Digital Engineering Execution Plan

(DEEP) Template

Ver. 0.1

Date: 6 January 2022

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| **Revision** | **Description** | **Released By** | **Date** |
| 0.1 | First draft | J de Villiers | 6/01/2022 |
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Definitions

**Appointing party** Watercare as the employer

**Asset information model** The AIM is a single source of validated and approved information that relates to a built asset that comprise of models, data, documents and other records required for the operational phase of an asset

**BIM** A process supported by various tools and technologies to generate, share and manage the digital representation of physical and functional characteristics of infrastructure

Acronyms

AIM Asset information model

AIR Asset information requirements

BIM Building information modelling

BEP BIM execution plan

CDE Common data environment

CAD Computer aided design

EIR exchange information requirement

IDP Integrated design process

LOD Level of development

LOI Level of information

OIR Organisational information requirements

PIM Project information model

PMF Watercare’s project management framework

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# Introduction

## Purpose

This document provides the delivery team with the minimum inclusions and a standard format for a project-specific digital engineering execution plan (DEEP).

It will help facilitate communication of digital asset information between stakeholders

This document is tailored to ensure the lead Appointed Party to respond to the exchange information requirements (EIR). Depending on the contract type and what stages the contract extends across, this template will need to change.

For example, if there is a design-only EIR (i.e. no construction within the contract), then various parts will need to be modified.

Equally, prior to Construction, the DEEP should be updated to reflect the approach for construction, commissioning and handover. This document should meet the EIR, organisation information requirements (OIR) and asset information requirements (AIR), as defined by the Appointing Party.

This document does not provide guidance on digital engineering.

## Updating and developing this DEEP

A strategy for how this DEEP will be updated and developed during the lifecycle of the project.

This digital engineering execution plan (DEEP) has been developed to facilitate the delivery of the [insert project name] project. It is a live document, and will be appropriately updated throughout the course of the project to ensure it reflects EIR’s information and delivery requirements. This includes the current project phase and scope, project team structure and capabilities.

This DEEP is to be actively managed and updated throughout the course of the project to ensure that it remains relevant to the project scope, digital engineering strategy, contract structure and available resources (tools/IT systems and personnel).

This DEEP must include any changes requested by the Appointing Party, as deemed necessary to the project.

# Digital engineering execution plan

## 2.1 Basis of document

This section outlines the structure of the DEEP for the lead Appointed Party. It will need to be modified for each organisation, project and situation.

This DEEP is divided into four sections:

* Section 1: Project information – sets out the basic project information, the structure of the DEEP and provides relevant glossary and acronyms;
* Section 2: Governance – provides an overview of key owner-side contacts (Appointing Party) for the project;
* Section 3: Management – provides clarification on standards, soft landings, data drops, QA/QC, federation, communication and roles and responsibilities;
* Section 4: Technical requirements – describes the scope and specification of the Services; and

## Requirement terminology

This section articulates the ‘language’ of compliance. The following terms have defined meanings. Care must be taken to ensure their appropriate use throughout this document. These must be aligned with the norms associated with contracts in the department/agency.

* must – describes mandatory requirements;
* should – describes non-mandatory, best practice recommendations; and
* may – describes possible options that are neither mandatory nor best practice.

It may be worth articulating within this section how the Appointed Parties can demonstrate compliance. Users of this requirement must explicitly demonstrate compliance through:

* adopting appropriate standards and providing explicit reasons for their selection; or
* providing an explicit, evidence based, business case supporting compliance with this standard.

Further, it may be worthwhile articulating the process around deviation from requirements -- how, when, who, why?

Where the deliverables of this requirement are not able to be met through the design process, a request for deviation must be made. Requests for deviation must explicitly state the areas where a proposal does not comply. As a minimum, submissions must include detailed commentary on:

* the reason for deviation from this standard;
* how the deviation complies with all other mandatory standards or regulations; and
* any impacts on safety, reliability, ongoing cost, operability and maintenance.

## Section 1: Project information

|  |
| --- |
| Project details |
| Project name |  |
| Project address |  |
| Project number |  |
| Lead design team |  |
| Lead construction team |  |
| Project Completion date |  |
| Project Handover date |  |

### Project summary

Provide a brief summary of the project.

For example, Project X is located approximately 25 km north-west of Melbourne’s CBD. Land is owned and operated by YY. The site includes a range of existing scope:

The following scope will be demolished:

Following demolition, the project will embark on early works; the scope of the early works includes:

Following completion of early works, the project will design and construct the following.

### Project schedule

Table 1 describes the planned start and end dates of key milestones as per the overall design and assurance program. These milestones are also determined by the required information deliverables at each of project stage. The DE Lead will be responsible for collecting and collating required information and coordinating the deliverables.

Enter major milestones here, and/or provide link to the Project Schedule providing these dates.

Table 1: Project schedule and milestones

|  |  |  |  |
| --- | --- | --- | --- |
| Project stage | Milestone | Planned submission date | Planned approval date |
| Brief |  | DD MM YYYY | DD MM YYYY |
| Concept |  | DD MM YYYY | DD MM YYYY |
|  | DD MM YYYY | DD MM YYYY |
| Definition |  | DD MM YYYY | DD MM YYYY |
|  | DD MM YYYY | DD MM YYYY |
|  | DD MM YYYY | DD MM YYYY |
|  | DD MM YYYY | DD MM YYYY |
|  | DD MM YYYY | DD MM YYYY |
| Design |  | DD MM YYYY | DD MM YYYY |
|  | DD MM YYYY | DD MM YYYY |
| Building and commission |  | DD MM YYYY | DD MM YYYY |
|  | DD MM YYYY | DD MM YYYY |
| Handover and closeout |  | DD MM YYYY | DD MM YYYY |
| Operation and maintenance |  | DD MM YYYY | DD MM YYYY |

### Digital engineering objectives

For example, the Appointing Party is focused on the following benefits and outcomes when digital engineering is used during design, construction, commissioning and operations. These objectives form the definition uses of digital engineering and constitute the requirements to be addressed by the project delivery team.

The Appointing Party is staging the implementation of digital engineering in line with industry readiness over a phased time horizon. In Table 2 confirm the delivery team processed digital engineering uses for the project.

(Note: where a digital engineering use applies, copy and paste the tick symbol in the appropriate cell. If a use is not applicable, please leave the cell blank).

Table 2: Phased BIM uses

| BIM uses | Project phases |
| --- | --- |
| Stage 1 | Stage 2 | Stage 3 | Stage 4 | Stage 5 | Stage 6 | Stage 7 |
| (Brief) | (Concept) | (Definition) | (Design) | (Build and commissioning) | (Handover and closeout) | (Operation and maintenance) |
| Estimated delivery dates |  |  |  |  |  |  |  |
| Improved stakeholder engagement (3D) |  |  |  |  |  |  |  |
| Improved coordination (3D) |  |  |  |  |  |  |  |
| Improved program planning  |  |  |  |  |  |  |  |
| Safety in design and hazard review and tracking (3D) |  |  |  |  |  |  |  |
| Existing asset capture  |  |  |  |  |  |  |  |
| Optimised handover  |  |  |  |  |  |  |  |
| Consistent use of classification (Uniclass 2015) |  |  |  |  |  |  |  |
| Reliability and completeness of as built information |  |  |  |  |  |  |  |
| Improved operation and maintenance activities |  |  |  |  |  |  |  |
| Improved cost management  |  |  |  |  |  |  |  |
| Progress claims associated to the model (5D) |  |  |  |  |  |  |  |
| Improved management of asset information using interconnected data (6D) |  |  |  |  |  |  |  |
| Digital set out to complement traditional surveying techniques |  |  |  |  |  |  |  |
| Other |  |  |  |  |  |  |  |

### Reference Documents

The below listed documents area referenced throughout the DEEP. It is suggested that all stakeholders are familiarised with these documents to understand the context in relation to the project

|  |  |  |
| --- | --- | --- |
| Document reference | Title  | Release date / Version |
| New Zealand Digital Engineering handbook  |  |  |
| Victorian Digital Asset Strategy (VDAS)  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

### Standards

Identify/nominate the specific standards and guidelines to be followed by all project participants to apply best practises for digital engineering and project execution. Consideration or adoption of any other standards related to digital engineering must be identified, discussed and agreed in writing with the DE Lead prior to implementation for any project.

|  |  |
| --- | --- |
| Standard | Release date / Version |
| ISO 19650 Part 1 and 2 | 2019 |
|  |  |

### Appointing Party standards

This section should articulate relevant standards, e.g. CAD standard, drawing numbering, BIM standard, GIS standard, asset data loading templates etc.

|  |  |  |
| --- | --- | --- |
| Standard | Number | Release date / Version |
| CAD Manual | 7363 | 8.7 |
| Asset creation sheet |  | 6.10 |
|  |  |  |

### Innovation and value adding opportunities

Each project should demonstrate innovation or opportunities to add value to improve delivery and overall outcomes. Although this is not mandatory, Appointed Parties should highlight any opportunities for innovation or value adding here.

## Section 2: Governance

This section deals with the governance of the project’s digital engineering process. It discusses key roles, who is accountable from the Appointing Party/client side.

### Project team contacts

The following table captures information on key project contacts for digital engineering delivery. Add extra rows as needed.

Table 3: Project team contact list

|  |  |  |  |
| --- | --- | --- | --- |
| Defined role | Company | Contact name | Email and phone |
| Digital Engineering Project Champion |  |  |  |
| Project Director |  |  |  |
| Project Manager 1 |  |  |  |
| Project Manager 2 |  |  |  |
| DE Lead |  |  |  |
| BIM Lead |  |  |  |
| CAD Lead |  |  |  |
| GIS Lead |  |  |  |
| Package Lead 1 |  |  |  |
| Package Lead 2 |  |  |  |
| Package Lead 3 |  |  |  |
| **Discipline DE leads** |
| Architectural |  |  |  |
| Structural  |  |  |  |
| Hydraulic |  |  |  |
| Mechanical  |  |  |  |
| Civil |  |  |  |
| Electrical |  |  |  |
| Instrumentation |  |  |  |
| Rail Signalling |  |  |  |
| Process |  |  |  |
| Environmental |  |  |  |
| Systems |  |  |  |

Table 4: Project team behaviours

|  |  |  |
| --- | --- | --- |
| Ref | Activities | Description |
| 1 | Share, collaborate, deliver | All personnel have a responsibility to share information, and where required, coordinate and collaborate to deliver EIR required digital engineering outcomes. |
| 2 | Use common language | Use a common language so people can effectively exchange information. |
| 3 | Demonstrate an auditable assurance pathway | Resolve issues collaboratively, manage risks and track decisions to provide a traceable and auditable pathway through design development up until asset disposal. |
| 4 | Provide and use digital tools to support decision making | Implement effective tools and provide training so personnel are empowered to make decisions using the best available information. |
| 5 | Support and strive to adopt best practice | Use digital engineering tools and processes to drive innovation in the way projects are delivered. |

### Information management governance

Acknowledge the strategy or process for how information created for digital engineering on the project will be managed in accordance with what is outlined in the EIR. Including as a minimum:

* data exchange;
* data backup, including a minimum frequency of weekly back-ups, and retention of backups;
* data archiving; and
* approval state and suitability.

### Data security

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

Table 5: Data security

|  |  |  |
| --- | --- | --- |
| Company | Authorised manager | Authority (upload, download, change access/distribution) |
|  |  |  |
|  |  |  |
|  |  |  |

## Section 3: Management

This section deals with the management of the project’s digital engineering deliverables. It is the responsibility of the relevant disciplines on the project (in each Appointed Party’s organisation) and the Lead Appointed Party to administer.

### Project coordinates

A single file which has all the world and local setout coordinates and location settings for the individual discipline files for the project must adhere to the following:

This file, identified as the master coordinate file, will serve as the source of the project coordinates and for sharing such information. Any changes must be documented and communicated to the team when exchanging this file.

Table 6: Model geographic location

|  |  |  |
| --- | --- | --- |
| Attribute | Details | Example |
| Geodetic datum used |  |  |
| Height reference |  |  |
| Grid datum |  |  |
|  |
| Project location | Enter the project location, identifiable by cardinal points |  |
| Model rotation | In relation to the project north |  |

### BIM project base point

The project set out point (e.g. intersection of grids) needs to be agreed with the surveyor, lead consultant and client prior to any modelling work being performed. Please enter the values in Table 7 below.

### Project levels

Level nomenclature needs to be agreed with Appointing Party and delivery team and documented in the table below.

Table 7: Project level

|  |  |  |  |
| --- | --- | --- | --- |
| Level name | Abbreviation | Structure surface level | Finished floor level  |
|  |  |  |  |
|  |  |  |  |

### Project GRID system

Table 8: Project GRID system

|  |  |  |
| --- | --- | --- |
| Grid system | Values | Comments  |
| Project east to west | A, B, C, D, E etc. |  |
| Project north to south | 1, 2, 3, 4, 5 etc. |  |

### Project work lots

To ensure correct coordination of information across the project phases, all parties need to adhere to the following. This needs to be agreed post contract award. The project staging/phasing is as follows:

Please nominate the project phasing in this section, e.g. existing, new construction, stage 1, stage 2.

Table 9: Project stages/phases

|  |  |
| --- | --- |
| Name | Comments |
|  |  |
|  |  |
|  |  |
|  |  |

### Information delivery program

Table 10: Information delivery program

| Item | Date/frequency | Projects |
| --- | --- | --- |
| DE-project kick-off workshop |  | DE teams |
| DE-strategy workshop |  | DE lead and BIM/CAD/GIS lead |
| DE-technical workshop |  | BIM/CAD/GIS lead and coordinators |
| DEEP draft |  | DE lead and BIM/CAD/GIS lead |
| **Concept**  |
| DE strategy technical review meeting #1 |  |  |
| Design coordination meeting (discipline/ location) | Weekly |  |
| Design coordination meeting (site wide) | Monthly |  |
| Design |
| DE strategy technical review meeting #1 | TBC post concept submission | DE teams |
| Design coordination meeting (discipline/ location) | Weekly | BIM/CAD/GIS lead and coordinators and design leads |
| Design coordination meeting (site wide) | Monthly | BIM/CAD/GIS lead and coordinators and design leads |
| **Construction** |
| DE strategy technical review meeting #1 | TBC post design submission | DE teams |
| Coordination meeting (discipline/location) | Weekly | Design BIM lead and coordinators and design leads |
| Construction design management meeting | Weekly | Construction BIM lead and construction design package leads |
| Coordination meeting (site wide) | Monthly | BIM/CAD/GIS lead and coordinators & design leads |
| **Issued for construction** |
| DE strategy technical review meeting #1 | TBC post construction submission | DE teams |
| Coordination meeting (discipline/ location) | Weekly | Design BIM/CAD/GIS lead and coordinators and design leads |
| Construction design management meeting | Weekly | Construction BIM/CAD/GIS lead and construction design package leads |
| Coordination meeting (site wide) | Monthly | BIM/CAD/GIS lead and coordinators and design leads |
| **As built** |
| DE strategy technical review meeting #1 | TBC post construction submission | DE teams |
| Coordination meeting (discipline/location) | Weekly | BIM/CAD/GIS lead and coordinators and design leads |
| Coordination meeting (site wide) | Monthly | BIM/CAD/GIS lead and coordinators and design leads |

### Soft landings/data drops

The project requires the following data drops across the asset lifecycle:

Note: this section, if used, should respond to the owner’s requirements in terms of data/information throughout the project lifecycle. This should reflect the owner’s needs in terms of assurance, clients, stakeholders and process. It may also reflect requirements set out by other departments and agencies.

Soft landings are intended to be a smooth transition from the design and construction phase to the operational phase of a built asset (i.e. no surprises).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Definition | Stage 1 | Stage 2 | Stage 3 | Stage 4 | Stage 5 | Stage 6 | Stage 7 |
| Brief | Concept | Definition | Design | Build and commission | Handover and closeout | Operations and maintenance |
| Data drop |  | **1** | **2** | **3** | **4** |  | **5** |  |

The above table should reflect the project timeline and needs as per the EIR.

The above data drops require the following information:

The contents of table below should respond to the client’s soft-landing needs as noted in the EIR. The numbered boxes above should cross reference the table below.

| Data drop | Description |
| --- | --- |
| **1** | When: DD MMM YYYYMethodology: Desktop assessment based on submitted information, supplemented by conversations with project team to clarify any matters.Submission details:* completed project statement of intent, including key contacts and dates;
* design statement in line with XX, and a note of the persons (name and role) involved in the development of the statement – i.e. those stakeholders represented in the development of both the agreed non-negotiables and the benchmarks;
* initial list of relevant design guidance to be followed – XX, YY, ZZ;
* assessment of current OIR and AIR; and
* assessment of how project will align with OIR and AIR.

Format:Information to be provided in an agreed electronic format e.g Word/PDF. |
| **2** | When: DD MMM YYYYMethodology: site feasibility studies and analysis of project options to inform a preliminary business case.Submission details:* ≤ 1:1000 plot plans and drawings
* where a project is one of a series, or a major development, being considered for a site, a masterplan is required to demonstrate the potential interaction on other services;
* analysis of site option(s) ( ≤ 1:500), in terms of potential for achieving the project’s non-negotiables criteria and benchmarks established in the design statement and the inherent design risks (i.e. where the site presents difficulties in achieving the benchmarked standards); and
* initial list of relevant design guidance to be followed – XX, YY, ZZ, Including a schedule of any key derogations.

Format: Information to be provided in an electronic format. Geometric models: proprietary 3D BIMs with 2D PDFs cut from the models to the above noted levels of definition/scales. Non-graphical information to be provided in an agreed electronic format e.g. Word/PDF. |
| **3** | When: DD MMM YYYYMethodology: more rigorous feasibility study-based on site-confirmed information, basic engineering and detailed stakeholder engagement to clarify any matters.Submission details:* completed project statement of intent, including key contacts and dates;
* developed project brief, including design statement.;
* evidence of completion of design in line with the procedures set out by the department;
* evidence of consultation with local authority planning department on approach to site development and alignment with local development plan;
* evidence of consultation with the Department of Environment, Land, Water and Planning (DELWP) on approach;
* detailed photographs/LiDAR of site showing broader context;
* updated list of relevant design guidance to be followed;
* outline design study showing proposals considered and favoured development option;
* plans should be rendered to distinguish between main use types (circulation, consult, etc) so that orientation and aspect of areas can be considered;
* outline design study should be coordinated and include relevant multi-discipline input, including but not limited to: architecture, building services, structural, fire, landscape design concepts; including diagrams and sketches demonstrating the key proposals to assess alignment with brief;
* relevant energy modelling information; and
* 3D models of design intent for key spaces identified in design statement.

Format: Information to be provided in an electronic format. Geometric models: proprietary 3D BIMs with 2D PDFs cut from the models to the above noted levels of definition/scales. Federated model in an agreed format, e.g. industry foundation class. Non-graphical information to be provided in an agreed electronic format, e.g. Word/PDF. |
| **4** | When: DD MMM YYYYMethodology: Desktop assessment based on submitted information, supplemented by conversations with project team to clarify any matters.Submission details:* completed project statement of intent, including key contacts and dates;
* finalised project brief, including design statement;
* evidence of completion of design in line with the procedures set out by the department;
* integrated cost estimate (in line with XX standard);
* integrated project schedule (in line with XX standard) – integrated with XX, YY, and ZZ, project;
* geometrical models, federated models and linked data e.g. operation and maintenance manuals plus relevant record survey (e.g. point clouds) all with Uniclass 2015 classification; and
* final design study showing developed proposals (e.g. drawings at ≤1:200, key interfaces at ≤1:50, plus key elements ≤1:20 ). Key drawings, (construction details/specs need not be submitted) including:
	+ site layout showing wider context and landscape proposals;
	+ plans rendered to distinguish between use types (circulation, consult);
	+ elevations/sections showing design in context;
	+ building services report and layouts;
	+ structural/civil report and layouts;
	+ landscape report and layouts;
	+ specialist report and layouts;
	+ 3D visualisations of the building in context – including key approaches perspectives from a human eye height; and
	+ confirmation of planning permission and building regulation compliance.

Format: Information to be provided in an electronic format. Geometric models: proprietary 3D BIMs with 2D PDFs cut from the models to the above noted levels of definition/scales. Federated model in an agreed format, e.g. industry foundation class. Non-graphical information to be provided in an agreed electronic format e.g. Word/PDF. |
| **5** | When: DD MMM YYYYMethodology: As-built graphical and non-graphical project information and key information handover to the operator, facilities manager and maintenance manager.Submission details:* geometrical models, federated models and linked data, e.g. operation and maintenance manuals plus relevant record survey (e.g. point clouds), all with Uniclass 2015 classification;
* geometrical models to be correct with the following tolerances:
	+ mechanical: +/- XX mm;
	+ electrical: +/- XX mm;
	+ architecture +/- XX mm;
	+ etc.
* linked data, e.g. operation and maintenance manuals plus relevant record survey (e.g. point clouds), all with Uniclass 2015 classification;
* detailed asset register as per (XX YY standard) – validated by third-party;
* retention of native federated project model for XX years with client access; and
* handover of planning-critical information to DELWP via XX.

Format: Information to be provided in an electronic format. Geometric models: proprietary 3D BIMs with 2D PDFs cut from the models to the above noted levels of definition/scales. Federated model in an agreed format, e.g. industry foundation class. Non-graphical information to be provided in an agreed electronic format, e.g. Word/PDF. |

###

### Communication

#### Reports

Reports/dashboards are required in the following format, frequency, and level of detail:

This section articulates how information management and digital engineering processes are reported back to the Appointing Party/client. This should include formats, software, frequency, level of information, audience, and decisions that need to be made as a result.

Note: reports should be automated where possible. Onerous reporting for the sake of reports can be burdensome and erode value for money outcomes.

Table 11: Project report and dashboard requirements

|  |  |  |  |
| --- | --- | --- | --- |
| Report type | Frequency  | Stage of project | Audience |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

#### Meetings

Scheduled coordinated clash detection workshops are to coincide with design team meetings/workshops as well as with major design program milestones.

Table 12 should articulate the where, when and who of digital engineering meetings. It should also indicate the high-level tasks to be completed as part of a standing agenda of those meetings.

#### Coordination and clash detection

This section should identify the clash detection process including:

* proposed software to be used for model federation and clash detection/management;
* responsibilities;
* outputs (e.g. clash reports, excel, dashboarding);
* tolerance strategy;
* the clash detection and management process; and
* clash resolution process.

For example, for coordination and clash reporting, discipline BIM will be reviewed and coordinated using XXX at scheduled intervals in during the project. An .XXX file shall be loaded onto the shared work area of the project and a clash detection shall be executed for each discipline BIM submission within XXX to be shared amongst the project parties. Following the appropriate adjustment to the detection tolerance, each clash produced in the resultant report along with the .XXX file shall be distributed and resolved by the relevant party before the next model submission.

#### Quality control strategy

[Provide an overview of the Lead Appointed Party’s own internal model file and data standards, and compliance procedures. This section could reference other areas of the DEEP such as:

* quality assurance/control procedures for data, models and documents;
* design process and associated software ; and
* information security and information assurance requirements (data security protocol).

Define the proposed project approach for management of quality control in line with requirements included in the contact. At minimum this should refer to:

* establishment and use of suitable procedures for quality assurance and data control for both issuing and receiving of data;
* throughout the life of the project it will be necessary to audit the digital engineering environment and its constituent models to maintain consistency of approach to digital engineering, data management, adherence to the contract and to establish software and hardware issues that require attention. These audits will take place at regular intervals. The frequency of these audits will be discussed, agreed and recorded in the final DEEP. The audits will be undertaken by the DE Lead, BIM and GIS Leads, who in turn will issue a report to all members of the design team for comment and action; and
* the Lead Appointed Party DE Lead is responsible for closing out the actions identified in the audit and will be expected to elevate any issues beyond the control of the Project Delivery Team to the DE Project Champion.

#### Quality control checks

Quality control checks are required at each project stage. Please define which checks will be performed at which stages inTable 12.

Table 12: Quality control checks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Checks | Definition | Stages (SD, DD, CD, IFC) | Responsible party  | Software program(s) |
| Visual check | Ensure there are no unintended model components, and that they are correctly located in x, y, z, and coordination of the model against elements within the same model has occurred. | SD, DD, CD, IFC |  |  |
| Interference check | Detect problems in the model where two components are clashing, including soft and hard clashes. | DD, CD, IFC |  |  |
| Standards check | Ensure that the BIM/CAD standards and EIR have been followed (fonts, dimensions, line styles, levels/layers, room names, embedded data, etc.). | SD, DD, CD, IFC |  |  |
| Model integrity checks  | Describe the QC validation process used to ensure that the BIM has no undefined, incorrectly defined or duplicated elements and the reporting process on non-compliant elements and corrective action plans. | DD, CD, IFC |  |  |
| Model accuracy | Validate the completeness of the model, ensuring all appropriate dimensioning as needed for design intent, analysis and construction are included in the model. | DD, CD, IFC |  |  |
| Data validation | Check the information that is attributed to the object(s) has the correct values for the stage of the project. | DD, CD, IFC |  |  |
| 2D output | Check the 3D against 2D output (e.g. drawings and schedules against modelled elements). | DD, CD, IFC |  |  |
| Asset data check | Check the information that is attributed to the object(s) has been exported correctly to the asset data spreadsheet (e.g. COBie) and has the correct values for the stage of the project. | CD, IFC, As built |  |  |

### Model element responsibilities and detailed schedule

The following colours are to be applied to the federated model for ease of identifying the relevant discipline.

Table 13 should be modified according to the type of project. For example, civil may be further broken into tunnels, geotech, etc.

Table 13: MEA discipline legend

|  |  |  |  |
| --- | --- | --- | --- |
| Architectural  | ARC | Landscape architect | LAN |
| Civil  | CIV | Structural contractor  | SPC-C |
| Structural consultant | STR | Steel fabrication  | STF-C |
| Mechanical consultant | MEC | Mechanical-contractor | MEC-C |
| Electrical consultant | ELE | Electrical-contractor  | ELE-C |
| Plumbing and drainage  | PLU | Plumbing and drainage  | PLU-C |
| Fire consultant | FIR | Fire contractor | FIR-C |
| Traffic consultant | TRF | Acoustic | ACO |
| Information communication and technology | ICT | Other/Head contractor | OTH |

The ownership of model elements and detail shall be defined for each project stage to an appropriate level for the Appointing Party’s needs. This is up to the Appointing Party/client to decide how the project should be broken down in terms of information management.

Provided below are two example tables – basic and advanced.

The basic table outlines NBS UniClass2015 Systems (Ss) down to level 1. For UniClass2015 systems that are not in use, delete them. If more granularity and detail is required from the Lead Appointed Party, then use level 2 tables (see advanced table). This table is aimed at smaller/less complex projects.

The advanced table begins to outline a MEA and detail schedule through a NBS UniClass2015 System (Ss) down to level 2. Not all UniClass2015 Ss level 2 items are provided in the table. For UniClass2015 systems that are not in use, delete them. If more granularity and detail is required from the Lead Appointed Party, then use level 2 tables (see advanced). This table is aimed at larger/more complex projects.

Note 1: UniClass2015 systems are best thought of as ‘collections of products’. For example, a system for a timber pitched roof includes timber structural members, boards, fastenings, etc.; and signal system for a railway is made up of signals, detection and warning equipment, posts, cables, etc. UniClass2015 is free to use.

Note 2: It is important to seek alignment between the project’s CBS, its WBS and the asset classification employed by the organisation. Another asset classification system can be used; however, it should be mapped back to UniClass2015.

Note 3: Both tables outline level of development (LOD) as a measure of design maturity. LOD is not an exhaustive design manual – instead it provides a platform for discussion between the lead Appointed Party and the Appointing Party. Requesting LOD 500 requires considerable effort which can be costly to design. This cost must be met with a need from the Appointing Party. More information about LOD can be found in the NBS toolkit: https://toolkit.thenbs.com/Uniclass/Ss.

Note 4: The table also allows the Appointing Party to provide notes where applicable. For example, if the Appointing Party was to bring their own IP, objects or modelling expertise, this could be highlighted in the section below.

Table 14: Basic model element responsibilities and design level schedule

| **Uniclass system code (SS) – level 2** | **CBS/WBS** | **Project phase** | **Stage 2** | **Stage 3** | **Stage 4** | **Stage 5** | **Stage 6** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Description** | Concept design | Schematic design | Detailed design | Issued for construction (IFC) shop drawing | As built |
| **Author and design level**  | MEA | LOD | Notes | MEA | LOD | Notes | MEA | LOD | Notes | MEA | LOD | Notes | MEA | LOD | Notes |
| **Description** |  |
| Ss15 |  | Earthworks, remediation and temporary systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 20 |  | Structural systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 25 |  | Wall and barrier systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 30 |  | Roof, floor and paving systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 32 |  | Damp proofing, waterproofing and plaster finishing systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 35 |  | Stair and ramp systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 37 |  | Tunnel, shaft, vessel and tower systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 40 |  | Signage, fittings, furnishings and equipment (FF&E) and general finishing systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 45 |  | Flora and fauna systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 50 |  | Disposal systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 55 |  | Piped supply systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 60 |  | Heating, cooling and refrigeration systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 65 |  | Ventilation and air conditioning systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 70 |  | Electrical systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 75 |  | Communications, security, safety, control and protection systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 80 |  | Transport systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 85 |  | Process engineering systems | N/A | N/A | N/A | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |
| Ss 90 |  | Soft facility management systems | ARC | 100 |  | ARC | 200 |  | OTH | 200 |  | OTH | 300 |  | OTH | 300 |  |

Table 15: Advanced model element responsibilities and design level schedule

| **Uniclass system code (SS) – level 2** | **CBS/WBS** | **Project phase** | **Stage 2** | **Stage 3** | **Stage 4** | **Stage 5** | **Stage 6** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Description** | Concept design | Schematic design | Detailed design | Issued for construction (IFC) shop drawing | As built |
| **Author and design level**  | MEA | LOD | Notes | MEA | LOD | Notes | MEA | LOD | Notes | MEA | LOD | Notes | MEA | LOD | Notes |
| **Description** |  |
| Ss\_15\_10 |  | Groundworks and earthworks systems | ARC | 100 |  | CIV | 100 |  | CIV | 200 |  | CIV | 300 |  | CIV | 400 |  |
| Ss\_15\_10 |  | Groundworks and earthworks systems | ARC | 100 |  | CIV | 100 |  | CIV | 200 |  | CIV | 300 |  | CIV | 400 |  |
| Ss\_15\_30 |  | Remediation, repair and renovation systems | ARC | 100 |  | CIV | 100 |  | CIV | 200 |  | CIV | 300 |  | CIV | 400 |  |
| Ss\_15\_95 |  | Temporary works systems | ARC | 100 |  | CIV | 100 |  | CIV | 200 |  | CIV | 300 |  | CIV | 400 |  |
| Ss\_20\_05 |  | Substructure systems | ARC | 100 |  | STR | 100 |  | STR | 200 |  | STR | 300 |  | SPC-C | 400 |  |
| Ss\_20\_10 |  | Structural frame systems | ARC | 100 |  | STR | 100 |  | STR | 200 |  | STR | 300 |  | SPC-C | 400 |  |
| Ss\_20\_20 |  | Structural beams | ARC | 100 |  | STR | 100 |  | STR | 200 |  | STR | 300 |  | SPC-C | 400 |  |
| Ss\_20\_30 |  | Structural columns | ARC | 100 |  | STR | 100 |  | STR | 200 |  | STR | 300 |  | SPC-C | 400 |  |
| Ss\_20\_40 |  | Structural sheet and cable systems | ARC | 100 |  | STR | 100 |  | STR | 200 |  | STR | 300 |  | SPC-C | 400 |  |
| Ss\_20\_50 |  | Bridge abutment and pier systems | ARC | 100 |  | STR | 100 |  | STR | 200 |  | STR | 300 |  | SPC-C | 400 |  |
| Ss\_20\_60 |  | Retaining wall systems | ARC | 100 |  | STR | 100 |  | STR | 200 |  | STR | 300 |  | SPC-C | 400 |  |
| Ss\_20\_70 |  | Structure covering and finishing systems | ARC | 100 |  | STR | 100 |  | STR | 200 |  | STR | 300 |  | SPC-C | 400 |  |
| Ss\_20\_80 |  | Structure accessory systems | ARC | 100 |  | STR | 100 |  | STR | 200 |  | STR | 300 |  | SPC-C | 400 |  |
| Ss\_20\_95 |  | Temporary structural systems | ARC | 100 |  | STR | 100 |  | STR | 200 |  | STR | 300 |  | SPC-C | 400 |  |
| Ss\_25\_10 |  | Framed wall systems | ARC | 100 |  | ARC | 100 |  | ARC | 200 |  | MEC | 300 |  | MEC | 400 |  |
| Ss\_25\_11 |  | Monolithic wall structure systems | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Ss\_25\_12 |  | Panel wall structure systems | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Ss\_25\_13 |  | Unit wall structure systems | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Ss\_25\_14 |  | Fence systems | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Ss\_25\_15 |  | Fixed pedestrian barrier systems | N/A | N/A | N/A | LAN | 100 |  |  |  |  |  |  |  |  |  |  |
| Ss\_25\_16 |  | Fixed traffic and protective barrier systems | N/A | N/A | N/A | LAN | 100 |  |  |  |  |  |  |  |  |  |  |
| Ss\_25\_17 |  | Dam and levee structure systems | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Ss\_25\_20 |  | Wall cladding systems | ARC | 100 |  | ARC | 100 |  | ARC | 200 |  | ARC | 300 |  | ARC | 300 |  |
| Ss\_25\_25 |  | Wall lining systems | ARC | 100 |  | ARC | 100 |  | ARC | 200 |  | ARC | 300 |  | ARC | 300 |  |
| Ss\_25\_30 |  | Door and window systems | ARC | 100 |  | ARC | 100 |  | ARC | 200 |  | ARC | 300 |  | ARC | 300 |  |
| Ss\_25\_32 |  | Gate access systems | N/A | N/A | N/A | N/A | N/A | N/A | ELE | 100 |  | ELE | 300 |  | ELE | 300 |  |
| Ss\_25\_34 |  | Operable pedestrian barrier systems | N/A | N/A | N/A | N/A | N/A | N/A | MEC | 200 |  | MEC | 300 |  | MEC | 300 |  |
| Ss\_25\_36 |  | Operable traffic barrier systems | N/A | N/A | N/A | N/A | N/A | N/A | MEC | 200 |  | MEC | 300 |  | MEC | 300 |  |
| Ss\_25\_38 |  | Wall and barrier opening hardware systems | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Ss\_25\_45 |  | Wall covering and finish systems | ARC | 100 |  | ARC | 100 |  | ARC | 200 |  | ARC | 300 |  | ARC | 300 |  |
| Ss\_25\_50 |  | Wall mounted canopy and screen systems | ARC | 100 |  | ARC | 100 |  | ARC | 200 |  | ARC | 300 |  | ARC | 300 |  |
| Ss\_25\_60 |  | Wall and barrier accessory systems | ARC | 100 |  | ARC | 100 |  | ARC | 200 |  | ARC | 300 |  | ARC | 300 |  |
| Ss\_25\_95 |  | Temporary wall and barrier systems | N/A | N/A | N/A | N/A | N/A | N/A | CIV | 100 |  | CIV | 100 |  | N/A | N/A | N/A |

### Training

Training of the delivery team personnel in the use of BIM, GIS, CAD etc. is the responsibility of the Appointed Parties. Training of personnel should meet the requirements of the EIR.

## Section 4: Technical

### Common Data Environment

Explanation of how the CDE will be used and accessed. The CDE should meet the requirements of the EIR. E.g. ProjectWise, DE360, Synergy

#### 1.1 Common data environment

Information to be provided on the common data environment (CDE) should include:

* confirmation of collaboration tools;
* description of the validation process to be implemented to ensure that all information, in regard to the intended use, meets client’s requirements;
* folder structure;
* description of how work in progress, shared, published and archived is to be used, including the sharing with other project stakeholders; and
* proposed information flow, as well as frequency.

#### 1.2 Project CDE requirements

Enter here the specific uses and features of the project CDE on the project.

#### 1.3 File deliverables

Enter here any project specific requirements for all deliverables which will be uploaded into the project CDE.

#### 1.4 File metadata requirements

Enter here how the file metadata schema is to be utilised by the project team within the project CDE to help govern and control collaboration.

Provide the metadata to be utilised, including:

* document numbering (unique ID);
* file naming;
* status and suitability; and
* revision and version control.

#### 1.5 Naming conventions

Acknowledge the numbering system to be applied across projects as specified in the EIR.

File naming identifies the project naming convention. Information contained in the table is taken from the project work breakdown structure.

Table 16: File naming

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Project  | Zone/subzone | Package | Type | Originator | Discipline | AWB | Number |
| NEL | 000 | 100 | MLP | CFS | 100 | 000 | 0100 |

i.e. NEL-000-100-MLP-CFS-100-000-0100

#### 1.6 Status and suitability

Provide details on the method to be adopted for tracking the suitability and state of each document and model.

#### 1.7 Revisions and versions

The revision and version numbering of documents uploaded to the project CDE is to be documented below

Table 17: Information exchange program

|  |  |  |  |
| --- | --- | --- | --- |
| Information exchange | Project stakeholder | Frequency | Format |
| WIP design models | Designers | As required  | Native, IFC, Navisworks and Exchange. |
| Shared design models | Designers | Weekly (or at significant change) | Native, IFC, Navisworks and Exchange. |
| Published design models | Designers | Each stage gate | Native, IFC, Navisworks and Exchange. |
| WIP federated models | BIM Lead  | As required  | Navisworks federated models |
| Shared federated models | BIM Lead | Weekly (or at significant change) | Navisworks federated models |

#### 1.8 Interfaces between CDE

Define the detailed workflows for sharing data and information between the Project CDE and Operational CDE, specifying any specific access or security requirements.

Information shared with the owner must be uploaded to the CDE. Include in this section the process for review and approval of data prior to upload, and the upload process for the following:

* how the project CDE interfaces with the operational CDE; and
* how the information is validated and migrated to the Project CDE.

### Project object library

The project will adopt and utilise an existing object library. Details of the library include:

If a centralised object library is to be used, please confirm the stated approach for this from the EIR. If independent object libraries are to be used, please confirm the sources, e.g. BIM Object, XXX Company library, YYY Company Library.

Confirm all objects contain a Uniclass 2015 classification.

If additional technical assurance is required for pre-approved Technical Authority – confirm the process for this.

Confirm the location of the library.

### Existing asset information

The following asset-level information is available for use:

Acknowledge existing asset information made available by the client and whether they for use, for reliance, etc.

### Existing site/legacy data integration

Define the extents of existing conditions to be scanned/modelled and the level of development required.

### Survey strategy

Provide the survey strategy and relevant survey information to be used for the project.

Table 18: Survey strategy

|  |  |  |  |
| --- | --- | --- | --- |
| Survey method | Delivery format | Survey origin | Details/notes |
| Feature survey |  |  |  |
| Point cloud |  |  |  |
| Light detecting and ranging (LIDAR) |  |  |  |
| Global navigation satellite systems (GNSS) |  |  |  |
| Utility mapping |  |  |  |

### Digital survey deliverables

Detail what survey deliverables are to be provided to support the requirements of the contract, including the level of accuracy. Refer to the EIR for survey deliverable requirements.

### CAD layer naming

Provide the strategy and process for mapping CAD layers in accordance with the EIR, as well as the metadata schema.

### CAD deliverables

Provide details of what CAD deliverables are to be provided to support the requirements of the contract.

### BIM deliverables

Please state how the model is to be coordinated across disciplines and the formats in which they will be submitted as specified by the client.

### GIS deliverables

Provide the strategy for how GIS will assist the project with spatial analysis, graphical representation of information, and overall collaboration. This includes the following:

* how the georeferenced positions will be represented and located;
* what the relationship is to the other CAD systems being used; and
* how coordinates are associated.

### Systems engineering deliverables

If digital engineering is to be used to demonstrate requirements management (systems assurance), detail here the procedure and information requirements to demonstrate traceability of the business requirements specification (BRS) and/or system requirements specification (SRS).

### Scheduling (4D) deliverables

Enter here the strategy and details for scheduling, construction sequencing and simulation in alignment with the project requirements. This includes the following:

* file formats to be submitted, and whether they are compatible with the CDE;
* the schedule management plan;
* how the scheduling will be simulated with models on the project;
* alignment strategy with each of the different project phases; and
* any other scheduling requirements for the project.

### Cost (5D) deliverables

Provide information on the strategy for cost simulation, and alignment to the metadata schema in line with the project’s cost plan. This includes the following:

* the cost breakdown structure; and
* the strategy for aligning costs with the schedule.

### Detailed design drawings

The design consultants, contractor, and its subcontractors must utilise building information modelling (BIM) to produce the detailed design documentation.

List all proposed detailed design drawing deliverables for this project in the task information delivery plan (TIDP) and collate in the master information delivery plan (MIDP), update post award.

### Issued for construction (IFC) drawings

The design consultants, contractor, and its subcontractors must utilise BIM to produce the IFC documentation, building on the requirements from detailed design.

List all proposed IFC drawing deliverables for this project in the TIDP and collate in the MIDP. Update post award.

### Commissioning data

The contractor is to specify the commissioning data (in consultation with the DE Project Champion) for each relevant discipline and ensure the corresponding values are identical to the parameter values within the model(s) against the asset for future reference by the facility manager.

Define approach for capturing commissioning data, update post award.

### Field verification

Please nominate the field-verified data for submission to the client and provide commentary for each field in Table 19.

Include any other fields considered necessary for this project.

Table 19: Field verification

|  |  |  |
| --- | --- | --- |
| Verification method | Linked to:  | Comments |
| Photographs | (e.g. Revit, Civil 3D) |  |
| Surveys |  |  |
| Laser scan of coordinated \*primary systems (Complete) |  |  |
| Laser scan of coordinated \*primary systems (Partial) |  |  |

\* Primary systems include: structural framing, primary heating, ventilation and air conditioning (HVAC) duct runs, primary fire protection main runs, primary electrical conduits (50mm+ tolerance) and ceiling grids layouts.

### Asset data (6D) deliverables

Provide here details of the asset data deliverables to support the requirements of the contract, including:

* asset data submitted at each of the configuration management gates; and
* any other project specific requirements for asset data within the contract.

### As-built documentation

The contractor must provide all as-built documentation in accordance with the general conditions of contract. All as-built documentation must be delivered in PDF native editable file types.

In Table 20, specify the native formats, published formats and BIM deliverables for each discipline with a hyperlinks and/or parameters populated in the model which are to be defined in the model content plan.

Table 20: As built documentation

|  |  |  |  |
| --- | --- | --- | --- |
| Document type | Native format | Published format | BIM deliverables |
| Operations manuals | Microsoft Word | PDF |  |
| Asset registers | Microsoft Excel | PDF |  |
| Commissioning results | Microsoft Excel | PDF |  |
| Product data sheets | PDF | PDF |  |

### Project asset handover strategy

Provide the strategy for asset handover and completion, including how all pertinent handover or asset information transition activities will be captured and recorded throughout the project, and shared at the required data exchange points.

### Practical completion

For example:

Before, and as a pre-requisite to, the date for practical completion is achieved, the as-built BIM/s with associated asset data and Uniclass 2015 classification for maintainable assets must be issued to Appointing Party in accordance with the conditions of contract. This information will be verified prior to practical completion being achieved, and must:

* be in electronic format and in the latest version of the adopted BIM environment;
* comply with the contract (including the project scope and DEEP), including all drawings, irrespective of the source of the drawing and including drawings from vendors, third parties, and the like. It is not acceptable to submit as-built documentation as part of vendor manual;
* include asset datasheets with all design, construction and asset management relevant information, aligned to Uniclass 2015 extracted and issued to Appointing Party Asset management team for integration with the CMMS;
* ensure management of digital operations and maintenance manuals connected to the relevant digital asset within BIM are the responsibility of the Lead Appointed Party; and
* build upon the construction model to a level of development (LOD) whereby the model element is graphically represented within the model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, commissioning and installation information, field verified.

Non-graphic information may also be attached to the model element.

### Software selection matrix

The contractor must utilise or interface with the owner in the following software platforms listed on the next page:

If applicable, nominate the preferred software to be used on this project in Table 21

Table 21: Design authoring software

| Area | Authoring software | Version | Native format | Comments |
| --- | --- | --- | --- | --- |
| **General** |
| Cost estimating |  |  |  |  |
| Scheduling |  |  |  |  |
| Document management |  |  |  |  |
| Design reviews |  |  |  |  |
| **Verticals** |
| Architectural  |  |  |  |  |
| Interior design |  |  |  |  |
| Landscape architecture |  |  |  |  |
| Quantity surveyor |  |  |  |  |
| Structural  |  |  |  |  |
| Mechanical  |  |  |  |  |
| Hydraulic  |  |  |  |  |
| Electrical  |  |  |  |  |
| Communications (ICT) |  |  |  |  |
| Security |  |  |  |  |
| Fire protection  |  |  |  |  |
| Baggage handling |  |  |  |  |
| **Civil and infrastructure** |
| Geotechnical |  |  |  |  |
| Tunnels |  |  |  |  |
| Bridges |  |  |  |  |
| Roads  |  |  |  |  |
| Culverts |  |  |  |  |
| Water and wastewater treatment |  |  |  |  |
| Drainage |  |  |  |  |
| Transmission |  |  |  |  |
| Coordination tool |  |  |  |  |

#### 21.1 Software version update policy

The contractor must follow the following software update policy.

For example:

Versioning of software must be managed by the Project BIM Manager throughout the project lifecycle.

Any software version update(s) must be agreed with the delivery team across all disciplines/trades prior to updating. Once agreed, the nominated representative will endorse the upgrade. Only then will the BIM be upgraded. It is recommended that the timing of any updates should align with the end/start of project milestone dates to avoid disruption to the delivery team deliverables.

### Data and exchange formats

Data and exchange formats shall be developed in consideration of the most reliable and appropriate means of communicating data and information.

Provide details of your proposed Information exchange strategy.

Table 22: Exchange formats

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Deliverable | Stakeholder | Software version | Native format | Exchange format to CDE |
| Models |  |  |  |  |
| Drawings |  |  |  |  |
| Final drawing format |  |  |  |  |
| Schedules or spread sheets |  |  |  |  |

### Level of development (LOD)

Specify the LOD for each element that will be generated at each project milestone and information exchange to meet the specified BIM uses. The LOD and level of information (LOI) determine the extent and nature of geometry and data to be included within BIM objects.

The extent of development required for elements or systems at various project stages will necessarily depend on the project procurement method to be used, as well as project-specific requirements. Elements must be modelled in accordance with LOD assignments defined in the DEEP.

The different levels of development are defined below based on the BIM forum level of development specification.

Table 23: LOD definitions

| Level of development  | Model element |
| --- | --- |
| LOD 100 | The model element may be graphically represented in the model with a symbol or other generic representation but does not satisfy the requirements for LOD 200. Information related to the model element (i.e. cost per square metre, tonnage of HVAC, etc.) can be derived from other model elements.Note: LOD 100 elements are not geometric representations. Examples are information attached to other model elements or symbols showing the existence of a component but not its shape, size, or precise location. Any information derived from LOD 100 elements must be considered approximate. |
| LOD 200 | The model element is graphically represented within the model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the model element.Note: LOD 200 elements are generic placeholders. They may be recognisable as the components they represent, or they may be volumes for space reservation. Any information derived from LOD 200 elements must be considered approximate. |
| LOD 300 | The model element is graphically represented within the model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the model element.Note: The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs. The project origin is defined and the element is located accurately with respect to the project origin. |
| LOD 350 | The model element is graphically represented within the model as a specific system, object, or assembly in terms of quantity, size, shape, location, orientation, and interfaces with other building systems. Non-graphic information may also be attached to the model element.Note: Parts necessary for coordination of the element with nearby or attached elements are modelled. These parts will include such items as supports and connections. The quantity, size, shape, location and orientation of the element as designed can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs. |
| LOD 400 | The model element is graphically represented within the model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the model element.Note: An LOD 400 element is modelled at sufficient detail and accuracy for fabrication of the represented component. The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs. |
| LOD 500 | The model element is a field verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the model elements.Note. LOD 500 relates to field verification and is not an indication of progression to a higher level of model element geometry or non-graphic information.  |

### Level of information need

The level of information about each asset class shall progressively be developed in the design and construction phases of the project for incorporation into the system.

Acknowledge the proposed approach for how information will be delivered from BIM into the CMMS (e.g. COBie) in line with the project stages.

Table 24: Level of information need

|  |  |  |
| --- | --- | --- |
| LOI  | Level of information (non-graphical) | Tagline |
| 100 | Generic identity and functionality of space and object | Sufficient for identification |
| 200 | Metadata for functionality of space and object, conditions of space, generic objectDetails of design calculation information, material specification, proposed generic object information | Sufficient for investigation |
| 300 | Specific identity and functionality of space and objectSpecific categorisationDesign specification and specified system performance information | Sufficiency for design |
| 400 | Specific Identity and Functionality of space and objectSpecific categorisationDesign specification and specified system performance informationSpecific manufacturer make and model | Sufficient for procurement |
| 500 | Specific identity and functionality of space and objectSpecific categorisationFurther data as per asset management requirements | Sufficient for management as per AM/OM requirements |