Tucana Guidance Note

Version 1

Document Control

Version History

Version Number	Version Date	Summary of Changes	Author
1.0	20/08/2021	Initial publish for project use	A Lyon / N Carey
1.1	13/05/2022	Included reference to new Digital Design Management Guidance Note	N Wagner
1.2	14/03/2024	Revised to reflect major upgrades within the CDE including the name change.	N Carey

Reviewers' Name

Reviewer Name	Date	Signature	Position
T Bray	22/03/2024	*Tyson Bray*	Digital Engineering Programme Manager

Signed off by Approver

Approver Name	Date	Signature	Position
D Jannings	22/03/2024		Programme Director – Digital Engineering

Contents

Tables

Figures

1   Introduction

1.1   OVERVIEW

To support their digital objectives KiwiRail have implemented a Common Data Environment (CDE).

The CDE is a structured data environment that holds KiwiRail's project and asset information during the delivery of a project. As a Crown Entity and a key New Zealand infrastructure owner, it is essential that we hold our project and asset data in a central place that is easily accessible.

Tucana is a cloud-based ecosystem of digital tools that sit under a single interface. It allows all models, drawings, survey data, documentation, and all other project information to be located and viewed in one place over the lifecycle of the project.

The CDE facilitates the production and sharing of project information and has the capacity to host both iterative/preliminary information and final/contractual information (e.g. Issue for Construction, As-builts etc). The platform provides a contract management and correspondence function to support project delivery and supports the transfer of information to organisational Asset Management Systems.

1.2   CDE DESIGN PRINCIPLES

The Common Data Environment (CDE) is defined in ISO 19650-1:2018 as the agreed single source of information for a given project or asset, for collecting, managing, and disseminating information through a managed process.

During the delivery phase of a project, the CDE workflow solution supports the management of information including activities for the production, quality assurance, and exchange of information.

Figure 1 below represents the organisation roles and relationships as defined by ISO 19650-1:2018

Figure 1 ISO 19650 CDE Team Structure
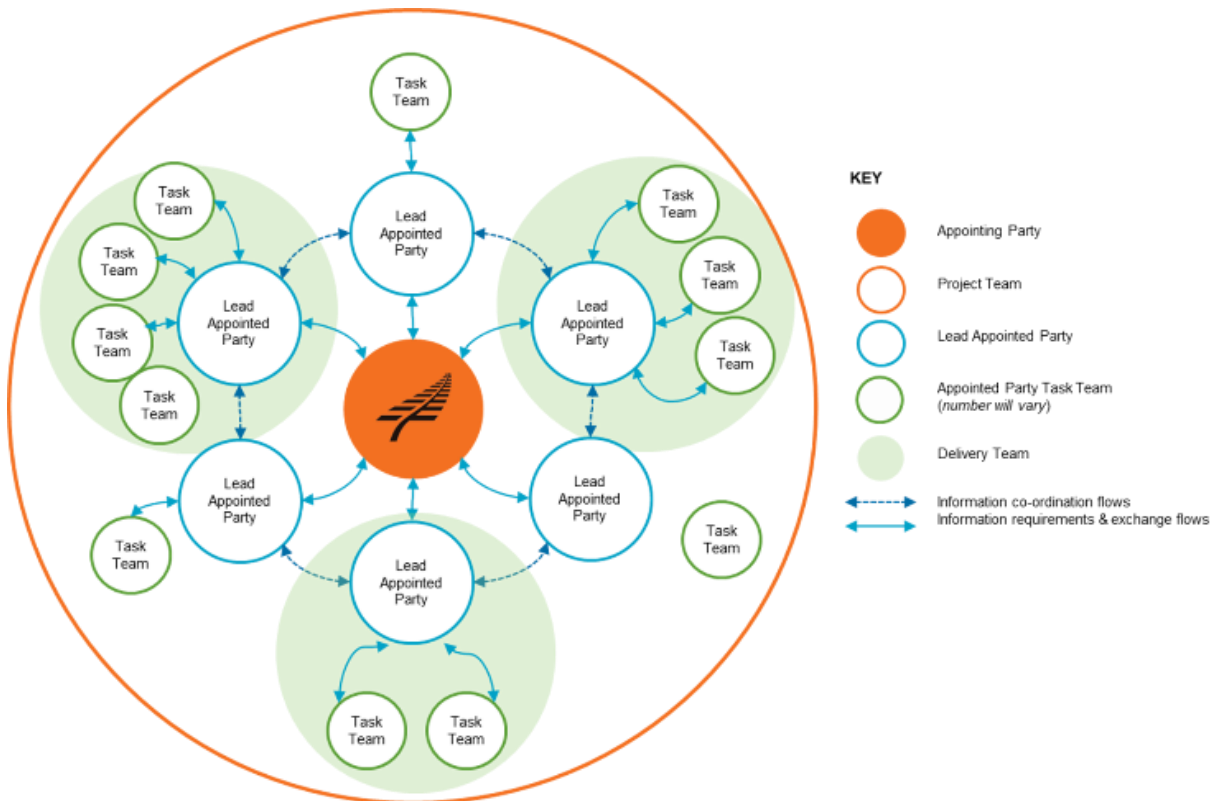
KiwiRail are both the Appointing Party and the owner of the CDE. The platform supports multiple KiwiRail programmes and projects and multiple suppliers within respective projects. The CDE is an "ecosystem" of different digital technology solutions, that supports different information types and file formats.

Figure 2 Common Data Environment Ecosystem
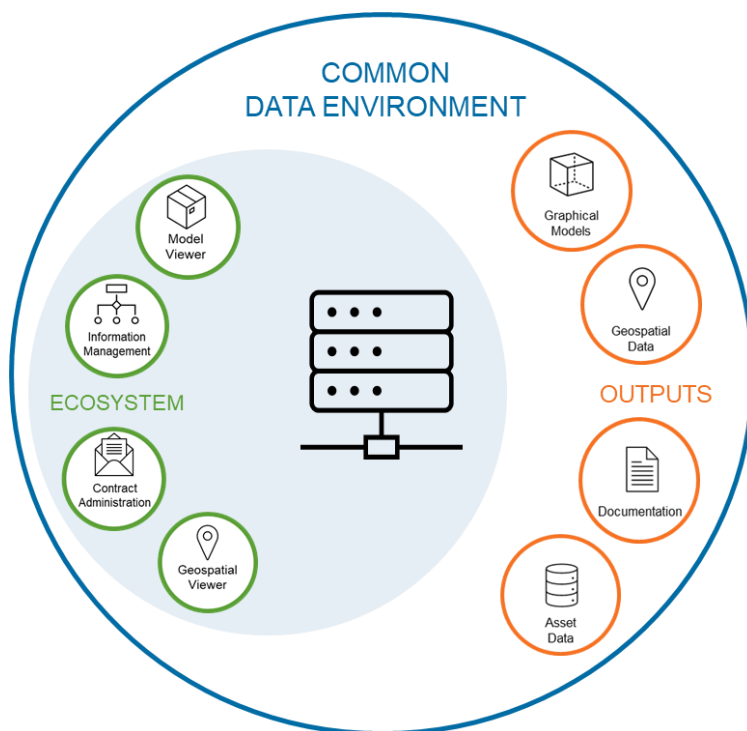
The CDE aligns with the 19650-1:2018 relationship structure. This enables all Appointed Parties to use their own internal CDE solutions to produce information as a Work in Progress alternative. However, KiwiRail requires all information to be submitted to the KiwiRail CDE when a supplier is ready to share content with the wider delivery team(s) and/or the overall project.

The following table further defines the roles and relationships implemented by 19650-1:2018.

Table 1: ISO 19650 Role Definitions

Types of parties		Types of teams	
Appointing party	The organisation leading the project or asset management. For a project this is typically the client, who may also be the asset owner.	Project Team	Everyone involved in the project, regardless of appointment / contract arrangement.
Lead appointed party	The party who is responsible for co-ordinating information exchange between task teams or between a delivery team and the appointing party.	Delivery Team	A lead appointed party and their associated task teams - IE a contractor and its sub-contractors and suppliers, or internal groups from an organisation contributing to the one deliverable.
Appointed party	Anyone generating information about the project – IE a contractor, consultant, sub-contractor	Task Team	A person or group of people performing a specific task – IE the architecture team or the sub-contractor. Often the Task Team is aligned to an Organisation.

The high-level design principles for the CDE are as follows:

- The common data environment should support:
    - the information management processes relating to production, control, and exchange of information as established in this standard.
    - the development of a Project Information model during the delivery of a project.

Tucana Guidance Note

- o the management of an Asset Information model during the lifecycle of an asset.
- o the transfer of information containers (files) from the Project information model to the Asset information model as required.

The CDE is the key to the collaborative production of an information model, as it allows graphical models, asset data, and documentation to be coordinated and managed effectively throughout the life of the project.

The platform implements three core principles, as follows:

1.2.1 Collaboration

To create consistency across current and future programmes and projects, the CDE uses international standards to guide the collaborative production and management of project information.

As a minimum the CDE will ensure the projects are able to create, compile, verify, store, present and exploit in a structured way that is aligned to the ISO 19650 principles.

Information management and quality assurance is facilitated by automated workflows that allow project teams to collaborate in the production of information and defines the process for project teams to follow so they can comply with KiwiRail's Digital Objectives.

1.2.2 Transparent

Tucana uses geospatial technologies to visualise the project data. This enables greater design collaboration and amalgamation, and access to design and survey information. Tucana supports this by the storing of large datasets (specifically point clouds and LiDAR scans).

1.2.3 Centralised

The CDE contains automated functionality for submitting and transmitting digital content. Projects are expected to utilise these functions to manage formal project correspondence, replacing the pervasive use of email as an information and document exchange mechanism.

Projects can use automated notification functions within the CDE to notify other project members that the CDE has been updated. In this regard, the CDE provides a robust repository of all information transactions that have taken place during the project lifecycle.

The CDE uses digital workflows to automate collaboration, quality assurance and information exchange functions. These workflows are driven by the initial capture of content metadata, according to ISO19650 principles, and enables successive reviews and approvals to take place across task and delivery teams.

1.3 FRAMEWORK DOCUMENTS

Version 5 of the DE Framework is segmented into a suite of documents. This enables specific technical information to be covered in a specific document, for the right audience.

The following diagram and table convey the suite of the framework documentation.

Enterprise

Digital Engineering Framework.

Digital Engineering Information Standard

Part 1: Information Management

Digital Engineering Information Standard

Part 2: Information Production

Asset Information Requirements (AIR).

Project

Project Information Protocol.

Project Information Requirements (PIR).

Digital Engineering Execution Plan (DEXP).

Information Delivery Schedule.

Exchange Information Requirements (EIR).

Guidance Notes

Digital Design Management Guidance Note.

Revizto Guidance Note.

Tucana Guidance Note.

Services/ Utilities Identification and Modelling Guidance Note.

Spatial Capture Guidance Note.

Table 2: 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.
Asset Information Requirements	Outlines all the possible asset types, and their associated attribution requirements.
Project	
Project Information Protocol	Provides additional clauses which enable the scope of Digital Engineering to be amended to the contract.
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)
Information Delivery Plan (IDP)	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. Outlines an exhaustive list of digital artifacts required for project close out.
Guidance Notes	
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.
Revizto Guidance Note	How KiwiRail standardise the use of Revizto across the KiwiRail projects portfolio.
Tucana Guidance Note	Supplementary document which covers off the correct usage of the CDE, including details of the background processes for those wanting additional detail.
Subsurface Utilities Identification and Modelling Guidance Note	How to identify, model and transmit subsurface utility information to KiwiRail within a project.
Spatial Capture Framework	Outlines how spatial information is to be captured, created, referenced, and controlled.
Resources	
Construction Delivery Matrix (CDM)	Helps to facilitate a discussion between the designers and contractors around which piece of information can be used for pricing and construction setout.

Minimum Data Requirements	Helps to facilitate specifying the minimum asset data requirements for capture during the project's lifecycle, and who's responsibility it is to provide this information.
Asset Information Exchange Template	Helps to facilitate the Asset Information Exchange process between suppliers and DE team.
Scan Register	Scan register template to provide KiwiRail with details around the captured scan / survey data.

2 General Configuration

The following sections outline the general configuration and operation of the CDE.

2.1 CDE STRUCTURE

Tucana allows project delivery teams to produce, view and manage all project information, including drawings, models, and documentation.

Tucana's structure is made up of a four-tier hierarchy.

- Programme
- Project
- Delivery Team
- Task Team

These four tiers integrate with Work in Progress (WIP), Shared, and Published content states where users locate files and progress files through the information lifecycle.

Figure 3 Tucana CDE Structure
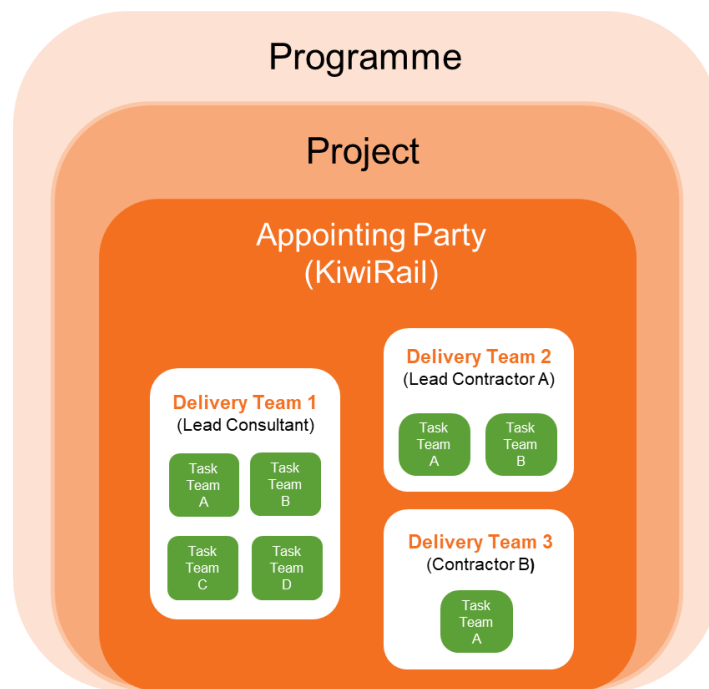
Task Teams sit within a Delivery Team and are where all information is initially uploaded to, in what is known as the Work in Progress (WIP) content state.

Most task teams are defined by organisation, e.g. Consultant, Sub Consultant, Contractor, Sub Contractor, etc, but can also be a combination of various project members who are delivering a part of the project.

Only the members of a task team can view and edit content within it. All project members need to be added to a task team to access their project.

2.1.1 Delivery Teams

Projects can be structured as a single delivery team, or with multiple delivery teams.

A single delivery team structure enables all parties to access all information in both the Shared and Published content states.

A multiple delivery team structure enables a Project Manager to restrict or grant access to each individual Shared and/or Published content state between the different delivery teams.

This gives projects more flexibility when managing sensitive information and is activated at the discretion of the Project Manager.

Users can view who has access to their Shared and Published contents states by clicking on the information icon in the upload screen or when completing a shared or published workflow.

Figure 4 Single and Multiple Delivery Teams
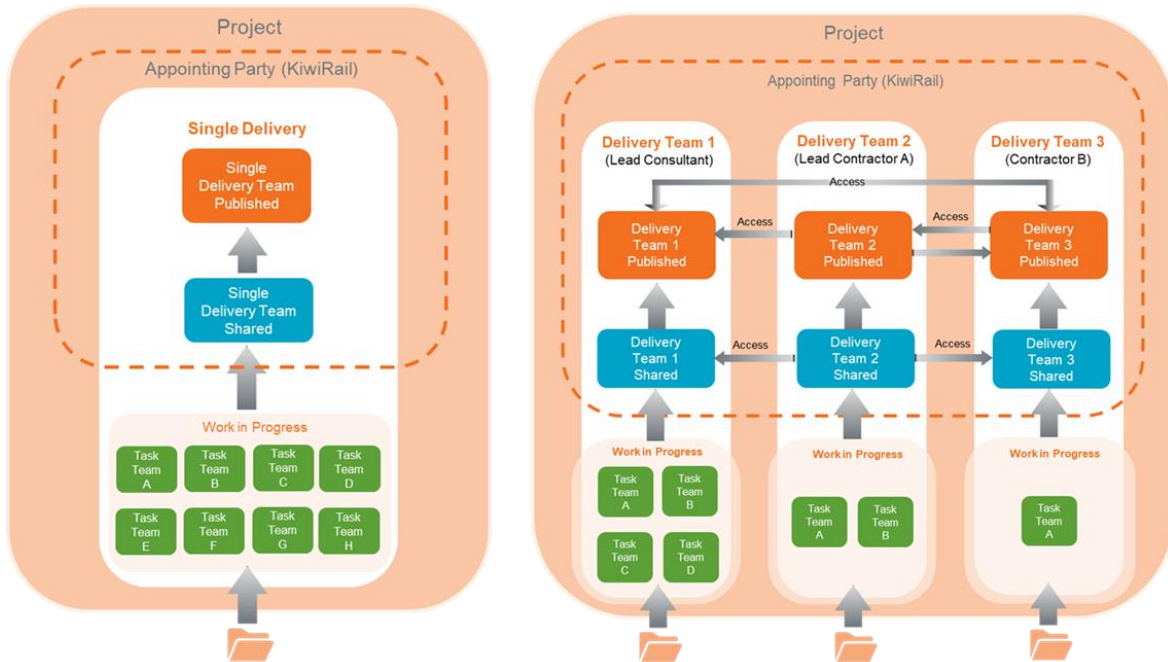
2.2   CONTENT STATES

All file containers within the CDE have a status attributed to them depending on which content state they are in. The structure indicates the status of the development of the information container.

There are three main lifecycle states:

- Work in Progress (WIP)
- Shared
- Published

For file containers to progress through these lifecycle content states, and to be shared across delivery and project teams, approvals, authorisations, and acceptances are required.

Figure 5: Common Data Environment Status Concept.
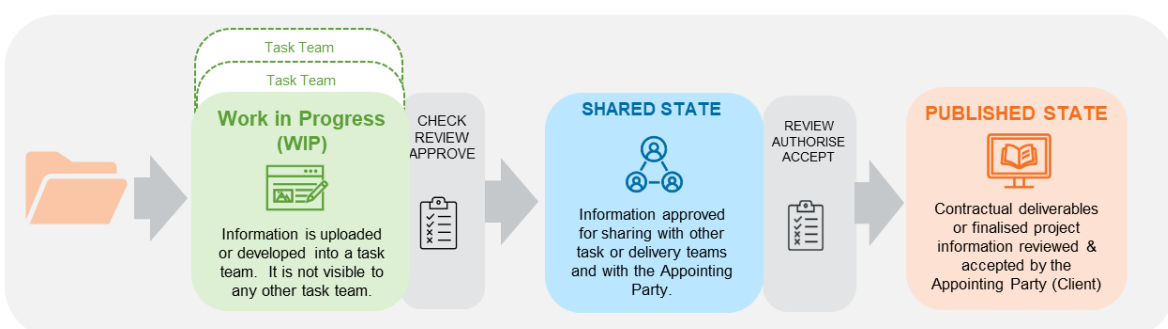
2.3   TASKS AND WORKFLOWS

All workflow tasks are located under the Tasks module. These are used to review information within WIP and Shared or for approval, authorisation, and acceptance of information containers between the WIP, Shared, and Published content states. Tasks appear in the following views:

- Tasks awaiting a user's action;

- Tasks initiated by a user for others to action;

- All pending tasks across the project (task team relevant); and

- All tasks across the project, pending and rejected or approved (task team relevant).

2.4   TRANSMITTALS

Project contract administration and all other exchanges of information are to be carried out in Transmittals module that allows for an auditable trail of correspondence and contract administration relating to all appointments or information exchanges over the project lifecycle. It is structured to align with the task teams configured in the CDE. The tool can be configured at project level for customised transmittal types and associated reasons.

2.5   INFORMATION ASSURANCE

It is acknowledged that the integrity of model information that forms part of a contractual transaction represents an area of concern for suppliers. Specifically, "*how do we ensure model data that has been issued for a purpose is not modified/altered thus creating ambiguity over liability*"?

To address this issue the CDE provides detailed File Container History, which gives an audit trail of all file uploads, modifications, revisions, workflow activity etc.

Suitability Codes are incorporated into the workflows to communicate suitability, and any change in the Suitability would require a workflow review + accept and would be present in the Audit trail.

2.6   INFORMATION OUTPUT

The primary purpose of the CDE is to support the controlled collation and assurance of project and asset information so it can be relied on by stakeholders and re-used by other systems. It is therefore important the CDE has sufficient functionality to exploit the stored assured data and linked files.

Published project and asset information stored in the CDE shall be available for use by permitted stakeholders for a range of different purposes, subject to security and access permissions.

The CDE shall enable exposure of data for use in other systems e.g. asset management systems or facility management systems. This can be through a reliable data integration service or application program interface (API).

2.6.1   Files and Data Download

The CDE shall provide suppliers and KiwiRail teams with access to documents, models, and data files to download, subject to full security files and disclosure rules and document marking. Files shall be available to download in bulk. The export/download of files shall be available with applied renaming rules derived from metadata to meet employer naming policies.

2.6.2 Application Program Interfaces

The integration interface enables secure web services API connectivity to provide query-able data and linked files from the CDE to appropriate connected authorised enterprise systems.

3 Project Specific Configuration

Tools are available that allow projects to configure their specific requirements within the broader framework of the CDE structure.

3.1 PROJECT PROVISIONING

The information required for from the project to provision a site within the CDE are as follows:

- The Programme and Project names
- The Project number (6 digit)
- Project Owner
- A Project Description
- Metadata
- Delivery Team

3.2 PROJECT LEVEL SECURITY AND ROLES

Within each project Delivery and Task Team, there are roles that must be defined, to administer the workflows that move the information through its lifecycle. These roles are to be defined by the Programme /Project Manager or Lead Appointed Parties.

3.2.1 Project Owner

The project owner is usually the client Project Director or Project Manager

3.2.2 System Admin

The System Admin role is restricted to the KiwiRail Digital Engineering team. This role can provision new projects and change various control settings systemwide.

3.2.3 Project Admin

The Project Admin role is allocated to KiwiRail only Project Administrators, Document Controllers, or Information Managers. This role can create a task team, add users to the task teams, and allocate and amend workflow roles on projects.

Before anyone is allocated to this role, they are mandated to attend training by the KiwiRail Tucana Product Manager.

3.2.4 Approvers

The Approver role is a pre-determined list of members specific to a task team who approve information to pass through from WIP to the Shared content state.

3.2.5 Authorisers

The Authoriser role is a pre-determined list of subject matter experts, design or construction managers, or whoever is deemed necessary to authorise information to go to KiwiRail for review and acceptance as a contractual deliverable or finalised piece of project information into the Published Content State.

3.2.6 Acceptors

The Acceptors are a pre-determined list of KiwiRail appointed project members who accept authorised contractual deliverables or finalised project information into the Published content state.

3.3 PROJECT LEVEL GROUPS

Project sites are structured according to ISO 19650 principles that guide the creation of Task Teams.

Project members are allocated to a task team to access their project site. A Task Team is a group of individuals that are performing a project task and are usually defined by organisation and sometimes by process or function, e.g. the Design Consultant or Construction Contractor.

3.4 PROJECT LEVEL METADATA

There are four project configurable Metadata streams are as follows:

- Zone
- Area (links to zone as a sub-set))
- Asset
- Workstream

It is acknowledged that zone and area are geographical terms and are not always relevant to all projects. However, the classifications that sit within these can be redefined for project best use.

3.5 PROJECT ARCHIVING

Projects are never deleted once any information has been uploaded into a site. All projects can be archived once the project information has been handed over and the project is closed out.

4 Files and Content States

4.1 FILES AND CONTENT TYPES

4.1.1 Size and Format

Tucana has no restriction on file format or size.

4.1.2 Content Types

The CDE is the central platform that houses ALL project documentation, including the following:

- **Non-geospatial data and documents include:**
  - reports, specifications, contracts, minutes, RFI's, briefs, inspection plans, commissioning certificates, product data sheets, user manuals, schedules, databases, registers etc

- **Geospatial data include:**
  - models, drawings, IFC, photographs, video

Collectively the above suite of information is called the Project Information Model (PIM) during design and construction phase. Once this information has been handed over, it then becomes the Asset Information Model (AIM).

The word "model" in these terms should not be confused with only the 3D graphical model, rather it is ALL information listed above. The PIM is progressively developed and delivered to KiwiRail through a series of information exchanges at different stages of the project and these exchanges will contain contributions from all parties.

The following points give an overview of the functionality of the CDE with regards to the data to be contained within it:

4.1.2.1 Non-Graphical Data and Documents

Tucana provides control for the sharing and publishing of documents, specifications, calculations, and other non-graphical information. Project teams shall be responsible for ensuring up to date information is stored within the CDE.

Tucana uses Microsoft SharePoint to store Microsoft Office files in the Work in Progress (WIP) content state. This allows users to co-author on MS Office applications if they are in the same task team or via the collaborate tool if documents require co-authoring outside of your task or delivery Team.

Co-authoring outside of your task team is a function that needs to be activated at Project Level and is at the discretion of the Project Manager

However, once documents move into the Shared and Published Content States, they are stored in Blob Storage and are read only.

4.1.2.2 Geospatial Data

There are two visualisation tools available within the CDE allowing users to:

- Visualise 2D and 3D geospatial data and models without needing specialist software installed.

- Visualise information without needing to download and interrogate entire datasets that are often very large.

  a) **ESRI's ArcGIS Online platform:**
     - 2D visualisations of information, such as photos and panoramic images (spheres)

- a 3D geospatial web scene viewer.

Where required, all point clouds and native unfederated models can be translated and loaded into the 3D web scene viewer from the Shared or Published content states. The viewer will provide the following functionality:

- Visualisation of 3D models to enable simple interactions, measurements, sectioning & fly throughs in context with surround geography (such as land and terrain adjacent to the rail corridor)

- Visualisation of current state using point clouds.

- Functionality to identify models and point cloud datasets to help users find the respective files in the CDE.

All panoramic images captured during point cloud surveys will be uploaded to the CDE for loading into the panoramic viewer tool. This is accessed via the Apps.

b) **Autodesk Forge:**

- 3D visualisation and interaction with native and federated models.

- Query of attributes within the models.

All drawings and models (including federated) uploaded to Tucana will be processed by Autodesk Forge and can be viewed by opening each file within the CDE.

4.2 ADD AND SUPERSEDE CONTENT

The upload tool allows users to upload and supersede up to 100 files from their device or network drives at one time.

Tucana will identify any existing files with an 80% likeness to the Tucana and Original Filenames to any files being uploaded.

Users can select those files identified as a duplicate and use the supersede button to work through the possible matching files with the option to skip or select and confirming if superseding is required.

Uploading new and superseding existing files can be carried out in the one upload action. Revisions will appear in the File Information History via the 3 dots menu at the right of the Content State screens.

4.2.1 Metadata

All files require metadata to be applied on upload. Metadata allows users to search, filter and sort, either for specific files, or related groups of files within each Content State.

The CDE provides KiwiRail standard mandatory metadata and project configurable metadata fields. It is advisable to define all project configurable metadata streams at the beginning of the project to ensure all information is classified correctly.

The metadata elements are outlined in the following table. Metadata is assigned at the time of upload to Tucana, however some of the fields below are automatically populated.

Table 3: Information Container Metadata

Metadata Element	Definition	Format	System or Project Definition	User defined	Optional	Included in CDE Naming
Filename	The Tucana ID Code given to all file containers on upload	6-digit project code, 2-digit Discipline abb,	System	No	No	n/a

Metadata Element	Definition	Format	System or Project Definition	User defined	Optional	Included in CDE Naming
		2 digit Doc Type abb, sequential file number				
Original filename	The name of the file on upload	The name that is attributed to a file on upload to Tucana	n/a	Yes	No	No
Description	Free text field to give context to the file(s) the user is uploading	Free text 50-character field.	n/a	Yes	Yes	No
Discipline	The discipline that the content is representing	2 digits, alpha (e.g. AA...)	System	Yes	No	Yes
Project phase	Current project phase the content belongs to	3 digits, alpha (e.g. PRE...)	System	No	No	No
Document type	The type of content	2 digits alpha (e.g. RE)	System	Yes	No	Yes
Document subtype	Content subtype (only available for certain types of content)	2 digits alpha (e.g. PC)	System	Yes	Yes	No
Zone	A means of breaking up the delivery of a project scope – Zone is the highest-level breakdown.	Alpha	Project	Yes	Yes	No
Area	As above – Area is the second level breakdown and can be linked as a subset of specific Zones.	Alpha	Project	Yes	Yes	No
Asset	Refers to the asset(s) that are referenced by the created content	Alpha	Project	Yes	Yes	No
Workstream	Project configured field used to package information deliverables	Alpha	Project	Yes	Yes	No
Revision	Auto-assigned revision code.	3 digits alphanumeric (e.g. [P01])	System	No	No – via workflow	Yes
Task Team Originator	The WIP content state Task Team where the file originated	Alpha	Project	No	No	No
File Size	The size of the file container.	Numeric	n/a	No	No	No
No. of Files	The number of files the file container contains.	Numeric	n/a	No	No	No
Suitability code	Reflecting the current purpose of the content. This will automatically be applied to the file container when a workflow is activated.	2 digits alphanumeric	System	Yes - by workflow	No	No

4.3 WIP

The Work in Progress (WIP) state is where all information is uploaded to. It consists of multiple task teams that are defined by process or party/organisation.

All information within the task team is secure and only visible to the members of that particular task team. This is the state that is used to develop information to a level where it is ready to be shared with other task teams.

It is accepted that most content in this state is able to be held within the supplier's own CDE, and in this case, WIP is only used for uploading files and progressing the information to the Shared state for collaboration.

4.4 SINGLE DELIVERY TEAM SHARED

The purpose of the Shared state is to allow all project members to view and collaborate on the information model.
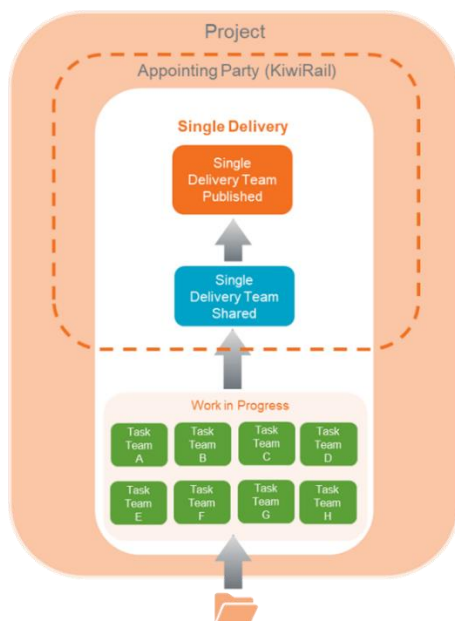
Content in the Shared state should be used by all appropriate parties for the purpose of coordination and collaboration. This content is visible and accessible but not editable. If editing is required, content should be edited in the WIP content state and resubmitted by its author for further review.

4.5 SINGLE DELIVERY TEAM PUBLISHED

The published state is used for information that has been authorised by the lead appointed party and accepted by KiwiRail for use as a contractual deliverable or as finalised project information.

Only content in the published state can be used for milestone deliverables such as tendering, IFC Design and As-built construction records.

Figure 6 Single Delivery Team Structure

4.6 MULTIPLE DELIVERY TEAM SHARED

If a project is using multiple delivery teams, each Delivery Teams' Shared content state can be made visible or invisible to any of the other delivery teams, on a per delivery team basis by the Project Manager. This is dependent on each delivery team's requirement to view the information promoted into Shared by another Delivery Team.

The KiwiRail Appointing Party automatically has access to all content in the Shared State.

Content in the Shared State is for the purpose of coordination and collaboration. This content is visible but not editable. If editing is required, content should be returned to the WIP content state for amendment and resubmission by its author.

4.7 MULTIPLE DELIVERY TEAM PUBLISHED

If a project is using multiple delivery teams, each Delivery Teams' Published Content State can be made visible/invisible to any of the other delivery teams, on a per delivery team by the Project Manager. This is dependent on each delivery teams' requirement to view the information promoted into Published by another Delivery Team.

The KiwiRail Appointing Party automatically has access to all content in the Published state.

The published state is used for information that has been authorised by the lead appointed party and accepted by KiwiRail as a contractual deliverable or as finalised project information.

Only content in the published state can be used for milestone deliverables such as tendering, IFC Design and As-built construction records.

Figure 7 Multiple Delivery Team Structure
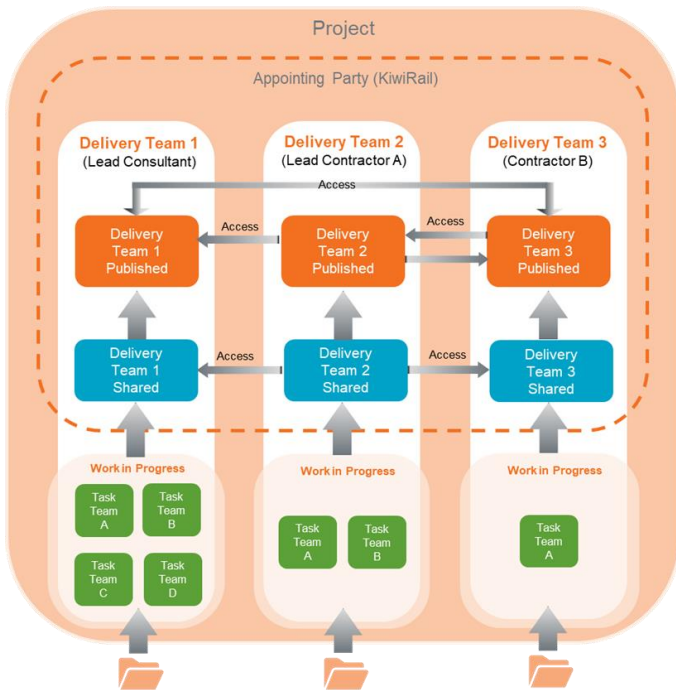
5   Tasks / Workflows

The CDE workflows are aligned to ISO 19650-1:2018. There are three main lifecycle states:

- Work in Progress (WIP)
- Shared
- Published.

For file containers to progress through these lifecycle content states, and shared across delivery and project teams, approvals, authorisations, and acceptances are required. This section details the individual automated workflows and explains how these are related to the quality assurance process.

Figure 8 Workflow Process
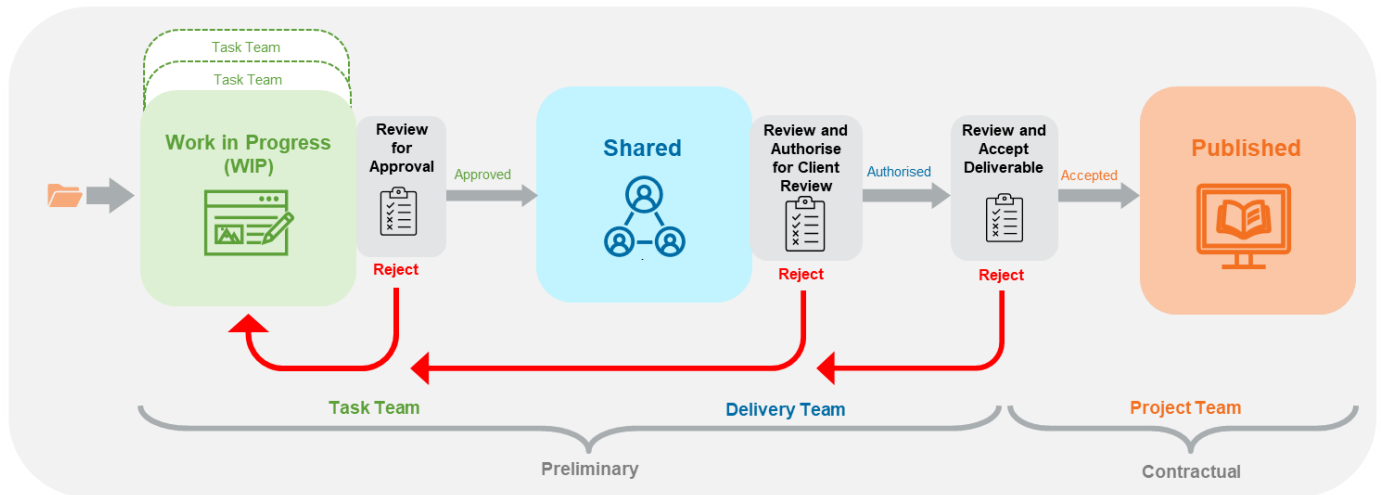
5.1   WORKFLOW AND LIFECYCLE STAGES

Automated workflows are used to trigger a change of content state and enable the required quality assurance processes. A revision code is applied at each stage of the lifecycle indicating the containers state and version.

5.1.1   Suitability Codes

The following standard suitability codes are applied to information containers as they pass through the CDE workflows. Suitability codes can be customised for each project.

Table 4: Suitability Code Application

Status	Description
Shared (Non-Contractual)	
Approved for Sharing with other Task and Delivery Teams	
REF	Static Reference Information
	Files that provide background / historical asset information and cannot move past the Shared content state
S1	Suitable for Co-ordination.
S2	Suitable for Information
S3	Suitable for Review & Comment
S4	Suitable for Stage Approval

Status	Description
S6	Suitable for PIM Authorisation
S7	Suitable for AIM Authorisation
Published Documentation (Contractual)	
Authorised by Lead Appointed Party or SME for Review by KiwiRail and ultimately Accepted by KiwiRail as a contractual deliverable	
A1,	Suitable for Costing
A2	Suitable for Tender
A3	Suitable for Contractor Design
A4	Suitable for Manufacture/Procurement
Published for AIM Acceptance	
CR	As Construction Record documentation, PDF, Models etc

5.1.2   Workflow Tools

Table 5: Workflows

| Workflow	Purpose	Status
Collaborate	Notify a task, delivery or project team member that content is available for viewing or their input is requested/required. Notify users from other task and delivery teams that files have been shared with them (optional feature at Project Managers discretion). Includes links to content.	Optional
Task team review	An optional formal review of content in the WIP state. Content can be reviewed by any member of the task team. The reviewer approves the content rejects the task with comments for issues to be resolved for resubmission. Content is locked while the workflow is in progress.	Optional
Share	Content is sent to the selected approver(s) from a pre-determined list. The approver may approve the task and the content appears in Shared or rejects with comments for issues to be resolved for resubmission. Content is locked while the workflow is in progress.	Compulsory
Delivery Team Review	An optional formal review of content in the Shared state. Content can be reviewed by any delivery team member(s). The reviewer approves the task or rejects the task with comments for issues to be resolved for resubmission. Content is locked while the workflow is in progress.	Optional
Publish	Content is sent to the selected Authoriser(s) from the pre-determined list. The authoriser(s) may authorise or reject the task with comments for issue resolution and resubmission. Once authorised, the task is automatically sent to a pre-determined list of Appointing Party Acceptor(s). The Appointing Party accepts the content as a deliverable and the content appears in the Published Library or rejects with comments for any issues to be resolved for resubmission. Content is locked while the workflow is in progress.	Compulsory

5.1.3 Approval Gate 1: Share workflow

The Share workflow:

- Control the transition from the WIP content state to the Shared content state.

- Confirm the use of the information container by setting the suitability code.

- Set the information container as read-only.

- Set the file containers revision code.

- If approved, the content will appear in the Shared content state as a read only revision.

*Figure 9: Shared Workflow*
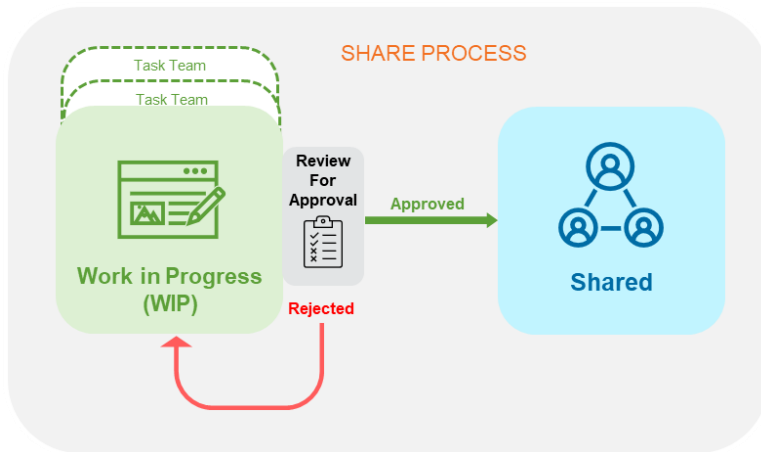
5.1.4 Approval Gate 2: Published Workflow

The Published workflow is there to:

- Control the transition from the Shared content state to the Published content state.

- Authorise the use of the information container by setting the suitability code.

- Authorise the content to be reviewed by KiwiRail.

- Automatically send the content to KiwiRail for review and acceptance as a deliverable.

- Set the file containers revision code.

- Once accepted, the content appears in the Published Content State.

Figure 10: Published Workflow
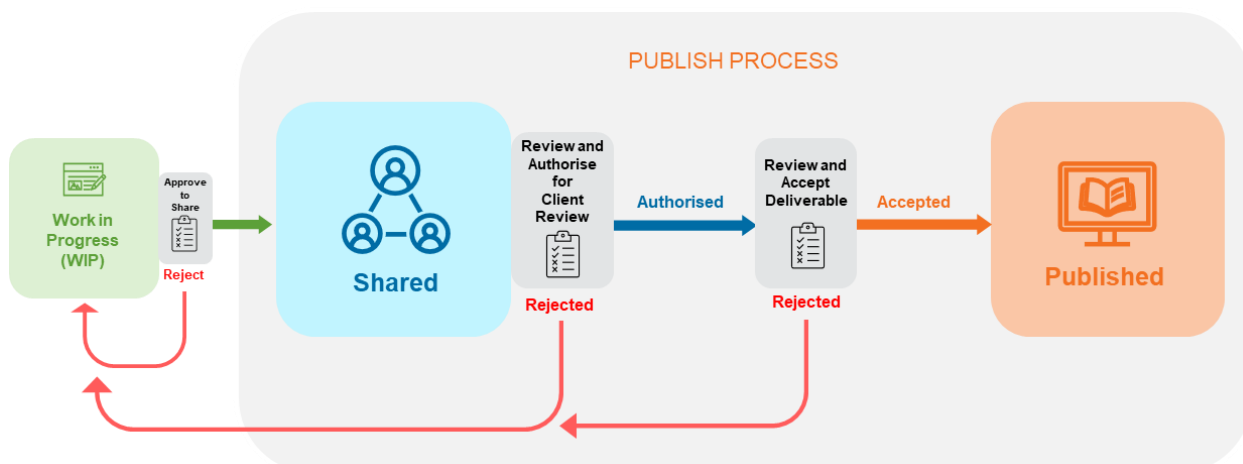
5.2 REVISIONS

Revisions distinguish changes or amendments to a document and are a very common part of information control on projects.

Revisions are an automated process and controlled by the CDE when a file is superseded the history will display Revision and/or a workflow is activated.

5.2.1 Revision labels

Tucana labels are aligned to information container state as follows:

Work in progress (Revision)

When a file container is uploaded into WIP it will become Revision 1 as shown in the File History audit trail.

If an information container is superseded in WIP, it will show as Revision 2 in the File History audit trail.

Example Revision 1, Revision 2, etc.

Shared (preliminary "P")

A revision code starting with "P" (starting at P01) is applied when a file container is approved into the Shared State and is displayed in the metadata and the file History audit trail in the Shared state.

Each time the information container is approved into Shared the 2-digit number will increment.

Examples P01, P02, P03 etc.

Published (contractual "C")

For the published state, only numbers prefixed with "C" (starting at C01) are applied to published contractual information.

Each time the information container is accepted into Published, the 2-digit number will increment.

*Examples C01, C02, C03, etc.*

5.2.2 Revision sequence

The revision sequence applied to the lifecycles states are defined below:

Table 6: Revision Sequence

Life cycle state	Work in progress	Shared	Published	Archived
Revision examples	Revision 1, Revision 2, Revision 3	P01, P02, P03 …	C01, C02, C03 …	No change

The diagram below defines how the revision changes as the information container moves between life cycle states.

Figure 11: Revision Sequence
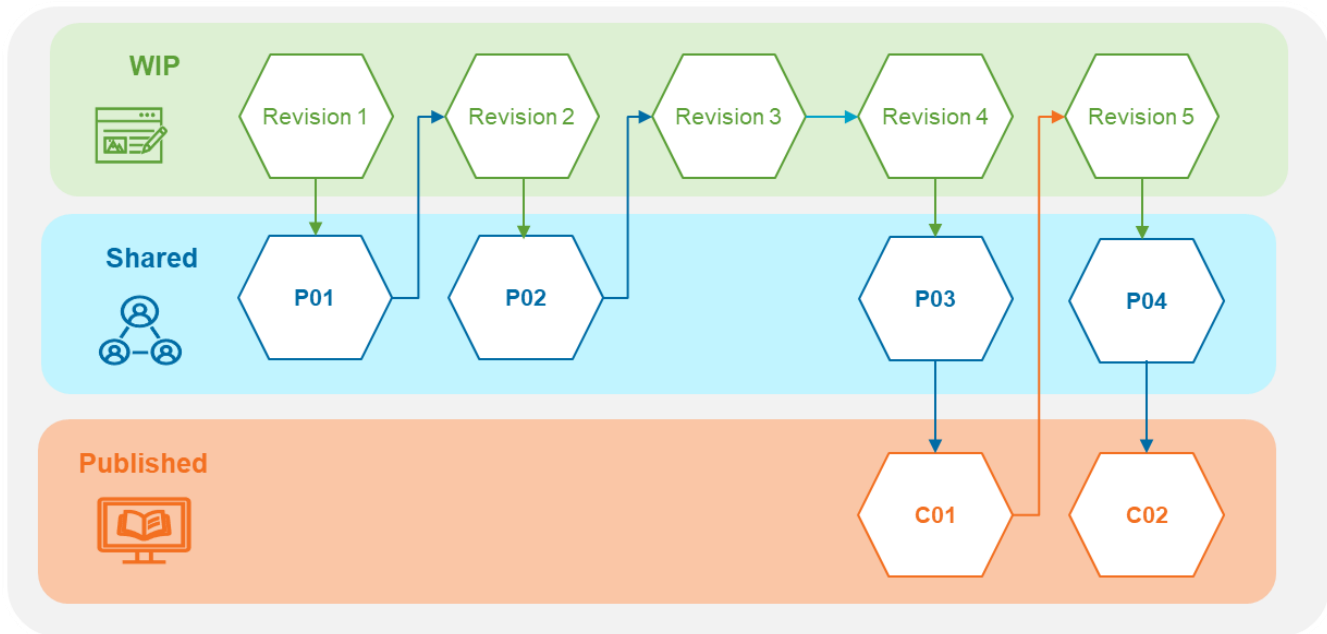
6 Contract Management & Correspondence

The Transmittals module provides an auditable trail of correspondence/transmittals relating to all appointments and information exchanges over the project lifecycle. It is structured in alignment with the delivery and task teams configured for each project.

In alignment with ISO 19650, users are only able to attach content from the Shared and Published Content states as this has been through the quality assurances processes and is approved for sharing.

Figure 12 Contract Administration
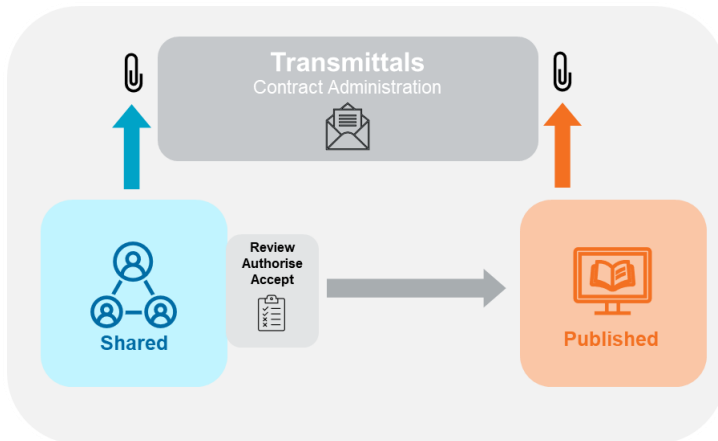
6.1 EXTERNAL USERS

To enable all project correspondence to be auditable, various stakeholders who cannot and should not access the central CDE can be added as external users to the project for transmittals only.

External users will be able to access the transmittals tool only and no other tools or content will be visible to them, other than the correspondence and any content attached that has been sent or made visible to them.

6.2 VIEWS

There are three views within the Transmittal Tool:

- My Notifications
- Initiated by Me
- Visible to Me

6.2.1 My Notifications

A user can view all transmittals where they have been added in the "Notify" field (To). Users receive an email notification containing a link to the transmittal in Tucana.

6.2.2 Initiated by Me

User can view all transmittals they have "initiated" (sent).

6.2.3 Visible to Me

User can view all transmittals where they have been added to the 'Visible to me' field. Users do not receive an email notification but can see and respond to the transmittals in Tucana.

6.3   METADATA

6.3.1   Types and Reasons

The default mail types and associated reasons available are listed below but these are project configurable and can be customised for each project if required.

Table 7: Transmittal Metadata

Type	Reason
Correspondence Intended for non-contractual correspondence that needs to be retained against the project.	n/a
Consultant's Advisory Notice	n/a
Notice to Engineer	• Variation to Contract • Advance Notice • Other
Notice to Contractor Intended as a contractual notification generally issued by the Principal or Engineer to Contract	• Clarification only • Potential cost implications - Proceed immediately (submit price within 10 days) • Provide price prior to proceeding • Price received - Approval to proceed • Other
Quality Issue	• OFI • NCR • Other
Request for Information Intended as a formal request under a contract issued to the Principal or Engineer to Contract	n/a
Transmittal	• Issued for Collaboration • Issued for Design • Issued for Construction • Issued for Close Out/Handover • Other

6.3.2   Filter, Search and Sort

Users can filter and sort transmittals on the metadata fields within the Transmittals function. The filtered or sorted outputs can be exported to a csv file should parties require an external record.

6.3.3   Filter

- Type
- Reason
- Subject
- Status
- Initiation and Due Dates
- Last Updated

6.3.4 Free Text Search

- Transmittal ID
- Subject
- Initiator
- Task Team Originator

7   Visualisation & GIS

The project visualisation tool is designed to provide access to aggregated geospatial information relating to the project. This is delivered through an ArcGIS Online web scene, see image below.

The Visualisation tool is capable of hosting a wide range of 3D spatial data including point clouds, models, surfaces, and other geometric data. The tool also contains simple tools to interrogate data including measurement and cross-sectioning.
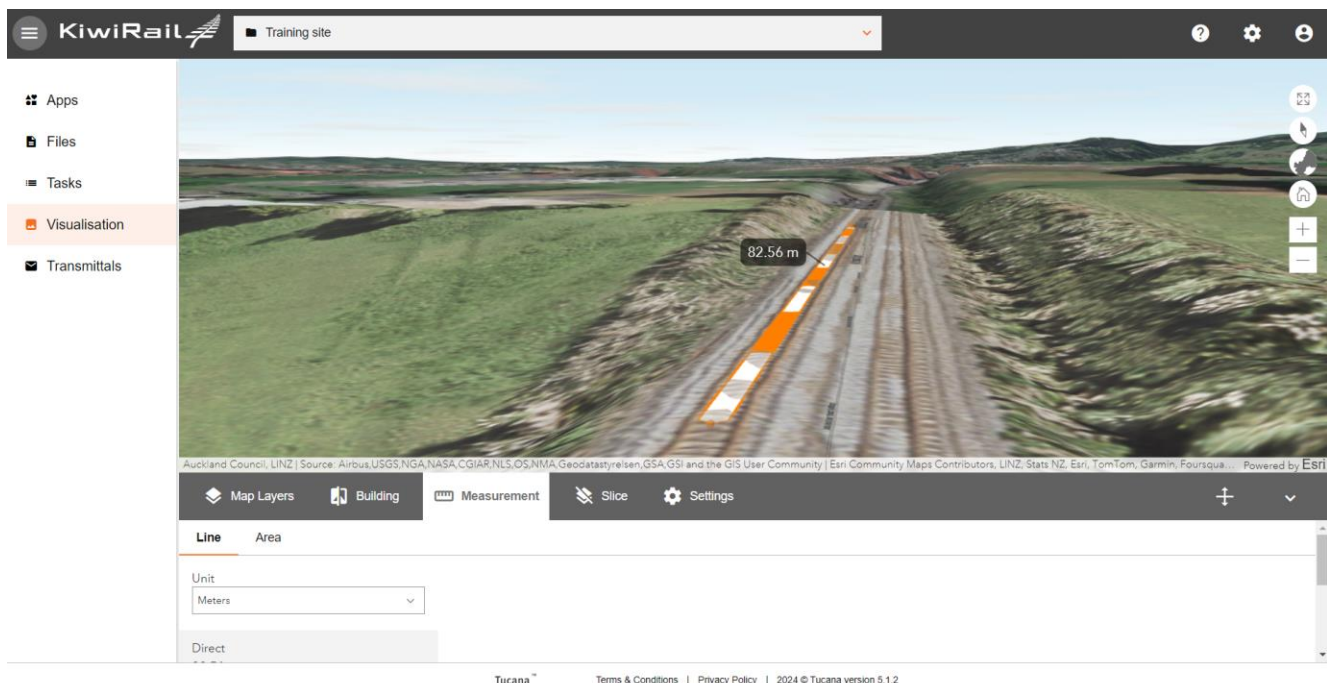
7.1   FILE TYPES

Refer to Section 4.1.2.2 for detailed Geospatial data file types relating to the Visualisation tool and ArcGIS Online.

7.2   UPLOAD PROCESS

Once any geospatial data that requires uploading into the Visualisation tool has progressed through into the Shared or Published content state, the GIS team are to be notified via the Collaborate tool and the GIS Distribution List.

As a guideline, this would occur at the following or similar milestones:

- Project Initiation – Point cloud datasets and any other relevant geospatial data
- 50% Design
- IFC Design
- As-Built Construction