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AMT-WI-020

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ARTC Network Wide

SMS

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1.0	08 Feb 2023	AMS Improvement Advisor	Project Support and Training Officer	Manager Asset Management Systems	Manager Asset Planning & Investment

Amendment Record

Amendment Version #	Date Reviewed	Clause	Description of Amendment
1.0	08 Feb 2023		First issue of document to supersede EGW-10-02. Engineering document transferred to Asset Management document. No content has changed. Only updates to cover page, Header / Footer, Procedure Owner, Document numbers within.

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1 Introduction

1.1 Purpose

ARTC maintains an Asset Management System (AMS) to ensure that assets are fit for the purpose of allowing the operation of trains over ARTC infrastructure. The AMS enables ARTC to perform the following core responsibilities;

- Capital investment in the network
- Manage the infrastructure comprising the network
- Maintain the infrastructure comprising the network

The purpose of this work instruction is to describe the universal mandatory attributes required by the system; as currently configured; to manage all asset types (to achieve the stated purpose above).

1.2 Scope

This work instruction currently applies to ARTC's infrastructure assets as follows;

- All asset types
- The entire ARTC Network

This work instruction applies to the following aspects of the AMS;

- The management of assets
    - Register of all assets, including configuration, engineering data and attributes.
    - Register of known conditions affecting all assets
    - Register of all preventative and corrective maintenance requirements

1.3 Procedure Owner

The Manager Asset Management Systems is the Document Owner and is the initial point of contact for all queries relating to this work instruction.

1.4 Parent Procedure

The following documents support this procedure:

- ARTC Safety Management System (SMS)
- AMT-PR-010 Asset Management System
- EGP-03-01 Rail Network Configuration Management

1.5 Subordinate Documents

The following documents are subordinate to this procedure:

- AMT-WI-021 Data Classification Structures

1.6 Definitions

The following terms and acronyms are used within this document:

Term or acronym	Description
ADA	Asset Data Administrator
AEI	Associate Equipment Item
AMP	Asset Management Plan
AMS	Asset Management System
ARTC	Australian Rail Track Corporation Ltd.
Attribute	Single component of a record. Similar to a database field.
AWP	Annual Works Plan
CAP	Capital Works
Component	The component or element of the equipment reference for the known condition
CoP	ARTC Engineering (Track and Civil) Code of Practice
DMS	Drawing Management System
EC	Equipment Class
EGI	Equipment Group Identifier
Inspection	The examination of an infrastructure asset, for the purposes of ensuring the asset is safe and capable of performing to operation requirements
km	Kilometrage
Known Condition	Any unsatisfactory condition which has the potential to develop into asset failure. May be a discrete fault against a component of the asset, or the overall condition of the asset. Also referred to as a defect
Modifier	Code indicating the component or element of the equipment reference (if there is more than one)
MPM	Major Periodic Maintenance
MST	Maintenance Schedule Task
Nameplate	Instrument used to store engineering characteristics against an asset in Ellipse
NDT	Non-Destructive Testing
Part	Optional filter for designating the sub-element or sub-component affected by a known condition
PU	Productive Unit, used to group assets within the business hierarchy
RCRM	Routine Corrective and Reactive Maintenance
Responsible Manager	ARTC personnel with designated responsibility for management of the asset, or an aspect of the management of the asset

Term or acronym	Description
SMS	Safety Management System
SPN	Structured Plant Number
TCR	Train Control Report
TMP	Technical Maintenance Plan
TSR	Temporary Speed Restriction
User	A suitably competent person, authorised to interact with the AMS in accordance with this procedure
Value	The stored contents of an attribute within the AMS
WO	Work Order

2 Application of the Standard

This work instruction describes data attributes or requirements that are universal for all equipment. Data attributes or requirements that are governed by technical or other specific requisites are described in the relevant subordinate work instruction (refer to cl 1.5).

This work instruction is intended to be read and used in conjunction with the other subordinate data classification work instructions.

2.1 Nomenclature

This work instruction describes both the physical asset (and its constituents), and its associated digital records.

To avoid confusion, the nomenclature described in Table 1 has been used in the work instruction to differentiate between the physical and the digital structures;

Physical Asset	Asset Management System
Asset (i.e. a bridge)	Equipment
	Parent Equipment
	AEI Equipment Structure
	Component Modifier Equipment Structure
Element (i.e. a bridge girder)	Child Equipment
	Associate Equipment Item (AEI)
	Component
	Modifier
	Part

Table 1 – Nomenclature

3 Ellipse

The definition (and controls) of information for each asset type are defined either below or in the relevant data management work instruction (refer to cl 1.5). Ellipse defines this information as data attributes.

3.1 Data Attributes (Asset Information)

Data attributes are either;

- Uncontrolled attributes
- Controlled value attributes

Uncontrolled attributes can hold any data (subject to the attribute character limit).

Controlled value attributes have a data filter. The filter may limit the data type that is entered in the attribute (e.g. numeric or date values), or restrict data entry to values from a drop down list (the data is stored in an enabling file).

3.2 Data Attributes Controls

There are 4 types of control that may be applied to an attribute;

- Character limit
- Data type
- Special edit
- Enabling files

Some data attributes have predefined controls applied to them. However, the data attribute controls described in this section are typically applied to attributes that are defined by ARTC (e.g. bridge ‘deck material’, which is a nameplate attribute).

3.2.1 Character Limit

The character limit specifies the maximum number of characters that may be entered into an attribute. It is recorded as a prefix to the data type. E.g. 30N indicates that a maximum of 30 numbers may be entered into an attribute.

3.2.2 Data Type

The Data Type specifies what types of data may be recorded in an attribute. Refer to Table 2 for more information.

Type	Description
A	Alpha
AN	Alphanumeric
D	Date (dd/mm/yyyy)
N	Numeric
>Z	Numerical, greater than zero

Type	Description
Z>Z	Numerical, greater than or equal to zero

Table 2 – Commonly Used Attribute Type Controls

3.2.3 Special Edit

The Special Edit limits the format of the data that can be recorded in an attribute. It is most commonly used to limit decimal places in numerical attributes and to create yes/no attributes. Refer to Table 3 for more information.

Type	Description
DEC1-5	Number of decimal places. E.g. DEC2 specifies 2 decimal places
YN	Yes or No
YNS	Yes or No or Space

Table 3 – Commonly Used Special Edit Controls

3.2.4 Ellipse Modules

Ellipse operates a number of different modules to perform the required AMS processes. The available modules and their functionality will depend on the access granted by the user's profile. Refer to Table 4 below for a list of Ellipse modules commonly used by ARTC.

For a full list of modules currently installed in ARTC's implementation of Ellipse refer to MSE010/MD (refer to cl 3.2.5 for note on nomenclature).

Module Code	Module Title	Description
MSE600	Equipment Register	Used to store and search for registered equipment and associated equipment items (assets)
MSE60A	Equipment Register	In addition to MSE600 used to view and navigate the productive unit hierarchy
MSEWDA	Alarms and Defects	Used to enter and search defects
MSEWOT	Work Order	Used to enter and search for work orders. Optimised for interaction with individual work orders
MSEWJO	Jobs	Used to search and forecast MST's and work orders. Optimised for interaction with multiple work orders (or MST's)
MSE623	Work Order Tasks	Used to assign, schedule and complete work order tasks
MSE541	Work Request	Used to enter and search for work requests
MSE580	Document Manager	Used to search for a document
MSEWAB	Attributes	Used to search the register of defined defects in Ellipse
MSEWLA	Attributes Link	Used to search the register of defects (attribute link ID's) stored against an EGI
MSE010	Search Table	Used to search enabling files that have been defined in Ellipse

Module Code	Module Title	Description
MSO011	Review Table File	Used to search enabling files that have been defined in Ellipse
MSEMST	Maintenance Schedule Task	Used to search MST's that have been recorded against an asset
MSE690	Standard Job	Used to search the register of standard jobs in Ellipse
MSE603	Search Equipment List	Used to search static user defined equipment lists
ARBWOEA	WO, WR and defect compliance extract	Used to create user defined equipment and work order lists based on attribute value filters

Table 4 – Commonly used Ellipse Modules

Ellipse modules can be accessed via the context menu or the quick launch box.

3.2.5 Enabling Files (drop-lists)

The Enabling File limits the contents of an attribute to values stored in a control table. The control table can be either a;

- System control table (e.g. the Equipment Class 'EC' table)
- ARTC defined table.

ARTC defined tables have the naming convention '+ABC'.

Enabling files can be viewed in MSE010 by entering the table code in the 'Table Type' attribute (refer to Figure 1). Where referenced in this work instruction, the enabling files will have the naming of MSE010/EC, MSE010/+SPE etc.

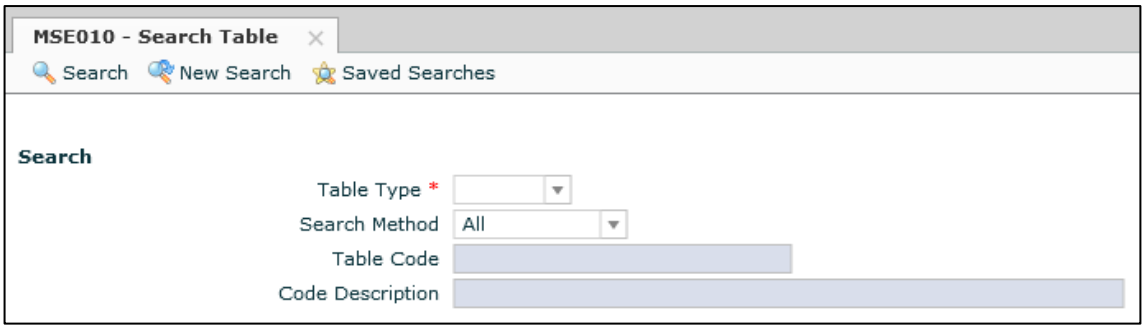

Figure 1 - Enabling File Search Frame

The enabling file for a given attribute (where applicable) can be determined by enabling the "show attribute tooltips" option from the configuration menu (i.e. the gear icon in the left vertical menu bar), as shown in Figure 2. When the user's mouse is over the attribute a tooltip box will appear describing the specific enabling file that is being applied to the attribute.

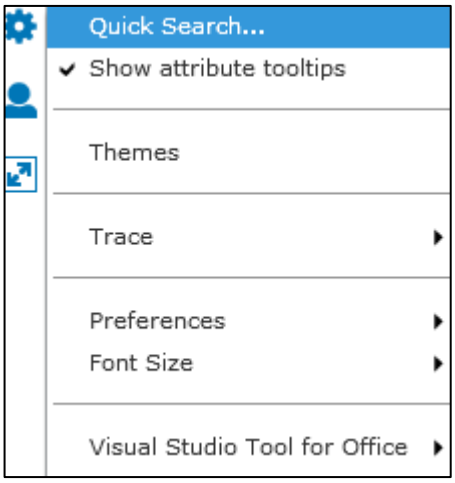

Figure 2 - Enable Attribute Tooltips

4 Equipment Register

The equipment register [MSE600] is used to create, update, and review all equipment and AEI information.

The following clauses prescribe the minimum data attributes that must be completed for each equipment record in the equipment register.

4.1.1 Equipment Number

The Equipment Number is a controlled value attribute. It contains a 12 character numeric code that is the unique identifier for equipment in Ellipse. The Equipment Number is automatically generated by Ellipse for new assets.

Any infrastructure data contained in another constituent system (refer to EGP-10-01) shall be related back to the Equipment Number of the asset in Ellipse.

An example of a valid Equipment Number would be ‘000000038276’.

4.1.2 Description

The Description is an uncontrolled value attribute. It comprises two lines of text (with a maximum of 40 characters per line), located above the tabbed sub-frames in the equipment record. The purpose of the Description is to provide an easy visual indication of what the asset is.

The Description attributes are searchable in the ‘Primary Search’ or ‘Advanced Search’ sub-frames.

Refer to the relevant data classification work instruction for the data format of the Description attributes.

4.1.3 Associated Equipment Item

The Associated Equipment Item is a controlled value attribute. It contains a 1 character alpha code that has the YN data type. The Associated Equipment Item attribute indicates the location of the equipment record within the ARTC equipment hierarchy (refer to 4.1.7 below). This is most commonly referred to as the Parent – Child relationship.

Value	Hierarchy Level	Description
No	6	The parent to equipment record is the line segment
Yes	7	the parent to the equipment record is the parent asset (or assembly)

Table 5 - Associated Equipment Item Values

Note: Associate Equipment has different requirements and controls for certain attributes. This work instruction will only describe the requirements for parent equipment records.

4.1.4 Equipment Class

The Equipment Class is a controlled attribute. It contains a 2 character alpha code. The Equipment Class is the highest level of the equipment hierarchy used to organise assets in Ellipse. The equipment hierarchy is defined in Table 6;

Level	Description	Example
1	Equipment Class	Bridge
2	Equipment Group Identifier	Bridge – Steel
3	Function (Plant Segment 2)	Underbridge

Table 6 - Equipment Hierarchy

The valid Equipment Class values in Ellipse are defined in MSE010/EC. The values defined in this enabling file shall be derived from the relevant ARTC technical standards.

Note: The Equipment Class controls the SPN. The Equipment Class cannot be altered without providing a new SPN number. Similarly, the SPN format cannot be altered without providing a new Equipment Class.

4.1.5 Structured Plant Number (SPN)

The ARTC Structured Plant Number (Also known colloquially as the Plant Number or SPN) is a non-unique identifier for an equipment record. The SPN is a string of controlled value attributes, derived from the data stored in up to 6 'plant segments'.

The Equipment Class associated with an equipment record shall determine;

- The specific SPN data requirements for the record
- The controls applied to the SPN plant segments
- The format in which the data is displayed.

Track and Civil, and Structures share common root SPN formats. There are SPN formats specific to signals assets, comms assets etc. Refer to the relevant data classification work instruction for more information of the SPN format and specific controls applied to the plant segments.

The typical full-form SPN for Track and Civil, and Structures assets is shown in Table 7.

An example of the common 4 plant segments in use would be;

- S00100440485.408TO
  - S00 (Main South)
  - 10044 (Main South Down)

- 0485.408 (Kilometrage)
- TO (Turn Out)

The equipment record equipment class will determine whether he additional plant segments 5 and 6 are required. An example of this applied to the SPN above would be;

- S00100440485.408TODNMN119B
  - S00 (Main South)
  - 10044 (Main South Down)
  - 0485.408 (Kilometrage)
  - TO (Turn Out)
  - DNMN (Down Main)
  - 119B (Points No.)

Order	Field	Size
1	ROUTE	3AN Note 1
2	BASECODE	5N
3	KMS	8N
4	FUNCTION	2A Note 1

Table 7 - Structured Plant Number (SPN)

Note1: The size indicates the visible size of the attribute data. Refer to the relevant clause for more information on the attribute constraints.

Note: It should be noted that whilst the Equipment Number and SPN can often be used interchangeably to identify a specific asset, it is theoretically possible for two assets to share the same SPN (e.g. when equipment is disposed of and replaced on a like for like basis). Only the Equipment Number is unique.

4.1.5.1 Route (Plant Segment 1)

The Route is a controlled value attribute. It contains a (visible) 3 character alphanumeric code. The visible format of the route code is ‘ANN’. The route code is used in a number of different ARTC systems.

The enabling file stores the full 5 character alphanumeric code, in the format “ANANN”. The first 2 characters of the full code describe the controlling Equipment Class (i.e. the route code may only be selected against assets with the controlling equipment class). The last 3 characters describe the route code displayed in the SPN.

The enabling file in Ellipse that contains the active route codes shall not be altered without the approval of the owner of this procedure.

The enabling file for plant segment 1 is MSE010/P1.

The master table describing valid routes for use in Ellipse is MSE010/+COR.

4.1.5.2 Basecode (Plant Segment 2)

The Basecode is a controlled value attribute. It contains a 5 character numeric code. The basecode denotes a continuous length of track, spanning between two physical nodes (e.g. turnouts points).

The enabling file for plant segment 3 is MSE010/P3.

The master table describing valid basecodes for use in Ellipse is MSE010/+BAS.

Note: The register of basecodes is contained on an MS Access database (RIC TRACK CODES PRODUCTION) that is maintained by Transport for NSW. The basecode database is linked to the Track speed system that ARTC also shares with Transport for NSW.

The valid basecodes that appear in Ellipse shall be controlled by those described in the basecode database. Any basecodes in Ellipse that do not appear in the basecode database shall be marked as inactive.

4.1.5.3 KMS (Plant Segment 3)

The 'km's' is a controlled value attribute. It contains an 8 character numeric code in the format "0000.000".

Where applicable, the enabling file for plant segment 5 is MSE010/P5.

Note: Historic km's data was entered in a number of formats. The responsible manager shall identify any km's data that is not in the format "0000.000" and correct it. A consistent km's format is important for calculation and sorting purposes.

4.1.5.4 Function (Plant Segment 4)

The Function is a controlled value attribute. It contains a (visible) 2 character alpha code.

The enabling file stores the full 4 character alpha code, in the format "AAAA". The first 2 characters of the full code describe the controlling Equipment Class (i.e. the function code may only be selected against assets with the controlling equipment class). The last 2 characters describe the function code displayed in the SPN.

For example, an underbridge would be stored in the enabling file as 'BRUB' because the equipment class is 'bridge' (BR). However, it would display in the SPN as 'UB'.

Refer to the relevant data classification work instruction for the valid Function codes.

The enabling file for plant segment 2 is MSE010/P2.

Note: Any future changes or additions to the valid Function codes shall ensure that the last 2 characters are unique across all asset types.

4.1.6 Status

The Status is a controlled value attribute. It contains a 2 character alpha code. The Status is used (in conjunction with the equipment hierarchy attributes) to determine the appropriate inspection schedule for an asset.

The responsible manager shall ensure that the correct Status is assigned to all assets. Refer to Table 8 for valid codes;

Code	Description	MST Required
BO	Booked Out (e.g. with IBA)	N
DI	Disposed Of	N
GM	Within Group MST	N
IS	In Service	Y
NM	Not Maintained	N
PN	Project New	N
RI	Redundant Infrastructure	Y
SO	Seasonal Only	N
SW	Service Withdrawn	N

Table 8 - Asset Status

4.1.7 Productive Unit

The Productive Unit is a controlled value attribute. The Productive Unit specifies the parent relationship of the asset within ARTC's business hierarchy. The business hierarchy levels are shown in Table 9;

Level	Description	Example
1	Company	ARTC
2	Business Unit	Interstate
3	Network	Tottenham (VIC) – Crystal Brook (SA)
4	Corridor	A00 – Keswick to VIC Border
5	Line Segment	0161 Belair – VIC Border
6	Equipment	OVBR Upper Sturt Rd
7	Assembly	Bridge Span 4
8	Associate Equipment	Steel Main/Top Girder S004 N01

Table 9 - Business Hierarchy

A user may locate the current business hierarchy codes by using the following process;

- In MSE600, perform a search string for "ARTC" (refer to Figure 3)
- In the ARTC equipment record, go to Actions → Productive Unit

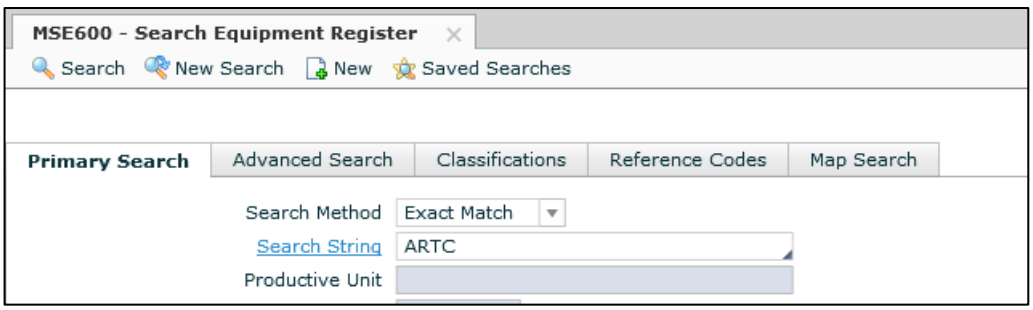

Figure 3 - ARTC Business Hierarchy Search

4.1.8 Input By

Input is a controlled value attribute. It contains a 10 character numeric code. The Input attribute records the employee ID number of the user who created the new equipment record.

Note: If the Input attribute is left blank during the creation of a new equipment record, the value will default to the employee ID of the 'logged in' user.

4.1.9 Active

Active is a controlled value attribute. It contains a 1 character alpha that has the Y/N data type. The attribute indicates whether the equipment record is active or inactive in Ellipse.

Inactive assets will not appear in user defined equipment lists (such as those created via MSE603 or ARBWOEA).

Note: All assets in the ARTC Equipment Register should be set to active, even if the asset is 'not maintained' or 'disposed of' as status will define activity requirement.

4.1.10 Equipment Group Identifier

The EGI is a controlled value attribute. It contains a 5 character alphanumeric code. The EGI is the primary mechanism used by Ellipse to identify what "type" of asset is being described by an equipment record.

It is essential that the EGI value associated with an equipment record is accurate, as the EGI controls the following functions in the AMS;

- Assignment of nameplate attributes
- Defect entry (via the defect attribute link)
- MST's (the appropriate technical maintenance plan is derived from the EGI)

If the EGI value against an equipment record is changed, the existing nameplate attributes (and any values recorded against them) will be deleted and replaced with the nameplate attributes of the new EGI.

Refer to the relevant data classification work instruction for the rules pertaining to the correct allocation of EGI to an asset.

Note: The Equipment Group Identifier is not directly linked in Ellipse to either the Equipment Class or SPN (plant segment 2).

The responsible manager shall ensure that the Equipment Class, Equipment Group Identifier and plant segment 2 are correctly aligned for an asset, in accordance with the restrictions imposed in the relevant data classification work instruction.

The MST's recorded against an equipment record are not directly controlled via Ellipse based on the equipment record EGI value. The off-line technical maintenance plan documentation is orientated around the valid EGI values. This documentation forms the basis of engineering assurance against the technical maintenance regime applied to the equipment in the AMS.

4.1.11 Equipment Location

The Equipment Location is a controlled value attribute. It contains a 3 character alpha code. The code refers to the geographic location of the asset on the Network (i.e. Jacana, VIC - JAC).

The Equipment Location is not part of the ARTC equipment hierarchy, and the attribute values are not directly controlled by another related attribute (e.g. Productive Unit, Basecode or Account Code).

4.1.12 Account Code

The account code (also known colloquially as line segment or cost centre) is used to link the assets position within ARTC's business (refer to cl 4.1.7 above) and financial hierarchies (refer to FIN-GL-018, cl 2). The account code determines which delivery unit and division any costs accrued against the asset will be recorded against.

The account code attribute in the equipment register allows Ellipse data to be merged with data from ARTC's financial system (CI Financial) for report creation.

The valid account codes that appear in Ellipse shall be controlled by those used in CI Financial, as described in FIN-RG-006.

Any account codes in Ellipse that do not appear in either CI Financial or FIN-RG-006 shall be marked as inactive.

4.2 Classifications

The classifications sub-frame is located within the equipment register [MSE600], as shown in Figure 4.

Figure 4 - Equipment Classification Sub-frame

The classification sub-frame contains 11 ARTC defined attributes. The ARTC classification attributes are designed to perform one of two functions;

- Improve equipment searching functionality (by providing common ARTC groupings that are not provided for by the standard equipment register configuration or business hierarchy)
- Facilitate cost recovery (for shared infrastructure assets)

The purpose of each classification attribute is specified in Table 10 below.

The "search functionality" attributes are controlled value attributes. They contain a 2 character alphanumeric code.

The enabling file for each search functionality attribute can be accessed at MSE010/E2 to MSE010/E12.

The "cost recovery" attributes are controlled value attributes. They contain a 1 character alpha code that has the Y/N data type.

For equipment with cost recovery requirements (i.e. subject to a shared infrastructure agreement or similar) it is important that the data in the cost recovery attributes is configured in accordance with appendix 1. Failure to configure the attributes in accordance with appendix 1 can hinder or prevent ARTC from recovering applicable costs from external parties.

Classification	Control	Example Code	Purpose	Example Description
Management Business Unit	2N	03	Search	Interstate
Network	2N	3C	Search	Tottenham (VIC) – Crystal Brook (SA)
Corridor	2N	AA	Search	A00 – Keswick to VIC Border
Line Segment	2N	AB	Search	0112 - Crystal Brook – Spencer Junction
Management Delivery Unit	2N	3E	Search	Telarah to Acacia Ridge
Provisioning Centre	2N	AO	Search	Geelong
State	2N	VC	Search	Victoria
ARTC Owned	YNS	Y	Cost Recovery	Yes
ARTC Maintained	YNS	N	Cost Recovery	No
Shared Asset	YNS	Y	Cost Recovery	Yes
Cost Recovery	YNS	N	Cost Recovery	No

Table 10 - Equipment Classification Attributes

Classification attributes can be used in combination with attributes in the Primary Search and Advanced Search sub-frames to search the equipment register.

Note: A limitation of the classification attributes is that they may only be used to search or filter within the equipment register. They may not be used to filter or search for MST's, work orders, work requests, known conditions etc. in their respective modules.

4.3 Nameplate

The Nameplate sub-frame is located within the equipment register [MSE600].

The Nameplate sub-frame contains a number of ARTC defined attributes. The purpose of the Nameplate attributes is to record specific technical information against an asset that is not provided for by the standard equipment register configuration, proving a more comprehensive dataset about "what" the asset is.

The Nameplate sub-frame is controlled by the EGI code recorded against the equipment record. The EGI recorded against an equipment record will determine;

- The number of Nameplate attributes available
- The purpose (description) of each Nameplate attribute
- The controls (data type and enabling file) applied to each Nameplate attribute

For more information about the available Nameplate attributes for a specific EGI please refer to the relevant data classification work instruction.

Note: A limitation of the Nameplate attributes is that they may only be viewed against a specific equipment record. Nameplate attributes cannot be used to search within the equipment register or within the MST, work order or work request modules.

4.4 Equipment Structure

ARTC assets present within the rail corridor are not typically solid or monolithic entities – they have been constructed using multiple elements, sub-assemblies or mechanisms. In many cases these elements are of importance to the overall asset. They may be;

- Maintainable items (individually replaceable)
- Present a failure mechanism that must be controlled by ARTC to ensure safe operation of the asset (i.e. the element could have a preventative maintenance task)

It is important that ARTC captures the configuration of its asset down to the element level. This data is used to record known conditions against the parent equipment and to develop the asset management plan (AMP).

There are two primary methods for capturing the element (or component) data against parent equipment. The two methods are;

- Associate Equipment Item (AEI) structure
- Component Modifier Structure

The method adopted will be determined by the EGI code recorded against the parent equipment.

4.4.1 Associate Equipment Structure (AEI)

Associate Equipment Items (AEI) (or parent-child assets as they are more commonly known) are used for assets that are unique, or almost unique. Examples of these include bridges, which are mostly designed and constructed on a per location basis (though a number of standard designs have been implemented on the ARTC network).

The configuration of AEI assets is recorded by creating an equipment record for each individual element of the asset. These equipment records are made subordinate to a parent equipment record that represents the equipment in its entirety.

The AEI that have been recorded against an equipment record can be viewed by following the process specified in cl 6.3.1 below.

Refer to the relevant data classification work instruction for more information about how to create AEI against an equipment record.

4.4.2 Component Modifier Structure

Component modifier structures are applied to assets that have a standard design or configuration. Examples of these include signals installations (that are constructed from a standard design) and track (which has a standard configuration).

The component modifier structure is associated with the EGI code recorded against an equipment record. Equipment that uses a component modifier structure will display a pre-populated component list that can be used to record known conditions.

The component modifier structure that has been created against an equipment record by its EGI code can be viewed by following the process specified in cl 6.3.2 below.

Refer to the relevant data classification work instruction for more information about the component modifier structure design for an EGI code.

5 Technical Maintenance Planning

Maintenance activities must be performed on assets by ARTC to maintain a predictable level of performance. These preventative maintenance tasks are recorded in the AMS as Maintenance Scheduled Tasks (MST's).

5.1 Maintenance Scheduled Task (MST)

Maintenance schedule tasks within Ellipse are based on the technical maintenance plans.

MST's can be reviewed in MSEMST, and interacted with in MSEWJO.

A MST is required for every 'in service' or 'redundant' equipment record in the equipment register (refer to EGP-10-01 for more information).

Refer to Table 11 below for a description of the MST attributes recorded in MSEMST.

Attribute Title	Control Type	Enabling File / Table	Description
Equipment Reference	12N	MSEMST	Links MST to asset
Work Group	8AN	MSE720	Links MST to Work Group
Standard Job Number	6AN	MSE690	Description of task
Schedule Indicator	1N	MSE010/MI	Determines schedule for creation of future work orders Note 1
Schedule Frequency 1	4N	-	Number of days until next schedule task
Last Scheduled Date	D	-	Calculated based on schedule indicator
Last Performed Date	D	-	Date updated by work order completion
Next Scheduled Date	D	-	Calculated based on schedule indicator

Table 11 - MST Attributes

Note: The MST inspection latitude is not recorded in the MSEMST MST inspection record. MST latitudes are stored in MSE010/+LAT on a per equipment ↔ task basis. Latitudes are recorded as No. days.

The heritage 'latitude' is currently being transitioned out of use and replaced with 'tolerance' (i.e. the out of the box Ellipse solution). Tolerance is calculated as a percentage of the MST frequency. The percentage tolerance calculated will be determined by the MST standard job priority.

The process applied to an MST will depend on how far progressed the controlling equipment class is in the AMIP process.

Note 1: Unless otherwise specified, all ARTC MST's shall have a 'last scheduled date' schedule indicator.

5.2 Creation of MST's

Creation, deletion, or modification of MST's recorded against an asset must be performed in accordance with EGP-03-01. Any requested changes must be submitted to the Ellipse system administrator, supported by;

- EGP0301F-01 Network Alteration Notice
- EGP0302F-01 Change Authorisation Form

Any modifications to an assets MST regime shall be in strict accordance with the relevant Technical Maintenance Plan.

Description	Size	Enabling File / Table	Example Data
SPN or Equipment Number	-	MSE600	S0010440455.353UB
MST Task #	4AN	-	9020
MST Description 1	45AN	-	Visual Inspection - Bridge
MST Description 2	45AN	-	(SPN of Structure)
Schedule Indicator	1N	MSE010/MI	1 (last scheduled date)
Frequency	4N	-	730
Work Group	8AN	MSE720	177CIV
Standard Job No	6AN	MSE690	P26005
Next Scheduled Date	D	-	15/12/2018
Work Order Type	2A	Note 1	MT (Maintenance)
Maintenance Type	1A	Note 1	P (Preventative)
Originator Priority	2A	Note 1	3
Km From	8N	-	455.353
Km To	8N	-	455.353

Table 12 - MST Creation Attributes

Note: Work order type, maintenance type, and originator priority are defined against the standard job. They are not defined or amended during MST creation. The originator priority will determine the tolerance for the MST. Refer to cl 5.1 above for more information.

6 Known Conditions

Known Conditions are recorded in the AMS, as a register of all known issues (deterioration, deficiencies etc.) that affect ARTC equipment.

6.1 Terminology

AMS procedures and work instructions have adopted the term "known condition" rather than the previously used term "defect". This terminology change has been implemented to facilitate a cultural change in the recording and management of asset deficiencies within ARTC.

Previous management of asset deficiencies presented a potential risk to ARTC; as a defect was often not recorded in the AMS until its magnitude had exceeded a defined threshold.

With known conditions, ARTC will record all asset deterioration or deficiencies in the AMS – not just those that require rectification. This increased volume of equipment condition data (referred to as the known condition pool) will be used to develop long term condition based asset management strategies.

Note: The previous AMS process automatically generated a work order for each defect recorded in the AMS. As AMIP is applied to each technical discipline this functionality will be disabled.

This will allow known conditions to be managed as asset data (were appropriate), without automatically creating a reportable requirement to perform work.

6.2 Known Condition Management Workflow

Users of the AMS should apply data to the known condition attributes (in MSEWDA) in accordance with the known condition management workflow; as described in the known condition procedure.

Table 13 describes how the known condition management workflow categorises users;

Role	Application
Inspector	Performs scheduled maintenance tasks, records known conditions
Responsible Manager	Assesses and actions known conditions into a WR or WO as required
Asset Manager	Programs WR's and WO's into the AWP and AMP
Maintainer	Performs remedial works and closes out WR, WO, and known conditions

Table 13 - Known Condition Management Workflow Roles

Some of the known condition's attributes will be amended by the relevant user as the known condition progresses through the workflow.

6.3 Entry of Known Conditions

ARTC requires that known conditions are entered into Ellipse using the Equipment Register [MSE600] action menus, rather than directly via the Alarms and Defects module [MSEWDA].

This process will vary slightly depending on whether the parent equipment has been configured to use the AEI or Component Modifier equipment structure.

6.3.1 AEI Equipment Structure

To record a known condition, the user shall open the relevant parent equipment record in the equipment register, and access the equipment's associated AEI's via;

Actions → Productive Unit

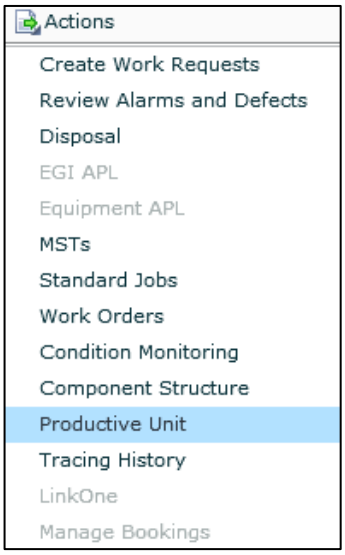

Figure 5 - Equipment Record Actions Menu (AEI Hierarchy View)

This will open a new frame, displaying the AEI equipment that has been created against the parent equipment. The user shall select the correct AEI equipment and then access the alarms and defects module via;

Actions → Create Defects

Note: *When identifying the correct AEI, it is important to note that the relevant AEI may be nested beneath an assembly (e.g. a span, abutment or pier for bridge equipment)*

The user may need to request the creation of the required AEI equipment, if they cannot identify the correct AEI in the hierarchy.

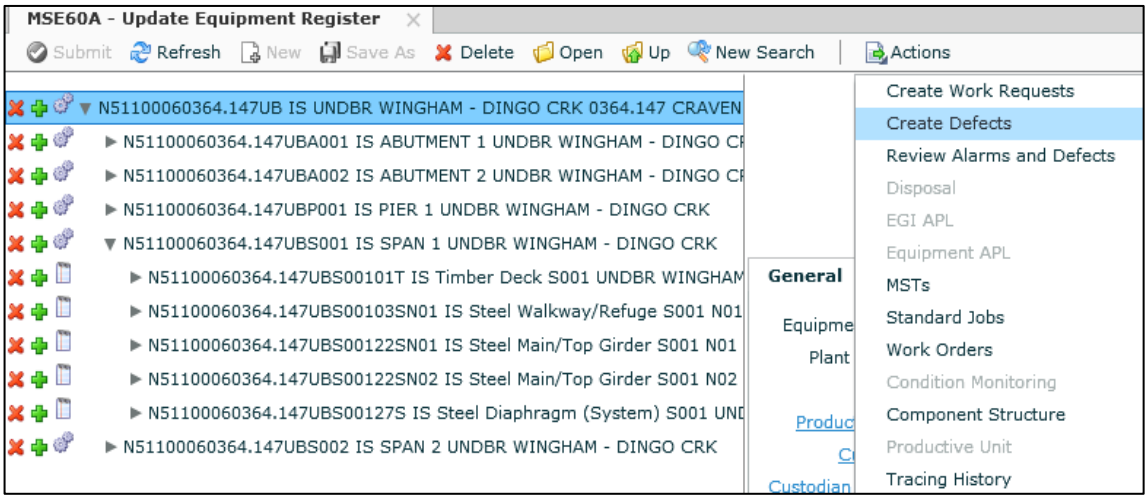

Figure 6 - Productive Units Actions Menu

6.3.2 Component Modifier Equipment Structure

To record a known condition, the user shall open the relevant parent equipment record in the equipment register, and access the equipment's component modifier structure via;

Actions → Component Structure

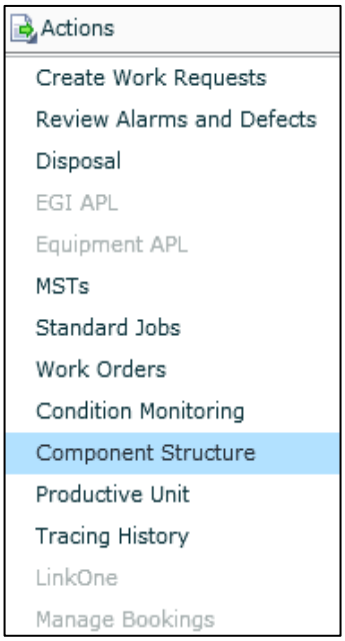

Figure 7 - Equipment Record Actions Menu (Component Modifier Hierarchy View)

This will open a new frame, displaying the component modifier structure that has been defined against the parent equipment's EGI. The user shall select the correct component modifier and then access the alarms and defects module via;

Actions → Create Defects

Note: The user may need to review the equipment's EGI, if they cannot identify the correct component in the hierarchy (or if the hierarchy appears wrong).

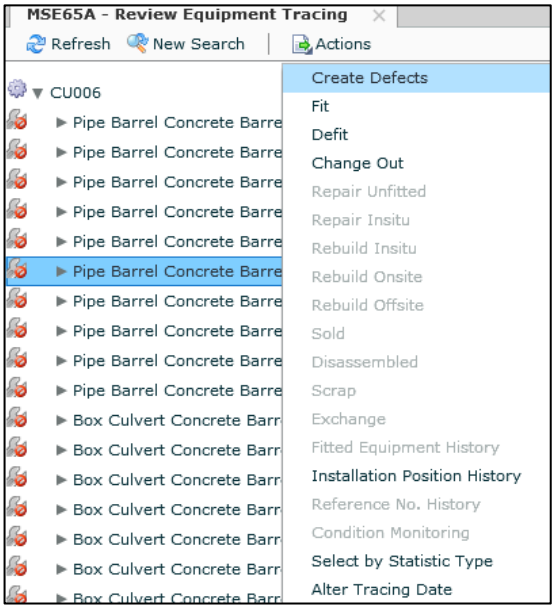

Figure 8 - Component Modifier Actions Menu

6.4 Alarms and Defects

Per cl 6.1 above, ARTC requires that all known condition entry be recorded via the Equipment Register [MSE600] module in the first instance. Subsequent management of the known condition record can then be performed directly via the Alarms and Defects module.

The known condition attributes are described in Table 14 below. Any variance from Table 14 will be described in the relevant technical discipline work instruction.

Attribute Title	Size	Control Type	Mandatory
Equipment Reference	12N	MSE600	Y Note 1
Component Code	4AN	MSE010/CO	N Note 1
Component Modifier Code	3AN	MSE010/MO	N Note 1
Inspected Segment From	8N		N
Inspected Segment To	8N		N
Defect Segment From	8N		N
Defect Segment To	8N		N
Attribute Link ID	12AN	MSEWLA	Y Note 2
Attribute ID	12AN	MSEWAB	N Note 3
Description	40AN	MSEWAB	N Note 3
Attribute Description 2	40AN	MSEWAB	N Note 3
Attribute Type	2A	MSE010/INAT	N Note 3
Failure	6AN	MSE010/FAUL	N Note 3
Part	4AN	MSE010/PART	N Note 3
Response Note 5	2AN/255AN	MSE010	Y Note 4
Severity	2N	MSE010/SEVR	Y
User Status	2N	MSE010/ADUS	Y
Corrective Action Code	2N	MSE010/CASL	Y
Priority Code	2AN	MSE010/PY	Y
Corrective Action	255AN		N
Fault Found Description	255AN		N

Table 14 - Default Known Condition Attributes

Note 1: The Component and Component Modifier Codes attributes are only used for equipment that uses the Component Modifier Structure.

Known Conditions against Component Modifier equipment must be entered via MSE600 to ensure that the correct Component and Component Modifier attribute data is applied to the record.

Note 2: The enabling file that populates the drop list will be determined by the equipment's EGI (and selected Component where applicable).

Note 3: These attributes will be automatically populated based on the selected Attribute Link ID.

Note 4: User should refer to MSEWLA to identify the relevant Validation Code enabling file (if applicable). The enabling file can be reviewed in MSE010. The enabling file is determined by the Attribute Link ID.

Note 5: The response can be either text or an enabling file drop list. This will be determined by the selected Attribute Link ID.

6.4.1 Component Code

The Component Code is a controlled value attribute. It contains a 4 character alphanumeric code.

The Component Code and Component Modifier Code operate in tandem. The Component Code is the prefix, describing the type of element that is affected by the known condition.

Table 15 provides examples of typical components;

Technical Discipline	Equipment	Component
Track and Civil	Track Mainline	**Rail**
Structures	Concrete Culvert	**Culvert Headwall**
Signalling	Signal	**Light**

Table 15 - Example Components

The Component Code only requires populating if the equipment EGI specifies a component modifier equipment structure (refer to the relevant technical discipline for more information).

For component modifier equipment structure, population of the Component Code is mandatory.

6.4.2 Component Modifier Code

The Component Modifier Code is a controlled value attribute. It contains a 3 character alphanumeric code.

The Component Code and Component Modifier Code operate in tandem. The Component Modifier Code is the suffix, describing the specific element (or subassembly) that is affected by the known condition, if there is more than one installed on the equipment.

Table 15 Table 16 provides examples of typical components;

Technical Discipline	Equipment	Component	Modifier
Track and Civil	Track	Rail	**Up**
Structures	Concrete Culvert	Culvert Headwall	**End 1**
Signalling	Signal	Lamp	

Table 16 - Example Component Modifiers

The Component Modifier Code only requires populating if the equipment EGI specifies a component modifier equipment structure (refer to the relevant technical discipline for more information).

For component modifier equipment structure, population of the Component Modifier Code is not mandatory.

6.4.3 Attribute Link ID

The Attribute Link ID is a controlled value attribute. It contains a 12 character alphanumeric code.

The Attribute Link ID defines what the known condition actually “is”. The drop list of valid Attribute Link ID’s is controlled by;

- The EGI - for AEI equipment structure
- The EGI and the Component Code – for component modifier equipment structure

The Attribute Link ID values are stored in the Search Attributes Link module [MSEWLA]. The stored defect type link codes should be aligned with the intervention criteria specified in the relevant ARTC technical standard.

Refer to the relevant data classification work instruction for more information on the specific Defect Type Link codes (and governing rules) for a particular EGI.

6.4.4 Attribute Type

The Attribute Type is a controlled value attribute. It contains a 2 character alpha code.

The Attribute Type defines the control that is applied to the Response attribute (refer to cl 6.4.7). The Attribute Type value is recorded against with the Attribute ID.

When a valid attribute ID (or Attribute Link ID) is selected, the defined Attribute Type will be applied to the known condition record. Table 17 describes the available Attribute Types;

Code	Description	ARTC Application
CF	Condition/Feature Test	Provides enabling file defined drop-list (where response is defined by ARTC Technical Standards)
DA	Date	
DI	DateTime	
DT	Defect Type	
DU	Duration	
EA	Equipment Attributes	
GH	Group Header	
GP	GPS Value	
LA	Location Attribute	
MT	Multiline	
NU	Numeric	Provides text box for numeric measurement (i.e. crack width)
OC	Op Stat – Cumulative	
OM	Op Stat – Meter	
PH	Photo	
TI	Time	
TX	Text	Provides text box for custom defects
YN	Yes or No	

Table 17 - Alarms and Defects Attribute Types

6.4.5 Failure

Failure is a controlled value attribute. It contains a 6 character alphanumeric code.

The failure attribute specifies the failure mode of the defined known condition. This allows for analysis of multiple known conditions that share a common failure mode. As an example ‘vegetation control’ is not a known condition, but is a contributing failure mechanism for multiple track and civil known conditions.

The failure is pre-defined against the attribute link ID.

6.4.6 Part

The Part is a controlled value attribute. It contains a 4 character alphanumeric code.

The Part specifies a non-maintainable constituent of an element (e.g. a web stiffener on a steel girder).

The part is pre-defined against the attribute link ID. The purpose of the Part attribute is to enable data analysis of known condition records.

6.4.7 Response

Validation of the response attribute is determined by the stored value in the Attribute Type (refer to 6.4.4 above). The Response attribute may be either a controlled or uncontrolled value, depending on the associated Attribute Type value.

The purpose of the response is to record the magnitude of the known condition. This is commonly either a measurement taken from the equipment, or a response code defined by ARTC technical standards (such as ETW-00-01 ARTC Track and Civil Code of Practice Response Booklet).

The most common Attribute Types used by ARTC to achieve this purpose are CF, NU, and TX.

Attribute Type	Controlled Attribute	Control
CF	Y	2AN
NU	Y	N Note 1
TX	N	255AN

Table 18 - Alarms and Defects Response Types

Note: The numeric response type has a dynamic length, which is defined during the configuration of the attribute ID.

6.4.8 Severity

The Severity is a controlled value attribute. It contains a 2 character numeric code.

The purpose of the severity is to describe;

- The risk that the known condition presents to the business
- What mitigation needs to be applied to the equipment to control this risk

An appropriate Severity code should be selected by the inspector when a known condition is first recorded. The Severity code can subsequently be changed as;

- The known condition is reviewed (either in the office or on track)

- Mitigating controls (such as repairs or temporary supports) are imposed on the equipment, to reduce the risk posed by the known condition.

Table 19 describes the valid Severity codes;

Code	Description
10	Stop Trains
20	TSR > 40kph below normal
30	TSR ≤ 40kph below normal
40	Weight Restricted and TSR
50	Weight Restricted Only
60	No Impact on Services
70	Safety Issue
80	Environmental Issue

Table 19 - Alarms and Defect Severity Codes

6.4.9 User Status

The user status is a controlled value attribute. It contains a 2 character numeric code.

The purpose of the User Status is to describe the position of the known condition along the known condition management workflow.

The User Status may be changed by the user as the status of the known conditions changes through the process of; Instigation, review, mitigation and rectification.

Table 20 describes the valid User Status codes;

Code	Description
10	New Issue
20	Reviewed (Office)
22	Work Order Required
24	No Initial Work Order Required
30	Requires Reassessment
40	Reassessment Undertaken
50	Defect Fully Resolved
60	Temporary Repair Completed
70	Found and Fixed
80	Repair not Completed
90	Add to Existing WO or WR [Note 1]
99	Cancelled (No Action)

Table 20 - Alarms and Defect User Status Codes

Note 1: 'Add to Existing WO or WR' is used for adding or raising a known condition to an open work order or MST.

6.4.10 Corrective Action Code

The Corrective Action Code is a controlled value attribute. It contains a 2 character numeric code.

The Purpose of the Corrective Action Code is to describe what action ARTC needs to take with the known condition.

An appropriate Corrective Action Code should be selected by the inspector when a known condition is first recorded. The Corrective Action Code can subsequently be changed as the asset manager programmes the required work against the equipment.

Table 21 describes the valid Corrective Action Codes.

Code	Description
01	Monitor
02	Repair
03	Replace
ADJUS	Adjust
ASSMT	Assess / Inspect / Examine
CLEAN	Clean
CRIBO	Crib out Ballast
FTBC	Full Track Ballast Cleaning
GRNDH	Grind (Hand)
GRNDS	Grind (Production)
INSTL	Install
KKTST	Ultrasonic Testing
PLATE	Plate
RECON	Recondition
REMOV	Remove
REPLN	Replenish
RRAIL	Re-Rail
SLASH	Spray / Slash / Cut
TAMPM	Tamping (Hand)
TAMPS	Tamping (Excavator)
TAMPX	Tamping (Track Machine)
TEST	Test (Not Specified)
UNCUT	Undercut
WELDC	Weld (Closure)
WELDF	Weld (Wire Feed)
WELDR	Weld (Rail Length)

Table 21 - Alarms and Defect Corrective Action Codes

6.4.11 Priority Code

The Priority Code is a controlled value attribute. It contains up to a 2 character alphanumeric code

The purpose of the Priority Code is to describe the urgency of the known condition – i.e. the timeframe in which ARTC must rectify or otherwise action the known condition.

A Priority Code should be selected by the inspector when a known condition is first recorded. The Priority Code can subsequently be changed as the reviewing manager assesses or actions the known condition.

The Priority Code selected by the inspector or reviewing manager shall be appropriate in the context of the relevant ARTC technical standards.

Table 22 describes the valid Priority Codes;

Code	Description
E	Do Immediately
P1	7 Days or less
P2	28 Days or less
P3	6 Months or less
P4	1 Year or less
P5	2 Years or less
PR	90 Days or less
PN	No Action Required

Table 22 - Alarm and Defect Priority Codes

6.4.12 Corrective Action

Corrective Action is an uncontrolled attribute. It contains a 255 character text box.

Corrective Action shall be used by the originator (i.e. the inspector) to describe any remedial work recommendations.

Reviewing managers or asset managers may also use this attribute to provide annotation with regards to their assessment or actioning of the known condition.

The text recorded in the corrective action attribute is transcribed against any work order opened against the known condition.

Note: Due to the character limit, information recorded in other known condition attributes should not be duplicated in the Corrective Action attribute.

6.4.13 Fault Found Description

Fault Found Description is an uncontrolled attribute. It contains a 255 character text box.

Fault Found Description shall be used by the originator (i.e. the inspector) to provide additional description or narrative to the known condition. This narrative shall consist of information that is not required by the controlled attributes and may include;

- An exact measurement of the known condition

- The location of the known condition on the element
- Any secondary issues (e.g. ballast loss)

The information recorded in the Fault Found Description should not be altered by reviewing managers or asset managers. It may be updated as appropriate by inspectors during subsequent inspections of the known condition.

The text recorded in the fault found attribute is not transcribed against any work order opened against the known condition.

Note: Due to the character limit, information recorded in other known condition attributes should not be duplicated in the Fault Found Description attribute.

7 Appendix 1 – Equipment Classification (Cost Recovery) Matrix

Scenario	Description	Details	ARTC Owned	ARTC Maintained	Shared Asset	Cost recovery
1	ARTC asset, and external party maintains (or uses) and pays	Asset leased to an external party; E.g. siding agreement for an ARTC siding (non-multiuser siding). Under this effective monopoly a private siding agreement is in place. The maintenance boundary will be per the interface agreement. The private siding is therefore managed and maintained by the external party.	Y	N	N	Y
2	ARTC and external party both pay for an asset that supports their operations	Examples include; • ARTC VIC lease track adjacent to V/Line track with – o Culverts running continuously under both tracks o Level crossings over both tracks o Pole line route in corridor across both tracks • Telco has equipment fixed to ARTC communication tower • Private level crossing agreement	Y	Y	Y	Y
3	Entire asset is jointly managed by ARTC and an external party	Asset is typically a level crossing with one or more interfacing external parties, per the relevant interface agreement or lease document. Interface is typically split as follows; The road manager maintaining the road approach signage, line markings etc. ARTC managing the primary controls (sign or active equipment) at the crossing to a designated interface. ARTC owns and maintains its part of the overall asset.	Y	Y	Y	N

Scenario	Description	Details	ARTC Owned	ARTC Maintained	Shared Asset	Cost recovery
4	Asset owned by external party, which if not properly managed could impact ARTC business continuity	Examples include; • Rail bridge owned or maintained by local council • Common bridge abutments on MFN • Approach protection beams for road-rail overbridges • Road-rail overbridge • Footbridge over ARTC track	N	N	N	N
5	Asset owned by external party, with the external party paying ARTC to manage the asset	Examples include; • Sydney Trains Enfield yard signalling equipment • Benalla - Oakland branch line	N	Y	N	Y
6	Asset owned by external party, ARTC contributes to maintenance costs for the benefit of ARTC	E.g. maintenance costs for access road to ARTC communication tower site (access road not on ARTC land)	N	N	Y	N
7	Asset owned by ARTC, but maintained by an external party for the benefit of ARTC	Examples include; • Assets forming part of a lease or licence agreement with an external party • Corridor and cross licence agreement o Keswick to Belair Corridor o Keswick to Salisbury Corridor • Standard gauge signals owned by ARTC but maintained by the rail commissioner	Y	N	N	N