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Technical Direction – TD 00039:2023

Issue date: 01 December 2023

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Title: Adjustment of definition and figure – Amendment to TS 01515.1:1.0 *Asset Information – Part 1: Management of Asset Information*

This technical direction is issued by the Asset Management Branch (AMB) as an update to TS 01515.1:1.0 *Asset Information – Part 1: Management of Asset Information*.

1 Background

A recent review of definitions listed in TS 01515.1 was triggered by stakeholder feedback provided during the development of an adjacent artefact, TS 01506.1 *Development of Technical Maintenance Plans – Part 1: Development Process*. The feedback noted an inconsistency in the definition for service provider in TS 01515.1. The update aligns the definition to TS 01506.1 and more broadly, the *Asset Management Framework*.

Additional direct feedback was received about Figure 1 relating to the misalignment of colours noted in the figure's legend. This has been addressed.

2 Amendment to TS 01515.1:1.0

The following sections in TS 01515.1:1.0 are amended as follows:

Section 1 Scope

Delete Figure 1 and its caption and replace with the following:

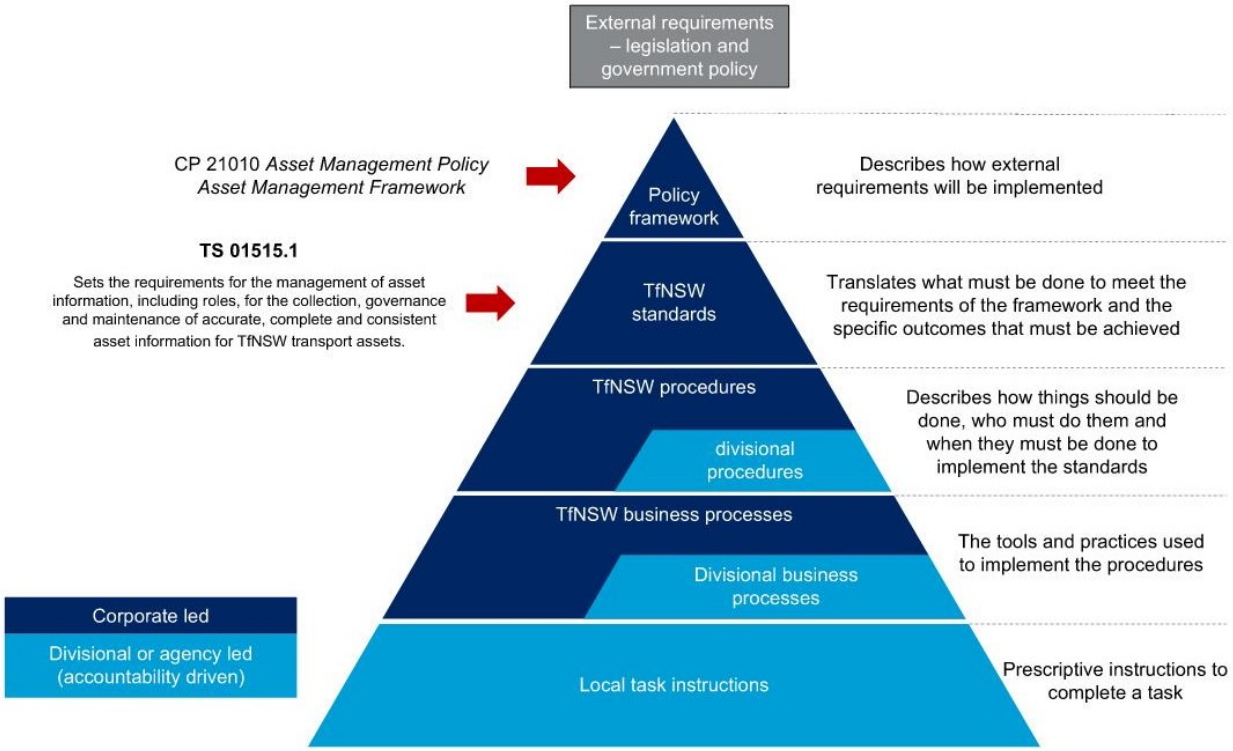

Figure 1 – TfNSW document hierarchy

Section 4 Terms, definitions and abbreviations

Delete the term and definition of service provider and replace with the following:

service provider party providing a service to an asset owner either directly or indirectly.

Authorisation:

Approved by	Director Asset Planning and Assurance Asset Management Safety, Environment and Regulation

TS 01515.1:1.0

T MU AM 02004 ST

Standard

Asset Information

Part 1: Management of Asset Information

Issue date: 30 June 2023

Effective date: 30 June 2023

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Document information

Owner:	Director Asset Planning and Assurance Asset Management Safety, Environment and Regulation
Mode:	Multimodal
Discipline:	Asset management

Document history

Revision	Effective date	Summary of changes
1.0	30/06/2023	First issue as TS 01515.1. Version renumbered to 1.0 in line with new designation.

Preface

This is a first issue as TS 01515.1.

This standard supports the *Transport for NSW: Asset Management Framework* which provides a system and governance model for the management of TfNSW transport assets including the management of asset information.

The information management approach is specific to information and data, across the asset life cycle, for assets owned by TfNSW and TAHE. The information management approach covers information on assets that are created, exchanged and managed either internally or under asset partner contracts throughout the asset life cycle including asset stewards, operators or maintainers.

This standard supersedes the following documents:

- TS 01512 (T MU AM 01012 ST) *Engineering Document Requirements*, version 2.0
- TS 01513 (T MU AM 01014 ST) *Asset Information Handover Requirements*, version 1.0
- TS 01514 (T MU AM 02001 ST) *Asset Information and Register Requirements*, version 4.0
- TS 01515 (T MU AM 02004 ST) *Management of Asset Information*, version 1.0.

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1 Scope

This standard specifies the requirements for the management of asset information, including roles, for the collection, governance and maintenance of accurate, complete and consistent asset information for TfNSW transport assets.

Asset information management is the means by which an organisation optimises the processes that it uses to plan, collect, organise, use, control, store, disseminate and dispose of its asset information. An asset information management system ensures that an organisation obtains the maximum value from its asset information by optimising how it is managed across the asset life cycle.

The scope of asset information management encompasses the whole information life cycle which aligns closely to the asset life cycle. Additionally, the scope encompasses the following:

- information standards used to create asset information
- data and information security
- governance
- quality assurance
- accessing information
- archiving and disposal of asset information
- roles and responsibilities.

Figure 1 shows the TfNSW document hierarchy and the level at which this standard sits.

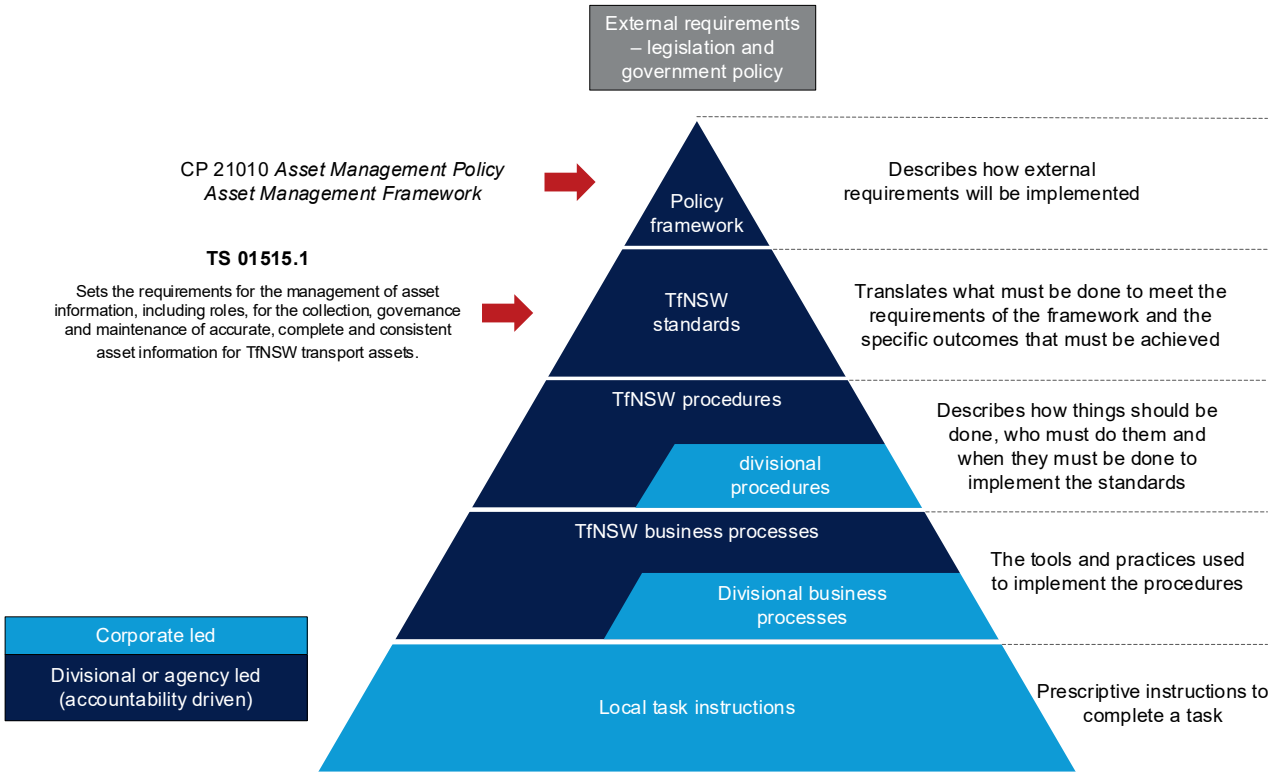


Figure 1 – TfNSW document hierarchy

2 Application

This standard applies to all transport modes.

This standard is intended to be used by the following:

- TfNSW agencies
- service providers engaged by TfNSW to provide engineering services that cover any part of the asset life cycle of TfNSW transport assets and are assigned an asset information role
- service providers that manage asset information of TfNSW transport assets
- third parties whose work affects TfNSW transport assets.

3 Referenced documents

The following documents are cited in the text. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document applies.

Australian standards

AS ISO 19650.1 *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling – Part 1: Concepts and principles*

Transport for NSW standards

TS 01455 *Configuration Management*

TS 01497 (T MU AM 01012 F1) *Metadata Spreadsheet for Engineering Documents*

TS 01499 (T MU AM 01007 TI) *Asset Reference Codes Register*

TS 01500 (T MU AM 01009 TI) *Technical Maintenance Coding Register*

TS 01501 (T MU AM 02002 TI) *Asset Classification System and Data Dictionary*

TS 01502 (T MU AM 02003 TI) *Register of Asset Information Systems and Repositories*

TS 01505 (T MU AM 01001 ST) *Life Cycle Costing*

TS 01506 (T MU AM 01003 ST) *Development of Technical Maintenance Plans*

TS 01508 (T MU AM 01005 ST) *Asset Handover Requirements*

TS 01515.2 *Asset Information – Part 2: Asset Data Interchange*

TS 01515.3 (T MU AM 01006 ST) *Asset Information – Part 3: Asset Location Classification*

TS 01547.1 (T MU MD 00006 ST) *Engineering Drawings and CAD Requirements*

Legislation

Disability Discrimination Act 1992 (Cth)

State Records Act 1998 (NSW)

Transport Administration Act 1988 (NSW)

Other referenced documents

Department of Finance and Services 2013, *Transition Guidelines: Managing legacy data and information*

NSW Treasury, TPP 19–07 *Asset Management Policy for the NSW Public Sector*

State Records NSW, *Standard on records management* (Standard No 12, November 2018)

State Records NSW, *Standard on the physical storage of State records* (Standard No 13, February 2019)

Sydney Metro, SM-17-00003118 *Employer's Information Requirements* (This document is not publicly available. To obtain access email sydneymetroims@transport.nsw.gov.au)

TfNSW, CPr16003 *Records Disposal Procedure* (available on request from standards@transport.nsw.gov.au)

TfNSW, CP17005.1 *Data and Information Asset Management Policy*

TfNSW, CPSt21002 *Transport Information Security Standard* (available on request from standards@transport.nsw.gov.au)

TfNSW, CP21010 *Asset Management Policy*

TfNSW, CPSt22002 *Transport Cloud Security Standard* (available on request from standards@transport.nsw.gov.au)

TfNSW, DMS-ST-202 *Digital Engineering Standard – Part 1 – Concepts and Principles*

TfNSW, DMS-ST-207 *Digital Engineering Standard – Part 2 – Requirements*

TfNSW, DMS-ST-208 *Digital Engineering Framework*

TfNSW, DMS-FT-533 *Enterprise Content Management (ECM) Schema and Specification*

TfNSW, *Transport for NSW: Asset Management Framework* (available on request from standards@transport.nsw.gov.au)

TfNSW, *Transport Information Labelling and Handling Guidelines* (available on request from standards@transport.nsw.gov.au)

The Australian Building Codes Board, *National Construction Code, volumes one and two*

4 Terms, definitions and abbreviations

The following terms, definitions and abbreviations apply in this document.

AFC approved for construction

AIDP asset information delivery plan

AIM asset information model

AIR asset information requirements

AIS asset information strategy

AMB Asset Management Branch

AMSA Australian Maritime Safety Authority

asset item, thing or entity that has potential or actual value to an organisation (Source ISO 55000. Notes removed)

asset custodian the TfNSW Division accountable for the end to end lifecycle management and performance of assets (including asset condition, risk and reporting) on behalf of the asset owner to achieve agreed customer and community outcomes

asset information the combined set of data (graphical and non-graphical) and documents (drawings, manuals, plans, certificates) required to support the management of assets over the life cycle

asset information provider any party that is responsible for providing asset information for inclusion in an asset information repository

asset information system a set of interrelated repositories of structured asset information and related processes required to manage the asset portfolio over the life cycle

asset owner the entity that is the owner of the asset (for example, TfNSW and TAHE)

asset register record of asset inventory considered worthy of separate identification including associated historical, condition, construction, technical and financial information about each asset

asset steward the entity given the responsibility by an asset custodian to oversee part of the life cycle process for an asset

asset steward – delivery the entity responsible for:

- procuring assets from investment decision to commissioning
- delivering the benefits
- translating requirements from the client and managing delivery outcomes
- selecting the most appropriate supplier/s to meet project objectives.

asset steward – operate or maintain the entity responsible for the day to day operations and maintenance of assets once commissioned. May be a part of the asset custodian division or a separate entity. Operator and maintainer of the assets might be separate entities.

ATP automatic train protection

CBI computer based interlocking

CDE common data environment

change authority a person or entity who can authorise a change.

configuration interrelated functional and physical characteristics of a product defined in configuration information

configuration information requirements for product design realisation, verification, operation and support. Forms part of asset information.

ECMS enterprise content management system

FMECA failure mode, effects and criticality analysis

ID identifier

information reinterpretable representation of data in a formalized manner suitable for communication, interpretation or processing (Source ISO 19650.1. Note removed)

I/O input/output

NAC network assurance committee; a governance entity that reviews proposed or progressing configuration changes and recommends if a configuration baseline be approved based on a presented assurance case. Also known as a configuration control board.

NCC *National Construction Code, volumes one and two*

network configuration the configuration of transport assets viewed as a system that is for achieving the business objectives of TfNSW and is composed of discrete configuration items identified at a level commonly identified by TfNSW

ODM operational data manager; responsible for data quality within their respective area, ensuring adherence to asset information standards and supporting the resolution of data quality issues within their asset information

OIR organisational information requirements

service provider an organisation outside of TfNSW offering and delivering a service

TfNSW Transport for NSW

TfNSW transport network the transport system (transport services and transport infrastructure) owned and operated by TfNSW, its operating agencies or private entities upon which TfNSW has power to exercise its functions as conferred by the Transport Administration Act or any other Act.

TLS through life support

TMP technical maintenance plan

transport assets means assets used for or in connection with or to facilitate the movement of persons and freight by road, rail, sea, air or other mode of transport, and includes transport infrastructure (Source: *Transport Administration Act 1988*)

Transport cluster All organisations who work with and around the transport infrastructure space, who are represented by the Minister for Transport and Roads and the Minister for Regional Transport and Roads

transport form type of vehicle or method used to facilitate the movement of people and freight. For example train, bus, ferry, light rail vehicle, car, motorbike, bicycle or walking

transport mode the means by which people and freight move from place to place. Falls into one of three basic types: land (bus, car, truck, motorbike, train), active (walking and cycling), sea (ship and ferry) and air

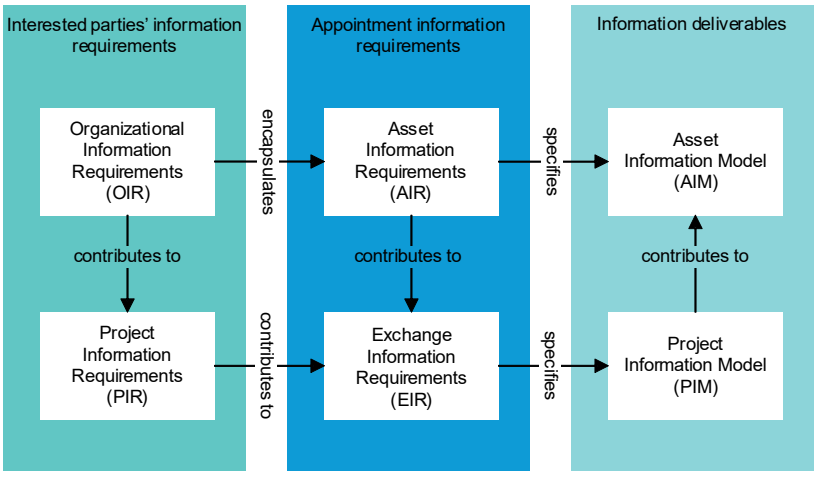
trigger event planned or unplanned event that changes an asset or its status during its life cycle which results in information exchange (Source ISO 19650-1. Note removed)

5 Information requirements and information models

Information requirements are a statement of the information that TfNSW requires to meet its organisational objectives and its asset management objectives. These information requirements are provided to organisations and individuals that need them to specify or inform their work in support of achieving these objectives. Information requirements needed to achieve the objectives can be different depending on the lifecycle stage of the assets. The information is used to assess performance against the TfNSW objectives, facilitate verification of requirements and support life cycle decision-making in the design and delivery of sustainable service outcomes.

Information models are repositories of information that are specified by the information requirements. These information repositories are used to carry out activities required to meet the objectives.

TfNSW's requirements for the specification of information models and information requirements are based on AS ISO 19650.1 which provides guidance on the relationship between information models and information requirements as shown in Figure 2. Information requirements associated with the delivery phase of an asset should be guided by the project stages and information requirements associated with the operation and maintenance of the asset should be guided by the activities undertaken during this stage of the asset lifecycle.



Note: In this figure, 'encapsulates' means 'provides input to', 'contributes to' means 'provides an input to, 'specifies' means 'determines the content, structure and methodology'.

(Source: ISO 19650.1:2018, reproduced and colours modified with permission. © ISO, original available from ISO.)

Figure 2 – Relationship between information models and information requirements

Note: The project information requirements (PIR), the exchange information requirements (EIR) and the project information model (PIM) are not covered by this standard and are defined in DMS-ST-202.

5.1 Organisational information requirements

OIR are determined by the information needed to meet TfNSW strategic objectives and outcomes and can arise from documents such as the *Transport for NSW: Asset Management Framework* as well as NSW Government requirements such as TPP 19–07. TfNSW's organisational objectives are outlined in the *Transport Administration Act 1988*. Transport outcomes describe the results TfNSW is seeking to achieve for customers, communities and the people of NSW, and the primary purpose for which TfNSW administers and invests public resources.

TPP 19–07 specifies that NSW Government agencies develop a fit-for-purpose asset register which contains accurate and comprehensive information on the agency's planned and existing assets.

Figure 3 shows the relationship between key TfNSW asset management documents. The OIR typically support the strategic policy and framework documents and strategic asset management decision-making processes. The AIR typically support the tactical and operational documents as well as other operating and maintenance decision-making processes.

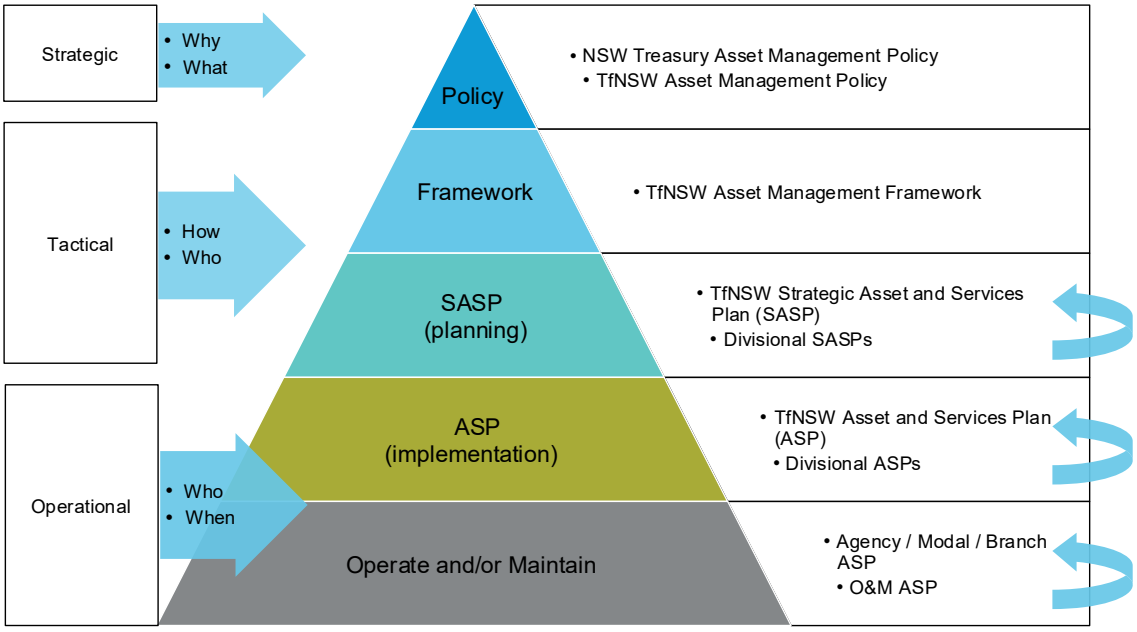


Figure 3 – Key TfNSW asset management documents

5.2 Asset information requirements

AIR set out managerial, commercial and technical aspects of asset information and are expressed in a way to support organisational decision-making such as the following:

- network configuration information
- asset configuration (including location, classification and specification), performance, condition, service risk and warranty information
- asset maintenance contract and interface agreement information
- maintenance requirements and work history information including defects (maintenance assurance)
- changes to maintenance plans
- operating requirements, capacity and usage information
- asset acquisition financial information, life cycle costing information and asset depreciation.

AIR comprise high level objectives and purposes for the need for different types of asset information that not only support the delivery of new as-built or altered assets, but are required to support the whole-of-life operation and maintenance of the asset including the following:

- compliance with relevant asset management standards and legislative requirements
- asset modification (refurbishment, expansion, renewal and replacement)
- asset decommissioning and disposal
- asset transfer through change of contract or vesting (change of asset custodian)
- asset repurposing.

Decisions may be based on the asset location, asset condition including age and remaining life, failure probability and consequence, resource constraints, spares availability, regulatory compliance, business priorities and whole-of-life costs.

The AIR are derived from the OIR and establish the information to be captured during the response to a trigger event described in TS 01515.2.

The AIR determine the content, structure and methodology to produce the AIM.

5.3 Asset information model

The AIM supports the strategic and day-to-day asset management processes established by TfNSW. The AIM can also provide information at the start of the project delivery process. For example, the AIM contains asset registers, cumulative maintenance costs, records of handover and maintenance dates, property ownership details and other details that the asset owner or asset custodian regards as valuable and wishes to manage in a systematic way.

The AIM is the name given to all asset information deliverables produced for use in the operate and maintain phase of the asset life cycle by a Transport cluster agency or a service provider and supports the strategic and day-to-day TfNSW asset management processes. TfNSW uses the term asset information except where there is a specific need to differentiate configuration

information from the broader term asset information. The terms configuration information and product configuration information refer to a subset of asset information. Asset information includes, but is not limited to, the following:

- information that describes the physical characteristics of an asset such as design drawings and models, asset registers, and physical and spatial locations
- information that describes the functional characteristics of an asset such as, design calculations, operating manuals, maintenance manuals, design assumptions, reports, failure modes and maintenance plans
- records of approvals, tests and certifications
- financial records such as, capital acquisition, maintenance and depreciation costs
- performance history such as, maintenance, fault, defects and usage records and condition
- systems engineering deliverables for each life cycle stage.

The centre of the AIM is the asset register that contains the details for every unique instance of an asset across the TfNSW transport network. The asset register contains data in relation to its identification (including an asset id, description, serial no, label, product code). See Section 8 for asset register requirements.

6 Asset information management system

This standard details a framework for providing a structure and governance around data to ensure the quality and availability of information adequately supports the information needs of TfNSW stakeholders.

TfNSW requires that data and information, being assets, are effectively managed across the life cycle. TfNSW also requires that any activities related to a network level configuration change (covering both fleet and infrastructure assets) as part of asset acquisition (design, construction or procurement), operations and maintenance and disposal are appropriately managed to meet the requirements of the TfNSW configuration management framework.

The asset information management system is specific to information and data, across the asset life cycle, for assets owned by TfNSW and TAHE for the long-term sustainable management of assets and delivery of services to TfNSW customers. The asset information management system covers information on assets that are created, exchanged and managed either internally or under asset partner contracts throughout the asset life cycle including asset stewards, operators or maintainers.

Asset information is managed in a similar manner to physical assets which require a definition of information requirements, a definition of how the information is managed and used, a governance approach and management of risk. The scope of the asset information management system comprises several elements shown in Figure 4.

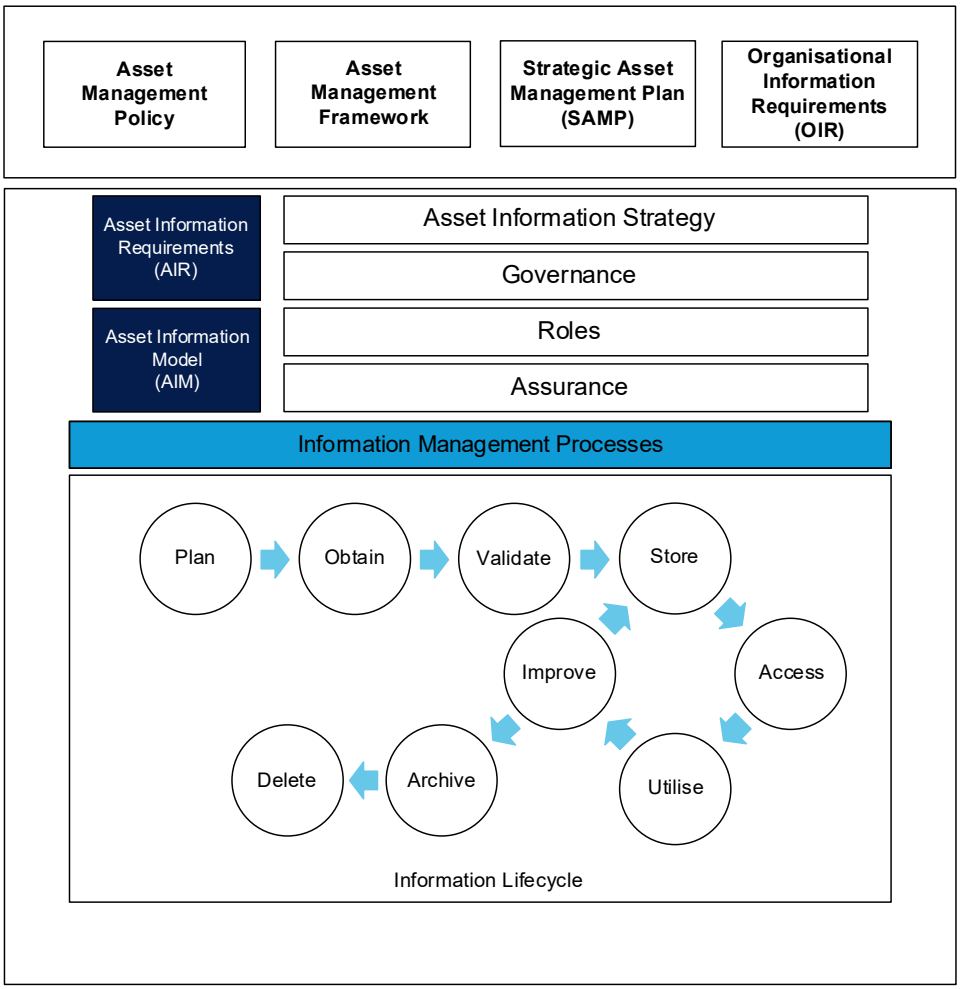


Figure 4 – Scope of the asset information system

6.1 Asset management policy and strategy

CP21010, CP17005.1, TPP 19–07 and *Transport for NSW: Asset Management Framework* are documents that define the asset management policies and strategies that guide TfNSW in their asset management function and therefore guide the definition of the OIR as defined in Section 5.1. As defined in Section 5, the OIR provides input to the AIR which then specifies the AIM. These information requirements and information models form the basis of the asset information management system. The model in Figure 4 demonstrates a line of sight from organisational policy and strategy to the information that is managed within that system.

6.2 Asset information strategy

The asset information strategy shall be aligned to the asset management strategy. The asset information strategy provides a view of the current state of asset information, a target for the future state of asset information and a roadmap for the delivery of the strategy.

6.3 Governance, roles and assurance

This standard specifies the high-level governance requirements for developing, managing, securing, modifying, transferring or providing asset information relating to TfNSW transport assets. Elements of governance that are relevant to the management of asset information are covered within several sections of this standard. Asset information management roles are defined in Section 7 and elements of assurance have been described throughout this standard.

6.4 Asset information management processes

6.4.1 Plan to obtain asset information

Across the asset life cycle, various events can occur that trigger the requirement to update the relevant asset information. These events can result from changes in asset strategy, service strategy, new asset type, maintenance strategy including maintenance requirements and asset configuration. A trigger event changes data in the AIM. Different information management processes apply to different trigger events based on the level of change required. Trigger events are further defined in TS 01515.2.

Asset information providers shall implement processes to ensure that information is collected resulting from trigger events. Data and information required throughout the asset life cycle shall be specified by the AIR. Updating the AIR shall be a governed process to ensure that all information provided meets a specific business need.

The minimum detail of information required to avoid over production of information leading to waste must be considered and the purpose of any produced information must be taken into account when specifying AIR.

Through the process of developing the AIR, which are informed by the OIR, all asset information shall be aligned to key organisational and asset management decisions which will define what it will be used for.

Assets owned by TfNSW shall be created in the asset register if the following occur:

- the asset has a defined maintenance plan
- the asset is required to have financial cost allocation applied
- the asset is a critical asset which is an asset for which the financial, business or service level consequences of failure are sufficiently severe to justify proactive inspection and rehabilitation and there is a need to assess condition and performance over the service life
- the asset is of a major value and is also required for financial capitalisation and depreciation requirements (including property and licences)
- the asset is required for parent hierarchy grouping purposes

- the asset is rotable, individually serialised and for which service life installation and maintenance history is required
- the asset is required for safety or statutory purposes
- the asset is required for recording statistical and measurement details for operational or maintenance purposes
- the asset is required for configuration control purposes including the management of type approved assets and assets under trial
- the asset requires warranty details to be recorded and managed
- the asset is a heritage asset which is any place or item that is included in a statutory list within a world, national, state, state agency, or local register or schedule
- there is a need to support renewal, expansion or replacement strategies of complex assets where components have different useful lives and need to be managed separately; in these situations, the components are created as sub-assets within the asset register hierarchy linked to the parent asset.

If an asset does not satisfy any of the requirements in the preceding bullet list it does not require an entry in the asset register.

6.4.2 Obtain asset information

All asset information shall be provided in a digital format such as structured data sets and data models that can be loaded directly into its information systems. Where specified, this shall be done using templated formats such as in TS 01515.2 and in accordance with section 12.9. Documents and files shall be provided with associated metadata. All processes and methods of obtaining information shall include a specification on what information is required, what format the information needs to be in and the level of detail of the information required.

Asset information submitted to the ODM shall be an accurate record of a planned asset or actual asset as appropriate to the purpose. A planned asset is an asset that is in the create or acquire stage of the asset life cycle and an actual asset is in the operate or maintain stage. Asset information providers shall have systems in place to assure asset information submitted meets the requirements of TfNSW.

The asset custodian, asset steward, or project manager shall plan the transfer of asset information. When a transfer of asset information is required, the information shall be provided in a form that can be reasonably expected to be used by the recipient.

6.4.3 Validation of asset information

Information validation is a process that shall be implemented as a quality assurance process to ensure that information provided meets relevant information requirements and data standards.

The asset information provider shall assure the completeness and accuracy of the information supplied. See Section 11 for security classification requirements.

The information receiver shall assess the quality of the information provided and report compliance to the information provider. The information provider shall correct the non-compliant information and resubmit it. These steps are shown in Figure 5.

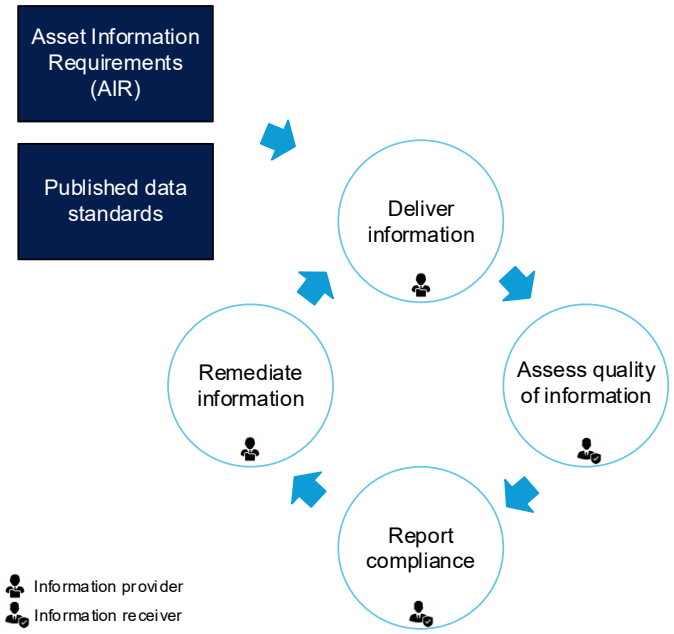


Figure 5 – Information validation process

6.4.4 Storage of asset information

Following validation of new or updated asset information, the asset custodian shall update their asset information systems to reflect the validated asset information. The asset custodian shall implement processes to properly store data and create workflows and approval processes to ensure that the information being stored meets the required standards. Section 9 provides more information on asset information systems and repositories.

6.4.5 Access to asset information

Information shall only be made accessible to people within the organisation based on their role and the information that they require to carry out that role. The location of information to carry out that role shall be made clear. Access to information shall be made possible through multiple applications in a CDE.

Systems and tools shall provide controlled access to asset information. Information repositories shall meet information security, information confidentiality, commercial and other administrative requirements. Asset information provided to users from the asset information repositories shall be complete and accurately reflect information stored in the repository. Additions and

amendments to asset information shall be validated and managed so as to ensure stored asset information accurately reflects all valid information supplied.

Where information (for example, drawings, information models or data sets) has been provided to a party to be updated, the source information shall be locked for editing to ensure that changes aren't made during this process. Where multiple parties are making changes to common information models, this shall be done using a CDE as defined in DMS-ST-202 to create a federated information model.

6.4.6 Utilisation of asset information

Asset stewards shall implement systems that allow users to easily find information when needed and re-use data and information for multiple approved uses though an integrated CDE.

Asset stewards shall define information workflow processes including roles and responsibilities. The information workflows shall include controls to changes to data and information.

6.4.7 Improvement of asset information

Section 13 provides requirements for the management and improvement of asset information. TfNSW may assess the quality of the asset data that is being maintained. Where data falls below the required data quality thresholds, TfNSW shall work with the asset steward responsible for the data on a data quality remediation plan. Data quality thresholds shall be defined in the AIR and contracts.

An asset information improvement process shall be developed to ensure that any existing or legacy information for actual assets is brought up to a level required by the current Information Standards. This can include technologies such as digital capture tools including laser scans and related mobile technology.

6.4.8 Archive and delete asset information

Asset stewards shall implement processes to archive and delete data and information which meet requirements for the retention and disposal of state records.

The *State Records Act 1998* contains requirements for the protection of state records. Disposed assets shall be retained in the asset register together with all its associated asset information and maintenance records. When an asset is disposed of, the TfNSW finance and investment division shall be engaged to ensure that capital cost allocation against the disposed assets is updated and its values within the fixed asset register is maintained in the financial system.

Disposed assets shall have a record that indicates a date of disposal and have its status updated to disposed. New assets that have replaced a disposed asset shall have a new asset identifier however, shall still refer to the same location, position and label details as applicable.

Asset information shall not be disposed of if the asset still exists or if the information may still be required by the business such as for analysis, legal or historical reasons.

Prior to disposing of asset information, the responsible asset steward shall seek approval from the AMB and comply with the requirements of CPr16003. Asset stewards shall ensure processes are in place to support these activities and tasks.

Archiving and disposal of asset information shall comply with the requirements of *Transport Information Labelling and Handling Guidelines.*

7 Asset information roles

Sections 7.1 to 7.4 define the roles that have responsibility for asset information relating to TfNSW transport assets. Roles relating to the management of asset information are aligned to the roles relating to the management of the assets that the information is associated with. Refer to TS 01508 and TS 01455 for definitions of these roles as they apply to asset handover and configuration management.

Figure 6 shows the information flow and interfaces that commonly exist between the asset information roles. Arrangements may vary in specific circumstances.

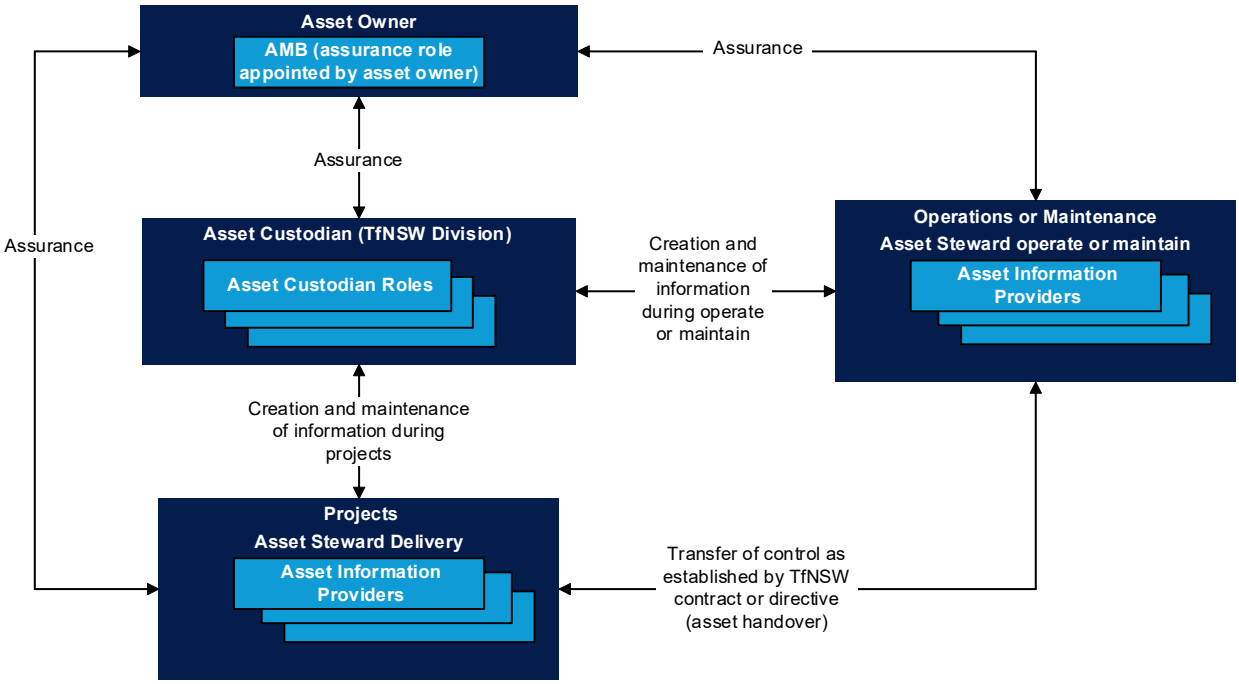


Figure 6 – Typical relationships and interfaces for asset information roles

7.1 Asset owner

A range of asset information is in existence and is continually developed by TfNSW and parties working directly or indirectly with TfNSW. The asset owner is also the owner of the information related to those assets. The AMB shall be delegated to provide assurance over asset

information including the AIM. There shall be a clear definition in service provision contracts as to which information models are owned by the asset owner.

The AMB performs the following functions:

- determines, maintains and publishes standards for asset information and specifies any related processes or system requirements.
- supervises the management of asset information and conducts assurance activities
- directs, so far as allowable within contracts, that corrective action be undertaken in circumstances where it is identified that applicable AIR have not been met, or the management of that information is deficient relative to the best interests of TfNSW.

The AMB does not control asset information management activities outside those specified in requirements, contracts and standards.

7.2 Asset custodian

Asset information is critical to achieving the whole-of-life life cycle management and performance of assets on behalf of the asset owner and the accountability of the asset custodian is extended to the management of asset information.

The asset custodian is critical for several reasons, including the following:

- reducing the risk of orphan assets being created which are assets that are created without a TfNSW Division agreeing to accept custodianship
- managing whole-of-life budget considerations (that is, asset rationalisation, updating whole-of-life cost requirements)
- being a clear point of contact for project delivery teams for decision-making and approval pathways
- ensuring that assets and asset information delivered meet whole-of-life outcome requirements
- identifying the risk tolerance for the asset and its outcomes and ensuring that tolerance is met through the support of asset stewards and TfNSW subject matter experts (SMEs), and
- ensuring that all assets have the required information available to deliver the whole of life outcome requirements.

7.3 Asset steward

The asset steward shall ensure that all asset information submitted electronically is stored securely and managed within an electronic asset information repository and that the relevant stakeholders are provided access and are trained in its use. Asset stewards shall provide access to any new or existing asset information system as requested by TfNSW, including any

asset information system delivered as part of a project. Definition of the provision of asset information by external service providers shall be defined in relevant service provision contracts.

The role of an asset steward is likely to change during the life of an asset and the role shall be managed by the party in control of the assets. There are two asset steward roles during the life of an asset being asset steward – delivery and asset steward – operate or maintain.

Asset stewards shall have processes and systems including tools in place to manage configuration items and information that they control and provide to other parties. Asset stewards shall have arrangements in place for assuring the asset information quality, completeness and accuracy.

All modifications to asset information shall be validated and submitted for inclusion in appropriate asset information repositories by the asset steward responsible for providing the information.

In considering security classification of asset information, asset stewards shall assess the asset information in accordance with Section 11.

7.3.1 Asset steward – delivery

The asset steward – delivery shall be responsible for the delivery of assets on the transport network on behalf of the asset owner and the asset custodian. This includes providing asset information and data to the asset custodian or asset steward – operate or maintain, or both as required, during and following delivery.

The asset steward – delivery shall comply with the following requirements:

- manage and update the asset information on behalf of TfNSW
- consult with the AMB when planning a significant change to an existing repository, planning to create a new repository or planning to migrate data from an existing repository
- ensure the asset information is updated for any new, existing or altered assets in accordance with TS 01515.2
- ensure the asset information is a true and accurate representation of the asset condition and status of all delivered assets
- consult with the asset custodian on the preparation of the AIDP which includes asset information requirements and format
- handover the asset information to the asset custodian or asset steward – operate or maintain, or both as required, during and delivery.

7.3.2 Asset steward – operate or maintain

The asset steward – operate or maintain shall be responsible for the day-to-day operations or maintenance of assets, or both as required, once commissioned. This includes the management of asset information associated with the assets.

The asset steward – operate or maintain shall comply with the following requirements:

- manage and update the asset information on behalf of TfNSW
- consult with the AMB when planning a significant change to an existing repository, planning to create a new repository or planning to migrate data from an existing repository
- ensure the asset information is updated in a timely manner for any new or altered assets in accordance with TS 01515.2
- ensure the asset information is a true and accurate representation of the asset condition and status of all assets throughout the operate and/or maintain contract period
- handover the asset information to TfNSW at the end of the operate or maintain contract in an agreed format
- accept new assets and update the asset information including asset modifications and disposals
- ensure that all asset management activities are planned, scheduled, prioritised, controlled, recorded and monitored in the asset information system over the full life cycle of the asset
- record all asset information in the asset information system as a result of configuration changes
- allow TfNSW to audit the accuracy, validity and currency of the asset information as required.

7.3.3 Transfer of asset stewardship

When an asset is handed over from delivery to operations and maintenance, the role of asset steward shall be transferred from the asset steward – delivery to the asset steward – operate or maintain.

When an asset is handed over from one service provider to another service provider, the role of asset steward – operate or maintain shall be transferred to the new service provider. Such a handover may occur where TfNSW engages a contracted service provider to perform work on assets that were being managed by a separate maintenance service provider.

The effective control of assets being transferred is managed using contracts between TfNSW and service providers. This mechanism shall also be used to transfer the role of asset stewardship. Contractual arrangements entered into shall comply with *Transition Guidelines: Managing legacy data and information*.

A change in stewardship of asset information may alter the authority of service providers to submit and access asset information. Asset custodians shall manage the amendment of information to ensure information is only updated by appropriate asset stewards.

7.4 Asset information providers

An asset information provider shall submit asset information to a delegated asset steward engaged by TfNSW.

An asset information provider shall have and apply processes to assure asset information submitted meets the following criteria:

- accurate and complete
- appropriately formatted
- meets AIR including submission requirements
- delivered in a timely manner.

If asset information is delivered in stages the complete set of asset information delivered shall accurately represent all the assets under the control of the project.

If there is a requirement to submit a new type of asset information or if a large amount of asset information is to be submitted, the asset information provider shall give prior notice to asset information repository custodians. The notice shall provide sufficient time for planning and implementation of any arrangements necessary.

8 Asset register requirements

The asset register integrates associated asset information and provides a current and historical record of both financial and non-financial information over each asset's life cycle.

The asset register shall be a defined and structured inventory of the assets owned by TfNSW. All information created within the asset register shall be in accordance with defined AIR.

Figure 7 shows the integration of the asset register and the related asset information required to support and manage the asset management activities over all stages of the life cycle.

Figure 7 – Integrated asset information framework model

TfNSW transport assets are categorised by discipline and sub-discipline and grouped into asset classes and sub-classes. The asset classification shall be applied to every asset within the asset register to enable consistent structuring, searching and reporting and shall be coded in accordance with TS 01501.

The assets in the asset register shall be integrated with records that support the life cycle management of TfNSW transport assets. These records extend the asset information to cover the following:

- Works management – an asset is linked with defects and maintenance and servicing transactional records.
- Document management – includes but is not limited to, an asset linked with a range of technical engineering documents, drawings and models including those based on its specification covering TMPs, operating and maintenance manuals, certificates, warranties, drawings and models, test and commissioning reports, design reports, statutory and regulatory requirements, condition reports and maintenance reports.
- Geospatial information – an asset is linked with spatial information (point, line and polygon) to define shape and geospatial location.
- Financial management – an asset is linked to a fixed asset ID and capitalised based on its asset classification. This covers the initial cost of capital acquisition as well as costs incurred over the life cycle used to improve and extend the asset life.

- Procurement and contract management – an asset is linked to a contract ID and service provider.

Further details on these requirements including coding conventions, reference data and metadata requirements are in TS 01501.

8.1 Asset and location classes

Asset classes exist for all fixed infrastructure, mobile fleet and their associated assets and asset systems, (fixed and onboard) both physical and non-physical (for example, software and licenses).

Asset classes are defined as part of the asset classification system and shall be used as a primary means of grouping assets having a similar function and type. Refer to TS 01501 for all asset classes that can be used in the asset register.

Asset location classes are used to group the general geographical and physical location of all assets across the TfNSW transport network within the asset register and associated information repositories. Asset location classes shall be used as a primary means of grouping assets by their location and aggregating data by asset location. Refer to TS 01515.3 for requirements related to the classification of locations.

8.2 Asset category

All assets defined within an infrastructure or fleet complex asset hierarchy are categorised as linear, non-linear or mobile which is derived from its physical characteristics and reflected in its asset classification.

Asset categories across the TfNSW asset portfolio are defined as follows:

- fixed (linear or non-linear) – for infrastructure assets and associated fixed systems contained within a corridor, interchange, feeder or facility
- mobile – for fleet assets and associated onboard systems (including plant and equipment).

For each asset category, specific asset information shall be captured and managed associated with its category, including attributes in the asset register.

8.3 Transport mode and transport form

Transport modes are the means by which people and freight move from place to place.

All fixed infrastructure assets shall be associated with one transport mode. The transport mode shall be identified as part of the network code attribute and defined by a four-character code in accordance with TS 01499. The network code provides the high-level location classification that shall be captured and managed as an attribute for each asset instance in the asset register.

Fleet refers to multiple vehicles of a certain transport form used to facilitate the movement of people and freight which interact with the fixed network infrastructure to enable the provision of transport services. Fleet operating on the TfNSW transport network including trains, light rail vehicles, ferries, buses, road vehicles and vessels shall also be associated with a network using the appropriate network code.

8.4 Unique identification of assets in the asset register

All assets (operational, non-operational and disposed assets) shall have a unique asset identifier within the asset register managed by the asset steward. Where stewardship of an asset passes from one party to another, the new asset steward shall retain any existing identifier to ensure asset traceability across the lifecycle. This does not limit the ability of the new asset steward to generate additional unique identifiers as part of their data management process.

For example, a unique asset identifier is created by the asset steward delivery during the project stages and on the acceptance of new assets handed over as part of asset acquisition (construction or procurement). The asset steward operate or maintain shall retain this unique identifier.

The asset owner may define an additional unique Transport cluster wide asset identifier. Transport cluster wide asset identifiers support asset register consolidation to enable the transition of contracted assets from one maintenance service provider to another maintenance service provider without loss of historic information. The Transport cluster wide asset identifier shall not be the same as the service provider asset identifier. Transport cluster wide asset identifiers shall be linked within the service provider’s asset information system or enterprise asset management system.

Asset identifiers ensure the information system stores a unique identifier that serves as a mechanism to link related asset data, attributes and documents against a particular discrete asset, against a linear asset, against a mobile asset or a rotable asset. This unique asset identifier also enables searching for and tracking of rotable assets.

Assets shall have both a TfNSW asset identifier and a linked service provider asset identifier.

The asset identifier in the maintenance service provider’s asset information system provides the primary means to identify the asset uniquely in the operating environment and for maintenance purposes. See Section 8.8 in relation to asset identifiers, structuring and the asset hierarchy. As the asset information system used by each maintenance service provider can vary, the asset register identifiers shall contain either of the following as a minimum:

- List of assets with system generated asset identifiers that provide a parent – child asset hierarchy to be managed for fixed infrastructure, mobile fleet and rotable assets.

- List of assets with structured coding asset identifiers which may support a location based approach for defining fixed asset positions (infrastructure and fleet). The structured code assigned may contain references to its location, function, kilometrage or label (for example, vehicle or carriage number, door number, CCTV camera number) to ensure uniqueness.

8.5 Asset classification system and technical object

The asset classification system establishes a consistent definition, structure and categorisation of assets across the asset portfolio. The asset classification system provides codes for each level of the asset hierarchy which, when linked, make up the technical object code.

All assets shall be classified by a technical object code as an attribute in the asset register in accordance with TS 01501.

8.6 Asset specification

All assets shall contain a reference to an asset specification. Each asset in the asset register shall have an asset specification assigned in accordance with TS 01500 and TS 01501. Asset specification is a code that associates an asset with an asset specification. Asset specification defines; make or model attributes (physical or functional), components, failure modes, maintenance requirements and spares.

8.7 Components and subcomponents

Subcomponent parts shall be related to the component. Component parts shall be related to the system to which they comprise. Systems shall be related to the element or function they provide. Elements and functions shall be related to the entity (for example, facility or interchange) they are part of. Entities aggregate to form an identified complex.

The components and subcomponents that comprise a system can vary, with different component builds able to provide the same systematic function. For example, two comparable signalling systems may have different signal asset types associated to it with different component builds.

8.8 Asset register hierarchy

Assets shall be defined at a number of different levels within a hierarchy. The asset hierarchy ensures the following:

- Assets can be viewed in a logical way in reference to how they physically and functionally relate with other assets (for example, physically within the complex or functionally by system within the complex). Physical reference attributes (for example, corridor, complex zone, position, room) and functional reference attributes (for example, system) exist to support both physical and functional asset hierarchies.

- Assets can be grouped in a way that they are managed and maintained.
- Rotable assets can be added.
- Asset specific, system, parent or zonal maintenance activities can be managed.
- Assets with different warranties and lives and can be managed.
- Assets with different serial numbers can be identified or tracked.
- Asset performance, financial and maintenance reporting can be managed at different levels.

Assets from one asset class may form part of a hierarchy with assets from another asset class.

9 Asset information systems and repositories

The asset information repository shall allow the information from an AIM to be stored, continuously maintained and made accessible to users in a controlled manner as shown in Figure 8.

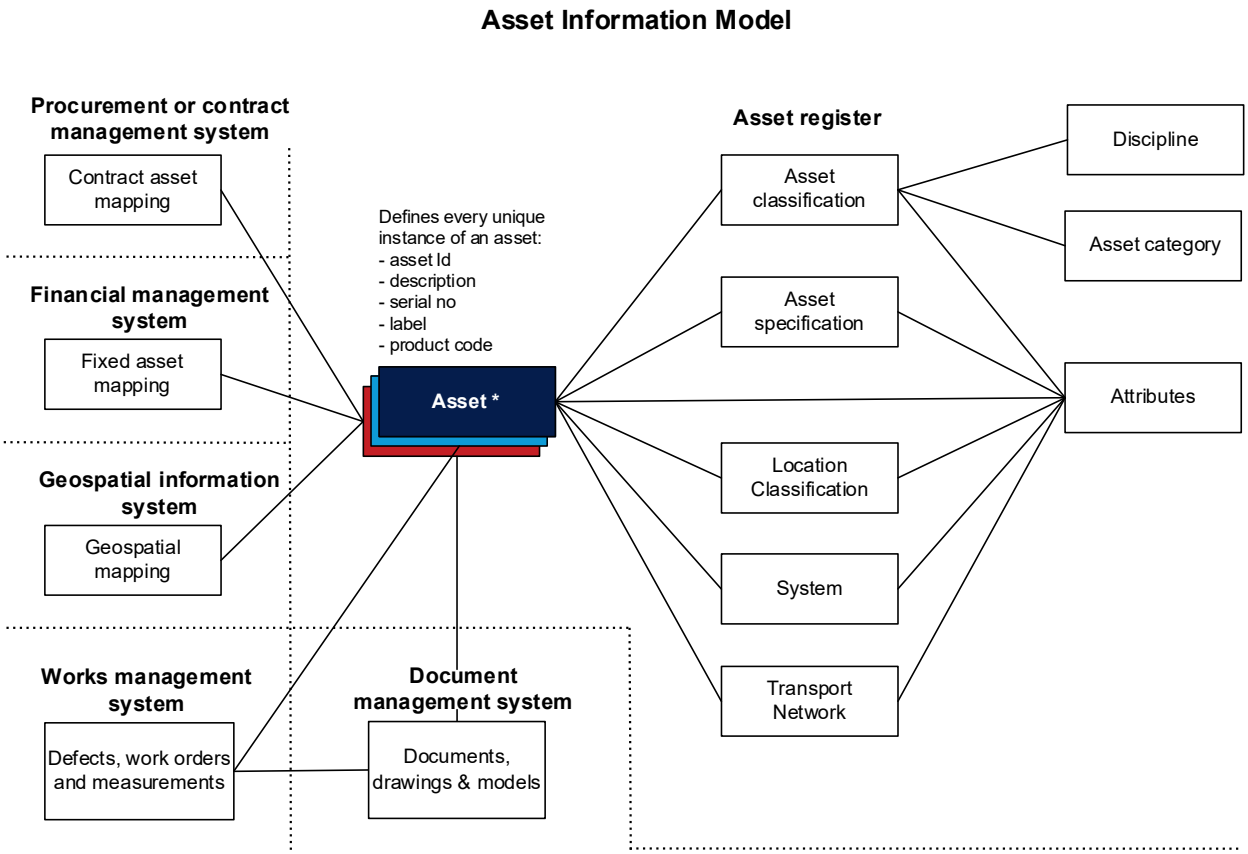


Figure 8 – AIM showing examples of relationships between asset information repositories

Note: Assets exist at multiple levels of the asset hierarchy based on a physical break down defined by its infrastructure or fleet container complex and every asset instance is a unique asset record.

Asset information repositories shall be in place for the collection, storage and maintenance of asset information on behalf of TfNSW. The repository shall be sustainable, maintained, fit for purpose and scalable. Physical repositories shall comply with State Records NSW, Standard No 13, February 2019. Cloud based repositories shall comply with CPSt22002.

The asset steward delivery shall ensure that all key stakeholders (including TfNSW and the asset custodian) are involved collaboratively in the design and configuration of any new asset information system planned to be delivered.

The AMB shall be advised of all repositories established that are a primary repository of asset information describing TfNSW transport assets. Asset stewards nominated by the AMB, planning the creation of new repositories or migrating data from existing repositories, shall consult with the AMB prior to creating repositories or migrating data. Asset stewards shall have systems in place to manage asset information in a way that meets TfNSW requirements and any other agreed performance requirements.

Asset information repositories recognised by the AMB as repositories of TfNSW are registered and published in TS 01502 .

9.1 Asset information system requirements

The asset information system shall contain the following:

- a complete listing of the assets managed by the asset custodian on behalf of the asset owner in an asset register aligned with the asset classification system including all asset metadata and reference data
- all the asset information associated with the assets in the asset register as specified in this standard.

The asset information system shall be capable of the following:

- managing an asset register and all associated asset information, plans, manuals and activities into a consolidated system comprising one or more integrated repositories
- provide information in commonly used industry standard formats
- providing integrated asset information within a reporting dashboard format to TfNSW and approved stakeholders
- planning, scheduling, prioritising and completing asset management activities
- storing the current and complete historical record of all asset information in a secured, controlled environment
- providing records in relation to inventory management, work order management, tracking of costs and asset warranty:
    - enabling the delivery of the following asset management functions:

  - plan and document management
  - work management, including capital work, recurrent maintenance work and costing
  - failure and defect management
  - asset condition management
  - configuration management
  - program and project management, including estimating
  - materials management
  - reporting
- integrating information with the following asset management related systems:
  - incident
  - financial
  - procurement
  - human resource and rostering
  - condition monitoring and supervisory control and data acquisition (SCADA)
  - operational systems, including control and timetables
  - business intelligence reporting and analysis
  - maintenance requirements analysis
  - engineering design
  - information modelling
  - mobile technology systems and devices, including supporting remote information access, review, capture and update
- producing reports on the configuration, condition, planned work, work history and performance of all assets including defect and failure and incident analysis
- integrating data.

10 Authorised access

Asset information shall be available to any party engaged by TfNSW or Transport cluster agency for whom such information is necessary to undertake the engaged work. Access control requirements contained in CPSt21002 of TfNSW shall be met by asset stewards.

The following requirements apply to access or supply of asset information:

- The party requesting access to the asset information shall have a nominated contact who manages asset information requests on behalf of their organisation.

- Requests for asset information shall be directed to asset stewards through project interface managers.
- Evidence of engagement by TfNSW or a Transport cluster agency shall be provided to asset stewards when requesting access to asset information. Such evidence shall generally state the scope of asset information that the engaged entity requires access to and the duration of that access.
- Asset information shall also be provided to any party where there is a legal requirement to do so, legal advice shall be sought by information repository stewards or TfNSW if it is not clear if the information may or needs to be provided.

A project office in TfNSW, or a Transport cluster agency that is managing the engagement of a party, may act on behalf of that engaged party when requesting access to asset information.

11 Asset information security labelling and classification

All parties managing TfNSW asset information shall do so in accordance with information security classification requirements in CPSt21002, *Transport Information Labelling and Handling Guidelines* and CPSt22002.

Asset stewards shall ensure that security assessment, classification and labelling of asset information is conducted where required or appropriate.

Any party in possession of, or given access to, security classified asset information shall manage that information in accordance with the requirements of this standard.

Document or user access control may be applied to assist the management of information security.

12 Asset information delivery

Sections 12 to 12.9.4 specify the minimum set of asset information deliverables by type and format required for asset acceptance and as part of asset handover throughout the asset life cycle. Sections 12 to 12.9.4 shall be read in conjunction with TS 01508 to ensure alignment between the handover of the physical asset and the associated asset information.

The focus of Sections 12 to 12.9.4 are related to defining the requirements and the delivery of information requirements leading up to and including asset handover at the following stages:

- at asset acquisition to TfNSW (asset owner) and to maintenance service providers (asset custodian)
- from maintenance service providers (asset custodian) back to TfNSW (asset owner)

The requirements in Sections 12 to 12.9.4 ensure the prompt delivery of consistent asset information in TS 01455 which provides the confidence that change authorities are aware of their deliverables and obligations related to network level configuration changes associated with construction, procurement and maintenance contracts.

12.1 Asset information delivery plan

The asset information handover requirements are heavily dependent on the scope of the project being delivered for both infrastructure and fleet projects.

An AIDP shall be used to demonstrate control and governance of the delivery and acceptance of accurate and complete asset information. An AIDP shall be tailored to suit the information requirements of TfNSW, Transport cluster agencies and service providers involved in the asset handover and asset handback. The cost of capturing and delivering the complete set of AIR shall be factored in when preparing the business case.

The content of the AIDP shall include the following:

- scope of the asset information that shall be progressively submitted leading up to each asset handover event and to whom it is provided
- the delivery of the asset information shall meet the requirements of the specification, defined and managed in collaboration with all the relevant parties receiving the information and in accordance with the requirements of this standard, specifically that all information delivered shall meet the requirements specified in the AIR
- the information under the custodianship of TfNSW that affects transport operations shall be handed over to TfNSW
- the information under the custodianship of TfNSW that affects transport operations shall be defined within the AIDP
- the information required to apply financial cost allocation to as built assets
- the agreed quantity or level of asset information required for each project in conjunction with any supporting discipline specific infrastructure and fleet standards to be determined by the interface coordination.

The delivering party shall develop the AIDP in consultation with all key stakeholders (including operators and maintainers) and in collaboration with TfNSW and asset stewards. The asset information affected shall be clearly communicated and recorded between the delivering party and each asset steward. The plan shall contain a submission schedule for delivery of each asset information requirement.

An AIDP shall be used to demonstrate control and governance of the delivery and acceptance of accurate and complete asset information. An AIDP shall be tailored to suit the information

requirements of TfNSW, Transport cluster agencies and service providers involved in the asset handover and asset handback.

The asset owner, asset steward, or project manager shall plan the transfer of asset information. When transfer of asset information is required, the information shall be provided in a form that can be reasonably expected to be used by the recipient. Where no specific requirement is set by the AMB or by contract, a mutually agreeable means for transfer of asset information shall be negotiated between the parties involved.

Existing network infrastructure information in the operate and maintain stage managed by the asset steward shall be made available and used as the baseline for current and future projects.

Asset information associated with any altered or disposed assets shall be addressed as part of the AIDP.

When a configuration change is complex and involves multiple packages (design and construction) a number of sub-sections shall be produced for each work package to make up the AIDP. This is to improve the identification, management and delivery of the asset information.

The identified asset information and dates in the plan shall be reviewed at key stages of the project. Figure 9 shows the transport asset life cycle and gateways and Table 1 shows the activities required for progressive development of an AIDP across project stages and during operations and maintenance as part of contract end handover.

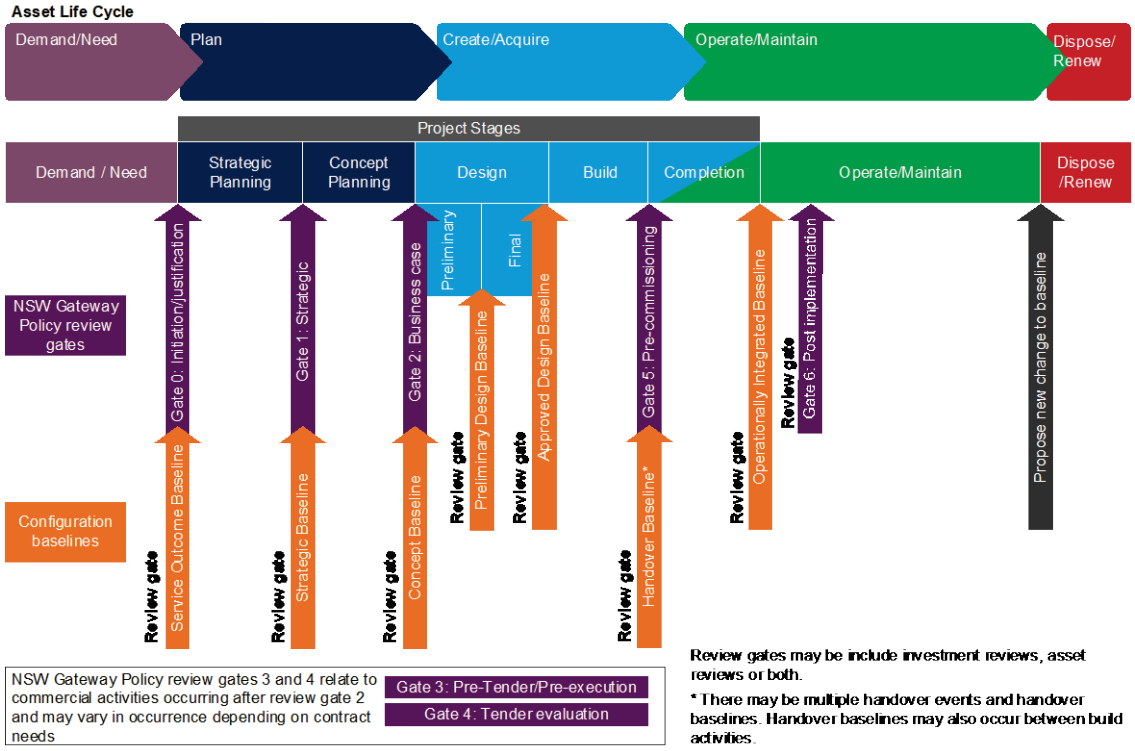


Figure 9 – Transport asset life cycle and gateways

Table 1 – AIDP development for asset information handover

Asset Lifecycle	Project Stages	Configuration baselines	NSW Gateway Policy review gates	Activities between baselines
Demand/Need	Demand/Need	Service Outcome Baseline	Gate 0 initiation /justification	
Plan	Strategic planning	Strategic Baseline	Gate 1 strategic	
Plan	Concept planning	Concept Baseline	Gate 2 business case	Establish AIDP as part of handover
Create/Acquire	Preliminary design	Preliminary design baseline		Review AIDP as design stage with asset custodian Approve AIDP with asset custodian NAC review of AIDP
Create/Acquire	Final design	Approved design baseline		Deliver asset information AFC Update AIDP at construction stage with data custodian
Create/Acquire	Build	Handover baseline	Gate 5 Pre-commissioning	Deliver asset information as-built Asset custodian accepts asset information Asset custodian updates asset information system repositories Handover from project to owner to maintainer
Create/Acquire Operate/Maintain	Completion	Operationally integrated baseline		

Asset Lifecycle	Project Stages	Configuration baselines	NSW Gateway Policy review gates	Activities between baselines
Operate/Maintain	Completion		Gate 6 Post implementation	Establish AIDP as part of handover Approve AIDP with asset owner Deliver asset information – as-maintained Asset owner accepts asset information at contract end and asset handover Handover from maintainer to owner
Operate/Maintain	Operate /Maintain	Proposed new change to baseline		
Dispose	Dispose/Renew			

12.2 Asset information delivery – create and acquire stage

Asset information delivered during the create and acquire (concept baseline to handover baseline) stage shall use an AIDP as a tool to assist the delivering party (for example, change authorities) and the receiving party (for example, agencies and maintenance service providers) identify the asset information required by the proposed configuration change in consultation with the interface managers.

The AIDP shall identify affected asset information at the completion of a detailed design or the construction stage of a project. The completed AIDP shall assure TfNSW as the asset owner and demonstrate that a project has appropriately managed the asset handover.

The delivering party shall develop AIDPs. The detailing of the AIDP shall assist the delivering party to be fully aware of the asset information deliverables and promptly prepare the asset information for delivery to TfNSW (asset owner and asset data owner) and the agencies and maintenance service providers (asset maintainer and asset custodian).

The AIDP shall be part of the assurance evidence presented at defined project stages in accordance with requirements of TS 01455 together with evidence that all required parties have been consulted for asset handover.

After the AIDP is received by the relevant NAC, it shall form the baseline for the delivery of asset information (data, documents, drawings and models) by the delivering party. The receipt of the AIDP as part of a submission to a NAC shall be recorded to provide a traceable history of that particular configuration change.

The two primary asset information submissions shall coincide with the following two project stages:

- end of detail design and prior to construction (AFC)
- after construction and commissioning (as-built).

When preparing an AIDP at detailed design stage, the delivering party shall identify the following:

- asset information for the proposed change required and appropriate for the project stage and type of project (construction or procurement)
- applicable standards, templates and format relevant to the delivery of each asset information deliverable
- dates for delivery of the AFC asset information.

After the detailed design is completed and approved, the delivering party shall provide the relevant checked and verified asset information to the asset custodian. The relevant NAC shall seek assurance that the asset information is delivered to the asset custodian and recorded to provide traceability. After the agreed asset information is submitted, the asset custodian shall provide the delivering party with confirmation of its receipt.

Asset information at the completion of detailed design stage shall include AFC drawings and information deliverables in Table 2 in Appendix A and corresponding with the relevant project stage in Table 3 in Appendix A where applicable.

The asset custodian shall ensure the AFC asset information is stored and managed in approved asset repositories. This includes asset information on assets altered, repurposed or disposed as a result of the project.

When preparing an AIDP for a proposed configuration change at the construction stage, the delivering party shall identify the following:

- asset information for the proposed change required and appropriate for the project stage and type of project (construction or procurement)
- applicable standards, templates and format relevant to the delivery of each asset information deliverable
- dates for the delivery of pre-commissioning and post-commissioning asset information
- details of any temporary configuration change such as enabling works, or services relocation that will require the delivery of updated asset information
- a schedule of consultation about asset information handover with the asset owner, the asset custodian and future or existing operators and maintainers.

After construction and commissioning is completed, the delivering party shall provide the relevant checked and verified asset information to the asset custodian. Evidence that the asset

information has been checked and verified shall also be provided. The relevant NAC shall seek assurance that the asset information is delivered to the asset custodian and recorded to provide traceability. After the agreed asset information is submitted, the asset custodian shall provide the delivering party with confirmation of its receipt.

Asset information at the completion of construction and commissioning stage shall include as-built drawings and information deliverables in Table 2 in Appendix A and corresponding with the relevant project stage in Table 3 in Appendix A where applicable.

The timing of the handover of AFC and as-built asset information can vary with project complexity and delivery. The delivery party shall ensure that all asset information is complete and accurate.

The asset custodian shall ensure the as-built asset information is stored and managed in approved asset repositories.

Both the structured and unstructured data shall be stored and managed in one, or a combination of linked systems, reflecting the complete asset history. Both the structured and unstructured data shall be accessible by TfNSW as required.

Each unique asset instance in the asset register shall be the means to link the asset with unstructured documents and models using defined schema and leveraged off metadata standards in accordance with this standard.

12.3 Asset information delivery – operate and maintain stage

An AIDP shall be used by the delivering party (for example, agencies and maintenance service providers) and the receiving party (for example, TfNSW) to identify the asset information required at contract end in consultation with the contract managers. The AIDP shall identify affected asset information at the completion of the maintenance contract. The completed AIDP shall assure TfNSW as the asset owner and demonstrate that the maintainer has appropriately managed the asset handover. This occurs after the operationally integrated baseline.

The delivering party shall develop AIDPs as part of the contract end of term. The detailing of the AIDP shall assist the delivering party (asset maintainer and asset custodian) to be fully aware of the asset information deliverables and promptly prepare the asset information for delivery to TfNSW (asset owner and asset data owner).

The AIDP shall be part of the assurance evidence presented during the maintenance stage, along with evidence that the required parties have been consulted for asset handover.

After the AIDP is received by the relevant NAC, it shall form the baseline for the delivery of asset information (data, documents, drawings and models) by the delivering party. The receipt of the plan as part of a submission to a NAC shall be recorded to provide a traceable history of that particular configuration change.

The primary asset information submission shall coincide with the end of the maintenance contract or progressively as defined within the contract.

The timing of the handover of asset information can vary with contract complexity.

12.4 Asset models

All asset models and geographic information system (GIS) data submitted to TfNSW shall be in accordance with DMS-ST-207 or SM-17-00003118 for Sydney Metro asset models.

Digital asset models shall be associated with assets contained in an asset register and include a geometrical relationship linked to a geospatial information system containing georeferenced coordinates information defining asset location including point, linear and area shape features.

Digital asset models shall be developed to be considered as AFC (approved design baseline) and as-built (handover baseline) status.

12.5 Asset data

Asset data and attributes associated with assets are categorised into the following information views which shall be delivered in alignment with TS 01501.

- asset classification – the asset classification view provides a view of like asset classes
-
- geospatial – the geospatial view defines the geospatial location and surroundings of the asset
- physical – the physical view defines the characteristics of the asset
- condition – the condition view defines the current and historical condition of the asset
- demand, network performance and usage – this view defines the planned demand and the actual operational performance of the asset
- financial – the financial view defines the financial information related to the asset
- organisational – the organisational view defines ownership and contractual requirements of the asset
- project information – the project information view defines the information relating to projects
- maintenance – the maintenance view describes the work that has been completed and is planned to maintain the asset
- regulatory – the regulatory view defines asset specific information as stipulated by current regulatory requirements including, but not limited to heritage status, hazardous material classification, environmental requirements.

Asset data and attributes can be of a geometrical or non-geometrical nature and classified as follows:

- static data – requires a one-off capture and validation, infrequent update required
- periodic data – requires a regular collection and updating regime, periodic update required
- dynamic data – requires continuous updating in real or near real time.

Asset data encompasses all categories of assets including linear, non-linear and mobile assets. Refer to TS 01501 for asset data attributes and metadata. Attributes are divided into common attributes and class specific attributes.

12.6 Asset documents

All asset documents submitted to TfNSW not covered by TS 01547.1 shall use document numbering schema in DMS-ST-207. All asset documents submitted to TfNSW shall have the document number and revision number on the cover page of the document. Each document shall be created and provided as a separate electronic file, that is, multiple certificates, warranties and so on shall not be combined in one document.

All asset documents submitted to the asset steward shall include the following:

- project information
- transmittal
- document metadata
- asset document files.

Structured document metadata shall be provided to ensure the ability to index the content of the documents and files to be maintained alongside the asset register as well as the ability to logically associate which documents pertain to which assets.

Where a project uses an ECMS the preceding requirements in Section 12.6 may be satisfied as part of the submission and upload process in the form of project information and document metadata.

All drawings and native source files shall be defined and submitted to TfNSW or agreed ODM in accordance with the requirements of TS 01547.1 including required metadata.

All engineering documents (excluding drawings and models) shall be defined and submitted to TfNSW or agreed ODM in accordance with TS 01497.

12.7 Review process

AIDPs shall be reviewed by the asset custodian and parties requiring asset information such as owners, operators and maintainers. The relevant NAC shall ensure that an effective review has occurred before it is delivered and accepted.

12.8 Project information

Project information submitted as part of project stage baselines that are staged deliverables are not defined as AIRs and are not covered in this standard in relation to asset information handover. Project information shall still be submitted and retained by TfNSW. Project information includes, but is not limited to, the following:

- safety assurance plan
- safety assurance statement
- safety assurance report
- system assurance plan
- safety hazard assessment and hazard log
- project risk register (residual risks are handed over to the operator maintainer)
- concession to TfNSW standards (handed over to the operator maintainer)
- type approval
- proposed electrical traction and high voltage operating diagrams (new and amended)
- interface coordination plan
- asset handover plan
- asset handover notification (notification of forthcoming handover)
- asset handover certificate (technical and contractual)
- operational concept definition
- maintenance concept definition
- as-built documentation
- operations and maintenance manuals
- certificate for cost allocation
- technical and functional specification – infrastructure and fleet.

When project information is no longer required to be accessed for the purposes it was created, it shall be archived in accordance with Section 6.4.8.

12.9 Format

Asset information provided to asset stewards shall be in a format required by asset stewards. Asset stewards shall provide this format to the asset information provider.

12.9.1 Project information

Any submission to TfNSW shall be accompanied by project information that identifies the program, project, the package and the corresponding design stage as relevant. The project information shall include any AMB concessions and non-conformances that affect the submission requirements of the package. This project information may be provided as part of the configuration information in the ECMS or as a cover letter where an ECMS is not being used.

12.9.2 Transmittal

The transmittal shall contain a list of all the engineering document files that are submitted to a TfNSW asset information repository.

12.9.3 Document metadata

TS 01497 contains all metadata information for the engineering documents transmitted to TfNSW. Where a project is utilising an ECMS, the ECMS shall be configured to capture this metadata on file upload. All metadata fields shall be completed either by selecting an option from a drop-down menu, entering a relevant value from an associated reference list or by typing text. An example of a metadata spreadsheet is in TS 01497.

Document metadata shall only be applied to those documents that are not covered by TS 01547.1 or DMS-ST-207 but are engineering documents required to be submitted to TfNSW in accordance with this standard.

12.9.4 Engineering document file name

The engineering document files shall be submitted electronically using the ECMS or other agreed method such as email with their file names. The file name is typically structured with conventions set by TfNSW and the project. DMS-FT-533 may be used as a form of agreed document numbering and file naming. DMS-FT-533 is a mandatory requirement in some applications such as projects delivered according to the digital engineering framework and where specified as a mandatory requirement for document numbering and file naming.

13 Requirements for management of asset information

The AIM shall be continually assessed to ensure the quality of information is maintained by the asset steward (for example, maintenance service provider) to ensure compliance with the requirements in Section 7.2 together with targeted surveillance audits. Information quality is determined by the following factors:

- completeness – information shall be complete

- correctness – information shall be accurate and up to date
- consistency – information shall be defined including business rules and format
- clarity – information shall be clear and unambiguous
- integrity – information shall be structured and relationships maintained with other asset information repositories
- uniqueness – no duplication of the information shall exist.

A formal approach to the governance of the asset information is required to ensure the information is current, accurate, accessible and complete to support and substantiate asset decisions to meet TfNSW objectives in accordance with CP17005.1.

The requirements in Sections 13.1 to 13.7 relate to maintaining the asset information quality stored in asset information repositories.

13.1 Completeness

Asset information submitted to asset stewards shall be a complete representation of the approved design baseline or the handover baseline as appropriate. Where the actual asset baseline does not match the approved design baseline, configuration information recovery activities described in TS 01455 may be required.

13.2 Accuracy, consistency and currency

Asset information submitted to asset stewards shall be an accurate reflection of an approved asset or actual asset as appropriate. Asset information providers shall have systems in place to assure asset information submitted meets the requirements of the asset owner, asset custodian or, where appropriate, asset stewards.

Accurate and complete asset information supports and substantiates key decisions made on the existing asset portfolio to ensure the following:

- maintaining the condition and long term value to ensure delivery of sustainable services by achieving the following:
    - improving effectiveness on investment decisions based on total life cycle costs and taking into consideration the enterprise risks in relation to safety, security and the environment
    - improving effectiveness of repair, refurbishment and replace decisions through greater knowledge of asset condition and utilisation
    - enhancing and extending the life of the assets through the optimisation of maintenance plans

- improving the efficiency and sustainability of services and operations by achieving the following:
    - reducing downtime by reducing mean time to repair (MTTR)
    - improving reliability by increasing mean time between failures (MTBF) or mean distance between failures (MDBF)
- analysing and addressing gaps between performance of the existing asset portfolio and the assets that are required to support current and future service needs, with the key questions to be analysed including the following:
    - asset dependability – can service delivery be made less asset dependent?
    - asset condition – are the assets in the required condition to meet their design function and deliver required levels of service?
    - asset utilisation – are the assets fully utilised in the delivery of current and future services?
    - asset location – are the assets properly located to optimise service delivery and are they meeting the current and future business requirements?
    - asset capacity – are the assets able to support a change in service demand?
    - asset resilience – are the assets able resist and recover from disruption, stress, or damage while maintaining their essential functions and services?
    - asset functionality – are the assets functionally suitable to support current and future service demands or changes to legislation?

Asset information provided to users from the asset information repositories shall be complete and accurately reflect information stored in the repository.

Additions and amendments to asset information shall be validated and managed so as to ensure stored asset information accurately reflects all valid information supplied.

Information consistency enables the following:

- analysis across asset types maintained and operated by different maintainers and operators
- transfer of information whilst maintaining its accuracy and integrity
- audits across multiple datasets
- collection and better use of historical information
- use of common language across multiple datasets
- work breakdown structure of maintenance work, defects and failures.

13.3 Integrity

Asset information repositories shall maintain the integrity of the hosted asset information. Management systems, processes and tools shall be applied to minimise the possibility of loss of asset information, introduction of errors, unauthorised access or unauthorised changes. System metadata which supports the integrity of the information (for example, access permission and functionality design) shall be available for audit by TfNSW.

Requirements for the management of asset information described in this standard support the integrity of asset information. Asset information integrity is achieved by management of the following:

- additions, deletions and changes to asset information
- governance
- consistency of information
- transfer of information.

13.4 Timeliness

Asset information shall be submitted to asset stewards promptly after the information becomes available. All required asset change information shall be provided to asset stewards prior to the conclusion of an asset change project. Refer to TS 01515.2 for further information on the exchange of asset-related information.

13.5 Availability

Systems and tools that manage asset information repositories shall meet the following requirements:

- maintain agreed service levels or maintain reasonably expected service levels if there is no agreement in place
- maintain capacity adequate to support users
- facilitate timely reinstatement of information to an original state in the event of a failure

The repository shall allow for the asset information to be readily available to authorised users in an efficient manner.

13.6 Accessibility

Systems and tools shall provide controlled access to asset information.

Information repositories shall meet requirements in Sections 10 and 11.

13.7 Documentation and tools for management of asset information

TfNSW maintains a suite of documents and tools including requirements, guidance, procedures, controlled metadata sets, forms, templates and asset information repositories to support the management of asset information. These documents and tools support the requirements and achievement of outcomes in TS 01455, CP21010 and the *Transport for NSW: Asset Management Framework*.

A layered approach of documentation and tools combines AMB documents with those produced and managed by nominated service providers. Figure 10 shows how the various documents and tools used in the management of asset information relate to each other.

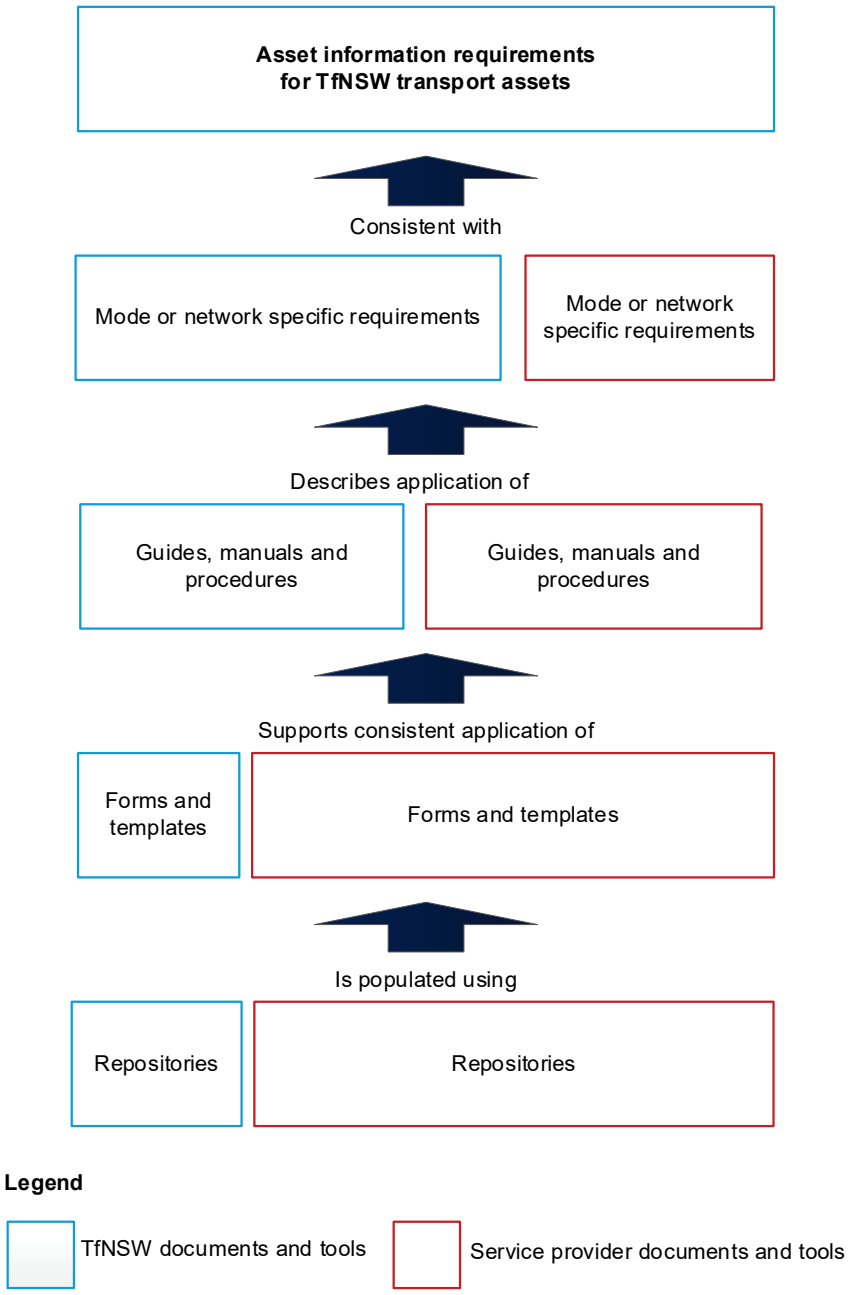


Figure 10 – Relationship of documentation and tools used in management of asset information

Documentation shall be developed by asset stewards to support the management of asset information repositories and asset information. Documentation shall be compliant with AMB requirements.

Appendix A Asset information deliverables (normative)

Table 2 – Asset documents, drawings and models grouped by type

Type	Asset information deliverable – by type
Certificate	*Disability Discrimination Act 1992* (DDA) compliance certificate NCC compliance certificate (including design or construction certificate) – see note 1 Test and commissioning certificate – see note 2 Fleet certificate – see note 3
Drawing	Drawing in accordance with TS 01547.1
Model	Model in accordance with DMS-ST-207
Manual	System manuals covering the following: • installation and maintenance manual • engineering manual • operations manual • training manual • equipment manual • warranty.
Plan	TMP Asset management plan including an annual works plan Life cycle cost plan in accordance with TS 01505 Inspection and test plan Environmental management plan
Procedure	Local instructions (site) Operating instructions and procedures (including fleet preparation procedures) Safe work method statement Test procedures and instructions

Type	Asset information deliverable – by type
Record	Design calculations Inspection and test records Configuration settings (for example, circuit breaker trip settings, transformer tap settings, I/O settings) Configuration records (for example, CBI data, ATP balise data, clearance data, survey data – track alignment, curvature and monument data, fibre allocation) Interface agreement (including TLS deed) Maintenance agreement Material safety data sheet Service level agreement (SLA) and operational level agreement (OLA) Protocol of trials (vessels) Provisional acceptance record Builders guarantee Maintenance records during construction, testing and commissioning
Register	Asset register (including associated fixed asset capitalisation and Section 170 Heritage and Conservation Register and assets impacted (modified, disposed or vested) – in accordance with Section 8 Defects register Spares register Materials register (as-built construction materials) Register of special tools and equipment Register of vital and nonvital data Register of software and licences Work order register (including measurements and service records)
Report	Design report and design life Survey report Environmental report including geotech Sea trial report (builders and AMSA requirement) Power study FMECA or reliability, availability, maintainability and safety (RAMS) report Test and commissioning report Stability book (vessels) Asset condition report and assessment criteria Asset inspection or examination reports
Schedule	Service schedules - in accordance with TS 01506 Schedule of finishes (in accordance with the NCC certificate)
Specification	Material specification Process specification
Standard	Engineering standard Concession to TfNSW standards

Note 1: Examples of certificates required in relation to NCC compliance certificates are as follows:

- certificate of design compliance
- certificate of construction compliance covering:
  - structural construction certificate
  - communication services construction certificate
  - drainage construction certificate
  - electrical services construction certificate
  - fire services construction certificate
  - glazing construction certificate
  - lifts and escalators construction certificate
  - mechanical ventilation and air conditioning construction certificate
- fire and life safety certificate
- fire door certificate
- fall arresting system certificate
- surveyors certificate
- WorkCover registration for lifts and escalators
- occupation certificate
- independent certifier certificates (if applicable).

Note 2: Examples of test and commissioning certificates are as follows:

- design integrity test certificate
- test readiness certificate
- independent safety assessor certificate demonstrating the asset is safe to operate (if applicable)
- practical completion certificate
- final completion certificate.

Note 3: Examples of fleet certificates and forms are as follows:

- welders certification (vessels)
- compass deviation certificate (vessels)
- certificate of non-registration (vessels)

- P-mark certification (buses)
- bill of sale (vessels – AMSA requirement)
- notification of change of ownership (vessels – AMSA requirement)
- builders certificate (vessels – AMSA requirement)
- certificate of survey (vessels – AMSA requirement)
- car history book (records of manufacturing information of rolling stock.

Table 3 – Asset documents, drawings and models grouped by stage of delivery and configuration gate

Typical gates	Asset information deliverable - by stage or gate
Requirements definition (strategic and concept baseline)	Nil
Preliminary design (preliminary design baseline)	Concept drawing in accordance with TS 01547.1 Concept model in accordance with DMS-ST-207
Detail design and construction (approved design baseline)	AFC drawing in accordance with TS 01547.1 AFC model in accordance with DMS-ST-207 Asset register Interface agreement (including TLS deed) Maintenance agreement Installation and maintenance manual Engineering manual Operations manual Training manual Equipment manual TMP and service schedules in accordance with TS 01506 Asset management plan including an annual works plan Register of special tools and equipment Register of software and licences Life cycle cost plan Operating instructions and procedures (including fleet preparation procedures) Local instructions (site) Test procedures and instructions Environmental management plan Environmental report including geotech

Typical gates	Asset information deliverable - by stage or gate
Testing and commissioning	Configuration records (for example, CBI data, ATP balise data, clearances, survey data – track alignment, curvature and monument data, fibre allocation) Configuration settings (for example, circuit breaker trip settings, transformer tap settings, I/O settings) Inspection and test plan Test and commissioning report Test and commissioning certificate Inspection and test records Maintenance records during construction, testing and commissioning
Handover to contracted maintainer (Handover Baseline)	As built drawing – in accordance with TS 01547.1 As built model – in accordance with DMS-ST-207 Defects register Spares register (required based on criticality and spares analysis) Materials register (as built construction materials) Register of vital and non vital data Warranty Design report and design life Design calculations Survey report Stability book (vessels) Power study FMECA or RAMS report Material specification Process specification SLA and OLA DDA compliance certificate NCC compliance certificate (including design or construction certificate) Schedule of finishes (in accordance with the NCC certificate) Protocol of trials (vessels) Sea trial report (builders and AMSA requirement) Provisional acceptance record Builders guarantee

Typical gates	Asset information deliverable - by stage or gate
Handover to TfNSW at contract end	Asset management plan (current for the financial year) Annual works plan (historic and current for the financial year) works program and delivery at a program level including forecast budget required to deliver the program Asset register including configuration changes or modifications and fitment of serialised rotables Defects register Work order register (complete work history including measurement and service records) Spares register (required level as defined at handover and actual level) Asset condition and assessment criteria and methodology used Updated documents or drawings provided at handover Additional documents or drawings not provided at handover (including reports) TMP (updated)