Llywodraeth Cymru
Welsh Government

BIM Protocol

Schedule 30 of the Template MIM Education Project Agreement

(WEP Strategic Partnering Delivery Model)

CONTENTS

1.0 Defined Terms

Agreement means the agreement between the Employer and the Project Team Member into which this Protocol is incorporated under Schedule 30 of the Project Agreement.

Asset Information Model means a maintained Information Model used to manage, maintain and operate the asset.

Built Asset Security Manager means the individual reporting directly to, or employed by, the Employer or asset owner and undertaking the role of security management in relation to the Project.

BIM Execution Plan means the plan prepared by the Project Team Member to explain how the information modelling aspects of the Project for which it is responsible will be carried out.

Common Data Environment or CDE Process means a combination of hardware, software and workflow that is used to collect, manage and disseminate all relevant approved files, documents and data for multidisciplinary teams in a managed process.

Employer means the Authority under the Project Agreement;

Employer's Information Manager means the person (or persons) appointed, initially by the Employer or the owner of the built asset which is the subject of the Project, to perform a role in connection with the Project which includes, amongst other things, the establishment and management of the processes, protocols and procedures set out in the Information Particulars.

Employer's Information Requirements means a document setting out the information to be delivered and the standards and processes to be adopted in the delivery of Project Information.

Federated Information Model means an Information Model consisting of connected but distinct individual Information Models.

Information Model means a collective set of documentation, non-graphical information and graphical information that represents a constructed, under-construction or to-be constructed physical asset.

Information Particulars means Appendix 2 of this Protocol, the Employer's Information Requirements, the BIM Execution Plan and any other documents identified in Appendix 2.

Level of Definition means the Level of Model Detail and Level of Information (as applicable).

Level of Information means the level of detail of non-graphical content as defined in the Information Particulars.

Level of Model Detail means the graphical appearance of Information Model objects as specified in the Information Particulars.

Material means the Specified Information and all information prepared by or on behalf of the Project Team Member under the Agreement and comprised in or extracted from:

(a) the Specified Information; and

(b) the Federated Information Models, to the extent that these comprise Specified Information or to the extent that the Project Team Member owns any additional rights in any Federated Information Model, excluding any material forming part thereof which is provided to the Project Team Member by or on behalf of the Employer.

Other Project Team Member means any person having responsibilities in relation to the production, delivery and/or use of Information Models and appointed by the Employer in relation to the Project, excluding the Project Team Member.

Other Project Team Information means any information which Other Project Team Members produce, publish and/or share as specified in the Responsibility Matrix and the Information Particulars and/or any Federated Information Models (or any part thereof) produced and/or delivered by Other Project Team Members.

Parties means the Employer and the Project Team Member.

Proprietary Material means the Project Information and any proprietary work contained therein or extracted from the same.

Permitted Purpose means a purpose related to the Project (and/or the construction, refurbishment, extension, operation, management and/or maintenance of the Project) which is consistent with:

(a) the applicable Level of Definition of the relevant Project Information;

(b) the applicable status code of the Project Information in accordance with BS1192:2007+A2:2016;

(c) the applicable functional state of the Project Information in accordance with BS1192:2007+A2:2016; and

(d) the purpose for which the relevant Project Information was prepared.

Project means the project to which the Agreement relates.

Project Information means the Material, the Specified Information, the Federated Information Models and the Other Project Team Information.

Project Team Member means Project Co appointed by the Employer pursuant to the Agreement.

Protocol means this building information modelling protocol including Appendices 1, 2, and 3.

Responsibility Matrix means the document setting out responsibility for model or information production in line with defined Project stages in Appendix 1.

Security Minded Provisions means [insert appropriate cross references if applicable];

Security Requirements means the document attached at Appendix 3 of this Protocol setting out the security requirements for carrying out the Project in a security-minded way, including any policies, protocols, processes and procedures referred to therein.

Sensitive Information means information which is sensitive information as defined in PAS 1192-5:2015, section 3.1.28, and which is identified in:

(a) the Security Requirements; and/or

(b) any instruction issued under paragraph 6. 1. 7 of this Protocol.

Specified Information means the information, including, without limitation any Information Models, which the Project Team Member is to produce, share and/or publish as specified in the Responsibility Matrix and the Information Particulars.

2.0 Introduction

2.1 The BIM Protocol

2.1.1 This Protocol is based on the CIC BIM Protocol 2nd edition.

2.1.2 The CIC BIM Protocol was first commissioned by the Construction Industry Council (CIC) in 2013 as part of its response to the UK Government BIM Strategy. The CIC BIM Protocol was drafted for use with all common construction contracts (i.e. contracts for design and construction in respect of an asset) and supports BIM working at Level 2.

2.2 Purpose

2.2.1 The Protocol;

1) details the contractual obligations on the Employer and the Project Team Member in connection with Specified Information and Project Information including compliance with security standards and processes;
2) sets out the rights the Project Team Member and the Employer have to use that Specified Information and Project Information;
3) identifies the information which members of the Project Team are required to produce as set out in the
    - Responsibility Matrix identified in Appendix 1 and in Appendix 2 and
    - Employer's Information Requirements and BIM Execution Plan referred to in Appendix 2.

2.3 Principles

2.3.1 The following principles have informed the drafting of the Protocol:

1) Minimum changes necessary have been made to the pre-existing contractual arrangements on construction projects
2) There is an obligation to provide and share specified information using a Common Data Environment process and to comply with the Employer's Information Requirements and BIM Execution Plan
3) The Project Team Members can be required to comply with the Employer's security processes and procedures in providing their work/ services
4) The Protocol should be incorporated into the contracts of all the project team, creating a consistent framework in respect of BIM
5) The Protocol is flexible and suitable for use on all Level 2 BIM projects (whatever form of procurement is adopted, whether traditional or more collaborative, such as alliancing and partnering).

3.0 Appendices

The key items to be included in Appendices 1-3 are as follows:

Appendix 1 - Responsibility Matrix

Identifies the:

- Specified Information to be procured, shared and published by the Project Team Member
- Level of Definition (Level of Information and/ or Level of Model Detail)

Appendix 2 - Information Particulars

Information Particulars comprise:

- Information Requirements (IRs)
- BIM Execution Plan (BEP)

Appendix 3 - Security Minded Provisions – if applicable

- Sensitive Information
- Employer's Standards
- Project Specific Standards

4.0 Meetings

The Project Team Member shall attend such meetings with the Employer's Information Manager and/ or the Other Project Team Members in connection with the co-ordination of Project Information as required in the Agreement and in the Information Particulars.

5.0 Obligations of the Employer

5.1 The Employer shall;

5.1.1 comply with its obligations under the Project standards, methods and procedures referred to in the Information Particulars.;

5.1.2 to the extent that such obligations are within the scope of the Project Team Member's obligations under the Agreement, arrange for;

1) the Information Particulars and the Responsibility Matrix to be reviewed and updated (if necessary) at each defined Project stage until the end of the Project. The Project Team Member's rights (if any) following any such update after the date of the Agreement shall be assessed in accordance with the Agreement and this Protocol;
2) the appointment of the Employer's Information Manager to be made, changed or renewed as necessary such that there is at all times until the end of the Project an Employer's Information Manager;
3) the Project Team Member to be able to make use of the CDE Process to the extent necessary to enable the Project Team Member to comply with the Agreement;

4) the Project Team Member to access Project Information shared through the CDE Process for the purpose of retaining a record copy of the Project Information at the end of the Project or following any earlier termination of the Agreement;

5) the Security Requirements to be reviewed and updated (if necessary) at each defined Project stage until the end of the Project; and

6) the appointment of the Built Asset Security Manager (if applicable) to be made, changed or renewed as necessary such that there is at all times until the end of the Project a Built Asset Security Manager.

6.0 Obligations of the Project Team Member

6.1 The Project Team Member shall, exercising the relevant level of skill and care applicable to its equivalent obligations in the Agreement;

6.1.1 produce the Specified Information (excluding any material forming part of the same which is provided to the Project Team Member by or on behalf of the Employer [Welsh Government/ Authority]);

6.1.2 use the CDE Process to share and/ or publish the Specified Information (subject to any events or circumstances which entitle the Project Team Member to an extension of time or additional time under the Agreement):

1) at the Level of Definition specified in the Responsibility Matrix;

2) during the Project stage specified in the Responsibility Matrix;

3) at such times as stated in;

a. the Responsibility Matrix;

b. the Information Particulars; and

c. any other part of the Agreement.

6.1.3 comply with the Information Particulars when producing, sharing and/ or publishing the Specified Information;

6.1.4 use the Other Project Team Information in accordance with the Information Particulars;

6.1.5 provide such information and assistance as specified in the Information Particulars in connection with any Asset Information Models at such times as required in the Information Particulars;

6.1.6 co-operate with the Built Asset Security Manager (if applicable);

6.1.7 comply with those parts of the Security Requirements which relate to Sensitive Information;

6.1.8 comply with any reasonable instructions the Employer may issue to the Project Team Member in respect of any Sensitive Information provided the Project Team Member's rights (if any) following any instruction issued in accordance with this paragraph after the date of the Agreement shall be assessed in accordance with the Agreement and this Protocol;

6.1.9 comply with the Security Requirements and the policies, processes and procedures identified therein and not cause or contribute to any breach by the Employer of the same to the extent that such policies, processes and procedures relate to the Project Team Member's obligations under the Agreement and have been provided to the Project Team Member.

6.2 If the Built Asset Security Manager has reasonable grounds to consider that the Project Team Member is likely to breach paragraphs 6.1.7 and/or 6.1.8 and/or 6.1.9 of this Protocol, the Employer may give notice to the Project Team Member requiring that steps are taken to prevent the breach within a reasonable period as specified in the notice.

6.3 If the Project Team Member breaches paragraphs 6.1.7 and/or 6.1.8 and/or 6.1.9 of this Protocol, the Employer may at its discretion give notice to the Project Team Member requiring that steps are taken to remedy the breach and/or mitigate the consequences of the same within a reasonable period as specified in the notice

6.2 Sub-contracts

6.2.1 The Project Team Member shall arrange for this Protocol (or such other provisions as may be appropriate) to be incorporated into all sub-contracts that it enters into in relation to the Project to the extent required to enable the Project Team Member to comply with this Protocol.

Appendices

Appendix 1 – Responsibility Matrix

Appendix 2 – Information Requirements (EIRs)

[Appendix 3 – Security Minded Provisions]

Responsibility Matrix - Appendix 1 to the BIM Protocol			Information Exchange / Data Drops																						
			0 Strategy			1 Brief			2 Concept			3 Developed Design			4 Technical Design			5 Construction			6 Handover and closeout			7 Operation		
Specified Models	Elemental model break-down according to NRM		Model originator	LOI	LOD	Model originator	LOI	LOD	Model originator	LOI	LOD	Model originator	LOI	LOD	Model originator	LOI	LOD	Model originator	LOI	LOD	Model originator	LOI	LOD	Model originator	LOI	LOD
Architectural design Structural design Civil engineering design Mechanical, electrical and plumbing services Fixtures, fittings and equipment design Specialist design Landscaping model etc.	1.1	Substructure																							
	2.1	Frame																							
	2.2	Upper floors																							
	2.3	Roof																							
	2.4	Stairs and ramps																							
	2.5	External walls																							
	2.6	Windows and external doors																							
	2.7	Internal walls and partitions																							
	2.8	Internal doors																							
	3.1	Wall finishes																							
	3.2	Floor finishes																							
	3.3	Ceiling finishes																							
	4.1	Fittings, furnishings and equipment																							
	5.1	Sanitary installations																							
	5.2	Services equipment																							
	5.3	Disposal installations																							
	5.4	Water installations																							
	5.5	Heat source																							
	5.6	Space heating and air conditioning																							
	5.7	Ventilation																							
	5.8	Electrical installations																							
	5.9	Fuel installations																							
	5.10	Lift and conveyor installations																							

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	5.11	Fire and lightning protection																							
	5.12	Communication, security and control systems																							
	5.13	Specialist installations																							
	5.14	Builder's work in connection with services																							
	6.1	Prefabricated buildings and building units																							
	7.1	Minor demolition works and alteration works																							
	7.2	Repairs to existing services																							
	7.3	Damp-proof courses/fungus and beetle irradiation																							
	7.4	Façade retention																							
	7.5	Cleaning existing services																							
	7.6	Renovation works																							
	8.1	Site preparation works																							
	8.2	Roads, paths, pavings and surfacings																							
	8.3	Soft landscaping, planting and irrigation systems																							
	8.4	Fencing, railings and walls																							
	8.5	External fixtures																							
	8.6	External drainage																							
	8.7	External services																							
	8.8	Minor building works and ancillary buildings																							

Model uses (examples)		Logic
Assist design/ construction development	Generate design and construction outputs including 2D detailed drawings, room data sheets and specifications	Ideally models should be the originating source for all design and specification information, regardless of how this information is presented. The avoids the potential for conflicts within design.
	Form the basis of design review	Models provide improved visualisation when compared to drawings so it is easier to understand and engage with proposals.
	Enable design option testing	Models can offer an efficient way of trialling different design options/solutions. A change in a model is reflected in all model outputs so this can assist visual understanding. In addition it can be quicker to understand cost, programme and performance impacts if models are used as the primary source of these types of analyses.
	Support design and construction co-ordination, risk evaluation and risk management	The routine federation of models and the use of software to identify design clashes, helps design and construction team to take action with issues which may otherwise be difficult to spot until construction is in progress.
Simulate site/ asset related activities	Assist construction sequencing, management and/or handover phasing through simulation	Models can be used to simulate the construction processes presenting the ability to optimise/test activities and phasing.
	Assist temporary works management through simulation	It is useful to understand the interface of temporary and permanent works especially where space is constrained and/or works are complex.
	Assist site management through simulation	Models can assist in site management which is helpful where site accommodation will need to be relocated during construction and/or where storage space is confined.
	Assist site configuration	Where a project comprises master planning or multiple assets, models can help identify optimal positioning in terms of access, security, day lighting, servicing routes and similar.
Communicate proposals and requirements and issues	Support site induction	The virtual reality offered by models means that they are a great communication tool, especially where people are not familiar with the asset, the site or the process of construction. They are also useful for informing construction health and safety risks as well as holding a record and visualisation of maintenance and operation related health and safety risks.
	Support user/occupier induction to the asset	
	Understand the asset(s) and site in context	
	Demonstrate navigation within, around and external to the asset	
	Communicate proposals to and/or progress to stakeholders	
	Understand health and safety compliance and risks	
Assist related modelling, analysis and evaluation	Support the cost estimating/cost planning process	As well as assisting understanding of proposals, the data held with model components can be accessed to inform related project performance modelling such as cost and energy. Using this data effectively (instead of reproducing it) offers efficiencies and helps manage risk. It also speeds up the process of reporting about the impacts of design options.
	Help simulate/ test cash flow	
	Support valuation of construction works on site	
	Support pricing of the construction works	
	Inform/enable energy assessments	
	Support sustainability evaluation	
Facilitate material/ component production	Enable the fabrication of construction materials or components	If models are constructed accurately and are available in suitable file formats then they can be used directly for the purposes of fabrication and manufacture
Provide asset records supporting operational activities and maintenance	Provide a record of existing conditions	Models and the data within them offer an accessible record of the asset. They can be created for that purpose alone but they can also be used to support operation and maintenance of the asset and to enable management of end-of-life activities
	Provide and accurate record of the constructed asset	
	Assist facilities management activities and processes	
	Provide asset data to support maintenance, operation and end-of-life activities	
	Manage space utilisation	
Enable resolution of issues	Support dispute resolution	Just as models can be constructed, they can be deconstructed which is useful for analysis to inform dispute resolution

The **Responsibility Matrix** should be read in conjunction with the Information Delivery Plan and the Asset Information Requirements. Collectively, they confirm all the Information Delivery Requirements for the design and construction phase of the project. The **Responsibility Matrix** is concerned with the scope and data maturity of the design and construction models and the allocation of responsibility for the delivery of the models. The **Responsibility Matrix** creates a record for the Client and the design and construction team about what models are required, when and how accurate they should be.

The content and structure of the **Responsibility Matrix** is particularly important if the CIC BIM Protocol is to be used to contractually capture design and construction team obligations. It contains specific terminology and it is sensible to reflect this to avoid potentially ambiguous content.

The **Responsibility Matrix** is initiated by the Client but it must be agreed with recipient and impacted parties. It should be carefully co-ordinated with other appointment/ contract scope or contents. The **Responsibility Matrix** could in theory be adapted by design and construction team members to use with the appointment of sub-consultants and sub-contractors.

	The **Responsibility Matrix** should ideally identify the following:
1	An identity for each required model (the CIC BIM Protocol refers to these as **Specified Models**). They could for example, be described by discipline (such as architectural model) or by scope (fixtures, fittings and equipment model), or a combination.
2	The scope of model content. Depending on the project's security/sensitivity status, this scope could be identified as a minimum requirement or a maximum requirement (if there are specific security/sensitivity issues it may be sensible not to model some features, or to model them but only to a certain degree of detail). It is sensible to identify the scope in accordance with a recognised breakdown structure so ambiguity around requirements is reduced. Ideally you would not identify model scope down to each individual component.
3	The project's information exchange programme
4	Level of model detail (i.e. geometry) and level of model information to be generated at each information exchange. Again, this could be a minimum requirement or a maximum requirement.
5	Allocation of responsibility for generation of the model content. You need to take care to reflect the contractual relationship between the client and design and construction team member. To explain, if the client appoints the contractor direct to complete all design and construction there is no need to allocate responsibility for delivery of the models/model content.

The **Responsibility Matrix** can also capture the anticipated **Model Uses**. This is important for informing expectations and providing context to requirements and helps the design and construction team establish what is feasible and what might be aspirational. Model uses may be separately covered in the content of the Employer's Information Requirements (EIRs). This works providing that the design and construction team are obligated in the same way to meet both sets of requirements (i.e. both should be a contractual obligation or neither should be a contractual obligation).

Try to keep the specified models, model scope and model uses closely connected so that context is easily established.
Remember that elements of design will progress at a faster pace than others. Model content is unlikely therefore to offer a consistent level of information and/ or level of model detail
Use an established and recognised means of structuring model scope. This will offer a reference point if there are any queries about the coverage of a term used.
Think about the model uses when setting out model scope. If, for example, a model use is to assist temporary works management through simulation it is important that temporary works are included in the modelling scope.

Appendix 1 to the BIM Protocol

Reference 1

LEVEL OF DEFINITION (LOD)

The following document explains the **Level of Definition (LOD)** concept, as outlined in PAS1192-2, and is to be used in conjunction with the Responsibility Matrix (Appendix 1 to the BIM Protocol).

Contents

1.0 Introduction

1.1 Definition

The term **Level of Definition (LOD)** is used collectively to describe the Level of geometric detail and the Level of information.

- **LEVEL OF DETAIL** represents the term used to define the geometric accuracy and intricacy of model objects and components and associated model outputs

- **LEVEL OF INFORMATION** represents the term used to convey the accuracy of information associated with the model objects and components and other information sources

1.2 Reference in EIRs

The Employer's Information Requirements (EIRs) should:

1) Confirm the LOD Standard adopted (e.g. PAS1192-2)
2) Provide the LOD Standard referencing system (LOD1, 2, 3, 4, 5, 6, 7)
3) Provide a definition of LOD for each reference (see pages 2-8)

1.3 LOD standards available

There are several industry-recognised standards available to use for the identification of the Level of Definition, e.g.:

- PAS1192-2
- BIM Forum
- NBS BIM Toolkit

This particular document summarises the **PAS1192-2** standard definitions.
The table below depicts the alignment of the LOD with RIBA stages, as per PAS1192-2

Strategic definition	Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and closeout	In Use
RIBA 0	**RIBA 1**	**RIBA 2**	**RIBA 3**	**RIBA 4**	**RIBA 5**	**RIBA 6**	**RIBA 7**

LOD as defined in PAS1192-2

n/a	Brief	Concept	Definition	Design	Build and Commission	Handover and Closeout	Operation
n/a	**LOD 1**	**LOD 2**	**LOD 3**	**LOD 4**	**LOD 5**	**LOD 6**	**LOD 7**

1

LOD 1 Brief / RIBA 1 Brief

Model information communicating:

Brief
Performance requirements
Performance benchmarks
Site constraints

Outputs

Project brief
Procurement strategy

Parametric information

Project needs updated:
- definition of functions
- operation
- quality and time

Benchmarking updated:
- capital cost
- maintenance cost
- time
- health & safety
- risk

Procurement contract

Performance requirements

Priorities and aspirations for:
- function
- mix of uses
- scale
- location
- quality
- performance in use
- cost (Capex & Opex)
- value
- time
- health & safety
- embodied and in-use carbon
- energy and resource needs

Site constraints:
- geo-spatial
- available site information

Project Costs

Initial Project Budget
Order of cost estimate

Project logistics and off-site activities

Client requirements
EG to avoid impact on other operations

Project facilities (welfare, IT, infrastructure, security etc.), on-site and off-site examples

Collaboration tools
Data standards

Notes and associated project documents, based on model information

Management systems for information and decision making
Approval Policies

LOD 2 Concept / RIBA 2 Concept Design

Model information communicating:

Initial response to the Brief
Aesthetic intent
Outline performance requirements
Model can be used for an early:
- Design development
- Analysis
- Co-ordination
- Sequencing

Further design development

Model content is not fixed and may be subject to further design development

Outputs

Refined project brief
Concept approval

Parametric information

Sufficient data to estimate rates per m^2, ft^2
Wireframe models or surfaces models or solids

Concepts
Site context
Placeholder/ volumes/ package volumes
System routings

Site selection

Datum points
Levels
Site selection

Integrated concept for the project
Incorporation of standard systems

Scope
Scale
Form

Primary design criteria:
- architectural form
- spatial arrangements
- structural concept
- civil engineering concept
- spatial arrangements
- services concept
- special arrangements

preliminary assessment of:
- energy use
- embodied carbon and in-use carbon

Project Costs

Feasibility Cost Plan
Feasibility Whole-Life Cost Plan

Project logistics and off-site activities

Assumed access and egress points
Potential delivery
Lay down zones

Project facilities (welfare, IT, infrastructure, security etc.), on-site and off-site examples

Assumed access and welfare zones
Design team collocation

Notes and associated project documents, based on model information

Technical strategy studies
Commissioning philosophy
NRM1 capital cost plan
NRM3 maintenance cost plan

Critical Interfaces and logic

Environmental control philosophy and spatial allocations for ventilation
Availability of the site and outline construction methodology

Assumptions
Services capacity for the site
Permitted working hours on site

Construction requirements

Crane use zones
Traffic diversions, etc.

LOD 3 Definition / RIBA 3 Developed Design

Model information communicating:

A dimensionally correct and co-ordinated model which communicates the:

- response to the brief
- aesthetic intent
- some performance information

Model can be used for:

- Analysis
- Design development
- Early contractor engagement
- Co-ordination
- Sequencing
- Estimating purposes
- Agreement of a first stage target price

Outputs

Approval of co-ordinated developed design

Parametric information

Co-ordinated developed design for the project setting:

- Generic systems
- Components or assemblies represented in detailed form
- Function
- Cost

Defining all components':

- overall size
- typical detail
- performance specification
- outline specification
- primary geometry

Integration of:

- standard designs
- systems
- builder's work strategy for significant interfaces
- energy use
- embodied and in-use carbon

Maintenance plan

Detailed design and construction programme

Project Costs

Commitment Cost Plan
Contractor's first stage bid submission
Detailed whole-life cost plan

Project logistics and off-site activities

Feasible logistics sequence for the construction sequence
Confirmed Modular Strategy (volumetric, panellised, hybrid or other)

Project facilities (welfare, IT, infrastructure, security etc.), on-site and off-site examples

Confirmed access zones
Confirmed Design team collocation

Notes and associated project documents, based on model information

Provides the basis for Integrated Production Information to be produced on a package-basis with limited risk of changes to primary coordination

- Room Information sheets
- Detailed construction methodology
- NRM1 capital cost plan
- NRM3 maintenance cost plan
- Health and safety risk
- Management Risk
- Management plan

Critical Interfaces and logic

Assumed procurement package
Performance and spatial boundaries
Relationships between procurement packages
Assumed design

Codes regarding dimensional tolerances of related systems
Foundation tolerances for the use of off-site modular systems
Assessment of predicted movements:
(thermal, loading, creep, shrinkage, etc.)

Construction requirements

Confirmed crane zones (or other lifting system zones)
Traffic diversion details
Form work details

LOD 4 Design / RIBA 4 Technical Design

Model information communicating:

A dimensionally correct and co-ordinated model that can be used to verify compliance with regulatory requirements

Start point for the incorporation of specialist contractor design models

Model can include information that can be used for:
- Fabrication
- Co-ordination
- Sequencing
- Estimating
- Agreement of a target price/ guaranteed max. price

Outputs Integrated production information

Parametric information

Production information for the project

Specific systems, objects and assemblies accurate in terms of
- Specification
- Size
- Form
- Function
- Location
- Critical interfaces flagged
- Fixing methodology
- Confirmed clash free design
- Programme sequence

Updated:
- energy use
- embodied and in-use carbon
- detailed design
- construction programme

Project Costs

Contract Sum/ Target Price/ Agreed Maximum Price
Pre-construction whole life cost plan

Project logistics and off-site activities

Finalized logistics sequences
Details of actual off-site system to be used

Project facilities (welfare, IT, infrastructure, security etc.), on-site and off-site examples

Finalized, costed plan
Critical lead times confirmed
Off-site manufacturing capacity reserved

Notes and associated project documents, based on model information

Updated:
- Detailed construction methodology
- NRM2 procurement pricing schedule
- NRM3 maintenance cost plan
- Health and safety risk
- Management plan
- Risk management plan

Critical Interfaces and logic

Allocated procurement package relationships, performance and special boundaries
Actual dimensional interface requirements
Records of any derogations approved
Actual on-site to offsite interface
Specifications

Construction requirements

Actual crane (or other lifting system) zones and movement sequences
Construction methodology
Sequence and movements critical to how the production design is developed

LOD 5 Build and Commission / RIBA 5 Construction

Model information communicating:

An accurate model of the asset before and during construction:

- Co-ordinated specialist subcontract design models
- Associated model attributes

The model can be used for:

- sequencing of installation
- capture of as-installed information

Outputs

- Integrated production information
- Complete fabrication and manufacturing details
- System and element verification
- Operation and Maintenance information
- As-installed model with all associated data references

Parametric information

Production record for the project

Specific systems objects and assemblies accurate

- Specification
- Size
- Form
- Function
- Location
- Detailing fabrication
- Assembly
- Installation information
- Detailed routing of systems
- Fixings and interfaces details to be used

Updated:

- Energy use
- Embodied and in-use carbon
- Detailed design and construction programme

Project Costs

Contract Sum/ Target Price/ Agreed Maximum Price

Pre-construction whole life cost plan

Project logistics and off-site activities

Object status progress recording to initiate demand pull signals for deliveries

Project facilities (welfare, IT, infrastructure, security etc.), on-site and off-site examples

Recording status of security critical areas (EG unchecked, sweep in progress, screened and secured)

Notes and associated project documents, based on model information

- Detailed construction methodology
- Updated:
  - Health and Safety risk management plan
  - NRM3 maintenance plan

Critical Interfaces and logic

- Progressive capture of actual dimensional data for critical interface dimensions
- Progressive capture of information for calculating material requirements for follow on packages
- Capture of object status for progress reporting and collaborative planning

Construction requirements

- Status of construction requirements
- Safety briefing information
- Construction methodology, sequence and movements, critical to installation.
- Formwork details including install and removal sequence.
- Actual traffic diversion details

LOD 6 Handover and closeout / RIBA 6 Handover and closeout

Model information communicating

An accurate record of the asset as constructed at handover, including all information required for operation and maintenance

Outputs

- As-constructed systems
- Operation and Maintenance information
- Agreed Final Account
- Building Log Book
- Information gathered as key elements are completed to feed into Installation information for the later packages

Parametric information

Updated:

- Geometry and installed product information as-constructed
- Accuracy & resolution of information.
- Commissioned performance for:
  - Opex
  - Energy
  - Carbon
- Detailed Maintenance Methodology
- Snagging actions status

Project Costs

Final Account

Project logistics and off-site activities

Remote monitoring system status

Project facilities (welfare, IT, infrastructure, security etc.), on-site and off-site examples

- Security system operational
- Potentially using model information for lines of sight from cameras, PAVA zone controls, etc.

Notes and associated project documents, based on model information

- Approximate final account
- Maintenance procurement
- Pricing Remedial works
- Handover and Maintenance Programme

Critical Interfaces and logic

- As-constructed 3D scan
- Element performance test results
- System commissioning status

Construction requirements

- Confirmed status that the construction aids have been removed

LOD 7 Operation / RIBA 7 In-use

Model information communicating

An updated record of the asset at a fixed point in time incorporating any major changes made since handover, including performance and condition data and all information required for Operation and Maintenance

Outputs

Agreed final account
In use performance compared against Project Brief
Project process feedback:

- Risk
- Procurement
- Information management
- Soft Landings

Parametric information

Revisions for modifications to the facility during its life

Project Costs

Actual in-use costs
Asset replacement
Sinking fund

Project logistics and off-site activities

Remote monitoring system status

Project facilities (welfare, IT, infrastructure, security etc.), on-site and off-site examples

- Security system operational
- Facilities management systems running on information generated by the Model
- Geometry for letting activities accessed from As-built Model

Notes and associated project documents, based on model information

- n/a (project closed)

Critical Interfaces and logic

- As-modified Survey data

Construction requirements

Design of any construction requirements
e.g. temporary safety supports or restraint system if structural defects have been discovered

Llywodraeth Cymru
Welsh Government

Participant's/ Authority's Information Requirements (PAIRs)

Appendix 2 to the BIM Protocol

Project's Name: **……**

Date: **……**

Background Note

This document must be read in conjunction with the Project BIM Agreement which outlines the BIM strategy for the delivery of all new Projects from the point at which a New Project Request is raised to Handback of the project back to the Authority.

The Project BIM Agreement describes the process to be followed to achieve the key objectives and aspirations of Welsh Government in achieving compliance with the UK BIM Framework. It further sets out the requirements and responsibilities of each of the parties, namely the [Participant/ Authority] and [WEPCo/ ProjectCo].

Incorporation of the BIM Protocol into contract documents

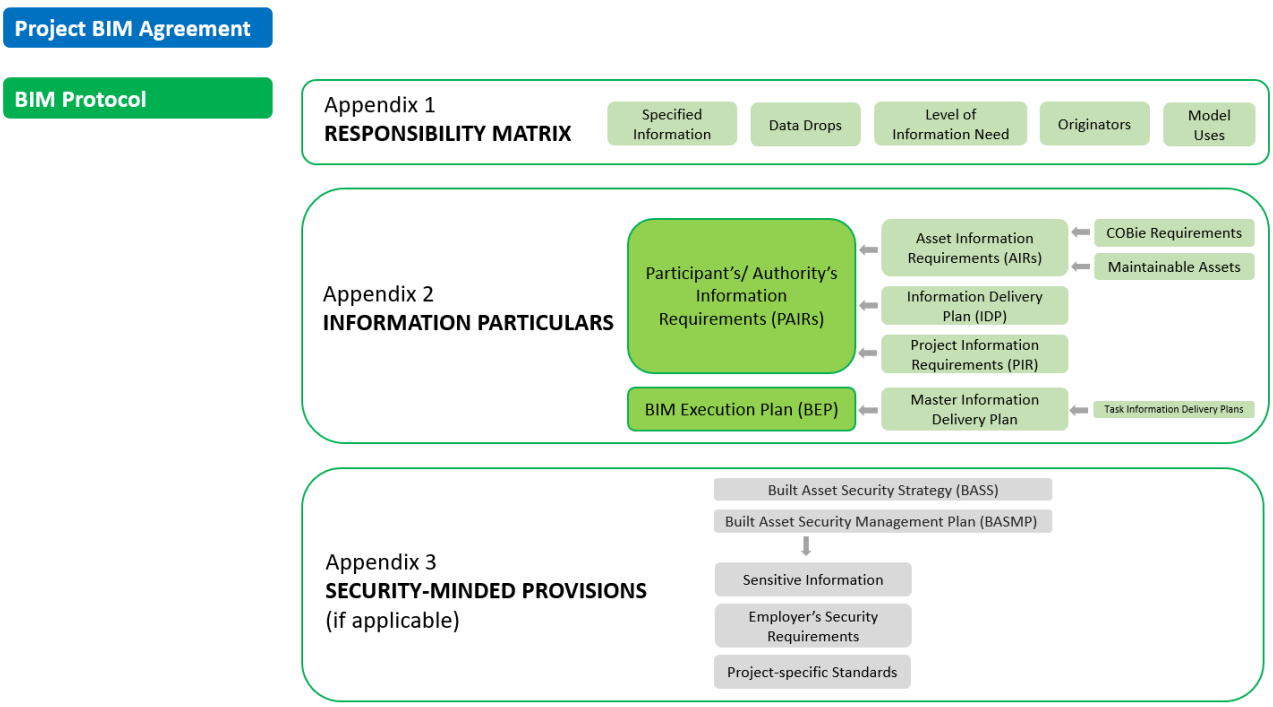
The Participant's/ Authority's Information Requirements shall be included as Appendix 2 to the BIM Protocol.

The BIM Protocol is to be adopted on all Projects and all parties shall comply with the BIM Protocol.

The BIM Protocol sets out the requirements and responsibilities between the [Participant/ Authority], [WEPCo/ ProjectCo], the design team, the Building Contractor and its sub-contractors and the Service Provider and its subcontractors.

The BIM Protocol is a contractually binding document and shall be incorporated into all project appointments and cascaded down to sub-contracts.

Diagram 1 - BIM documents structure:



Contents

1.0 Definitions

Authority – means the Local Authority or Further Education Institution which has entered into a Project Agreement with ProjectCo. (previously known as the 'Participant' in the Strategic Partnering Agreement under the Strategic Partnering until the PA is executed).

Authority Information Manager – a joint appointment between the Authority and ProjectCo to undertake the duties detailed in the BIM Protocol. It is critical that the Information Manager acting for the Authority is an independent role (whether direct or joint appointment).

Asset Information Requirements (AIRs) – Information relating to an operational phase of an Asset.

BIM Execution Plan (BEP) - Prepared by WEPCo/ ProjectCo. in response to the Participant's/ Authority's Information Requirements (PAIRs).

BIM Protocol – Sets out contractual requirements [between the Participant/ Authority and WEPCo/ ProjectCo, their design team, Building Contractor and sub-contractors and Service Provider and sub-contrators] relating to the production of design and construction information and documents and the rights of parties to use the information and documents.

Built Asset Security Management Plan (BASMP) - Developed for the lifecycle of the built asset. It is derived from the Built Asset Security Strategy and considers the people, process, physical and technological aspects of the built asset, the related asset information and building related systems.

Built Asset Security Manager (BASM) - The individual appointed by the Participant undertaking the role of security management.

Built Asset Security Strategy (BASS) - The formal document recording an organisation's security strategy, risk assessment and mitigation plan. It also records the security requirements determined by a security triage process plus those who need to be informed about residual risks and how the strategy itself should be reviewed and updated.

COBie - Construction Operations Buildings Information Exchange. A specific, defined structure for the collection of asset data relating to its construction, installation, operation and maintenance requirements. It offers a means of getting data generated through the construction process into an asset management system and process.

Common Data Environment (CDE) – A secure, structured and managed platform used for storing, managing and sharing information

Data Drop (Milestone) - A formal information exchange enabling project to progress to the next stage or through a gateway. The following 'standardised' data drops will be adopted for all New Projects:

DATA DROP 1 – 'STAGE 1' SUBMISSION

DATA DROP 2 – 'PLANNING APPLICATION' SUBMISSION

DATA DROP 3 – 'STAGE 2' SUBMISSION

DATA DROP 4 – 'APPROVED FOR CONSTRUCTION' SUBMISSION

DATA DROP 5 – 'AS-BUILT' SUBMISSION

DATA DROP 6 – 'HAND-BACK' SUBMISSION

Additional Data Drops may be required on a Project-specific basis and could include:

- Medium and High Value Changes
- Low Value Changes if they directly impact on the facility operation, security and/ or safety (e.g. affect the circulation, fire compartmentation, escape routes, escape strategies, occupancy, access points)
- Low Value Changes (other than those outlined above) to be updated on an annual basis or part of a 'catch up' with a Medium Value Change or High Value Change Data Drop.

Handback – the handback of the Facilities to the Authority on expiry of the Project Agreement.

Information Delivery Plan (IDP) – A structured plan drafted by the Participant setting out all the information to be delivered during the briefing, design and construction phases of a project. It also lists the required format of the information, the Data Drops and the Level of Definition.

Information Standards – Industry standards required to be adopted to enable the delivery projects compliant with the UK BIM Framework.

Master Information Delivery Plan (MIDP) - A schedule of all model, data and information deliverables for a project prepared by WEPCo. in response to the Information Delivery Plan. It identifies the party responsible

for development and delivery of the related files, the level of detail and level of information required and when the deliverables will be generated. It is a collection the Task Information Delivery Plans.

Milestone (Data Drop) - A formal information exchange enabling project to progress to the next stage or through a gateway.

New Project – has the meaning given in the Strategic Project Agreement.

New Project Request – has the meaning given in the Strategic Project Agreement.

Participant – has the meaning given in the Strategic Project Agreement and means any party to the Strategic Project Agreement (other than WEPCo) such as a Local Authority or Further Education Institution. The Participant becomes the 'Authority' once the Project Agreement for a New Project has been executed.

Participant's Information Manager – the Information Manager appointed by the Participant (or jointly by WEPCo and the Participant) to represent the Participant and undertake the duties detailed in the BIM Protocol. It is critical that the Information Manager acting for the Participant is an independent role (whether direct or joint appointment);

Participant's/Authority's Information Requirements (PAIRs) – Appendix 2 to the BIM Protocol. A document drafted by the Participant/Authority setting out the standards and processes to be adopted by the design and construction team in relation to models, data and information.

Plain Language Questions (PLQs) - Questions contained within the Participant's/ Authority's Information Requirements (PAIRs), introduced with each information exchange (Data Drop) so that the design and construction team understand the detailed requirements of the information exchange and can determine how best to respond. PLQs offer a means of evaluation of the information exchange.

Responsibility Matrix – Appendix 1 to the BIM Protocol. A table defining the specified models (the models to be generated during a design and construction project), the scope of the specified models, the responsibility for the development of the specified models, the level of detail and level of information the specified models should represent at each formal information exchange (Data Drop). It also includes the purposes for which the models will be used. The Responsibility Matrix is set-out by the Participant and forms the suite of Information Requirements (also including the Asset Information Requirements, the Participant's/Authority's Information Requirements and the Information Delivery Plan).

Routine Information Exchange Schedule – an informal information exchange which takes place in the CDE (but does not form a Data Drop) where model originators (such as the architect) identified in the Responsibility Matrix upload their work-in-progress models into the CDE weekly during the design development periods.

Soft Landings – Participant's/ Authority's may wish to implement Soft Landings for a graduated handover of an asset over a defined period of time; with the ProjectCo providing aftercare.

Stage 1 – means the 'Feasibility' stage which commences once the Participant has raised a New Project Request which is accepted by WEPCo.

Stage 2 – means the 'Supply Chain Assembly, Design and Planning' stage which commences once the Participant has approved the Stage 1 Submission.

Task Information Delivery Plan (TIDP) - A plan generated by each Task Team setting out the models, data and information they will produce, responsibility for production, the level of detail and level of information it will represent and the point(s) at which it will be provided.

Task Team - Team responsible for the delivery of a specified task

2.0 Core Standards, Specifications and Codes of Practice

2.1 ISO 19650-1 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using BIM - Part 1: Concepts and Principles;

2.2 ISO 19650-2 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) — Information management using BIM - Part 2: Delivery phase of the Assets;

2.3 The UK National Annex to ISO 19650-2 for naming conventions and CDE workflows

2.4 PAS 1192-3 Specification for information management for the operational phase of Assets using BIM;

2.5 BS 1192-4 Collaborative production of information. Fulfilling Employer's Information Exchange requirements using COBie;

2.6 PAS 1192-5 Specification for Security-minded BIM, digital built environments and smart Asset management;

2.7 PAS 1192-6 Specification for collaborative sharing and use of structured Health and Safety information using BIM;

2.8 BS 8536-1 Briefing for design and construction-Part 1: Code of practice for facilities management;

2.9 BS 8536-2 Briefing for design and construction-Part 2: Code of practice for Asset management;

2.10 BS 8541-1 Library objects for architecture, engineering and construction Part 1: Identification and classification. Code of practice;

2.11 BS 8541-2 Library objects for architecture, engineering and construction Part 2: Recommended 2D symbols of building elements for use in BIM CDM 2015 Construction Design Management Regulations 2015;

2.12 ISO 16739 Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries;

2.13 CIC BIM Protocol, 2nd edition

2.14 CIC Outline scope of services for the role of Information Management;

2.15 RICS Code of measuring practice 6th edition; and

2.16 NBS Uniclass 2015 classification

3.0 Introduction

3.1 Project description

[insert a brief description of the Project]

3.2 Project Identification

Facility:	Name, Description
Site:	Name, Address and postcode
Project:	Name

3.3 Project Geo-location

3.3.1 Geo-spatial referencing system
The adopted geo-spatial referencing system shall be the Ordnance Survey Grid

3.3.2 Setting-out Point completed in the BIM Execution Plan
A common setting-out point for the site shall be adopted by the whole Project Team and there shall be no deviation.

3.3.2.1 Project Base Point
Common point of reference (identified by gridlines intersection, identify explicitly)

Northing and Easting of this point	[N; E]
Project North Direction	[identify in degrees from 'true North']

3.3.2.2 Project Datum [m]
Aligned with a Finished Ground Floor Level (e.g. +120,875m)

Project Datum	[…,… m]

4.0 Objectives

The objective of this document is to support the implementation of Building Information Modelling (BIM) on the [insert the name] Project in line with the UK BIM Framework.

This document outlines best practices, procedures and data-exchange protocols to facilitate collaborative processes and to produce the information required by the [Participant/ Authority].

4.1 Aspirations

The [Participant's/ Authority's] aspirations are to: [amend as required]

4.1.1 Have an accurate, up-to-date, intelligent asset information database
4.1.2 Reduce building operation costs

4.1.3 Facilitate a smooth transition from the design and construction through to commissioning, handover and into operation

4.1.4 Increase efficiency in the operation of an Asset

I. Integrate data generated by the Information Models into the FM systems for the duration of the Assets' operation

II. Assist in the measurement and monitoring of energy use in conjunction with other data analysis platforms

4.1.5 Improve space management

4.1.6 Effectively manage retrofits, upgrades and improvements

4.1.7 Support projects' integrity and transparency

5.0 Information Exchange, Data Drops

5.1 The following Data Drops have been identified as the dates on which the formal Information Exchange shall take place:

Data Drops					
DATA DROP 1	DATA DROP 2	DATA DROP 3	DATA DROP 4	DATA DROP 5	DATA DROP 6
'**Stage 1**' Submission	'**Planning Application**' Submission	'**Stage 2**' Submission	'**Approved for Construction**' Submission	'**As-Built**' Submission	'**Hand-back**' Submission
Level of Information Need 2	Level of Information Need 3	Level of Information Need 4	Level of Information Need 5	Level of Information Need 6	Level of Information Need 6+
			COBie required	COBie required	COBie required

5.2 WEPCo./ ProjectCo. is required to submit their deliverables as set out in the BIM Protocol and its appendices:

5.2.1 Responsibility Matrix

5.2.2 Information Particulars

i. Participant's/ Authority's Information Requirements (PAIRs)

- Information Delivery Plan (IDP)
- Asset Information Requirements (AIRs)

ii. BIM Execution Plan (BEP)

5.2.3 Security-minded Provisions

6.0 BIM-specific roles and responsibilities

6.1 [Participant/ Authority]

The [Participant/ Authority]'s main contact is: [name]

The [Participant/ Authority]'s main contact email is: [email]

6.1.2. The [Participant/ Authority]'s BIM-related responsibilities include, but are not limited to:

6.1.2.1 Implementing the BIM Protocol and all its appendices

6.1.2.2 Appointing the Participant's Information Manager/ Authority's Information Manager

6.1.2.3 Approving the BIM Execution Plan (BEP)

6.1.2.4 Signing off the Data Drops submissions

6.1.2.5 Providing stage approvals via implementing the Plain Language Questions

6.1.2.6 Approving the Asset Information Requirements (AIRs)

6.1.2.7 Approving the Information Delivery Plan (IDP)

6.1.2.8 Approving the Responsibility Matrix

6.2 Participant's Information Manager and Authority's Information Manager

6.2.1 The Participant's Information Manager/ Authority's Information Manager's role shall be carried out in accordance with:

6.2.1.1 CIC Scope of Services for the role of Information Management; and

6.2.1.2 ISO 19650-1 and ISO 19650-2

6.2.2 The Participant's Information Manager and the Authority's Information Manager will:

I. Provide CDE-access to WEPCo./ ProjectCo. and their supply chain;
II. Formally accept/ reject Data Drops within the CDE
III. Maintain and receive information into the information model;
IV. Enable integration and co-ordination of information within the information model;
V. Populate the information exchange format for the information model;
VI. Establish, agree and implement the information structure and maintenance standards for the information model;
VII. Receive information into the information model in compliance with agreed processes and procedures;
VIII. Verify the Information Container (i.e. make sure the information container exists)
IX. Maintain the information model to meet integrity and security standards in compliance with the information requirements;
X. Manage CDE processes and procedures, validate compliance with them and advise on non-compliance;
XI. Initiate, agree and implement a project information plan and asset information plan covering information structure across roles e.g.:

i. Software platforms (all levels of supply chain) appropriate to meet the Contracting Authority's requirements and project team resources;

ii. Responsibility for the provision of information at each stage;

iii. Level of information need required for specific project outputs e.g. planning, procurement, operational updates; and

iv. The process for incorporating as-constructed, testing, validation and commissioning information;

XII. Enable integration of information within the project team and co-ordination of information by design leads;

XIII. Agree formats for project outputs;

XIV. Assist project team members in assembling information for project outputs;

XV. Support the implementation of the Project BIM Agreement including updating the appendices (when required);

XVI. Liaise with and co-operate with project team members and the Participants in support of a collaborative working culture;

XVII. Assist the project team members in establishing information exchange processes, including defining and agreeing procedures for convening, chairing, attendance and responsibility for recording 'information exchange process meetings', and;

XVIII. Participate in and comply with project team management procedures and processes including:

a) Risk and value management;

b) Performance management and measurement procedures;

c) Change management procedures including adjustments to budgets and programme;

d) Attendance at project and design team meetings as required; and

e) Agree and implement record keeping, archiving and audit trail for Information Model.

XIX. In undertaking these activities, the information manager will not accept any design responsibility or the right to issue any design related instructions.

6.3 BIM co-ordinator

The BIM co-ordinator is responsible for the integrity of federated Models in terms of their shared co-ordinates, geometry, technical content and inter-disciplinary co-ordination.

It is critical that the BIM Co-ordinator is familiar with the models' content, layouts, zones, the project's location, site constraints and has a solid understanding of the construction sequencing, discipline interfaces and the technical aspects of construction.

The BIM co-ordinator's responsibilities include, but are not limited to:

6.3.1 The population of the established Shared Co-ordinates in the master model

6.3.2 Setting out of the Project Base Point, Project Datum and the Project North in the master model

6.3.3 Setting out the agreed grid system in the master model

6.3.4 Clash Avoidance - ensuring all models are spatially co-ordinated, escalating any interface issues to the design team

6.3.5 Model Federation and Clash Detection at agreed intervals and addressing & resolution of issues that arise from clash detection

6.3.6 Validate the content of the Information Containers (i.e. make sure the content of the Information Container is correct and as complete as it needs to be)

6.3.7 Management of model work-sets (if applicable)

6.3.8 Management of model volumes (if applicable) – i.e. splitting models into rational and manageable volumes, e.g. determined by gridlines, levels or functional units

6.3.9 Setting up project templates and sharing them with the wider project team

6.3.10 Overseeing the population of agreed parameters within specified models

6.3.11 Managing sheet sets (verifying title blocks, line weights, print/ plot settings)

6.3.12 Implementation of the agreed naming convention

6.3.13 Data conversion to agreed formats (where applicable)

6.3.14 Establishing quality control procedures – ensuring the geometric accuracy of models

6.3.15 Liaison with the Design Team and the [Participant/ Authority]

6.3.16 Co-ordination of the handover of information at agreed data drops

6.3.17 Ensuring minimal disruption in day-to-day modelling interfaces (model sharing, synchronising, overlaying, referencing)

6.3.18 Preparing the BIM co-ordination progress reports

6.3.19 Attending all co-ordination meetings

6.4 Built Asset Security Manager (BASM)/ Function

6.4.1 The Participant shall appoint a Built Asset Security Manager to undertake the Security Triage Process with the Participant to assess the security requirements for each Project.

6.4.2 The Participant will assess the following security risks :

- Physical security
- Cyber security
- Personnel security

6.4.3 The Participant shall record the outcome of the application of the Security Triage Process for each built asset to which it is applied, including where there is no identified need for more than Baseline Security Measures.

6.4.4 Where the recorded outcome details the security protection level or classification level of a built asset, the information shall be managed by all parties on a strict need-to know basis and shall be subject to security measures, appropriate to the level of risk, with regard to its creation, storage, distribution and use.

6.4.5 The Built Asset Security Manager will:

6.4.5.1 Assist the Participant in undertaking the Security Triage Process (See Figure 1below)

6.4.5.2 Provide a holistic view of the security issues and threats to be addressed

6.4.5.3 Offer guidance and direction on the handling of risks

6.4.5.4 Take ownership, manage, and assist in the development of the built asset security strategy (BASS)

6.4.5.5 Be accountable for security decisions that are taken;

6.4.5.6 Take ownership, manage, and assist in the development of the Built Asset Security Management Plan (BASMP)

6.4.5.7 Take ownership, manage, and assist in the development of Security Breach/ Incident Management Plan (SB/ IMP)

6.4.5.8 Take ownership, manage, and assist in the development of the Built Asset Security Information Requirements (BASIR)

6.4.5.9 Assist in the development of Plain Language Questions and Participant's Information Requirements

6.4.5.10 Assist in the development and reviewing of any tendering and project planning documentation

6.4.5.11 Be responsible for promoting a security-minded culture

6.4.5.12 Brief advisors, specialists and supply chain on relevant aspects of the BASS, BASMP and BASIR

6.4.5.13 Advise on the need for, and undertake, the review and auditing of documentation, policies, processes and procedures relating to the security of the built asset

6.4.5.14 Where appropriate and necessary, seek appropriate professional security advice to provide additional guidance throughout the lifecycle of the project and/ or asset.

6.4.5.15 The Built Asset Security Manager does not perform any design role within a project.

6.5 Soft Landings Champion (where applicable)

Where Soft Landings are to be implemented, it is required that the Participant appoints a Soft Landings Champion.

7.0 Security

All data and information that the [Participant/ Authority] needs to collect, store, process, generate or share to deliver services and conduct [Participant/ Authority] business has intrinsic value and requires an appropriate degree of protection.

7.1 Cyber Essentials Plus certificate

WEPCo./ ProjectCo. shall meet the requirements of the Cyber Essentials Scheme and shall provide Cyber Essentials Plus certification.

8.0 Common Data Environment (CDE)

8.1 It is required that Common Data Environment is utilised on all projects through the development, construction and operation and is capable of transfer to the Authority on Handback, at the end of the Project Term (or on early termination).

8.2 Refer to the **Project BIM Agreement** for the information regarding the responsibilities for the procurement, management and maintenance of the CDE.

8.2.1 WEPCo. is required to procure the CDE on behalf of the Participant. The CDE will be established to ensure that the CDE will stay with the New Project through development construction and operation and is capable of transfer to the Authority on Hand-back, at the end of the Project Term (or on early termination).

8.2.2 During Stage 1 the Participant will be required to maintain the role of the Participant's Information Manager (IM) who will be acting as a 'gate keeper' and ensuring that all parties accessing and using the CDE comply with the processes and procedures established.

8.2.3 The Participant's Information Manager shall ensure that access to the CDE will be provided to the WEPCo's Supply Chain as they are appointed; access permissions and approval workflows will be established to reflect WEPCo's requirements. Access permissions of those whose involvement in the Project terminated at the end of Stage 1 should be removed so access is no longer available.

8.2.4 Prior to the execution of the Project Agreement (between the ProjectCo. and Participant/ Authority) the WEPCo. shall transfer ownership of the CDE to the ProjectCo ensuring a smooth transition without the loss of any functionality of the CDE and without the loss or corruption of data.

8.2.5 The Authority will jointly appoint with the ProjectCo an Authority's Information Manager (AIM) to undertake the tasks set out within the BIM Protocol and its appendices. The AIM shall ensure that access to the CDE will be provided to the ProjectCo's Supply Chain as they are appointed; access permissions and approval workflows will be established to reflect ProjectCo's requirements. Access permissions of those whose involvement in the Project terminated should be removed so access is no longer available.

8.2.6 ProjectCo. shall ensure that the CDE access requirements are communicated to the Authority's Information Manager; access permissions and approval workflows will be established by the Authority's Information Manager to reflect the requirements of ProjectCo's delivery team. Access permissions to those whose involvement in the Project terminated at the end of Stage 2 should be removed so access is no longer available.

8.2.7 ProjectCo. shall communicate the access requirements of their Soft Service Providers to the Authority's Information Manager, who will set up the CDE access.

8.2.8 During the Operational phase, the Authority may carry out audits of the CDE and the maintained model and information at any point during the operational period to confirm if ProjectCo is meeting its obligations.

8.2.9 The CDE shall remain operational until the end of the 25-year 'In Use' period.

8.2.10 ProjectCo. is responsible for the arrangement of the CDE transfer to a platform provided by the Authority.

8.2.11 Where a contract is terminated prior to the end of the 25-year 'In Use' period, ProjectCo. shall hand-back the CDE to the Authority.

8.2.12 The Authority is responsible for the sign-off of the CDE transfer, to confirm that the required information has been provided in the correct formats and as detailed in the BIM Protocol and its appendices.

8.3. All Task Team members are responsible for storing and maintaining a copy of all project information in a secure stable location within their own organisation and will make information available to the project team and the [Participant/ Authority] via the CDE at agreed information exchange intervals on agreed dates.

8.1 CDE duration

8.1.1 It is required that the CDE remains functional until the end of 25-yr. operational period. After that, all data will be transferred from the CDE to a local system provided by the Local Authority.

8.1.2 ProjectCo. is responsible for the arrangement of the CDE transfer to a platform provided by the Authority.

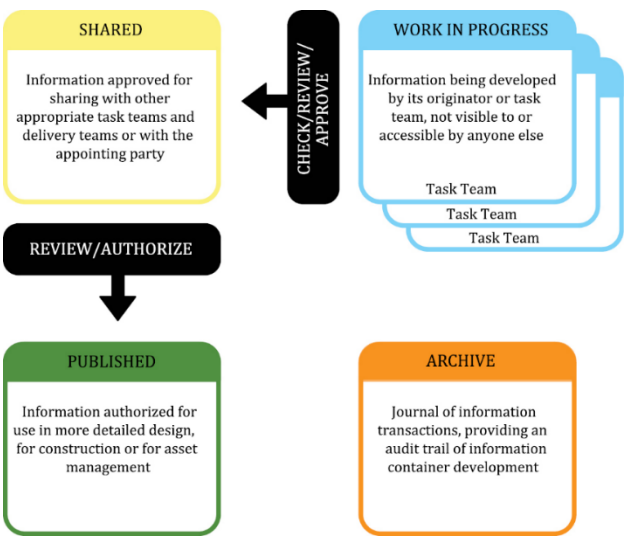
8.1.3 Where a contract is terminated prior to the end of the 25-year 'in-use' period, ProjectCo. shall handback the CDE to the Authority.

8.1.4 The Authority is responsible for the sign-off of the CDE transfer, to confirm that the required information has been provided in the correct formats and as detailed in the BIM Protocol and its appendices.

8.2 CDE general principles

All project information exchanged in/ through the CDE must be checked, reviewed and approved in accordance with the processes defined in:

- ISO 19650-1
- ISO 19650-2



8.3 CDE purpose and functionality

8.3.1 The purpose of the CDE is to:

8.3.1.1 Provide the [Participant/ Authority] and [WepCo/ ProjectCo] with a central accessible resource of current project information

8.3.1.2 Eliminate duplication, loss of information, use of out-of-date information

8.3.1.3 Facilitate collaboration

8.3.1.4 Support projects' integrity and transparency through retaining a full audit trail

8.3.2 Functionality

8.3.2.1 The following CDE functionalities are mandatory:

I. Configuration of access permissions
II. File storage and management
III. Viewing of 3D models without additional software installation
IV. Structured revisioning
V. File status referencing
VI. Information exchange management
VII. Workflow configuration (setting up of approval processes)
VIII. Data search/ filtering/ retrieval
IX. Audit trail provision; time-stamped activities assigned to users, i.e. uploaded/ downloaded/ viewed/ edited/ checked/ approved/ signed off

8.3.2.2 The following CDE functionalities are optional:

a. Model Federation
b. Clash Detection
c. Model mark-up/ comment
d. Configuration and application of additional file metadata
e. Automated file naming
f. Contract administration management
g. Offline working
h. Cost management functionality
i. Programme planning functionality
j. Automated production of Asset data derived directly from models
k. Informal conversation threads
l. Interface with other systems/ software

8.4 CDE configuration and access permissions

8.4.1 The Participant's Information Manager/ Authority's Information Manager shall configure the CDE and set up and manage required functionality, governance and workflows. The Participant's Information Manager/ Authority's Information Manager shall also manage CDE access, permissions and denial.

8.4.2 Approval to access the CDE shall be as follows:

I. An individual will be denied access to the CDE when their direct participation in project design, construction or operational activities cease. In this instance, the **[WepCo/ ProjectCo]** shall

notify the Participant's Information Manager/ Authority's Information Manager in writing at the point in which this direct participation ceases so that the individual's access can be removed.

II. The Participant's Information Manager/ Authority's Information Manager shall ensure that the list of authorised CDE users, permissions and security groups remains up-to-date at all times and detailed in the BIM Execution Plan and provided to the **[Participant/ Authority]** upon request.

8.5 CDE backup

Files, data and records held in the CDE shall be backed up as follows and as a minimum:

8.5.1 Full back-up every week

8.5.2 Differential backup every night

8.5.3 Transaction log every five minutes

9.0 File naming

9.1 Files shall be named in accordance with the UK National Annex to ISO19650-2. Adoption of the National Annex methodology (i.e. the unique ID plus metadata) means that information descriptions, if needed, can be kept to a bare minimum. This aids efficiency and consistency for information identity (which is essential when a CDE contains a large volume of information containers) but importantly, supports a security-minded approach to information management.

9.2 The UK's National Annex describes the naming standard for information containers within a common data environment (CDE) and is based on the same convention set out in superseded BS 1192:2007.

9.3 In the National Annex, the term 'information container' is used to describe the unique identification of a file. For a construction project, an information container could be a cost plan, a programme, a drawing, a geometric model etc.

9.4 The National Annex Clause NA3.6 lists common types of information containers and how these can be named. It is not a definitive list and there is an option to specify project-specific codes if required.

9.5 Each information container should be identified through a unique ID and National Annex Clause NA2.2 provides the structure for this ID.

9.6 The National Annex also requires the project's CDE(s) to enable attributes (metadata) against each information container to record its status, revision and classification. Metadata requirements are covered in National Annex Clause 4.

9.7 The CDE should prompt the addition of metadata according to the National Annex plus the update of metadata when an information container is revised. The CDE may also enable configuration so that additional metadata can be added if required.

10.0 Model uses

10.1 It is required that the model is capable of being used for the following:

10.1.1 3D co-ordination

10.1.2 Visualisation

10.1.3 Asset management

10.1.4 Changes beyond the Defects Liability Period
Medium volume changes (10-100k)
High volume changes (>100k)
Changes which impact on safety and/ or security of the Asset (circulation, fire escape routes, etc.)

10.1.5 Design authoring

10.1.6 Design reviews

10.1.7 Production of deliverables

10.1.8 Data classification

10.1.9 Cost planning & Cost management

10.1.10 Sustainability Evaluation (BREEAM)

10.1.11 Zoning for HVAC assessment (Accurate calculations of volumes (rooms & spaces))

10.1.12 Zoning for fire compartmentation - clear demarcation of fire compartments, accurate calculations of volumes (rooms/ spaces/ zones), accurate measurements of fire escape routes, escape routes optioneering, tagging or components to report their fire resistance values

10.1.13 Building system analysis

10.1.14 Communication - Support site induction, Support user/ occupier induction, communicating of proposals to stakeholders, Understanding health & safety compliance and risks, Support evacuation strategies, Site ownership demonstration, access to adjacent parties

10.1.15 Sustainability evaluation (carbon)

10.2 It is not required that the model is used for the following:

10.2.1 Simulation of site-related activities and aid logistics

10.2.2 Tendering

10.2.3 Production of room data sheets

10.2.4 Soft Landings

10.2.5 Fabrication/ manufacture

10.2.6 Disaster Planning (Emergency services may need access to the digital information to develop strategies Improved response efficiency)

11.0 Level of Information Need (ISO19650)

It is required that Level of Information Need is identified according to the NBS Toolkit.

Data Drops					
DATA DROP 1	DATA DROP 2	DATA DROP 3	DATA DROP 4	DATA DROP 5	DATA DROP 6
'**Stage 1**' Submission	'**Planning Application**' Submission	'**Stage 2**' Submission	'**Approved for Construction**' Submission	'**As-Built**' Submission	'**Hand-back**' Submission
Level of Information Need 2	Level of Information Need 3	Level of Information Need 4	Level of Information Need 5	Level of Information Need 6	Level of Information Need 6+
			COBie required	COBie required	COBie required

12.0 File formats

Versions to be agreed and stated in the BIM Execution Plan.

Table below is indicative only.

Deliverables	File formats									
	RVT	IFC	DWFx	NWD	DWG	PDF	XLSX	CSV	DOCx	Etc.
Individual Specified Models	YES	YES	YES	YES						
Federated Models	YES	YES	YES	YES						
2D drawings						YES				
COBie		YES					YES			
Documents						YES			YES	
Schedules						YES	YES			
Programmes										
Etc.										

13.0 Model authoring software

The [Participant/ Authority] requires that all Models are authored in [name and version of software]

WEPCo./ ProjectCo. shall confirm the Model authoring software and its version in the BIM Execution Plan (BEP).

14.0 Model file size

The size of individual specified models shall not exceed 500Mb.

The size of a federated model shall not exceed 1Gb.

Access and use of free Model viewing software must not be limited or restricted because of file complexity, size or format.

15.0 Classification

Model component classification is mandatory.

All model components shall adopt the Uniclass 2015 classification system at System level.
e.g. Ss_55_70_38 - Hot and cold-water supply systems
Where system code is not available or applicable, the Product code shall be used.

16.0 COBie

COBie deliverables are mandatory.

COBie parameters shall be adopted and populated as described in the Asset Information Requirements (AIRs).

17.0 Model outputs

All drawings (plans, elevations and sections) shall be created in the models and shall be direct outputs of the models.

Areas generated from Models shall be measured in accordance with the gross internal floor area as defined in the RICS Code of Measuring Practice.

18.0 Model Federation and Clash Detection

The Model Federation and Clash Detection shall be carried out by the BIM co-ordinator.

The following software will be used to complete the model Federation: **[name and version]**

The following software will be used to carry out the Clash detection: **[name and version]**

The co-ordination strategy, routine information exchange schedule, model tolerances and clash sets shall be detailed in the BEP along with proposals for process and resolution reporting.

19.0 Routine Information Exchange Schedule

19.1 All model originators identified in the Responsibility Matrix shall upload their work-in-progress models into the CDE during the design development and construction periods with required frequency.

19.2 WEPCo./ ProjectCo. is required to identify the nominated days and frequency of uploads in their BIM Execution Plan.

For example:

Identified model originators shall upload their work-in-progress models on Thursday of every week. Model federation and clash detection shall be carried out on a weekly basis on a Friday of every week.

19.3 It is required that all models shall:

i. Adopt the agreed shared co-ordinate system
ii. Show the agreed grid system at all times
iii. Be purged of all unused items prior to each upload
iv. Be purged of all linked and referenced files prior to each upload
v. Contain a 'landing page' with a title block identifying the current revision of the model at the time of each upload
vi. Be detached from the central file, audit option shall be selected prior to saving
vii. Be constructed to reflect actual physical construction methods and logical sequencing and requirements

19.4 All components created 'in-place' shall be given a name and assigned a family category

19.5 Access and use of free Model viewing software must not be limited or restricted because of file complexity, size or format

20.0 Operational period

20.1 Model Maintenance Schedule

20.1.1 It is required that the Model and associated asset data is maintained and updated throughout the 25-yr. operational period within the Common Data Environment.

20.1.2 The responsibility for the model and asset data maintenance lies with ProjectCo.

20.1.3 It is recommended that the model/ asset data maintenance is carried out annually as a minimum.

20.1.4 ProjectCo. shall identify proposed dates/ time periods for the Model Maintenance Schedule in the BIM Execution Plan.

20.1.5 The Authority shall review and approve the proposed dates.

20.2 Scope of required model updates

It is required that the model/ asset data updates capture:

i. All medium-volume changes (10-100k)
ii. All high-volume changes (>100k)
iii. Any changes which may impact on safety and/ or security of the Asset and/ or Asset users (circulation, fire escape routes, accessibility, etc.).

20.3 CDE during operation

20.3.1 ProjectCo. shall be responsible for the day-to-day activities in the CDE during the operational period as required.

20.3.2 The Authority may carry out audits of the CDE and the maintained model and information at any point during the operational period to confirm if ProjectCo is meeting its obligations.

20.3.3 ProjectCo. shall communicate their access requirements to the Authority's Information Manager who shall provide access as required.

21.0 Handback

21.1 ProjectCo is required to complete an updated version of the 'As-Built' Submission to reflect all changes that will have taken place since the 'As-built' submission, in accordance with the Model Maintenance Schedule.

21.2 The Authority is responsible for the sign-off of Data Drop 6 ('Hand-back' submission), confirming that all of the required information has been provided in the correct formats and as detailed in the BIM Protocol and its appendices.

21.3 ProjectCo is responsible for the arrangement of the CDE transfer to a platform provided by the Authority.

21.4 Where a contract is terminated prior to the end of the 25-year 'in-use' period, ProjectCo shall handback the CDE to the Authority.

21.5 The Authority is responsible for the sign-off of the CDE transfer, to confirm that the required information has been provided in the correct formats and as detailed in the BIM Protocol and its appendices.

22.0 Training

The [Participant/ Authority] is not responsible for the provision of any training with regards to the application of the UK BIM Framework processes or associated software tools. It is a requirement that the [WepCo./ ProjectCo.] and all individual parties contributing to the project are fully trained prior to project engagement.

22.0 Plain Language Questions (PLQs)

WEPCo./ ProjectCo. is required to respond to the following Plain Language Questions (PLQs) at the identified Data Drops:

22.1 DATA DROP 1 – Stage 1 submission

i. How will BIM be managed and exploited?
ii. What is the quality assurance system?
iii. What, if any, are the deviations from, or proposals to improve the brief?
iv. Have the purposes for which the models will be used been defined?
v. What physical constraints are there on and around the site?
vi. What are the project risks?
vii. What are the lessons learnt?

22.2 DATA DROP 2 – 'Planning Application' submission

i. What is the change control process?
ii. What is the information management strategy?
iii. How does the design meet statutory and mandated requirements?
iv. What services constraints (water, drainage, electricity etc) exist?
v. What is the forecast volume of energy in-use (gas, water, electricity)?
vi. How is the information being delivered in accordance with the Information Delivery Plan?

vii. What are the lessons learnt?

22.3 DATA DROP 3 – 'Stage 2' Submission

i. What is the information needed to maintain and operate the completed asset?
ii. To what extent is COBie populated?
iii. What is the whole life cost estimate?
iv. How have lessons learnt been incorporated?
v. What is the methodology for ensuring existing utility services interface with the new works?
vi. How does the forecast volume of energy in-use (gas, water, electricity) compare to previous forecasts?

22.4 DATA DROP 4 – 'Approved for Construction' submission

i. Will the project still be delivered by the required completion date?
ii. How is project risk being identified, evaluated and managed?
iii. What is the health and safety information required for operation and maintenance of the asset?
iv. What is the training, commissioning and aftercare strategy?
v. What site information is to be provided?
vi. To what extent is COBie populated?
vii. How are the models supporting the model use requirements?

22.5 DATA DROP 5 – 'As-Built' submission

i. To what extent are the design/ construction models co-ordinated?
ii. What is the forecast volume of energy in-use (gas, water, electricity)?
iii. To what extent is COBie data correct and complete, providing a register of spatial and physical assets?
iv. To what extent is COBie data correct and complete to enable the Authority to understand facility operational requirements and to anticipate operational cost?
v. What is the information needed to maintain and operate the completed asset?
vi. What are the statutory and mandated approval requirements?
vii. What is the health and safety information required for operation and maintenance of the asset?

22.6 DATA DROP 6 – 'Hand-back' submission

i. How have lessons learnt been captured?
ii. To what extent is COBie data complete, providing an up-to-date register of spatial and physical assets?
iii. What are the outcomes from the occupancy evaluation?

iv. Has the performance gap been identified? i.e. how does the volume of energy in-use (gas, water, electricity) differ from that forecast?

Appendices

Responsibility Matrix – Appendix 1 of the BIM Protocol

Asset Information Requirements (AIRs)

Information Delivery Plan (IDP)

Llywodraeth Cymru
Welsh Government

Asset Information Requirements (AIRs)

(Appendix A to the IRs)

Project's Name: ……

Date: ……

Contents

Note to be incorporated

In order to determine the scope of Data required to support the operation and maintenance of an Asset and the methodology by which it might be generated, it is important to establish what Systems are in use (or are likely to be in use), what Data they can consume and requirements for specific Data transfer file formats.

- Participant's objectives for the use of asset data
- Project's Security/ Sensitivity status determined
- Identify the authoring parties
- Agree Asset data outputs and formats (Information Manager advises)
- Scope of Asset data collection (Information Manager advises)
- Plain Language Questions to establish the Project Team's solid understanding of the asset Data requirements (Information Manager advises)

What CAFM Systems are currently operational/ are likely to be operational for facilities management of the completed Asset?

- Identify the acceptable format for Data to be uploaded to the CAFM System(s)
- Determine the preferred structure for Data to be uploaded to the CAFM System(s)

1.0 Roles and responsibilities

1.1 The Participant [Local Authority/ Further Education Institution]

The Participant [Local Authority/ Further Education Institution] should be specific about the purposes supporting the ownership of the Facility for which the information is required and about the timing and content of any interim deliveries so as to allow the supply chain to respond appropriately.

The Participant [Local Authority/ Further Education Institution] should require the delivery of COBie from the Lead Designer and/ or Lead Contractor. A finalized COBie should be required at the time of handover, but earlier serial deliveries may be used to monitor the business case and life-cycle decisions for the Facility, and to help plan for taking the Facility into ownership and operation.

The COBie information should be archived for record purposes when delivered, and may be held in Portfolio, Asset and Facility Management applications.

The information should be maintained so as to be available to support the tendering of parallel operational activities and for future projects.

1.2 [WepCo.] Designers, Contractors and Service Providers

The project team should document the information about a Facility in both its spatial and physical aspects.

- Spatially, they should document the Spaces and their allocation to a Floor/ Level and their grouping into Zones
- Physically, they should document the Components and their specification by Product Type and their grouping into functional Systems

In federated BIM level 2 projects, information for COBie is likely to be available from the models, structured specifications and other schedules.

Wherever possible, data should be mapped to COBie automatically (e.g. via the COBie plug-in for Revit). **[WepCo.]** should specify the required COBie information on specific aspects from their supply chain. Lead parties should ensure that their supply chains deliver these specified aspects for the inclusion in the COBie deliverable.

Where an asset is sensitive from a security perspective (physical and/ or information security), this information should be handled in a separate limited access COBie deliverable.

1.3 Supply chain

The supply chain should deliver the specified aspects of the Requirements.

The supply chain might include consultants, specialist sub-contractors, product suppliers and manufacturers.

If the [The Welsh Government/ Authority]'s information purposes include the "specification/ selection/ replacement" process, then the product Types should be given the necessary specification Attributes.

The product information might also include operational recommendations relating to the installation, maintenance operation and emergency procedures. It might also include information relating to the economic and environmental Impact of the product. It might include information about its Connections and other interfaces.

1.4 COBie during life-cycle

There should be progressively more complete COBie deliverables throughout the project phases, culminating at the handover into operation. Any COBie deliverable after handover should include any corrections and updates, and any data obtained during post-occupancy assessments.

The in-use COBie should be provided to the Project Lead at the commencement of a project affecting an existing asset to enable the re-use of the information and its further development.

Where COBie deliverables include configuration and operation information relating to security, access control, and building/ industrial control systems, this information should be managed and protected in accordance with the security requirements established in the EIR such as security strategy, policy, processes and procedures.

2.0 Asset data use

The purposes for which the Participant requires Asset information are as follows:
Read in conjunction with the anticipated Model uses identified in clause 9.1 Model Uses in the EIRs.

TABLE 1 – Asset Data Use

Task/ activity	The objective is to:	y/n/tbc
Asset operation	Effectively and efficiently operate and maintain the Asset/ Facility	yes
Register of Assets	Provide a complete and up-to-date register of Assets to support auditing and reporting	yes
Business questions/ case	Support the evaluation of the business case for facility ownership and operation	
Compliance and Regulation support	Maintenance of the health and safety of facility users	
Capacity, utilisation, space management	Enable comparison of actual use and utilisation	
Security and surveillance	Support the management of security and surveillance of the facility and/ or adjacent sites	
Repurposing	Support repurposing of the facility and/ or its spaces	
Impact	Support evaluation of the impacts (cost, carbon, energy, waste, water use, etc.) of the facility	
Operation costs	Enable the anticipation of the operational costs, reduce building operation costs	yes
Maintenance and Repair	Enable the anticipation and planning of costs associated with planned preventative maintenance	
Replacement	Enable the anticipation of service life and replacement costs, effectively manage retrofits and upgrades	
Decommissioning & Disposal	Support the anticipation and planning of the end-of-life costs	
Tendering	Support the tendering of parallel operational activities and future projects	

3.0 Security/ Sensitivity Status and Requirements

Note: The security triage should be undertaken prior to submission of this document
A security triage process (clause 7.1 in the EIRs) has been undertaken in accordance with PAS 1192-5. This has established that Asset data **[requires/ does not require]** specific protection beyond baseline measures. Sensitive data shall be collected, stored and provided separately from non-sensitive data. If Asset data requires specific protection according to PAS 1192-5, clarify what this protection is and/ or state the sensitivity rating according to the triage process.

4.0 COBie requirements

4.1 COBie File format

The [The Welsh Government/ Authority] requires that Asset data created through the design and construction process will be provided in the COBie-UK-2012 (v2.4) format as **.xls** files

4.2 COBie structure

All data in COBie worksheets is assigned one of the following three attributes Core/ Operational/ Supplementary:

CORE ASSET DATA

Facility	Distinct operational built or geographical asset, typically a building or a section of infrastructure along with details and extent of geographic site and of the temporal project
Floor	Intermediate spatial division including distinct vertical levels and horizontal areas and sections with spaces allocated
Space	Location for activities such as use, inspection or maintenance, including un-occupied or un-inhabitable spaces but not necessarily inaccessible. Spaces may be internal or external
Zone	Set of spaces/ locations sharing a specific attribute (such as activity, access, management or conditioning)
Type	Specification for components including equipment, products and materials
Component	Individually scheduled physical items and features that might require management (inspection, maintenance, services, replacement) during the operational phase
System	Set of manageable components providing a common function
SUPPLEMENTARY ASSET DATA	
Contact	Person and/ or Organisation involved in the facility life cycle
Assembly	Physical aggregation of a type or component into another type or component where both the overall assembly part and the constituent part has significance for their operation and use
Connection	Logical relationship between two components
Impact	Economic and environmental measure
Document	External document associated to an asset
Attribute	Specific characteristic associated to an asset
Coordinate	Position associated to facility, floor, space, component or assembly
Issue	Deficiency in the information or risk associated to the asset
OPERATIONAL ASSET DATA	
Spare	Replaceable part associated to component types
Resource	Material or skill required to execute Jobs
Job	Task or activity during in-use phase associated to component types

4.3 Required COBie Parameters/ Columns

COBie parameters shall be populated in line with Appendix C - COBie Requirements workbook 1

4.4 Assets required to be captured via COBie

COBie parameters shall be populated about the following Assets: Appendix C - COBie Requirements workbook 2

4.5 Classification

Uniclass 2015 shall be adopted for the component classification.
Where the COBie plug-in is used, component parameters shall be named and populated as follows:

Component parameter	Populated with:
COBie.Type.Name	Component/Revit family
COBie.Type.Category	Uniclass 2015 Product Code
COBie.Type.Description	Uniclass 2015 Product Title
COBie.Component.Name	Component/Revit family + Element ID
COBie.Component.Description	Component/Revit Type Name
COBie.System.Name	Uniclass 2015 System Title
COBie.System.Category	Uniclass 2015 System Code

5.0 COBie Data exchange

5.1 Timing

Complete and correct COBie file submission(s) shall be made: [Identify when]
Read in conjunction with the **Information Delivery Plan** (IDP) and the **Data Drops** identified in the EIRs.

5.2 Plain Language Questions (PLQs)

Example of PLQs for the **operational phase** of an Asset

For further examples of PLQs, please see Appendix D - Plain Language Questions (PLQs)

Energy	How are systems supporting the measurement of energy in use and CO_2 emissions? What is the forecast volume of energy in-use (gas, water, electricity)? How does the forecast volume of energy in-use (gas, water, electricity) compare to previous forecasts?

Financial	What is the forecast final account? How does the forecast final account compare to previous forecasts? What is the forecast whole life cost? How does the forecast whole cost compare to previous estimates?
Lessons	What are the lessons learnt? How have lessons learnt been captured for related activities/ projects?
Model, data and information management	How is the model, data and information strategy being managed and exploited? How are the models supporting the model use requirements? To what extent are the design/ construction models in accordance with the model production and delivery table? To what extent is COBie populated? To what extent is the COBie data correct and complete, providing a register of spatial and physical assets? To what extent is the COBie data correct and complete to enable evaluation of the business case for facility ownership and operation? To what extent is the COBie data correct and complete to support the maintenance of the health and safety of facility users? To what extent is the COBie data correct and complete in providing a record of the facility's spaces, their capacity and utilisation according to the [The Welsh Government/ Authority]'s Requirements? To what extent is the COBie data correct and complete to support management of security and surveillance of the facility in accordance with the [The Welsh Government/ Authority]'s Requirements? To what extent is the COBie data correct and complete to support management of security and surveillance of the site in accordance with the [The Welsh Government/ Authority]'s Requirements? To what extent is the COBie data correct and complete to support management of security and surveillance of the neighbouring site(s) in accordance the [The Welsh Government/ Authority]'s Requirements? To what extent is the COBie data correct and complete, providing a comprehensive record to support repurposing of the facility and/ or its constituent spaces? To what extent is the COBie data correct and complete providing an as constructed record of [The Welsh Government/ Authority] defined Project Impacts? To what extent is the COBie data correct and complete providing a forecast of [The Welsh Government/ Authority] defined In-use Impacts? To what extent is the COBie data correct and complete to enable the [The Welsh Government/ Authority] to understand facility operational requirements and to anticipate operational cost To what extent is the COBie data correct and complete setting out recommended maintenance tasks and to support the [The Welsh Government/ Authority] to anticipate and plan for the costs of maintenance? To what extent is the COBie data correct and complete detailing expected/service life and constituent materials for the purposes of understanding replacement costs? To what extent is the COBie data correct and complete to assist the [The Welsh Government/ Authority] is planning for end-of-life costs?
Operation	How has the construction stage training and commissioning process assisted operation? How is aftercare being implemented in accordance with construction stage commitments? How is the aftercare process assisting operation? Are the systems working in accordance with requirements?
Performance	What is the methodology for undertaking occupancy evaluation? What are the outcomes from the occupancy evaluation? How are the occupancy evaluation outcomes being reported and acted upon?
Security	How are security requirements being met? Is management of data and information in accordance with requirements and proposals? Is there appropriate management of information detailing sensitive asset and system selection and connectivity?

6.0 Appendices

Appendix C - COBie Requirements

Appendix D - Plain Language Questions (PLQs)

Information Delivery Plan (IDP) Appendix B to the Information Requirements (IRs)		File Formats	Project Stage								LOI	Originator
			0	1	2	3	4	5	6	7		
			Strategy	Brief	Concept	Developed Design	Technical Design	Construction	Handover and Close-out	Operation		
1	Project Strategies and Methodologies											
2	Statutory and legal requirements, approvals and certifications											
3	Financial reporting and approval requirements											
4	Programme and phasing requirements											
5	Insurance requirements											
6	Health and Safety requirements											
7	Reports and inspection records											
8	Models, drawings, specifications, COBie											
9	Sustainability and performance proposals, methodologies and measures											
10	Training requirements, proposals and guidance											
11	Testing and commissioning plans, certificates and reports											
12	Operational and maintenance requirements, manuals and schedules											
13	Sub-consultant and sub-contract warranties and agreements											

COBie population requirements

Sheet	Column	Notes	Populated	Data Drop	Originator	Notes
Contact	Email	Identify the valid email address, including '@'	Y		all stakeholders	
	CreatedBy		Y		all stakeholders	
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y		all stakeholders	
	Category		Y		all stakeholders	
	Company		Y		all stakeholders	
	Phone		Y		all stakeholders	
	ExternalSystem	Automatically populated via design software	Y		all stakeholders	
	ExternalObject	Automatically populated via design software	Y		all stakeholders	
	ExternalIdentifier	Automatically populated via design software	Y		all stakeholders	
	Department				all stakeholders	
	OrganizationCode				all stakeholders	
	GivenName				all stakeholders	
	FamilyName				all stakeholders	
	Street				all stakeholders	
	PostalBox				all stakeholders	
	Town				all stakeholders	
	StateRegion				all stakeholders	
	PostalCode				all stakeholders	
	Country				all stakeholders	
Facility	Name	Names should be unique within their sheet	Y		design team	
	CreatedBy		Y		design team	
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y		design team	
	Category		Y		design team	
	ProjectName		Y		design team	Agree Project name and record in BEP
	SiteName		Y		design team	
	LinearUnits		Y		design team	
	AreaUnits		Y		design team	
	VolumeUnits		Y		design team	
	CurrencyUnit		Y		design team	
	AreaMeasurement	Refer to the method of measurement (i.e. NRM1 GIA)	Y		design team	
	ExternalSystem	Automatically populated via design software	Y		design team	
	ExternalProjectObject	Automatically populated via design software	Y		design team	
	ExternalProjectIdentifier	Automatically populated via design software	Y		design team	
	ExternalSiteObject	Automatically populated via design software	Y		design team	

	ExternalSiteIdentifier	Automatically populated via design software	Y	design team	
	ExternalFacilityObject	Automatically populated via design software	Y	design team	
	ExternalFacilityIdentifier	Automatically populated via design software	Y	design team	
	Description			design team	
	ProjectDescription			design team	
	SiteDescription			design team	
	Phase		Y	design team	
Floor	Name	Names should be unique within their sheet	Y	design team	Agree floor naming strategy and record in BEP
	CreatedBy		Y	design team	
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	design team	
	Category		Y	design team	
	ExtSystem	Automatically populated via design software	Y	design team	
	ExtObject	Automatically populated via design software	Y	design team	
	ExtIdentifier	Automatically populated via design software	Y	design team	
	Description			design team	
	Elevation	Provide numeric values without units appended. Unknown values should be entered as n/a		design team	
	Height	Provide numeric values without units appended. Unknown values should be entered as n/a		design team	
Space	Name	Names should be unique within their sheet	Y	design team	Agree room numbering strategy and record in BEP
	CreatedBy		Y	design team	
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	design team	
	Category		Y	design team	
	FloorName	Every Space must be assigned to one Floor; there must be at least one Space to a Floor	Y	design team	Should match the floor naming in BEP
	Description		Y	design team	
	ExtSystem	Automatically populated via design software	Y	design team	
	ExtObject	Automatically populated via design software	Y	design team	
	ExtIdentifier	Automatically populated via design software	Y	design team	
	RoomTag			design team	Agree room numbering strategy and record in BEP
	UsableHeight	Provide numeric values without units appended. Unknown values should be entered as n/a		design team	
	GrossArea	Provide numeric values without units appended. Unknown values should be entered as n/a		design team	
	NetArea	Provide numeric values without units appended. Unknown values should be entered as n/a		design team	
Zone	Name	Every Zone-Name taken with Space-Names should be unique	Y	design team	
	CreatedBy		Y	design team	
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	design team	
	Category		Y	design team	Agree Zoning Strategy
	SpaceNames	Every Zone must have at least one Space	Y	design team	
	ExtSystem	Automatically populated via design software	Y	design team	
	ExtObject	Automatically populated via design software	Y	design team	
	ExtIdentifier	Automatically populated via design software	Y	design team	

	Description			design team	
Type	Name	Names should be unique within their sheet	Y	design team	
	CreatedBy		Y	design team	
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	design team	
	Category	Uniclass 2015 Product Code	Y	design team	
	Description	Uniclass 2015 Product Title	Y	design team	
	AssetType		Y	design team	
	Manufacturer		Y	contractor	
	ModelNumber		Y	contractor	
	WarrantyGuarantorParts		Y	contractor	
	WarrantyDurationParts		Y	contractor	
	WarrantyGuarantorLabor		Y	contractor	
	WarrantyDurationLabor		Y	contractor	
	WarrantyDurationUnit		Y	contractor	
	ExtSystem	Automatically populated via design software	Y	design team	
	ExtObject	Automatically populated via design software	Y	design team	
	ExtIdentifier	Automatically populated via design software	Y	design team	
	ReplacementCost	Provide numeric values without units appended. Unknown values should be entered as n/a	Y	contractor	
	ExpectedLife		Y	contractor	
	DurationUnit		Y	contractor	
	WarrantyDescription		Y	contractor	
	NominalLength	Provide numeric values without units appended. Unknown values should be entered as n/a	Y	design team	
	NominalWidth	Provide numeric values without units appended. Unknown values should be entered as n/a	Y	design team	
	NominalHeight	Provide numeric values without units appended. Unknown values should be entered as n/a	Y	design team	
	ModelReference			contractor	
	Shape			contractor	
	Size			contractor	
	Colour			contractor	
	Finish			contractor	
	Grade			contractor	
	Material			contractor	
	Constituents			contractor	
	Features			contractor	
	AccessibilityPerformance			contractor	
	CodePerformance			contractor	
	SustainabilityPerformance			contractor	
	ClassificationNRM1	to be considered	?	design team	additional parameter
	ClassificationNRM3	to be considered	?	contractor	additional parameter

	ClassificationSFG20	to be considered	?	contractor	additional parameter
Component	Name	Names should be unique within their sheet	Y	design team	
	CreatedBy		Y	design team	
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	design team	
	TypeName	Every Component must be assigned to one Type	Y	design team	
	Space	Every Component must be assigned to at least one Space	Y	design team	
	Description		Y	design team	
	ExtSystem	Automatically populated via design software	Y	design team	
	ExtObject	Automatically populated via design software	Y	design team	
	ExtIdentifier	Automatically populated via design software	Y	design team	
	SerialNumber		Y	contractor	
	InstallationDate	Format as yyyy-mm-dd (i.e. 2016-05-29)	Y	contractor	
	WarrantyStartDate	Format as yyyy-mm-dd (i.e. 2016-05-29)	Y	contractor	
	TagNumber			contractor	
	BarCode		Y	contractor	
	AssetIdentifier		Y	contractor	
	Installer		Y	contractor	additional parameter
	WarrantyExpirationDate		Y	contractor	additional parameter
	ExpectedTechnicalEndDate		Y	contractor	additional parameter
System	Name	Uniclass 2015 System Title	Y	design team	
	CreatedBy		Y	design team	
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	design team	
	Category	Uniclass 2015 System Code	Y	design team	
	ComponentNames	Every Component should be assigned to at least one System, identifying its function	Y	design team	
	ExtSystem	Automatically populated via design software	Y	design team	
	ExtObject	Automatically populated via design software	Y	design team	
	ExtIdentifier	Automatically populated via design software	Y	design team	
	Description		Y	design team	
Assembly	Name	Names should be unique within their sheet	Y	design team	
	CreatedBy		Y	design team	
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	design team	
	AssemblyType		Y	design team	
	SheetName			design team	
	ParentName			design team	
	ChildNames			design team	
	ExtSystem	Automatically populated via design software	Y	design team	
	ExtObject	Automatically populated via design software	Y	design team	
	ExtIdentifier	Automatically populated via design software	Y	design team	

	Description		Y	design team
Connection	Name	Names should be unique within their sheet		design team
	CreatedBy			design team
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)		design team
	ConnectionType			design team
	SheetName			design team
	RowName1			design team
	RowName2			design team
	RealizingElement			design team
	PortName1			design team
	PortName2			design team
	ExtSystem	Automatically populated via design software		design team
	ExtObject	Automatically populated via design software		design team
	ExtIdentifier	Automatically populated via design software		design team
	Description			design team
Spare	Name	Names should be unique within their sheet	Y	contractor
	CreatedBy		Y	contractor
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	contractor
	Category			contractor
	TypeName		Y	contractor
	Suppliers		Y	contractor
	ExtSystem	Automatically populated via design software	Y	contractor
	ExtObject	Automatically populated via design software	Y	contractor
	ExtIdentifier	Automatically populated via design software	Y	contractor
	Description		Y	contractor
	SetNumber			contractor
	PartNumber		Y	contractor
Resource	Name	Names should be unique within their sheet	Y	contractor
	CreatedBy		Y	contractor
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	contractor
	Category			contractor
	ExtSystem	Automatically populated via design software	Y	contractor
	ExtObject	Automatically populated via design software	Y	contractor
	ExtIdentifier	Automatically populated via design software	Y	contractor
	Description		Y	contractor
	Name	Names should be unique within their sheet	Y	contractor
	CreatedBy		Y	contractor
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	contractor

Job	Category		Y	contractor	
	Status		Y	contractor	
	TypeName		Y	contractor	
	Description		Y	contractor	
	Duration		Y	contractor	
	DurationUnit		Y	contractor	
	Start	Format as yyyy-mm-dd (i.e. 2016-05-29)	Y	contractor	
	TaskStartUnit		Y	contractor	
	Frequency	The duration between Job starts	Y	contractor	
	FrequencyUnit		Y	contractor	
	ExtSystem	Automatically populated via design software	Y	contractor	
	ExtObject	Automatically populated via design software	Y	contractor	
	ExtIdentifier	Automatically populated via design software	Y	contractor	
	TaskNumber			contractor	
	Priors		Y	contractor	
	ResourceNames		Y	contractor	
Impact	Name	Names should be unique within their sheet	Y	contractor	
	CreatedBy		Y	contractor	
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	contractor	
	ImpactType			contractor	
	ImpactStage			contractor	
	SheetName	Constant Impacts should be assigned to the Type or System (not the Component) and the Floor or Zone (not the Space)		contractor	
	RowName			contractor	
	Value		Y	contractor	
	ImpactUnit		Y	contractor	
	LeadInTime	Express in Years	Y	contractor	
	Duration	Express in Years	Y	contractor	
	LeadOutTime	Express in Years	Y	contractor	
	ExtSystem	Automatically populated via design software	Y	contractor	
	ExtObject	Automatically populated via design software	Y	contractor	
	ExtIdentifier	Automatically populated via design software	Y	contractor	
	Description		Y	contractor	
	Name	Names should be unique within their sheet	Y	contractor	
	CreatedBy		Y	contractor	
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)	Y	contractor	
	Category			contractor	
	ApprovalBy		Y	contractor	
	Stage		Y	contractor	

Document	SheetName	Constant documents should be assigned to the Type or System (not the Component) and the Floor or Zone (not the Space)		contractor	
	RowName			contractor	
	Directory			contractor	
	File	Include as a hyperlink or URL	Y	contractor	
	ExtSystem	Automatically populated via design software	Y	contractor	
	ExtObject	Automatically populated via design software	Y	contractor	
	ExtIdentifier	Automatically populated via design software	Y	contractor	
	Description		Y	contractor	
	Reference		Y	contractor	
Attribute	Name	Every Attribute-Name taken with Sheet-Name and Row-Name should be unique			
	CreatedBy				
	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)			
	Category				
	SheetName	Constant Attributes should be assigned to the Type or System (not the Component) and the Floor or Zone (not the Space)			
	RowName				
	Value				
	Unit				
	ExtSystem	Automatically populated via design software			
	ExtObject	Automatically populated via design software			
	ExtIdentifier	Automatically populated via design software			
	Description				
Coordinate	Name				
	CreatedBy				
	CreatedOn				
	Category				
	SheetName				
	RowName				
	CoordinateXAxis				
	CoordinateYAxis				
	CoordinateZAxis				
	ExtSystem	Automatically populated via design software			
	ExtObject	Automatically populated via design software			
	ExtIdentifier	Automatically populated via design software			
	ClockwiseRotation				
	ElevationalRotation				
	YawRotation				
	Name	Names should be unique within their sheet			
	CreatedBy				

Issue	CreatedOn	Format as yyyy-mm-ddThh:mm:ss (i.e. 2016-05-29T09:02:00)		
	Type			
	Risk			
	Chance			
	Impact			
	SheetName1			
	RowName1			
	SheetName2			
	RowName2			
	Description			
	Owner			
	Mitigation			
	ExtSystem	Automatically populated via design software		
	ExtObject	Automatically populated via design software		
	ExtIdentifier	Automatically populated via design software		

Maintainable asset register according the NRM system

	Element		Sub-element	Maintenance descriptor	Required	Critical	Vulnerable	Sensitive
1.1	Substructure	1	Standard foundations	Standard foundations				
1.1	Substructure	2	Specialist foundation systems	Underpinning - monitoring subsidence				
1.1	Substructure	3	Lowest floor construction	Gullies/floor outlets				
1.1	Substructure	3	Lowest floor construction	Prefabricated floor channels				
1.1	Substructure	3	Lowest floor construction	Internal manholes				
2.1	Frame	1	Steel frames	Frame - steel				
2.1	Frame	2	Space frames/decks	Frame - Space deck				
2.1	Frame	3	Concrete casings to steel frames	Frame concrete casings				
2.1	Frame	4	Concrete frames	Frame - concrete				
2.1	Frame	5	Timber frames	Frame - timber				
2.1	Frame	6	Specialist frames	Frames - specialist				
2.2	Upper floors	1	Floors	Upper floors - concrete				
2.2	Upper floors	1	Floors	Upper floors - pre-cast concrete decking systems				
2.2	Upper floors	1	Floors	Upper floors - timber				
2.2	Upper floors	1	Floors	Structural screeds				
2.2	Upper floors	2	Balconies	Purpose made balconies				
2.2	Upper floors	3	Drainage to balconies	Downpipes				
2.2	Upper floors	3	Drainage to balconies	Floor outlets				
2.3	Roof	1	Roof structure	Roof structure - pitched				
2.3	Roof	1	Roof structure	Thermal insulation				
2.3	Roof	1	Roof structure	Roof structure - flat				
2.3	Roof	2	Roof coverings	Roof covering				
2.3	Roof	2	Roof coverings	Photovoltaic device				
2.3	Roof	2	Roof coverings	Surface treatments				
2.3	Roof	2	Roof coverings	Roof paving				
2.3	Roof	2	Roof coverings	Green roofs/gardens				
2.3	Roof	2	Roof coverings	Roof planting				
2.3	Roof	3	Specialist roof systems	Specialist roof systems				
2.3	Roof	4	Roof drainage	Gutters				
2.3	Roof	4	Roof drainage	Syphonic roof drainage				
2.3	Roof	4	Roof drainage	Rainwater heads				
2.3	Roof	4	Roof drainage	Downpipes				
2.3	Roof	5	Roof lights, skylights and openings	Skylights				
2.3	Roof	5	Roof lights, skylights and openings	Pavement lights				
2.3	Roof	5	Roof lights, skylights and openings	Roof hatches				
2.3	Roof	5	Roof lights, skylights and openings	Access hatches				
2.3	Roof	5	Roof lights, skylights and openings	Smoke vents				
2.3	Roof	6	Roof features	Roof features				
2.4	Stairs and ramps	1	Stair/ramp structures	Stair/ramp structures				
2.4	Stairs and ramps	2	Stair/ramp finishes	Stair finishes				
2.4	Stairs and ramps	2	Stair/ramp finishes	Ramp finishes				
2.4	Stairs and ramps	3	Stair/ramp balustrades and handrails	Stair/ramp balustrades and handrails				
2.4	Stairs and ramps	4	Ladders/chutes/slides	Ladders/chutes/slides				
2.5	External walls	1	External enclosing walls above ground floor level	External walls				
2.5	External walls	1	External enclosing walls above ground floor level	Chimneys				
2.5	External walls	1	External enclosing walls above ground floor level	Curtain walling				
2.5	External walls	1	External enclosing walls above ground floor level	Safety barriers and the like				
2.5	External walls	2	External enclosing walls below ground floor level	External basement walls				
2.5	External walls	3	Solar/rain screening	Solar/rain screening				
2.5	External walls	4	External soffits	External soffits				
2.5	External walls	5	Subsidiary walls/balustrades and proprietary balconies	Subsidiary walls				
2.5	External walls	5	Subsidiary walls/balustrades and proprietary balconies	Balustrades and handrails				
2.5	External walls	5	Subsidiary walls/balustrades and proprietary balconies	Wall handrails				
2.5	External walls	5	Subsidiary walls/balustrades and proprietary balconies	Railings to parapets				
2.5	External walls	5	Subsidiary walls/balustrades and proprietary balconies	Juliet balconies				
2.5	External walls	5	Subsidiary walls/balustrades and proprietary balconies	Downpipes				
2.5	External walls	5	Subsidiary walls/balustrades and proprietary balconies	Floor outlets				
2.5	External walls	6	Façade access/cleaning systems	Window/façade cleaning cradles/access systems				
2.5	External walls	6	Façade access/cleaning systems	Combined façade/roof cleaning systems				
2.5	External walls	6	Façade access/cleaning systems	Building maintenance units				
2.5	External walls	6	Façade access/cleaning systems	Other façade access systems				
2.6	Windows and external doors	1	External windows	External windows				
2.6	Windows and external doors	1	External windows	Solar/rain screening				
2.6	Windows and external doors	1	External windows	Canopies				
2.6	Windows and external doors	1	External windows	Roller/sliding door				
2.6	Windows and external doors	1	External windows	Screen/shutters				
2.6	Windows and external doors	1	External windows	Blinds and shutters				
2.6	Windows and external doors	2	External doors	External doors				
2.6	Windows and external doors	2	External doors	Automatic door				
2.6	Windows and external doors	2	External doors	Screens and storm doors				
2.6	Windows and external doors	2	External doors	Solar/rain screening				
2.6	Windows and external doors	2	External doors	Revolving doors				
2.6	Windows and external doors	2	External doors	External shop (radiation specialist)front doors				
2.6	Windows and external doors	2	External doors	Roller/sliding shutter				

2.6	Windows and external doors	2	External doors	Garage doors				
2.6	Windows and external doors	2	External doors	Canopies				
2.6	Windows and external doors	2	External doors	Grilles (fixed and folding)				
2.7	Internal walls and partitions	1	Walls and partitions	Walls and partitions				
2.7	Internal walls and partitions	1	Walls and partitions	Borrowed lights and screens				
2.7	Internal walls and partitions	2	Balustrades and Handrails	Balustrades and Handrails				
2.7	Internal walls and partitions	3	Moveable room dividers	Moveable room dividers				
2.7	Internal walls and partitions	4	Cubicles	Cubicles				
2.8	Internal doors	1	Internal doors	Internal doors				
2.8	Internal doors	1	Internal doors	Sliding/folding doors				
2.8	Internal doors	1	Internal doors	Hatches				
2.8	Internal doors	1	Internal doors	Ironmongery				
2.8	Internal doors	1	Internal doors	Doors - fire resisting				
2.8	Internal doors	1	Internal doors	Roller/sliding doors				
3.1	Wall finishes	1	Wall finishes	Wall finishes				
3.2	Floor finishes	1	Finishes to floors	Floor finishes				
3.2	Floor finishes	2	Raised access floors	Raised access floor system				
3.3	Ceiling finishes	1	Finishes to ceilings	Ceiling finishes				
3.3	Ceiling finishes	2	Finishes to ceilings	False ceilings				
3.3	Ceiling finishes	3	Finishes to ceilings	Demountable suspended ceilings				
4.1	Fittings, furnishings and equipment	1	General fittings, furnishings and equipment	General fittings, furnishings and equipment				
4.1	Fittings, furnishings and equipment	1	General fittings, furnishings and equipment	Fire fighting equipment				
4.1	Fittings, furnishings and equipment	2	Domestic kitchen fittings and equipment	Domestic kitchen units				
4.1	Fittings, furnishings and equipment	2	Domestic kitchen fittings and equipment	Sinks, taps and the like				
4.1	Fittings, furnishings and equipment	2	Domestic kitchen fittings and equipment	Other kitchen fittings and equipment				
4.1	Fittings, furnishings and equipment	2	Domestic kitchen fittings and equipment	Catering equipment				
4.1	Fittings, furnishings and equipment	2	Domestic kitchen fittings and equipment	Refrigeration				
4.1	Fittings, furnishings and equipment	2	Domestic kitchen fittings and equipment	Dishwashers				
4.1	Fittings, furnishings and equipment	2	Domestic kitchen fittings and equipment	White goods				
4.1	Fittings, furnishings and equipment	3	Special purpose FF&E	Special purpose FF&E				
4.1	Fittings, furnishings and equipment	4	Signs/notices	Signs and notices				
4.1	Fittings, furnishings and equipment	6	Non-mechanical and non-electrical equipment	Disabled access equipment				
4.1	Fittings, furnishings and equipment	6	Non-mechanical and non-electrical equipment	Non-mechanical/electrical equipment				
4.1	Fittings, furnishings and equipment	6	Non-mechanical and non-electrical equipment	Ladders and the like				
4.1	Fittings, furnishings and equipment	7	Internal planting	Internal planting				
4.1	Fittings, furnishings and equipment	8	Bird and vermin control	Bird and vermin control				
4.1	Fittings, furnishings and equipment	8	Bird and vermin control	Bird repellent coatings				
5.1	Sanitary installations	1	Sanitary appliances	Sanitary Appliances				
5.1	Sanitary installations	1	Sanitary appliances	Showers				
5.1	Sanitary installations	1	Sanitary appliances	Shower Booster Pumps				
5.1	Sanitary installations	1	Sanitary appliances	Shower Valves				
5.1	Sanitary installations	1	Sanitary appliances	Drinking fountains				
5.1	Sanitary installations	1	Sanitary appliances	Taps and outlet fittings				
5.1	Sanitary installations	1	Sanitary appliances	Water Saving Devices				
5.1	Sanitary installations	1	Sanitary appliances	Controls and sensors				
5.1	Sanitary installations	1	Sanitary appliances	Shower Unit, including Shower Head and Hose				
5.1	Sanitary installations	2	Sanitary ancillaries	Hand Dryers				
5.1	Sanitary installations	2	Sanitary ancillaries	Paper towel dispensers				
5.1	Sanitary installations	2	Sanitary ancillaries	Sanitary Incinerators				
5.1	Sanitary installations	2	Sanitary ancillaries	Sanitary Macerators				
5.1	Sanitary installations	2	Sanitary ancillaries	Other sanitary fittings				
5.2	Services equipment	1	Services equipment	Catering equipment				
5.2	Services equipment	1	Services equipment	Food Storage Equipment				
5.2	Services equipment	1	Services equipment	Other Services Equipment				
5.3	Disposal installations	1	Foul drainage above ground	Foul drainage				
5.3	Disposal installations	1	Foul drainage above ground	Floor channels/gratings				
5.3	Disposal installations	1	Foul drainage above ground	Sump Pumps				
5.3	Disposal installations	2	Chemical, toxic and industrial liquid waste drainage	Pipework systems				
5.3	Disposal installations	2	Chemical, toxic and industrial liquid waste drainage	Traps, access points and rodding eyes				
5.3	Disposal installations	2	Chemical, toxic and industrial liquid waste drainage	Gullies				
5.3	Disposal installations	2	Chemical, toxic and industrial liquid waste drainage	Storage Tanks and Vessels				
5.3	Disposal installations	2	Chemical, toxic and industrial liquid waste drainage	Settlement Tanks				
5.3	Disposal installations	2	Chemical, toxic and industrial liquid waste drainage	Effluent treatment plant				
5.3	Disposal installations	2	Chemical, toxic and industrial liquid waste drainage	Dosing Equipment				
5.3	Disposal installations	2	Chemical, toxic and industrial liquid waste drainage	Sterilisation Equipment				
6.3	Disposal installations	3	Chemical, toxic and industrial liquid waste drainage	Thermal insulation				

5.3	Disposal installations	2	Chemical, toxic and industrial liquid waste drainage	Controls				
5.3	Disposal installations	2	Chemical, toxic and industrial liquid waste drainage	Monitoring equipment located externally				
5.3	Disposal installations	2	Chemical, toxic and industrial liquid waste drainage	Painting - Anticorrosion Treatment and Coating Systems				
5.3	Disposal installations	3	Refuse disposal	Refuse collection and disposal equipment				
5.3	Disposal installations	3	Refuse disposal	Incineration Plant				
5.3	Disposal installations	3	Refuse disposal	Safety devices				
5.4	Water installations	1	Mains water supply	Pipework systems				
5.4	Water installations	1	Mains water supply	Valves				
5.4	Water installations	1	Mains water supply	Meters				
5.4	Water installations	1	Mains water supply	Trace Heating				
5.4	Water installations	2	Cold water distribution	Pipework systems				
5.4	Water installations	3	Cold water distribution	Valves				
5.4	Water installations	2	Cold water distribution	Water-saving Devices				
5.4	Water installations	2	Cold water distribution	Taps				
5.4	Water installations	2	Cold water distribution	Pumps				
5.4	Water installations	3	Cold water distribution	Pressurisation expansion units				
5.4	Water installations	2	Cold water distribution	Pressure booster sets				
5.4	Water installations	2	Cold water distribution	Cold water storage tanks and cisterns				
5.4	Water installations	2	Cold water distribution	Trace Heating				
5.4	Water installations	2	Cold water distribution	Instrumentation and Control Components				
5.4	Water installations	2	Cold water distribution	Thermal insulation				
5.4	Water installations	2	Cold water distribution	Rainwater harvesting systems				
5.4	Water installations	2	Cold water distribution	Grey water collection systems				
5.4	Water installations	3	Hot water distribution	Hot water systems				
5.4	Water installations	3	Hot water distribution	Valves				
5.4	Water installations	3	Hot water distribution	Water Saving Devices				
5.4	Water installations	3	Hot water distribution	Taps				
5.4	Water installations	3	Hot water distribution	Pumps				
5.4	Water installations	3	Hot water distribution	Heat Exchangers				
5.4	Water installations	3	Hot water distribution	Heat Exchangers				
5.4	Water installations	3	Hot water distribution	Storage Cylinders and Calorifiers				
5.4	Water installations	3	Hot water distribution	Trace heating – pipework				
5.4	Water installations	3	Hot water distribution	Hot water storage vessels				
5.4	Water installations	3	Hot water distribution	Hot water storage vessels				
5.4	Water installations	3	Hot water distribution	Immersion heaters				
5.4	Water installations	3	Hot water distribution	Expansion tank				
5.4	Water installations	3	Hot water distribution	Water softeners				
5.4	Water installations	3	Hot water distribution	Instrumentation and controls				
5.4	Water installations	3	Hot water distribution	Thermal insulation				
5.4	Water installations	4	Local hot water distribution	Instantaneous water heaters				
5.4	Water installations	4	Local hot water distribution	Under-sink, multipoint amd over-sink units				
5.4	Water installations	5	Steam and condensate distribution	Steam services pipework systems				
6.4	Water installations	5	Steam and condensate distribution	Valves				
7.4	Water installations	5	Steam and condensate distribution	Steam reduction stations				
8.4	Water installations	5	Steam and condensate distribution	Condensate receivers				
9.4	Water installations	5	Steam and condensate distribution	Condensate pump sets				
10.4	Water installations	5	Steam and condensate distribution	Steam connection outlets				
11.4	Water installations	5	Steam and condensate distribution	Taps				
5.4	Water installations	5	Steam and condensate distribution	Heat Exchangers				
5.4	Water installations	5	Steam and condensate distribution	Storage cylinders and calorifiers				
5.4	Water installations	5	Steam and condensate distribution	Instrumentation and controls				
6.4	Water installations	5	Steam and condensate distribution	Thermal insulation				
5.5	Heat source	1	Heat source	Boilers - Biomass				
5.5	Heat source	1	Heat source	Boilers - Gas/Oil				
5.5	Heat source	1	Heat source	Boilers - Steam				
5.5	Heat source	1	Heat source	Boilers - Coal Fired				
5.5	Heat source	1	Heat source	Boilers - Electric				
5.5	Heat source	1	Heat source	Packaged Steam Generators				
5.5	Heat source	1	Heat source	Boiler - wood pellet				
5.5	Heat source	1	Heat source	Central (combined) heat and power (CHP) boiler plant				
5.5	Heat source	1	Heat source	Heat pumps				
5.5	Heat source	1	Heat source	Ground source heating				
5.5	Heat source	1	Heat source	Pumps/valves				
5.5	Heat source	1	Heat source	Non-storage calorifiers				
5.5	Heat source	1	Heat source	Solar thermal panels				
5.5	Heat source	1	Heat source	Other heat sources				
5.5	Heat source	1	Heat source	Tanks				
5.5	Heat source	1	Heat source	Instrumentation and controls				
5.5	Heat source	1	Heat source	Fans				
5.5	Heat source	1	Heat source	Gantries				
5.5	Heat source	1	Heat source	Flues				
5.6	Space heating and air conditioning	1	Central heating	Central heating system				
5.6	Space heating and air conditioning	1	Central heating	Pipework systems				
5.6	Space heating and air conditioning	1	Central heating	Heat emission units				
5.6	Space heating and air conditioning	1	Central heating	Under-floor heating				
5.6	Space heating and air conditioning	1	Central heating	Heat emitters				
5.6	Space heating and air conditioning	1	Central heating	Cable heating systems				
5.6	Space heating and air conditioning	1	Central heating	Plenum air-heating systems				
5.6	Space heating and air conditioning	1	Central heating	Valves				
5.6	Space heating and air conditioning	1	Central heating	Ductwork				

5.6	Space heating and air conditioning	1	Central heating	Grilles and diffusers				
5.6	Space heating and air conditioning	1	Central heating	Plate recuperator				
5.6	Space heating and air conditioning	1	Central heating	Thermal wheel				
5.6	Space heating and air conditioning	1	Central heating	Duct heater battery				
5.6	Space heating and air conditioning	1	Central heating	Cables				
5.6	Space heating and air conditioning	1	Central heating	Instrumentation and controls				
5.6	Space heating and air conditioning	1	Central heating	Thermal insulation				
5.6	Space heating and air conditioning	2	Local heating	Heat emitters				
5.6	Space heating and air conditioning	2	Local heating	Flues				
5.6	Space heating and air conditioning	2	Local heating	Instrumentation and controls				
5.6	Space heating and air conditioning	3	Central cooling	Chilled beams				
5.6	Space heating and air conditioning	3	Central cooling	Terminal units - Fan coils				
5.6	Space heating and air conditioning	3	Central cooling	Terminal units - VRV				
5.6	Space heating and air conditioning	3	Central cooling	Chillers				
5.6	Space heating and air conditioning	3	Central cooling	Refrigeration distribution system				
5.6	Space heating and air conditioning	3	Central cooling	Cooling towers				
5.6	Space heating and air conditioning	3	Central cooling	Pipework systems				
5.6	Space heating and air conditioning	3	Central cooling	Valves				
5.6	Space heating and air conditioning	3	Central cooling	Pumps				
5.6	Space heating and air conditioning	3	Central cooling	Distribution ductwork and fittings				
5.6	Space heating and air conditioning	3	Central cooling	Grilles, diffusers, fans				
5.6	Space heating and air conditioning	3	Central cooling	Filters				
5.6	Space heating and air conditioning	3	Central cooling	Air Handling Units				
5.6	Space heating and air conditioning	3	Central cooling	Instrumentation and controls				
5.6	Space heating and air conditioning	3	Central cooling	Thermal insulation				
5.6	Space heating and air conditioning	3	Central cooling	Grilles, fans, filters and other ancillary components of central cooling systems				
5.6	Space heating and air conditioning	4	Local cooling	Air conditioning units				
5.6	Space heating and air conditioning	4	Local cooling	Pipework systems				
5.6	Space heating and air conditioning	4	Local cooling	Valves				
5.6	Space heating and air conditioning	4	Local cooling	Ductwork systems				
5.6	Space heating and air conditioning	4	Local cooling	Grilles, diffusers, fans				
5.6	Space heating and air conditioning	4	Local cooling	Instrumentation and controls				
5.6	Space heating and air conditioning	5	Central heating and cooling	Termination units - fan coil units 1				
6.6	Space heating and air conditioning	6	Central heating and cooling	Termination units - VAV systems				
5.6	Space heating and air conditioning	5	Central heating and cooling	Chillers				
5.6	Space heating and air conditioning	5	Central heating and cooling	Pipework systems				
5.6	Space heating and air conditioning	5	Central heating and cooling	Valves				
5.6	Space heating and air conditioning	5	Central heating and cooling	Pumps				
5.6	Space heating and air conditioning	5	Central heating and cooling	Ductwork systems				
5.6	Space heating and air conditioning	5	Central heating and cooling	Grilles, diffusers, fans				
5.6	Space heating and air conditioning	5	Central heating and cooling	Air Handling Units				
5.6	Space heating and air conditioning	5	Central heating and cooling	Termination units - fan coil units 2				
5.6	Space heating and air conditioning	5	Central heating and cooling	Instrumentation and controls				
5.6	Space heating and air conditioning	5	Central heating and cooling	Thermal insulation				
5.6	Space heating and air conditioning	6	Local heating and cooling	Split systems				
5.6	Space heating and air conditioning	6	Local heating and cooling	Pipework systems				
5.6	Space heating and air conditioning	6	Local heating and cooling	Valves				

5.6	Space heating and air conditioning	6	Local heating and cooling	Pumps				
5.6	Space heating and air conditioning	6	Local heating and cooling	Ductwork systems				
5.6	Space heating and air conditioning	6	Local heating and cooling	Grilles, diffusers, fans				
5.6	Space heating and air conditioning	6	Local heating and cooling	Instrumentation and controls				
5.6	Space heating and air conditioning	6	Local heating and cooling	Thermal insulation				
5.6	Space heating and air conditioning	7	Central air conditioning	Plenum air-heating systems				
5.6	Space heating and air conditioning	7	Central air conditioning	Central air conditioning systems (CACS)				
5.6	Space heating and air conditioning	7	Central air conditioning	Humidifiers				
5.6	Space heating and air conditioning	7	Central air conditioning	Chillers				
5.6	Space heating and air conditioning	7	Central air conditioning	Air Handling Units				
5.6	Space heating and air conditioning	7	Central air conditioning	Terminal units				
5.6	Space heating and air conditioning	7	Central air conditioning	Pipework systems				
5.6	Space heating and air conditioning	7	Central air conditioning	Valves				
5.6	Space heating and air conditioning	7	Central air conditioning	Pumps				
5.6	Space heating and air conditioning	7	Central air conditioning	Ductwork systems				
5.6	Space heating and air conditioning	7	Central air conditioning	Grillers, diffusers, fans				
5.6	Space heating and air conditioning	7	Central air conditioning	Instrumentation and controls				
5.6	Space heating and air conditioning	7	Central air conditioning	Thermal insulation				
5.6	Space heating and air conditioning	8	Local air conditioning	Room air conditioning units				
5.6	Space heating and air conditioning	8	Local air conditioning	Pipework systems				
5.6	Space heating and air conditioning	8	Local air conditioning	Valves				
5.6	Space heating and air conditioning	8	Local air conditioning	Pumps				
5.6	Space heating and air conditioning	8	Local air conditioning	Ductwork systems				
5.6	Space heating and air conditioning	8	Local air conditioning	Grilles, diffusers, fans				
5.6	Space heating and air conditioning	8	Local air conditioning	Instrumentation and controls				
6.6	Space heating and air conditioning	9	Local air conditioning	Thermal insulation				
5.6	Space heating and air conditioning	8	Local air conditioning	Air curtains				
5.7	Ventilation	1	Central ventilation	Fans				
5.7	Ventilation	1	Central ventilation	Terminal units				
5.7	Ventilation	1	Central ventilation	Ductwork systems				
5.7	Ventilation	1	Central ventilation	Grilles, diffusers, filters				
5.7	Ventilation	1	Central ventilation	Pipeline systems				
5.7	Ventilation	1	Central ventilation	Valves				
5.7	Ventilation	1	Central ventilation	Pumps				
5.7	Ventilation	1	Central ventilation	Instrumentation and controls				
5.7	Ventilation	1	Central ventilation	Thermal insulation				
5.7	Ventilation	2	Local and special ventilation	Fans				
5.7	Ventilation	2	Local and special ventilation	Kitchen ventilation				
5.7	Ventilation	2	Local and special ventilation	Safety cabinet and fume cupboard extracts				
5.7	Ventilation	2	Local and special ventilation	Fume extracts				
5.7	Ventilation	2	Local and special ventilation	Dust collection unit				
5.7	Ventilation	2	Local and special ventilation	Anaesthetic gas extract				
5.7	Ventilation	2	Local and special ventilation	Cyclone systems				
5.7	Ventilation	2	Local and special ventilation	Car park ventilation				
5.7	Ventilation	2	Local and special ventilation	Ductwork systems				
5.7	Ventilation	2	Local and special ventilation	Grilles and diffusers				
5.7	Ventilation	2	Local and special ventilation	Instrumentation and controls				
5.7	Ventilation	3	Smoke Extract/ Control	Smoke extract/controls				
5.7	Ventilation	3	Smoke Extract/ Control	Automatic smoke compartmentalisation systems				
5.7	Ventilation	3	Smoke Extract/ Control	Fans				
5.7	Ventilation	3	Smoke Extract/ Control	Ductwork systems				
5.7	Ventilation	3	Smoke Extract/ Control	Grilles and diffusers				
5.8	Electrical installations	1	Electrical mains and sub-mains distribution	LV distribution				
5.8	Electrical installations	1	Electrical mains and sub-mains distribution	HV switch gear				
5.8	Electrical installations	1	Electrical mains and sub-mains distribution	LV switch gear and distribution boards				
5.8	Electrical installations	1	Electrical mains and sub-mains distribution	HV and LV cables and wiring				
5.8	Electrical installations	1	Electrical mains and sub-mains distribution	Conduit and cable trunking				
5.8	Electrical installations	1	Electrical mains and sub-mains distribution	Busbar trunking				
5.8	Electrical installations	1	Electrical mains and sub-mains distribution	Transformers				
5.8	Electrical installations	1	Electrical mains and sub-mains distribution	Feeder pillars, base units and the like				
5.8	Electrical installations	1	Electrical mains and sub-mains distribution	Surge protection				
5.8	Electrical installations	1	Electrical mains and sub-mains distribution	Electricity monitoring system				
6.8	Electrical installations	3	Power installations	General LV power installations				
5.8	Electrical installations	2	Power installations	Extra LV supply installations				
5.8	Electrical installations	2	Power installations	Direct current installations				
5.8	Electrical installations	2	Power installations	LV switch gear and distribution boards				

5.8	Electrical installations	2	Power installations	UPS system				
5.8	Electrical installations	2	Power installations	Cables and wiring				
5.8	Electrical installations	2	Power installations	Wiring and components				
5.8	Electrical installations	2	Power installations	Socket outlets				
5.8	Electrical installations	2	Power installations	Specialist power installations				
5.8	Electrical installations	3	Lighting installations	Light fittings - general				
5.8	Electrical installations	3	Lighting installations	Emergency Lighting				
5.8	Electrical installations	3	Lighting installations	External lighting				
5.8	Electrical installations	3	Lighting installations	LV switch gear and distribution boards				
5.8	Electrical installations	3	Lighting installations	Cables and wiring				
5.8	Electrical installations	3	Lighting installations	Conduits and cable trunking				
6.8	Electrical installations	3	Lighting installations	Fittings to lighting points				
5.8	Electrical installations	3	Lighting installations	Lighting switches				
5.8	Electrical installations	3	Lighting installations	Luminaires and lamps				
5.8	Electrical installations	3	Lighting installations	Lighting control equipment				
5.8	Electrical installations	4	Specialist lighting installations	Illuminated display signs				
5.8	Electrical installations	4	Specialist lighting installations	Studio lighting				
5.8	Electrical installations	4	Specialist lighting installations	Auditorium lighting				
5.8	Electrical installations	4	Specialist lighting installations	Arena lighting				
5.8	Electrical installations	4	Specialist lighting installations	Operating theatre and other specialist lighting				
5.8	Electrical installations	4	Specialist lighting installations	LV switch gear and distribution boards				
5.8	Electrical installations	4	Specialist lighting installations	Cables and wiring				
5.8	Electrical installations	4	Specialist lighting installations	Conduits and cable trunking				
5.8	Electrical installations	4	Specialist lighting installations	Fittings to lighting points				
5.8	Electrical installations	4	Specialist lighting installations	Switches				
5.8	Electrical installations	4	Specialist lighting installations	Luminaires/lamps				
5.8	Electrical installations	4	Specialist lighting installations	Lighting gantries				
5.8	Electrical installations	4	Specialist lighting installations	Lighting control equipment				
5.8	Electrical installations	5	Local electricity generation systems	Standby generator				
5.8	Electrical installations	5	Local electricity generation systems	Ancillary components				
5.8	Electrical installations	5	Local electricity generation systems	Wind turbines				
5.8	Electrical installations	5	Local electricity generation systems	Photovoltaic devices				
5.8	Electrical installations	5	Local electricity generation systems	Solar collectors devices and the like				
5.8	Electrical installations	5	Local electricity generation systems	Other transformation devices				
5.8	Electrical installations	5	Local electricity generation systems	Photovoltaic devices				
5.8	Electrical installations	5	Local electricity generation systems	Electricity generation systems				
5.8	Electrical installations	6	Earthing and bonding systems	Earthing and bonding cables				
5.8	Electrical installations	6	Earthing and bonding systems	Protective conductor and earth				
5.8	Electrical installations	6	Earthing and bonding systems	Hazardous area (electrics) earthing				
5.9	Fuel installations	1	Fuel storage	Fuel systems				
5.9	Fuel installations	1	Fuel storage	Fuel storage tanks and vessels				
5.9	Fuel installations	1	Fuel storage	Thermal insulation				
5.9	Fuel installations	2	Fuel distribution systems	Fuel systems				
5.9	Fuel installations	2	Fuel distribution systems	Pipework systems				
5.9	Fuel installations	2	Fuel distribution systems	Pumps, valves				
5.9	Fuel installations	2	Fuel distribution systems	Gas distribution components				
5.9	Fuel installations	2	Fuel distribution systems	Terminal control equipment				
5.9	Fuel installations	2	Fuel distribution systems	Monitoring equipment				
5.10	Lifts and conveyor installations	1	Lifts and enclosed hoists	Lifts				
5.10	Lifts and conveyor installations	1	Lifts and enclosed hoists	Firefighting lifts				
5.10	Lifts and conveyor installations	1	Lifts and enclosed hoists	Wall-climbing lifts				
5.10	Lifts and conveyor installations	1	Lifts and enclosed hoists	Gantries, trolley blocks and the like				
5.10	Lifts and conveyor installations	1	Lifts and enclosed hoists	Controls and electrical works				
5.10	Lifts and conveyor installations	1	Lifts and enclosed hoists	Hoists				
5.10	Lifts and conveyor installations	2	Escalators	Escalators				
5.10	Lifts and conveyor installations	2	Escalators	Ancillary components				
5.10	Lifts and conveyor installations	2	Escalators	Controls and electrical works				
5.10	Lifts and conveyor installations	3	Moving pavements	Moving Pavements				
5.10	Lifts and conveyor installations	3	Moving pavements	Travelators				
5.10	Lifts and conveyor installations	3	Moving pavements	Stair lifts				
5.10	Lifts and conveyor installations	3	Moving pavements	Controls and electrical works				
5.10	Lifts and conveyor installations	4	Powered stair lifts	Powered stair lifts				
5.10	Lifts and conveyor installations	4	Powered stair lifts	Controls and electrical works				
5.10	Lifts and conveyor installations	5	Conveyors	Conveyor systems				
5.10	Lifts and conveyor installations	5	Conveyors	Specialist systems				
5.10	Lifts and conveyor installations	5	Conveyors	Controls and electrical works				
5.10	Lifts and conveyor installations	6	Dock levellers and scissor lifts	Dock levellers				
5.10	Lifts and conveyor installations	6	Dock levellers and scissor lifts	Scissor lifts				
5.10	Lifts and conveyor installations	6	Dock levellers and scissor lifts	Controls and electrical works				
5.10	Lifts and conveyor installations	7	Cranes and unenclosed hoists	Cranes				
5.10	Lifts and conveyor installations	7	Cranes and unenclosed hoists	Travelling cranes				
5.10	Lifts and conveyor installations	7	Cranes and unenclosed hoists	Unenclosed hoists and cradles				
5.10	Lifts and conveyor installations	7	Cranes and unenclosed hoists	Controls and electrical works				
5.10	Lifts and conveyor installations	8	Car, lifts, car systems, turntables	Car lifts and car stacking systems				
5.10	Lifts and conveyor installations	8	Car, lifts, car systems, turntables	Vehicle turntables				
5.10	Lifts and conveyor installations	8	Car, lifts, car systems, turntables	Controls and electrical works				
5.10	Lifts and conveyor installations	9	Document handling systems	Document handling systems				
5.10	Lifts and conveyor installations	9	Document handling systems	Warehouse picking systems				
5.10	Lifts and conveyor installations	9	Document handling systems	Controls and electrical works				
5.10	Lifts and conveyor installations	10	Other transport systems	Paternoster lifts				
5.10	Lifts and conveyor installations	10	Other transport systems	Hoists for moving people with disability				
5.10	Lifts and conveyor installations	10	Other transport systems	Other transport systems				
5.10	Lifts and conveyor installations	10	Other transport systems	Controls and electrical works				
5.11	Fire and lightning protection	1	Fire fighting systems	Fire hose real system				
5.11	Fire and lightning protection	1	Fire fighting systems	Dry riser				
5.11	Fire and lightning protection	1	Fire fighting systems	Wet riser				
5.11	Fire and lightning protection	1	Fire fighting systems	Pipework systems				
5.11	Fire and lightning protection	1	Fire fighting systems	Pipework systems				
5.11	Fire and lightning protection	1	Fire fighting systems	Thermal insulation				
5.11	Fire and lightning protection	1	Fire fighting systems	Control components				
5.11	Fire and lightning protection	1	Fire fighting systems	Fire and smoke protection curtains				
5.11	Fire and lightning protection	2	Fire suppression systems	Sprinkler system				
5.11	Fire and lightning protection	2	Fire suppression systems	Deluge system				
5.11	Fire and lightning protection	2	Fire suppression systems	Gas Firefighting Systems				

5.11	Fire and lightning protection	2	Fire suppression systems	Foam dispensing firefighting system				
5.11	Fire and lightning protection	2	Fire suppression systems	Foam dispensing firefighting system				
5.11	Fire and lightning protection	2	Fire suppression systems	Pipework systems				
5.11	Fire and lightning protection	2	Fire suppression systems	Tanks and cisterns				
6.11	Fire and lightning protection	3	Fire suppression systems	Thermal insulation				
7.11	Fire and lightning protection	4	Fire suppression systems	Control components				
5.11	Fire and lightning protection	3	Lightning protection	Lighting Protection				
5.12	Communications, security and control systems	1	Communication systems	Telecommunication systems				
5.12	Communications, security and control systems	1	Communication systems	Data transmission systems				
5.12	Communications, security and control systems	1	Communication systems	Paging and emergency call systems				
5.12	Communications, security and control systems	1	Communication systems	Public Address and conference audio system				
5.12	Communications, security and control systems	1	Communication systems	Radio systems				
5.12	Communications, security and control systems	1	Communication systems	Projection systems				
5.12	Communications, security and control systems	1	Communication systems	Fire detection and alarm systems				
5.12	Communications, security and control systems	1	Communication systems	Smoke detection				
5.12	Communications, security and control systems	1	Communication systems	Liquid detection alarms				
5.12	Communications, security and control systems	1	Communication systems	Clocks				
5.12	Communications, security and control systems	1	Communication systems	Door entry systems				
5.12	Communications, security and control systems	2	Communication systems	Radios				
5.12	Communications, security and control systems	1	Communication systems	Television systems				
5.12	Communications, security and control systems	1	Communication systems	Pneumatic message system				
5.12	Communications, security and control systems	1	Communication systems	Other communication systems				
5.12	Communications, security and control systems	2	Security systems	Surveillance equipment				
5.12	Communications, security and control systems	2	Security systems	Security detection equipment				
5.12	Communications, security and control systems	2	Security systems	Security alarm equipment				
5.12	Communications, security and control systems	2	Security systems	Access control systems				
5.12	Communications, security and control systems	2	Security systems	Burglar and security alarms				
5.12	Communications, security and control systems	2	Security systems	Door entry systems				
5.12	Communications, security and control systems	2	Security systems	Security lighting and lighting systems				
5.12	Communications, security and control systems	2	Security systems	Other security systems				
5.12	Communications, security and control systems	3	Central control/BMS	Control panels				
5.12	Communications, security and control systems	3	Central control/BMS	BMS and central operating station systems				
5.12	Communications, security and control systems	3	Central control/BMS	Controlling terminal units and switches				
5.12	Communications, security and control systems	3	Central control/BMS	Control cabling and containment				
5.12	Communications, security and control systems	3	Central control/BMS	Compressed air and vacuum operating controls				
5.12	Communications, security and control systems	3	Central control/BMS	Computer-aided facilities management systems				
5.12	Communications, security and control systems	3	Central control/BMS	Central control/building management systems				
5.13	Specialist installations	1	Specialist piped supply systems	Medical and laboratory gas supply systems				
5.13	Specialist installations	1	Specialist piped supply systems	Centralised vacuum cleaning systems				
5.13	Specialist installations	1	Specialist piped supply systems	Treated water systems				
5.13	Specialist installations	1	Specialist piped supply systems	Swimming pool water treatment systems				
5.13	Specialist installations	1	Specialist piped supply systems	Compressed air systems				
5.13	Specialist installations	1	Specialist piped supply systems	Other specialist piped supply systems				
5.13	Specialist installations	1	Specialist piped supply systems	Pipework systems				
5.13	Specialist installations	1	Specialist piped supply systems	Air duct lines, duct line ancillaries and fittings				
5.13	Specialist installations	1	Specialist piped supply systems	Thermal insulation				
5.13	Specialist installations	1	Specialist piped supply systems	Silencers and acoustic treatment				
5.13	Specialist installations	1	Specialist piped supply systems	Control components				
5.13	Specialist installations	2	Specialist refrigeration systems	Cold rooms				
5.13	Specialist installations	2	Specialist refrigeration	Ice pads				
5.13	Specialist installations	2	Specialist refrigeration	Other specialist refrigeration systems				
5.13	Specialist installations	3	Specialist mechanical installations	Wave machines				
5.13	Specialist installations	3	Specialist mechanical installations	Saunas				
5.13	Specialist installations	3	Specialist mechanical installations	Jacuzzis				
5.13	Specialist installations	3	Specialist mechanical installations	Swimming pools				
5.13	Specialist installations	3	Specialist mechanical installations	Other specialist installations				
5.13	Specialist installations	4	Specialist electrical/electrical installations	Radio and television studio equipment				
5.13	Specialist installations	4	Specialist electrical/electrical installations	Recording studio equipment				
5.13	Specialist installations	4	Specialist electrical/electrical installations	Television aerial and satellite systems				
5.13	Specialist installations	4	Specialist electrical/electrical installations	Home cinemas				
5.13	Specialist installations	4	Specialist electrical/electrical installations	Multi-room audio and video				
5.13	Specialist installations	4	Specialist electrical/electrical installations	Automated curtains and blinds				
5.13	Specialist installations	5	Water features	Water features				

5.13	Specialist installations	5	Water features	Water filtration equipment				
5.13	Specialist installations	5	Water features	Nutrient treatment and equipment				
5.13	Specialist installations	5	Water features	Control components				
8.2	Roads, paths, pavings and surfacings	1	Roads, paths and pavings	Roads - condition inspections				
9.2	Roads, paths, pavings and surfacings	1	Roads, paths and pavings	Paths - paving slabs				
8.2	Roads, paths, pavings and surfacings	1	Roads, paths and pavings	Paved areas				
8.2	Roads, paths, pavings and surfacings	1	Roads, paths and pavings	Roundabouts				
8.2	Roads, paths, pavings and surfacings	1	Roads, paths and pavings	Road crossings				
8.2	Roads, paths, pavings and surfacings	1	Roads, paths and pavings	Steps				
8.2	Roads, paths, pavings and surfacings	1	Roads, paths and pavings	Ramps				
8.2	Roads, paths, pavings and surfacings	1	Roads, paths and pavings	Pavement markings				
8.2	Roads, paths, pavings and surfacings	2	Special surfacings and pavings	Special surfacings and pavings				
8.3	Soft landscaping, planting and irrigation systems	1	Seeding and turfing	Seeding and turfing				
8.3	Soft landscaping, planting and irrigation systems	2	External planting	External planting				
8.3	Soft landscaping, planting and irrigation systems	2	External planting	Shrubs and hedges				
8.3	Soft landscaping, planting and irrigation systems	2	External planting	Tree maintenance				
8.3	Soft landscaping, planting and irrigation systems	2	External planting	Hedge maintenance				
8.3	Soft landscaping, planting and irrigation systems	3	Irrigation system	Irrigation system				
8.4	Fencing, railings and walls	1	Fencing and railing	Fencing				
8.4	Fencing, railings and walls	1	Fencing and railing	Railings				
8.4	Fencing, railings and walls	1	Fencing and railing	Gates				
8.4	Fencing, railings and walls	1	Fencing and railing	Security gates				
8.4	Fencing, railings and walls	1	Fencing and railing	Ironmongery				
8.4	Fencing, railings and walls	2	Walls and screens	Walls				
8.4	Fencing, railings and walls	2	Walls and screens	Pier caps				
8.4	Fencing, railings and walls	2	Walls and screens	Copings				
8.4	Fencing, railings and walls	2	Walls and screens	Screens				
8.4	Fencing, railings and walls	2	Walls and screens	Gates				
8.4	Fencing, railings and walls	2	Walls and screens	Security gates				
8.4	Fencing, railings and walls	3	Retaining walls	Retaining walls				
8.4	Fencing, railings and walls	4	Barriers and guardrails	Barriers and guardrails				
8.5	External fixtures	1	Site/street furniture and equipment	Gates				
8.5	External fixtures	1	Site/street furniture and equipment	Turnstiles				
8.5	External fixtures	1	Site/street furniture and equipment	Bollards				
8.5	External fixtures	1	Site/street furniture and equipment	Poster display units/notice boards				
8.5	External fixtures	1	Site/street furniture and equipment	Directional signage				
8.5	External fixtures	1	Site/street furniture and equipment	Flagpoles				
8.5	External fixtures	1	Site/street furniture and equipment	Sports/playground equipment				
8.5	External fixtures	1	Site/street furniture and equipment	Other furniture				
8.5	External fixtures	1	Site/street furniture and equipment	Bus stops/shelters				
8.5	External fixtures	1	Site/street furniture and equipment	Sculptures				
8.5	External fixtures	2	Ornamental features	Water Features				
8.5	External fixtures	2	Ornamental features	Ornamental features				
8.6	External drainage	1	Surface water and foul water drainage	Surface water and foul water drainage				
8.6	External drainage	1	Surface water and foul water drainage	Gullies and gratings				
8.6	External drainage	1	Surface water and foul water drainage	Drainage runs, below ground				
8.6	External drainage	1	Surface water and foul water drainage	Packaged pumping stations				
8.6	External drainage	1	Surface water and foul water drainage	Drainage runs, above ground				
8.6	External drainage	1	Surface water and foul water drainage	Septic tanks				
8.6	External drainage	1	Surface water and foul water drainage	Petrol interceptor units				
8.6	External drainage	1	Surface water and foul water drainage	Retention/storage tanks and vessels				
8.6	External drainage	1	Surface water and foul water drainage	Interceptor traps and fresh-air inlets, and air-release and wash-out valves to pressure pipelines				
8.6	External drainage	1	Surface water and foul water drainage	Manholes and the like				
8.6	External drainage	1	Surface water and foul water drainage	Clearing drains				
8.6	External drainage	2	Ancillary drainage systems	Ancillary drainage systems				
8.6	External drainage	3	External chemical, toxic and industrial liquid waste drainage	External chemical, toxic and industrial liquid waste drainage				
8.6	External drainage	3	External chemical, toxic and industrial liquid waste drainage	Storage tanks				
8.6	External drainage	3	External chemical, toxic and industrial liquid waste drainage	Settlement tanks				
8.6	External drainage	3	External chemical, toxic and industrial liquid waste drainage	Effluent treatment				
8.6	External drainage	3	External chemical, toxic and industrial liquid waste drainage	Dosing equipment				
8.6	External drainage	3	External chemical, toxic and industrial liquid waste drainage	Sterilisation equipment				
8.6	External drainage	3	External chemical, toxic and industrial liquid waste drainage	Control components				
8.6	External drainage	3	External chemical, toxic and industrial liquid waste drainage	Monitoring equipment				
8.6	External drainage	4	Land drainage	Land drainage				
8.7	External services	1	Water mains supply	Water mains supply				
8.7	External services	1	Water mains supply	Hydrants				
8.7	External services	1	Water mains supply	Trace heating				
8.7	External services	1	Water mains supply	Thermal insulation				
8.7	External services	1	Water mains supply	Rainwater harvesting systems				

8.7	External services	1	Water mains supply	Grey water systems				
8.7	External services	2	Electricity mains supply	Electricity mains supply				
8.7	External services	2	Electricity mains supply	Transformer stations				
8.7	External services	2	Electricity mains supply	Generator plant				
8.7	External services	3	External transformation devices	External transformation devices				
8.7	External services	3	External transformation devices	Generator plant				
8.7	External services	4	Electricity distribution to external plant and equipment	Electricity distribution to external plant and equipment				
8.7	External services	4	Electricity distribution to external plant and equipment	UPS				
8.7	External services	4	Electricity distribution to external plant and equipment	Earthing and bonding				
8.7	External services	5	Gas mains supply	Gas mains supply				
8.7	External services	6	Telecoms and other communication system connections	Telecoms and other communication system connections				
8.7	External services	7	External fuel storage and piped distribution systems	Fuel storage and piped distribution systems				
8.7	External services	7	External fuel storage and piped distribution systems	Thermal insulation				
8.7	External services	7	External fuel storage and piped distribution systems	Monitoring equipment				
8.7	External services	8	External security systems	External security systems				
8.7	External services	9	Site/street lighting systems	Site/street lighting systems				
8.7	External services	10	Local/district heating installations	Local/district heating installations				
8.7	External services	11	Builder's work in connection with external services	Builder's work in connection with external services				
8.8	Minor building works and ancillary buildings	2	Ancillary buildings and structures	Ancillary buildings and structures				

Appendix D | Using the plain language questions guide

Background

Formal information exchanges represent key gateways in the project and/or are points at which milestone activities/decisions are undertaken (for example financial approval, regulation/licencing application submission, appointment of contractors etc.).

An information exchange can represent issue of information from the Client to the design and construction team and vice versa. This approach enables the Client to make sure they are confident about a project via its models, data and information before moving forwards into the next stage or activity.

It is useful for information exchanges to be presented with a rationale, giving the design and construction team an insight into gateway/ activates/decisions the information exchange is supporting. As well as this rationale, Plain Language Questions (PLQs) can be introduced with each exchange so that the design and construction team understand the detailed requirements of the information exchange and can determine how best to respond. The PLQs also offer a means of evaluation of the information exchange.

The timing and nature of an information exchange and the PLQs included against an information exchange will be specific to a project.

How to use this guide

The PLQs provided in this guide are examples only. It is not suggested that you adopt any or all of them, rather that they are used to help you decide what the appropriate PLQs are for your project and its constituent stages.

The PLQs are presented against the four constant stages of a construction project:

1 Review the PLQs against each relevant stage:
   Briefing
   Design
   Construction
   Operation

2 Identify the PLQs appropriate to your project
3 Amend the wording of the PLQs as required
4 Supplement the PLQs as required
5 Collate the project PLQs splitting them between PLQs relating to the Asset Information Requirements and PLQs relating to the Employer's Information Requirements as you think appropriate
6 Allocate the PLQs to the correct stage of the construction project
7 Break down each construction project stage into a recognised plan of work if a plan of work is adopted for the project
8 Present the PLQs against each stage for inclusion in the Asset Information Requirements and/or the Employer's Information Requirements

Hints and tips

1 If you want to create an audit trail of responses it is useful to repeat the same PLQ across multiple stages and introduce related PLQs. For example, if understanding the capital cost throughout the project is important, it is worth repeating the PLQ: *What is the capital cost estimate* within the Briefing and Design stages and then introducing PLQs considering the contract sum and final account in the Design, Construction and Operation stages.
2 Identifying the PLQ category will help you and design and construction team members focus on the purpose of the PLQ.
3 If you want the party responding to the PLQ to come up with the most appropriate means of responding, avoid providing an indication of the response expected within the wording of the PLQ (for example, avoid PLQ wording such as *What is the capital cost according to the current cost plan?)* .
4 You may wish to provide further rationale behind each PLQ, if the PLQ in itself doesn't sufficiently convey requirements.
5 Don't word PLQs so that they can be responded with 'yes' or 'no' (remember you are trying to create evidence of the response using the project models, data and information).
6 Try not to have too many PLQs; focus on what is important in order to progress the project based on a sound, evidenced basis.
7 PLQs are particularly helpful if you are implementing Soft Landings; they can help ensure that operational performance measures are primary, consistent consideration in briefing, design development, construction on site and preparation for handover.

Examples for inclusion in Information Requirements

Example PLQs using the four stages of a project as information exchange points (table)

Back to instructions

	Project stage	Briefing	Design	Construction	Operation
PLQ category	**PLQ**				
Change	What is the change control process?	√			
Change	How is the change control process being implemented to enable the client to effectively review, endorse or decline change requests?		√	√	
Financial	What is the capital cost estimate?	√			
Financial	How does the capital cost estimate compare to previous estimates?		√		
Financial	How does the forecast final account compare to the contract sum?			√	√
Performance	What are the performance measures to be adopted for design and construction?	√	√		
Performance	To what extent/how are the construction performance measures being met?			√	

Example PLQs using the four stages of a project plus a plan of work as information exchange points (table)

	Project stage	Briefing	Design				Construction		Operation
	Plan of work stage	0	1	2	3	4	5	6	7
PLQ category	**PLQ**								
Change	What is the change control process?	√							
Change	How is the change control process being implemented to enable the client to effectively review, endorse or decline change requests?		√	√	√	√	√	√	
Financial	What is the capital cost estimate?	√	√	√	√	√			
Financial	How does the capital cost estimate compare to previous estimates?		√	√	√	√			
Financial	How does the forecast final account compare to the contract sum?						√	√	√
Performance	What are the performance measures to be adopted for design and construction?	√	√	√	√	√			
Performance	To what extent/how are the construction performance measures being met?						√	√	

Example PLQs using the four stages of a project as information exchange points (text)

Briefing stage PLQs

PLQ category	**PLQ**
Change	What is the change control process?
Financial	What is the capital cost estimate?
Performance	What are the performance measures to be adopted for design and construction?

Design stage PLQs

PLQ category	**PLQ**
Change	How is the change control process being implemented to enable the client to effectively review, endorse or decline change requests?
Financial	How does the capital cost estimate compare to previous estimates?
Performance	What are the performance measures to be adopted for design and construction?

Construction stage PLQs

PLQ category	**PLQ**
Financial	How does the forecast final account compare to the contract sum?
Performance	To what extent/how are the construction performance measures being met?

Operation stage PLQs

PLQ category	**PLQ**
Financial	How does the forecast final account compare to the contract sum?

Possible PLQs to support the Briefing stage

Back to instructions

PLQ category	PLQ
Change	What is the change control process?
Design	How has the design standardisation policy been defined?
Design	What is the scope of works?
Financial	What is the initial view of revenue (FM) cost?
Financial	What is the initial view of revenue income?
Financial	What is the capital cost estimate?
Financial	How will the whole life cost be assessed?
Lessons	What lessons have been learnt from previous projects?
Lessons	How have lessons learnt been incorporated into the briefing stage?
Model, data and information	How is the model, data and information strategy being managed and exploited?
Model, data and information	What is the information management strategy?
Model, data and information	What is the means of controlling distribution of files and information?
Model, data and information	What is the quality assurance and monitoring system?
Model, data and information	Is there sufficient information to achieve a reliable tender?
Model, data and information	Have the purposes for which the models will be used been defined?
Operation	What is the primary information needed to maintain and operate the completed asset
Performance	What are the performance measures to be adopted to support post occupancy evaluation?
Performance	What are the performance measures to be adopted for design and construction?
Regulation	What are the statutory and mandated approval requirements?
Risk	What are the project risks?
Safety	What site specific safety considerations need to be made?
Site	What is the available site?
Site	What physical constraints are there on and around the site?
Site	What other data about the site/asset is available from client records?
Stakeholders	How are stakeholder needs captured?
Strategy	How will each site or design option be appraised?
Utility services	What services constraints (water, drainage, electricity etc) exist?

Possible PLQs to support the Design stage

Back to instructions

PLQ category	PLQ
Change	How is the proposal still compliant with the brief?
Change	What, if any, are the deviations from, or proposals to improve the brief?
Change	How have changes been incorporated and are they traceable?
Change	What is the change control process?
Change	How is the change control process being implemented to enable the client to effectively review, endorse or decline change requests?
Communication	How is communication being managed in accordance with the Employer's Information Requirements?
Communication	How is evidence to support claims being presented?
Design	How has the design standardisation policy been defined?
Design	What is the scope of the design?
Design	How can the design be constructed?
Design	What is the proposal for structural design?
Design	How does the design demonstrate the elevational treatments?
Design	How does the design demonstrate detailed proposals to enable co-ordinated design?
Design	How does the design demonstrate detailed proposals for site layout?
Design	How does the design demonstrate detailed proposals for environmental systems?
Design	How does the design demonstrate planning and spatial arrangement?
Design	How does the design meet statutory and mandated requirements?
Design	How does the design demonstrate the ability to meet sustainability requirements?
Design	How is there sufficient design information to support supply chain tendering?
Design	How has the concept been designed for efficient manufacture and reassembly?
Design	To what extent are the design models co-ordinated?
Design	How does the design demonstrate detailed proposals for construction systems?
Design	How does the design demonstrate detailed proposals for buildability?
Design	Is the design principle in accordance with the approved concept?
Design	Is the design progressing in accordance with the contractor procurement strategy?
Design	How is there sufficient design information to agree the project lump sum?
Design	How are the spaces clearly defined and sign posted?
Design	How does the design demonstrate room/space equipment requirements?
Energy	How has a systems methodology for measuring energy in use and CO2 emissions been incorporated into the design?
Energy	What is the forecast volume of energy in-use (gas, water, electricity)?
Energy	How have the calculations in relation to any energy related planning conditions been completed?
Energy	How does the forecast volume of energy in-use (gas, water, electricity) cmpare to previous forecasts?
Financial	What is the capital cost estimate?
Financial	How does the capital cost estimate compare to previous estimates?
Financial	What is the whole life cost estimate?
Financial	How does the whole life cost estimate compare to previous estimates?
Financial	How will the whole life cost be assessed?
Financial	What is the forecast cash flow?
Financial	How is the cash flow forecast reliable?
Financial	What are the forecast life cycle replacement costs?
Financial	What is the contract sum?
Lessons	What lessons have been learnt from previous projects?
Lessons	What are the lessons learnt?
Lessons	How have lessons learnt been incorporated?
Logistics	How will logistics requirements be met?
Logistics	How will any temporary decant of personnel and activities be managed?
Logistics	What is the principle means of pedestrian and vehicle access, external movement and vehicle parking?
Model, data and information management	How is the model, data and information strategy being managed and exploited?
Model, data and information management	What is the information management strategy?
Model, data and information management	What is the means of controlling distribution of files and information?

Model, data and information management	How are the models supporting the model use requirements?
Model, data and information management	How are the models being developed in accordance with the model production and delivery table?
Model, data and information management	How is the information being delivered in accordance with the information delivery plan?
Model, data and information management	What is the quality assurance and monitoring system?
Model, data and information management	Is there sufficient information to achieve a reliable tender?
Model, data and information management	Have the purposes for which the models will be used been defined?
Model, data and information management	To what extent is COBie populated?
Operation	What is the information needed to maintain and operate the completed asset?
Operation	What is the training, commissioning and aftercare strategy?
Operation	How is the facility to be operated and maintained?
Performance	What are the performance measures to be adopted to support post occupancy evaluation?
Performance	What are the performance measures to be adopted for design and construction?
Performance	What are the performance objectives?
Performance	Will the project still be delivered by the required completion date?
Performance	How are stakeholder requirements incorporated into the design?
Programme	What is the anticipated design and construction programme?
Programme	What are the risks to the design and construction programme?
Regulation	What are the statutory and mandated approval requirements?
Regulation	How does the design meet the statutory and mandated requirements?
Regulaton	What are the exemptions from statutory and mandated requirements?
Risk	What are the project risks?
Risk	How is project risk being identified, evaluated and managed?
Risk	How does the current project risk riks profile compare to the previous?
Safety	What site specific safety considerations need to be made?
Safety	How is the design safe to construct and use?
Safety	What is the health and safety information required for operation and maintenance of the asset?
Security	How will security requirements be met?
Security	How is management of model, data and information in accordance with requirements?
Security	How will the construction site be managed securely?
Security	Is there appropriate management of information detailing sensitive asset and system selection and connectivity?
Security	Are measures being applied for the secure migration of asset data and information?
Site	What is the available site?
Site	What physical constraints are there on and around the site?
Site	What site information is to be provided?
Strategy	How is each site or design option being appraised?
Strategy	How will the project be procured?
Utility services	What services constraints (water, drainage, electricity etc) exist?
Utility services	What is the generic services philosophy (passive, natural ventilation, % renewable energy, etc?)
Utility services	What is the methodology for ensuring existing utlility services interface with the new works?

Possible PLQs to support the Construction stage

Back to instructions

PLQ category	
Change	How is the proposal still compliant with the brief?
Change	What, if any, are the deviations from, or proposals to improve the brief?
Change	How have changes been incorporated and are they traceable?
Change	How have changes been incorporated into emergency and operational procedures
Change	How is the change control process being implemented to enable the client to effectively review, endorse or decline change requests?
Communication	How is communication being managed in accordance with the Employer's Information Requirements?
Communication	How is client witnessing of commissioned work being scheduled?
Communication	How is evidence to support claims being presented?
Design	How does the construction meet statutory and mandated requirements?
Design	How does the construction meet sustainability requirements?
Design	To what extent are the design/construction models co-ordinated?
Energy	How will the systems support the measurement of energy in use and CO2 emissions?
Energy	What is the forecast volume of energy in-use (gas, water, electricity)?
Energy	How have the calculations in relation to any energy related planning conditions been completed?
Energy	How does the forecast volume of energy in-use (gas, water, electricity) cmpare to previous forecasts?
Financial	What is the forecast final account?
Financial	How does the forecast final account compare to the contract sum?
Financial	What is the forecast whole life cost?
Financial	How does the forecast whole cost compared to previous estimates?
Financial	What is the forecast cash flow?
Financial	How is the cash flow forecast reliable?
Financial	What are the forecast life cycle replacement costs?
Financial	Is the contract sum still validated and robust?
Lessons	What lessons have been learnt from previous projects?
Lessons	What are the lessons learnt?
Lessons	How have lessons learnt been incorporated?
Logistics	How are logistics requirements being met?
Logistics	How will any temporary decant of personnel and activities be managed?
Logistics	What is the principle means of pedestrian and vehicle access, external movement and vehicle parking?
Model, data and information management	How is the model, data and information strategy being managed and exploited?
Model, data and information management	What is the means of controlling distribution of files and information?
Model, data and information management	How are the models supporting the model use requirements?
Model, data and information management	How are the models being developed in accordance with the model production and delivery table?
Model, data and information management	How is the information being delivered in accordance with the information delivery plan?

Model, data and information management	What is the quality assurance and monitoring system?
Model, data and information management	To what extent is the COBie data correct and complete, providing a register of spatial and physical assets?
Model, data and information management	To what extent is the COBie data correct and complete to enable evaluation of the business case for facility ownership and operation?
Model, data and information management	To what extent is the COBie data correct and complete to support the maintenance of the health and safety of facility users?
Model, data and information management	To what extent is the COBie data correct and complete in providing a record of the facility's spaces, their capacity and utilisation according to the Employer's Requirements?
Model, data and information management	To what extent is the COBie data correct and complete to support management of security and surveillance of the facility in accordance with the Employer's
Model, data and information management	To what extent is the COBie data correct and complete to support management of security and surveillance of the site in accordance with the Employer's Requirements?
Model, data and information management	To what extent is the COBie data correct and complete to support management of security and surveillance of the neighbouring site(s) in accordance the Employer's
Model, data and information management	To what extent is the COBie data correct and complete, providing a comprehensive record to support repurposing of the facility and/or its constituent spaces?
Model, data and information management	To what extent is the COBie data correct and complete providing an as constructed record of Employer defined Project Impacts?
Model, data and information management	To what extent is the COBie data correct and complete providing a forecast of Employer defined In-use Impacts?
Model, data and information management	To what extent is the COBie data correct and complete to enable the Employer to understand facility operational requirements and to anticipate operational cost
Model, data and information management	To what extent is the COBie data correct and complete setting out recommended maintenance tasks and to support the Employer to anticipate and plan for the costs of maintenance?
Model, data and information management	To what extent is the COBie data correct and complete detailing expected/service life and constituent materials for the purposes of understanding replacement costs?
Model, data and information management	To what extent is the COBie data correct and complete to assist the Employer is planning for end-of-life costs?
Operation	What is the information needed to maintain and operate the completed asset?
Operation	How does the information needed to maintain and operate the completed asset detail exemptions from statutory and mandatory requirements?
Operation	What is the training, commissioning and aftercare strategy?
Operation	How does the training scope effectively cover emergency strategies and procedures
Operation	How is training and commssioning being delivered in accordance with the related strategy?
Performance	What are the performance measures to be adopted to support post occupancy evaluation?
Performance	To what extent/how are the operational and occupancy performance measures being met?
Performance	To what extent/how are the construction performance measures being met?
Performance	How are stakeholder requirements incorporated into the construction?
Programme	What is the anticipated completion date?
Programme	How does the current forecast for completion compare to previous?
Programme	How does the programme accommdate training, commissioning and handover requirements?
Programme	How is the programme robust?
Regulation	What are the statutory and mandated approval requirements?
Regulation	How does the construction meet the statutory and mandated requirements?
Regulaton	What are the exemptions from statutory and mandated requirements?
Risk	What are the project risks?
Risk	How is project risk being identified, evaluated and managed?
Risk	How does the current project risk riks profile compare to the previous?
Safety	What site specific safety considerations need to be made?
Safety	How is the design safe to construct and use?
Safety	What is the health and safety information required for operation and maintenance of the asset?
Security	How are security requirements being met?

Security	Is management of data and information in accordance with requirements and proposals?
Security	How is the construction site being managed securely?
Security	Is there appropriate management of information detailing sensitive asset and system selection and connectivity?
Security	Are measures being applied for the secure migration of asset data and information?
Utlity services	What is the methodology for ensuring existing utlility services interface with the new works?

Possible PLQs to support the Operational stage

Back to instructions

PLQ category	PLQ
Energy	How are systems supporting the measurement of energy in use and CO2 emissions?
Energy	What is the forecast volume of energy in-use (gas, water, electricity)?
Energy	How does the forecast volume of energy in-use (gas, water, electricity) cmpare to previous forecasts?
Financial	What is the forecast final account?
Financial	How does the forecast final account compare to previous forecasts?
Financial	What is the forecast whole life cost?
Financial	How does the forecast whole cost compared to previous estimates?
Lessons	What are the lessons learnt?
Lessons	How have lessons learnt been captured for related activities/projects?
Model, data and information management	How is the model, data and information strategy being managed and exploited?
Model, data and information management	How are the models supporting the model use requirements?
Model, data and information management	To what extent are the design/construction models in accordance with the model production and delivery table?
Model, data and information management	To what extent is COBie populated?
Model, data and information management	To what extent is the COBie data correct and complete, providing a register of spatial and physical assets?
Model, data and information management	To what extent is the COBie data correct and complete to enable evaluation of the business case for facility ownership and operation?
Model, data and information management	To what extent is the COBie data correct and complete to support the maintenance of the health and safety of facility users?
Model, data and information management	To what extent is the COBie data correct and complete in providing a record of the facility's spaces, their capacity and utilisation according to the Employer's Requirements?
Model, data and information management	To what extent is the COBie data correct and complete to support management of security and surveillance of the facility in accordance
Model, data and information management	To what extent is the COBie data correct and complete to support management of security and surveillance of the site in accordance
Model, data and information management	To what extent is the COBie data correct and complete to support management of security and surveillance of the neighbouring site(s) in
Model, data and information management	To what extent is the COBie data correct and complete, providing a comprehensive record to support repurposing of the facility and/or its
Model, data and information management	To what extent is the COBie data correct and complete providing an as constructed record of Employer defined Project Impacts?
Model, data and information management	To what extent is the COBie data correct and complete providing a forecast of Employer defined In-use Impacts?
Model, data and information management	To what extent is the COBie data correct and complete to enable the Employer to understand facility operational requirements and to
Model, data and information management	To what extent is the COBie data correct and complete setting out recommended maintenance tasks and to support the Employer to anticipate and plan for the costs of maintenance?
Model, data and information management	To what extent is the COBie data correct and complete detailing expected/service life and constituent materials for the purposes of
Model, data and information management	To what extent is the COBie data correct and complete to assist the Employer is planning for end-of-life costs?
Operation	How has the construction stage training and commissioning process assisted operation?
Operation	How is aftercare being implemented in acordance with construction stage commitments?
Operation	How is the aftercare process asisting operation?
Operation	Are the systems working in accordance with requirements?
Performance	What is the methodology for undertaking occupancy evaluation?

Performance	What are the outcomes from the occupancy evaluation?
Performance	How are the occupancy evaluation outcomes being reported and acted upon?
Security	How are security requirements being met?
Security	Is management of data and information in accordance with requirements and proposals?
Security	Is there appropriate management of information detailing sensitive asset and system selection and connectivity?

Appendix 3 to the BIM Protocol

[TO BE COMPLETED]