subset of its fleet of 'Legacy' radars. The upgraded 'Wurrung' radars have an upgraded receiver and control systems however retain the original antenna hardware. In January 2024, Wurrung radars accounted for 18 of the Bureau's 69 fixed location radars.
>
> The most recent Wurrung radar 'went live' in April 2024 in Carnarvon, Western Australia, replacing a 'Legacy' radar.
>
> - The Wurrung radar was assembled in July 2023 in Melbourne. In October 2023, it was shipped to Carnarvon.
> - Installation of the Wurrung radar began in January 2024, and it went live in April 2024.
> - Two weeks after this the deconstruction of the 'Legacy' radar began, and by July 2024 the old Carnarvon radar was in transit to the Bureau central store in Melbourne.
>
> The deployment minute for the Carnarvon Wurrung radar states that 'all removed equipment shall be … either returned to spares or utilised for future Wurrung deployments'.

Records of disposal

Enterprise Asset Management System

3.75   Records of disposal in EAMS can relate to assets, facilities, or stations.

- Within EAMS, 'assets' refers to parts or instruments, such as an Anemometer[76], which can be marked as 'disposed'. Between November 2021 and August 2024, 4122 assets have been recorded as 'disposed'.
- 'Facilities' refer to groups of parts and instruments which achieve a function. The number of parts and instruments in a facility can vary, for example with a weather radar containing more than a water level gauge. As of July 2024, 13 facilities are recorded as 'disposed'.
- 'Station' refers to a location and the facilities at that location. Stations may be marked as 'disposed' when they are no longer in use. More commonly, stations which are shut down are marked as 'decommissioned' when all equipment is removed from the site or

---

76   An anemometer is a device that measures wind speed and direction. Anemometers are part of multiple observing network sub-network assets: automatic and manual weather stations in the surface network, automatic weather stations located on ships in the marine network, and coastal sea level stations in the sea level network.

'mothballed' when equipment remains on site. The facilities and assets from a decommissioned station may be reused, as discussed in Case Study 2. As of July 2024, one station is recorded as 'disposed', 17,123 stations are recorded as 'decommissioned', and 351 stations are recorded as 'mothballed'. This includes historical data that predates EAMS.[77]

3.76   The Bureau is not generating records of disposal from EAMS to inform operational or strategic planning for observing network asset management.

Fixed Asset Register

3.77   The Bureau's Fixed Asset Register (FAR) within SAP (see paragraphs 2.67 to 2.69) uses accounting standards to define 'asset' and records items differently than EAMS. In March 2024 the FAR contains 5266 observing network assets.

3.78   EAMS distinguishes instruments and infrastructure at a more granular level than the FAR. This allows for movement or disposal of parts to be tracked in EAMS. In August 2024, the Bureau advised the ANAO that 'There must be a material change to the overall asset (not individual parts) to meet the financial requirements for the adjustment in the value of an asset to be recorded in SAP.' This means that where instruments from a decommissioned station are reconfigured to construct a new asset, as in Case Study 2, the FAR records the disposal of one asset and the acquisition of another.

3.79   The FAR does not contain a field which can be used to align the records with EAMS, such as an asset ID code for either individual assets or asset types which is used across both systems. The Bureau does not have a process or guidance to ensure records are aligned between the two systems.

3.80   In July 2021, a key financial controls health check of the Bureau was conducted by its internal auditors. This review sampled disposed assets recorded in the FAR. This review found that:

- assets were disposed of without all required approvals being obtained[78];
- processes to support asset location details within the fixed asset register require strengthening; and
- entries in the vendor master file were inaccurate.

3.81   Within the Bureau, the FAR is the 'source of truth for financial information for all assets' and EAMS is considered the single source of truth for day-to-day information about and management of observing network assets. The systems perform different functions, and need to record assets in different ways. As the systems are not interoperable and record asset information in a format that does not map between the two data sets, there is a risk that human errors, such as the failure to complete disposal records in both systems, will not be identified and rectified.

---

77   For example, the Bureau's EAMS records include the decommissioned Flagstaff Gardens station in Melbourne which ran from 1858 to 1863.

78   The internal audit report referred to sample testing of 10 disposed assets. Six disposed assets were identified where there was no written approval prior to disposal. None of the six identified assets were observing network assets.

Opportunity for improvement

3.82 The Bureau document the differences in approach between financial records and operational recording of assets in procedure, process, and guidance documents relating to the counting and recording assets.

3.83   Asset valuation within the FAR includes the retention and use of both whole assets and instruments beyond their useful life. In August 2024, the Bureau advised the ANAO that 'Assets are revalued by an external valuer every three years' including assessing the remaining useful life of the asset and the depreciation rate.

4. Monitoring and reporting

Areas examined

This chapter examines whether the Bureau of Meteorology (the Bureau) is effectively monitoring, measuring, and reporting on its management of assets in its observing network.

Conclusion

The Bureau's monitoring, measuring, and reporting on assets in its observing network is partly effective. Information on observing network asset data availability is being recorded in Bureau systems and reported to established governance bodies. The Bureau is not reporting against the achievement of sustainability funding commitments. Three of the Bureau's newly developed observing network performance measures report whether risks have eventuated and two report whether risk controls are being implemented. Since November 2020, the Bureau has been reporting against out-of-tolerance risks relating to 'unviable' asset capabilities. Monitoring and reporting is not being undertaken to regularly review asset management maturity, as proposed in the Strategic Asset Management Plan.

Areas for improvement

The ANAO identified an opportunity for the Bureau to consider progress reporting against the sustainability funding commitments, and for the Bureau to address internal audit recommendations.

4.1   Effective monitoring and evaluation provide assurance that government activities and programs are delivering outcomes as intended and that performance is tracked and recorded.[79] Established performance requirements of assets and asset management allows an entity to obtain assurance that the asset management framework is fulfilling the required purpose.

Is there a fit-for-purpose performance measurement strategy?

The Bureau's performance measurement strategy measures the output of the observing network through information on observing network asset data availability. This supports reporting on the achievement of corporate outcomes identified in the Bureau *Strategy 2022–2027* and Data and Digital Group Plan. The Bureau is not reporting against the achievement of sustainability funding commitments. Without a strategy for investment in asset maintenance and monitoring and reporting of the impacts of investment, the Bureau cannot know whether investment is effective.

4.2   Under section 38 of the *Public Governance, Performance and Accountability Act 2013*, the accountable authority of a Commonwealth entity must measure and assess the performance of the entity in achieving its purposes.[80]

4.3   Section 16EA of the Public Governance, Performance and Accountability Rule 2014 states the requirements for performance measures published in a Commonwealth entity's corporate plan,

---

79   Australian Centre for Evaluation, *Commonwealth Evaluation Toolkit* — 'Why evaluate', Department of the Treasury, 2023.

80   *Public Governance, Performance and Accountability Act 2013*, section 38.

noting that performance measures must include measures of the entity's outputs, efficiency, and effectiveness if those things are appropriate measures of the entity's performance.[81]

4.4   The Bureau's purpose is 'to provide trusted, reliable and responsive weather, water, climate, ocean and space weather services for Australia'.[82] The Bureau's *Corporate Plan 2024–25* was published in September 2024. The Corporate Plan states that 'to achieve its purpose, the Bureau will continue to implement its Strategy 2022–2027, which sets its future direction and focuses on four pillars that will drive its success.'[83]

Enterprise planning, performance and reporting framework

4.5   The Bureau's *Planning, Performance and Reporting Framework 2023–24* 'outlines the different activities the Bureau will undertake in each part of the planning and reporting cycle during 2023–24, when these activities are undertaken, and the staff and governance bodies responsible for their delivery.' The Bureau's Planning, Performance and Reporting Framework is reviewed annually, with the 2023–24 iteration approved by the in November 2023.

4.6   The Bureau's *Planning, Performance and Reporting Framework 2023–24* sets out the key documents and the 'cascading approach', whereby activities undertaken at lower levels inform achievement of enterprise level measures. The cascading approach is depicted in Figure 4.1.

Figure 4.1:   Overview of the Bureau's cascading approach to planning, performance measurement, and reporting
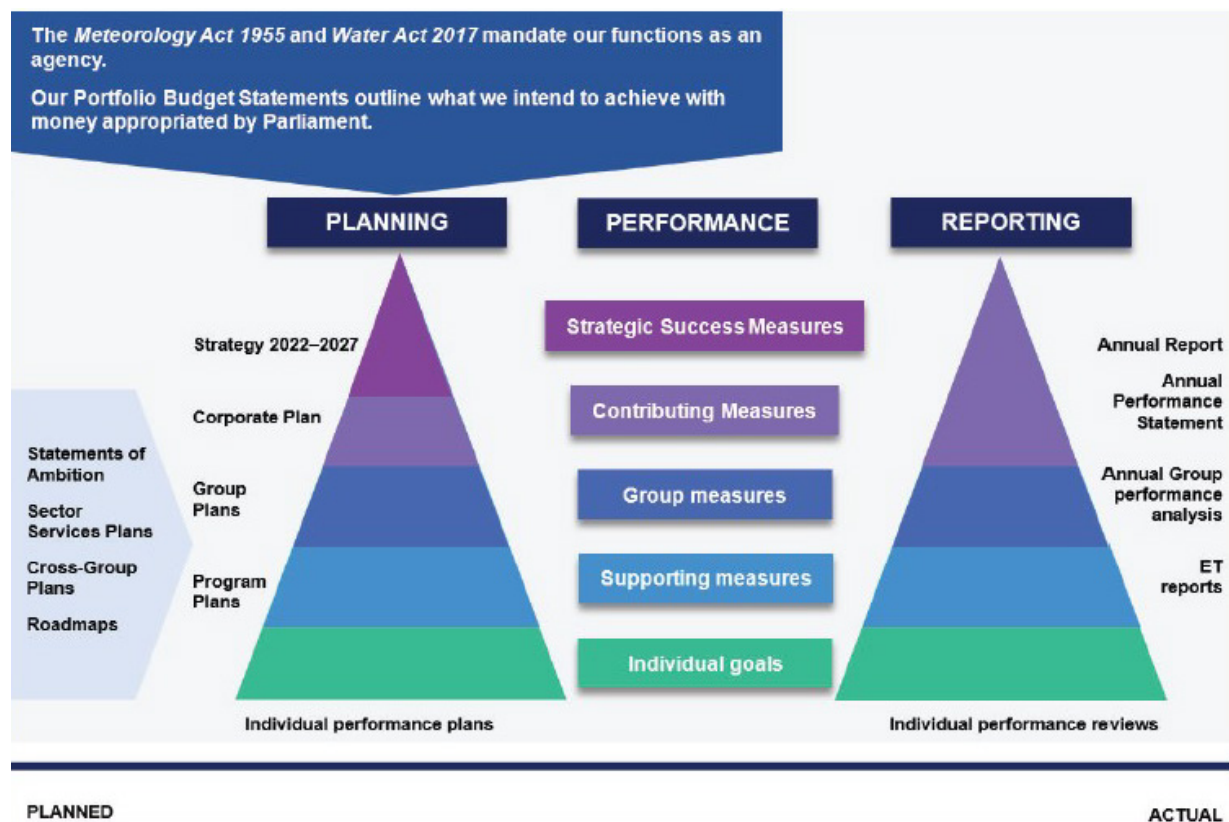
Source: Bureau of Meteorology, *Planning, Performance and Reporting Framework 2023–24*, p. 5 (Figure 2).

---

81   Public Governance, Performance and Accountability Rule 2014, section 16EA.

82   Bureau of Meteorology, *Corporate Plan 2024–25*, Bureau of Meteorology, Melbourne, 2024, p. 7.

83   ibid., p. 8.

Strategy 2022–2027

4.7   The Bureau *Strategy 2022–2027* (Bureau Strategy) is the whole-of-enterprise document which sets out the areas of focus for all Bureau activities. The Bureau Strategy sets out 16 enterprise 'strategic actions' and 12 enterprise 'strategic success measures' under four 'strategic pillars' (see Appendix 5, Table A.3). The enterprise strategic success measures are intended to 'help demonstrate the Bureau is achieving the objectives under each of its four strategic pillars and the Strategy overall'.

4.8   The Bureau's enterprise strategic success measures are reported against in the Bureau's Corporate Plan and Annual Report. Enterprise strategic success measure SSM05 (see Appendix 5, Table A.4) includes two contributing measures for which the key activity is attributed to the Data and Digital Group (see Table 4.1).

Table 4.1:   Data and Digital Group reporting against SSM05

Strategic Success measure[a]	Result 2023–24	Contributing measures	Target 2023–24	Result 2023–24	Target 2024–25 to 2025–28[b]
SSM05: Capacity utilisation, system reliability, security and resilience benchmarked against best practice.[c]	Performance met expectations	CM5.1: Operational systems meet agreed performance targets for uptime and capacity utilisation.	Various	Partially met: 2 of the 11 Observing Network sub-networks met their specific availability target. System uptime targets for the high-performance computing systems were met.	Agreed performance targets met
		CM5.4: Data information management maturity score.	Increase in data maturity	Met: improvement in data maturity to 3.67. Past data maturity score not listed.	Improvement in data maturity score from National Archives Australia Check-up PLUS questionnaire

Note a: All enterprise strategic success measures are shown in Appendix 5, Table A.4.

Note b: Column header taken from Corporate Plan 2024-25.

Note c: Best practice is not defined in the Annual Report 2023–24 or Corporate Plan 2024–25.

Source: Bureau of Meteorology, *Corporate Plan 2024–25*, Bureau of Meteorology, Melbourne, 2024, p. 31, and Bureau of Meteorology, *Annual Report 2023–24*, BOM, Melbourne, 2024, pp. 43–45.

4.9   Internal progress reporting on the delivery of the Bureau Strategy was developed in August 2023. Reporting is intended to be twice-yearly and has occurred in August 2023, February 2024, and October 2024. Reporting is against the enterprise strategic actions, rather than the enterprise strategic success measures. As such, progress reporting against SSM05, 'Capacity utilisation, system reliability, security and resilience benchmarked against best practice', or its contributing measures is not available.

Data and Digital Group — Group Plan 2023–2027

4.10   The Bureau's *Planning, Performance and Reporting Framework 2023–24* outlines that each Group Executive is responsible for developing a Group Plan that articulates how each Group will contribute to delivering the Bureau Strategy.

4.11   The Bureau's Data and Digital Group (DDG) includes the Observing Systems and Operations program, and is responsible for the data, infrastructure and systems that underpin the Bureau's core operations (see paragraph 2.34).

4.12   The DDG 'Group Plan 2023–2027' (DDG Group Plan) notes that DDG's success will be measured by four enterprise success measures, including SSM05.[84] The DDG Group Plan includes four outcomes. The outcomes are statements under which Group-specific outputs are linked to the enterprise strategic actions, and specific activities for the years 2023–24 to 2026–27 are listed against each output. The DDG Group Plan also identifies owners and other internal stakeholders involved in delivering the outputs.

4.13   The four DDG Group Plan outcomes are:

- Outcome 1: Strengthen our customer focus to maximise the Bureau's Technology [Information Technology and Observing Technology] and data capabilities to meet the needs of Bureau customers both now and into the future in collaboration with our colleagues who engage with customers.

- Outcome 2: Information Technology (IT), Observations Technology (OT) and data operations delivery resilient and secure services all day every day.

- Outcome 3: Cultivate our partner ecosystem to optimise resource utilisation for Information and Observations Technology and data delivery.

- Outcome 4: Build and sustain distinctive capabilities and a workforce for the future.

4.14   Sixteen performance measures are included in the DDG Group Plan. Outcome 2 includes two which directly relate to the enterprise strategic success contributing measures shown in Table 4.1.

- '[Observing Technology] uplift is delivered as per the [Observing Technology] service levels and sustainability goals.'

- 'The Bureau's data maturity improves annually as measured by NAA Checkup PLUS questionnaire.'[85]

---

84   The others are:
- SSM03 — The utilisation of our services by new and existing customers;
- SSM04 — Our delivery against agreed customer requirements and commitments; and
- SSM10 — Our performance benchmarked against work health, safety, wellbeing, security and environment best practice.

See Appendix 5, Table A.4 for all enterprise strategic success measures.

85   The National Archives of Australia 'Check-up survey' is an 'online self-assessment tool designed to measure Australian Government agencies' maturity and performance in managing their information assets.' In 2021 and earlier it was referred to as 'Check-up PLUS'. See National Archives of Australia, *Check-up survey*, NAA, 2024, available from https://www.naa.gov.au/information-management/check-survey [accessed 9 October 2024].

4.15   Performance reporting on data availability percentages in observing network sub-networks is available across the year through the Data and Digital Group Technology Report (DDG Technology Report) (see paragraph 4.42), which is provided to the Executive Team monthly. The Bureau advised the ANAO in April 2024 that the DDG Technology Report 'is a key input to the preparation of the full-year performance information reported against SSM05 and its associated contributing measures'.

Observing Systems and Operations Program Plan

4.16   Since 2020, the Observing Systems and Operations Program (OSO program) has developed an annual *Observing Systems & Operations Program Plan* (program plan). Each program plan provides a four-year outlook against desired outcomes.

4.17   The 2023–2027 Program Plan includes four target outcomes:

- Observations Technology (OT) operations delivering resilient and secure services all day every day;

- Maximise OT capabilities through continued automation and adoption of new technologies, to meet the needs of Bureau customers both now and into the future;

- Fit-for-purpose observation support services and in-field volunteer and partnership management, supported by automated processes, testing and quality assurance; and

- Build and sustain distinctive capabilities and a workforce for the future.

4.18   For each outcome, the program plan includes outputs, milestones, and performance measures.

4.19   Between 2020–21 and 2022–23, reporting of progress against the Program Plan occurred annually, midway through the financial year. This reporting occurred on an output level, tracking the achievement of activity included in the program plan for the financial year. Reporting did not include monitoring of the program plan performance measures. In September 2024, the Bureau advised the ANAO that 'there was no OSO Program Plan reporting completed in FY23-24', though 'the OSO Leadership Team tracked deliverables in their regular monthly meetings'.

Sustainability funding and business case

4.20   As discussed in Chapter 3, paragraphs 3.12 to 3.17, in the 2020–21 Federal Budget, the Australian Government increased the Bureau's overall funding to 'ensure the financial sustainability of the Bureau'. The Bureau developed a business case to support advice to government, focused on the security, stability and resilience of Bureau assets, including the observing network. The Bureau did not translate the assumptions of cost modelling that informed the business case into a plan.

4.21   In October 2023, reporting to the Bureau's Investment Committee stated that:

> The Bureau committed to levels of performance exceeding existing standards … There is an indirect relationship between the funding and subsequent lifecycle management of Bureau assets, and the performance standards required to meet the business case commitments. This means that the commitments were made on the basis of all Bureau assets being managed to required standards. …
>
> The commitments are not time-bound, and due to the extended timeframe required to complete the ROBUST Program, they have not yet been developed into specific KPIs, however planning for this step is underway to align with the formal closure of ROBUST in June 2024.

4.22   As at July 2024, there is no reporting given to the Investment Committee or the Executive Team on the relationship between the budget funding and the performance standards in the observing network. Without reporting against the business case commitments the Bureau does not have assurance that the funding and subsequent lifecycle management of Bureau assets is achieving required performance standards.

Opportunity for improvement
4.23 The Bureau could develop more detailed progress reporting on the investments in its observing network to ensure that it meets required standards of business case commitments.

Are performance indicators aligned to risk?

The key performance indicator for observing network assets is data availability which is based on the risk of weather information not being available to stakeholders. Three of the Bureau's newly developed observing network performance measures report whether risks have eventuated and two provide insight into whether risk controls are available and being implemented. Since November 2020, the Bureau has been reporting against out-of-tolerance risks relating to 'unviable' asset capabilities. The addition and completion of treatment plans and controls has not reduced the reported risk level.

4.24   The Bureau introduced its risk management framework, comprising the *Enterprise Risk Management Policy*, *Risk Management Procedure*, and *Risk Appetite and Tolerance Statement* in 2022. The Bureau's risk management framework is depicted in Figure 4.2.

Figure 4.2:   Bureau of Meteorology Risk Management Framework

Note: 'SRBCC' refers to the Bureau's Security, Risk and Business Continuity Committee and 'BMAC' refers to the Bureau of Meteorology Audit Committee.

Source: Bureau of Meteorology documentation.

4.25   Within the framework:

- the *Risk Management Policy* 'defines how the Bureau of Meteorology manages risk to achieve its mission and strategic objectives';

- the *Risk Management Procedure* 'sets out the process for conducting risk management across the Bureau of Meteorology in accordance with the Bureau's *Risk Management Policy*';

- the Risk Appetite and Tolerance Statement 'provides guidance on how the Bureau should engage with risks according to each Risk Category'; and

- the Bureau maintains a risk reporting schedule that notes when risk reports are due to relevant governance and oversight committees.[86]

4.26   A report covering all enterprise risks is required to be submitted monthly to the Security, Risk and Business Continuity Committee, and quarterly to the Executive Team and the Bureau of Meteorology Audit Committee.

4.27   The Bureau's *Corporate Plan 2024–25* includes 'Systems and assets' as one of its key enterprise risk categories.[87] The Risk Management Policy defines this as 'Risks to functionality and continuity of the Bureau's data, systems, and assets.

4.28   The Bureau's Risk Appetite and Tolerance Statement states that it 'has a low appetite for any risk that may impact the delivery of our business-critical activities or the safety of our people and the community'. The Bureau's Risk Appetite and Tolerance Statement states it is set annually by the Executive Team. It was most recently updated in October 2024. Prior to this, it was last updated in September 2022.

4.29   The Bureau's risk tolerance for 'Systems and Assets' is noted as low to medium, where it has 'low tolerance for risks which may disrupt the functionality and continuity of critical systems and assets necessary to deliver our products and services'; and medium risk is accepted 'where the Bureau is still able to maintain its core products or services', accepting that 'this may result in the degradation or disruption of the Bureau's non-critical services'.

Bureau risk reporting

Enterprise risks

4.30   Along with the risk management framework introduced in 2022, the Bureau reviewed its enterprise risks. Two risks were identified which are related to observing network asset management, shown in Table 4.2.

---

86   The governance and oversight committees are the Bureau Executive Team; Security, Risk and Business Continuity Committee; and Bureau of Meteorology Audit Committee.

87   Bureau of Meteorology, *Corporate Plan 2024–25*, BOM, Melbourne, 2024, p. 40.

Table 4.2:   Enterprise risks related to observing network asset management

Risk category	Risk	Description	Current risk level	Target risk level
Systems and asset risk	Systems and asset disruption risk	Technology, property and other system and asset outages and disruptions.	Extreme	Medium
	Technological innovation risk	The Bureau's systems and assets becoming obsolete, unviable, or not fit for purpose.	High	Low

Source: ANAO analysis of Bureau of Meteorology Audit Committee papers.

4.31   Current enterprise risk and target risk levels were introduced in the March 2023 Enterprise Risk Report. For these two risks, the risk levels have not changed since introduction, and are marked as outside of tolerance.

4.32   Prior to 2022, a similar risk reported to the Bureau of Meteorology Audit Committee was 'Inappropriate or unviable asset capabilities: [the] Bureau cannot deliver functions and services required and expected due to inadequate, inappropriate or unviable asset capabilities'. The risk was rated 'extreme' and outside of risk tolerance. The treatments identified in the first inclusion of this risk 2020 and relevant treatment status as at October 2024 are set out in Table 4.3.

Table 4.3:   Inappropriate or unviable asset capabilities risk report — risk treatment plan November 2020

Treatment name	Treatment status as of October 2024
ROBUST Enterprise Asset Management System roll out	The Bureau's Enterprise Asset Management System was rolled out in 2021.
Completion of the Observing Systems Strategy	The Bureau closed the Observing System Strategy in August 2024.
Development of the Observation Ecosystem plan	The Bureau developed an Observation Ecosystem Roadmap in 2021.[a]
Workforce plan to meet agreed [service level targets] and implement identified structural changes to support service management team	The Bureau recently commenced development of a workforce plan for the OSO program for 2024–2026.

Note a: The Observation Ecosystem Roadmap was 'refreshed' in 2024.
Source: ANAO analysis of Bureau of Meteorology Audit Committee papers.

4.33   The risk was noted again in the August 2021 Bureau of Meteorology Audit Committee papers with no changes to the causes, ratings, and controls.

4.34   The Bureau's Strategic Asset Management Plan identified in 2020 that the 'most of the Bureau's assets in the observing network are nearing or are beyond the end of their useful life.' The addition and completion of treatment plans and controls has not reduced the reported risk level.

4.35   As of October 2024, the four treatments proposed for the Bureau's risk of inappropriate or unviable asset capabilities have been achieved (Table 4.3). Under the 2022 risk management framework, the risk of obsolete, unviable, or not fit-for-purpose systems and assets retains the same risk rating of 'extreme'.

Business unit risks

4.36   As established under its 2022 *Risk Management Procedure*, the Bureau maintains a risk register of business unit risks, including those for the for the Data and Digital Group. As of May 2024, there are seven 'High' or 'Extreme' risks listed for the Observing Systems & Operations program in the business unit risk register, shown in Table 4.4.

Table 4.4:   High or extreme risks for the Observing Systems & Operations program as at May 2024

Risk	Current risk rating	Target risk rating
Reoccurrence of compromised data due to incorrect use of type of [data acquisition] card in [automatic weather stations]	High	Low
Degradation of radar network data returns and radar products	High	High
Serious injury, impairment or death of staff or contractor	High	Medium
Interruption/degradation of observing systems and operation services	High	N/A
Space weather network infrastructure outages	High	Medium
Ineffective controls for outsourcing services	High	Medium
Prolonged outages of legacy radars	Extreme	Medium

Source: Bureau of Meteorology documentation.

Observing network risks

4.37   The Bureau also maintains a separate risk register of business unit risks for the observing networks. As of September 2024, there are 113 risks listed in the Observing Networks Risk Register. The Observing Networks Risk Register includes details such as current risk level; assessment of risk tolerance; and next review date for all risks.

4.38   Risks for each sub-network from the Observing Networks Risk Register are included in the Asset Management Plan (AMP). The AMPs also identify how implementation of their proposed programs of work would reduce risk levels for these risks.

Observing network performance measures

4.39   Data availability has 'historically' been the single metric used by the Bureau to assess the performance of the observing network. This is linked to the Bureau's low tolerance for risks that impact delivery of its products or services since its key products and services are based on observations (see paragraphs 4.28 to 4.29). Additional metrics to measure performance are currently being introduced as part of the Bureau's longer-term ambition to uplift its asset management capability.

4.40   The 'Observing System Service Level Project' was developed in 2020 to broaden performance reporting targets and metrics for the observing network. This project developed five key performance measures and an initial set of targets, which were approved by the Executive Team in May 2021. These five key measures were linked to the Bureau's overall objective of improving its enterprise asset management to industry best practice, as initiated by Tranche 2 of the ROBUST Program in 2018. The measures and targets are published on the Bureau intranet.

4.41   The five performance measures with targets and reporting schedule as of June 2024 are shown in Table 4.5 and discussed further below.

Table 4.5:   Observing network performance measures

Category	Measure	Target	Current reporting
1. Data performance	Total data received from the asset network as a percentage of expected data.[a]	Targets vary by sub-network and instrument	Reporting provided to the Executive Team monthly.
2. System performance	Mean time between full outage of data service, calculated as operating time divide by the number of failures.	Targets vary by sub-network and instrument	Metric introduced June 2024. Reporting of metric for 2021 to present[b] provided to the Executive Team monthly.
3. Incident management	Mean time to restore, calculated as the average time between incident prioritisation and service restoration.	Not set	Reporting (without target) provided to the Executive Team monthly for major incidents.[c] Additional reporting introduced June 2024.
4. Maintenance & operations	Percentage of preventative maintenance work orders completed.	100 per cent	Reporting provided to the Executive Team monthly.
5. Resource health	The number of full-time equivalent staff needed to fill the competency gap in service delivery.	Not set	A report is provided bi-monthly to the OSO Leadership Team which outlines the number of staff, positions and capabilities held.[d]

Note a: The Executive Decision Paper provided for approval in May 2021 specifies that data should be within acceptable timeliness thresholds and having passed quality control processes. This is not currently included in reporting of the targets for this measure.

Note b: Reporting shows a table of mean time between failure across the last four years (see Table 4.6)

Note c: Major incidents are defined as priority one or two on the IT incident four-point scale (see paragraph 3.42).

Note d: This report relates to staff in National Observing Operations section only (see paragraph 2.39).

Source: ANAO analysis.

Data performance

4.42   The reporting product for the data performance measure is the DDG Technology Report.[88] Reporting is summarised in Figure 4.3.

---

88   The incident management performance measure is also reported in the DDG Technology Report. The system performance and maintenance & operations performance measures are reported in a separate monthly report. The Resource Health measure is reported to the OSO leadership team in a separate bi-monthly report.

Figure 4.3: Observing network performance data availability by month for 2024

Jan 24 ■ Feb 24 ■ Mar 24 ■ Apr 24 ■ May 24 ■ Jun 24 ■ Jul 24 — Target performance
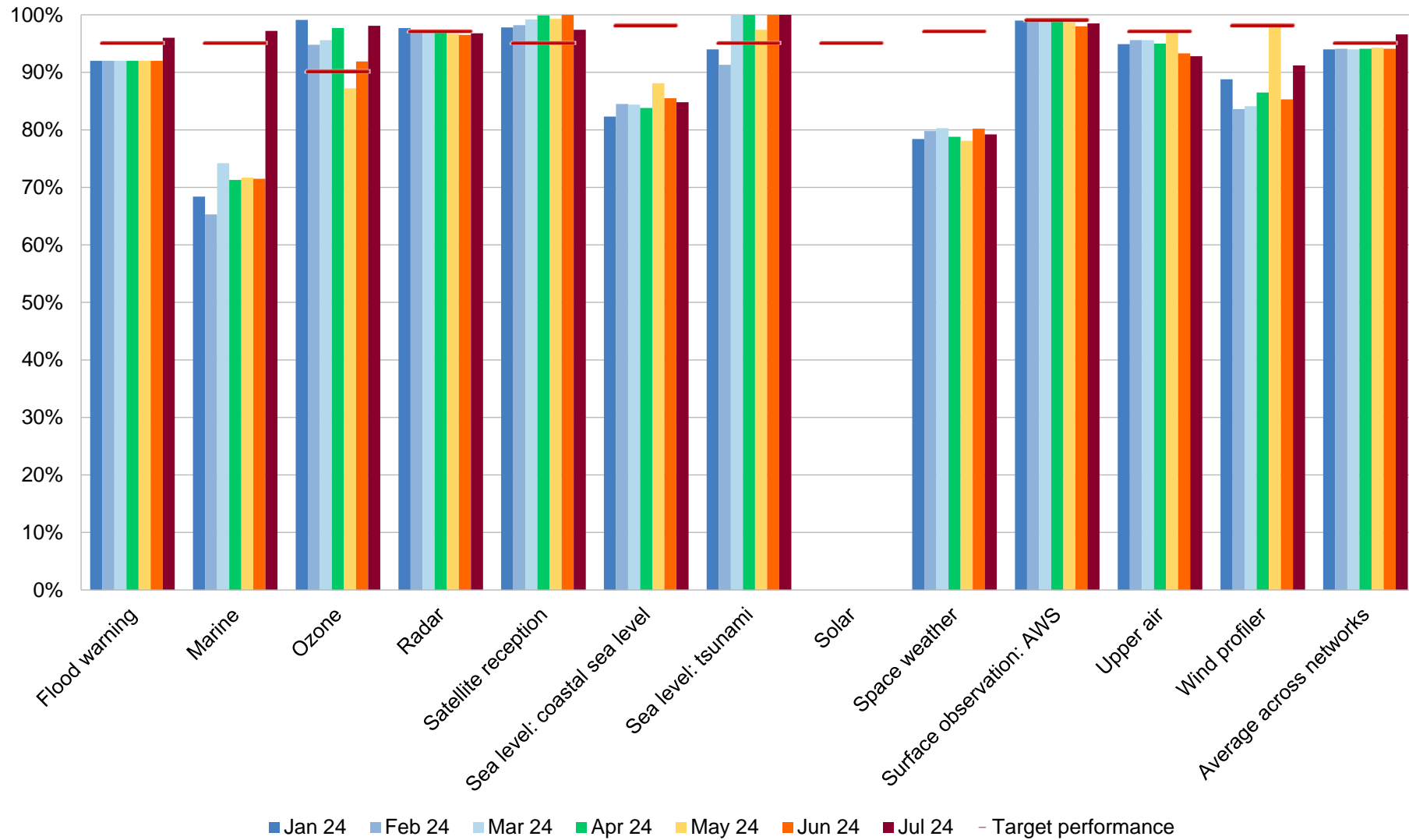
Note: The DDG Technology Report includes 'Tsunami' as a separate sub-network. See the sub-networks identified in Chapter 1, paragraph 1.4.

Source: ANAO analysis.

4.43   Target performance levels have varied over time.

- Prior to August 2023, the target performance level for data availability of all networks was set at 95 per cent.

- In August 2023, specific data availability targets for each network were set in addition to the overall target of 95 per cent (shown in Figure 4.3). Each month since August 2023 between three and five sub-networks achieved their specific target.

- Since April 2024, the August 2023 targets have been re-labelled as 'stretch targets'. Data availability targets have been set at 95 per cent for all sub-networks, except the ozone network which has a 90 per cent target. Since April 2024, five or six sub-networks have achieved this target each month.

4.44   Of the 12 networks, five did not meet their target in any month. Reporting also includes the average across all networks, with a target of 95 per cent. Since August 2023, the data availability average across all networks has not met this target in any month.

4.45   When considering data availability, the DDG Technology Report states that availability is 'measured at central ingest point, not infrastructure availability'. This means that outages can relate to information transfer as well as to the function of observing network instruments. This is the case for the solar network, discussed in Case Study 3.

Case study 3.   Solar network data outage

The Bureau's solar network consists of 13 sites containing instruments which collect information about sunlight, irradiance, and the sun's movements. As shown in Figure 4.3, this network has been reporting zero per cent data availability since August 2023. The Solar Network AMP, endorsed in January 2024, states that

> Current CAPEX funding for FY2324 is focussed on remediation of the solar servers which have gone many years without formal IT support, which has caused the [quality control] software to fail, leading to a length [sic] period with no data available to stakeholders.

> The connection between the solar servers and the filestore failed in October 2020 and has not been restored. This means that the Bureau cannot currently perform manual quality control of the solar data. As a result, no data has been made available to stakeholders since October 2020. However, raw data continues to be collected.

The Solar Network AMP also states the quality of observations is tied to maintenance activities, specifically regular cleaning of sensors which is optimally performed daily, before sunrise, and after relevant weather events such as rain or dust storms. This was previously undertaken by on-site Bureau staff for all stations. It is now being undertaken by contractors at some sites at 'less than ideal frequency'.

The Solar Network AMP identifies the current solar network as having high risks related to electrical safety, reputational impact of reduced data quality, and the data flow failure which has actualised. It additionally identifies medium risks related to degradation in data quality if sensors are not cleaned daily, and the dependence on manual quality control. All risks are stated as outside of tolerance. The AMP presents a plan to reduce the risk profile 'by replacing aging assets, and build[ing] a supportable IT infrastructure and data flow, including the automation of the [quality control] process.'

Unlike other networks, the primary source for solar radiation data is satellite measurements, rather than the solar network. The primary uses of solar network data is in verifying satellite results and in monitoring and prediction by the solar energy sector. In July 2024, the Bureau advised the ANAO that 'stakeholder consultation has confirmed there is a valid ongoing need for high quality ground-based solar radiation measurement data' and as such 'the intention to repair the connection and remediate the central data processing system was never in question'.

The Bureau's DDG Technology Report for July 2024 estimates that data will be available to stakeholders from the end of October 2024.

4.46   In January 2024 the Executive Team requested a more detailed report on outage patterns and common causes. The Bureau developed a draft report for the volume of observing technology incidents, including analysis of the perceived increase. This draft report considered outage data from April 2022 to March 2024 and concluded that there was an increase in outage incidents between October 2023 and January 2024.

4.47   This draft report notes that one factor in the perceived increase is 'improved record keeping practices' following the development and implementation of the *Observing Technology Incident Management Process*. The report also lists the specific error types most commonly responsible for outages within the AWS and radar networks. The report proposes that severe weather conditions may be responsible, and notes that further information would be needed to confirm this. Further analysis of outage patters, causes, and potential solutions has not been undertaken.

System performance

4.48   The Bureau's system performance metric is 'mean time between failure'. The Bureau calculates mean time between failure as total operating time divided by the number of failures which occur.[89] As shown in Table 4.6, reporting shows the target and actual mean time between failure for each sub-network in months. Actual mean time between failure is calculated as the total between 2021 and 'present'. For this time period, four of eleven sub-networks met their target.

Table 4.6:   Mean time between failure reporting, June 2024

Network	Mean time between failure (months)	Target (months)	Meeting target
Flood warning	31.4	24.0	🔷
Marine	21.0	240.0	🟥
Ozone	36.5	—[a]	–
Radar	7.0	8.0	🟥
Satellite reception	28.1	24.0	🔷

---

89   'Mean', or average, is the sum of a collection of numbers divided by the count of numbers in the collection. In 'mean time between failure' this would be the collection of lengths of time that assets have run without failing, divided by the number of times in that list. This is the same as the total operating time divided by the number of failures.

Network	Mean time between failure (months)	Target (months)	Meeting target
Sea level: coastal sea level	20.6	24.0	🟥
Sea level: tsunami	27.5	48.0	🟥
Solar	Not included in reporting		
Space weather	28.8	—a	–
Surface observation: automatic weather stations	14.6	24.0	🟥
Upper air	13.7	12.0	🟢
Wind profiler	28.0	24.0	🟢

Key: ◆ Meeting target ■ Not meeting target.

Note a: Reporting states that 'Some targets were not set in the original paper and need to be established.'

Source: ANAO analysis of Bureau reporting.

4.49   Mean time between failure reporting was introduced in June 2024. Reporting occurs in the 'Networks and PM Performance' report, provided monthly to the Bureau Executive Team and OSO Program Leaders. Reporting figures were the same in both the June and July 2024 documents. Reporting notes that by averaging mean time between failure across all assets in a network, the data resolution is 'too broad' and that the future intention is to report against systems within each sub-network. There is no evidence that this failure rate is informing analysis of risk, or how the Bureau intend to use this performance metric to inform their asset management risk approach.

Incident management

4.50   The Bureau's performance measure for incident management is mean time to restore, calculated as the average time between incident prioritisation and service restoration. In the May 2021 key performance measures and initial set of targets approved by the Bureau Executive Team, targets were set for mean time to restore that varied based on incident priority and the distance of travel required.

4.51   DDG Technology Reports include mean time to restore calculations for observing network incidents rated one or two on the IT incident four-point scale (see paragraph 3.42). This reporting does not include targets for the observing network 'due to the variety of equipment, systems and geographical locations.'

4.52   From June 2024, a metric of mean time to restore has also been included in reporting to the OSO Leadership Team, reported as the count and percentage of incidents which 'failed to comply [with the] required time to restore [service level agreement]'. In December 2024, the Bureau advised the ANAO that the cited service level agreements are the targets set in May 2021. In July 2024, the Bureau reported that 43.3 per cent of incidents failed to achieve their target between July 2023 and June 2024.

Maintenance & operations

4.53   The maintenance & operations measure is reported as the ratio of target preventative maintenance work orders to completed target preventative maintenance work orders, categorised by sub-network. Reporting covers six of the 11 observing network sub-networks.[90]

4.54   The reporting output for the maintenance & operations measure was discussed in Chapter 3, paragraphs 3.58 to 3.61. The target completion rate is 100 per cent. Reporting demonstrates that targets are not being met. Between 23 and 69 per cent of target preventative maintenance work orders for each sub-network were achieved in 2022–23, and between 52 per cent and 79 per cent were achieved in 2023–24.

4.55   The maintenance & operations measure relates to preventative maintenance. Preventative maintenance can act as a control to reduce the risk of failure. Reporting against this metric identifies whether this control is being implemented as planned and so can inform assessment of the current risk of failure.

Resource health

4.56   The resource health performance measure does not have a metric or target determined.

4.57   Bureau reporting on resource health in the National Observing Operations section is captured in a workforce health performance report, provided bi-monthly to the OSO Leadership Team as part of its OSO Operations meetings. For each Observing Operations Hub (hub) the report includes full-time equivalent staff with relevant capabilities (see paragraphs 2.76 to 2.79 for discussion of capabilities), as well as the target number of staff and the time required to onboard a new staff member in the relevant capability. The report also includes commentary on the forecast six-month workforce capacity, the competency, and activities that could assist in achieving the target.

4.58   In November 2024, the workforce health performance report stated that across National Observing Operations staffing was at 78 per cent of the target full-time equivalent level. The proportion of the target full-time equivalent staffing level applicable to each hub, as well as by capability with specific sub-networks is shown in Table 4.7. The workforce health performance report also includes the count of staff able to work on the sea level sub-network for Adelaide and Brisbane. It does not include a target number of staff for the sea level sub-network.

Table 4.7:   Proportion of target full-time equivalent staff by National Observing Operations Hub and observing network sub-network capability

Hub	Radar (%)	Surface (%)	Flood (%)	Upper air (%)	Overall (%)
Adelaide	85	54	90	91	**69**
Brisbane	80	57	55	100	**64**
Cairns	49	62	59	114	**72**
Darwin	63	78	50	133	**72**
Hobart	80	42	131	140	**58**

90   The sub-networks reported on for the maintenance & operations measure are: flood warning, marine, radar, sea level, upper air, and surface observation.

Hub	Radar (%)	Surface (%)	Flood (%)	Upper air (%)	Overall (%)
Melbourne	112	104	113	Target is 0	**104**
Perth	77	72	75	89	**80**
Sydney	88	46	20	82	**66**
National	**76**	**64**	**59**	**100**	**78**

Source: ANAO analysis of Workforce Health Performance Report — November 2024.

Are the results of performance monitoring and measurement used to inform and prioritise decision-making?

> The Bureau has identified corrective actions to take against assets or the asset management approach when observing network asset performance monitoring targets are not met. Monitoring and reporting is not being undertaken to regularly review asset management maturity, as proposed in the Strategic Asset Management Plan. The Bureau has not addressed the risks identified within internal audit recommendations.

4.59   The World Meteorological Organization is an agency of the United Nations that seeks to facilitate and promote the standardisation of meteorological observations across member states. The World Meteorological Organization Integrated Global Observing System Technical Regulations state that 'Members should analyse monitoring results to detect any performance-related changes, trends and deficiencies and should use the results and analyses as input for continual improvement' as part of managing an overall observing system.[91]

Response to observing network performance measures

4.60   The Bureau undertakes measurement and analysis of observing network asset performance at a network level. In August 2023, the Bureau introduced a process for managing 'Asset Resilience'. The Asset Resilience process is triggered when assets do not meet performance measure targets, and is used to determine the appropriate corrective action for each asset.

4.61   Potential corrective actions include:

- change operational procedures or work instructions;
- change to the maintenance routine by updating the master preventative maintenance requirement in the Bureau's Enterprise Asset Management System, such as to increase the frequency of a type of maintenance or to implement regular asset condition assessments;
- create a corrective maintenance work order for multiple small pieces of work, such as to replace a specific instrument in all sites;
- propose a self-contained work package by engaging observing systems support;
- engage the OSO program projects and delivery team for a changes which require a project; or

---

91   World Meteorological Organization, *Annex VIII to the Manual on the WMO Integrated Global Observing System*, WMO, 2023, p. 22 (section 2.6.4.5.11).

- propose a new initiative for the Asset Management Plan if a major project is required.

4.62   The Asset Resilience process instructs that risk treatment plans be reviewed for inconsistency between observed resilience and expected, and that delays to risk treatment plans be reported to the asset management reference forum (see paragraph 2.38).

4.63   A summary of actions in progress to achieve data performance targets is included in reporting against the performance measure in the DDG Technology Report.

Asset management maturity review

4.64   The Bureau's Strategic Asset Management Plan (SAMP) 'outlines the strategic projects to uplift the Bureau's asset management maturity'. One of the eight initiatives listed in the SAMP 'to uplift asset management capability' was to 'regularly review maturity, progress and implement continuous improvement projects'. The SAMP specifies that the initiatives align with two of the four strategic pillars in the Bureau *Strategy 2017–2022*.[92]

4.65   As part of the risk and review section of the SAMP, it notes that 'the Bureau will establish review processes for the [asset management framework], implement dashboards to monitor performance and as part of the asset management framework, continue to put forward ideas for improvement'.

4.66   The Bureau has not reported on progress against the initiatives of the SAMP, including the initiative to regularly review progress. In August 2024, the Bureau advised the ANAO that evaluation of progress against the individual initiatives of the SAMP will be documented in the next iteration of the SAMP. The SAMP was recommended for review in 2021. No date has been established.

4.67   As discussed in paragraph 2.15, the SAMP includes both initial and expected asset management maturity levels across maturity areas (see Appendix 3, Table A.1) and reports that the Bureau's overall asset management maturity level in 2019 was 0.6, with a target maturity of three. *ISO55001:2014* defines maturity on a scale of zero to five with five being 'Excellent.'[93]

4.68   The Bureau's asset management maturity level was reassessed in 2022. The Bureau was scored at 1.62, with a target maturity of three.

Table 4.8:   Maturity assessment, 2022

Grouped maturity areas	Maturity assessment score
Strategy and planning	1.90
Asset management decision-making	0.84
Lifecycle delivery	1.73
Asset information	1.57
Organisation & people	1.98
Risk & review	1.72

Source: Bureau of Meteorology Asset Management System's Maturity Assessment Report, 2022.

---

92   The Bureau *Strategy 2017–2022* is the predecessor to *Strategy 2022–2027*, discussed in paragraphs 4.7 to 4.9. The four strategic pillars are broadly the same across the two documents, with different actions proposed to achieve them.

93   British Standards Institution, *ISO 55001:2014 – Asset management – Management systems – Requirements,* BSI Standards Publication, 2014.

4.69   The 2022 Maturity level reassessment included an Asset Management Roadmap for the achievement of the target maturity level. The Asset Management Roadmap provided recommended improvement activities, the expected impact these would have on the Bureau's maturity level the relevant area, and a suggested priority order for implementation of the recommendations. In December 2024, the Bureau advised the ANAO that 'The 2024-25 assessment was initially planned to commence after December 2024 and has been deferred due to competing operational priorities'.

Internal audit recommendations

4.70   In February 2022, the Bureau's internal auditors delivered a final report of the observing network asset management framework to the Bureau. The report found that overall, the Bureau was 'making good progress in uplifting the Bureau's asset management capability' however 'some areas of improvement concerning the monitoring and reporting of asset performance, roles and responsibilities and compliance with new process [sic] … could further support the uplift of asset management capability and enable better alignment with the ISO standards'.

4.71   The report made seven recommendations to the Bureau regarding monitoring and reporting of asset performance or health; finalising information in asset management plans; compliance with outage notification processes; clarity around roles and responsibilities; and development of a roadmap or other planned approach to assess progress on asset management capability uplift.

4.72   In June 2024, the Bureau reported to the audit committee that actions were remaining for one recommendation: the recommendation to 'Finalise and operationalise the executive reporting on Observing Network asset performance/health that includes the five new performance measures …'. The agreed management action for this recommendation stated that 'the Enterprise Asset Management Team (including the Observing Network Service Management Team) will continue to work with stakeholders to deliver the executive report on an ongoing basis by the end of FY 2021/22'. The June 2024 the Bureau reported to the audit committee that the due date was revised to of 30 June 2024 and that the outstanding two measures would be included in June 2024 reporting. As at August 2024, reporting on all five measures is not finalised (see paragraph 4.41).

4.73   As discussed in Chapter 2, paragraphs 2.50 to 2.55, the internal audit report proposed two recommendations against the finding that there was a 'lack of a clear approach/roadmap to uplift the remaining asset management processes'.

4.74   The internal audit report noted that a 'lack of clear approach' for uplifting asset management processes 'may result in the inability to uplift processes in a timely manner as well as poor decision making/prioritisation that could impact processes efficiency and result in ineffective utilisation of resources'.

4.75   The two recommendations are closed. Closure reports do not demonstrate how the activities undertaken addressed this risk. The 2022 Maturity level reassessment and Asset Management Roadmap[94] are not equivalent to a planned approach to uplift asset management processes, as the Asset Management Roadmap itself includes the recommendation to review all established processes and rewrite them as needed. The development and application of a standard

---

94   See paragraphs 4.68 to 4.69.

template is not 'an approach to document and monitor the progress in uplifting each of the 142 asset management processes to continue to assess the Bureau's maturity level and highlight the focus areas going forward'. Without addressing the risks identified within internal audit recommendations, identified risks persist.

> **Opportunity for improvement**
>
> 4.76 There is an opportunity for the Bureau to address internal audit (and any other) recommendations to support timely management of risk, achievement of planned outcomes, and resolution of identified weaknesses.

Dr Caralee McLiesh PSM
Auditor-General

Canberra ACT
20 December 2024

Appendices

Appendix 1   Entity response

Australian Government
Bureau of Meteorology

Office of the CEO

In reply, please quote:
DIR 24 0212

12 December 2024

Dr Caralee McLiesh
Auditor General
Australian National Audit Office
GPO Box 707
Canberra ACT 2601

Dear Dr McLiesh

Thank you for providing the Australian National Audit Office's (ANAO) report under s.19 of the Auditor-General Act 1997 on the Bureau of Meteorology's Management of Assets in its Observing Network.

The Bureau of Meteorology's (Bureau's) observing network, consisting of almost 15,000 individual assets, distributed across Australia and its territories, is one of the nation's largest and most complex data gathering endeavours. The meteorological information gathered by the observing assets, 24 hours a day every day of the year, consist of observations of the atmosphere, space weather, terrestrial waterways and oceans.

Together, they form the information base which is vital for the provision of public weather services, the specialist needs of industry and national security, the integrity of the national climate record, and Australia's contribution to international meteorological data and science through the World Meteorological Organisation.

I recognise the Bureau's significant reforms and investment in the observing capabilities over the last decade, including improvements to logistics and maintenance practices, the automation of manual observations and new observations maintenance hubs, the introduction of consistent asset management and technology competency and training frameworks, and the recent implementation of a new enterprise asset management system.

The Bureau regularly measures and reports on the performance of its observing assets. Incremental new funding related to observing assets from the 2020 Budget came online in 2023/24. Noting the extended lifecycle of many of the observing assets, meeting improved performance targets for assets requires time to take effect, with those targets to be incorporated into asset performance management practices once sufficient cyclical asset replacement activity has occurred.

The Bureau "agrees" with the ANAO's recommendations as further contributions to the maturity of Bureau observing network asset management and operations, and has committed to relevant actions as follows:

1. *Review Enterprise Asset Management Planning documents and report on the asset management uplift initiatives.*

The Bureau will review and update the Bureau's Strategic Asset Management Plan, ensuring that it reflects existing asset management approaches. Future asset management capability improvements will be included in the update, and subsequently tracked and reported to the Bureau's Executive.

2. *The Bureau of Meteorology develop procedures for asset management lifecycle activities and complete its review of processes.*

The Bureau will continue to build out its substantial base of guiding procedures for asset management lifecycle management, completing its in-progress reviews. The completion of procedures will provide a more consistent approach to asset management of observations assets.

3. *The Bureau of Meteorology finalise training requirements and methods for all maintenance and repair activities across the observing network.*

The Bureau will complete residual gaps in maintenance training and related frameworks, ensuring that all observing assets benefit from the uplift to the skills and competencies of our national field operations personnel.

4. *The Bureau of Meteorology include management outcomes in asset management planning documentation.*

The Bureau will review how the performance of its observing network assets is measured, including agreeing and setting relevant targets, measuring those statistics over the life of assets, and better understanding the impacts of its asset management approaches on asset performance and availability.

Through these and other continuous improvement actions, the Bureau remains committed to the proactive management of its observing networks and providing the Australian public with world-class national weather, climate and water services.

Yours sincerely

Dr Andrew Johnson PSM FTSE FAICD
CEO and Director of Meteorology

Appendix 2 Improvements observed by the ANAO

1.   The existence of independent external audit, and the accompanying potential for scrutiny improves performance. Improvements in administrative and management practices usually occur: in anticipation of ANAO audit activity; during an audit engagement; as interim findings are made; and/or after the audit has been completed and formal findings are communicated.

2.   The Joint Committee of Public Accounts and Audit (JCPAA) has encouraged the ANAO to consider ways in which the ANAO could capture and describe some of these impacts. The ANAO's corporate plan states that the ANAO's annual performance statements will provide a narrative that will consider, amongst other matters, analysis of key improvements made by entities during a performance audit process based on information included in tabled performance audit reports.

3.   Performance audits involve close engagement between the ANAO and the audited entity as well as other stakeholders involved in the program or activity being audited. Throughout the audit engagement, the ANAO outlines to the entity the preliminary audit findings, conclusions and potential audit recommendations. This ensures that final recommendations are appropriately targeted and encourages entities to take early remedial action on any identified matters during the course of an audit. Remedial actions entities may take during the audit include:

- strengthening governance arrangements;
- introducing or revising policies, strategies, guidelines or administrative processes; and
- initiating reviews or investigations.

4.   In this context, the below actions were observed by the ANAO during the course of the audit. It is not clear whether these actions and/or the timing of these actions were planned in response to proposed or actual audit activity. The ANAO has not sought to obtain assurance over the source of these actions or whether they have been appropriately implemented.

- As noted in paragraphs 3.20 and 3.23, the Bureau of Meteorology finalised their *Portfolio Management Framework* and *OSO Equipment Handover Process*.

Appendix 3   Future state maturity assessment of asset management as at January 2020

1.   The Bureau's Strategic Asset Management Plan identifies the initial asset management maturity levels across maturity areas and the expected asset management maturity levels at the completion of Tranche 2 and Tranche 3 of the ROBUST Program (see Table A.1).[95]

Table A.1:   **Future state maturity assessment of asset management as at January 2020**

Maturity area	Initial state	Estimated maturity level at end of Tranche 2	Estimated maturity level at end of Tranche 3
Asset management competence	1.0	1.5	3.0
Asset management engagement	0.0	1.5	2.0
Asset management framework	0.0	2.0	3.0
Asset management system	1.0	2.0	3.0
Audit	0.0	2.0	3.0
Continuous improvement	0.0	2.0	3.0
Documentation and records	1.0	2.0	3.0
Lifecycle activities	1.0	2.0	3.0
Management review	0.0	2.0	2.0
Risk	0.0	2.0	3.0
Roles and responsibilities	0.0	2.0	3.0

Note: The Strategic Asset Management Plan defines the maturity levels, scored from zero to four, as below.

Zero: The organisation has taken no action to establish an asset management framework.

One: The organisation understands the need for an asset management framework and a few components are in place however there is no structure linking them.

Two: The organisation has more than half of the components of an asset management framework in place and the linkages between them are established and properly documented. In addition, action is being taken to develop the remaining components.

Three: The organisation has an established and documented asset management framework with all necessary components and linkages in place.

Four: The organisation's process(es) surpass the standard required to comply with ISO 55000 requirements.

Source: Bureau of Meteorology Strategic Asset Management Plan.

---

95   See paragraph 1.10. The ROBUST program was undertaken in three tranches, with Tranche 3 being closed in August 2024.

Appendix 4 High-level business requirements for the Bureau's Enterprise Asset Management System

1. The Bureau listed 13 high-level business requirements for its Enterprise Asset Management System in project documentation relating to its purchase and implementation. These are shown in Table A.2, along with the ANAO's analysis of status as of August 2024.

Table A.2: Enterprise Asset Management System business requirements — status as of August 2024

Requirement	Status
FR-01 — Will have the capability to support the core asset management processes across all the Bureau's asset classes; and to manage the asset register and associated configuration information.	In place across observing network asset classes; not yet managing the asset register
FR-02 — Will have the capability to manage asset and facility events such as availability, data quality, data timeliness; whether unplanned, planned, or routine.	In place
FR-03 — May have the capability to support the management of financial asset performance.	Not used
FR-05 — Must have the capability to support maintenance planning including establishing routine maintenance schedules and defining work templates for routine maintenance, as well as planning other work types (corrective maintenance and calibration).	Scheduling and planning in place
FR-06 — Will have the capability to manage both planned and unplanned work to support the initiation, planning, scheduling, execution, monitoring and analysis of work.	In place
FR-07 — Must have the capability to manage the Bureau's workforce for the purposes of assigning and dispatching work.	In place
FR-08 — Will have the capability to support safe work practices in the execution of work. This includes the identification of hazards and mitigations associated with assets and work.	Not used[a]
FR-09 — Will have the capability to manage consumables, spare parts, rotables and tools. The Solution will manage the inventory at the Bureau's hubs and sites.	In place
FR-10 — Will have the capability to create purchase requisitions as well as providing visibility of purchase orders and receipts. May include the capability to receive materials, inventory and services.	In place
FR-11 — Will have the capability to support the management of contracts associated with maintaining and operating the Bureau's assets.	Not used[a]
FR-12 — Will have the capability for a user to perform all Work Execution functions on a mobile device in online and off-line mode.	In place
FR-13 — May have the capability for a user to perform asset audit functions on a mobile device in online and off-line mode.	In place for critical inventory items
FR-14 — May have the capability for a stores officer to perform a stock count on a mobile device.	In place

Note: No 'FR-04' is listed.

Note a: The Bureau uses a tool for these functions.

Source: ANAO summary of Bureau documentation.

Appendix 5   Tables from the *Bureau Strategy 2022–27*

1.   The *Bureau Strategy 2022–27* sets out 16 enterprise 'strategic success actions' under four 'strategic pillars' (discussed in Chapter 4, paragraphs 4.7 to 4.9). The pillars and actions are set out in Table A.3.

Table A.3:   *Bureau Strategy 2022–27* strategic pillars and actions

Success pillar	Impact and value	Operational excellence	Insight and innovation	The Bureau way
Objective	Products and services that enhance the wellbeing of all Australians.	Outstanding people supported by secure, effective and resilient systems, processes and technology.	Practical implementation of novel, mission-directed solutions for our customers.	One enterprise that lives its values through agreed behaviours every day.
Strategic actions				
[The Bureau] will:	1.1 Amplify and accelerate engagement to help build the nation's prosperity and resilience to natural hazards in a changing climate.	2.1 Align strategy, capability, culture, investment and governance to enhance impact and value.	3.1 Systematically monitor and evaluate our external environment to anticipate and identify opportunities for accelerating impact and value.	4.1 Provide a safe, diverse, respectful, inclusive, secure and flexible working environment, where our staff excel and their contributions are valued.
	1.2 Enhance timeliness, accuracy, relevance and availability of data, information and advice to support decision-making in priority sectors.	2.2 Uplift enterprise systems, processes and technologies to enable an improved customer and staff experience.	3.2 Cultivate, prioritise and invest in innovation that delivers transformative impact for our customers.	4.2 Continue building a unified customer-focused enterprise culture.
	1.3 Enable all Australians to more easily access, customise and utilise our products and services.	2.3 Embed whole-of-lifecycle product, data, information and technology management across the enterprise.	3.3 Grow the portfolio of national and international partnerships, aligned with strategy and Australia's national interest.	4.3 Foster a growth mindset and a workforce that is appropriately skilled, agile and equipped for the future.
	1.4 Grow products and services that support renewable energy systems and assist in greenhouse gas emissions reduction	2.4 Implement secure, stable and resilient ways of working that support sustained delivery of trusted products and services.	3.4 Build the pipeline of STEM talent to operate in a customer-focused way.	4.4 Align and connect the contributions of every staff member to ensure the collective delivery of our Strategy.

Source: ANAO summary of *Bureau Strategy 2022–2027*, pp. 6–7.

2.   The strategic success measures are set out in Table A.4.

Table A.4:   ***Bureau Strategy 2022–2027* strategic success measures**

Success will be measured by:			
Impact and value	Operational excellence	Insight and innovation	The Bureau way
SSM01[a]: The financial and social value we deliver to industry, government and the wider community.[b]	SSM04: Our delivery against agreed customer requirements and commitments.	SSM07: The depth, breadth and resilience of our external partnerships and collaborations.	SSM10: Our performance benchmarked against work health, safety, wellbeing, security and environment best practice.
SSM02: The levels of satisfaction and trust our customers, partners and stakeholders have in the products and services we provide.	SSM05: Capacity utilisation, system reliability, security and resilience benchmarked against best practice.	SSM08: The conversion of ideas and opportunities to customer outcomes.[d]	SSM11: Individual and team actions demonstrate commitment to enterprise values and behaviours.
SSM03: The utilisation of our services by new and existing customers.[c]	SSM06: Verification of our products and services.	SSM09: The quality and application of our research and development, benchmarked internationally.	SSM12: A diverse and inclusive workforce, that reflects the communities we serve.

Note a: The number label for each strategic success measure is set out in the Bureau's *Annual Report 2023–24*.[96] The number label is not included in the Strategy document. The number label is included the Bureau's *Corporate Plan 2024–25*.[97]

Note b: In the Bureau's *Annual Report 2023–24,* SSM01 was rephrased as 'The financial and social value we deliver to the Government, industry and the Australian community.'[98]

Note c: In the Bureau's *Annual Report 2023–24,* SSM03 was rephrased as 'The utilisation of our services by new customers and the return rate from existing customers.'[99]

Note d: In the Bureau's *Annual Report 2023–24,* SSM08 was rephrased as 'The conversion rate from ideas to opportunities to customer outcomes.'[100]

Source: *Bureau Strategy 2022–2027*, p. 8.

---

96   Bureau of Meteorology, *Annual Report 2023–24*, BOM, Melbourne, 2024, pp. 38–52.

97   Bureau of Meteorology, *Corporate Plan 2024–25,* BOM, Melbourne, 2024, pp. 27–38.

98   Bureau of Meteorology, *Annual Report 2023–24*, BOM, Melbourne, 2024, p. 38.

99   ibid., p. 41.

100   ibid., p. 48.