

 <i>Construction with Care</i>	Darlow Lloyd Consultant Ltd Letter	DLC-MP-07-F2
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Darlow Lloyd Consultant Ltd
 8 Village Farm,
 Village Farm Industrial Estate,
 Pyle,
 CF33
 6BL,
26th March 2022

Mr. Wilson Harris
 Swansea City and County Council,
 Civic Centre,
 Oystermouth Rd,
 Maritime Quarter,
 Swansea,
 SA1 3SN

For the attention of: - Wilson Harris

RE: Meeting Standards of BIM maturity (Level 2) for Ysgol Baw Abertawe project

Dear Mr. Wilson Harris,

I am writing to you as the lead consultant of 'Darlow Lloyd Consultant LTD' and have been appointed to deliver 'Ysgol Bae Abertawe', a state-of-the-art infant school in Swansea. This project is a joint funded venture with the Welsh Government and yourselves. As requested by yourselves (Swansea City and County Council) you have asked how you can accomplish and meet the requirements/standards of BIM maturity (Level 2). To meet the standards of BIM maturity (Level 2) I will outline what is required under ISO 19650 and the steps you need to take to achieve this. BIM is process that can be very confusing at times but do not panic, we are here to help you though this. Hopefully this letter will clear up and answer any questions you may have about the topic.

I understand The BIM process and meeting the requirements can be complex, but to put a simplify Level 2 BIM Maturity is 'a mixture of manual and automated information management processes are used to generate a federated information model' (ISO19650 – 1) within a project. This includes all information required by 'task teams in relation to an asset or a project'. (ISO19650 – 1). The two main documents and

guidance we follow for information for what to include and the requirements are outlined in 1. *BS EN ISO 19650-1 Organisation of information about construction works – Information management using building information modelling – Part 1: concepts and principles*, and 2. *BS EN ISO 19650-2 Organisation of information about construction works – Information management using building information modelling – Part 2: Delivery phase of assets*. These two standard documents (ISO19650 1 and ISO19650 2) outline what is required to meet each BIM maturity Level and this 'refers to "stages of maturity' (Scottishfuturestrust, 2022) and digital information. Each document (19650-1 and 19650-2) outlines the following:

(19650-1 Part 1: Concepts and principles)

- Includes terms and definitions related to BIM process within a project (though assets and projects and information management)
- Principles that outline baseline information for how to control project information, perspective and collaborative working.
- How BIM should be managed though tender to hand over at the end of the project.
- How the information will be delivered e.g., 3D models, 2D Models, visualisations schedules etc
- Outlining capability and capacity of BIM requirements in the task team (what is expected by each party involved including the lead consultant (myself) responsibility (more information on how to achieve this is outlined in 19650-2)
- Also outlining and giving the principles of what should the CDE (Common data environment) should achieve as a whole. The way you set up your CDE will ensure you reaching that BIM Maturity level 2.

(19650-1 Part 1: Concepts and principles)

- This document is all about how you manage, control and log information using the right naming conventions for international standards.
- How you manage the process from Assessment, to invitation to tender, to tender response, to appointment (BEP - BIM Execution Plan), to Mobilization of the works with collaborative production of information.

The development of your BIM maturity (Level 2), would involve the lead consultant and other appointing parties will have to put in place a effective management system to deal with information for short and long term in the project. (ISO 19650-1 :2018, 5.3). As stated by ISO19650-2 'nominating individuals from within the appointing party's organization to undertake the information management function on behalf of the appointing party' (ISO 19650-2). Points to consider in this part is who is going to be responsible for certain development and management of information, and outlines

what skills they will require. Next you will need to Establish the projects information requirements such as site location, Scope of project, project plan of work, expected procurement route and key decisions made throughout the intended work. You would need to also include the following:

- 5.1.3 Establish the project's information delivery milestones (ISO 19650-2) – Key points of decisions made and Dates to each decision made on how the information model will be delivered.
- 5.1.4 Establish the project's information standard (ISO 19650-2), explain, and outline the how information will be exchanged such as Exchange between the appointing part, and External Stakeholders/external operators or maintainers/and between prospective lead appointed party and the appointing party. In this section how the information will be structured, classified, and how the information will be operated during different phases of the asset.
- 5.1.5 Establish the project's information production methods and procedures (ISO 19650-2), in this section requirements are to be able to capture existing asset information, the review/approval of new information and delivery of said information.
- 5.1.6 Establish the project's reference information and shared resources (ISO 19650-2). All shared information should be referenced to the correct stand and how shared resources can be managed during the tender process or appointment. Existing asset information would include 'under license from external providers (mapping and imagery, etc.); (ISO 19650-2), and' 'within public libraries and other sources of historical records'(ISO 19650-2). And others outlined in 5.1.6. Shared resources would include (BIM execution plan, master information delivery plan, etc.) and how any 2D or 3D Models can be set out.
- 5.1.7 Establish the project's common data environment (ISO 19650-2). Working collaboratively together, and all parties should participate in the implementation of the ISO 19650 series (ISO19650 -1). The appointing party should establish a CDE (Common Data Environment). Appropriate naming conventions should include status, revision and classification (in accordance with the framework defined in ISO 12006-2);
- 5.1.8 Establish the project's information protocol (ISO 19650-2), any warranties or liabilities, background and foreground intellectual property rights of information, the use of existing asset information; and use of shared information (ISO 19650-2).

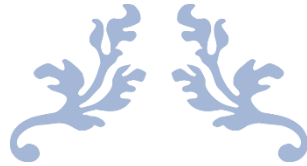
This is the basic understanding of how to meet the BIM Level 2. Hope this clears up any queries you had with meeting the standards of BIM Level 2 in the Ysgol Baw Abertawe project. Any further questions don't hesitate to ask or refer to ISO 19650-1 and ISO 19650-2.

Best regards,

Kyle Davies (Senior Consultant)
Darlow Lloyd Consultant LTD

In Text Citation	Full Reference
(Scottishfuturestrust, 2022)	https://bimportal.scottishfuturestrust.org.uk/page/new-international-bim-standards . New BIM Standards - ISO19650 Breakdown and overview of the new ISO 19650
(ISO19650 – 1)	Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information modelling. Part 1: Concepts and principles
(ISO 19650-2)	Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling. Part 2: Delivery phase of the assets

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BIM EXECUTION PLAN

5010-DLCLTD-XX-XX-T-Z-1001-BEP-S2



Project: Ysgol Bae Abertawe
Project number: 5010
Client: Swansea City Council
Lead Consultant: Darlow Lloyd Consultant Ltd

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APRIL 26, 2022

DARLOW LLOYD CONSULTANT LTD
8 Village Farm, Village Farm Industrial Estate, Pyle, CF33 6BL

Executive Summary

This BEP (BIM Execution Plan) outlines the requirements ISO 19650-2 for implementation of BIM within the course of the project after all the tender documents have been received and accepted. This BEP is a requirement of the lead consultant in their tender response. (See ISO 19650-2 clause 5.3.2). This plan is developed by the lead consultant 'on behalf of the delivery team to convey the information management approach' (bsi, 2020), accompanied by delivery team capability, planning, milestone dates and resource information management. This document also includes roles and expected responsibilities of the task team, with requirements of what is expected from them in terms of information, management and capabilities. A selection of I.T Solutions along with versions of models required to use. Implementation of this BEP will ensure optimised success throughout the whole project for all stakeholders involved.



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1.1 Project information/details

Employer's Name	Swansea City Council
Project Name	Ysgol Bae Abertawe
Employee Project Code	5010
Project location & Address	Wilson.Harris@swanseacouncil.co.uk
Project Value (£)	£10 Million
Contract Type & Delivery Method	NEC3 – Option A (Lump Sum)
Anticipated Start Date	05/09/2022
Anticipated End Date	04/09/2023

1.2 Project description

A new construction to build 'Ysgol Bae Abertawe' primary school. The building consists of one floor to house form entry infant school for 90 pupils, with 48 PT Nursery provision. Two existing structures to be part of the demolition works which include taking down a retaining wall and small building in the existing site. Hard and soft landscaping to be completed including Bus pick up area, staff parking, soft and hard play areas.



Site location and proposed site

2.0 Management

This section refers to the requirements in PAS 1192-2 and BS EN ISO 19650-2.

2.1 Roles, Responsibilities and Authorities

This information below outlined in *Table 1: project contracts (individuals and organisations)*. 'And their respective organisations undertaking Information Management Responsibilities' (**BIMblog.house,2016**), as outlined within Figure 9 of ISO 19650 – 2. The contractors that have been considered for the project and how they share information can be outlined in BS EN ISO 19650-1 5.1.4.

Name	Company	Role	Resources	Contact information
Wilson Harris	Swansea City Council	Client	C1	Wilson.Harris@swanseacouncil.co.uk
Kyle Davies	Darlow Lloyd Consultant Ltd	Lead Consultant	LC1	Kyle@dlc.co.uk
Sean Milsom	Milsom Architectural Services	Architectural	A1	sean@milsom-architecture.com
Ben Davies	Heatlink Mechanical Engineering	Mechanical	M1	Ben.davies@heat-link.com
John Davies	Phillips Services (Wales) Ltd	Electrical	E1	John.davies@phillips-services.co.uk
Carl Burridge	Burridge groundworks	Civil & Groundworks	CG1	Carl.burridge@bgroundworks.co.uk
Tom Samuel	Andrew Scott Ltd	Engineer	S1	Tom.samuel@andrewscottltd.co.uk

Table 1: Project contracts (individuals and organisations).

The following **Employer's Representative** responsibilities apply to each individual as follows

Responsibility	Resource
Capture Key Decision Points	LC1
Produce Plain Language Questions	LC1
Capture Required Standards, Methods, and Procedures	LC1
Ensure the Appointment of a Project Information Manager	A1
Review the Supplier Information Exchanges against the EI	LC1

Table 2: (**BIMblog.house,2016**) - Employers Representative responsibilities

Outlined in the below table are the **Project Information Manager** responsibilities that apply to each individual.

Responsibility	Resource
Enable Information Exchanges through a CDE	**
Maintain and Receive Information into the Information Model	A1
Enable Integration and Coordination of Information	A1
Configure Information for Projects Outputs	A1
Populate the Information Exchange Format	A1
Accept/Reject Information Exchanges	A1

Table 3: (BIMblog.house,2016) - Project Information Manager responsibilities

Outlined in the below table are the **Project Delivery Manager** responsibilities that apply to each individual.

Responsibility	Resource
Assure Delivery of Information Exchanges	A1
Confirm Suppliers Ability to Deliver Information Requirements	**
Accept/Reject Information Exchanges	A1

Table 4: (BIMblog.house,2016) - Project Delivery Manager responsibilities

Outlined in the below table are the **Lead Designer/Contractor** responsibilities that apply to each individual.

Responsibility	Resource
Coordinate Delivery of all Design Information	LC1
Manage Information Development and Information Approvals	LC1
Confirm Design Deliverables	LC1
Overall Lead for Configuration Management	LC1
Confirm Status and Approve Information for Issue	LC1
Approve Design Charges Proposed to Resolve Clashes	LC1

Table 5: (BIMblog.house,2016) - Lead Designer/Contractor responsibilities

Outlined in the below table are the **Task Team** responsibilities that apply to each individual.

Responsibility	Resource Architectural	Resource Mechanical	Resource Electrical	Resource Civil & Groundworks	Resource Engineer
Production of Design Outputs Relates to Specific Tasks	A1	M1	E1	CG1	S1
Issue Approved Information	**	**	**	**	**

Direct the Production of Information in Compliance with SMP	A1	M1	E1	**	**
Direct the Production of Information Using Agreed Systems	A1	M1	E1	CG1	S1
Confirmation that information is suitable for Issue	A1	M1	E1	**	**
Manage Spatial Coordination im behalf of the Task Team	A1	M1	E1	**	**
Propose Resolution to Coordination Clashes	A1	M1	E1	CG1	S1
Develop Constituent Parts of the Information Model	A1	M1	E1	**	S1
Production of Project Outputs	A1	M1	E1	**	S1

Table 6: (BIMblog.house,2016) - Task Team responsibilities

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2.2 Project Schedule/Phases/Milestones

Project Stage / Milestone		Estimated Start Date	Estimated Completion Date	Project Stakeholders Involved
Design Stage				
Design Model	Design concept phase LOD 100-200	07/03/2022	04/04/2022	LC1, A1 and C1
	Design development phase LOD 200-300	07/03/2022	04/04/2022	LC1, A1 and C1
	Construction Documents Phase LOD 300 Complete	25/04/2022	06/06/2022	LC1, A1 and C1
Construction Stage				
As-built Model	Construction delivery Phase LOD 400 Complete	05/09/2022	04/09/2023	E1,CG1,M1 and S1
	Project close-out phase LOD 500 Complete	04/09/2023	06/11/2023	E1,CG1,M1, S1 and LC1

Table 7: (GSA, 2022) Project Schedule/Phases/Milestones

3.0 Planning and Documentation

This section of the BEP covers the requirements of ISO 19650- 2 Figure 3 and 5.1

3.1 Project Collaboration Plan (Table 8)

Company	Solution	Network	Database	File based	Comments
Milsom Architectural Services	Revit	Revizto	Model	RVT	3D Model of Building
Andrew Scott Ltd	Revit and Auto-Cad	Revizto and Autodesk	Model, plan and Surveys	RVT,DWG and PDF	Surveying
Darlow Lloyd Consultant Ltd	Revit and Auto-Cad	Revizto and Autodesk	Model, plan and Surveys	RVT,DWG and PDF	
Milsom Architectural Services	Solibri	Revizto	Model	IFC	Clash Detection
Burridge groundworks	Civil 3d	Autodesk Civil 3D	Model and plan	DWG and PDF	Clash Detection and Civil and groundwork co-ordination

Table 8 – BIM collaboration plan

3.2 BIM Uses in the project

After careful consideration the team has decided on a number of BIM uses on the project. These uses are based on what stage of the project they are to be completely implemented. (GSA, 2022)

Maturity	BIM Uses	LOD-100 (Pre-design)	LOD-200 (Schematic Design)	LOD-300 (Design Development)	LOD-350 (Construction Documents)	LOD-400 (Fabrication / Construction)	LOD-500 (Closeout)	LOD-500 (Operation & Management)
<i>Visualization</i>	<i>Programming</i>	X	X					
	<i>Site Analysis</i>	X	X					
	<i>Design Reviews</i>		X	X	X			
	<i>Phase Planning (for presentations)</i>	X	X	X	X			
<i>Documentation</i>	<i>Existing Conditions Modeling</i>	X	X	X	X	X	X	X
	<i>Design Authoring</i>		X	X	X			
	<i>Cost Estimation (Quantity takeoff)</i>				X			
	<i>Record Modeling</i>					X	X	
	<i>COBie</i>		X	X	X	X	X	X
	<i>BIM Requirements for FM</i>							
<i>Model-Based Analysis</i>	<i>Space Management and Tracking</i>		X	X	X			X
	<i>Engineering Analysis</i>		X	X	X			
	<i>a. Energy Analysis</i>		X	X	X			
	<i>b. Structural Analysis</i>		X	X	X			
	<i>c. Lighting Analysis</i>			X	X			
	<i>d. Mechanical Analysis</i>			X	X			
	<i>e. Other Engineering Analysis</i>		X	X	X			
	<i>Sustainability (LEED) Evaluation</i>			X	X			
	<i>Disaster Planning</i>		X	X	X			X
	<i>Cost Estimation (Estimating)</i>	X	X	X	X	X	X	X
	<i>Phase Planning (4D modeling)</i>				X	X		
	<i>Site Utilization Planning</i>				X	X		
<i>Integrated Analyses</i>	<i>3D Coordination</i>				X	X		
	<i>Construction System Design</i>					X		
	<i>3D Control and Planning (Digital Layout)</i>					X		

	<i>Digital Fabrication (Supply chain management)</i>							
	<i>Building (Preventative) Maintenance Scheduling</i>							X
	<i>Building System Analysis</i>							X
	<i>Asset Management</i>							X
<i>Automation & Optimization</i>	<i>Code Validation</i>				X			
	<i>Digital Fabrication (Off-site fabrication)</i>					X		

Table 9: (GSA, 2022) – BIM Uses and Implementation

3.3 Task Information Delivery Plan (TIDP)

The Task information delivery plan (TIDP) is completed for each task within the project, and this information will be used when creating a master information delivery plan (MIDP). All members of the task team should establish and complete throughout the project the TIDP and submitted on the 'project extranet'. (Cpic, 2013). The below table is an example for what the TIDP should cover the requirements of ISO 19650-2 5.4.4.

File identifier							Model/drawing title	Delivery dates			
Project	Originator	Volume	Level	File Type	Discipline	Number		Milestone 1	Milestone 2	Milestone 3	etc
5010	DLCLTD	XX	XX	M	Z	0001	Ground Floor Layout 1	12/12/2022			

Table 10 (Cpic, 2013) – Template for task information delivery plans

3.4 Master Information Delivery Plan (MIDP)

The requirements are outlined in ISO 19650-2 5.4.5 and they state:

The lead appointed party shall aggregate the TIDP from each task team to establish the delivery team's master information delivery plan (MIDP). (ISO,2018)

In doing this, the lead appointed party shall consider:

- the assigned responsibilities within the detailed responsibility matrix;
- the information predecessors or dependencies on information between task teams;
- the time the lead appointed party will need to review and authorize the information model; and
- the time the appointing party will need to review and accept the information model.

(ISO,2018)

4.0 Standards, methods, and Procedures

4.1 PIM Origin and Orientation

The requirements for this are outlined in ISO 19650-2 PIM Project information model.

Reference	Position
Ground Floor FFL	0 (mm)
Project Base Point	00000N, 00000E(mm)
Building Point 1	192364.7N, 265976.9E (mm)

Table 11 (BIMblog.house, 2016) - Origin and Orientation Values

4.2 File Naming Convention

The Requirements for this is outlined in ISO 19650-2 5.1.7 and all drawings should follow the BS EN ISO 19650-2 updated naming conventions for 2021, See below:

Project – Originator – Functional Breakdown – Spatial Breakdown – Form – Discipline – Number
(Grimston, Paul, 2021)

Also Revisions can be added to the end of this naming convention if there are multiple edits to that drawing.

4.3 Federation Strategy

The Federation Strategy is the system that is implemented into the BIM model and can help split up 'task teams to the appropriate Level of Information Need at each stage of the project' (IPD, 2022). This is an important in any project's BIM model, for splitting up information, creating drawings, and appropriate naming conventions.

5.0 IT Solutions

The requirements for this are outlined in Transition guidance to BS EN ISO 19650 5

5.1 Software Versions

In this section, it is outlined the software that is being used is following the current versions of the software, enabling all involved parties to use, and collaborated on the same versions. No software's should be updated and moved to a later version without all parties agreeing and accepting this. See below table of current versions:

Company	Purpose	Software	Versions
Autodesk	3D Modelling	Revit	2022
Autodesk	2D Modelling	Auto-Cad	2023
Solibri	3D Modelling and Clash Detection	Solibri	2022
Autodesk	3D Modelling and Clash Detection	Civil 3d	2022
Adobe	Documentation and protection of drawings	PDF	2021

Table 12: Project Software (BIMblog.house, 2016)

5.2 Exchange Formats

Export Software	Format	Version
Autodesk	.RVT	2022
Autodesk	. DWG	2023
Solibri	.IFC	2022
Autodesk	.RVT and .DWG	2022
Adobe	.PDF	2021

Table 13: exchange formats (BIMblog.house, 2016)

6.0 References and Documents

In Text Citation	Full Reference
(BIMblog.house, 2016)	The template for this BEP was taken from https://docs.google.com/document/d/1GyEwzyXayPuRx08ZhdKnC2zsaAKFydlcPxYn1-z2aE/edit# 'Post contract-award BIM Execution Plan 7001-BBH-XX-XX-SP-Z-00001
(GSA, 2022)	BIM PROJECT EXECUTION PLAN - GSA https://www.gsa.gov
(Cpic, 2013)	http://www.cpic.org.uk/wp-content/uploads/2013/06/cpix_post_contract_bim_execution_plan_bep_r1.0.pdf Post Contract-Award Building Information Modelling (BIM) Execution Plan (BEP) CPI on Line Page 17
(ISO,2018)	BSI Standards Publication 2018, Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling. Part 2: Delivery phase of the assets (ISO19650-2)
(Grimston, Paul, 2021)	https://www.symetri.co.uk/insights/blog/iso-19650-file-naming-update ISO 19650 File Naming Update. Article by Paul Grimston.
(IPD, 2022)	https://integratedprojectdesign.com/ddd/federation-strategy/ 'Federation strategy' from integratedprojectdesign Website
(bsi, 2020)	https://archilantis.com/wp-content/uploads/2020/12/Guidance-Part-E_Tendering-and-appointments_Edition-1.pdf 'Information management according to BS EN ISO 19650' Guidance Part E, Tendering and appointments. First release as Guidance E. Note this guidance text first appeared in ISO 19650 Part 2 guidance edition 3