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Transport Infrastructure Ireland

# TII Publications



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## BIM for Infrastructure Implementation Guidelines for National Roads

**GE-BIM-00101**

**June 2026**

## About TII

Transport Infrastructure Ireland (TII) is responsible for managing and improving the country's national road and light rail networks.

## About TII Publications

TII maintains an online suite of technical publications, which is managed through the TII Publications website. The contents of TII Publications is clearly split into 'Standards' and 'Technical' documentation. All documentation for implementation on TII schemes is collectively referred to as TII Publications (Standards), and all other documentation within the system is collectively referred to as TII Publications (Technical).

## Document Attributes

Each document within TII Publications has a range of attributes associated with it, which allows for efficient access and retrieval of the document from the website. These attributes are also contained on the inside cover of each current document, for reference.

<b>TII Publication Title</b>	<i>BIM for Infrastructure Implementation Guidelines for National Roads</i>
<b>TII Publication Number</b>	<i>GE-BIM-00101</i>

<b>Activity</b>	<i>General (GE)</i>	<b>Document Set</b>	<i>Technical</i>
<b>Stream</b>	<i>Building Information Modelling (BIM)</i>	<b>Publication Date</b>	<i>June 2026</i>
<b>Document Number</b>	<i>00101</i>	<b>Historical Reference</b>	<i>N/A</i>

## TII Publications Website

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## TII Publications




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# 1. Introduction

## 1.1 Background

From January 2024, consultants and contractors engaged to design, construct and oversee the construction of public works contracts will have Building Information Modelling (BIM) requirements included in their scope of service, initially applying to higher-value projects and progressively extending to all contracts over €1 million by 2027.

The Office of Government Procurement (OGP), in conjunction with the Government Contracts Committee for Construction (GCCC), will coordinate the uptake of BIM across those public bodies who are required to use the Capital Works Management Framework (CWMF).

Transport Infrastructure Ireland (TII) as an Approving Authority has taken responsibility for developing BIM implementation guidelines and standards in line with this mandate, to ensure consistency across all the projects and successful implementation of BIM. These documents are based on the information management plans released by Build Digital Project and the National Standards Authority of Ireland SR CEN/TR 17654:2021 'Guideline for the implementation of Exchange Information Requirements (EIR) and BIM Execution Plans (BEP) on European level based on I.S. EN ISO 19650 series.

## 1.2 Document Purpose

This document represents Transport Infrastructure Ireland (TII) Information Management Guidelines and sets out the commercial, managerial and technical aspects of producing project information. The commercial and managerial aspects include the production methods and procedures which shall be implemented by the Delivery team. The technical aspects specify those detailed pieces of information needed to answer the project information requirements to support the implementation of BIM in a project.

This document sets guidelines for the Project Team regarding what information (geometrical data, documents, and alphanumerical data) is required at each project stage, how to meet those requirements, when the information will be delivered and to whom, and how it will be coordinated with information from other parties. The guidelines should be used by all projects which are funded through Transport Infrastructure Ireland (TII) and / or where TII is the Approving Authority, unless otherwise instructed by TII. *(TII is the Approving Authority for national roads and greenways and a Sponsoring Agency for public transport.)*

Nothing in this document is intended to relieve the Project Delivery Teams, including Lead Appointed Party, Appointed Parties of responsibility to comply with ISO 19650 requirements and TII Publications.

The requirements shall be addressed by Lead Appointed Party and Appointed Parties in a project BIM Execution Plan (BEP), and this will inform the production and delivery of a Project Information Model (PIM) which meets the requirements of TII.

The PIM is the project information shall be delivered by the Project Delivery Teams in addition to the physical asset itself.

The scope of this document applies to all TII projects in line with the BIM for Infrastructure Statement of Intent and Road Map.

## 1.3 Applicable Standards

### 1.3.1 Industry Standards

- **BS EN ISO 13567-1:2017:** CAD Overview and principles
- **BS EN ISO 13567-2:2017:** CAD Concepts, format and codes used in construction documentation
- **I.S. EN ISO 19650-1:2018:** Organisation and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling. Part 1: Concepts and principles
- **I.S. EN ISO 19650-2:2018:** Organisation and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling. Part 2: Delivery phase of the assets
- **I.S. ISO 19650-3:2020:** Organisation 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
- **I.S. ISO 19650-4:2022:** Organisation and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling. Part 4: Information exchange
- **I.S. ISO 19650-5:2020:** Organisation 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
- **BS ISO 19650-6:2025:** Organisation and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling. Part 6: Health and safety information
- **BS ISO 7817-1:2024:** Building information modelling – Level of information need. Part 1: Concepts and principles
- **BS ISO 29481-1:2017:** Building information models – Information delivery manual. Part 1: Methodology and format
- **ISO 22341:2021:** Security and resilience — Protective security — Guidelines for crime prevention through environmental design

### 1.3.2 TII Website

- BIM for Infrastructure – Statement of Intent and Road Map

### 1.3.3 TII Publications

#### *BIM for Infrastructure Publications*

- **GE-BIM-00101:** BIM for Infrastructure Implementation Guidelines for National Roads
- **GE-BIM-00102:** Computer Aided Design (CAD) Standards for National Roads

#### *Related Publications*

- **PE-PMG-02041:** Project Management Guidelines
- **GE-ENV-01106:** Transport Infrastructure Ireland Carbon Tool for Road, Greenway and Light Rail Projects: User Guidance Document
- **AM-STR-06054:** EIRSPAN Bridge Management System Principal Inspection Manual
- **TII Climate Action Roadmap**
- **AM-PAV-06049:** Pavement Asset Repair and Renewal - Scheme Approval Procedures
- **GE-STY-01037:** Road Safety Improvement Scheme Approval Procedure

#### **1.3.4 TII Templates and Supplementary Information**

- **Appendix K of the GE-BIM-00101:** Level of Geometrical Information Catalogue
- **Appendix L of the GE-BIM-00101:** Exchange Information Requirements(EIR) Template
- **Appendix M of the GE-BIM-00101:** Capability & Capacity Assessment Template
- **Appendix N of the GE-BIM-00101:** Pre-Appointment BIM Execution Plan (BEP) Template

Supplementary information can be found in the Supplementary Information section of the TII Publications website.

## **1.4 Standards Relationship**

Figure 1.1 explains the main concepts and relationship between applicable industry standards and TII publications defined in Section 1.3 of this document.

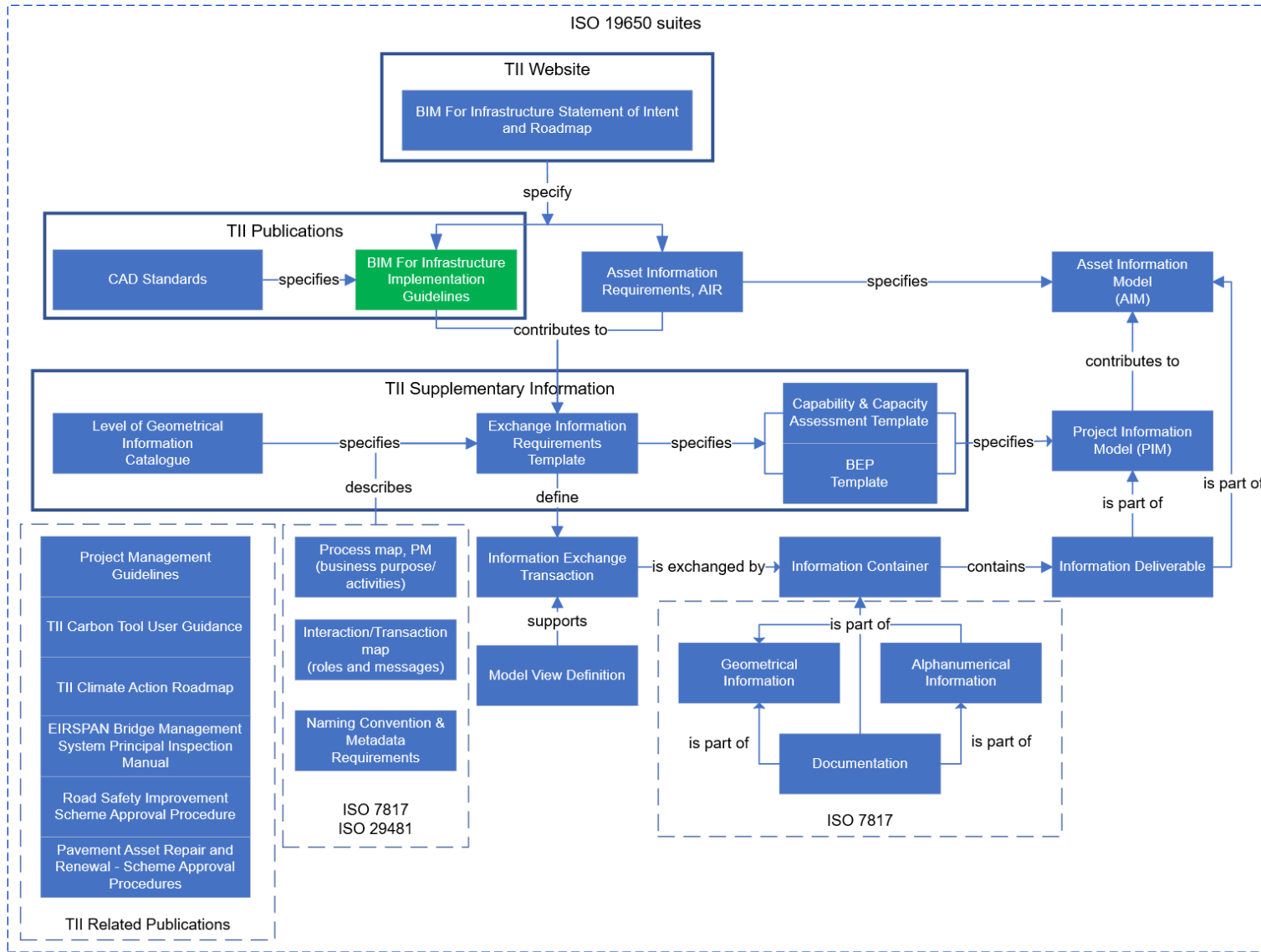


Figure 1.1 – Standards Relationship

Figure 1.2 provides a visual guide on how to navigate the suite of TII IM publications. It outlines the recommended reading order, identifies which documents to start with and how each standard relates to the others.

The purpose of each document is summarised below:

1. BIM for Infrastructure – Statement of Intent and Road Map: defines TII’s commitments and strategic timeline to implementing Information Management (IM) across the full asset lifecycle- created in response to the public sector BIM mandate to support the effective delivery of TII funded projects. The roadmap outlines a structured approach to IM implementation, incorporating a current-state assessment, gap analysis, and a prioritised programme of actions aligned with ISO 19650 and TII’s project lifecycle.
2. BIM for Infrastructure Implementation Guidelines for National Roads: This document.
3. Computer Aided Design (CAD) Standards for National Roads: Establishes guidelines for computer–aided design (CAD) conventions to ensure consistency, interoperability, and quality across project documentation.
4. Level of Geometrical Information Catalogue: Outlines the expected levels of geometrical detail for project information models (PIM) at various project stages to support consistency and clarity in design and delivery. Appendix K of this document.
5. Exchange Information Requirements (EIR) Template: A structured template to define the Appointing Party information needs, aligned with project goals, TII IM publications and the ISO 19650.
6. BIM Execution Plan (BEP) Template: Provides a standard format for the BIM Execution Plan (BEP), detailing how project participants will meet the EIR and coordinate IM activities.
7. Capability and Capacity Assessment Template: A template for evaluating the Appointed party ability to meet the Appointing Party information needs outlined in the EIR.

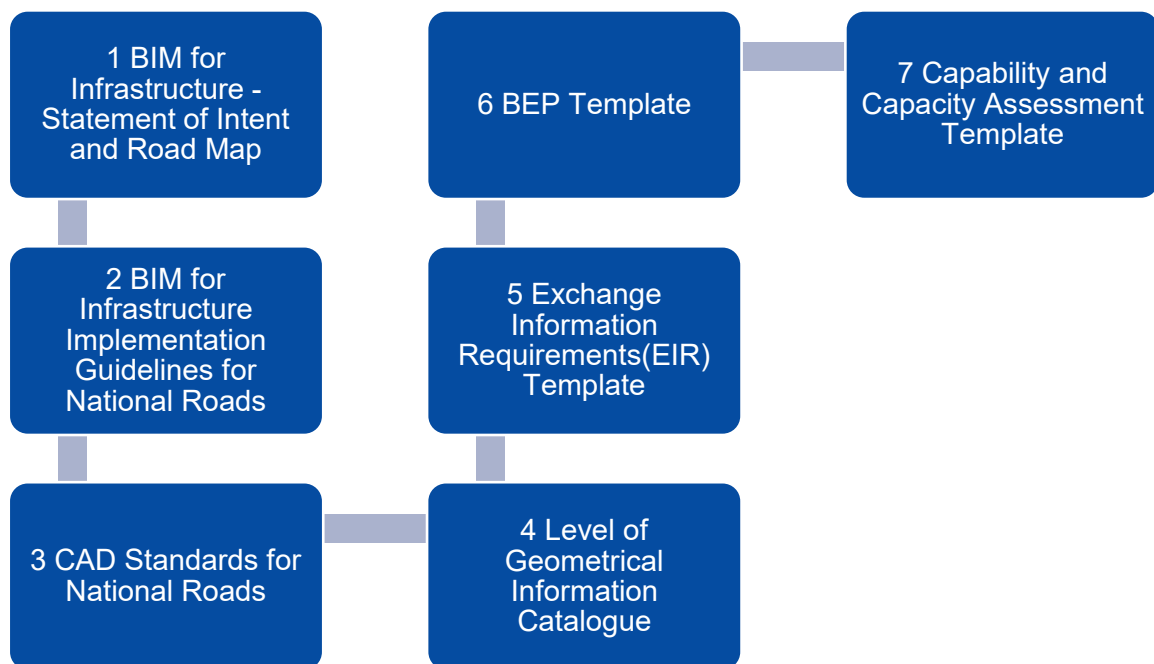


Figure 1.2 – Standards Flow Chart

## 1.5 I.S. EN ISO 19650 Key Terminology

One of the aspects of a fast-developing IM procurement area is that terminology is not used as standard across all contract forms, standards and protocols.

Even when writing this document, key terms may have a degree of interchangeability. For example, when looking at an IM template, this might be effectively set out within the BEP.

It is also understood that in respect of ISO 19650 future drafting there is consideration as to whether the use of BEP as a term might be changed, although it is unclear as to whether that may or may not alter to become the Information Execution Plan (IEP) or if another term is to be used.

As identified in the NEC4 Practice Notes referred to, there is also guidance on what term under the NEC contract corresponds to a Party identified within ISO19650. It is further understood that, when procuring contracts, utilising protocols and standards and producing scopes, it is important to seek to align terms or identify their corresponding terms as used in differing documentation.

The Build Digital Project from the Government of Ireland for example has a Concepts and Principles Guide which includes a section on definition of information requirements and resulting information models (Build Digital, 2026).

The publication, the Little Book of BIM (2023 Edition), in addition to identifying BIM standards, BIM and supporting and management system standards and guiding principles also contains a useful section on terms and abbreviations (The British Standards Institution, 2023).

Albeit there is a move to formalise IM Execution plans, these are still initiatives and not yet formalised into any “Standard” for reference, currently the change is termed Information Management Initiative (IMI). Further information in respect of IMI is available via the corresponding referenced items identified in reference (Nima, 2025).

The language used in ISO 19650 has been developed to neutralise terminology for international consumption.

Table 1.1 illustrates the key ISO 19650 terms used in this document and their relation to the definitions contained within the typical conditions of contract.

Information Management Procurement Guidance is available in Section 3 of this document. Section 3 shall be used by the Appointing party to support the procurement of TII funded projects.

**Table 1.1 – ISO 19650 Terminology Mapping**

ISO 19650 Term	Description	Typical Contract Definitions*
Appointing Party	The organisation leading the project or asset management. For a project this is typically the Client, who can also be the asset owner.	The Client or the person / organisation authorised to act on behalf of the Client, such as the Project Manager Typically, the Local Authority
Prospective Lead Appointed Party	A party tendering for the role of Contractor/Consultant.	Tenderer/Bidder
Lead Appointed Party	The party who is accountable for coordinating information exchange between task teams or between a delivery team and the Client.	Contractor/Consultant (Dependent on the procurement route)

ISO 19650 Term	Description	Typical Contract Definitions*
Appointed party	Anyone generating information about the project – for example a subcontractor, supplier or consultant.	Designer, Checker, Supply Chain Member i.e. the Information Provider
Building Information Modelling (BIM)	Use a shared digital representation of a built asset to facilitate design, construction and operation processes to form a reliable basis for decisions.  NOTE 1: Built assets include, but are not limited to, bridges, roads, process plants, buildings.  NOTE 2: In the context of this document BIM and information management terms, represent the same meaning.	Information Management
Project	Asset or service defined in the contract definition.	Service, Project, Asset
Project Team	Everyone involved in the Project and Sub-Project, regardless of appointment or contract arrangement.	The Client, Project Manager, Contractor, Supervisor, Information Provider Designer, Checker, and Supply Chain Members working on the project
Delivery team	A Contractor/ Consultant and their associated task teams – for example a contractor and its subcontractors and suppliers.	The Contractor and any person/company employed by the Contractor (i.e. the Designer, Checker and all Supply Chain Members).
Appointment	Agreed instruction for the provision of information concerning works, goods or services	Contract
Project Information	Set of structured and unstructured Information Containers relating to the delivery phase of a project.  Note 1: Including Project Information Model (PIM) and Asset Information Model (AIM).	Project Deliverables in line with:  PE-PMG-02041 - Project Management Guidelines  AM-PAV-06049 Pavement Asset Repair and Renewal - Scheme Approval Procedures  GE-STY-01037 Road Safety Improvement Scheme Approval Procedure  Note 1: For example, in NEC4, could be referred to as Information Model
Exchange Information Requirements	This specifies the information that is required related to a specific appointment (contract).	Information Model Requirements

ISO 19650 Term	Description	Typical Contract Definitions*
	It includes responsibility, timescales, format and level of information need of the project information, consisting of the relevant information requirements from the OIRs, AIRs and PIRs.	

\*Note 1: to be updated in line with the contract definition.

All acronyms and abbreviations are summarised in Appendix A.

## 2. Information Management (IM)

Information Management (IM) using Building Information Modelling (BIM) as identified in ISO 19650 requires the client to define their information requirements prior to the appointment of a Delivery team for a planning, design, construction or operation stages of the project. The concept is that these information requirements are progressively developed and modified over the life cycle of the project. With each stage being used to enrich the requirements for the next project or project stage.

In addition, to defining project-specific requirements, the Client should also identify and provide access to relevant shared resources. These resources may include existing site or asset information, as well as models and drawings from previous project stages. By leveraging these shared resources, the delivery team can ensure continuity and consistency across the project lifecycle.

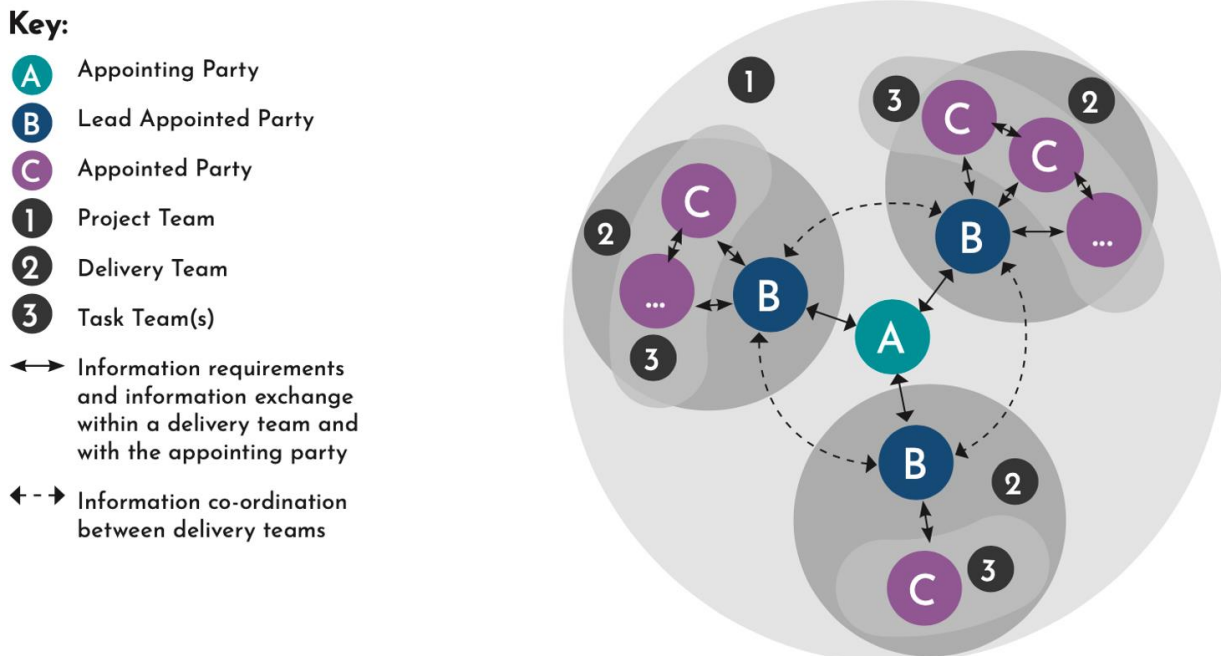
For instance, BIM deliverables produced during the design stage serve as a foundation for the construction stage, allowing the contractor to develop their construction models based on validated design information. However, ownership of these models should be clearly defined, as the transfer of responsibility for design models can vary depending on the chosen procurement route.

### 2.1 TII Strategic Goals

The TII strategic goals and objectives are outlined in the BIM for Infrastructure Statement of Intent and Road Map.

### 2.2 Stakeholder's Interface, Roles & Responsibilities

Figure 2.1 shows the information management interface between the project stakeholders.



**Figure 2.1 – Interface Between Parties and Teams (ISO 19650-2,2018)**

Table 2.1 outlines responsibility of each project stakeholder in line with ISO 19650.

**Table 2.1 – ISO 19650 Stakeholders Responsibilities**

Stakeholder	Responsibilities
Appointing Party	Create the Exchange Information Requirements (EIR) project standards OIR, AIR, EIR etc. (see Figure 1.1)
	Establish procedures for creation and delivery of information
	Establish Common Data Environment (CDE). NOTE 1: Appointing party can outsource this responsibility to third party.
Lead Appointed Party	Produce ISO 19650 BIM governance documentation: BIM Execution Plan (BEP), Master Information Delivery Plan (MIDP), Delivery Team’s Detailed Responsibility Matrix.
	Prepare and assign resources (people, processes, technology) within the Delivery Team.
	Develop Lead Appointed Party (LAP) appointment documents. NOTE 1: Only applicable if any appointed parties are present on the project.
	Manage and supervise the progress of the project information model by the delivery team
	Check if the project information model meets the requirements set by the appointing party
Appointed Parties	Produce ISO 19650 BIM governance documentation: BIM Execution Plan (BEP), Task Information Delivery Plan (TIDP), Delivery Team’s Detailed Responsibility Matrix. NOTE 1: Appointed Party and Lead Appointed party may produce a single combined set of BIM governance documentation.
	Creation of information according to the information standard and requirements.
	Taking part in the review of the project information model.

The stakeholder roles further divided into the Information Management functions across various Client, Contractor, Designer and Task Teams (Figure 2.2).

The responsibilities of each role are summarised in Appendix B.1 (UK BIM Framework, 2021).

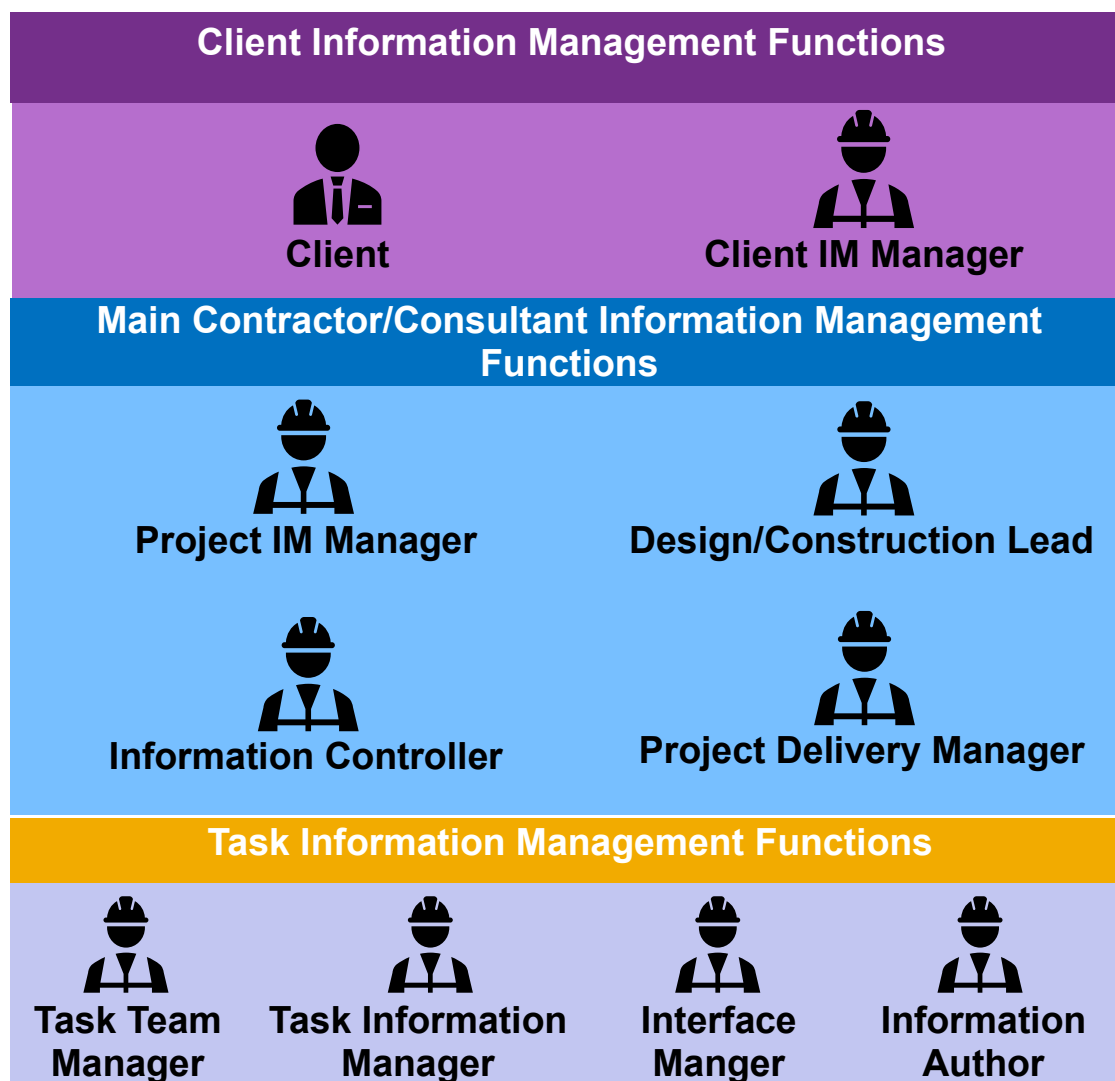


Figure 2.2 – The Information Management Function

Guidance for hiring organisations on sourcing Information Managers is outlined in the Information Manager(BIM) Role Profiles Document (Build Digital, 2026) - [https://media.cwmf.gov.ie/media/documents/Information\\_Manager\\_BIM\\_Role\\_Profiles.pdf](https://media.cwmf.gov.ie/media/documents/Information_Manager_BIM_Role_Profiles.pdf).

## 2.3 IM Process Map

The IM process consists of eight steps. The steps required for each Appointment and are divided into three phases (Figure 2.3):

### Procurement

1. Assessment and need – activities to be undertaken by the Appointing Party\*
2. Invitation to tender – activities to be undertaken by the Appointing Party\*
3. Tender Response – activities to be undertaken by the Lead Appointed Party/Delivery team

## Planning

4. Appointment – activities to be undertaken by the Lead Appointed Party/Delivery team
5. Mobilisation – activities to be undertaken by the Lead Appointed Party/Delivery team

## Production

6. Production of Information – activities to be undertaken by the Appointed Party task teams.
7. Information Acceptance – activities to be undertaken by the Appointing Party\*
8. Close- out and AIM Aggregation – activities to be undertaken by the Appointing Party\*

\* Appointing party can outsource this responsibility to third party.

Each step has a distinct purpose and acts as a prerequisite for the next. If the tasks within a step are not finished, it could impact those responsible for carrying out the activities in subsequent steps.

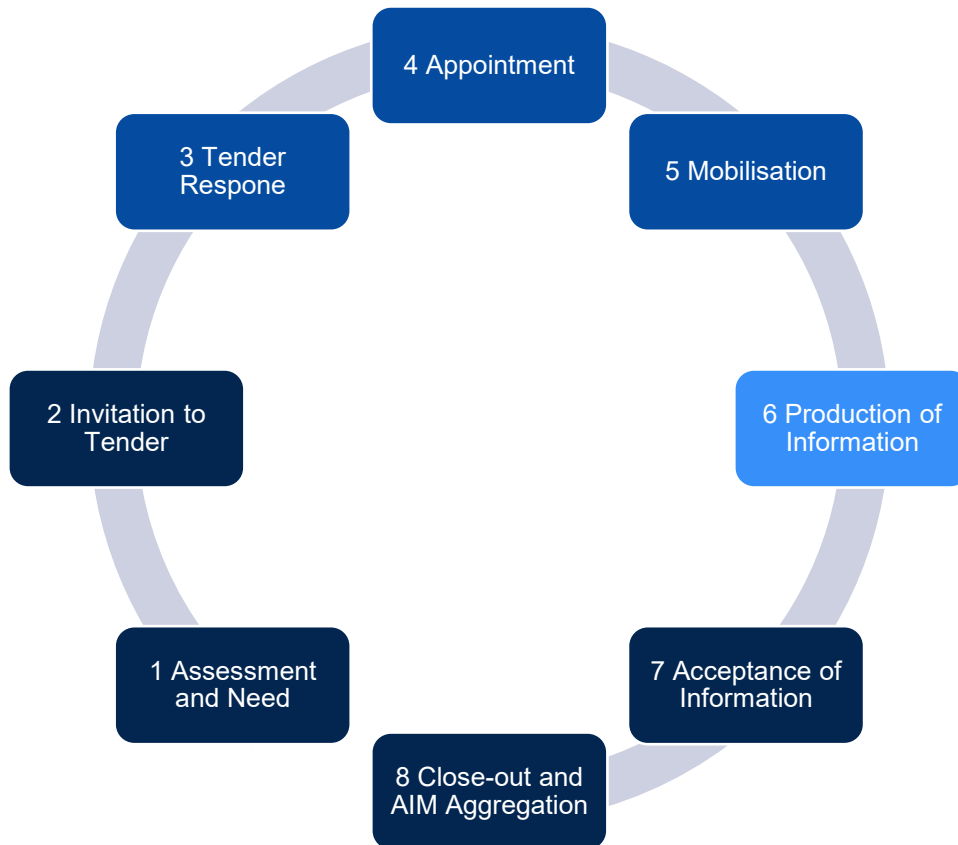


Figure 2.3 – IM Process Map

## 2.4 Strategic Purpose of Information

The strategic purpose of the information is defined in the PE-PMG-02041.

## 2.5 Project Specific Initiatives

The underlying expectation from the use of IM on the project is to achieve TII strategic goals defined in Section 2.1 of this document.

To achieve these goals, TII has established several project initiatives, which are outlined in Table 2.2.

Some of these initiatives align with best practices in the engineering industry, while others may extend beyond existing documents by engaging the project and its supply chain.

Additional initiatives may be embraced by the project and its supply chain to extend beyond existing practices.

It is important to note that this list is not exhaustive and reflects TII’s current approach. Additional initiatives are not prohibited but rather encouraged and should be defined in the Post-Appointment BEP.

Appointing party shall outline mandatory initiatives within Exchange Information Requirements Template (Appendix L).

**Table 2.2 – Project Initiatives**

#	Project Initiatives	Description	P&D*	C&I*	O&M*
1	CDE	Proposed Common Data Environment platform for project design and construction collaboration	✓	✓	✓
2	Clash Detection and Mitigation	Use of industry standard tools to detect and avoid clashes during design to reduce construction risk.	✓	✓	
3	Site Inspection & Photos	All site-based photos are to be captured with location services and GPS enabled to facilitate geospatial insights.		✓	✓
4	Model First Methodology	Undertake design on a philosophy of model-first. Model creation should precede the development of drawings, and any drawings should be derived from the model.	✓	✓	
5	Model Driven Reviews	Models to be used as the basis of all design reviews, preceding information produced on drawings.  This includes standard reviews alongside safety in design.	✓	✓	
6	Digital Asset Creation	Model elements produced and attributed with asset data requirements for handover to operations. All documentation to be attributed against asset tags.	✓	✓	✓
7	Non- graphical Information	Information generated as part of the project but unrelated to the 3D Model and its asset information.	✓	✓	✓

#	Project Initiatives	Description	P&D*	C&I*	O&M*
		Examples can include specifications, owner's manuals, calculations, maintenance schedules and contract documents			
8	Virtual Reality (VR) Engagement	Creation and delivery of graphical information in formats to support visualisation for engagement through use of Virtual Reality (VR) tools and technology.	✓		
9	Site Based Augmented Reality (AR)	Use of geospatially coordinated site-based survey markers to facilitate augmented reality model engagement.	✓	✓	
10	4D Construction Sequencing	Use of 4D BIM to both accurately and pragmatically schedule the construction works to drive improved delivery from the subsequent construction delivery team.	✓	✓	
11	5D Cost / Financial /Take offs Forecasting	Use of 5D BIM to provide increased visibility and reliability of cost-based information for project and programme governance insights.	✓	✓	
12	Machine Control	Uses digital information to guide and control machinery and equipment used in a construction environment.		✓	
13	Machine Avoidance	Uses digital information, technology, and sensors to detect and prevent potential clashes between construction machinery, equipment, workers, and others in the vicinity.		✓	
14	Visualisation and Simulation	Adopts gaming design principles, motions and features based on the digital 3D model to the construction/built environment for stakeholder engagement, health, and safety initiatives and more.	✓	✓	
15	Sustainability	Uses the BIM model to track, analyse and report on sustainability initiatives such as carbon footprint calculations, biodiversity and social gains etc.	✓	✓	
16	GIS	Utilise GIS data to manage spatial information about the project's assets, including their location, size, shape, and other attributes.  This data can be viewed through a GIS portal or application and may include various object types such as points, lines, polygons, topology, annotations, and 3D models.	✓	✓	✓

#	Project Initiatives	Description	P&D*	C&I*	O&M*
17	UAV technology	Use of UAV equipment, often equipped with sensors, cameras, and other technology for of surveying, progress monitoring and inspections to capture valuable data for design and construction purposes.	✓	✓	✓

\*P&D – Planning and Design; C&I – Construction and Implementation, O&M – Operation and Maintenance. Refer to Figure 4.1.

### 3. Procurement Guidelines

This section principally considers contractual aspects around the inclusion of Information Management in the contracts to procure an appropriate level of services in response to the OGP mandate in respect of IM for capital projects (from January 2024).

Whilst it is recognised that most contracts under current consideration in relation to the transport infrastructure in the public sector may be currently based upon the PWCF suite of contracts, there is, however, anticipated increased future use of the NEC4 contract suite within the market. Outside of those, other contract forms include contracts forms produced by FIDIC, RIAI and the JCT suite of Contracts. (Office of Government Procurement, n.d.)

The PWCF contract forms are particularly applicable in TII projects and the use of NEC4 is noted to be on the increase in the public works sector. The NEC4 contract suite is also noted to have one of the more developed approaches to Information Management. Accordingly particular commentary is provided in relation to these two suites.

Other contract forms, such as those from FIDIC may be less well used in transportation infrastructure sector and the RIAI and JCT contract forms are generally more building related.

However, given that many of the general principles around the use of information management might apply regardless of the Contract Form and approaches for dealing with this aspect are largely transferable/amendable, this document also picks up on a useful Practice Note issued by the JCT.

It is also noted that the RIAI BIM Pack released in 2022 provides advice for organisations considering bidding on a project that includes a requirement for BIM in accordance with I.S. EN ISO 19650-2.

#### 3.1 Key Documents to be Included in Contract

Key documents to implement Information Management within the TII's capital projects and the various BIM procurement documents required to be included in Tender are shown in Figure 3.1. These documents shall be included as part of each appointment for TII-funded projects.

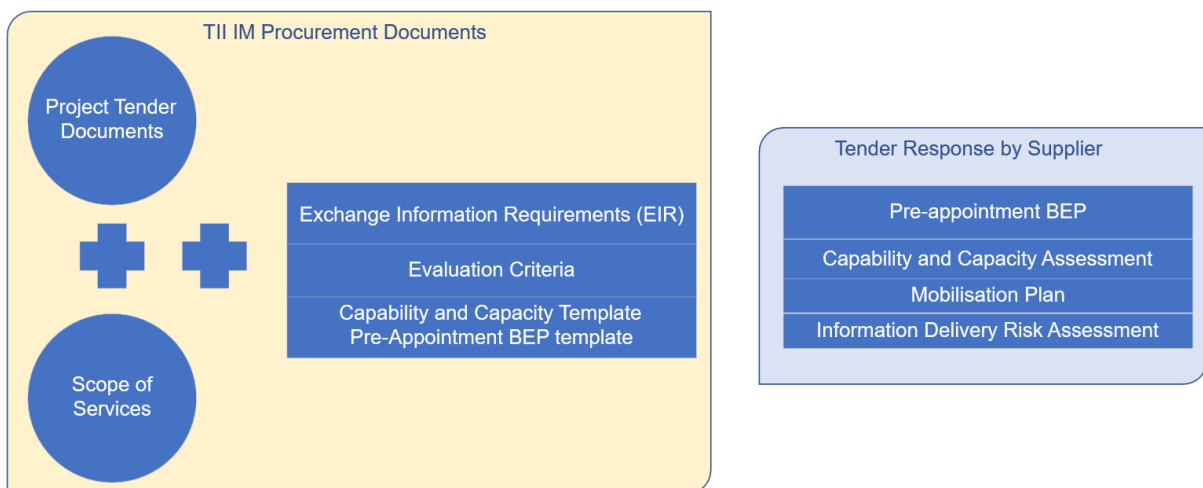


Figure 3.1 – Key Documents for IM Procurement

Refer to Section 1.3 for the relevant TII publication reference number.

## 3.2 NEC4

When the NEC4 works contracts launched in 2017 they introduced a new secondary option Clause X10: Information modelling (which could be applied to all NEC works contracts except the short contracts). With a relatively long history in the inclusion of information modelling and requirements for the provision of an IEP, the NEC4 X10 Clause sets out what is now a set of wording that has now been used in many NEC4 and NEC4 based contracts in relation to Information Modelling. Similar principles apply whether used in engaging a Contractor under an Engineering and Construction Contract or a Consultant under a Professional Services Contract (or any other NEC4 contract where it may be applied).

This Clause requires the works or service provider (as appropriate to the relevant contract) to provide an IEP, either as part of the executed contract document or within an identified period after the Contract Date (with either route being identified in the Contract Data). It also provides definitions for Project Information, Information Providers, the Information Model and the Information Model Requirements.

It is identified that the Information Model Requirements are the requirements identified in the Scope (or Subcontract Scope if using a subcontract form) for creating or changing the Information Model.

Clauses X10.2 and X10.3 are provided to pick up a requirement for collaboration with Other Information Providers and use of an early warning in relation to awareness of any matter that could adversely affect creation or use of the Information Model respectively.

Clauses X10.4 and X10.5 deal with instruction revision to and acceptance of the IEP and alteration in respect of a compensation event respectively.

Clause X10.6 relates to use of the Information Model, ownership and rights and requirements in the event of subcontracting, including documents transferring such rights.

A final clause, X10.7, relates to matters of liability as applicable to each Party and required insurance provision by the works or service provider (with the minimum level of insurance being an identified sum within a Contract Data entry) (NEC, n.d.).

In 2018, NEC4 – Practice Note 2 (NEC, 2018), was issued to address how to use the CIC BIM Protocol with NEC 4. The Practice Note picked up on many aspects including approach taken by NEC, a model Scope entry and use of terminology. That Practice note is similar in many aspects to Practice Note No.6 which picks up on a more recent Protocol, in referring to BS EN ISO 19650-2. Whilst the link to that Practice note is provided, much of the relevant information is referred to in more detail in the commentary in respect of Practice Note 6 below.

In 2020, NEC4 ECC – Practice Note 6 (as included with the references), was issued. Whilst specifically addressing the matter of “How to use the Information Protocol to support BS EN ISO 19650-2 the delivery phase of assets with NEC4”, it contains a guidance note that identifies that the X10 Clause had been designed to work on a protocol independent basis. This aspect of NEC also considers the international use of the contract and the fact that there may be other approaches to the use of a protocol and standards.

It however notes that the Information Protocol to support BS EN ISO 19650-2 the delivery phase of assets (the Protocol) edition 1 published by UK BIM Framework in association with the Construction Industry Council (CIC) May 2020 was one of a number of protocols available and that the Protocol had been written on the basis that it could be incorporated into any contract at any level within the supply chain. The Practice Note further refers to relevant roles within an NEC context.

The Practice Note explains that the Protocol can be incorporated into the NEC4 ECC by the selection of secondary Option X10 and the inclusion of the relevant parts of the Protocol as the Information Model Requirements in the Scope. In addition, it indicates a Model Scope Entry in relation to the documents that will form the Information Model Requirements and in respect of matching terms in the Protocol to those in the ECC contract.

The Model Scope entry and guidance notes provided therein are indicated to be for use when incorporating the Protocol in an NEC4 ECC. They may, however, apply to other NEC contracts, with terminology amended to suit the contract.

When using X10, whether tied to a specific published protocol or not, the Client's requirements that constitute the Information Modelling Requirements – the requirements for creating the Information Model - should be fully set out in the Scope. Such an approach allows the Client flexibility in describing requirements for managing the flow of information and creation of the Information Model.

Whether under NEC4 (utilising Clause X10) or any other contract form where inclusion of IM is required, it is imperative that the requirements for creating the Information Model or corresponding requirements for similar type provision are adequately set out in the Scope or alternative referenced documentation.

The Information Protocol should include a set of Information Particulars which shall include the list below as a minimum:

- Appointment description
- Appointing Party
- Lead Appointed Party
- Appointer
- Appointee
- Scope of works
- Level of Information Need
- Exchange Information Requirements
- BIM Execution Plan
- Project's Information Production Methods and Procedures
- Project's Information Standard
- Master Information Delivery Plan
- Task Information Delivery Plan
- Risk Register
- High Level Responsibility Matrix
- Mobilisation Plan
- Security Management Plan

Setting out these terms in the protocol will clarify the intentions of the Appointing Party (Client) and help to avoid conflicts that could have been avoided from the start. Regardless of the requirement, it is always advisable to seek legal advice adding this Information Protocol to a project contract (NEC, 2018).

### 3.3 Public Works Contract Forms (PWCF)

This suite of contracts that exists for use in the Public Sector, for works that are publicly funded includes the following, widely used forms (Capital Works Management Framework, 2025):

- PWCF1&3 Public Works Contract for Building Works/Civil Engineering Works designed by the Employer [used for Employer designed projects valued at over €5million]
- PWCF2&4 Public Works Contract for Building Works/Civil Engineering Works designed by the Contractor [used for Design & Build projects valued at over €5million]
- PWCF5 Contract for Minor Building & Civil Engineering Works designed by the Employer [used for Building & Civil Engineering Works valued between €1million and €5million]
- PWCF6 Public Works Short Form of Contract [used for Building & Civil Engineering Works valued up to €1million plus VAT].
- Other forms available from within the suite relate to Investigation Work, Public Works Frameworks, Early Collaboration and Term Maintenance and Refurbishment.

The CWMF identifies certain standards that are to be applied where BIM requirements are included in any public works project delivered under the CWMF. These include ISO 19650, Uniclass 2015, Industry Foundation Classes (IFC) and International Cost Management Standard (ICMS).

Further commentary on the use of standards in procurement can be found in Section 3.5.

Works in relation to PWCF forms are typically procured using the Pillar 1: Public Works Contracts (including those referred to above) and related Instructions to Tenderers and Forms of Tender and Schedules. It is the usual practice that the Public Works Contracts are not amended and the Schedules, which require to be populated, would be the appropriate documents within which to set out requirements in relation to Information Management. For example, where a PWCF3 contract was used the Tender and Schedule for Public Works Contract for Civil Engineering Works Designed by the Employer (Document reference FTS3) has a Schedule Part 1 B where the Works Requirements are identified, and this is where one may expect to see any IM requirements included. Other PWCF forms have Tenders and Schedule documents with a similar set up.

In a similar vein, where consultancy services were sought in relation to the CWMF, Pillar 2: Standard Conditions of Engagement with related Instructions to Tenderers and Forms of Tender and Schedules would normally be utilised. Again, the Standard Conditions of Engagement would remain unamended with the Schedules being the appropriate place for insertion of IM requirements.

Requirements in respect of IM are likely to be considered a scope item and as such it may be expected that either content will be provided within the specification document or, if a standard requirement is published by TII, then that may be incorporated via reference.

### 3.4 JCT Contract

The JCT contract suite (from UK Joint Contracts Tribunal), which has had 2024 issues, has seen limited use for construction in Ireland. The suite itself contains both main contracts and sub-contracts which reflect a range of collaborative procurement methods used by the UK construction industry including Traditional/Conventional, Design and Build, Management, and Integrated team/Partnering (JCT, 2019).

Whilst the previous 2016 issues were in use, JCT, in 2019, did issue a Practice Note titled “BIM and JCT Contracts”. The Practice Note focused on the use of BIM with the JCT Design and Build Contract (DB), as the most popular form of contract on projects employing BIM.

The ‘BIM and JCT Contracts’ Practice Note includes the following structure:

- **Part A:** A commentary on BIM and the JCT Design and Build Contract 2016, pointing out provisions that may be most impacted by or relevant to a project using BIM. It provides suggestions on matters to bear in mind, including preparing and incorporating a BIM Protocol
- **Part B:** Sets out suggestions on the main topics that may sensibly be covered in a BIM Protocol
- **Appendix 1:** A checklist of typical items to be considered by the Employer and the Employer’s professional advisers in formulating the Exchange Information Requirements at pre-tender stage
- **Appendix 2:** Glossary of terms
- **Appendix 3:** The Design and Build Contract clauses referred to in Part A for ease of reference
- **Bibliography:** To enable readers to further their knowledge and understanding

The Practice Note and other relevant contract forms, are available from the JCT Online Store.

### 3.5 Use of Standards and Protocols

OGP BIM mandate set out to require organisations to meet the standards of the ISO 19650 series, and these standards are used on an international basis.

The ISO 19650 series were identified to be adopted into the CWMF on a phased basis to impose the standard on information management for project delivery across the public sector.

A key step identified in BIM and the CWMF is to create a structured BIM Implementation Plan (BIP) to detail everyone’s roles and define the goals and requirements using the ISO 19650 series of standards. However, whilst a BIP may be seen as a strategic roadmap for how an organisation or company may adopt and utilise Information Management within and across different project phases, a BIM Execution Plan (BEP) would focus on the more detailed implementation within a specific project.

The full list of documents relevant to Information management and BIM are summarised in Section 1.3.

I.S. EN ISO 19650-2 is most relevant to construction contracts being let and the Part is referenced in more detail below.

In April 2024, The Build Digital Project from the Government of Ireland published a report produced under Project Ireland 2040 and the work of the Construction Sector Group Innovation and Digital Adoption Sub-Group which is titled CWMF Stages 1-5 ISO19650.

That report includes detailed steps, illustrated within flow charts (Build Digital, 2024), in relation to IM during the course of the corresponding stages of a project based upon a traditional design-bid-build procurement route from Feasibility through to Handover in a projects lifetime.

It also provides identification of the participation and actions of the Appointing Party (e.g. Employer / Client), Lead Appointed Party (e.g. Lead Design Team) and the Appointed Party (e.g. Disciplines or Specialist Design Teams) through each corresponding stage. It also includes an indication of the interaction of the various steps with the Common Data Environment.

Section 2.2 of this document outline the stakeholder relationships and responsibilities associated with the Information management.

Section 1.4 of this document outline the document relationship and provides a visual guide on how to navigate the suite of TII IM publications and industry standards.

By way of example NEC4 ECC – Practice Note 6, provides the guidance in this regard and identifies that:

- Within the Information Protocol to support ISO 19650-2 (the Protocol) the term “Information Particulars” covers several documents, some of which may be present at the Contract Date, whereas others are to be developed by the project team, post contract
- The documents that exist at the Contract Date should be identified in the first page of the Information Particulars in the Protocol and the completed front page and the documents included in the contract
- The Project Manager should maintain a record of the documents created after the Contract Date as stated in Clause 3.1.1 of the Protocol
- The Client will also need to decide which of the documents in existence at the Contract Date should be included as part of the Information Model Requirements. Those documents included in the Information Model Requirements will form part of the Scope and so the Contractor will need to comply with them and cannot change them without an instruction from the Project Manager. Such an instruction would normally be a compensation event
- The approach taken in NEC contracts to ownership of information and liability for its production is different from that set out in the Protocol. Since the provisions of the Protocol in respect of ownership apply only to the extent that the contract does not already contain such provisions, the clauses in the relevant NEC contract will apply instead of those in the Protocol
- When drafting the Information Model Requirements, the Client will need to consider any rights over the Project Information which will sit with the Contractor
- Dates in the Protocol Master Information Delivery Plan and any Protocol Task Information Delivery Plans should be shown in relevant programmes submitted for acceptance
- The Protocol requires a Lead Appointed Party to create a “Risk Register” for its Delivery Team. It is noted that the “Risk Register” is not the same as the “Early Warning Register” under the contract)
- If in accordance with Clause 11.2 of the Protocol the Client is entitled to terminate the contract and chooses to do so, then it must do so in accordance with the process and timescales set out in the relevant NEC contract. A breach under Clause 11.2 of the Protocol will be considered a default of the Contractor under the first bullet point of Clause 91.2 of the contract “substantially failed to comply with its obligations”.

Whilst the preceding bullet points are Protocol and/or NEC4 specific, it can readily be seen that similar points may need to be considered under other forms of contract where IM is required to form part of the Scope / Specification.

Additionally, the Digital Construction Pack (Ferris & Flynn, n.d.), includes a comprehensive section on Standards, Policies, and Guides. It also addresses topics such as Bidding for Digital Project Delivery, which is relevant to the procurement of IM.

It also includes a table which forms the basis of the table shown in Table 2.1 and which helps illustrate a high-level definition of project document requirements to successfully work on a project and meet the required project standard, using the terminology contained with ISO 19650.

### **3.6 Common Data Environment**

Many of the standards applicable to information modelling refer to a CDE in relation to shared asset information model. This may include documentation files (e.g. correspondence, specifications, manuals, warranties), nongraphical data files (digital attributes) and graphical data files (e.g. three-dimensional models, two-dimensional drawings) and metadata (describing what a package of CDE information contains).

However, the term CDE is not, for example, referred to in NEC4 option X10, or in NEC's recommended scope entry for the CIC BIM protocol.

Additionally, whilst the 'Information Model' in X10 is defined as the electronic integration of information of Project Information and similar provided by the Client and Other information Providers, it does not state the document or file formats to be used when exchanging information.

A proposed Z clause to help clarify matters around a CDE and digital collaboration has been suggested in the paper "Facilitating digital collaboration in the NEC4". That proposed Z clause provides definitions as to what Documentation, the CDE, and Information Originator, an Information Receiver and Metadata mean. It then goes on to set out matters around an information exchange.

Whilst the proposed Z clause had been drafted with the intent of potential use with NEC 4, similar clarification with regard to definitions and approach in respect of CDE may also be beneficial if detailed under other contract forms/relevant Scope documentation.

In relation to the use of a CDE, the flow charts contained in the paper on CWMF stages 1-5 ISO19650 from The Build Digital Project from the Government of Ireland are also noted to contain a Common Data Environment Key in relation to identification in the flow charts to defined States of the information shared between each of the identified parties at identified workflow process steps. Information regarding a project's CDE should be included within the BEP.

### **3.7 EU Procurement Directives**

As an overarching requirement, aside from any IM considerations, any procurement within the public sector that exceeds published thresholds, unless it qualifies for a specific exclusion, will be required to comply with any relevant EU public procurement Directive. This includes Directive 2014/23/EU on the award of concession contracts, Directive 2014/24/EU on public procurement and Directive 2014/25/EU on procurement with respect to Utilities. (Capital Works Management Framework, 2024)

### **3.8 Team Selection**

A further key step identified in the CWMF relates to choosing the team. When forming the team for a project, it is important to clearly define all the roles within the project team (and that team may comprise individuals from different organisations).

The team dynamic can be an important aspect in engagement with the processes and workflows and adopting latest software and in developing continued improvement. Team members should be open to learning from each other and sharing their experiences and the utilisation of open learning sessions, for example, may facilitate such a dynamic.

Also important in effective execution of Information Management is the provision of training, both in respect of any initial engagement in the process and during the course of the project. This may include in respect of matters such as expectation from the BEP, clarification of roles and responsibilities, adoption of processes and workflows and the use of software and systems.

Once IM processes are underway, focus may then turn to improvement in processes and other aspects. Experience from repeating processes together with effective monitoring, reviewing, evaluating and adjusting, will help lead to efficiencies and improvements in quality of deliverables.

Information Management Roles Guidance (Appendix B) outline typical roles and responsibilities required when carrying out information management activities.

## 4. Information Exchange

### 4.1 Information Exchange Milestone

This section communicates the timing and content of information exchanges between the Project Team / Supplier and the Client and how information exchanges are aligned to work stages. Information may flow both ways.

At a project level, the frequency of required information exchanges shall be defined in further detail within the project BIM Execution Plan (BEP) and Master Information Delivery Plan (MIDP).

#### 4.1.1 National Road, Greenway and Active Travel Projects

For National Road, Greenway and Active Travel Projects whilst information can be shared at any time during the course of a project stage, formal published information deliverables shall be exchanged in line with the Project Management Guidelines (PMG) PE-PMG-02041 stages.

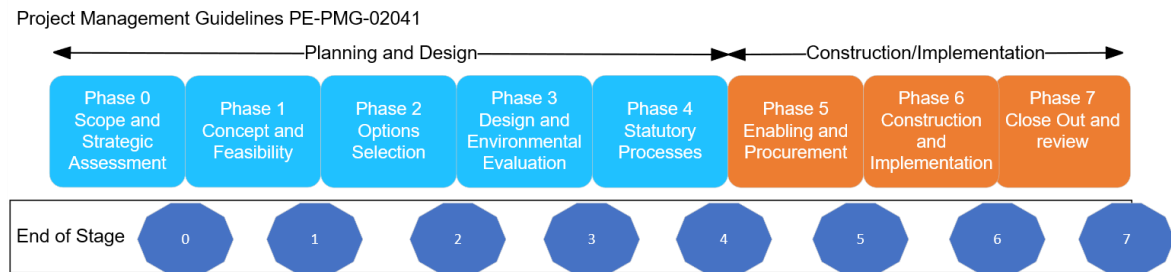


Figure 4.1 – Project Lifecycle

As outlined in PMG some phases may be run in parallel to facilitate the ease of delivery.

Where stages are combined or omitted this shall be agreed with the TII Senior Engineering Inspector and outlined in the Project and BIM Execution Plans.

#### 4.1.2 Pavement Asset Repair and Renewal (PARR) Projects

For Pavement Asset Repair and Renewal (PARR) projects, information may be shared informally at any time. However, formal deliverables must be exchanged in accordance with the approval gateways defined in the PARR Scheme Approval Procedures (AM-PAV-06049).

#### 4.1.3 Road Safety Improvement Schemes (RSIS)

For Road Safety Improvement Schemes (RSIS), information may be shared informally at any time. However, formal deliverables must be exchanged in accordance with the approval gateways defined in the RSIS Approval Procedure (GE-STY-01037).

### 4.2 Information Exchange Format

The Project Team should produce project information in the file formats listed in Table 4.1. This list is not exhaustive and other information types and file formats are not prohibited and may be used by the Project Team subject to the agreement of Project Manager. All formats shall be clearly defined within the BIM Execution Plan (BEP).

**Table 4.1 – Information Exchange Formats**

Information Type	Native Formats	Exchange Format
Information / 3D Models	dwg, dgn, rvt, 3DM	ifc
Project Information (Federated) Models	nwd, i.dgn, 3DM	STEP
2D Models	dwg, dgn	dxg, dwfx
Drawings	dwg, dgn	pdf
Documents	docx, doc	pdf, odt
Semi structured Data	xlsx, xls	csv, pdf, ods, xml, bcf, ags
Presentations	ppt, pptx	pdf, odp
Photogrammetry 3D Mesh Models	obj, 3sm, 3mx	3D Tiles, I3S
GIS Data	shp, shx, dbf, prj, tab, geoJSON	gdb, web URLs
Aerial and satellite imagery	jpeg, ecw, geotiff, jpeg 2000	jpeg
Point Cloud	las, pts, ptx, pod, xyz, ptd	e57
Virtual Environment (VE) Models	umap, uasset, unity	3D Tiles, I3S, glb, gltf, obj
Video Files	avi, mp4	
Alignment File	lfcAlignment 1.0, OFC, LandXML 1.2, OFC GML 3.3 or higher	
Terrain Data	LandXML, MX Genio	

Lead Appointed party (LAP) should exchange information through the project lifecycle (Figure 4.1) in both native and exchange formats (Table 4.1).

Appointing Party and Lead Appointed Party should consider methods for ongoing interoperability over the whole asset lifecycle when preparing files for exchange.

### 4.3 Information Exchange Process

All “Shared” or “Published” Status information in the CDE should be exchanged by the Project Team via formal transmittals.

All exchanges of digital information during all the project stages should be made via formal transmittals between the Appointed Parties, Lead Appointed Party and Appointing Party. Email should be confined to general correspondence and not include any attached documents.

Links to CDE information containers should be used as the main method for sharing information.

The transmittals should contain links to information delivery packages within a CDE and include a cover letter/transmittal sheet with the following details:

- Short description of transmittal contents
- Issue date
- List of delivered information containers including their titles/descriptions and associated Status and Revision codes
- List of transmittal recipients
- Expected actions from recipients e.g. download, acknowledge, review, respond, authorise
- Metadata defined in Section 5 of this document

The Project Team may consider the use of Application Programming Interfaces (APIs) or equivalent to automate the transmittal process and interoperability within information system infrastructure.

These tools may include functionality to speed up transmittal's preparation tasks and enable users to digitally acknowledge, download, review and respond to the information containers within transmittals.

The dates of the information exchanges should be provided in the BEP and MIDP.

Lead Appointed Party should implement the necessary procedures to ensure information models are produced in the appropriate exchange formats (Table 4.1), coordinates and units to ensure interoperability between native software applications, avoiding "data drop-off" and to drive interdisciplinary information sharing.

Sufficient time and resources should be allowed for testing and assurance of proposed exchange formats during the mobilisation period of the relevant stage.

Lead Appointed Party shall implement the necessary processes and workflows in accordance with the processes outline in ISO 19650-2 and in accordance with their internal Quality Assurance procedures to ensure design information is shared frequently and timely between Task Teams.

## 4.4 Project Close-Out

Upon acceptance of the completed project information, the Appointing party shall ensure that the Project Information Model is archived within the CDE (or an equivalent controlled repository).

Prior to archiving, the Appointing Party in consultation with the Lead Appointed Party and relevant Appointed Parties should consider:

- Which information containers will be needed as part of the asset information model
- Future information access requirements
- Future information re-use
- Relevant information retention policies

## 5. Information Management Deliverables

The Lead Appointed Party (LAP) shall supply information deliverables at specific milestones or stages, which comprise Information Exchanges in line with the agreed scope of works and PE-PMG-02041-01. Information exchange milestones shall be defined within BEP and MIDP.

Figure 5.1 illustrate the information management deliverables which should be provided by the Appointing Party, Lead Appointed Party and Appointed Parties. The list is not exhaustive and may increase in line with project Scope.

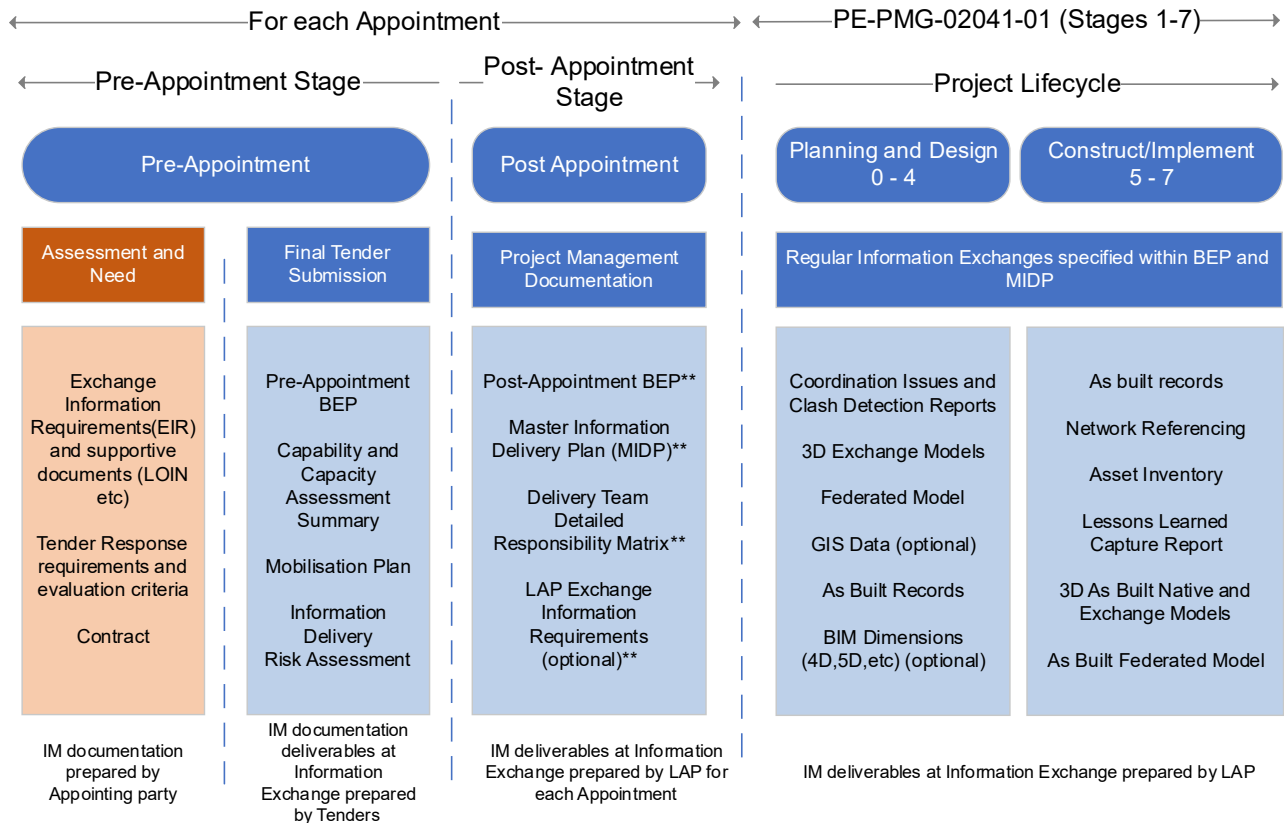


Figure 5.1 – Information Exchange

### 5.1 Exchange Information Requirements (EIR)

The Exchange Information Requirements (EIR) shall include responsibilities, timescales, formats, and the level of information required for the project. It will consist of the relevant information requirements necessary for project execution.

This document (GE-BIM-00101) outlines most of these requirements. However, the Appointing Party should supplement them with project and contract specific requirements as needed.

The Appointing Party shall also define the tender evaluation criteria.

Exchange Information Requirements template is available within TII supplementary information Appendix L.

## 5.2 Tender Response and Evaluation Criteria

As a minimum for the tender response Lead Appointed Party shall include deliverables outlined in Figure 5.1.

As part of this process, the Appointing Party shall consider the following elements within each tender response:

- The content and adequacy of the pre-appointment BIM Execution Plan (BEP) submitted by the Lead Appointed Party
- The competency and experience of the individuals proposed to undertake the information management function on behalf of the delivery team
- The Lead Appointed Party’s assessment of the capability and capacity of their proposed delivery team
- The delivery team’s proposed mobilisation plan
- The delivery team’s information delivery risk assessment, including identification and mitigation of risks associated with meeting the information requirements

These considerations shall be addressed prior to the appointment of the Lead Appointed Party, ensuring that the procurement process is robust, transparent, and aligned with the principles of ISO 19650-2.

Appointing Party can further add the tender response requirements by referencing them in the Exchange Information Requirements (EIR) Appendix L.

## 5.3 Pre Appointment BIM Execution Plan

A pre-appointment BIM execution plan (BEP) focuses on the delivery team's proposed approach to information management and their capability and capacity to manage information. The pre-appointment BEP as a minimum shall include (Table 5.1):

**Table 5.1 – Pre Appointment BEP Content**

Topic	Description
Team	The team identified in the tender and a summary of their key skills related to information management.
Delivery Strategy	Explanation how the team develop and deliver the information requirements for the project.
Software	Confirmation of the proposed authoring software including version.
Federation strategy	Confirmation of the federation strategy and information container breakdown structure.
Design Coordination & Clash avoidance	If applicable for a particular appointment process for design coordination and clash detection. Details on any proposed issue management software used to handle clashes and related model/design issues. If such software is included, explanation how it will be used for issue management.

Topic	Description
Project's information production methods and procedures	Confirmation of understanding of the project's requirements and processes, with the ability to comply accordingly. List any proposed additions or amendments to the scope of work as necessary.
Project's information standard	Confirmation of understanding of the project's information standard and the ability to deliver and exchange information accordingly. Any proposed additions or amendments, if relevant, should be provided.
Information management assignment matrix	The delivery team's information management assignment matrix, containing the allocated responsibility for each element of the information management and the key deliverables associated to each information model element.  Refer to Appendix E.  For further guidance refer to CWMF ISO 19650 -2 workflow. (Build Digital, 2024)
Mobilisation Plan	Plan that defines the activities required to mobilise information management arrangements before project commencement and on appointment of a new task team, including resource deployment, allocation of responsibilities, training, system set up, testing and implementation timescales, so that project information can be managed effectively from the outset.  Note 1: The mobilisation plan helps to ensure that all necessary systems, resources and competencies are in place and functioning correctly before project work begins, reducing the risk of delay to the project start date.  Note 2: Mobilisation activities can include software, hardware and network set up procedures; software and platform training; and software, platform and hardware testing.  Note 3: It can be prepared as a standalone document or included as part of the pre-appointment BIM Execution Plan (BEP).

Pre-appointment BEP template is available within TII supplementary information Appendix N.

## 5.4 Capability and Capacity Assessment

The capability and capacity assessment sets out the ability of the Appointed Party to effectively meet the information requirements set by the Appointing Party.

The Lead Appointed party shall conduct project specific supply chain competency assessments and provide an overview and summary of the outcomes.

As a minimum assessment shall consider:

- **Capability and capacity to manage information:** Experience of the standards and enough resource
- **Capability and capacity to produce information:** Experience of the methods and procedures and enough human resource
- **Availability of IT:** Appropriate hardware, software and support in sufficient quantities for the project

The template is available within TII supplementary information Capability and Capacity Assessment Template (Appendix M).

## 5.5 Risk Register

Establish the information management risk register. The risk register shall identify within the requirements set out by TII, risks associated with the planning, production and delivery of the information.

This can be a standalone document or be part of the overall project risk register.

## 5.6 Post Appointment BIM Execution Plan

The Lead Appointed Party shall prepare and maintain a post-appointment BEP and associated documents within the time periods stipulated in the contract.

A post-appointment BEP shall be submitted to the Appointing party for approval.

The document shall:

1. Be developed from and be consistent with the Pre-appointment BEP submitted during the tender stage and in line with Section 5.3 of this document.
2. Describe in detail how the project information will be managed and delivered by the LAP in compliance with this document.

Minimum requirements are summarised in Table 5.2.

**Table 5.2 – Post Appointment BEP Content**

Topic	Description
Team	Confirmed names of the individuals undertaking the project information management functions and the task information management functions.
Software	Confirmed schedule of software, hardware and IT infrastructure.
Delivery Strategy	Updated information delivery strategy, as required, comprising: <ol style="list-style-type: none"> <li>1. Approach to meeting the requirements of this document.</li> <li>2. Delivery team's goals for the collaborative production of information.</li> <li>3. Overview of the LAP organisational structure and Task Team composition.</li> <li>4. Propose CDE solution, in line with Section 7.2, which shall include a diagram illustrating the CDE's information management workflows.</li> </ol>
Design Coordination & Clash avoidance	Detailed collaboration and design coordination process.
Project's information production methods and procedures	Details outlining the processes for complying with the project's information production methods and procedures, ensuring adherence to the EIR.
Project's information standard	Provide details of the strategy for the project's information standards, ensuring the ability to deliver and exchange information effectively.

Topic	Description
Detailed responsibility matrix	Detailing what information to be produced; when the information is to be exchanged; and with whom; and which Task Team is responsible for its production.  Note 1: Can be a standalone document or an appendix to the post-appointment BEP.

A post-appointment BEP shall form part of the suite of quality assurance documents highlighting how the project and its information will be managed.

LAP shall keep the post-appointment BEP up to date to reflect any necessary changes to be made to the delivery team’s information management and delivery processes.

This includes the development of further detail, changes in the use of software and technology, and replacements of key personnel.

Updated versions of the BEP shall be submitted to Appointing Party.

## 5.7 Project Information Model (PIM)

The LAP shall supply the required PIM deliverables at the relevant Information Exchanges with the applicable Level of Geometrical Detail as shown in Section 8 of this document. PIM should be in the formats specified in Table 4.1 unless specified otherwise within EIR.

## 5.8 Asset Information Model (AIM)

The LAP shall supply the required AIM deliverables at the relevant Information Exchanges with the applicable Level of Information as shown in Section 8 of this document.

AIM should be in the formats specified in Table 4.1 unless specified otherwise within EIR.

## 5.9 Task and Master Information Delivery Plans (TIDP and MIDP)

Each task team shall establish, and maintain throughout its appointment, a task information delivery plan (TIDP).

The TIDP shall consider the project’s information delivery milestones, the task team’s responsibility within the responsibility matrix, this document and associated documentation, the availability of shared resources within the delivery team, and the time the task team will need to produce, generate, coordinate, review, and approve information.

LAP shall update the Master Information Delivery Plan (MIDP) to reflect any changes required due to the project’s circumstances and progress. Updated versions of the MIDP shall be submitted to Appointing Party.

No template has been provided for the TIDP and MIDP to allow the LAP options on how best to deliver and manage this. Minimum data requirements are specified in Appendix F.

The schematic composition of the MIDP is summarised in Figure 5.2.

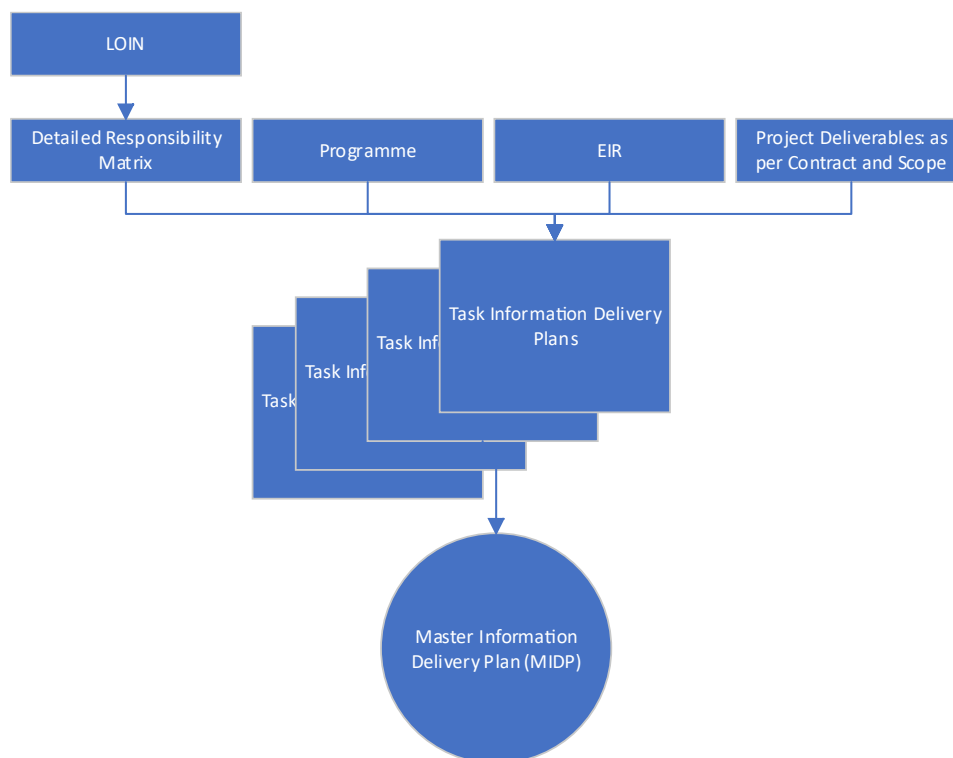


Figure 5.2 – MIDP Composition

## 5.10 LAP Exchange Information Requirements (EIR)

Where the LAP has any sub-appointment and requires appointed parties to comply with additional requirements, over and above EIR (Appendix L) in terms of the production and management of project information, these shall be established in specific LAP Exchange Information Requirements (EIR) and issued to each applicable appointed party.

LAP EIR must be consistent with EIR (Appendix L) and submitted to Appointing party for approval.

## 5.11 Lessons Learned Capture Report

In line with Section 5.8.2 in I.S EN ISO 19650-2, the LAP shall prepare a Lessons Learned Capture Report and submit it to the Appointing party prior to completion of the Appointment.

As a minimum this report shall identify the following:

- Issues that could be avoided in the future through improvement to the processes
- Successful strategies that might be adopted in the future
- Procedures or resources that could be improved with the view to eliminate waste and maximise efficiencies

## 6. Information Container

### 6.1 Information Container Identification (ID)

To conform with the I.S. EN ISO 19650-2:2018 clause 5.1.7 the information container identification shall adopt the container coding given in UK NA.2 BS EN ISO 19650-2.

The unique ID shall be defined using fields separated by the delimiter and in accordance with the convention below (Figure 6.1).

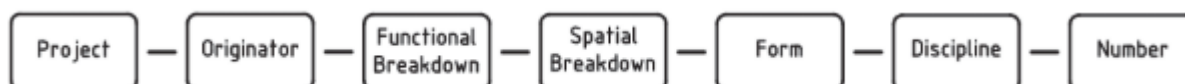


Figure 6.1 – Unique ID convention (BS ISO 19650-2 UK NA.2, 2018)

The following delimiter is to be used:

Hyphen-Minus

Unicode Reference U+002D

#### 6.1.1 Project Codes

A unique project code should be determined at the initiation of a project. The project field code should be a maximum of nine characters in length and shall relate to TII project reporting system (PRS).

All project stakeholders must use the same project code.

#### 6.1.2 Originator Codes

The originator code defines the company or organisation which has initially produced the file. The code for the originator field should be a minimum of three to a maximum of six characters in length.

Lead Appointed Party shall clearly define originator codes within the BIM Execution Plan (BEP).

For the list of originator codes refer to Appendix C.

The list is not exhaustive and other originator codes are not prohibited by this document and may be used by the Project Team subject to the agreement of Appointing Party. All codes shall be clearly defined within the BIM Execution Plan (BEP).

#### 6.1.3 Functional Breakdown Codes

The functional breakdown code should be chosen from established industry codification system to ensure consistency.

The field should consist of three characters in length.

For the list of functional breakdown codes refer to Appendix C.

The list is not exhaustive and other functional breakdown codes are not prohibited by this document and may be used by the Project Team subject to the agreement of Appointing Party. All codes shall be clearly defined within the BIM Execution Plan (BEP).

#### **6.1.4 Spatial Breakdown Codes**

The spatial breakdown code should be a fixed text or prefix component and uses values specific to the project and defined at the outset. The code is flexible and should consist of maximum ten characters in length. When planning complex projects and determining the number of model files required, it is commonplace and good practice for the project to be divided into spatial zones defined by coordinates/chainage within an overall project model that will be held as separate model files. This enables multiple users to work on the project efficiently.

Lead Appointed Party shall clearly define “spatial breakdown” strategy within the BIM Execution Plan (BEP).

As a minimum:

- The code ‘ZZ’ should be used for information containers associated with multiple spatial zones
- The code ‘XX’ should be used for information containers that are not associated with any spatial zone

The general form is optional letters followed by an integer numeral.

For the list of spatial breakdown codes and guidance refer to Appendix B.

The list is not exhaustive, and codes are not prohibited by this document and may be used by the Project Team subject to the agreement of Appointing Party. All codes shall be clearly defined within the BIM Execution Plan (BEP).

#### **6.1.5 Information Form/Type Codes**

The information type code relates to the type of file which the document is and assists with speeding up searching for the relevant file as well as the improved segregation of project information. As per the recommendation in BS EN ISO 19650-2:2018 UK National Annex NA. 3.6, the document type field should consist of maximum 2 characters in length

For the list of information type codes refer to Appendix C.

The list is not exhaustive and other level codes are not prohibited by this document and may be used by the Project Team subject to the agreement of Appointing Party. All codes shall be clearly defined within the BIM Execution Plan (BEP).

#### **6.1.6 Discipline/Role Codes**

Discipline codes define the role the originator company or organisation is playing in the creation of this specific file. One originator company can hold many different roles within a project. These codes further help with speeding up searching for the relevant file as well as the improved segregation of project information. This field should consist of maximum 2 characters in length.

For the list of information type codes refer to Appendix C.

The list is not exhaustive and other level codes are not prohibited by this document and may be used by the Project Team subject to the agreement of Appointing Party. All codes shall be clearly defined within the BIM Execution Plan (BEP).

### 6.1.7 Number

A sequential number shall be defined for each information container. The number code should be a minimum of three to a maximum of six digits in length. Leading zeros shall be used, i.e. 0001, 0002 etc.

## 6.2 Information Container Metadata

Project information managed through the CDE should include the following metadata as a minimum:

- **Status code:** As per table NA.4.2 in the UK national Annex to ISO 19650-2
- **Revision code:** As per Section NA.4.3 in the UK national Annex to ISO 19650-2
- **State:** 'Work in Progress', 'Shared', 'Published' and 'Archived' – as described in Sections 12.2 to 12.7 in I.S. EN ISO 19650-1
- **Originator's name**
- **Checker's name**
- **Reviewer's name**
- **Approver's name**
- **Approval date**
- **Revision details**
- **Classification:** Classification for information containers should be in accordance with Uniclass 2015, using PM table where possible as per Section NA.4.4 in the UK national Annex to ISO 19650-2
- **Project Stage:** project stage should be in line with PE-PMG-02041.

In addition to being recorded within the CDE, file metadata should also be presented as specified below.

- **Drawings:** Title and revision blocks on the drawing frame
- **2D and 3D Models:** Title and revision blocks on paper space/sheet models
- **Text Documents:** Document control page
- **Spreadsheets:** Document control sheet

## 6.3 Status Code

All information containers should have the relevant status code defined by the originator and each team member with responsibility for checking, reviewing, and approving as the process progresses.

The status codes featured in Appendix D should be assigned to information containers throughout its lifecycle (Figure 6.2).

Lead Appointed Party shall demonstrate within BIM Execution Plan (BEP) how status codes will be adopted for each project stage in line with PE-PMG-02041.

## 6.4 Revision

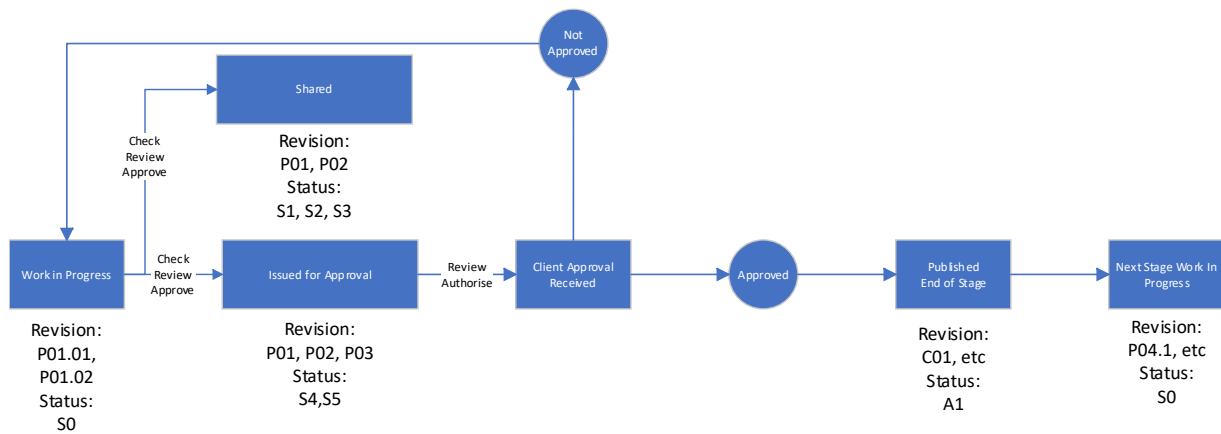
Preliminary revisions of information containers should be two integers, prefixed with the letter ‘P’ – for example P01.

Preliminary revisions of information containers in a ‘work in progress’ state should also have a one or two-integer suffix to identify the version of the preliminary revision – for example P02.05. It is important to keep track of ‘work in progress’ versions of information containers that are shared by a task team with the rest of their delivery team by using this methodology.

Contractual revisions of information containers should be two integers, prefixed with the letter ‘C’ – for example C01.

Note that preliminary revisions shall begin with P01 number. Preliminary WIP revision numbers shall be P01.01 and Contractual revision numbers shall follow the next revision number (P01, P02, P03 → C01 etc.). Refer to Figure 6.2 for revision status workflow.

It is recommended that the information container revisions should be automatically managed using the Common Data Environment system, ensuring the generation of a specific revision number.



**Figure 6.2 – Revision Status Workflow**

## 7. Technology Requirements

### 7.1 Mobilisation of IT

The mobilisation of technology infrastructure including hardware and software shall be outlined in a mobilisation plan as specified in Section 5.3 of this document. In line with ISO 19650-2 the Lead Appointed Party shall:

- Procure, implement, configure, and test the software, hardware, and IT infrastructure as required
- Configure and test the project's Common Data Environment (CDE)
- Configure and test the delivery team's (distributed) CDE and its connectivity to the project CDE (if applicable)
- Test information exchanges between task teams
- Test information delivery to the Appointing Party EIR
- Testing Information Production Methods and Procedures

Technology radar (Appendix G) outlines examples of technology software and vendors/products by each area of project operations.

This list is not exhaustive and other software and vendors are not prohibited by this document and can be used by the Project Team subject to the agreement of Appointing Party.

The chosen software shall be clearly defined within the BIM Execution Plan (BEP).

#### 7.1.1 Software Upgrade

To prevent compatibility issues, software versions should remain fixed for the duration of the Appointment. The Lead Appointed Party (LAP) must communicate any proposed version changes to the Project Team to avoid delivery disruptions.

No team member shall upgrade to a new version without adhering to the following principles:

- Notify the Project Team of the intent to upgrade software versions
- Obtain formal approval from the Project Information Manager (PIM) or Project Manager (PM) before proceeding
- Confirm the scheduled upgrade date with the PIM/IM
- Archive all project files immediately prior to the upgrade, to prevent data loss
- Issue updated files to the Project Team following the upgrade
- Await validation from the PM that no adverse effects or compatibility issues have occurred

It is considered good practice to use software that matches at least the current year e.g. If the current year is 2025, project models should be started or upgraded using a software version dated 2025.

### 7.2 Common Data Environment

A Common Data Environment (CDE) is a digital information platform that centralises project data storage, access and exchange.

A CDE shall host all project information including but not limited to documents like project contracts, estimates, reports, material specifications, and other information relevant to a project's planning, design and construction drawing and models.

### 7.2.1 Benefits of a CDE

- **Enhances collaboration:** All project data and information flow into and be updated in one centralised system (or combination of systems). This leads to improved coordination and teamwork, both internally and across delivery teams
- **Creates a single source of truth:** One reliable place for team members to access real-time project information leading to better decision-making and insight across projects
- **Improves efficiency and quality:** Reduce the need to manually recreate data, which leads to reduced input errors and lost information
- **Reduces risks:** Enhances transparency and provides a comprehensive project overview, enabling continuous improvement and greater predictability, key factors in driving business success
- **Improve information security:** Centralised data management enhances access control, reducing the risk of unauthorised access, data breaches, and loss of information

### 7.2.2 CDE Responsibility

The Appointing Party is responsible for establishing the Common Data Environment (CDE). Provided there is a scope of services included, the Appointing Party may optionally:

- Outsource this activity to a Third party
- Transfer responsibility for hosting, managing and/or supporting the CDE to a Lead Appointed Party or an Appointed Party provided there is a scope of services included

An Appointing Party with numerous ongoing assets may wish to consider retaining control of the CDE whereas in the case of a speculative one-off project, one of the two options may be more suitable.

Ownership or management of the CDE does not infer data ownership. It does however include responsibilities for assuring a minimum level of service and assurance as a system administrator that data is securely managed.

The functional and non-functional requirements of a CDE should meet the requirements of the Appointing Party and the project. In some cases, a simple document management system is required but in other cases more sophisticated processes that support field work, asset management, cost management and project management may be required.

There are numerous systems available, and in some cases the Appointing Party may develop bespoke systems to suit their own business needs.

Figure 7.1 illustrates the example of the information workflow associated with each project stakeholder having a dedicated CDE. This document does not prohibit other configurations and options of the information infrastructure.

The chosen project infrastructure shall be defined by the Lead Appointed Party within BIM Execution Plan and subjected to the approval of the Appointing Party.

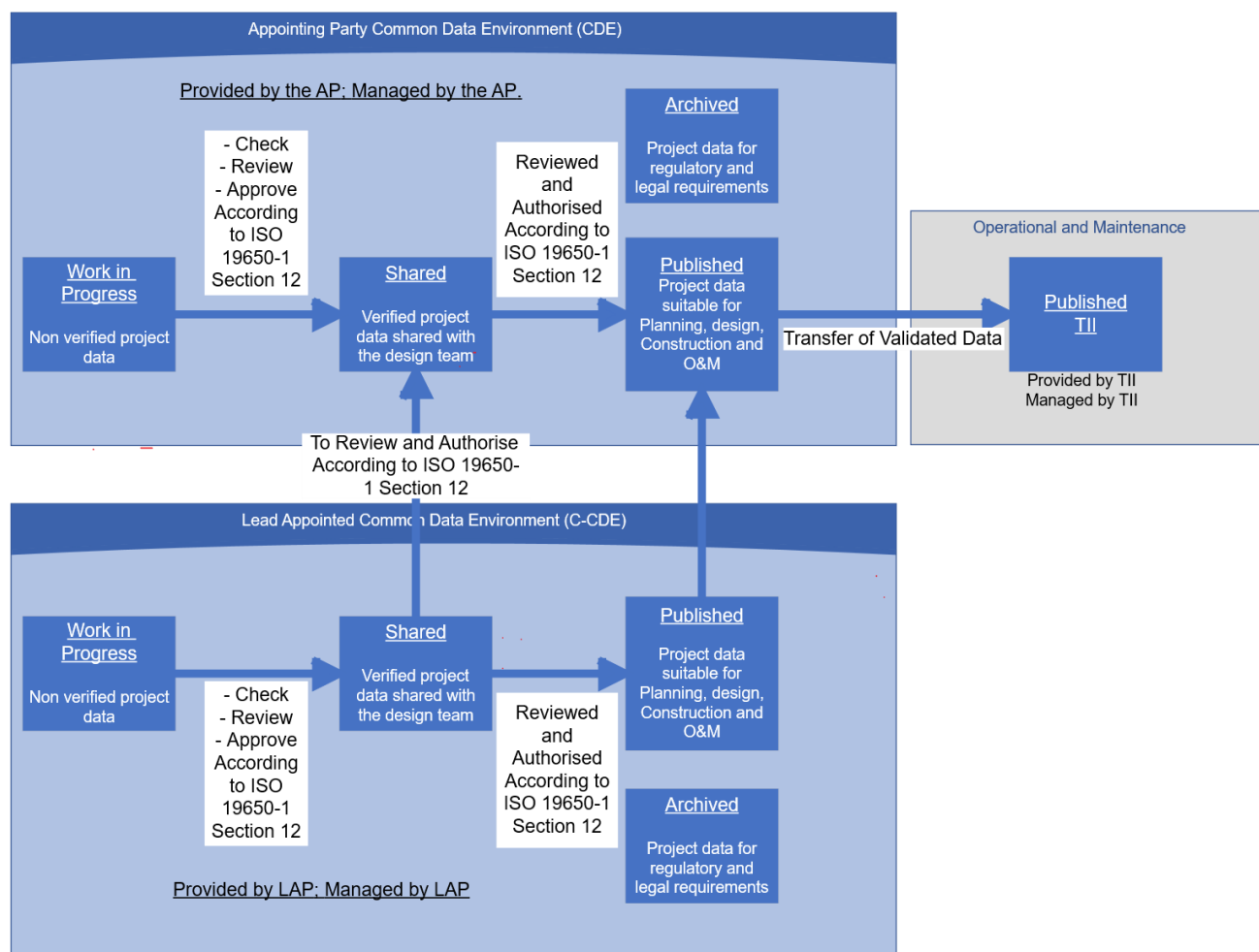


Figure 7.1 – Example of Information Exchange System’s Infrastructure

### 7.2.3 CDE Requirements

- CDE solution shall adopt the information management workflows specified in Section 12 of I.S. EN 19650-1. The CDE shall be capable of managing metadata and attribution
- CDE solution shall be capable of creating audit trail records detailing the development of files, users’ access and activity, searching capabilities, folder navigation, metadata viewing
- Minimum security requirements for a CDE solution are specified in Section 12 of this document
- All information within a CDE solution should be filed in accordance with Section 6 of this document
- A CDE solution shall enable each information container to have a unique ID in accordance with Section 6 of this document

### 7.2.4 CDE Workflows

Chosen CDE Solution shall be capable of facilitating workflows specified in in Section 12 of I.S. EN 19650-1 and illustrated in Figure 7.2.

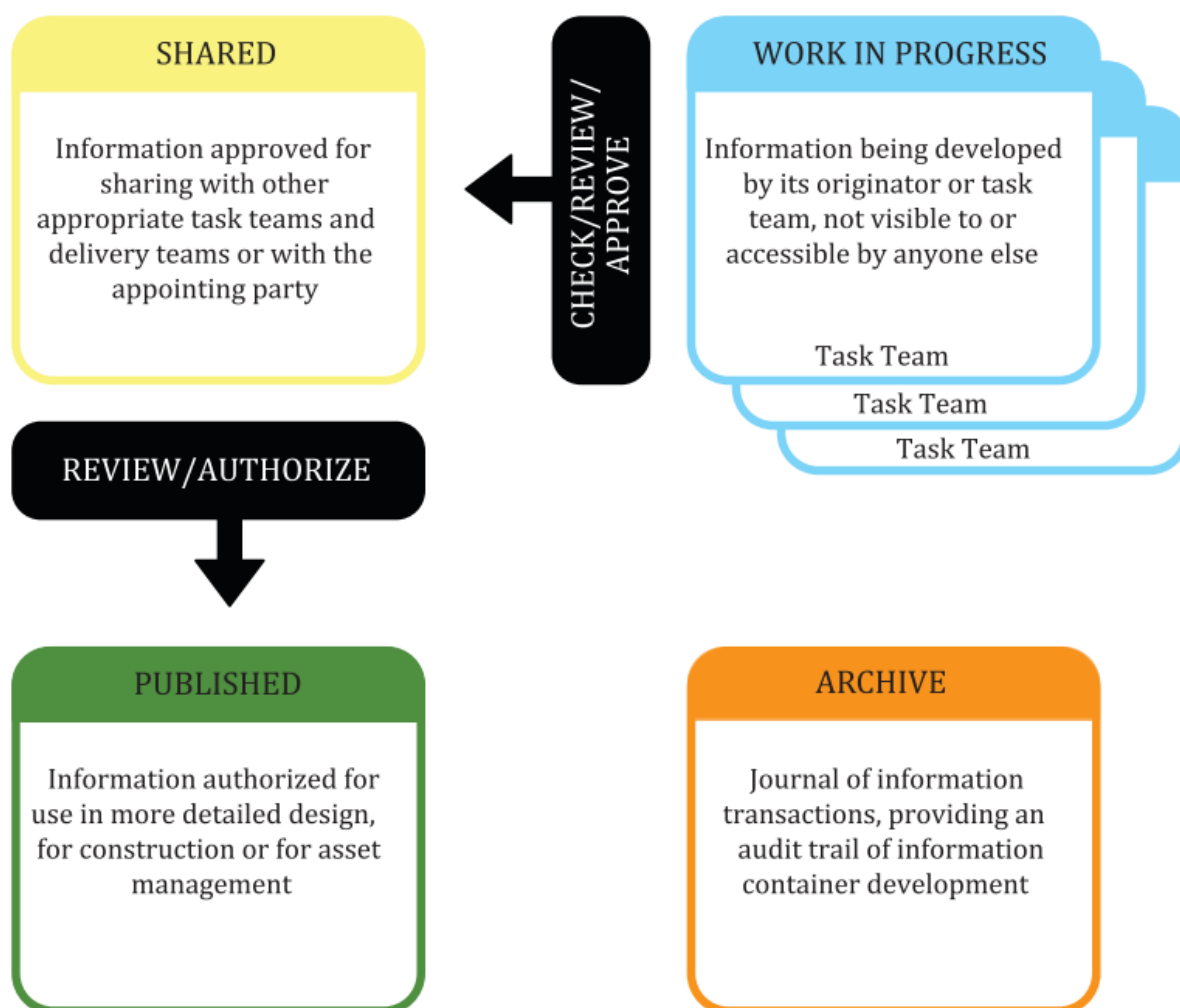


Figure 7.2 – Common data environment (CDE) workflow concept (ISO 19650-1, 2018)

These are:

- **Work in Progress (WIP) state:** The WIP state is used for information while its being developed by the corresponding task team. WIP information container should not be visible or accessible to any other task team.
- **Check/Review/Approval transition:** Once the information is ready to be shared with other task teams, the originating task team conducts quality assurance checks to ensure it has been developed in accordance with the agreed standards, methods, and procedures.
- **Shared State:** The purpose is to enable collaborative development of the project information. Information in this state should be accessible to relevant parties but cannot be edited. If changes are needed, the information must be moved back to work-in-progress stage for updates. Additionally, the shared state is used to store approved information that is ready for review and authorisation by the appointing party. This specific use is known as the client shared state.
- **Review/Authorise transition:** Checks project information to ensure it meets requirements for coordination, completeness, and accuracy. If it passes, information is moved to the published state.

If not, it is sent back to the WIP state for revision. Authorisation distinguishes finalised information, which can be used for planning, design, construction, or asset management, from information that is still subject to change in the work-in-progress or shared state.

- **Published State:** Contains authorised information used for planning, design, construction, or asset management. At the end of a project, the Project Information Model (PIM), or during asset operation, the Asset Information Model (AIM), includes only information in the published or archive state. This status is also read/view only.
- **Archived State:** The archive state stores a record of all shared and published information, providing an audit trail of its development. Information in this state was previously shared or published. This status is also read/view only.

The "Archived" state should contain a comprehensive audit trail of information development and exchange.

This should include details such as:

- Who checked and reviewed the information and when?
- Who approved it, and when?
- The status assigned to it before it was shared.
- Who authorized it, and when?
- Who accepted it, and when?

All these processes should be recorded in the CDE, which helps with transparency.

### 7.2.5 CDE Selection Checklist

The checklist which should be used to guide the selection process of CDE are outlined below:

- Have all potential CDE solutions been reviewed to ensure they support the agreed metadata assignment requirements?
- Have security considerations been considered when selecting CDE solutions, ensuring that access permissions can be managed at both individual and organisational levels?
- If multiple CDE solutions are being used, potentially owned or managed by different organisations, has the overall CDE workflow and interoperability been reviewed to confirm that information containers can pass seamlessly between systems?
- Has a clear and documented CDE workflow been established for each type of information container, outlining the steps for development, checking, sharing, authorisation, acceptance, publication, and archiving?
- Does the project have a clearly documented set of standard methods and procedures specifying how metadata assignments (as defined in the information standard) will be applied to information containers?

## 7.3 Hardware Requirements

The Appointing Party and Lead Appointed Party should ensure that Project Team engaged in the project delivery have access to hardware system that meet recommended minimum system requirements outlined in Appendix H.

These system requirements have been derived to ensure compatibility, performance and reliability when operating typical software platforms defined in technology radar outlined in Appendix G.

Given the evolving nature of hardware and software technologies, the LAP shall remain responsible for monitoring industry developments and updating systems as necessary to maintain compatibility with the latest supported versions of the core software used.

## 8. Level of Information Need (LOIN)

As per ISO 7817 the Level of Information Need (LOIN) is a framework to define the extent and granularity of information requirements. It is used to communicate clearly the right level of information to be delivered to satisfy the Client's information-related purposes at agreed project work stage (Figure 8.1).

The LOIN can be either derived from predefined templates or defined for a particular purpose, provided it aligns with the intended information use. A predefined level of information need may be found in regulations, standards, plans of work, or specific project requirements, while other level of information need may be project specific.

The following sections outline the LOIN framework that the Lead Appointed Party (LAP) should apply in producing all information deliverables. This comprises the geometrical, alphanumerical and documentation levels of information need.

The LOIN shall be developed considering set of prerequisites that define the context for information delivery. These prerequisites include:

- The purposes for which the information is required
- The information delivery milestones at which the information is needed
- The actors responsible for providing and receiving the information
- The objects structured within an agreed breakdown structure.

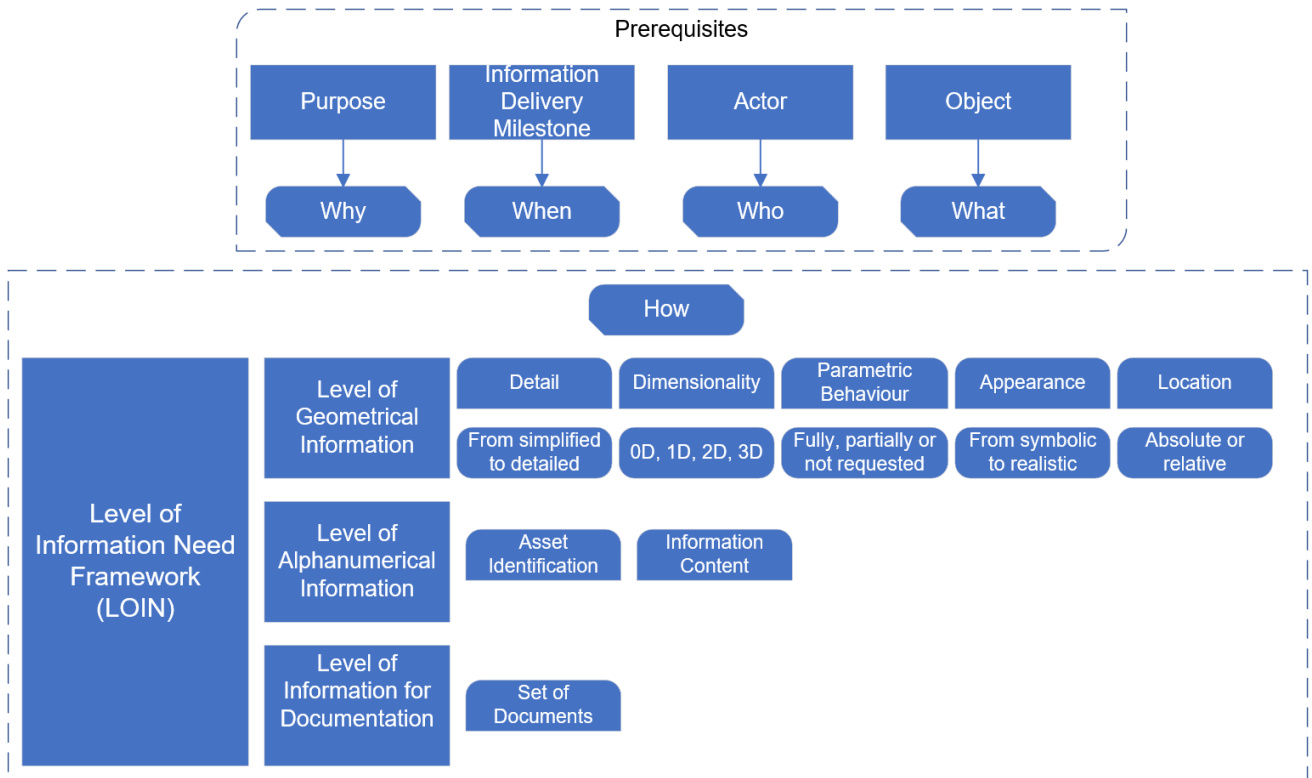
This is required to ensure that information requirements are aligned with the intended use, timing, responsibility, and structuring of project information. The prerequisites inform the LOIN but are defined separately and do not form part of the LOIN itself (Figure 8.1).

The Appointing Party and Lead Appointed Party should develop the LOIN required in collaboration with all parties to reflect the needs to fulfil different purposes at each milestone.

Level of information need should be specified in a way to allow both manual and machine interpretable verification and validation processes and/or data schemas.

The LOIN breakdown structure can follow a classification system, systems engineering principles or a federation strategy.

Different purposes may require different breakdown structure and derived decompositions.



**Figure 8.1 – Level of Information Need Framework (ISO 7817, 2024)**

The Lead Appointed Party shall outline their proposal for Level of Information Need in the BEP for each stage prior to commencement of work. LAP proposal shall consider and satisfy the requirements of this document, ISO 7817 and any additional LOIN requirements outlined in the EIR (Appendix L).

Appointing Party shall review and approve the LOIN proposed by LAP prior to commencement of each stage of delivery.

## 8.1 Level of Geometrical Information

Level of Geometrical Information is the description of graphical content of information containers within the Project Information Model (PIM) for different asset classes at different stages of the project, which shall specify the following aspects; Detail, Dimensionality, Location, Appearance and Parametric behaviour (Figure 8.1).

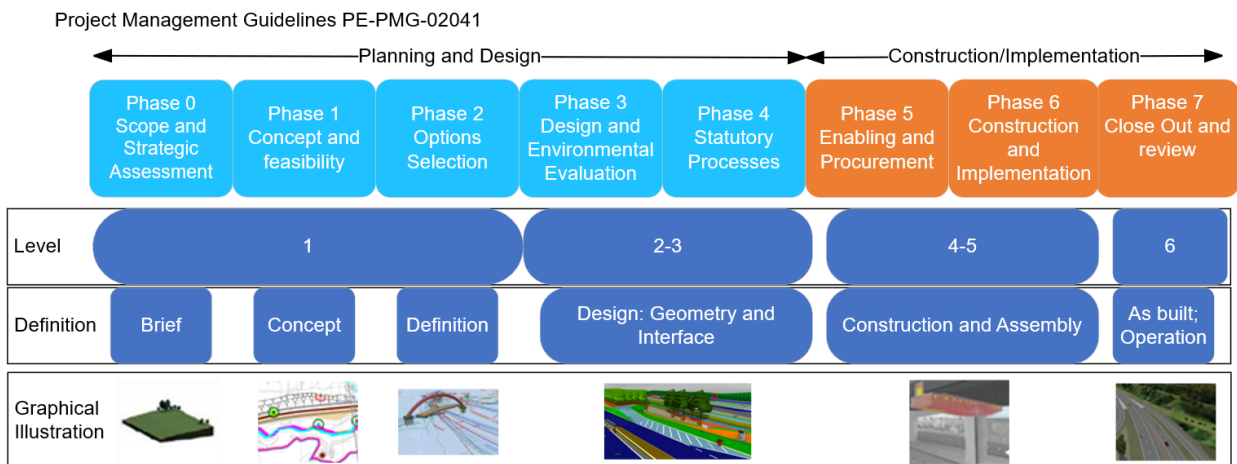
Level of Geometrical Information is essentially how much details is included in the graphical elements.

The selected Level of Geometrical Information shall be appropriate to support the project purposes and initiatives summarised in Table 2.2.

The Level of Geometrical Information will vary in accordance with the project scope, intended use, and selected purposes. The AP and the LAP should collaboratively define the Level of Geometrical Information Need to ensure that information requirements are met at each project milestone.

Typical levels of geometrical information, reflecting common project purposes at each project stage in line with the PE-PMG-02041 (as illustrated in Figure 8.2 ), are defined as follows:

- Level 1:** Elements are not required to be geometrically defined. Information may be represented symbolically or through references to other model elements (e.g. indicative symbols, annotations, or space reservations). Geometry, size, and precise location are not defined. Information derived at this level shall be considered approximate.  
 Typical Dimensionality: Predominantly 2D.
- Level 2:** Elements are represented by generic geometry and are identifiable as the components they represent (e.g. roads, manholes, pipes). Information derived at this level shall be considered approximate.  
 Typical Dimensionality: Combination of 2D with optional simple 3D massing or volumetric placeholders.
- Level 3:** Elements are sufficiently defined to convey the design intent of the asset, including accurate geometry, location, and key attributes.  
 Typical Dimensionality: Predominantly simplified 3D and 2D.
- Level 4:** Elements are developed to a level suitable for construction coordination, including interfaces between disciplines.  
 Typical Dimensionality: 3D with sufficient level to allow full design coordination.
- Level 5:** Elements are defined with sufficient detail to support fabrication, assembly, and installation. Typically, if a project's specifications require shop drawings for an item, the project team may model it at level 5. As a result, most assets include only a limited number of level 5 elements e.g. 3D reinforcement schedules  
 Typical Dimensionality: Detailed 3D for specific elements.
- Level 6:** This level does not represent a higher level of detail than level 4 or 5. Instead, it indicates that the element's geometry is based on observations of an existing (as-built) item rather than the design of a future item.



**Figure 8.2 – Level of Geometrical Information**

The typical allocation of Level of Geometrical Information by asset type and project phase is provided in Appendix I. Further guidance is included within the Asset Catalogue (Appendix K), which provides indicative Level of Geometrical Information requirements by asset class and project phase. The catalogue is not exhaustive, and alternative Level of Geometrical Information definitions may be adopted by the LAP, subject to agreement with the AP.

The Level of Geometrical Information requirements should be clearly documented within the BIM Execution Plan (BEP) by the LAP.

## 8.2 Level of Alphanumerical Information

Level of Alphanumerical Information is the description of non-graphical content of information containers at each applicable Information Exchange. Level of Alphanumerical information shall apply to geometrical models and alphanumerical information containers as follows:

- Geometrical models: Non-graphical asset data embedded within modelled asset objects or linked to the appropriate alphanumerical information containers, such as databases or spreadsheets
- Alphanumerical information containers: Non-graphical data held on databases or files structured in a tabular data format

The Alphanumerical Information requirements address TII's Organisational Information Requirements (OIR) and align with overarching Asset Management policies. To maintain the integrity of the Asset Information Model (AIM), it should be developed as a direct output of the Project Information Model (PIM), which serves as the single source of truth for all project data throughout design, construction, and handover.

The AIM's primary purpose is to support the effective ongoing management of the asset. It should provide a fully populated dataset that can be seamlessly integrated into the TII's Asset Information Management Systems.

A review is currently being conducted on the TII asset information requirements across various asset management databases to ensure accurate and complete data capture during project delivery. These requirements will be published in the future.

## 8.3 Level of Information for Documentation

Project documentation refers to all information containers within the CDE required to be supplied to the AP other than geometrical models and non-graphical asset data. This includes, but it is not limited to, reports, specifications, manuals, text documents, spreadsheets, schedules, programmes, photographs, hard copies of geometrical or alphanumerical information etc.

The LAP shall refer to the condition of contract, the scope, TII publications and any other relevant industry standards for the appropriate descriptions of the contents, quantity, quality and granularity of documents to be supplied to the AP.

## 9. IM Dimensions: 4D, 5D, Carbon and H&S

### 9.1 4D – Digital Rehearsals Guidance

4D integrates scheduling information with 3D models to visualise construction sequences over time. This capability enhances project planning, coordination, and communication by enabling project team to anticipate sequencing challenges, optimise schedules, and mitigate risks.

The typical use cases of 4D modelling includes:

- **Method statement development and implementation:** Supporting the preparation and validation of construction methodologies
- **De-risking complex activities:** Identifying and addressing potential sequencing conflicts before execution
- **Programme optimisation:** Enhancing scheduling accuracy and efficiency through simulation
- **Site communication and tracking of completed work:** Improving coordination and reporting of progress
- **Constructability reviews:** Visualising construction sequences to refine methodologies and execution strategies
- **Operational feasibility assessments:** Demonstrating that planned construction activities are achievable
- **Temporary works coordination:** Enhancing the planning and integration of temporary structures and supports
- **Stakeholder engagement:** Using visualisations to communicate complex engineering challenges effectively

Appointing party and Lead Appointing Party are encouraged to leverage 4D modelling to support planning and coordination activities.

Appointing party shall define those requirements in EIR template (Appendix L) for each appointment.

Unless specified otherwise by the EIR (Appendix L), native 4D file outputs are not expected to be exchanged by Lead Appointed Party with Appointing Party. However, if requested – such as for stakeholder presentation – outputs should be provided in open video format specified in Table 4.1.

If 4D is specified in the EIR (Appendix L) by Appointing party, as part of post- appointment activities LAP shall outline their approach to 4D processes in the BIM execution plan (BEP). As a minimum BEP shall outline:

- The way that 4D will support the use cases stated in EIR Appendix L
- The technology and tools selected for 4D modelling
- Resources, roles, and responsibilities for implementing 4D
- Technical methodology for integrating schedule data with graphical models

## 9.2 5D – Cost Information Guidance

5D is generally defined as the integration of cost information into project information model. When implementing 5D, Appointing party shall establish clear expectations regarding cost data requirements. Key considerations include whether the focus is on capital or operational costs whether costs should reflect pre-tender estimates or as-built records, and who is responsible for managing this information. Additionally, defining the measurement methodology is crucial for data consistency.

Appointing party and Lead Appointing Party are encouraged to leverage 5D modelling to support cost estimation activities.

Appointing party shall define those requirements in EIR template (Appendix L) for each appointment.

Unless specified otherwise by EIR (Appendix L), native 5D file outputs are not expected to be exchanged by Lead Appointed Party with Appointing Party. Instead, cost-related data should be incorporated within estimation templates and bill of quantities etc.

If 5D is specified in EIR (Appendix L) by Appointing party, as part of post- appointment activities LAP shall outline their approach to 5D processes in the BIM execution plan (BEP). As a minimum BEP shall outline:

- The way that 5D will support the use cases stated in EIR (Appendix L)
- Technology that will be used
- Resources required and responsibilities
- Technical information on how information models are used to extract cost, quantities and material information

## 9.3 Carbon Management Guidelines

Transport Infrastructure Ireland (TII) published their most recent Climate Action Roadmap setting out how the organisation plans to reduce emissions and meet decarbonisation and energy efficiency targets, aligned to the Climate Action Mandate. (Transport Infrastructure Ireland, 2025)

The main emphasis of this section is to outline carbon information requirements principles and interface with ISO 19650 and not carbon reporting standard or specification which are covered in TII Carbon Action Roadmap, ISO 14068 and PAS 2080.

The Lead Appointing Party shall use TII Carbon Tool to assess carbon emissions throughout the entire lifecycle of a proposed project from early design to construction, maintenance, operation and end-of-life in accordance with PAS2080.

The tool is accompanied by the User Guidance Document (GE-ENV-01106), which also outline the expected Level of Alphanumerical Information at each project stage.

Lead Appointing Party (LAP) should integrate carbon information into project information model (PIM) to support carbon management activities. The integration allows for real-time assessment and optimisation of carbon emissions throughout whole project lifecycle.

To support the integration of carbon information into the Project Information Model (PIM), the following practical applications and tools illustrate how Information Management (IM) enhances carbon management across infrastructure projects:

- **Material Quantification:** IM enables detailed quantification of key materials (such as asphalt, aggregates, geotextiles, steel reinforcement, and concrete etc). These quantities form the foundation for embodied carbon calculations and can be directly used in the TII Carbon Tool for consistent measurement and reporting. Where the appropriate materials are currently unavailable within the tool, verified Environmental Product Declarations (EPDs) can be supplied to TII to be added to the tool.
- **PIM integration with Life Cycle Assessment (LCA): Tools** tailored to infrastructure projects
- **Dynamic route and design scenario analysis:** Allows for the simulation of multiple alignments, material selections, and construction methods. Each scenario can be evaluated for its carbon footprint, enabling early-stage decisions that favour low-carbon outcomes.
- **Real-time Feedback and Design Optimisation**

LCA plug-ins can provide instant carbon performance metrics within the PIM environment. This allows design teams to refine geometry, pavement specifications, and drainage systems to minimise carbon emissions in real time. LAP shall outline their approach to carbon management processes in the BIM execution plan (BEP).

## 9.4 Health and Safety Management Guidance

The Lead Appointed Party shall follow the appropriate requirements from the S.I. No. 291/2013 – Safety, Health and Welfare at Work (Construction) Regulations 2013 and ISO 19650-6. All health and safety information shall be communicated and structured in line with of the ISO 19650-6.

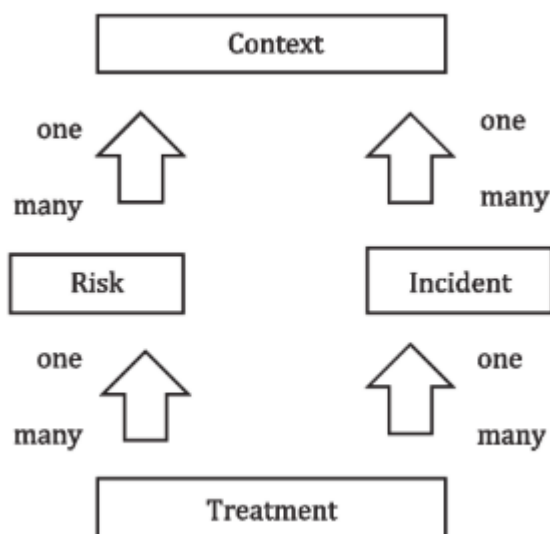
The main emphasis of ISO 19650-6 is communication of health and safety information in structured manner and not a risk assessment standard which is covered in the ISO 31000.

ISO 19650-6 defines:

- Guidance on how to structure health and safety information
- The information requirements that should be added to the contracts and appointments to support its use

### 9.4.1 H&S Schema

The health and safety information shall be structured using the schema as defined in ISO 19650-6 Section 4.3 (Figure 9.1).



**Figure 9.1 – Relationship between context, risk, incidents and treatments (ISO 19650-6, 2025)**

The context of the Health and Safety information shall be clearly described to ensure any risks and incidents can be assessed appropriately.

The Level of Alphanumerical Information for context, risk, incident and treatment is outlined in Appendix J.

#### 9.4.2 Risk, Incidents and Treatment Identifiers

To conform with the I.S. EN ISO 19650-6:2025 clause 4.4 the risk, incident and treatment information shall adopt the container coding given in Figure 9.2.



**Figure 9.2 – Risk, incident and treatment identifiers (ISO 19650-6, 2025)**

The unique identifiers should be defined using fields separated by the delimiter.

The identifier shall consist of:

- **Project/asset code (or context identifier):** Shall be composed of the project code as identifier in Section 6.1.1 of this document.
- **Originator:** Shall be composed of the originator code as identifier in Section 6.1.2 of this document
- **Number:** The sequential number, which shall be unique within the “Project/asset” (context)
- **Type:** Optional field, to distinguish among, risk, incident or treatment

#### 9.4.3 H&S Use Cases

The LAP shall provide details in the post appointment BEP of how IM - enabled processes will be used to manage the Appointing Party and Appointed Parties health and safety obligations appropriate to the stage (s) of work. These details may include but not limited to:

- Hazard and risk mapping and weighting across all project stages
- Asset hazard attributes for improved risk awareness
- Risk assessment alignment with Design Manual for Roads and Bridges (DMRB) GG104 guidance or equivalent
- Road engineering safety risks, including departures from standards
- Construction process/activity-based clash avoidance to reduce site conflicts
- Operations & Maintenance (O&M) clash detection to ensure safe asset operation
- Safe material distribution modelling, including plant and material movements and interim storage
- Identification of potential hazards and accident black spots using historical and predictive data
- Highlighting previous and potential near misses to inform proactive risk management
- Real-time tracking of live traffic locations to enhance site safety
- Identification and communication of site traffic routes to improve workforce and vehicular movement planning
- Augmented Reality (AR) for design and construction communication to improve hazard awareness
- Real-time workforce tracking incorporating AR to monitor labour force training levels and personal protective equipment (PPE) compliance
- Geo-tagging significant residual risks to enhance end-user safety understanding
- Digital management of access and egress within working areas to improve security and efficiency
- Development of interfaces with critical infrastructure to ensure safe integration of works
- Integration with live H&S data files for a continuous, real-time safety management approach

## 10. Training Management

The purpose of this section is to provide the Lead Appointed Party with the details of training which should be provided in connection with project systems, or training requirements should be delivered by the Appointing Party as part of their appointment/ contract.

The Appointing party should provide formal training on its systems to the Lead Appointed Party. This should be provided on a train the trainer basis unless otherwise agreed.

Appointing Party security or induction requirements should be highlighted to the Lead Appointed Party on a project specific basis.

Where projects include sensitive assets and systems, all personnel shall be subject to appropriate general security awareness training/briefing. Personnel with greater levels of access to information about these assets or systems shall be required to undergo more specific role-based security training.

Training and education needs of the project delivery team involved in the production, analysis and review of the Project Information shall be assessed and recorded in the Post appointment BIM Execution Plan (BEP).

Unless agreed otherwise project delivery training shall remain the responsibility of the relevant Lead Appointed Party.

## **11. Computer Aided Design (CAD) Standards**

Computer Aided Design (CAD) Standards for national roads are outlined in GE-BIM-00102: Computer Aided Design (CAD) Standards for National Roads

## 12. Information Security Guidance

The threat of information data theft is real and multifaceted. A cyber breach can lead to data being compromised, disclosed, copied, or stolen by unauthorised individuals. The consequences can be severe, ranging from financial losses to physical and economic damage. Data authenticity, availability, confidentiality, and integrity are paramount to minimising these risks.

One critical step in protecting data is engaging with the organisations IT Team to appoint a Built Asset Security Manager. This individual manages security threats, develops security plans, and promotes data security throughout the project's lifecycle. Their role is essential in ensuring that all security measures are enforced, and the data remains secure from design to project completion.

The ISO 19650 series, and especially Part 5, provides a framework for adopting a structured and security-minded approach to the management of information related to digital built assets. This should be implemented alongside ISO/IEC 27001, which lays out best practices for Information Security Management Systems.

A core message is that effective security is not just about technology; it also involves processes, people, governance, and a thorough understanding of the risks involved.

### 12.1 Guidance for Discussion

The following questions are a synopsis of 16 questions intended to be answered as part of a discussion between the organisation's security manager and those responsible for managing the organisation's built assets (National Protective Security Authority, 2020).

- Is the built asset a sensitive asset, in whole or in part?
- Who is responsible for providing security advice regarding the built asset and the asset information?
- Has any security advice been sought by the project sponsor?
- In respect of its sensitive built assets, what asset information is held by the organisation, its advisors, consultants, and/or contractors?
- Are any of the IT systems that store, process or display the asset information accessible from outside of the organisation?
- If so, what measures are in place to prevent unauthorised access to the systems?
- Where the organisation has multiple built assets, how is the asset information accessed across the organisation's estate?
- What information, if any, has been supplied to neighbouring asset owners regarding the organisation's assets?
- Where information has been received from neighbouring asset owners:
  - What restrictions, if any, were placed on the use or disclosure of the information?
  - Is any asset information created, stored, viewed or processed on handheld devices and what, if any, security measures are employed to protect it?
- What, if any, strategies and management plans are in place and how do they align with the requirements of I.S. EN ISO 19650-5?

## 12.2 Security Management

This section covers the agreed authorisations for security and project CDE access and authority to distribute documents.

### 12.2.1 Security Requirements

Requirements for systems used for information management, particularly concerning security. These requirements are intended to ensure the confidentiality, integrity, and availability of sensitive information throughout its lifecycle.

Depending on the nature, use or function of the built assets, there may be several sources of specialist security advice available to the employer or asset owner.

This advice typically covers personnel, physical and cyber security.

For sensitive built assets, advice will be available from a combination of Ireland's An Garda Síochána, National Cyber Security Centre (NCSC), National Standards Authority of Ireland (NSAI) and appropriate Government departments (Ireland's National Police and Security Service, 2019).

For other built assets, e.g. a high profile commercial building, the employer or asset owner's built asset security manager, along with An Garda Síochána (or the crime prevention design advisor CPDA), who should be embedded in the Local Authority Planning Office, and where necessary, specialist security advisors e.g. an appropriate member of the Register of Security Engineers and Specialists [RSES] should be able to assess the security threats and vulnerabilities to provide appropriate professional advice on security requirements and countermeasures (Department of Public Expenditure, 2021).

Additionally, in line with ISO 22341, Crime Prevention Through Environmental Design (CPTED) guidelines should be adopted. These guidelines offer a framework for designing and modifying the built environment to reduce crime and fear of crime.

The LAP should engage with Appointing Party IT department representative to address the following.

### 12.2.2 General Security Systems

- Systems should be secure by default, meaning full functionality is available without compromising security, and default settings should maximise protection. If a secure-by-default setting is not possible, the system settings should be configured to maximise the protection of sensitive information
- Systems and processes should prevent unauthorised control, manipulation, or interference, ensuring information is used only as specified
- Systems should be designed to prevent harmful states that can lead to injury, loss of life, environmental damage, or damage to assets
- Systems should be resilient, with the ability to recover from adverse events in a timely manner

### 12.2.3 Specific Security Measures

- **Access Control:** Access to sensitive information should be managed on a strict need-to-know basis. Access rights should be provisioned, reviewed, modified and removed according to the organisation's access control policy
- **Secure Storage:** Systems should provide secure storage of information

- **Secure Disposal:** Secure disposal and destruction of information is required when it is no longer needed
- **Information Transfer:** Rules for information transfer within the organisation and with external parties should be established
- **Configuration Management:** Configuration management and change control processes should be in place for systems processing and storing project and asset information
- **Authentication:** Allocation and management of authentication information should be controlled by a management process
- **Encryption:** Systems should employ encryption to protect information, particularly when transported via removable media or communication lines
- **Vulnerability Management:** Systems should be assessed for their ability to deliver information security to a level appropriate for the sensitivity of the information, including technical vulnerability management
- **Monitoring:** There should be monitoring of systems and networks for anomalous behaviour, and appropriate actions should be taken to address potential security incidents
- **Time Synchronisation:** The clocks of information processing systems should be synchronized to approved time sources
- **Network Security:** Networks and network devices should be secured, managed, and controlled to protect information. Security mechanisms, service levels, and service requirements of network services should be identified, implemented and monitored

#### 12.2.4 System Development and Acquisition

- When developing or acquiring applications, information security requirements should be identified, specified and approved
- Principles for engineering secure systems should be established, documented, maintained, and applied to any information system development activities
- Secure coding principles should be applied to software development
- Security testing should be conducted during development and acceptance
- Software should be assessed on its ability to deliver necessary security measures

#### 12.2.5 Supplier Relationships

- Processes and procedures should be defined to manage information security risks associated with the use of supplier's products or services
- Relevant information security requirements should be established and agreed upon with each supplier based on the type of relationship
- Processes and procedures to manage risks associated with the ICT products and services supply chain are necessary

#### 12.2.6 Documentation and Compliance

- There should be documented operating procedures available to all users who need them

- The organisation's approach to managing information security should be reviewed independently at planned intervals, or when significant changes occur
- Compliance with the organisation's security policies, rules, and standards should be regularly reviewed

### 12.2.7 Additional Considerations

- The software systems used should be assessed for their ability to deliver security
- Consideration should be given to regulatory and statutory processes
- Security measures should be appropriate and proportionate to the sensitivity of the information
- The system should be able to meet the defined information quality and security requirements
- A risk assessment should be conducted to identify threats and vulnerabilities
- Measures should be taken to mitigate the identified security risks
- The Security Management Plan should include the mechanisms for reviewing and updating the plan

These requirements collectively aim to establish a comprehensive security framework for information management systems, encompassing various aspects of system design, operation, and maintenance, as well as supplier and compliance considerations.

## 12.3 CDE Security

To ensure that project information is managed securely, as outlined in ISO 19650-5 strict control should be exercised over who is authorised to configure and distribute information within the Common Data Environment (CDE).

As part of this control mechanism, the designated roles listed in Table 12.1 should be permitted to exercise specific authorities within the CDE. These authorities are defined to uphold the integrity, confidentiality, and availability of project information and reduce the risk of unauthorised access, accidental release, or malicious use of sensitive data.

Authorities are as specified:

- Configuration of the project site including metadata, task teams, roles, and exchange
- Content Approval (shared) able to approve documents being pushed from WIP\* to Shared\* only
- Content Approval (published) able to approve documents being pushed from WIP\* to Published\* only

\*(refer to Section 7.2.4 for the CDE Workflows)

**Table 12.1 – Authorised persons to distribute information.**

Organisation Name	Authorised Role	Configuration	Content Approval Shared	Content Approval Published
A	Project Manager	✓	✓	
B	Information / BIM Manager	✓	✓	✓
C	Document Controller		✓	✓

## 12.4 Security and Information Management in Digital Built Assets

### 12.4.1 Introduction

Key concepts and requirements related to security and information management, particularly within the context of digital built assets and Building Information Modelling (BIM). It draws upon a range of standards documents and guidance from bodies like the National Protective Security Authority (NPSA).

The core themes revolve around the need for a "security-minded approach" to information handling throughout the lifecycle of assets, projects, and services.

### 12.4.2 Core Concepts and Themes

- Security-Minded Approach:** A fundamental concept throughout these documents is the need for a "security-minded approach." This means routinely applying "appropriate and proportionate security measures in any business situation so as to deter and/or disrupt hostile, malicious, fraudulent and criminal behaviours or activities" (ISO 19650-5:2020). This approach shall be integrated within the wider IM process (ISO 19650-5:2020)
- Sensitivity Assessment:** Before deciding on the level of security, a sensitivity assessment should be done to determine the potential impact of compromised information. This process considers a range of risks, including "the risk to the safety, security and/or privacy of individuals or communities or their personal information" (ISO 19650-5:2020). If there is uncertainty, expert advice should be sought
- Information Security Management System (ISMS):** The documents frequently refer to the establishment and maintenance of an ISMS. ISO/IEC 27001 specifies requirements for creating, implementing, and improving such a system. This includes "requirements for the assessment and treatment of information security risks tailored to the needs of the organisation" (ISO/IEC 27001:2022)
- Risk Management:** A vital aspect of security is risk assessment, involving consideration of "potential threats," "potential vulnerabilities," and the "nature of the harm which can be caused" (ISO 19650-5:2020). Organisations should document "tolerated security risks" (ISO 19650-5:2020)
- Collaboration:** The need for increased collaboration is a major driver for the adoption of BIM. Sharing and usage of data is essential but must be handled securely. It notes that "having an agreed collaborative security-minded approach is more robust than one where those organisations work in isolation." (ISO 19650-5:2020)

### 12.4.3 Key Elements of a Security-Minded Approach

**Sensitivity Assessment Process (ISO 19650-5):** Undertaking a formal process to identify the range of security risks.

- Identifying organisational sensitivities as well as sensitivities of third parties
- Recording the outcome of the assessment
- Reviewing the assessment
- Determining whether a security-minded approach is required

**Security Strategy (ISO 19650-5):** Assessment of potential threats and vulnerabilities.

- Assessment of the nature of harm which can be caused
- Determining the likelihood that a vulnerability will be exploited and cause that impact
- Documenting tolerated security risks
- Periodic and event driven reviews of the strategy

**Security Management Plan (ISO 19650-5):** Defining security information requirements, including policies for its use, storage, and destruction.

- Establishing procedures for information provision to third parties
- Logistical security requirements (e.g., handling of sensitive assets)
- Security breach/incident management plan
- Information Classification and Labelling (ISO/IEC 27001:2022): Information must be classified according to the "confidentiality, integrity, availability, and relevant interested party requirements" (ISO/IEC 27001:2022)
- Appropriate procedures for information labelling must be developed and implemented (ISO/IEC 27001:2022)

**Access Control (ISO/IEC 27001:2022):** Rules are required for "controlling physical and logical access to information" (ISO/IEC 27001:2022).

- Secure authentication technologies and procedures need to be implemented (ISO/IEC 27001:2022)

**Incident Management (ISO/IEC 27001:2022):** There should be a plan in place to manage incidents and breaches and also how information security should be maintained during disruption (ISO/IEC 27001:2022).

### 12.4.4 Information Management Practices

- Data Minimisation: Information should be "limited to the minimum required to achieve the desired outcome" (NTSA, 2021). This is important for legal compliance (Data Protection Act)
- Relevance and Clarity: Information must be relevant to its intended use, and its meaning must be unambiguous. It must also be easily accessible to authorised users (NTSA, 2021).
- Tailored Views: Access to sensitive information should be limited using role-based access controls. "The need for access to sensitive information should be regularly reviewed and access removed when no longer necessary" (NTSA, 2021).

#### 12.4.5 Key Actors and Standards

- **NSAI (National Standards Authority of Ireland):** Involved in the development of many of the standards mentioned, as well as providing certification and training (ISO-27001)
- **NPSA (National Protective Security Authority):** Provides guidance on security and risk management of digital built assets (e.g. NPSA - Establishing a dialogue about the security of digital built assets).
- **ISO (International Organisation for Standardization):** The source of standards like ISO 19650 and ISO 27000 series (e.g. ISO/IEC 27001:2022)
- **ISO 19650 Series:** Focused on the organisation and digitisation of information about buildings and civil engineering works, including BIM. Part 5 specifically deals with security
- **ISO/IEC 27000 Series:** Concerned with information security management systems (ISMS). Standards include ISO/IEC 27001, which specifies requirements for an ISMS, and ISO/IEC 27002, which provides guidelines for information security controls
- **RSES (Register of Security Engineers and Specialists):** Sponsored by NPSA, RSES promotes excellence in security engineering in the built environment (NPSA - Establishing a dialogue about the security of digital built assets)
- **ISO 22341:** provides guidelines for Crime Prevention Through Environmental Design (CPTED). These guidelines offer a framework for designing and modifying the built environment to reduce crime

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## **Appendix A - Acronyms and Abbreviations**

Acronym	Definition
AIM	Asset Information Model  Set of structured and unstructured Information Containers relating to the operational phase of a project.
AIR	Asset Information Requirements  This defines the information that is required, and the managerial and technical aspects of producing this information, for the operation of an asset to meet the OIR.
Alphanumerical Information Containers	Information Containers holding non-graphical content that can be expressed using characters, digits and symbols, or tokens such as mathematical symbols and punctuation marks, and are normally structured in a tabular/matrix format. These are mainly used to record relevant attributes/data associated with infrastructure assets.
AR	Augmented reality  A technology that superimposes a computer-generated image on a user's view of the real world, thus providing a composite view.
BEP	BIM Execution Plan  Plan that explains how the information management aspects of the Appointment will be carried out by the Delivery Team.  NOTE 1: A pre-appointment BIM Execution Plan focuses on the delivery team's proposed approach to information management and their capability and capacity to manage information.  NOTE 2: A post-appointment BIM Execution Plan is the contractual, document, produced after appointment that confirms exactly how the Delivery Team will implement information management to meet the Appointment requirements.  NOTE 3: Specific terminology can be applied to contracts, for example the equivalent term for 'BIM execution plan' under NEC 4 terminology is the 'Information Execution Plan (IEP)'.
BIM	Building Information Modelling  Use of a shared digital representation of a built asset to facilitate planning, design, construction and operation processes to form a reliable basis for decisions.
BIP	BIM Implementation Plan  Strategic roadmap for how an organisation or company may adopt and utilise Information Management within and across different project phases
CDE	Common Data Environment  A combination of process workflows and technical solutions used to collect, manage and disseminate structured and unstructured information (information containers) for a project or asset. The CDE workflow defines the processes, and the CDE solutions are the technologies that enable those processes, with appropriate access, control, status/metadata and auditability.  Used in combination with a digital storage solution, information is shared collaboratively in a logical and accessible way to help all key parties readily gain access to information, use consistent naming conventions, avoid duplication and retain ownership.

Acronym	Definition
Clash Avoidance	Process of proactively preventing spatial coordination overlaps and interface issues associated with the Design, employing robust interdisciplinary collaboration techniques. This process is applied prior to Clash Detection.
Clash Detection	Process of identifying if elements of the Design are over overlapping both spatially and chronologically, and if so, where and how these interferences occur. Modern software offers tools to automate this process.
Contract	Is a legally binding agreement between two or more parties that creates enforceable rights and obligations.
CWMF	Capital Works Management Framework Is the Irish suite of standardised contracts and guidance for public construction. It aims to improve cost certainty, delivery timelines, and value for money.
DBP	Digital Build Project Project led by Technological University Dublin (TU Dublin) to unite all construction and built environment stakeholders to drive integrated, interoperable digital data adoption across the industry to innovatively improve efficiency, productivity, and international competitiveness on a sustainable basis in Ireland.
EIR	Exchange Information Requirements A documented set of managerial, commercial and technical requirements for the production and exchange of project information. EIR defines the information to be delivered, the standards, methods and procedures to be applied by the delivery team and relevant project stage trigger milestones.
3D Exchange Models	Geometrical Models containing 3D representations of the scheme's assets, divided as per an agreed breakdown structure.  The main objective of 3D Exchange Models is to facilitate the exchange and sharing of geometrical asset information between project team members and other project's stakeholders.  They are normally supplied in open data formats and/or industry- wide proprietary formats to minimise interoperability issues and reduce risks associated with obsolescence.
FIDIC	International Federation of Consulting Engineers An international standards organisation for construction technology and consulting engineering. The organisation is best known for the FIDIC suite of contract templates.
GIS	Geographical Information System Framework comprising computer-based tools and applications that provides the ability to capture and analyse spatial and geographic data.
Geometrical Models	Information Containers used to represent physical infrastructure assets, comprising information expressed using shape, size, dimension, and location.
ICMS	International Cost Management Standard International standards for benchmarking, measuring and reporting construction project costs

Acronym	Definition
IFC	Industry Foundation Class Open data format
IM	Information Management The function and associated activities used to define information requirements, plan and control information production, and manage the delivery and checking of information to meet the needs of a project or asset.
IMI	Information Management Initiative Led by the Construction Leadership Council (CLC) the initiative aspires to become an industry-led and government-supported programme to progressively transform information management practices across the built and natural environment sector (Nima, 2025)
ITS	Intelligent Transport Systems
Information Container	Named persistent set of information retrievable from within a file, system or application storage hierarchy. Information Containers can comprise directories, folders, files, layers and symbols.
Information Exchange	Information delivered to the Appointing party at a pre-defined milestone/point in the project, which satisfies the EIR.
Information Management Deliverables	Resources, documentation and content prepared to support the effective management of information in a project in accordance with the I.S. EN ISO 19650 series.
IT	Information technology Refers to the systems, infrastructure, and tools used to support the creation, management, exchange, and delivery of digital information throughout a built asset's lifecycle.
JCT	The Joint Contracts Tribunal Standard forms of contract for construction.
Level of Geometrical Information	Description of graphical content for Geometrical Models.
Level of Alphanumerical Information	Description of non-graphical content for Geometrical Models and Alphanumerical Information Containers.
Level of Information for Documentation	Description of the content for project documentation such as drawings, text documents, schedules and photos.
MIDP	Master Information Delivery Plan Plan incorporating all relevant Task Information Delivery Plans (TIDP).
Mobilisation Plan	Plan that details the approach, timescales and responsibilities for the configuration and deployment of the necessary infrastructure and resources associated with the production and delivery of the Project Information.

Acronym	Definition
NPSA	National Protective Security Authority
OGP	Office of Government Procurement Plays a leading role in public procurement reform as part of the Department of Public Expenditure, Infrastructure, Public Service Reform and Digitalisation.
OIR	Organisational Information Requirements This specifies what information is required to achieve an organisations strategic objectives in relation to business operation, asset management, portfolio planning etc. The OIR may be developed from an ISO 55001 asset management system.
PIM	Project Information Model Composite information model created from separate Geometrical Models. It can embed, or be linked to, non-graphical data of modelled assets. Note: In the context of this document Federated Model and PIM has the same meaning.
PIR	Project Information Requirements This specifies the information that is required related to a specific project consisting of the relevant information from the OIRs and AIRs.
Project Information	Information produced and managed during the project delivery phase (including geometrical information, alphanumerical information and documentation) and controlled through the CDE;
PWCF	Public Works Contract Form(s) as published by the OGP.
RIAI	The Royal Institute of the Architects of Ireland
RSA	Road Safety Audit
Security Management Plan	A plan that outlines the security requirements, threat assessments, risk mitigations and security controls necessary to protect information assets throughout the asset lifecycle in accordance with I.S.EN ISO 19650-5.
Scope	The defined boundary of work and deliverables that a party is required to provide under an agreement. It describes what is included and what is excluded, together with the outputs, quality/acceptance criteria, assumptions and constraints, interfaces, and any responsibilities needed to achieve the intended outcomes.
Task Team	A person or group of people performing a specific task – for example the drainage team or the subcontractor who is designing/constructing the vehicle restraint systems.
TIDP	Task Information Delivery Plan Schedule of Information Containers and delivery dates, for a specific Task Team.
TII	Transport Infrastructure Ireland Is a state agency in Ireland, dealing with road and public transport infrastructure.
Uniclass	Uniclass 2015 is a unified classification system for the construction industry covering all sectors of the industry.

Acronym	Definition
	There are tables for civil and infrastructure projects covering road and rail, power and water. For the building sector there are tables including codes for university campuses, hospitals, schools, residential and office buildings. The codes are also there to cover landscape, structure and building services.

## **Appendix B - Information Management Roles Guidance**

## **B.1 Information Management Roles and Responsibilities**

### **B.1.1 Employer/Client Information Manager (Appointing Party)**

- Capturing the Appointing Party's key decision points and Project Information Requirements (PIR), Organisational Information Requirements and Asset Information Requirements (AIR)
- Documenting and validating the Information requirements within the Appointing Party Exchange Information Requirements (EIR)
- Responsible for appointing individuals to undertake the information management function
- Ensuring availability of the Common Data Environment (CDE) (when hosted by the Appointing Party)
- Ensuring applicable standards are available and being followed by all Task Teams and other parties
- Providing assurance regarding adherence to IM and BIM processes and information exchanges
- Ensuring collaborative behaviours are being embraced by all stakeholders
- Point of contact for the supplier Project Information Manager regarding compliance with the EIR
- Reviewing the Information Model against defined acceptance criteria as outlined in Appointing Party EIR and recommending acceptance/rejection

### **B.1.2 Design/ Construction Lead (Lead Appointed Party)**

- Responding to the Appointing Party EIR within the BIM Execution Plan (BEP)
- Task Team(s) appointments and defining the information production responsibilities of each
- Defining the federation strategy and assigning the appropriate level of information need (LOIN)
- Reviewing the Information Model against the Appointing Party EIR and authorising its contractual delivery on behalf of the Lead Appointed Party
- Ensuring all production information and handover information has been listed in the TIDP(s)/MIDP and has been agreed by the relevant parties
- Ensuring the project zones are defined and used to split the project into manageable sub-divisions
- Managing coordination and integration of the design, including the development and approvals of the production information and handover information

- Ensuring the design is fully co-ordinated and integrated across all disciplines, with others, with existing infrastructure and any adjacent works
- Ensuring all production information and handover information is strictly controlled and shared through the CDE

### **B.1.3 Delivery Manager**

- Managing risks associated to the delivery of the Project Information Model
- Ensuring effective communication between the Appointing Party, Lead Appointed Party and Appointed Parties
- Ensuring that only compliant production information and handover information is accepted and, if applicable, ensuring any concessions required are agreed with the supplier(s)

### **B.1.4 Supplier Project Information Manager (Lead Appointed Party and Appointed Party)**

- Compiling and managing the Master Information Delivery Plan (MIDP)
- Assuring the Project Information Model is delivered in accordance with the MIDP by checking the Task Information Delivery Plans (TIDP)
- Ensures the BIM Execution Plan (BEP) is:
  - Completed and agreed with the Appointing Party
  - Briefed to all Task Teams and other stakeholders including the Appointing Party
  - Managed through the project change control procedures
- Assess the Task Teams capability to produce information in accordance with the project standards and project methods and procedures
- Ensuring collaborative behaviours are being embraced across the project
- Providing the focal point for all production information and handover information management issues on the project
- Ensuring that all production information and handover information are compliant with the requirements of the contract and all applicable standards
- Ensuring the availability of the Common Data Environment (CDE) to all Task Teams (when CDE is hosted by the Lead Appointed Party)
- Ensuring that all production information and handover information are managed through the CDE including all mandatory meta-data
- Providing clear instructions to the project team including on the following areas:
  - What production information and handover information is required, by whom and for what purpose?
  - Who will generate and maintain the production information and handover information?
  - How it will be stored and distributed?
  - How frequently it is shared?

- What actions should be taken on receipt of the production information and handover information?
- Managing risks associated with the production of the Project Information Model

### **B.1.5 Design Coordination and Interface Manager**

- Providing a communications link between the design and construction teams
- Integrating the design deliverables of the sub-consultants, including designers and specialist designers against the construction programme to ensure delivery in accordance with the agreed programme and TIDP(s) / MIDP
- Managing (as part of a Task Team) the spatial interface with other tasks (the federation strategy determines the spatial allocation for each Task Team)

### **B.1.6 Task Team Manager**

- Task Team IM role appointments
- Developing the Task Information Delivery Plan (TIDP) and ensuring the availability of competent resources to execute it
- Production of the design output for a particular task or set of tasks allocated to their Task Team
- Ensuring all checks and reviews, as applicable for the purpose for which the production information and handover information is to be shared have been carried out
- Approving their Task Team's production information and handover information prior to approving for sharing through the CDE and assigning the appropriate status (suitability) of the information shared by the Task Team
- Providing authorisation for access to their Task Team's Work in Progress (WIP) Area
- Identifying and escalating risks associated to the delivery of the Project Information Model

### **B.1.7 Task Information Manager**

- Ensuring that there is a consistent approach to modelling assets physical and functional characteristics across the project
- Co-ordinating Task Team needs for Information Technology (IT) solutions and confirming compliance with project CDE/workflow requirements.
- Ensuring that all computer-aided design (CAD) files are shared using the agreed IT solutions and are compliant with agreed standards
- Ensuring the Task Team has the capability to produce information in accordance with the project standards and project methods and procedures
- Assuring (pass/fail) that the information produced by the Task Team is compliant with the project standards and project methods and procedures (prior to be shared)
- Providing support and guidance to Information Authors with respect to the project standards and project methods and procedures

- Identifying and escalating risks associated to the production of the Project Information Model

### **B.1.8 Information Author**

- Creating files and ensuring the appropriate file attributes are captured correctly
- Producing and/or amending information in accordance with the project standards and project methods and procedures
- Ensuring graphical models produced by them are spatially coordinated (clash avoidance) escalating any interface issues to the Interface Manager
- Ensuring authored information is co-ordinated within the Task Team scope and escalating interface issues
- Submitting information for approval in accordance with the Task Information Delivery Plan

### **B.1.9 Information Controller (Document Control)**

- Ensuring that all production information and handover information is delivered using the agreed IT solutions
- Ensuring only production information and handover information listed and agreed to be delivered in the TIDPs/MIDP, are delivered, and accepted
- Ensuring all production information and handover information, accepted by, or on behalf of the Project Manager, is distributed to the applicable internal systems

## **Appendix C - Information Container Identification (ID)**

## C.1 Originator Code

Code	Description
ACP	An Coimisiún Pleanála
AEC	Aecom
AGS	An Garda Síochána
ALS	Alstom Ireland
ARP	Arup Group Ltd.
ART	The Arts Council
ATK	Atkins
AUR	Aurora Telecom (GNI-ERV)
BAC	Bus Átha Cliath / Dublin Bus (CIE)
BAM	BAM Ireland
BCE	Belton Consulting Engineers
BEV	Barry Transportation / Egis Group J/V
BÉX	Bus Éireann (CIE)
BHA	Barton Hyett Associates Ltd.
BGE	Bord Gáis Energy (ERV)
BSM	Brady Shipman Martin
BTI	BT Ireland Formerly ESAT / OCEAN
BTT	Barry Transportation
CCX	Cork County Council
CCC	Cork City Council
CDE	Courtney Deery
CEC	Clare County Council
CIÉ	Córas Iompair Éireann
CNC	Cavan County Council
COD	Courtney Deery Heritage Consultancy Ltd.
COI	Coillte

Code	Description
COL	Colt Technology Services
COR	Corderoy
CSE	Clifton Scannell Emerson Associates
CSO	Central Statistics Office
CWC	Carlow County Council
DAA	Dublin Airport Authority
DAR	Dublin Area Rapid Transit (DART); (CIE)
DAF	Department of Agriculture, Food the Marine
DBE	Department of Business, Enterprise and Innovation
DCC	Dublin City Council
DCE	Department of Communications, Climate Action & Environment
DCH	Department of Culture, Heritage and the Gaeltacht
DCU	Dublin City University
DHP	Department of Housing, Planning and Local Government
DIG	Digiweb ADSL Broadband
DLC	Donegal County Council
DLR	Dún Laoghaire – Rathdown County Council
DPC	Dublin Port Company
DPE	Department of Public Expenditure and Reform
DTT	Department of Transport, Tourism and Sport (DTTAS)
EDA	EDAW Landscape Architects
EFA	Efacec – Sistemas De Electronica
EGI	EGIS Group
EIR	EIRCOM Limited, trading as EIR
EIG	EirGrid PLC

Code	Description
ENE	Enet (Open Access Networks)
EPA	Environmental Protection Agency
ERF	Eastern Region Fisheries Board
ERV	Ervia (Subs incl. GNI – IWX – AUR – BGE)
ESB	ESB Networks Ltd.
EUN	euNetworks
FAN	Future Analytics
FCX	Fingal County Council
GAL	Grimshaw Architects London
GCX	Galway County Council
GCC	Galway City Council
GDA	Grangegorman Development Agency
GNI	Gas Networks Ireland (ERV)
GRA	Graham Construction & Engineering
GUH	Galway University Hospital
HSA	Health and Safety Authority
HSE	Health Service Executive
IDO	IDOM
IRX	Irish Rail – Iarnród Éireann (CIE)
IWX	Irish Water – Uisce Éireann (ERV)
JAI	Jacobs / IDOM Engineering JV
JAC	Jacobs Engineering
JV	Joint Venture
JWA	Jarrett Walker + Associates
KEC	Kildare County Council
KEN	Kent Stainless (Wexford) Ltd
KKC	Kilkenny County Council

Code	Description
KNN	KN Network Services
KYC	Kerry County Council
LCC	Limerick City and County Council
LDC	Longford County Council
LHC	Louth County Council
LMC	Leitrim County Council
LSC	Laois County Council
MAG	Magnet Networks
MGR	Moore Group
MHC	Meath County Council
MKG	McKeon Group
MNC	Monaghan County Council
MOC	Mayo County Council
MOD	Ministry of Defence
MOT	Mott MacDonald
MUX	Maynooth University
NMI	National Museum of Ireland
NMS	National Monuments Service
NPW	National Parks and Wildlife Service
NRO	National Roads Office
NSA	National Standards Authority of Ireland (NSAI)
NTA	National Transport Authority
OCL	Oracle Corporation Ireland
OCT	Octatube
OGP	Office of Government Procurement
OPW	Office of Public Works
OYC	Offaly County Council

Code	Description
PMG	Project Management Holdings
POD	Pod-Trak
RCS	Royal College of Surgeons in Ireland
RIA	Royal Irish Automobile Club
RNC	Roscommon County Council
RPS	RPS Group Plc
ROD	Roughan & O'Donovan
SAA	Shaffery Architects
SDC	South Dublin County Council
SIA	SIAC Construction
SIS	John Sisk & Son
SJH	St. James's Hospital
SKY	SKY Broadband
SMA	Smart Telecom
SNC	SNC-Lavalin
SOC	Sligo County Council
SSJ	Sisk Steconfer Joint Venture
SYS	Systra
TAÉ	Tailte Éireann (PRA/ Valuation Office/ OSI)
TCD	Trinity College Dublin
TCX	Tipperary County Council
THR	Three Ireland
TII	Transport Infrastructure Ireland
TNT	Turner & Townsend
TRA	Transdev Dublin Light Rail Ltd
UCD	University College Dublin
VEO	Veolia Ireland (Dalka)

Code	Description
VER	Verizon
VIR	Virgin Media (Formerly UPC/ NTL)
VOD	Vodafone
WWI	Waterways Ireland
WCC	Waterford City and County Council
WHC	Westmeath County Council
WWC	Wicklow County Council
WXC	Wexford County Council
ZAY	Zayo Group

## C.2 Functional Breakdown Codes

Source: MCHW GG184.

Category	Code	Description
General	GEN	Scheme-wide generic information
	GHS	Health and Safety
	Z	Information associated with multiple elements or systems
	X	Information not associated with any element or system
Roads: National Roads	RAC	Highway Approvals & Consents
	RAT	Active Travel (incl. Greenways, Cycleways and Walking Infrastructure)
	RAW	Accommodation Works
	RDG	Drainage
	REL	Power / Electrical
	RFE	Fencing
	RGT	Geotechnical
	RGN	General
	RKF	Kerbs, Footways and Paved Areas
	RLG	Road Lighting

Category	Code	Description
	RCS	Road Communications & Intelligent Transport Systems (ITS)
	RMK	Road Markings
	RML	Mainline Geometric Layout
	RPV	Road Pavements
	RSA	Road Safety (Road safety audit / audit / intervention works)
	RRR	Road Restraint System (Vehicle and Pedestrian)
	RSC	Site Clearance
	RSL	Traffic Signals
	RSN	Traffic Signs
	RSR	Side Roads Geometric Layout
Structures	SBR	Bridges and Major Culverts
	SGN	General
	SGT	Geotechnical
	SGY	Gantries
	SMA	Masts
	SMN	Minor Structures and Culverts
	SRW	Retaining Walls
	SSP	Special structures
	STU	Tunnels
Environment	EAC	Environmental Approvals & Consents
	EAQ	Air Quality
	EBD	Biodiversity
	EGN	General
	EGT	Geology and Soils
	EAB	Archaeology and Built Heritage
	ELS	Landscape
	EAT	Active Travel Users

Category	Code	Description
	ENV	Noise & Vibration
	ETS	Townscape
	EWE	Water Environment
Survey	VAB	Asbestos survey
	VAS	Accident Statistics
	VAU	Unmanned Aerial Vehicle (UAV) / Drone survey
	VDS	Drainage Survey
	VES	Environmental survey
	VGN	Survey General
	VGT	Geotechnical Investigation
	VNR	National Road Telecommunications Services (NRTS)
	VPS	Pavement Systems
	VSM	Structures management
	VSS	Stakeholder Surveys
	VTO	Topographical
	VTR	Traffic Survey
	VUT	Utilities
Legal	LPA	Planning Approval (An Bord Pleanála / Local Authority)
	LEA	Environmental Impact Assessment Report (EIAR)
	LCO	Compulsory Purchase Order (CPO)
	LLO	Land Ownership Boundaries
	LSI	Statutory Instruments
Temporary	TTM	Traffic management
	TTW	Temporary works

### C.3 Spatial Breakdown Codes

MCHW GG184 Appendix B.

The options below should be considered when developing the location strategy for the project.

### C.3.1 Buildings

Code	Description
ZZ	Multiple levels
XX	No associated level
00	Base level
01	Level 01
02	Level 02
M1	Mezzanine above level 01
M2	Mezzanine above level 02
B1	Basement level 1

### C.3.2 Existing Network

The following options should be considered when developing the volume and location strategy for work/ schemes on the existing network.

#### C.3.2.1 Direction

Code	Description
NB	North bound
SB	South bound
CW	Clockwise
EB	East bound
WB	West bound

#### C.3.2.2 Location Type

Code	Description
ML	Mainline
SR	Side or Slip Road
Individual asset	
A	A carriageway
S	A structure
B	A bridge

Code	Description
G	A gantry
R	A retaining wall or similar

### C.3.2.3 Structures Key or Number

Structure ID (EIRSPAN)	Spatial Code	Description
LC-N21-020*	LC_N21_020*	County _ Highway _ Structure number

\*Code is for illustrative purposes only.

The code should be derived from the EIRSPAN system for bridge and structure numbering in accordance with EIRSPAN Bridge Management System Principal Inspection Manual (AM-STR-06054). To avoid the confusion with the information container identifier, the hyphen (“-“) should be replaced with the underscore (“\_“) to separate parts of the code to aid clarity.

The format of the code is County \_ Highway \_ Structure number.

### C.3.2.4 Other Asset Identifiers

Examples below from various asset management systems. This type of location code should only be used when the works specifically relate to that asset.

Code	Description
5WA21P*	Unique on-site identification label
SJ7282_170*	Unique asset reference

\*Codes are for illustrative purposes only.

## C.3.3 New Works

### C.3.3.1 Direction

Code	Description
A	Carriageway A, typically North Bound
B	Carriageway B, typically South Bound
C or CR	Central Reserve
Z or ZZ	Entire carriageway
J	Carriageway A off slip
K	Carriageway A on slip

Code	Description
L	Carriageway B off slip
M	Carriageway B on slip

### C.3.3.2 Location Type

Code	Description
ML	Mainline
SR	Side or Slip Road
Individual asset	
A	A Carriageway
S	A structure
B	A bridge
G	A gantry
R	A retaining wall or similar

### C.3.3.3 Section Identifier

Code	Description
S1	Section 1, junction 1 to junction 2
S2	Section 2, junction 2 to junction n
L1	Link 1, chainage 0100 to chainage 1500*
L2	Link 2, chainage 1500 to chainage 3400*
J1	New junction number 1
J2	New junction number 2

\* Numbers are for illustrative purposes only.

### C.3.3.4 Numeral

Code	Description
01	First
02	Second
03	Third
04	Fourth

Code	Description
etc.	
10	Tenth

### C.3.4 Spatial Code Combination Examples

Code	Description
ML01*	Location Type + Numeral - First Mainline reference
SR02*	Location Type + Numeral - Second side road
LC_N21_020*	EIRSPAN code for structure
N21_01*	Road Number + Numeral

\* Codes are for illustrative purposes only.

## C.4 Discipline/Role Code

Source: ISO 19650 UK NA-2018 NA 3.7 and MCHW GG184 Appendix D.

Code	Description
AX	Architectural – General
AR	Archaeologist
BL	Building Surveyor – Land and Property
BS	Building Surveyor
CB	Civil – Bridges and Structures
CD	Civil – Drainage
CE	Civil – Earthworks
CH	Civil – Highways
CM	Cost Manager / Quantity Surveyor
CT	Civil – Tunnels
CU	Civil – Utilities
CW	Civil – Temporary Works
CX	Civil Engineer – General Civil Engineer
EC	Electrical – Control Systems and Technology
EE	Electrical Engineer
EH	Electrical & Lighting Engineer – Voltage High
EL	Electrical & Lighting Engineer – Voltage Low
EO	Lighting Engineer
FM	Facilities Management
GE	Geotechnical Engineer
GI	Geotechnical Specialist
GS	Ground Engineer
HD	Heating and Ventilation Designer
IM	Information Management and BIM
KK	Client

Code	Description
LA	Landscape and Environment – Air and Noise
LB	Environment – Biodiversity
LC	Environment - Climate Change
LD	Environment - Environmental Impact Assessment (EIA) Coordinator
LE	Landscape and Environment – Environmentalist
LH	Landscape and Environment – Heritage
LW	Environment – Hydrology
MX	Mechanical Engineer
OP	General (Non-disciplinary) - Operations
OS	Operational Safety
PH	Public Health Engineer
PC	General (Non-disciplinary) – Professional Services Consultant
PL	Project Planning – General
QS	Quantity Surveyor
RC	Rail – Civils
RS	Road Safety Auditor
TE	Intelligent Transport Systems (ITS) Engineer
TR	Civil – Traffic Modelling
TT	Transport Planning
VG	Land Surveyor – Geotechnical Investigation/Survey
VT	Geographical / Geospatial and Land Surveyor
WM	Contractors – Main Contractor
XX	Subcontractor
YA	Specialist Designer - Acoustics
YE	Specialist Designer - Environmental
YF	Specialist Designer - Fire
YI	Specialist Designer - Telecommunications

Code	Description
YL	Specialist Designer – Lighting
YT	Specialist Designer – Traffic Modelling
ZA	General (Non-disciplinary) – Approvals
ZC	Commercial and Cost Management
ZF	General (Non-disciplinary) – Human Factors and Collaboration
ZH	Stakeholder Liaison
ZI	General (non-disciplinary) – Information Technology (IT)
ZK	General (non-disciplinary) – Contractual Information
ZL	Legal
ZM	Project Management
ZQ	Quality Assurance
ZS	Health & Safety
ZX	General (non-disciplinary) – General
ZZ	General (non-disciplinary) – Multi-discipline or Multi-function

## C.5 Information Form/Type Codes

Source: ISO 19650 UK NA-2018 NA 3.6 and MCHW GG184 Appendix C.

Code	Description
AF	Animation file
AG	Agenda
BQ	Bill of quantities
CA	Calculations
CC	Contract
CE	Certificate
CH	Chart
CM	Combined model
CO	Correspondence

Code	Description
CR	Clash rendition
DR	Drawing
DT	Document Transmittal Note
ER	Employer Records
ES	Estimate
FE	Fee Proposal
GD	Geographical Information System (GIS) dataset
IE	Information exchange file
IM	Image (excluding photographs)
IS	Issue Sheet
IV	Invoice
LT	Letter
M2	Model – Two dimensional
M3	Model – Three dimensional
MA	Manual
MO	Memo
MI	Minutes
MR	Model rendition
MS	Method statement
PH	Photograph
PL	Plan
PP	Presentation
PR	Programme
PT	Permit
PW	Process workflow
PY	Policy
QE	Quote

Code	Description
RD	Room data sheet
RG	Register
RI	Request for information
RP	Report
SB	Submittal
SC	Schematic
SH	Schedule
SK	Sketch
SN	Snagging list
SP	Specification
SU	Survey
TE	Template
VR	Video recording
VS	Visualisation

## **Appendix D - Status Code**

Source: UK national Annex to ISO 19650-2 NA 4.2

Code	Description	Typical use cases on the projects
<b>Work in Progress</b>		
<b>S0</b>	Initial status or WIP	Document creation and development
<b>Shared/Issued</b>	Non- Contractual	
<b>S1</b>	Suitable for Coordination	Information shared for use by others. For example, the interdisciplinary design coordination and model federation.
<b>S2</b>	Suitable for Information	Information requested by tasks teams
<b>S3</b>	Suitable for Review & Comment	Technical assurance review and comment /Review and comment by other parties.
<b>S4</b>	Suitable for Lead Appointed Party Approval	LAP (Lead Appointed Party) approval—also referred to as End of Stage approval—indicates that the submitted information meets the required level of information and quality for that specific project stage.  For example, a subcontractor may submit design or construction information to the principal contractor (i.e., the Lead Appointed Party) for review and approval, confirming it satisfies the stage-specific requirements before proceeding further.
<b>S5</b>	Suitable for Appointing Party Acceptance	Local Authority/ TII acceptance, and End-of-Stage acceptance are intended to ensure that project deliverables meet the defined standards and level of completeness appropriate to the current stage of the project. These acceptances confirm that the information is suitable for progression, in accordance with the requirements set by the Appointing Party.
<b>Published</b>	Contractual	
<b>An (*)</b>	Authorized and accepted	All documentation published as accepted and authorized by Appointing party.

(\*) An: n relates to the work stages defined in Figure 4.1 and Project Management Guidelines (PMG) PE-PMG-02041.

PE-PMG-02041 Stage and Work Stages for Published information:

PE-PMG-02041 Stages	BS 8536-2 Work Stage	Published Status Code
0 – Scope and Pre-Appraisal	0 – Strategy 1 – Brief	A1
1 – Concept and feasibility	2 – Concept	A1

<b>PE-PMG-02041 Stages</b>	<b>BS 8536-2 Work Stage</b>	<b>Published Status Code</b>
2 – Option Selection	2 – Concept	A2
3 – Design and Environmental Evaluation	3 – Definition	A3
4 – Statutory Processes	3 – Definition	A4
5 – Enabling and Procurement	4 – Design	A5
6 – Construction and Implementation	5 – Construct and Commission	A6
7 – Close out and Review	6 – Handover and Close-out	A7
	7 – Operation and End of Life	

# **Appendix E - Information Management Assignment Matrix**

Source: ISO 19650-2 Annex A:

<b>Key</b> R – Responsible for undertaking activity A – Accountable for activity completion C – Consulted during activity I – Informed following activity completion		<b>Appointing party</b>	<b>Third party</b>	<b>Lead appointed party</b>	<b>Appointed party</b>
ISO 19650-2 Task					
<b>5.1, 5.2 Assessment, need and Invitation to Tender</b>					
<u>5.1.4</u>	Establish the project's information standard				
<u>5.1.7</u>	Establish the project's common data environment				
<u>5.1.8</u>	Establish the project's information protocol				
<u>5.2.4</u>	Compile invitation to tender information				
<b>5.3 Tender Response</b>					
<u>5.3.1</u>	Nominate individuals to undertake the information management function				
<u>5.3.2</u>	Establish the delivery team's (pre-appointment) Information Execution Plan				
<u>5.3.3</u>	Assess each task team's capability and capacity				
<u>5.3.4</u>	Establish the delivery team's capability and capacity				
<u>5.3.5</u>	Establish the delivery team's mobilization plan				
<u>5.3.6</u>	Establish the delivery team's risk register				
<u>5.3.7</u>	Compile the delivery team's tender response				
<b>5.4 Appointment</b>					
<u>5.4.1</u>	Confirm the delivery team's BIM execution plan				

<b>Key</b> <b>R – Responsible for undertaking activity</b> <b>A – Accountable for activity completion</b> <b>C – Consulted during activity</b> <b>I – Informed following activity completion</b>		<b>Appointing party</b>	<b>Third party</b>	<b>Lead appointed party</b>	<b>Appointed party</b>
<u>5.4.2</u>	Establish the delivery team's detailed responsibility matrix				
<u>5.4.3</u>	Establish the lead appointed party's exchange information requirements				
<u>5.4.4</u>	Establish the task information delivery plan(s)				
<u>5.4.5</u>	Establish the master information delivery plan				
<u>5.4.6</u>	Complete lead appointed party's appointment documents				
<u>5.4.7</u>	Complete appointed party's appointment documents				
<b>5.5 Mobilisation</b>					
<u>5.5.1</u>	Mobilize resources				
<u>5.5.2</u>	Mobilize information technology				
<u>5.5.3</u>	Test the project's information production methods and procedures				
<b>5.6 Collaborative Production of Information</b>					
<u>5.6.1</u>	Check availability of reference information and shared resources				
<u>5.6.2</u>	Generate information				
<u>5.6.3</u>	Undertake quality assurance check				
<u>5.6.4</u>	Review information and approve for sharing				
<u>5.6.5</u>	Information model review				

<b>Key</b>		<b>Appointing party</b>	<b>Third party</b>	<b>Lead appointed party</b>	<b>Appointed party</b>
<b>R – Responsible for undertaking activity</b> <b>A – Accountable for activity completion</b> <b>C – Consulted during activity</b> <b>I – Informed following activity completion</b>					
<b>5.7 Information Model Delivery</b>					
<u>5.7.1</u>	Submit information model for lead appointed party authorisation				
<u>5.7.2</u>	Review and authorize the information model				
<u>5.7.3</u>	Submit information model for appointing party acceptance				
<u>5.7.4</u>	Review and accept the information model				
<b>5.8 Project Close-out</b>					
<u>5.8.1</u>	Archive the project information model				
<u>5.8.2</u>	Capture lessons learned for future projects				
<b>ISO 19650-5</b>					
<u>4.2</u>	Determine the range of security risks				
<u>4.7 and 4.8</u>	Undertake the security triage process and record the outcome				
<u>6</u>	Develop and maintain a security strategy (If required)				
<u>7</u>	Develop and maintain a security management plan (If required)				

## **Appendix F - TIDP and MIDP Information Requirements**

Field Name	Description	Data Type
Information Container ID	Document ID	Alphanumeric String
Information Container Description	Human readable name of the container, the document title	Alphanumeric String
<sup>1</sup> Predecessors	What deliverables are required to be in place for this item.	Alphanumeric String (of the relevant container/s, if multiple then please use comma separated values)
<sup>1</sup> Dependencies	What other information items are dependencies of the container.	Alphanumeric String (of the relevant container/s, if multiple then please use comma separated values)
Level of Geometrical Detail	Level of Geometrical Information (Figure 8.2). Please note that this is only required on containers for graphical information. Documentation is not required to have this field populated.	Numeric. Suitable values [1 2 3 4 5 6]
<sup>1</sup> Estimated Production Duration	Estimated time to take to complete deliverable	Numeric. Displayed as days. Partial days represented with integer. i.e. 0.5 days.
Estimated Review Duration	Estimated time to take to review complete deliverable	Numeric. Displayed as days. Partial days represented with integer. i.e. 0.5 days.
Information Author	Appointed party responsible	Alphanumeric String. In line with section 6.1.2 of this document.
<sup>1</sup> Delivery Milestone	The expected date of delivery into Appointing Party systems	Date Field.

<sup>1</sup>Predecessor, Dependency and Delivery Milestones can be replaced with programme activity ID's if linked from the master programme. If this is this chosen method, then LAP shall specify in the Post Appointment BEP.

## **Appendix G - Technology Radar**

Information Management Domains		
Workforce Collaboration: Microsoft 365	Common Data Environment: ProjectWise BCDE Autodesk Construction Cloud ASITE ACONEX	Requirements Management: IBM Doors
Stakeholder Engagement: MS Dynamics		E-signatures: DocuSign
Data & Analytics: PowerBI Nodes & Links		Interoperability: Workato Zapier

Design and Construction			
Autodesk: AutoCAD Civil 3D Revit Navisworks Infraworks	Bentley: Microstation OpenRoads Designer STAAD Plaxis 3D	Other: Tekla Suite Archicad Vectworks IntelliCAD	3D: Revizto BIMcollab iTwin ACC BIM Collab.
4D & 5D: SYNCHRO Vico Office VisiLean ACC Takeoff	Quality Assurance: Zutec Fieldview Andon	HSE: Capture 3D Repo ACC Build	GIS: Esri Arc GIS QGIS
Carbon Management -Life Cycle Assessment (LCA) plug-ins: One Click LCA ADW Developments CarboniCa Cerclos (formerly eTool)			

Project Controls	
Planning and Risk Management: Primavera P6 TILOS Xactium Asta Powerproject	Commercial, finance and contract management: CostOS TimeSheet Digital Beehive
Microsoft Project Aphex ARM PRISM	AEON GREEN CEMAR Portal

Resources		
Logistics & Resource Management: DataScope Intergraph Smart Materials	People: Biosite Mosaic Triple Threat	Supply Chain: SourceDogg

## **Appendix H - Minimum Hardware Requirements**

Component	Specification
Operating System	Microsoft® Windows® 10 (64-bit) or Windows® 11 (64-bit)
Processor (CPU)	Basic: Intel® Core i5 or AMD Ryzen 5 series, 6-core, base clock ≥ 2.5 GHz, SSE2 support Recommended: 3+ GHz processor (base), 4+ GHz (turbo)
Memory (RAM)	Basic: 16 GB Recommended: 32 GB
Display Resolution	Basic: 1280 x 1024 resolution minimum, 24-bit true colour or higher Recommended: High Resolution & 4K Displays Resolutions up to 3840 x 2160
Graphic Card	Basic: DirectX® 11 capable graphics card with Shader Model 5 and minimum 4 GB dedicated video RAM Recommended: 8 GB GPU with 106 GB/s Bandwidth and DirectX 12 compliant.
Disk Space	Basic: 500Gb Solid State Drive (SSD) Storage Recommended: 1Tb SSD Storage
Network	Internet connectivity for licensing, updates, and cloud collaboration workflows
Pointing Device	Microsoft-compatible mouse or 3Dconnexion® compliant device
.NET Framework	Microsoft .NET 8
Browser	Google Chrome, Microsoft Edge, Mozilla Firefox or equivalent (latest versions)

# **Appendix I - Typical Level of Geometrical Information by Phase**

## I.1 Spatial - Linear Site

Model Element/Phase	0-1	2	3-4	5-6	7
Boundaries	1	2	3	4	6
Topography, Grids and levels	1	2	4	-	-
Landscaping	1	2	2	-	-
Roads (mainline, side and other)	1	2	3	4	6
Vehicle Restraint Systems	1	2	3	4-5	6
Parking	1	2	3	4	6
Paths	1	2	3	4	6
Fences	1	2	3	4	6

## I.2 Civil & Structures

Model Element	0-1	2	3-4	5-6	7
Excavation	1	1-2	2	4-5	6
Foundations	1	1-2	3	4-5	6
Retaining Walls	1	1-2	3	4-5	6
Walls	1	1-2	3	4-5	6
Subsoil drainage	1	1-2	3	4-5	6
Floors/Deck	1	1-2	3	4-5	6
Columns	1	1-2	3	4-5	6
Beams	1	1-2	3	4-5	6
Framing	1	1-2	3	4-5	6
Penetrations	1	1-2	3	-	6
Stairs, ladders and ramps	1	1-2	3	4-5	6
Platforms and landings	1	1-2	3	4-5	6
Roof	1	1-2	3	4-5	6

Model Element	0-1	2	3-4	5-6	7
Chambers and manholes	1	1-2	3	4-5	6
Maintenance and access zones	1	1-2	3	-	-
Technology Systems	1	1-2	3	4-5	6
Security Systems	1	1-2	3	4-5	6
Pipework & Ducting	1	1-2	3	4-5	6
Pipe Fittings	1	1-2	3	4-5	6
Lighting	1	1-2	3	4-5	6
Electrical and control circuitry / cables outside cabinets	1	1-2	3	4-5	6
In-cabinet control & electrical equipment	1	1-2	3	4-5	6

## **Appendix J - Level of Alphanumerical Information Need (H&S)**

## J.1 Context Attribute Schema

Information about the context shall be described so that any risks and incidents can be assessed appropriately.

Source: ISO 19650-6 Section 4.3.2:

Property field	Specification	Description	Notes
Identifier	Text	Unique context identifier	The context identifier shall be composed of the project code as identifier in Section 6.1.1 of this document.
Category	Enumeration	Classification of the asset	-
Description	Text	Detailed description and narrative of the asset	-
Associated product	Text or identifier	Facility or system	Only systems that are exceptional given the overall context need to be recorded.
Associated activity	Text or identifier	Asset life cycle stage or work package	Only work packages that are exceptional given the overall context need to be recorded.
Associated location	Text or identifier	Site or zone	Only zones that are exceptional given the overall context need to be recorded.
Contextual location	Coordinates	Coordinate system-based location	Optional This can be cartesian, geo-spatial or alignment based.
Context link	Text or link to main context	-	Optional depending on implementation.
Context linkage	Inverse links to sub-contexts	-	Optional depending on implementation.
Risk linkage	Inverse linkage to risks	-	Optional depending on implementation.
Incident linkage	Inverse linkage to incidents	-	Optional depending on implementation.
History	Varies	Record of dates and actions including creation, updates	Entries shall not be deleted.

## J.2 Risk Attribute Schema

Risks shall be described to support their communication and assessment.

Source: ISO 19650-6 Section 4.3.3:

Property field	Specification	Description	Notes
Identifier	Text	Unique risk identifier	Defined in in section 9.4.2 of this document.
Category	Enumeration	Classification of the risk	To be defined by Appointing party or Lead Appointed Party.  Note 1: categorisation can be determined by legal and / or organisational reporting standards.  For examples, Refer to ISO 19650-6 Annex B.
Description	Text	Detailed description and narrative of the risk	-
Associated product	Text or identifier	Product, material, type, component or system associated	Optional if other associations given This can be a name, category, description or specification or model entity reference.
Associated activity	Text or identifier	Activity, process, task, job type, package or project/program associated	Optional if other associations given This can be a name, category description or construction or operation program or model entity reference.
Associated location	Text or identifier	Space, location, zone or site associated	Optional Shall be composed of the spatial zone code as identifier in Section 6.1.4 of this document.
Contextual location	Coordinates	Coordinate system-based location	Optional This can be cartesian, geo-spatial or alignment based.
Application stage	Enumeration.	The stage at which this risk applies. Refer to Figure 4.1	Based on PE-PMG-02041.
Status	Enumeration: <ul style="list-style-type: none"> <li>• Open</li> <li>• Closed</li> <li>• Unknown</li> </ul>	Status of the risk indicating the need for review and treatment	Status will be unknown until it has been assessed.

Property field	Specification	Description	Notes
Documentation	File reference or URL	Documentation of any expert or detailed risk analysis	-
Level of risk	Text	Prioritization provided to support communication and review	The level of risk established in the risk assessment shall be used. If applicable likelihood and consequence can be added to Appendix J.3 attribution schema.  For examples, Refer to ISO 19650-6 Annex C.
Affected party	Text	Name or role of party affected by this risk	Privacy can need protection.
Raised by	Text	Name or role of individual or organisation who raised this risk	Privacy can need protection.
Owned by	Text	Name or role of individual or organisation who is responsible to determine the appropriate risk treatment	Privacy can need protection
Context	Text or linkage	Association to a context	Refer to Section 9.4.1 of this document.
Treatments linkage	Inverse of links from treatments	-	Optional depending on implementation.  Refer to Section 9.4.1 of this document.
Review date	Date	Date review is due or has been carried out	Optional
History	Varies	Record of dates and actions including creation, updates	Optional Entries shall not be deleted.

### J.3 Incident Attribute Schema

Source: ISO 19650-6 Section 4.3.4:

Property field	Specification	Description	Notes
Identifier	Text	Unique risk identifier	Defined in Section 9.4.2 of this document.
Category	Enumeration	Classification of the risk	To be defined by Appointing party or Lead Appointed Party.  Note 1: categorisation can be determined by legal and / or organisational reporting standards.  For examples, Refer to ISO 19650-6 Annex B.
Description	Text	Detailed description and narrative of the risk	
Associated product	Text or identifier	Product, material, type, component or system associated	Optional if other associations given.
Associated activity	Text or identifier	Activity, process, task, job type, package or project/program associated	Optional if other associations given.
Associated location	Text or identifier	Space, location, zone or site associated	Optional Shall be composed of the spatial zone code as identifier in Section 6.1.4 of this document.
Contextual location	Coordinates	Coordinate system-based location	Optional
Application stage	Enumeration	The stage at which this incident applies. Refer to Figure 4.1	Based on PE-PMG-02041.
Status	Enumeration <ul style="list-style-type: none"> <li>• Open</li> <li>• Closed</li> <li>• Unknown</li> </ul>	Status of the incident indicating the need for review and treatment	Status will be unknown until it has been assessed.
Documentation	File reference or URL	Documentation of any detailed risk analysis	-
Level of risk	Text	Prioritization provided to support communication and review	-

Property field	Specification	Description	Notes
Affected party	Text	Name or role of party affected by this incident	Privacy can need protection.
Raised by	Text	Name or role of individual or organisation who raised this risk	-
Owned by	Text	Name or role of individual or organisation who is responsible to determine the appropriate risk treatment	-
Context link	Text or links	Association to a context	Refer to Section 9.4.1 of this document.
Treatments linkage	Inverse of links from treatments	-	Optional depending on implementation. Refer to Section 9.4.1 of this document.
Review date	Date	Date review is due or has been carried out	Optional
History	Varies	Record of dates and actions including creation, updates	Optional Entries shall not be deleted.

## J.4 Risk and Incident Treatment Attribute Schema

Source: ISO 19650-6 Section 4.3.5:

Property field	Specification	Description	Notes
Identifier	Text	Unique treatment identifier	Defined in in Section 9.4.2 of this document.
Category	Enumeration: <ul style="list-style-type: none"> <li>• Elimination</li> <li>• Substitution</li> <li>• Control</li> </ul>	Classification of the risk treatment	Substitution can include reduction.  Controls can include engineering controls, administrative controls, and personal protective equipment.  See ISO 45001, ISO 45002, and ISO 45006 for detail.
Description	Text	Detailed description and narrative of the risk treatment	-
Associated product	Text or identifier	Product, material, type, component or system associated	Optional if other associations given.
Associated activity	Text or identifier	Activity, process, task, job type, package or project/program associated	Optional if other associations given.
Associated location	Text or identifier	Space, location, zone or site associated	Optional  Shall be composed of the spatial zone code as identifier in Section 6.1.4 of this document.
Application stage	Enumeration	The stage at which this treatment applies. Refer to Figure 4.1	Based on PE-PMG-02041.
Status	Enumeration	Status of the risk treatment indicating the need for review and approval	Status will be unknown until it has been assessed
Documentation	File reference or URL	Documentation of any detailed risk treatment analysis	-
Raised by	Text	Name or role of party who raised or originated (authored) this risk treatment	-

Property field	Specification	Description	Notes
Owned by	Text	Name or role of individual or organisation who is responsible to determine the appropriate risk treatment	-
Approved by	Text	Name or role of party who approved this risk treatment	Optional till approved
Risk links	Text or links	Association to a risk record	Refer to Section 9.4.1 of this document.
Incident links	Text or links	Association to an incident record	Refer to Section 9.4.1 of this document.
Review date	Date	Date review is due or has been carried out	Optional
History	Varies	Record of dates and actions including creation, updates	Optional Entries shall not be deleted

# **Appendix K - Level of Geometrical Information Catalogue**

Refer to the “Appendix K Level of Geometrical Information Catalogue”. available within TII supplementary information.

# **Appendix L - Exchange Information Requirements Template**

Refer to the “Appendix L Exchange Information Requirements Template” available within TII supplementary information.

# **Appendix M - Capability and Capacity Assessment Template**


Refer to the “Appendix M Capability and Capacity Assessment Template”. available within TII supplementary information.

# **Appendix N - Pre-Appointment BIM Execution Plan (BEP) Template**

Refer to the “Appendix N Pre-Appointment BIM Execution Plan Template” available within TII supplementary information.





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