NOTE TO OUR SUPPLIERS

Digital Engineering is presently in the process of revising our existing procedures for asset information requirements. This document serves as a guideline, and suppliers are encouraged to collaborate closely with KiwiRail's DE team regarding ongoing projects' asset information needs. We will notify all our suppliers once the updated version is finalized and made available. Thank you.

Digital Engineering

Asset Information Requirements

Version 1

Document Control

Version History

Version Number	Version Date	Summary of Changes	Author
1.0	03 June 22	Initial publish for project use	Anna Whitmore, Andrew Shakes, Josh Bradfield

Reviewers' Name

Reviewer Name	Date	Signature	Position
D Jannings	7 June 2022		Digital Engineering Programme Manager
D Roberts	8 June 2022		Asset Information Manager - Network

Signed off by Approvers

Approver Name	Date	Signature	Position
A Lyon	17 June 2022		Programme Director – Digital Engineering

Final Distribution

Name	Position
File	-

Contents

Tables

Figures

1 Introduction

This document defines KiwiRail's Asset Information Requirements (AIR) which shall be applied in the production and delivery of asset information for KiwiRail.

This section sets out the purpose of the AIR and provides background and context.

1.1 PURPOSE

The purpose of this AIR is to define what asset information is required at project completion, to improve how as-built information is captured and managed.

The AIR aligns with the following DE Programme objective:

Provide information to everyone - democratise data (e.g. technical design models, laser scans) and drive data-based decision making across the CPAD portfolio, and in turn the wider business.

1.2 AIR OUTCOMES

By defining what asset information is required and how it shall be delivered, KiwiRail will achieve the following outcomes:

- Providing the supply chain with a clear scope for asset handover information to support an accurate tender process
-
- Ensure the right information is captured, stored and accessible in KiwiRail systems to support day one asset operation
- Increase the quality of asset information to improve asset management decision making
- Create the foundations for a future digital twin by capturing quality asset information

1.3 AUDIENCE

This AIR must be adopted by all task and delivery teams when managing information within a digitally enabled project.

The language and terminology used within the AIR is suited to project delivery professionals as the information required to be handed back is technical in nature.

1.4 TERMINOLOGY

This section articulates the 'language' of compliance. The following terms have defined meanings.

- must – describes a legal requirement
- shall – describes mandatory requirements of the standard;
- should – describes non-mandatory, best practice recommendations
- may – describes possible options that are neither mandatory nor best practice.

1.5 TERMS AND DEFINITIONS

For terms and definitions outlined in this document refer to Appendix A: Terms and Definitions.

1.6 FUTURE UPDATES

KiwiRail recognises that this AIR is a first release and includes some inconsistencies which will be addressed in future versions. KiwiRail welcomes feedback from users of the document.

The current workstreams in development include:

1. Asset information hand back toolset – to transform the process for defining and capturing asset data during project delivery.

2. Reconciliation of the required asset data attribution and GIS attribution
3. Information Delivery Plan Template – to standardise how asset information shall be delivered

1.7 REFERENCES

The AIR relies upon the information requirements collated from the following KiwiRail business units:

- CPAD – Capital Projects and Asset Development
    - Asset management
    - Digital Engineering
- Operations
    - Engineering Services
    - Network Services

In addition to these, it should be recognised that the AIR forms part of a larger document suite, and may draw reference to other relevant standards, requirements, specifications, or guidelines included in Table 1.

1.8 INFORMATION STANDARDS

The following standards shall be adopted during the production and exchange of asset information:

1. ISO 19650-3:2020 – Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM). Information management using building information modelling – Part 3: Operational phase of the assets.
2. ISO 19650-5:2020 - Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using building information modelling — Part 5: Security-minded approach to information management
3. ISO 16739 - Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries

1.9 FRAMEWORK DOCUMENTS

The KiwiRail DE Framework is a suite of documents as shown in Figure 1 and described in Table 1. This enables technical information to be covered in a specific document, for the right audience. The following two documents should be read in conjunction with this AIR:

- The **Digital Engineering Information Standard Part 2: Information Production** framework document provides additional guidance on the development of asset information.
- The KiwiRail **Information Delivery Plan** (IDP) provides a template for identifying project-specific information deliverables. The IDP sets out when information is to be prepared, by whom, and following what protocols and procedures for each delivery stage.

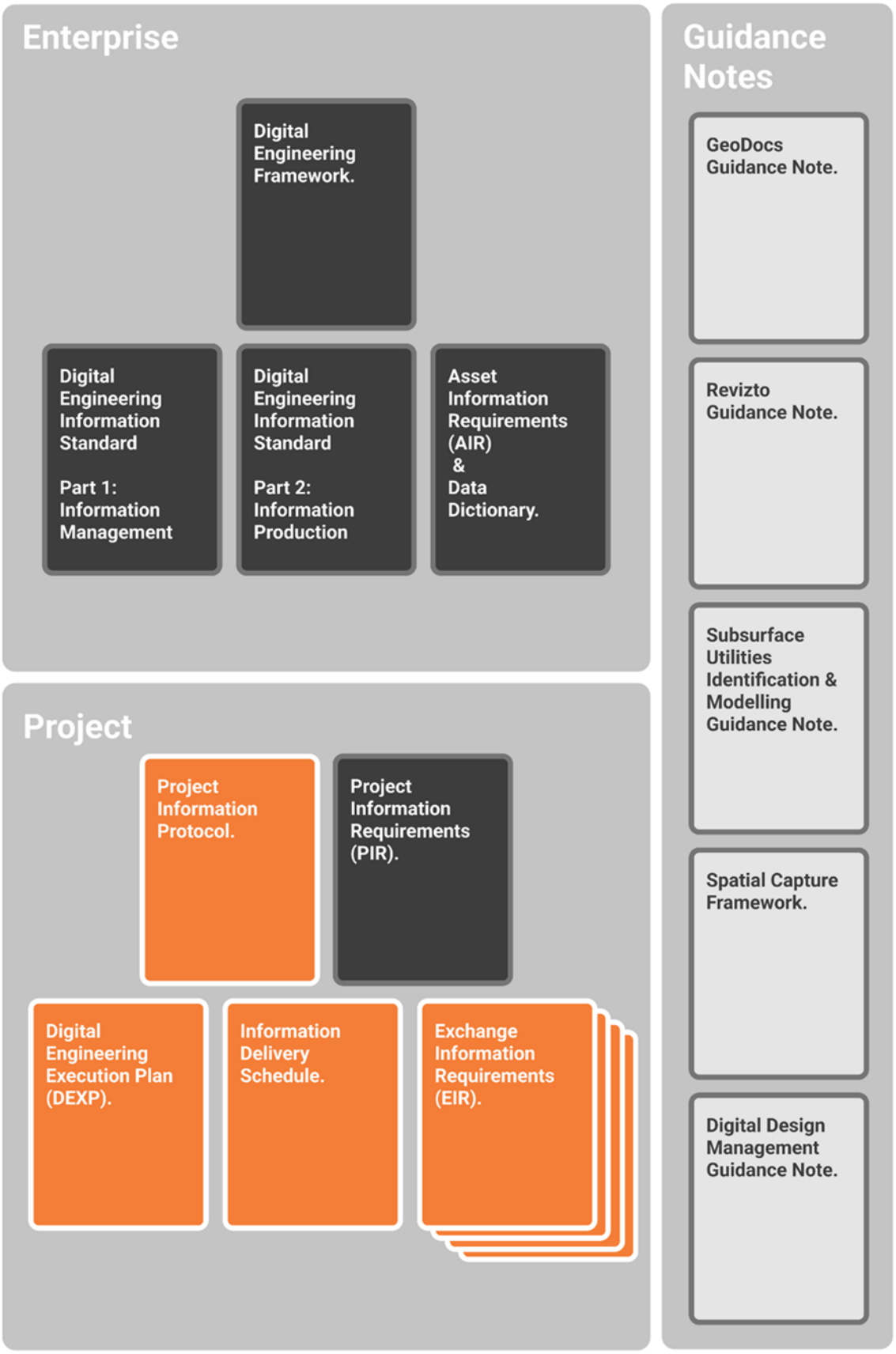

Figure 1: Digital Engineering Document Structure

Table 1: Digital Engineering Documentation

Document	Purpose
Enterprise	
Digital Engineering Framework	To outline KiwiRail's DE vision and overarching objectives. To provide guidance as to where specific detail can be found in other documentation.
Digital Engineering Information Standard – Part 1 (Management)	Outlines the process of how information is managed and consumed within the context of a project.
Digital Engineering Information Standard – Part 2 (Technical)	Outlines the details of how information should be produced by an author to meet KiwiRail's information requirements.
Subsurface Utilities Identification and Modelling Guidance Note	How to identify, model and transmit subsurface utility information to KiwiRail within a project.
3d Spatial Data Capture Framework	Outlines how spatial information is to be captured, created, reference, and controlled.
Asset Data Dictionary	Outlines all the possible asset types, and their associated attribution requirements.
GeoDocs Guidance Note	Supplementary document which covers off the correct usage of the CDE, including details of the background processes for those wanting additional detail.
Revizto Guidance Note	How KiwiRail standardise the use of Revizto across the KiwiRail projects portfolio.
Digital Design Management Guidance Note	Outlines how the DE tools & processes of KiwiRail's DE Framework can be embedded within the design phase of a capital project to support & enable design management fundamentals.
Project	
Digital Engineering Execution Plan (DEXP)	Outlines how Digital Engineering will be completed throughout the scope of the engagement, responding to the requirements outlined in the EIR. Outlines the roles and responsibilities within the supplier's organisation and can be used as a form of assessment for the tender submission process. Pre-contract is to be prepared by the supplier, and the post-contract is collaboratively developed between KiwiRail, its partners and the supplier.
Project Information Protocol	Provides additional clauses which enable the scope of Digital Engineering to be amended to the contract.
Information Delivery Schedule	Details the level of information need, required against asset data dictionary classifications, throughout the project lifecycle. Specifies the types of asset classifications expected throughout the scope of the project.
Project Information Requirements (PIR)	Includes general project information, including scope, stakeholders and high-level delivery milestones. Outline the overarching project specific digital initiatives for implementation on the project. PIR explain the information needed to answer or inform high-level strategic objectives within the appointing party in relation to a particular built asset project. PIR are identified from both the project management process and the asset management process. (extract from ISO)
Exchange Information Requirements (EIR)	Breaks down the overarching project objectives in the Project Information Requirements into the requirements of each engagement within a project at a detailed level. Details the expectations of information delivery against the project milestones. EIR set out managerial, commercial, and technical aspects of producing project information. The managerial and commercial aspects should include the information standard and the production methods and procedures to be implemented by the delivery team. (extract from ISO)

2 Asset information concept overview

This section describes Digital Engineering concepts, asset information types, how information is used across KiwiRail and the core asset information systems.

2.1 INFORMATION MODELS

There are two forms of information model being the Project Information Model, and the Asset Information Model.

2.1.1 Project Information Model (PIM)

The Project Information Model is delivered through two stages. The first stage is the Design Intent Model, and second is the Virtual Construction Model which is used for the fabrication/construction of the asset. Figure 2: The Project Information model (PIM) illustrates the types of information that contributes to the PIM.

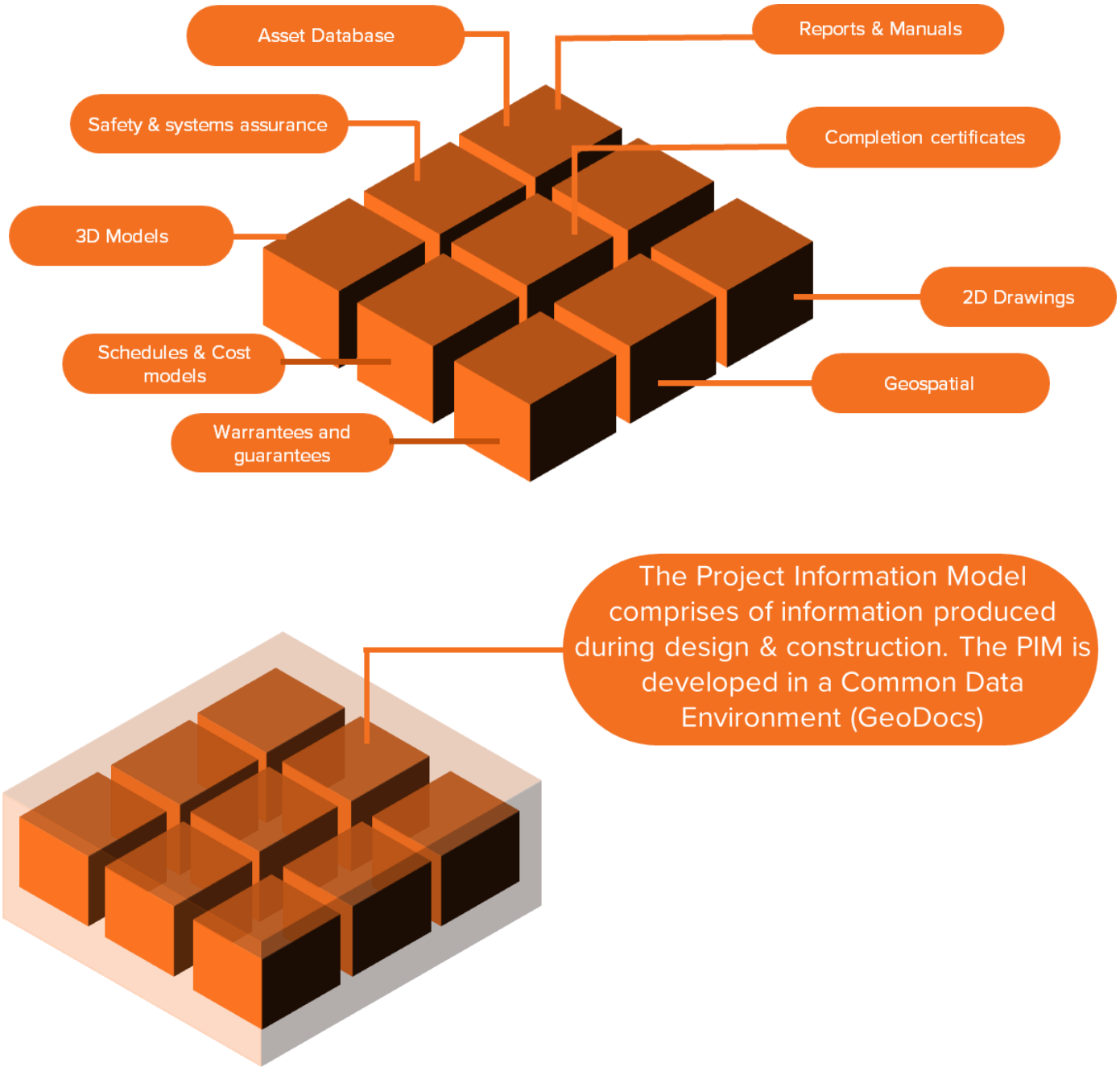

Figure 2: The Project Information model (PIM)

2.1.2 Asset Information Model (AIM)

The Asset Information Model (AIM) comprises of the completed Project Information Model (PIM), alongside information required for operations and maintenance, when all compiled within the KiwiRail asset management systems. The AIM specified supports the strategic and day-to-day asset management activities.

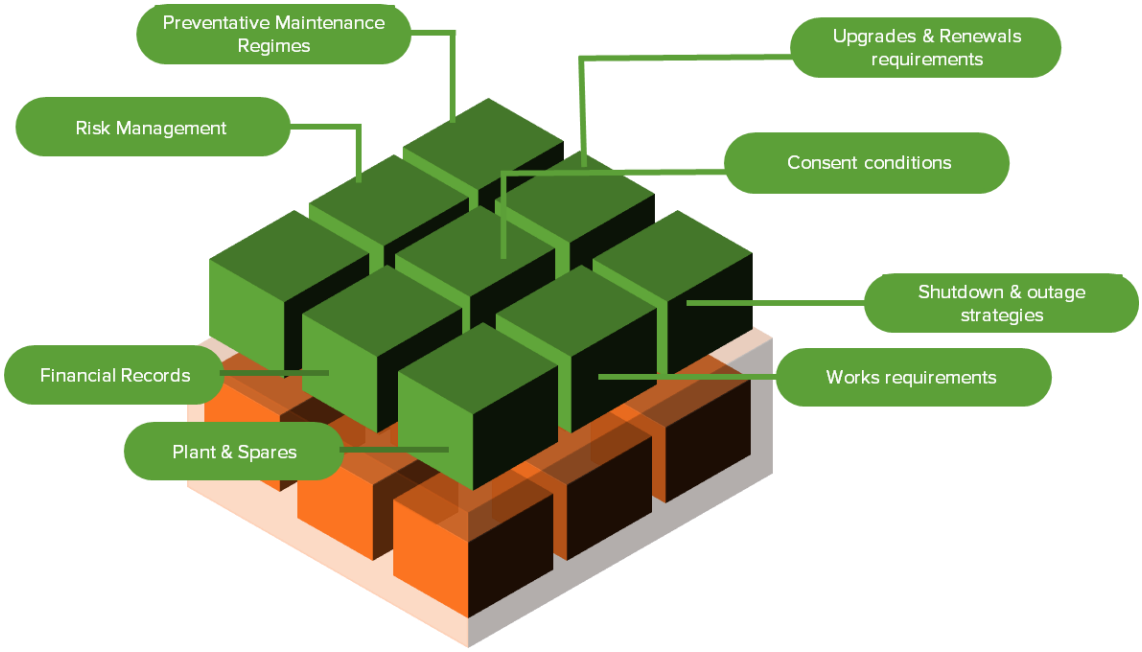

Figure 3: Asset Management activities inform asset information requirements

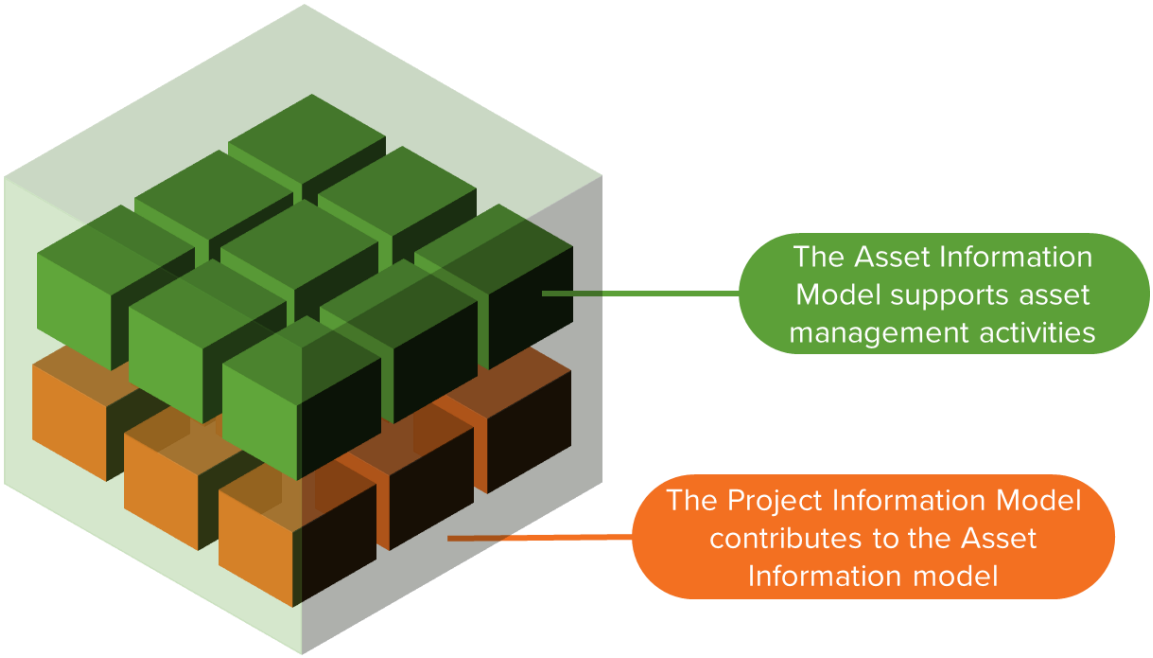

Figure 4: The Asset Information Model

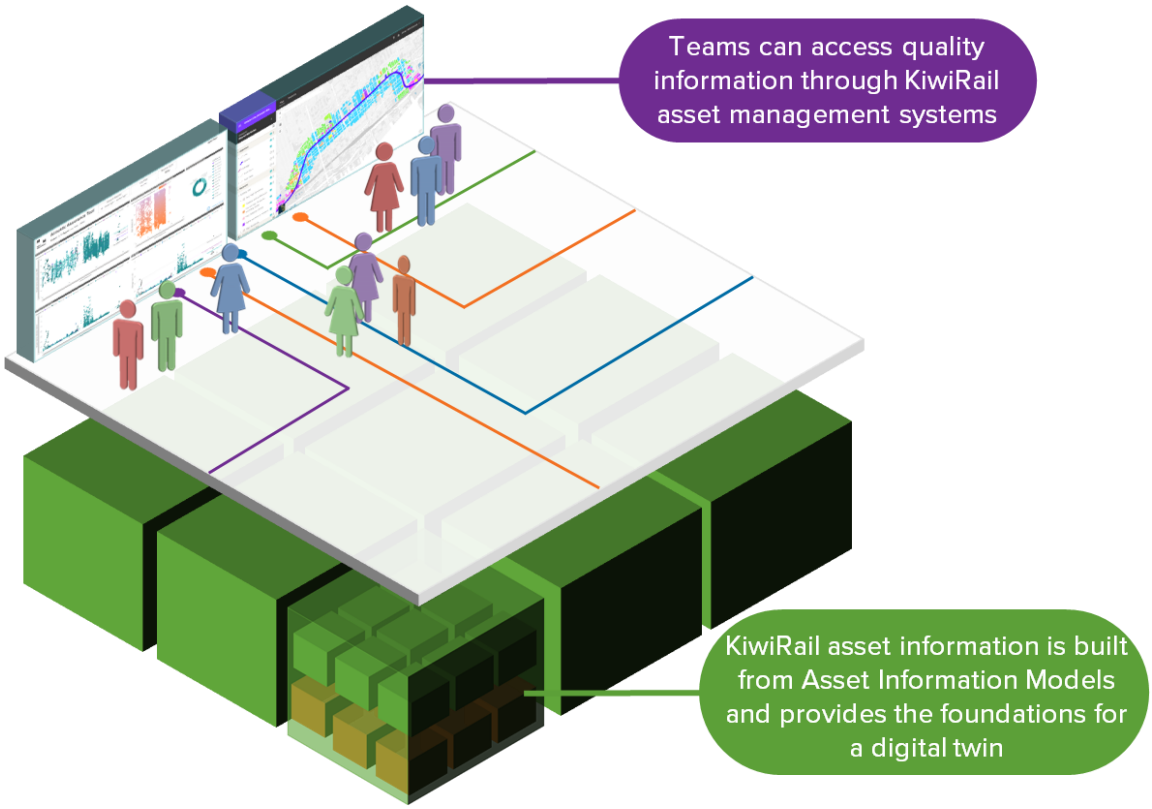

Figure 5: KiwiRail Enterprise Asset Information

Further information on the AIM and PIM is defined in the **Digital Engineering Information Protocol**.

The project specific PIR and KiwiRail AIR (this document) are distilled into **Exchange Information Requirements (EIR)**. PIR and EIR Guidance and templates are available on the **KiwiRail Digital Engineering website**.

2.2 HOW IS ASSET INFORMATION USED?

Asset information is consumed across the KiwiRail by different teams for different activities. The requirements detailed in this AIR were informed by the wider business, who are the end recipients of the information handed back from a project. Figure 6 describes how different roles across KiwiRail use asset information for decision-making across a range of use cases.

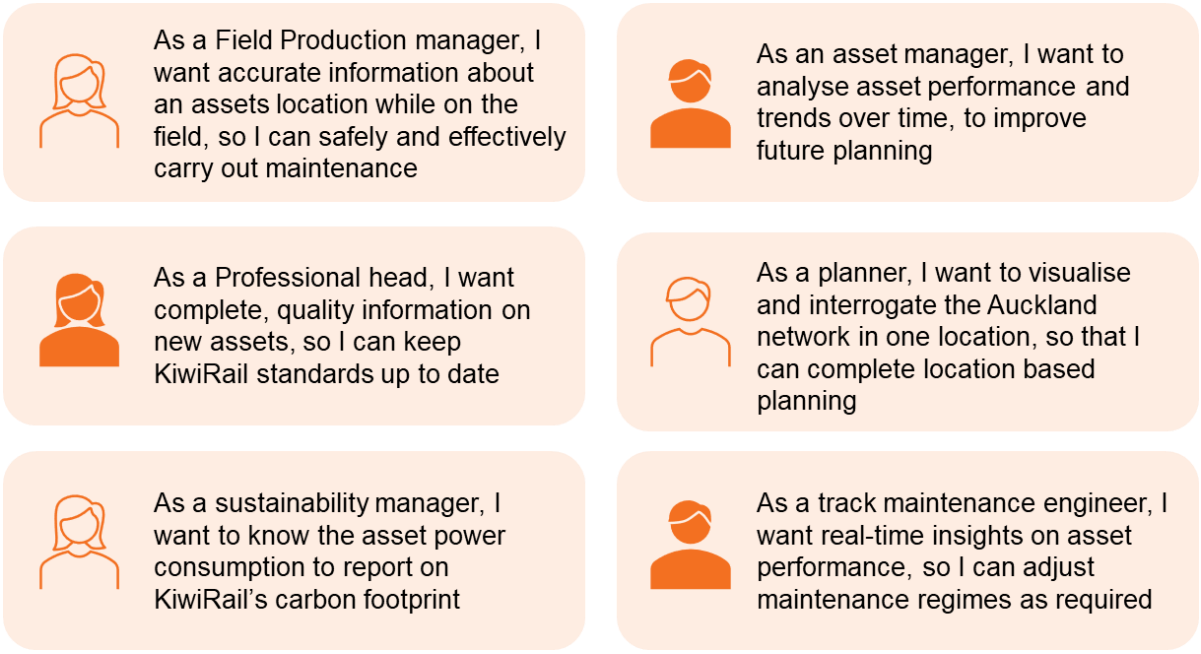

Figure 6: KiwiRail personas

2.2.1 Asset Information Types

There are different types of asset information that contribute to the Asset Information Model (AIM). Asset information has been grouped into the three types as shown in Figure 7.

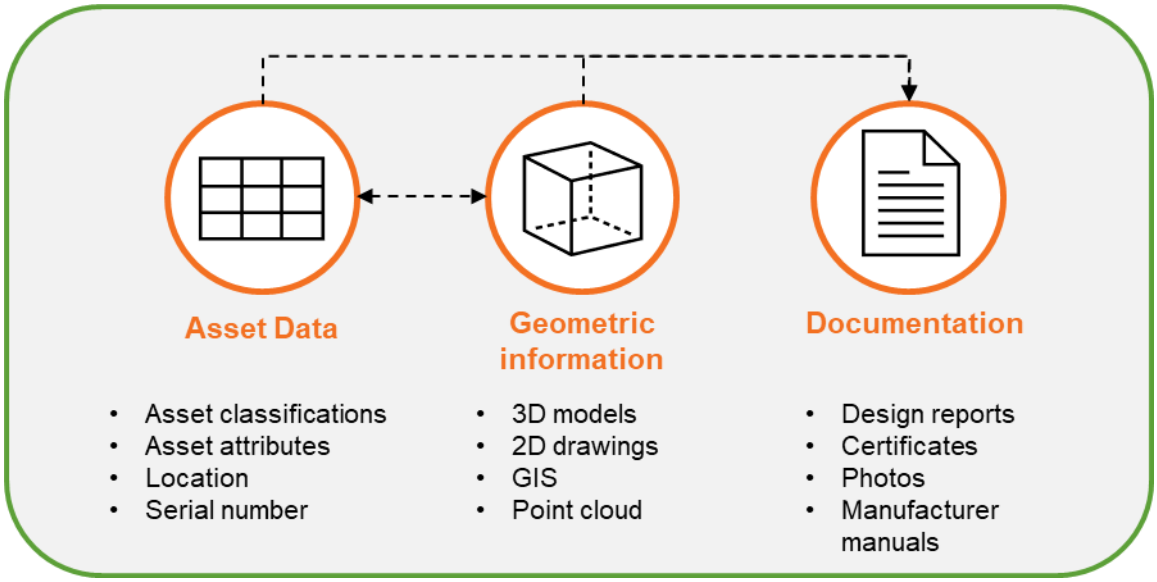

Figure 7: Asset Information Types

This document is structured based on these three information types, outlining what information is required and how it should be produced.

2.2.2 Common Data Environment (GeoDocs)

The KiwiRail Common Data Environment (CDE) creates a central source of truth for project information. The benefits of a CDE include streamlined processes, improved collaboration, and reduced rework.

All asset information handed back to KiwiRail should be transferred via the GeoDocs CDE. The KiwiRail Digital Engineering team will work collaboratively with the different business units to transfer the information into specific systems. This ensures all project information is stored on KiwiRail systems and mitigates the risk of incomplete information hand back.

Figure 8 provides an overview of information flows from the project teams, through the KiwiRail CDE and into the relevant operational business systems.

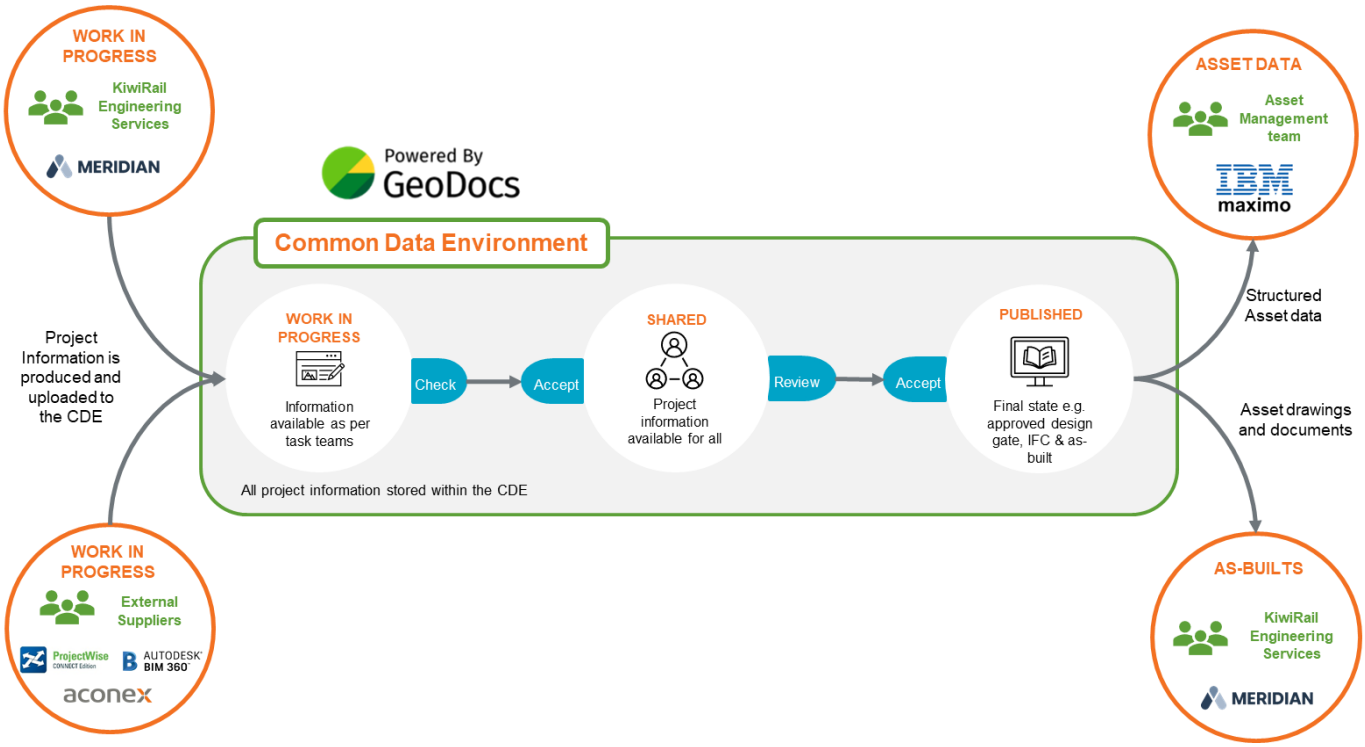

Figure 8: Project Information workflow through KiwiRail Systems

The KiwiRail Common Data Environment (CDE) for Capital Projects Delivery is GeoDocs. Detail on the GeoDocs CDE can be found in the **Digital Engineering Framework** and **GeoDocs Guidance Note.**

3 Asset data requirements

This section provides an overview of the asset data required prior to practical completion. At the time of publishing AIR Version 1.0, KiwiRail are developing an asset information hand back toolset. The purpose of the toolset is to improve the identification, exchange, and validation of asset data from the supply chain.

3.1 WHAT INFORMATION IS REQUIRED?

To support the efficient operation of KiwiRail assets, complete and accurate asset data must be captured and managed in KiwiRail Asset Information Management Systems.

All asset data shall be provided according to the KiwiRail Data Dictionary which has been informed by the KiwiRail asset management and maintenance teams. The KiwiRail Data Dictionary is an established hierarchy of asset information and defines a common language for identifying and classifying KiwiRail assets and spaces.

The KiwiRail Definition Viewer prescribes the attributes required for KiwiRail assets, aligned to the Data Dictionary.

The following sections provides an overview of the key asset information concepts within KiwiRail.

3.1.1 Asset classification information

Every KiwiRail asset has an assigned **classification** which determines what **attribution** is required for the asset. Each new asset delivered to KiwiRail must include the corresponding asset classification and required attributes. Figure 9 illustrates an asset classification example.

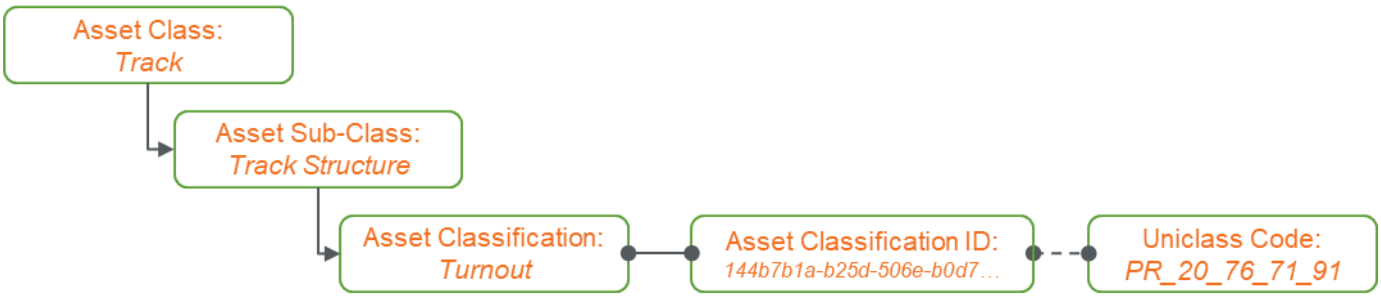

Figure 9: Asset Classification Example

3.1.1.1 Classification attributes

Asset attributes provide crucial information required for operations and maintenance. Figure 10 provides an example of some attributes required for assets classified as a Turnout.

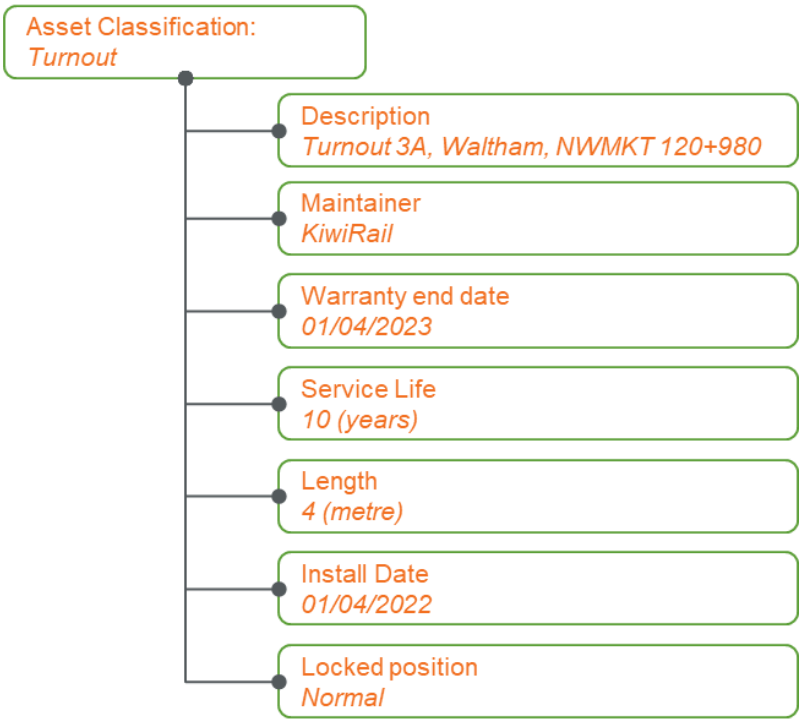

Figure 10: Example attributes required for Turnout Asset Classification

3.1.1.2 Uniclass Application

The Uniclass 2015 classification system, published by the National Building Specification (NBS), is a unified classification system for the built environment. The KiwiRail definition view provides Uniclass definitions where identified. Uniclass classifications should be defined for the first two hierarchy levels:

- Systems (Ss) Uniclass tables
- Product (Pr) Uniclass tables

Where a Uniclass classification is not available the KiwiRail Digital Engineering team should be informed and will provide a classification.

3.1.2 Asset Location information

3.1.2.1 Functional Location Type

A **Functional Location** describes an item in which other assets are operated, stored or repaired. A functional location has a one-to-many relationship with assets i.e. a functional location may contain multiple assets, but an asset can only be in one functional location.

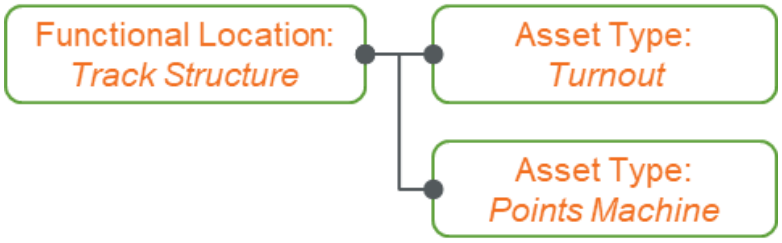

Figure 11: Example Functional Location

3.1.2.2 Linear reference

Linear referencing describes the position of an asset, event, or other asset information in relation to a linear asset. It may also be referred to as ‘chainage’, ‘meterage’ or ‘kilometerage.’ A linear reference can be expressed as an **absolute measure** (a distance along the linear asset from its origin) or as a **relative reference** (a distance along the linear asset from a reference point, whose position is also related to the origin of the linear asset).

For railway use, the reference point is typically a marker post adjacent to the railway. The **relative reference** form is similar to a street address for railway tracks and is the most commonly used form. There are four components of a relative linear reference:

- **Line** refers to the named rail corridors and is often abbreviated, e.g. North Island Main Trunk is abbreviated to the code NIMT.
- **Track** is used, where required, to position the asset or object relative to a specific track where there are two or more tracks running parallel.
- **Reference Point** is the known point from which the distance to the position of interest is measured. The reference point will always be a physical object and in most cases will be a Kilometre Post ('km post') adjacent the railway line. Note that km posts might not be spaced 1000m apart.
- **Offset** is the measured distance, in metres, from the reference point to the position of interest.

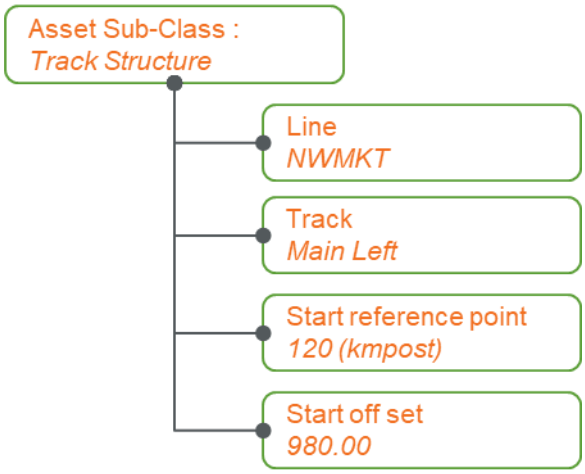

Figure 12: Linear Reference example

When using a km post as the reference point, the offset is usually represented as a 3-digit decimal fraction of a kilometre, for example NWMKT 120.980 is 980 metres past km post 120 on the Newmarket line, or with a plus sign instead of the decimal, e.g. NWMKT 120+980. Because both the decimal and plus form can cause confusion, reference point and offset must be provided in separate data fields.

Linear references can be converted to and from spatial coordinates. Guidance on how to derive linear references and convert between spatial coordinates is included in Appendix D: Linear Referencing Requirements.

3.1.3 Unique Identifier

Every asset shall have a unique identifier to provide a link between the asset and related graphical models, asset data, and documentation.

An asset identifier will be generated by the KiwiRail asset data hand back toolset at asset conception and serve as the primary key for the duration of project delivery. At asset handover the project asset identifier will be superseded by the KiwiRail asset identifier assigned in IBM Maximo.

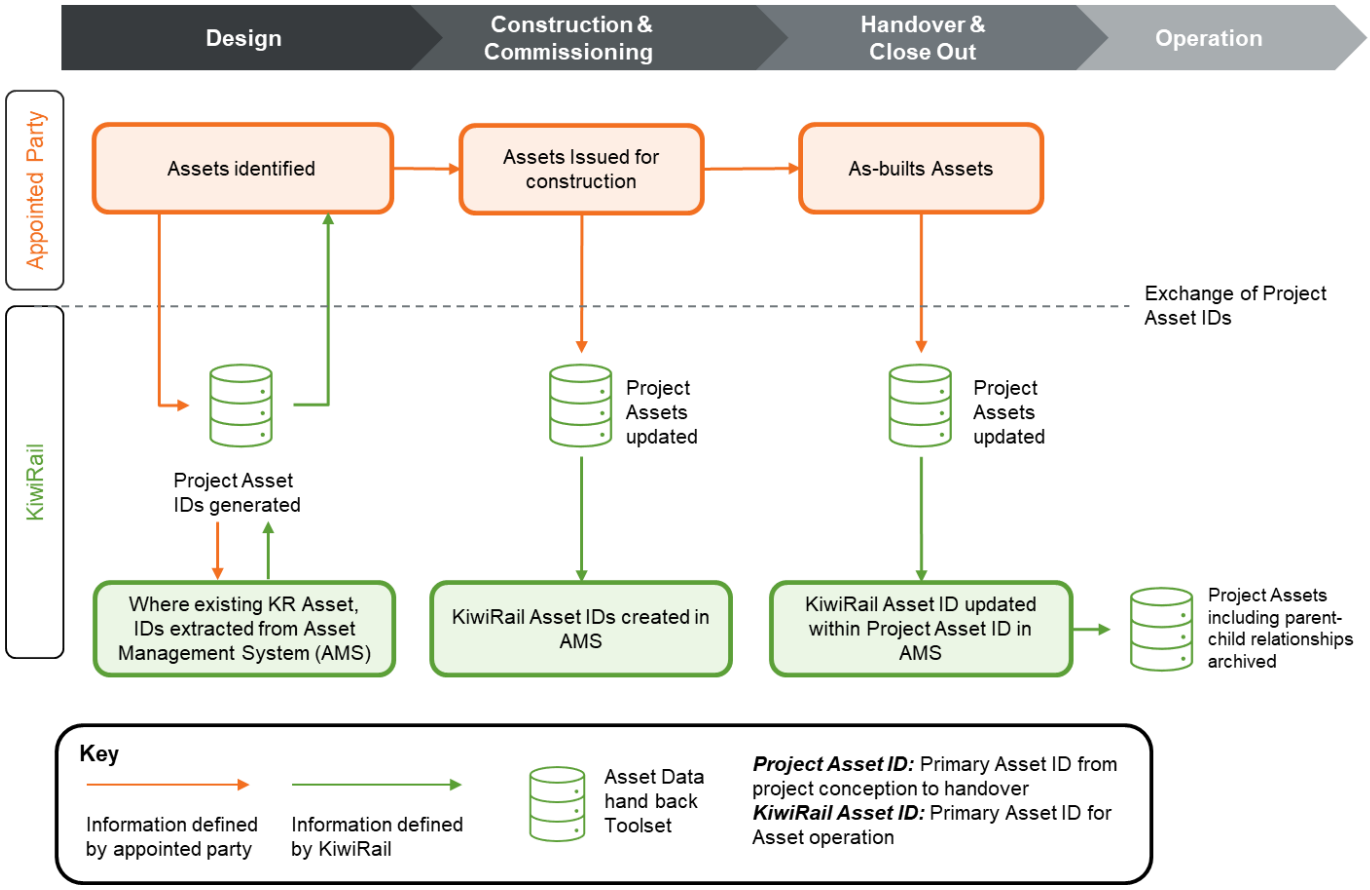

Figure 13: Unique Asset Identification flowchart

3.1.4 Asset naming conventions

At the time of developing this AIR there is no overarching KiwiRail asset naming convention. Certain asset classifications have defined naming conventions, e.g. Turnouts and Signals. Where defined, the conventions shall be followed and include in asset data in the *Name Description* attribute field.

3.1.5 Asset labelling convention

At the time of developing this AIR a KiwiRail asset labelling convention is under development. This will pertain to the physical labelling of the asset and is not considered within the scope of the AIR.

3.2 INFORMATION DELIVERY

The KiwiRail **Digital Engineering Information Standard Part 2: Information Production** provides details on how asset data should be produced. At project commencement **Exchange Information Requirements** shall be agreed, specifying the information deliverables, information exchange milestones and frequency.

3.2.1 Data structure

To facilitate standardised asset data delivery throughout the project lifecycle, the suppliers shall ensure that all asset data is populated in a standalone tabular format (i.e. COBie register) which may in some instances be derived from model attribution.

The following formats shall be accepted:

- A COBie register - as a subset of IFC (Industry Foundation Class), which is an open data schema, it provides a recognised structure for asset information deliverables. The use of COBie (Construction Operations Building information exchange) mitigates the time and potential inefficiency of transferring data between platforms.
- A flat tabular format (excel or csv) per asset classification.

As defined in the **KiwiRail Digital Engineering Information Protocol,** tabular asset data takes precedence over all other forms of attribution provided.

3.2.2 Quality assurance

At the time of publishing AIR Version 1.0, KiwiRail is developing an asset data hand back toolset to improve the quality of data received. The toolset shall validate asset data for the following quality metrics:

- Completeness – Is the required data present for a given exchange milestone (including metadata)?
- Uniqueness – Does the information have a unique identifier?
- Consistency – Is the number of assets and attribute data consistent?

It shall remain the responsibility of the supplier to ensure that all required attributes have been supplied, and any missing attributes amended and resubmitted to KiwiRail for approval.

3.2.3 Exchange milestones

To support asset management planning, a first version of asset data including the assets, attributes, and quantities should be provided at 'Issued for Construction' stage.

Complete asset data must be provided prior to asset handover.

Project specific information exchange milestones will be defined in the **Exchange Information Requirements**.

4 Asset documentation requirements

This section describes what asset documentation is required for asset management activities.

4.1 WHAT INFORMATION IS REQUIRED?

To support asset management activities a range of supporting documentation is required for each asset, such as operating guides, commissioning reports, photos and warrantees. These documents are used across KiwiRail by different teams for different purposes, and therefore must be discoverable and accessible across the business.

4.1.0 Asset operations information

4.1.0.1 Operations and maintenance

Information related to an asset's operation and maintenance requirements shall be provided to ensure KiwiRail can effectively plan, schedule and undertake maintenance.

Information should include:

- Operational and Maintenance requirements and procedures (PPNOPs)
- Inspection and monitoring requirements
- Training manuals
- Technical maintenance requirements
- Schedule of special tools, plant or equipment required
- Indicative operation and maintenance programmes
- Decommissioning procedures
- Shutdown and outage procedures
- Maintenance required for specific components to maintain Warranties and/or Guarantees

4.1.0.2 Manufacturer information

Original Equipment Manufacturer Manuals (OEM) shall be provided.

Warranties and guarantees shall be provided. Warranty installation dates, periods, and expiry dates shall also be provided as structured information as defined in the KiwiRail data dictionary.

4.1.0.3 Spares schedules

A spares schedule shall be provided for each asset type including:

- Illustrated parts list
- Supplier's details
- Recommended spare parts
- Availability of spare parts e.g., lead times
- Ordering details e.g., serial numbers

4.1.1 Health, safety and risk

The following information related to health, safety and risk shall be provided:

- Residual Hazard Log - residual hazards that may create issues during future asset management activities. For example, hazardous materials, undisturbed asbestos, ground investigation issues. The hazard should be attributed to an asset classification or unique asset id.
- Safety Related Application Conditions (SRAC) – the conditions, configurations, and constraints that need to be observed in order to operate or maintain the CRL assets safely and maintain the integrity of the safety argument. SRAC's should be attributed to an asset classification or unique asset id.
- Asset Risk Management Plans
- Safety in design reports
- Safety & system assurance certificates
- Failure Mode, Effects and Criticality Analysis

- Safety Assurance Reports
- Incident and response management plans

4.1.2 Design and as-builts

The following information related to asset design and as-builts shall be provided:

- Whole-of life assessments
- Maintenance and operation concepts
- Competency register for design, construction and T&C personal
- Design Calculations
- Design Reports
- Standards Departure List (Design Period)
- Design Gate & Completion Certificate
- Asset Data Sheets

4.1.3 Construction, commissioning and testing

The following information related to asset construction, commissioning and testing shall be provided:

- Construction
  - Construction Methodology/Method Statements
  - Signed Inspection and Test Plan(s)
  - Construction Monitoring Data
  - Constructions Records
  - Inspection Record Sheet(s)
  - Snagging / defects lists check sheets.
- Testing & Commissioning Supporting Documentation
  - Factory Acceptance test (FAT) certificate
  - Component and Materials assurance test certificate (CAT, MAT)
  - ASIT
  - Commissioning Values
  - Calibration Certificates
  - Producer Statements
  - Resource consents
- Property Information
  - Property Title/Deed
  - Deed of Grant
  - Grant of Right
  - Private Sidings Agreement
- Certificate of Train Running (CTR) and supporting completion test certificates

4.2 INFORMATION DELIVERY

4.2.1 Format

All documented asset information, such as a report or certificate, shall be delivered in the appropriate file format defined in **Digital Engineering Information Standard Part 2: Information Production**.

Where documented information cannot be provided in the format specified in the Information Production Standard (e.g. a manufacturer warranty), it may be provided as a machine readable PDF.

All documentation shall have metadata which maps the document to a unique asset identifier, asset classification and/or discipline. The metadata required will be defined in the IDP and depend on the type and expected usage of the information.

4.2.2 Exchange milestones

Documented information exchange milestones shall be agreed in project specific **Exchange Information Requirements**.

The KiwiRail **Information Delivery Plan** (IDP) template shall be completed by the lead delivery partner at project commencement and agreed between KiwiRail. This will define when information is to be prepared, by whom, and the Level of Information Need.

5 Geometric information requirements

Geometric information includes 3D models, geospatial information, 2D drawings, point clouds, and LiDAR outputs. Geometric information provides important context which, when combined with quality, structured asset data, supports KiwiRail Asset Management activities.

5.1 3D MODELS

The creation of quality, information rich 3D models is a key enabler for KiwiRail's Digital Engineering aspirations. The KiwiRail **Digital Engineering Information Standard Part 2: Information Production** defines the requirements to produce 3D Models during project delivery. The standard defines the Level of Information Need, file submission formats, model naming convention and as-built model requirements

During asset delivery, geometric information shall be provided on a monthly basis as outlined in the project contract and **Exchange Information Requirements**.

Asset data shall be embedded in the federated model, and where practical embedded in the native models during the design stages. Tabular asset data (3.1) should be derived from the 3D graphical model. The **Kiwirail Digital Engineering Information Protocol** defines precedence between tabular asset data and asset data contained within a graphical model.

5.2 GEOSPATIAL INFORMATION

5.2.1 What information is required?

Geospatial information is required for many KiwiRail assets, with some requiring multiple geometry types. For example, a fibre optic network has points for nodes, lines for cable, and polygons for cabinet assets.

Table 2 defines what asset types are required, including geometry and level of accuracy.

Table 2: GIS Information requirements

Asset	Geometry type	Accuracy level[2]
Track centreline	Lines	K5
Km posts	Points	K5
Tunnels	Lines	K5
Bridges and structures – including assets owned by other parties that pass over the rail corridor	Lines, polygons	K6
Underground services[1] - including other party utilities that pass through the rail corridor	Points, lines, polygons	K4
Culverts	Lines, points	K5
Electrified track	Lines	K5
Level crossings	Points	K7
Signals and Indicators	Points	K5
Ducting	Lines	K4
Fibre optic network	Points, lines, polygons	K4
Track structures including turnouts	Points	K5
Stations	Points	K8
Contaminated land	Polygons	K6

1 This requirement is in addition to a subsurface utility model and will be reviewed in future AIR versions.

2 Accuracy levels defined in the **KiwiRail Spatial Capture Framework**

All geospatial information shall contain a unique asset identifier (Section 3.1.3) in the layer attribution.

The required attribute information for each asset class is specified in Appendix E: GIS Attribution . KiwiRail recognises the duplication by requesting asset data in layer attribution and is extending the data dictionary to incorporate geospatial attribute data.

Each geospatial layer shall contain the following metadata:

Table 2: GIS Metadata Requirements

Metadata	Description	Format
Layer Name	KiwiRail GIS naming convention	Discipline_Originator_Description_DateUpdated *e.g. DR_LKA_Drainage layer_220512*
Description	meaningful description of the layer	Free text
Supplier Organisation	Name of the organisation that provided the data	Project specific list
Date Created	The date the provided dataset was created	DDMMYYYY
Date last updated	The date the provided dataset was last modified	DDMMYYYY
Last updated by	Name of the person/organisation that last updated the information	Project specific list

5.2.2 Information Delivery

Geospatial information shall be provided in the following format:

1. Esri file geodatabase
2. Coordinate system: NZTM/GD2000.
3. Vertical datum (including elevation attributes): NZVD2016
4. Geospatial information production shall follow the accuracy defined in the **Spatial Capture Framework**.

Timing of project specific information exchange milestones for geospatial information will be defined in the **Exchange Information Requirements**.

5.3 2D DRAWINGS

The **Digital Engineering Information Standard Part 2: Information Production** defines the requirements to for 2D drawings during project delivery.

As specified in the **Digital Engineering Information Protocol**, drawings must be derived from a graphical model.

As-built drawings are stored in Meridian – KiwiRail's drawing management platform. Drawing numbers shall follow the format Document Type – Line – Discipline – Drawing / Asset – Drawing number.

Table 3: 2D drawings naming convention

Component	Description	Format
Document Type	Document Type e.g. DR drawing	List - 2 letter alphanumeric
Line	Related train line	List – alphanumeric
Discipline	Related discipline e.g. Signalling, SI	List - 2 letter alphanumeric

Drawing / Asset Type	Type of drawing or asset e.g. Layout, component drawing	List - 2 letter alphanumeric
Drawing number	Drawing number – provided by KR	Numeric

The drawing requirements for Track, Civil and Signals 2D is detailed in Appendix F: Discipline 2D Drawing Requirements.

5.4 POINT CLOUD & LIDAR

The **Spatial Capture Framework** defines the required accuracy and currency of spatial data. The **Digital Engineering Information Standard Part 2: Information Production** defines the requirements to for Point Cloud & LiDAR during project delivery.

6 Appendices

6.1 APPENDIX A: TERMS AND DEFINITIONS

Term(s)	Definitions	ISO 19650 term
Appointed party	*Other consultants, sub-consultants to* the lead appointed party, who is the provider of information pertaining works, goods, *or services.*	✔
Appointing party	*End client, Asset owner or similar. Receiver of information from appointed party pertaining to works, goods or services.*	✔
Asset	*Item, thing, or entity that has potential or actual value to an organisation.*	✔
Asset information model (AIM)	An Asset Information Model (AIM) is a model that compiles the data and information necessary to support asset management, that is, it provides all the data and information related to, or required for the operation of an asset. – *Source NBS*	✔
Asset Life cycle	Life of the asset from the definition of its requirements to the termination of its use, covering its conception, development, operation, maintenance support and disposal.	✔
Author/Owner	The person responsible for the content in the information container.	
Building information modelling (BIM)	Use of a shared digital representation of a built asset to facilitate design, construction, and operation to form a reliable basis for decisions Note: BIM is a process for sharing structured information	✔
Classification	Information classifications allow information objects to be grouped for the purpose of common, agreed controls. Examples of controls may include object permissions, workflows, naming etc.	
Common data environment (CDE)	A system that manages the collaborative production, control and exchange of information based on a common standard and agreed access.	✔
Content engine	A content engine is a system designed to manage the production, control, and exchange of project information. Content engines are chosen based on the content they will manage	
Deliverable	Information container contractually agreed to be supplied to the client. The product of engineering and design efforts to be delivered to the client as digital files and / or printed.	
Delivery team	Lead appointed party and their appointed parties. Multi-organizational team working on a part of the project under a lead appointed party	✔
Design Intent Model	A stage of the project information model which demonstrates the early co-ordination of multidisciplinary design elements, including outline specifications and requirements.	✔
Digital Engineering Execution Plan (DEXP)	An agreed set of information to define the projects Digital Way of Working during the delivery phase. The digital work plan may also be referred to as a BIM Execution Plan, Digital Engineering Execution Plan, this may be dependent on industry or clients.	
Document	Information (meaningful data) and the medium on which it is contained. Container for persistent information that can be managed and interchanged as a unit. This can represent snap shots from the information model for a specific purpose. This is a synonym to information container	
Document code	A unique code attached to an information container for management purposes. The document code may also be referred to as the Information container code when applied to an information object.	
Information	For the purpose of this standard information is defined as geometric and non-geometric objects or set of objects that forms part of the project information model and ultimately the asset information model.	
Information breakdown structure	A means of grouping information objects by a common purpose. For example, by Work breakdown structure or plant area or facility.	

Term(s)	Definitions	ISO 19650 term
Information container	A named persistent set of information retrievable from within a file, system, or application storage hierarchy. An information container can refer to a specific information object or a set.	✔
Information life cycle	Information on a project goes through several stages starting with the requirements for information to the final archiving of the information after project closure.	
Information object	A specific information container such as a document, geometrical model or piece of data which is produced, received, or referenced during the delivery of the project. This is a synonym to information container	
Information set	A set of information objects grouped for the purpose of information control. This control may include reporting, quality assurance or workflow state change activities. Information sets will be typically applied to define groups of information objects delivered as part of the transmittal process. For example, an engineering work pack containing a number of information objects.	
Issued	An information object, or information package, that is distributed either internally or externally formally via a transmittal. The act of issuing may be carried out for many reasons and is defined by status coding. Typically, information is issued at defined workflow state changes such as Shared and Published.	
Lead appointed party	“Lead consultant”, EPC (Engineering, Procurement and Construction) or similar	✔
Metadata	Data that describes the information container stored in a common data environment (For example: project number, title, life cycle state, revision, etc.).	
Native	Term used for the information objects original file format created by the authoring application. E.g. docx, dwg, dgn, or rvt	
Phase	A point in time of an asset life cycle examples include opportunity, delivery and operational.	
Project	Unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time, cost, and resources. For the purpose of this standard, a project is the full life cycle from initiation project hand back/closeout according to the KiwiRail CPAD Manual.	
Project Information Management	Project Information Management is the application of management techniques and computer software to collect project information, communicate it within and outside the organization, process it to enable managers to make quicker and better decisions and ultimate disposition through archiving or destruction.	
Project information model (PIM)	A Project Information Model (PIM) is a model that compiles the data and information necessary to support design and construction phase of an asset, that is, it provides all the data and information related to, or required for the build of an asset.	✔
Project team	Appointing party and all the delivery teams	✔
Published	An information container is identified as ready for use outside the delivery organization, its actual use is typically defined by status coding clearly defines its allowed use and may enable it to be used to support different life cycle phases. Typically, it will be formally issued to the employer or contractor at this life cycle phase and in a suitable format.	
Rendition	A non-editable version of a native information container, typically a PDF or 3D review format such as Autodesk’s Navisworks or Bentley’s imodel.	
Retention period	A time period applied to records to ensure retention of information to meet legal obligations and support business continuity. Retention periods are governed by the KiwiRail Information Management Policy, KRG-IS008-POL0.	

Term(s)	Definitions	ISO 19650 term
Revision	A formal label stored on an information container to formally identify it from previous copies of the information container. Typically, revisions are incremented to reflect changes in life cycle states. Revisions may be alpha or numeric characters or a combination of both. Note: Revision numbers within the KiwiRail CDE are alphanumerical (e.g. P01) and are automatically assigned based on review/approval workflows.	
Shared	Once development of a deliverable has reached a suitable point and has been suitably checked, reviewed, verified, and approved, it may be shared outside of the immediate task team. Typically, this is the point at which the design may be translated and made available for cross discipline coordination. The information container may also be issued for external quality assurance review and/or verification processes.	
State	A state represents the different areas of the Common data environment workflow through which information objects transition. The only defined states applied by this standard are Work in Progress, Shared, Published and Archived.	
Status code	A formal label stored on an information container to formally identify the allowed use of the information container in a specific state in the workflow. (This term is contained in ISO 19650 and is also known as a suitability code).	✔
Supplier	Supplier is used as an all-encompassing term for any party contracted to KiwiRail to undertake any form of work, which could include; design (by a design consultancy) or construction (undertaken by a contractor).	
Task Information Management	The management of information sets defined by individual activities or tasks. Each activity has a task information delivery plan (TIDP) which described its information container, format, schedule etc. Task information delivery plans are combined to form a master information delivery plan (MIDP).	
Task team	Individuals assembled to perform a specific task. One or more task teams are appointed by the delivery team. Small projects may define a single task team.	✔
Version	Versioning is a system-controlled copy of the information object to define an auditable history of change.	
Virtual Construction Model	The virtual construction model provides information describing the detailed design, and should be relied upon for construction sequencing, methodologies, and other construction planning, before commencing construction on site.	✔
Work breakdown structure (WBS)	A means of breaking up the delivery of a project scope into packages, typically defined by a hierarchical coding system. *"deliverable oriented hierarchical decomposition of the work to be executed by the project team." – PMBOK definition.*	
Work in progress (WIP)	The first state in a workflow at which effort is applied, ongoing development of a task or deliverable prior to review and approval for share outside the originating task team. Typically work in progress is the only state where an information container can be edited.	✔
Workflow	The automation of a business process, in whole or part, during which information or tasks are passed from one participant to another for action, according to a set of procedural rules, a series of states.	

6.2 APPENDIX B: DOCUMENT TYPE CODE LIST

Code	Document Type	Code	Document Type
AM	Agenda/Minutes	**MN**	Manual
AS	Assumption	**MO**	Memorandum
AU	Audit	**MP**	Management Plan
BQ	Bill of Quantities	**NC**	Notice to Contractor
BR	Brief	**NE**	Notice to Engineer
CA	Calculations	**PC**	PCG Documents
CD	Credit Summary	**PF**	PERF
CE	Certificates	**PL**	Policy
CH	Change Note/Request	**PP**	Pricing Package
CN	Construction Notes	**PR**	Process or Procedure
CO	Consents	**PS**	Presentation
CR	Correspondence	**QA**	Quality Assurance
CT	Contract	**RF**	Reference
DA	Design Advice	**RG**	Register
DD	Design Departure Request	**RP**	Report
DG	Drawing	**RQ**	Requirements
DR	Document Review Record	**RR**	Risk Register
DR	Drawing Register	**SH**	Schedule (Programme)
DV	Design Verification Record	**SK**	Sketch
ES	Estimate	**SO**	Set Out
EV	Evidence	**SP**	Specification
FM	Form	**ST**	Standard
FN	Financial	**TE**	Tender Document
FR	Forecasts	**TM**	Template
GL	Guideline	**TN**	Technical Note
IM	Image/Photo/Video	**TP**	Task Plan
MA	Media	**TR**	TOR
MD	Model	**TS**	Transmittal

6.3 APPENDIX C: DISCIPLINE CODE LIST

Code	Discipline	Code	Discipline
AC	Access Management	**IM**	Integrated Management Systems
AS	Asset Management	**LD**	Landscaping
BC	Business Case	**ME**	Mechanical Engineering
BM	Benefits Management	**MP**	Mechanical, Electrical and Plumbing
CC	Civil Engineering	**OL**	Overhead Line Equipment / Traction
CM	Commercial Management	**PM**	Project Management/Controls
CN	Contractor Management	**PR**	Procurement
CO	Cost Management	**PS**	Project Management System
CP	Construction Planning	**QS**	Quantity Surveying
CS	Communications Systems	**RE**	Resource Management/Environmental Planning
CS	Communications and Stakeholder	**RI**	Risk
CT	Construction	**RM**	Rail Maintenance
DM	Design Management	**RQ**	Requirements Management
DR	Drainage	**RO**	Rail Operations
EH	Electrical HV	**RS**	Rail Systems (general)
EL	Electrical LV	**SA**	Safety and Systems Assurance
FE	Fire Engineering	**SC**	Scheduling and Time control
FI	Finance	**SM**	Stakeholder Management
GE	General Engineering	**SI**	Signalling
GS	GIS	**ST**	Structural
GT	Geotechnical Engineering	**SV**	Survey and Mapping
GV	Governance	**SU**	Sustainability
HF	Human Factors	**TE**	Traffic Engineering
HR	Human Resources	**TR**	Transport, Planning, and Integration
HS	Health, Safety and Environment	**TU**	Tunnels
		UT	Utilities

6.4 APPENDIX D: LINEAR REFERENCING REQUIREMENTS

6.4.1 Deriving Linear references

It is important to convert between linear reference and spatial coordinates accurately and consistently.

Where practical, it is preferred to derive linear references from as-built coordinates, but there may be specific occasions where the linear reference is measured out on site – using a measuring wheel.

- Coordinates used to convert to linear references must be accurate as defined in the **Spatial Capture Framework**.
- Conversion must be through approved KiwiRail processes. A web-based tool is expected to be available for this purpose in late 2022. In the interim the conversion must be completed by the KiwiRail Digital Engineering team.

6.4.2 Interim conversion requirements

For line features the start and end coordinates must be supplied separately. For polygon geometry the KiwiRail track centreline should be used to derive start and end coordinates. Polygon or line geometry will not be accepted.

A CSV of coordinates must be provided with the following schema for conversion:

- UniqueID
- X coordinate
- Y coordinate

The above headings should be included on the first row.

The coordinate system must be specified and be one of either:

- A local circuit (Eg Wellington Circuit)
- NZTM
- WGS84 (decimal degrees)
- Web mercator

A CSV will be returned containing UniqueID, Line, Side, Km, Offset

6.5 APPENDIX E: GIS ATTRIBUTION

For each GIS dataset the following attribute schema shall be provided:

Dataset	Geometry type	Attribute	Attribute type
Bridges	line	BRIDGE_NUM	char(10)
Bridges	line	LINE_NAME	char(50)
Bridges	line	TRACK	char(15)
Bridges	line	FROM_KM	char(10)
Bridges	line	TO_KM	char(10)
Bridges	line	BRIDGE_NAM	char(100)
Bridges	line	BRIDGE_TYP	char(50)
Bridges	line	COMMENTS	char(100)
Bridges	line	SEARCH	char(25)
Bridges	line	LINE_NAME_	char(50)
Bridges	line	ID_Maximo	char(255)
Culverts	point	KRSTARTOFFSETPROJ	double
Culverts	point	MATERIAL	char(30)
Culverts	point	FORM	char(30)
Culverts	point	WIDTH	double
Culverts	point	DEPTH	double
Culverts	point	HEIGHT	double
Culverts	point	DIAMETER	double
Culverts	point	MULTI	double
Culverts	point	ASSETNUM	char(255)
Ducting	line	Depth	double
Ducting	line	Status	char(255)
Ducting	line	Diameter	integer
Ducting	line	Material	char(50)
Electrification	line	ID_Maximo	double
Electrification	line	TrackInfo	char(150)
Electrification	line	Location	char(100)
Electrification	line	Reference	char(50)
Electrification	line	Type	char(50)
Electrification	line	Comments	char(150)
FibreOptic	line	GRANTEE	char(50)
FibreOptic	line	GRANT_NUMB	char(20)
FibreOptic	line	RIGHT_NUM	char(20)
FibreOptic	line	LINE_CODE	char(20)
FibreOptic	line	KM_FROM	char(20)
FibreOptic	line	KM_TO	char(20)
FibreOptic	line	STATION	char(50)
FibreOptic	line	DESCRIPTION	char(150)
FibreOptic	line	DATE_ADDED	date
FibreOptic	line	FILE	char(30)

FibreOptic	line	PLAN_REF	char(100)
FibreOptic	line	AS_BUILT	char(10)
FibreOptic	line	SEARCH	char(20)
FibreOptic	line	COMMENTS	char(150)
FibreOptic	point	GRANTEE	char(50)
FibreOptic	point	GRANT_NUMB	char(20)
FibreOptic	point	RIGHT_NUM	char(20)
FibreOptic	point	LINE_CODE	char(20)
FibreOptic	point	KM_FROM	char(20)
FibreOptic	point	KM_TO	char(20)
FibreOptic	point	STATION	char(50)
FibreOptic	point	DESCRIPTION	char(150)
FibreOptic	point	DATE_ADDED	date
FibreOptic	point	FILE	char(30)
FibreOptic	point	PLAN_REF	char(100)
FibreOptic	point	AS_BUILT	char(10)
FibreOptic	point	SEARCH	char(20)
FibreOptic	point	COMMENTS	char(150)
FibreOptic	polygon	GRANTEE	char(50)
FibreOptic	polygon	GRANT_NUMB	char(20)
FibreOptic	polygon	RIGHT_NUM	char(20)
FibreOptic	polygon	LINE_CODE	char(20)
FibreOptic	polygon	KM_FROM	char(20)
FibreOptic	polygon	KM_TO	char(20)
FibreOptic	polygon	STATION	char(50)
FibreOptic	polygon	DESCRIPTION	char(150)
FibreOptic	polygon	DATE_ADDED	date
FibreOptic	polygon	FILE	char(30)
FibreOptic	polygon	PLAN_REF	char(100)
FibreOptic	polygon	AS_BUILT	char(10)
FibreOptic	polygon	SEARCH	char(20)
FibreOptic	polygon	COMMENTS	char(150)
Kmposts	point	KM	float
Kmposts	point	LINE	char(40)
Kmposts	point	KPOST	char(50)
Kmposts	point	CONFIRMED	smallint
Kmposts	point	LINECODE	char(10)
Kmposts	point	LINE_CAP	char(40)
Kmposts	point	NEEDSCHECK	char(5)
Kmposts	point	SEARCH	char(80)
Kmposts	point	LINE_ABBRV	char(255)
LevelXing	point	alcamID	char(6)
LevelXing	point	lineName	char(50)
LevelXing	point	km	double

LevelXing	point	type	char(50)
LevelXing	point	control	char(50)
LevelXing	point	ownership	char(50)
LevelXing	point	assetID	char(10)
LevelXing	point	deedOfGran	char(10)
LevelXing	point	xingType	char(25)
LevelXing	point	lon	double
LevelXing	point	lat	double
LevelXing	point	Status_Xin	char(254)
LevelXing	point	ID_Maximo	char(254)
LevelXing	point	GISComment	char(254)
LevelXing	point	ValidateStatus	char(50)
TrackCentreline	line	StartKm	double
TrackCentreline	line	LINE	char(40)
TrackCentreline	line	LINE_Type	char(50)
TrackCentreline	line	LINE_ABBRV	char(20)
Services	line	GRANT_NUMB	char(20)
Services	line	CLASS	char(50)
Services	line	DESCRIPTIO	char(100)
Services	line	TLA	char(150)
Services	line	COMMENTS	char(150)
Services	point	GRANT_NUMB	char(20)
Services	point	CLASS	char(50)
Services	point	DESCRIPTIO	char(100)
Services	point	TLA	char(150)
Services	point	COMMENTS	char(150)
Services	polygon	GRANT_NUMB	char(20)
Services	polygon	CLASS	char(50)
Services	polygon	DESCRIPTIO	char(100)
Services	polygon	TLA	char(150)
Services	polygon	COMMENTS	char(150)
Signals	point	LineCode	integer
Signals	point	KR_LINE	char(8000)
Signals	point	ASSETNUM	integer
Signals	point	DESCRIPTION	char(8000)
Signals	point	STATUS	char(8000)
Signals	point	EditedBy	char(50)
Signals	point	EditedOn	date
Signals	point	Xcoord	double
Signals	point	Ycoord	double
Signals	point	LABEL	char(15)
StationsMajor	point	STATION	char(20)
StationsMajor	point	KM	double
StationsMajor	point	LINE_SECTI	char(100)

Structures	polygon	ASSETID	char(5)
Structures	polygon	STATIONCOD	char(5)
Structures	polygon	STATION	char(50)
Structures	polygon	ASSETTYPE	char(20)
Structures	polygon	GISAREA	double
Structures	polygon	VISIBLEAER	smallint
Structures	polygon	COMMENTS	char(100)
Structures	polygon	XCOORD	double
Structures	polygon	YCOORD	double
Structures	polygon	KM	double
Structures	polygon	TRACKSIDE	char(1)
Structures	polygon	DATASOURCE	char(50)
Structures	polygon	ID0	char(10)
Structures	polygon	CNUMBER	char(50)
Structures	polygon	COMPANYALL	char(50)
Structures	polygon	STATUS	char(15)
Structures	polygon	Toilet	char(255)
TrackStructure	point	Location	char(254)
TrackStructure	point	Reference	char(50)
TrackStructure	point	Type	char(50)
TrackStructure	point	Comments	char(150)
TrackStructure	point	ID_Maximo	char(255)
Tunnels	line	TUNNEL_NUM	char(10)
Tunnels	line	LINE_NAME	char(50)
Tunnels	line	FROM_KM	char(10)
Tunnels	line	TO_KM	char(10)
Tunnels	line	TUNNEL_NAM	char(100)
Tunnels	line	SPATIAL_SO	char(15)
Tunnels	line	COMMENTS	char(100)
Tunnels	line	SEARCH	char(25)
Tunnels	line	LINE_NAME_	char(50)
Tunnels	line	ID_Maximo	char(255)
ContaminatedPolygon	Polygon	SITENAME	char(50)
ContaminatedPolygon	Polygon	TYPE	char(50)
ContaminatedPolygon	Polygon	COMMENTS	char(50)
ContaminatedPolygon	Polygon	SITEAREA	char(50)
ContaminatedPolygon	Polygon	CONTAMINATED	char(50)
ContaminatedPolygon	Polygon	CONSULTANT	char(50)
ContaminatedPolygon	Polygon	REPOARTLINK	char(255)
ContaminatedPolygon	Polygon	MANAGEMENT	char(50)
ContaminatedPolygon	Polygon	REPORTDATE	date
ContaminatedPolygon	Polygon	PROCEDURE	char(50)
ContaminatedPolygon	Polygon	EDITORNAME	char(50)

6.6 APPENDIX F: DISCIPLINE 2D DRAWING REQUIREMENTS

For discipline specific drawing information requirements contact the KiwiRail Digital Engineering team.

KiwiRail