Project Information Requirements

Building Information Modelling

QH-GDL-374-9:2019
Queensland Health Project Information Requirements – Building Information Modelling

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<th>Definition</th>
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<tbody>
<tr>
<td>Appointed Party</td>
<td>A provider of information for the project, including services and typically has a lead party such as an Architect or Contractor</td>
</tr>
<tr>
<td>Asset Information Model (AIM)</td>
<td>Information model relating to the operational stage. As per ISO19650</td>
</tr>
<tr>
<td>Asset Information Requirements (AIR)</td>
<td>Information requirements in relation to the operation of the asset. As per ISO19650</td>
</tr>
<tr>
<td>BIM Execution Plan (BEP)</td>
<td>A detailed plan, created from the Queensland Health BEP Template, that documents the use of BIM on a project. It outlines who is responsible for what in the BIM process, when in the process they are responsible for it, and how they will execute Queensland Health requirements as specified in the Project Information Requirements (PIR) and Capital Infrastructure Requirements (CIR)</td>
</tr>
<tr>
<td>BEP Template</td>
<td>The standard Queensland Health Building Information Modelling (BIM) Template to be used by Delivery Teams.</td>
</tr>
<tr>
<td>BIM</td>
<td>The sharing and leveraging of structured information over the asset lifecycle</td>
</tr>
<tr>
<td>Building Information Models (BIM/s)</td>
<td>Means all models which any contributing party is (or its sub-Contractors) required to produce and deliver in accordance with the BEP, PIR and CIR</td>
</tr>
<tr>
<td>BIM Manager</td>
<td>An Appointed Party provided resource to manage the BIM and asset information creation processes on the project in collaboration with the Project Manager / Director and Hospital and Health Service (HHS) Facilities Manager</td>
</tr>
<tr>
<td>Delivery Team</td>
<td>A collection of Appointed Parties contributing to capital works project – the composition of which may change according to the project requirements and schedule, but typically comprises design consultants, Contractor and sub-Contractors. As per ISO 19650. For the purposes of this document, the Delivery</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<td>---------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Team</td>
<td>Team excludes Queensland Health and its internal Project Managers as its representatives</td>
</tr>
<tr>
<td>Federated Model</td>
<td>A combined BIM/s containing multiple discipline/trade models which can be used for coordination and collaboration</td>
</tr>
<tr>
<td>Key Decision</td>
<td>A business decision that Queensland Health values which can be made using information created by the Delivery Team</td>
</tr>
<tr>
<td>Level of Development (LOD)</td>
<td>The degree to which the element’s geometry and attached information have been progressed and the degree to which Delivery Team members may rely on the information when using the model. Queensland Health doesn’t specify the LOD requirements per stage, however, if the Delivery Team wishes to use LOD, the 2018 US BIM forum specification shall be used</td>
</tr>
<tr>
<td>Level of Information</td>
<td>The specific data associated with the individual objects within the BIM</td>
</tr>
<tr>
<td>Laser Scanning</td>
<td>The process of capturing digital information about the shape of an object with equipment that uses a laser to measure the distance between itself and the object, the resulting output is a point cloud</td>
</tr>
<tr>
<td>Massing Model</td>
<td>An early volumetric model useful for understanding bulk and scale, areas of floor plates and departmental layouts and adjacencies</td>
</tr>
<tr>
<td>Model Content Plan (MCP)</td>
<td>A Quantity Surveyor (QS) developed document that defines the modelling requirements (units of measure, codification) enabling cost estimating from BIM</td>
</tr>
<tr>
<td>Model Element</td>
<td>An individual component within a BIM (e.g. wall, floor, nurse call device, room, diffuser, column etc)</td>
</tr>
<tr>
<td>Model Element Author</td>
<td>A person responsible for creating an object in the BIM environment</td>
</tr>
<tr>
<td>Project Brief</td>
<td>Queensland Health requirements for a specific project</td>
</tr>
<tr>
<td>Project Information Model (PIM)</td>
<td>Information model relating to the delivery stage. The PIM consists of documentation, non-graphical information and graphical information of the project typically using BIM, CAD &amp; GIS. As per ISO19650</td>
</tr>
<tr>
<td>PIR</td>
<td>Queensland Health Information requirements to enable the creation and management of the PIM to support the ongoing AIM</td>
</tr>
<tr>
<td>Project Manager</td>
<td>A Queensland Health assigned resource to ensure the Delivery Team complies with the PIR and BEP enabling the creation of the PIM and AIM. The Project Manager works with the procurement manager in managing the project on behalf of the project owner. The Project Manager’s responsibility is to</td>
</tr>
<tr>
<td><strong>Term</strong></td>
<td><strong>Definition</strong></td>
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</tr>
<tr>
<td>manage the scope, time, cost, quality, resources, communications and risk aspects of the project</td>
<td></td>
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</table>

**Abbreviated Terms**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>3D</td>
<td>Three-dimensional digital model</td>
</tr>
<tr>
<td>4D</td>
<td>The task of producing animations or graphically representing the BIM with an electronic version of the project schedule to illustrate the sequence of installation. To be performed by the Building Contractor</td>
</tr>
<tr>
<td>AusHFG</td>
<td>Australasian Health Facility Guidelines</td>
</tr>
<tr>
<td>AIM</td>
<td>Asset Information Model</td>
</tr>
<tr>
<td>AIR</td>
<td>Asset Information Requirements</td>
</tr>
<tr>
<td>BIM</td>
<td>Building Information Modelling</td>
</tr>
<tr>
<td>BIM/s</td>
<td>Building Information Models</td>
</tr>
<tr>
<td>BEP</td>
<td>BIM Execution Plan</td>
</tr>
<tr>
<td>CAD</td>
<td>Computer Aided Design/Drafting</td>
</tr>
<tr>
<td>CBEP</td>
<td>Construction BEP</td>
</tr>
<tr>
<td>CIR</td>
<td>Capital Infrastructure Requirements</td>
</tr>
<tr>
<td>CMMS</td>
<td>Computer Maintenance Management System</td>
</tr>
<tr>
<td>DBEP</td>
<td>Design BEP</td>
</tr>
<tr>
<td>FFE</td>
<td>Furniture Fixture and Equipment</td>
</tr>
<tr>
<td>HHS</td>
<td>Hospital and Health Service</td>
</tr>
<tr>
<td>IFC</td>
<td>Industry Foundation Classes (IFC)</td>
</tr>
<tr>
<td>LOD</td>
<td>Level of Development</td>
</tr>
<tr>
<td>PIM</td>
<td>Project Information Model</td>
</tr>
<tr>
<td>PIR</td>
<td>Project Information Requirements</td>
</tr>
<tr>
<td>RDS</td>
<td>Room Data Sheets</td>
</tr>
<tr>
<td>SiD</td>
<td>Safety in Design</td>
</tr>
<tr>
<td>SoA</td>
<td>Schedule of Accommodation</td>
</tr>
</tbody>
</table>
1 Introduction

Through the CIR, Queensland Health has, for over a decade, requested the use of BIM on selected projects. This is in recognition of the benefits that BIM processes and technologies bring to the design, construction and ultimately operational management of Queensland Health facilities.

In November 2018, the Queensland Government through the Department of State Development, Manufacturing, Infrastructure and Planning released the Digital Enablement for Queensland Infrastructure - Principles for BIM Implementation\(^1\). The principles apply to Queensland Health and those who are involved in any part of the lifecycle of new major construction assets, including the planning, procurement, design, contract management, construction, operation or maintenance of the assets. This includes:

*the design, delivery and asset management of all new major construction projects and those involving significant alterations, extensions, renovations and repurposing of existing assets*

To support the implementation of the Queensland BIM principles, Queensland Health has developed this document, the PIR for BIM which;

- supports the existing CIR
- defines Queensland Health required uses of BIM and identifies the information required at specific stages
- is aligned with the international standard for BIM - ISO19650 and the Digital Enablement for Queensland Infrastructure - Principles for BIM Implementation Policy

1.1 Document structure

The PIR is divided up into the logical project delivery stages. In this way, Appointed Parties can work through specific project delivery stages, understanding the specific discipline BIM requirements for that stage. Section 2, 3 and 4 below indicate the information requirements under each of these three PIR sections.

*Table 1 - Project Information Requirements structure*

<table>
<thead>
<tr>
<th>PIR sections</th>
<th>2 - Commercial</th>
<th>3 - Managerial</th>
<th>4 - Technical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audience</td>
<td>Project Owner / Director, Senior Delivery Team staff, Managing Contractor</td>
<td>Project Manager, BIM Manager, discipline/trade leads, Managing Contractor and sub-Contractors</td>
<td>BIM authors and technical delivery personnel</td>
</tr>
</tbody>
</table>

This document articulates how information shall be structured, managed and delivered by each Appointed Party contracted by Queensland Health, creating a BIM during design and construction stages (see Figure 1 outer arrows).

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Understanding that not all Queensland Health Delivery Teams are at the same level of BIM maturity, the following capital works projects tiers (explained in Table 2) have been defined as requiring BIM deliverables.

- BIM Tier 1 - Project value more than $100 million
- BIM Tier 2 - Project value between $10 million and $100 million
- BIM Tier 3 - Under $10 million (where the value of BIM is clearly demonstrable)
1.3 Queensland Health BIM Objectives

The objective of this PIR document is to highlight the Queensland Health BIM requirements, not to recreate the CIR. Queensland Health intends to utilise the BIM as part of the broader PIM for clarity, the PIM is defined as the information needed to design and construct the facility. BIM is just one element of the PIM, along with other elements such as the cost plan, drawings, reports, schedules, Room Data Sheets (RDS) and Schedule of Accommodation (SoA) (see Figure 2).

![Project Information Model](image)

*Figure 2 – Project Information Model*

This approach supports the HHS in the ongoing use of the AIM (see Figure 3). For clarity, the AIM is defined as the information used to operate and maintain the facility. The PIM shall be developed to assist the HHS longer term AIM needs and strategies as defined by ISO19650 (BIM) and ISO55000 (Asset Management).

![Asset Information Model](image)

*Figure 3 - Asset Information Model (including the Project Information Model)*
Table 2 - BIM Objectives

<table>
<thead>
<tr>
<th>No:</th>
<th>Queensland Health BIM objective</th>
<th>Required uses of BIM by Appointed Parties</th>
<th>Tiers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BIM is procured and incorporated into project delivery, ensuring BIM and information is actively managed during planning, design and construction in alignment with the PIR, CIR and scope</td>
<td>From the earliest outset, a BEP is to be created, based on the PIR and CIR. The BEP is to be updated during delivery and must be administered (by a BIM Manager)</td>
<td>ALL</td>
</tr>
<tr>
<td>2</td>
<td>Improve capacity and capability within Queensland Health and the broader supply chain, using BIM for decision-making</td>
<td>Discipline/trade BIM/s are to be combined into a Federated Model and are to be used as a primary decision-making tool for coordination, collaboration aligned to key decision points</td>
<td>ALL</td>
</tr>
<tr>
<td>3</td>
<td>Platform agnostic - Open BIM formats are required</td>
<td>IFC are a contractual deliverable at handover</td>
<td>ALL</td>
</tr>
<tr>
<td>4</td>
<td>Appropriately structured BIM/s during design and construction to provide an as-built dataset</td>
<td>Continual development of the planning and design BIM/s to support the construction/as-built BIM/s and any associated data requirements</td>
<td>ALL</td>
</tr>
<tr>
<td>5</td>
<td>Data structuring and information coordination</td>
<td>SoA, drawings, schedules, AusHFG &amp; HHS coding to be coordinated and linked to BIM</td>
<td>ALL</td>
</tr>
<tr>
<td>6</td>
<td>Benefits realisation to be measured and tracked</td>
<td>BIM benefits realisation metrics to be reported at milestone deliverables by the Delivery Team</td>
<td>ALL</td>
</tr>
<tr>
<td>7</td>
<td>Clearer design and construction comprehension</td>
<td>The design team is to use BIM visualisation tools (3D collaboration tools that may be supplemented with VR/AR) to help inform stakeholders of design solutions</td>
<td>ALL</td>
</tr>
<tr>
<td>8</td>
<td>BIM Workplace Health and Safety</td>
<td>Identified Safety in Design (SiD) risks must be navigable within the BIM to improve understanding and minimise or eliminate these risks</td>
<td>Tier 1 &amp; 2 only</td>
</tr>
<tr>
<td>9</td>
<td>Cost estimating from BIM for design</td>
<td>The QS is to use design BIM/s to inform the cost planning activities including whole of life costs</td>
<td>Tier 1 &amp; 2 only</td>
</tr>
<tr>
<td>10</td>
<td>BIM to be used for operational planning, staging and decanting</td>
<td>The Delivery Team is to leverage BIM for operational planning, staging and construction planning</td>
<td>Tier 1 only</td>
</tr>
</tbody>
</table>
2 Commercial

From 1st July 2019, BIM is required on Queensland Health projects, with Tier 3 projects under $10m on an agreed value demonstrated basis. Queensland Health requires BIM and project information to be actively implemented and managed as part of the project procurement and delivery processes. As there are many procurement methods in use by Queensland Health, a one size fits all approach to the development of BIM and corresponding BEP cannot be achieved, however, the BEP shall start to be developed and documented as part of the preliminary business case stage prior to completion of the Functional Design Brief.

As changes during project delivery are inevitable, such as new Delivery Team members joining the project, the BEP shall be revised prior to each new project stage (see Figure 4 outer circle). Once agreement between Appointed Parties has occurred, Queensland Health will endorse the BEP at the following points:

a) When a newly appointed party joins (or leaves) the Delivery Team
b) Prior to the start of any major project stage (Schematic Design, Detailed Design, Construction Documentation etc)
c) When a change (client, design, or contractor/vendor initiated) occurs that has a material impact on the previously agreed time, cost and/or information deliverables

Figure 4 - BIM Execution Plan development (outer circle)
2.1 Capability and Information Management Principles

Queensland Health requires the Delivery Team to adhere to and demonstrate the following:

a. Information shall be collaboratively developed, shared and managed, ideally using a Common Data Environment (CDE) or centralised approach to information management

b. Object-based design and construction models (referred to as BIM/s) shall be created to satisfy the PIR, driving efficiency and predictability throughout the project. BIM/s shall be scalable, interoperable between Appointed Parties and available for review using Open BIM model reviewing software

c. 2D documentation, schedules and visualisations shall be produced from relevant BIM/s. Any proposed use of CAD (e.g. typical 2D details) shall be documented in the BEP and approved by the Queensland Health representative

d. The Delivery Team shall nominate a dedicated BIM Manager for design and again for construction who will manage the BIM processes for the project

e. The responsibility for the production, development and implementation of the BEP lies with the Delivery Team and shall be managed by the BIM Manager. The Delivery Team shall ensure that the contents of the BEP are collaboratively developed with their supply chain and documented in the relevant Queensland Health BEP Template with each appointed party agreeing to the approach. The CBEP shall build on the information within the DBEP to ensure consistency across the project

f. Capability, capacity and competence of the Delivery Team to meet the PIR shall be demonstrated in the BEP. If there are any requirements of the PIR that cannot be met due to capability or technical reasons, these shall be clearly stated in the returnable pre-contract BEP. Post-award these items shall be addressed and negotiated before final acceptance of the BEP as a contractually binding document

2.2 All Queensland Health BIM Projects

For Tier 1, 2 and selected Tier 3 projects, BIM/s shall be created that include all existing and proposed building, civil and site geometry of the affected capital works. The BIM/s shall contain the physical characteristics (graphical data) and HHS critical asset information (non-graphical data – see 4.10) needed to describe the design and construction works. 2D drawings and schedules (documentation) required for assessment, design review and construction shall be generated as extractions from the discipline/trade BIM/s and/or space planning tool.

Building and infrastructure systems shall be modelled to a level that facilitates verification of access clearances, analysis of conflicts/clashes and coordination of the work with other aspects of the project including surrounding existing conditions.

Cost planning and management is a fundamental part of any project. It is therefore crucial that the QS can input as early as possible into the BIM processes. It is imperative to ensure the model is set-up with proper geometric tolerances, units of measure and contains key information for effective cost planning. Further information on BIM, the role of the QS and the MCP can be found on the AIQS website.
2.3 BIM is procured and incorporated into project delivery

All Queensland Health BIM projects (Tier 1, 2 and selected Tier 3) shall have a documented BEP for both design and construction. Information management is a critical element of BIM, especially when using external data sources such as space planning tools. A BIM Manager (for both design and construction) shall be appointed to oversee the creation of the discipline and trade-centric BIM files, administer the BEP, manage the CDE, undertake coordination and clash detection and ensure compliance with this PIR document.

A Queensland Health Project Manager (or representative) shall review the information created by the Delivery Team at defined stages through the generation of the PIM. The review will highlight any errors or omissions based on the requirements of this document or other relevant Queensland Health standards and the subsequent Delivery Team generated Design and CBEPs.

The Delivery Team shall nominate the time required to remedy these issues to Queensland Health (maximum 5 business days). Queensland Health will not allow the project to progress through project stages until all review findings have been addressed.

2.4 Improving collaboration, coordination and capacity

The discipline/trade-centric BIM files for the project shall be aggregated together to form a Federated Model. It is the BIM Manager’s responsibility to undertake this task and create the clash tests with issues to be resolved by the Delivery Team. The definition of what constitutes a priority clash or issue shall be documented in the BEP. The findings will inform the design review and coordination meetings and action list for each Appointed Party. The Federated Model shall be used as the primary coordination and decision-making tool, improving capability across the Delivery Team and Queensland Health. The objective is to leverage the Federated Model over traditional 2D drawings, focusing effort on geometric coordination, data creation and collaboration, rather than using the 2D drawings. BIM shall be used for stakeholder consultation (user groups) and for deliverables.

2.5 Platform agnostic - The Open BIM environment

Queensland Health does not specify the BIM software systems to be used by the Delivery Team on the project. However, the information generated by the software shall be interoperable between the Delivery Team’s chosen BIM systems. The disciplines and trade-centric BIM shall be federated to form a holistic view of the project (Federated Model). The chosen BIM systems shall have IFC 2x3 (or higher) export and import functionality and IFC format deliverables shall be required at major milestones, along with the native BIM authoring files.

2.6 Structured and gradual development of BIM for as-built

The BIM/s created for the project shall gradually increase in geometric accuracy and embedded data throughout design and construction, aligned to Queensland Health project stages (see Figure 1). Queensland Health does not use LOD to measure this progression but recognises industry uses these terms. The following bands shall provide guidance:

a) Master Planning to Schematic Design, up to LOD 200
b) Detailed Design to Construction Documentation, up to LOD 300
c) Construction to As Built, up to LOD 400
Queensland Health requires the BIM/s being created to meet the agreed HHS critical AIR, the CIR, this PIR and any project specific requirements. This includes any requirements for data transfer into the HHS CMMS, as-built documentation in the native BIM authoring files and IFC format BIM/s at project completion.

A key element of any Queensland Health project is the SoA. The BIM environment shall be linked to the SoA, using a space planning or database tool with the ability to cross check the designed requirements (from BIM) against the briefed requirements. For Tier 1 & 2 projects the linkage between the SoA, BIM and cost plan must be demonstrable using a common classification schema.

### 2.7 Data structuring and Information coordination

At the project outset, it is important to consider and agree on the critical data structures, asset classification and information requirements of the end users, the HHS facility managers. This collection of information, typically called the AIR, is an important information source for the Delivery Team as it determines the types and amount of data that needs to be collected, created and managed during project delivery. Workshops shall be held with the HHS Facilities Managers to determine the critical AIR. This includes consistent naming, asset coding, drawing numbering etc and shall be agreed between Appointed Parties, the HHS and Queensland Health Project Manager and documented in the BEP. Minimum CMMS requirements are noted in Section 4.10.

The BIM/s produced shall be integrated with information from other sources such as the cost plan, SoA, AusHFG coding and standard components. Scheduling of elements (rooms, doors, windows, FFE shall be undertaken in BIM or alternatively bidirectionally linked to a space planning or database tool. Regardless, this information shall be coordinated between systems. Drawings shall be derived from the discipline/trade-centric models, post coordination with another discipline/trade models.

### 2.8 Benefits realisation measured

Determining the relevant BIM benefits realisation metrics for each project shall occur from the earliest outset. This shall include the strategic outcomes, measurable benefits, when the benefits will be realised and who ultimately will benefit.

As BIM is now a mandatory delivery mechanism for Queensland Health projects, the benefits realised in the use of BIM shall be identified early, analysed and planned for appropriately. Ongoing monitoring and reporting by the BIM Manager and Queensland Health project management are critical to the success of any benefits realisation framework.

As part of the strategic assessment, Preliminary and Detailed Business Case development, the specific benefits realisation items, as it relates to BIM, shall be determined in collaboration with the Delivery Team and Queensland Health in the provided Queensland Health BIM metrics for projects.xlsx. In this way, all parties have a say in how the benefits will be measured throughout project stages (SD, DD, CD & Construction) and these shall be reported to Queensland Health at each stage. The Queensland Health BIM metrics for projects.xlsx spreadsheet will be used as part of the benefits realisation stage at the end of the project.
2.9 Design & Construction Comprehension

BIM shall be used to more clearly convey the project’s design intent to Queensland Health and other relevant parties. The use of 3D material helps reduce misunderstanding or confusion of proposed design solutions. Whether aiding user group sign off, ensuring better client understanding, or briefing sub-contractors, BIM shall be considered as a means of producing clearer, more engaging visual aids. This may include static images, animations, interactive walk-throughs, immersive Virtual Reality or Augmented Real.

2.10 Additional requirements for Tier 1 and 2 projects

In addition to Queensland Health requirements for BIM on all projects, the following applies to Tier 1 and 2 projects.

2.10.1 Workplace Health and Safety

The use of BIM greatly improves a common understanding in relation to health and safety issues and is typically much faster than traditional 2D drawings. It is Queensland Health’s intention to leverage the BIM/s created in relation to managing health and safety outcomes. The Queensland Work Health and Safety Act 2011 requires that a SiD risk register is created and maintained during delivery and construction. This risk register shall be linked to the Federated Model, highlighting areas or specific equipment of concern. Other health and safety requirements may include, but not limited to: security, fire life safety, egress, doors and windows. The Federated Model shall be used to not only assess SiD but to support other safety assessments and operational workshops.

2.10.2 Quantity Surveyor Model Content Plan

For Tier 1 & 2 projects, a MCP is preferred and allows the QS needs (e.g. units of measure, classification) to be articulated to the Delivery Team. The QS shall work with Appointed Parties to ensure they understand what information is to be used by the QS and at which stage this information is needed. This process enables the QS to manage the BIM expectations efficiently, ensuring the QS can confidently use the BIM/s being produced for quantity surveying and costing purposes. For Tier 3 projects only, the QS requirements of the BIM/s can be included in the BEP rather than a separable MCP.

2.11 Additional Requirements for Tier 1 Projects Only

All previous requirements and the following apply to Tier 1 projects only.

2.11.1 BIM to be used for operational planning and staging

Most Queensland Health projects incorporate refurbishments and expansions to existing facilities. This requires careful planning for project delivery operational staging, decanting and construction staging to minimise disruptions. High-level planning, staging and diagrammatically showing this through design options in BIM is useful for stakeholder consultation and improving understanding of the proposed, staged works.

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It is a requirement of the Delivery Team to use BIM for operational staging and decanting purposes to reduce the need for multiple drawings. This does not mean that a detailed construction sequence needs to be applied to BIM (4D) unless there is a contractor requirement to do so.

2.12 Allowable BIM Uses

Queensland Health recognises that information created on each capital project has significant benefit to overall operational stages of the facility/HHS asset managers. Queensland Health acknowledges that information will be created by many discreet Appointed Parties, each with specific responsibilities during the process of design and construction. Critically, information created by any single appointed party can be used by other Appointed Parties for decision making.

Both the DBEP and CBEP shall state the allowable uses of the discipline or trade-centric information (e.g. costing, drawing production, coordination) during and at the end of specific milestones. These uses shall cover those defined in the PIR and Project Brief.

This is important as the BEP and BIM/s produced are contractually binding documents. It is also recommended that a Model Description Document is populated by the model authors to assist receiving parties understanding of what has changed in each model revision. An example is provided in the Queensland Health (DBEP) Template.

2.13 Reviewing BIM against the Project Information Requirements

Queensland Health has an obligation to report on the BIM implementation progress to the Queensland Government, to advance the public sector and industry adoption of BIM.

As the implementation of BIM into Queensland Health “business as usual” is developing, collectively both industry and Queensland Health have an opportunity to develop the defined processes for BIM. This first requires a consistent approach to the way information is developed, managed and maintained.

To improve data consistency across Queensland Health projects and the HHS, any BIM/s produced by the Delivery Team during design and construction shall be reviewed for compliance with the PIR. The objective is to improve the collective capability of Queensland Health supply chain and internal stakeholders in the use of BIM and further refine information management practices.
3 Management

This section outlines the management of the project deliverables and the proposed approaches to BIM.

3.1 BIM Execution Plan

Tendering parties shall demonstrate compliance with this PIR through the creation of the project-specific BEP, first for design and then for construction, created in the Queensland Health BEP Templates (see Figure 5). This shall be achieved by:

a) using the Queensland Health BEP Templates prior to Functional Design Brief and before Master Plan finalisation, for use by Queensland Health as part of the assessment criteria for Delivery Team award

b) the finalisation of the DBEP and/or CBEP within 45 days post-award (for known stages the Delivery Team is appointed for)

Queensland Health Requirements

Queensland Health BEP Templates (Design & Construction)

*Figure 5 – Model Content Plan and BIM Execution Plan development from templates*

The BEP shall cover all BIM related design tasks and ultimately construction uses of BIM, and be managed by the appointed BIM Manager, with input from all Appointed Parties. The Appointed Parties and Queensland Health must agree to the processes and requirements defined in the BEP, as the BEP shall be contractually binding. Any DBEP amendments must occur prior to the Delivery Team progressing to the next design stage, this includes:

- Master Plan
- Project Definition Plan
- Schematic Design
- Detailed Design
- Tender/Construction Documentation
Any CBEP amendments will occur prior to the Delivery Team progressing to the next construction stage, this includes:

- Construction Administration
- Commissioning and Handover
- Project closure

Benefits realisation metrics shall be recorded and tracked throughout the course of project implementation in Queensland Health BIM metrics for projects.xlsx template, thus informing the benefits realisation during project finalisation.

### 3.1.1 BEP Development – Design BEP

For all projects the design BIM Manager shall create a DBEP from the Queensland Health DBEP Template and update it when material changes to the project occur. The DBEP shall be based on the requirements defined in the PIR and shall reference the relevant sections from this document. This will enable all parties to understand whether the BIM requirements and uses have been met for specific project stages.

### 3.1.2 BEP Development – Construction BEP

At contractor tendering stage, the nominated tendering contractors shall create a CBEP using the Queensland Health CBEP Template. The CBEP shall be based off the previously developed DBEP and reference the relevant PIR sections. The CBEP shall be included as part of the contractor’s tender submission. If the contractor has extra requirements for the use of BIM, beyond the Queensland Health PIR, these shall be clearly identifiable in the CBEP (e.g. work packages planning, sub trade progress payments etc). These items may require further negotiation with any existing Appointed Parties.

### 3.2 Existing Conditions Modelling

All Appointed Parties shall verify with Queensland Health the availability of any previous as-built BIM/s and/or drawings prior to undertaking any work.

Existing drawings, survey and any BIM/s (if available) shall be obtained, and site checked for accuracy by the Delivery Team. Existing critical assets as defined by the HHS shall be modelled and incorporated into the Federated Model. These asset locations shall be agreed prior to modelling and verified by means of laser scanning or traditional survey.

The use of laser scans (point clouds) should be considered, facilitating the existing condition capture and verification of the existing conditions modelling. The extent of modelling beyond the affected areas and the required level of critical asset information shall be determined and agreed based on the cost, timeliness, HHS and project needs. These requirements shall be discussed and agreed during the project kick-off meeting and shall be documented in the BEP.

### 3.3 Project Planning – Preliminary Business Case - Functional Design Brief

To ensure the project is developed with the critical HHS AIR in mind, collaboration with the ultimate facility managers for the project should be sought during the Functional Design Brief stage, determining the asset information management effort required. As the Delivery Team is responsible for implementing the asset and facilities management principles (defined by the HHS) in the design BIM, the critical asset requirements of the HHS will be a key driving factor. Minimum CMMS requirements are defined in Section 4.10.
The information sourced during the strategic assessment (functional requirements, existing conditions, easements, topography, orientation etc) shall be collated and validated for currency to be leveraged in future stages and the development of the BIM/s.

Consideration should be given to using a space planning or database tool that can manage the SoA and briefed area, supporting the strategic Functional Design Brief and strategic infrastructure assessment. The space planning tool can also be linked to the Masterplan and Schematic Design BIM/s, providing a robust way of tracking the HHS SoA brief vs designed requirements.

The benefits realisation shall be developed at this time, in close consultation with the HHS and Queensland Health using Queensland Health BIM metrics for projects.xlsx template.

3.3.1 Tier 1 & 2 projects
   a) The QS shall work with the Delivery Team to collaboratively develop the MCP

3.4 Project Planning - Preliminary Business Case - Master Plan

The appointed BIM Manager and any appointed Delivery Team members shall revise the proposed approach to BIM in the DBEP, for the project phases they are engaged for. The approach to information management and the CDE must be documented in the DBEP and complemented with a proposed information container diagram, highlighting discipline/trade models that constitute the Federated Model, cost plan, SoA, RDS etc.

The Master Plan massing model should be generated in the BIM enabled platform throughout the Master Plan stage, enabling continuity from the Master Plan to Schematic Design. Basic general arrangement drawings and visualisations should be produced from BIM at this stage. Departmental functional relationships and adjacency diagrams and the whole of hospital departmental relationships shall be refined at this stage.

The BIM benefits realisation shall be documented for this stage at this time, by the Design BIM Manager, in close consultation with the HHS and Queensland Health using Queensland Health BIM metrics for Queensland Health BIM metrics for projects.xlsx.

3.4.1 Tier 1 & 2 projects
   a) SiD, Work, Health and Safety risks shall be documented
   b) The QS shall have a defined MCP and all engaged Delivery Team parties shall be developing the BIM/s to enable area-based costing by the QS

3.4.2 Tier 1 projects only
   a) High-level operational planning staging diagrams wshall be produced from the massing model

3.5 Project Planning – Detailed Business Case - Schematic Design

Before Schematic Design proceeds, a DBEP must be largely defined and in place. A nominated BIM Manager shall be assigned to the project. The development of the Schematic Design will require a preferred option to be refined and documented in BIM up until the submission of Schematic Design. The BEP shall form part of the Detailed Business Case and Schematic Design deliverables.

The building set out, orientation, preliminary building grid, floor to floor heights (including allocation of space for services) shall be confirmed at this stage and defined in BIM.
The various Schematic Designs in BIM (options) shall be undertaken. This will provide area analysis that can be linked to the Functional Design Brief, initial cost plan and SoA. All existing conditions and survey information shall be verified at this stage to ensure the proposed Schematic Design options created in BIM will integrate with the existing conditions affected by the proposed designs.

Circulation areas (footpaths, walkways, ramps, stairs, vertical transportation etc) shall be generically modelled. Travel distances routes (both horizontal and vertical) shall be modelled to validate that distances have been kept to a minimum.

The use of space planning tools and BIM/s for user group consultation and visualisation is preferred.

The BIM benefits realisation shall be documented for this stage at this time, by the Design BIM Manager, in close consultation with the HHS and Queensland Health using Queensland Health BIM metrics for Queensland Health BIM metrics for projects.xlsx.

3.5.1 Tier 1 & 2 projects
a) The approach linking SiD, Work, Health and Safety risks to the Federated Model shall be defined at this stage
b) Areas derived from the briefed SoA shall be linked to design departmental areas in BIM, and Model Elements as defined in the MCP shall be used to inform the cost plan

3.5.2 Tier 1 projects only
a) Further developed and detailed operational planning and staging diagrams shall be produced from the BIM

3.6 Project Implementation – Detailed Design

The Delivery Team shall continue to use BIM during the Detailed Design stage, building on the requirements of Schematic Design. The Delivery Team is responsible for enabling, creating and progressively delivering information that increases in detail (geometric and non-geometric data) from design through construction. This shall be managed by the BIM Manager. The following apply to this design stage:

Demonstrate that the requirements of this PIR and the Project Brief are documented within the BEP and the BIM/s being produced comply with these requirements.

When 2D drawings are required, these shall be derived from the BIM. Documentation and data cannot be created using separate 2D processes and detached data. Any drawings (e.g. typical details) that are developed outside of the BIM shall be clearly identified in the BEP and approved by Queensland Health prior to implementation.

All new maintainable assets and FFE shall be identified in BIM and RDS with the appropriate AusHFG coding, and attributed with the corresponding Group 1, 2 and 3 and subgroups.

Federation of the civil, structural, mechanical, electrical, fire, security and hydraulic model (plus any other discipline models) with the architectural model will occur during this design stage by the BIM Manager for review by the Project Manager.
Using an IFC compatible BIM coordination tool, prepare a clash detection report that will be reviewed and actioned by all design team parties. The discipline BIM/s and Federated Model must be made available in both native and IFC format. A Federated IFC format model shall be submitted to Queensland Health as defined by the project milestone delivery schedule.

Technologies such as virtual and augmented reality can be beneficial aides to support drawings and RDS and should be used at this stage to gain final user group sign off.

The design intent BIM/s shall be developed to a level whereby the Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

3.6.1 Tier 1 & 2 projects

a) SiD, Work, Health and Safety risks shall be documented and navigable in the Federated Model for ease of tracking and review

b) Detailed elemental costing associated with the BIM and whole of life costing is required during Design Development

3.6.2 Tier 1 projects only

a) Detailed operational planning such as the detailed decanting options shall be undertaken using the BIM/s prior to completion of Tender Documentation

The BIM benefits realisation shall be documented for this stage at this time, by the Design BIM Manager, in close consultation with the HHS and Queensland Health using Queensland Health BIM metrics for projects.xlsx.

The Federated BIM/s, along with all discipline BIM/s, will be independently audited against this PIR, the DBEP and other relevant Queensland Health requirements for project delivery. Any error or omissions will need to be remedied by the originating authors, managed by the Design BIM Manager.

3.7 Project Implementation – Tender Documentation

BIM/s and other information containers, such as the cost plan, SoA and RDS will be further developed during this stage to a higher LOD, informing the investment decision by Queensland Health and ultimately Tender Documentation. The Federated Model shall be supplied to prospective tenderers for information, supporting the traditional 2D documentation.

The DBEP must be updated at this time, by the Design BIM Manager, to reflect the modelling approaches, systems, and actual processes employed by the Delivery Team for all design stages prior to construction.

As part of the contractor’s tender, a draft CBEP (based off the updated DBEP) shall be developed and submitted as part of the Tender deliverables. Post-award the successful contractor shall have in place a construction BIM Manager, which may or may not be the Design BIM Manager. Handover of BIM/s from design to construction must occur, i.e. IFC format and native BIM format for each design BIM.

The extent of any retained Delivery Team, sub-contractors, fabricators and suppliers developing models for construction shall be agreed between Queensland Health and the preferred contractor to fulfil the requirements of the project.
3.7.1 Tier 1 & 2 projects

a) SiD, Work, Health and Safety risks shall be documented and navigable in the Federated Model for ease of tracking and review

b) Detailed elemental costing associated with the BIM and whole of life costing is required prior to completion of Tender Documentation

3.7.2 Tier 1 projects only

a) Detailed operational planning such as the detailed decanting options shall be undertaken using the BIM/s prior to completion of Tender Documentation

The BIM benefits realisation shall be documented for this stage at this time, by the Design BIM Manager, in close consultation with the HHS and Queensland Health using Queensland Health BIM metrics for Queensland Health BIM metrics for projects.xlsx.

The Federated BIM/s, along with all discipline BIM/s, will be independently audited against this PIR, the DBEP and other relevant Queensland Health requirements for project delivery. Any error or omissions will need to be remedied by the originating authors, managed by the Design BIM Manager.

3.8 Project Implementation – Construction Documentation

Discipline BIM/s and other information containers, such as the cost plan, SoA, RDS, drawings, schedules and associated specifications will be further developed during this stage to a higher LOD, suitable for competitive tendering and construction use i.e. For Construction Drawings, specifications and schedules.

The BIM Manager will undertake a detailed coordination review on the Federated Model and all discipline outputs (BIM/s, drawings, schedules) ensuring there are minimal geometric coordination issues prior to Construction.

3.8.1 Tier 1 & 2 projects

a) SiD, Work, Health and Safety risks shall be documented and navigable in the Federated Model for ease of tracking and review

b) Detailed elemental costing associated with the BIM and whole of life costing is required prior to completion of Construction Documentation

3.8.2 Tier 1 projects only

a) Detailed operational planning such as the detailed decanting options shall be undertaken using the BIM/s prior to completion of Construction Documentation

The BIM benefits realisation shall be documented for this stage at this time, by the Design BIM Manager, in close consultation with the HHS and Queensland Health using Queensland Health BIM metrics for Queensland Health BIM metrics for projects.xlsx.

The Federated BIM/s, along with all discipline BIM/s, will be independently audited against this PIR, the DBEP and other relevant Queensland Health requirements for project delivery. Any error or omissions will need to be remedied by the originating authors, managed by the Design BIM Manager.
3.9 Project Implementation – Construction

Prior to construction commencing, the CBEP shall be updated to document the approach of transferring the PIM to the AIM supporting the commissioning and handover plan as described in the CIR Volume 4 – Section 2. As constructed redline mark-ups shall be incorporated into the design and construction BIM/s to produce an as-built BIM of the project at handover.

Critical asset data and the transfer processes shall be confirmed with the HHS Facilities Managers at this stage. Testing of transferring design and future construction asset data from the PIM to the AIM shall occur to improve asset data handover, prior to commissioning and construction completion.

Sub-contractors may prepare workshop models in other 3D CAD software packages. These models shall be able to be integrated into the Federated BIM for coordination purposes.

The BIM benefits realisation shall be documented for this stage at this time, by the Construction BIM Manager, in close consultation with the HHS and Queensland Health using Queensland Health BIM metrics for Queensland Health BIM metrics for projects.xlsx.

The Federated BIM/s, along with all discipline BIM/s, will be independently audited against this PIR, the CBEP and other relevant Queensland Health requirements for project delivery. Any error or omissions will need to be remedied by the originating authors, managed by the Construction BIM Manager.

3.9.1 Tier 1 & 2 projects

a) Safety in Construction, Work, Health and Safety risks shall be finalised and navigable in the federated BIM

3.10 Project Implementation – As-Built

The final updated trade and discipline as-built BIM/s shall be provided to the HHS Facilities Managers in both native and IFC formats. A federated IFC as-built model is also required.

Any associated as-built 2D documentation including (but not limited to) Building Users Guide, drawings indicating the location of test points, test reports, operations and maintenance manuals etc shall be provided.

The agreed BIM benefit realisation items for construction shall be tracked and reported on by the Construction BIM Manager to Queensland Health project management.

The final critical asset data transfer of information from the PIM to the AIM will occur at this stage in line with the HHS asset information management requirements (see Section 4.10).

The Federated BIM/s, along with all discipline/trade BIM/s, will be independently audited against this PIR, the CBEP and other relevant Queensland Health requirements for project delivery. Any error or omissions will need to be remedied by the originating authors, managed by the Construction BIM Manager.
3.11 Project Finalisation – Benefits Realisation - Project Closure

The targeted benefits realisation results shall be reported at this time, in close consultation with the HHS and Queensland Health to feedback into future refinements to the PIR. These results shall encompass the implementation of BIM on the project, e.g. coordination issues resolved before construction, reduced number of RFI’s, improved user group sign off process, enhanced coordination of information deliverables (Cost, SoA, briefed vs. design outcomes).

These findings will inform future revisions to Queensland Health PIR for BIM.

4 Technical

The following section outlines the technical BIM requirements for the Delivery Team. This reference is to assist in the development of the BEP, MCP, software selections, coordination and collaboration processes and the like.

4.1 BIM Execution Plan Requirements

The Appointed Parties shall appoint a BIM Manager to collaboratively develop, prepare and manage the BEP and BIM/s for the project at both design and construction stages. The Queensland Health BEP Templates shall be used, referencing the relevant sections of this PIR for ease of tender assessment by Queensland Health. The following shall be addressed:

a) Project information (name, location, project summary/description)
b) Project stages (including modelling existing assets) and nominated start/end dates (schedule of BIM activities including milestones and submittals)
c) Specify relevant industry and critical HHS asset data standards (classification, nomenclature etc) which will be used in the execution of BIM for the project
d) Objectives and goals aligned to Queensland Health PIR with specific benefits realisation metrics defined
e) Specific uses of BIM aligned to this PIR for Queensland Health uses and nominate any contractor or design uses of BIM not available to Queensland Health
f) Identify the entire Delivery Team including all Appointed Parties, including proposed parties not yet appointed (contractor, steel fabricator etc)
g) Responsibility matrix (roles and responsibilities)
h) Processes of communicating to Queensland Health (both local and remote) the design, reviews and user group/stakeholder sign off
i) Communication and collaboration strategies between the Delivery Team (including contractor), the BIM Manager and the Queensland Health Project Manager
j) Information delivery plan (what data will be authored, at what stage and in which system) and any classification/asset data structures to be used
k) Model development requirements (if LOD is used, a LOD Matrix)
l) Level of Information requirements such as critical AIR (noted in section 4.10)
m) File, asset coding, room and naming conventions (nomenclature)
n) Plan for file sharing, suitability of the information, storage and retrieval, and data security (CDE)
o) Required elements, processes and management techniques required for clash detection
p) Methodology for quality assurance and validation of BIM files, project-wide
q) Software selections, file format, file exchange requirements

4.2 Roles and Responsibilities

The pre-contract BEP shall define the Delivery Team’s proposed BIM roles and responsibilities for each discipline and trade for the proposed stages for which they are engaged. This shall detail how these roles will enable the delivery and coordination of the project to meet this PIR. It is suggested that each discipline/trade allow for a nominated Model Manager to coordinate the development of the discipline/trade specific BIM. Depending on project scale the Model Manager could be a separate role or on smaller projects, this role could be fulfilled by a senior Model Element Author. The Delivery Team shall carefully consider the following roles and responsibilities as they relate to BIM:

- BIM Manager (separate Design and Construction role or combined)
- Discipline Model Managers (lead modeller)
- Model Element Authors (designers, modellers and trades)

The DBEP and CBEP shall define the Delivery Team by way of a table that provides the following information:

- Defined role
- Company
- Name
- Contact details (email and phone number)

The Delivery Team shall nominate an overall resource, the BIM Manager for design and construction stages. This role may be resourced by two different individuals to support the proposed procurement method – one for design and a different resource for construction or could be the same individual in the case of Design and Construct. Regardless, there shall always be an allocated resource undertaking the BIM Management role on the project and sufficient handover time allowed if the resource changes.

The BIM Manager shall oversee and report on the BIM and information management process to the Queensland Health Project Manager, ensuring that Delivery Teams conform to the content of the BEP. The following conditions apply:

a) Any replacement of the BIM Manager shall be advised to the nominated Queensland Health representative within 10 days
b) If the resource changes, the nominated handover time shall be documented, and prior approval sought from Queensland Health
c) The BIM Management experience of the resource shall be provided within the BEP Template stating the years, projects, experience, technical and communication abilities
d) The nominated allocation of time this resource will spend per week, by stage, by deliverable on BIM and information management related tasks

4.3 Communication and Meetings

The Delivery Team shall allow enough time for meetings to discuss any issues with BIM, deliverables and information management, which shall be incorporated into traditional design and construction review meetings. Timeframes for these meetings shall be indicatively documented in the pre-award BEP and agreed on post-award. As a minimum, Queensland Health anticipates the requirements listed in Table 3.
### Meetings

<table>
<thead>
<tr>
<th>Meetings</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIM Execution Planning</td>
<td>2 weeks after contract award, a review cycle until each party agrees with its contents. Final BEP required 45 days post-award. Revisions only as additional stakeholders become involved with the project and after Queensland Health approval.</td>
</tr>
<tr>
<td>SiD Workshop</td>
<td>As per project delivery schedule</td>
</tr>
<tr>
<td>3D Coordination / Clash Resolution</td>
<td>As a minimum, this shall take place fortnightly and prior to each project milestone from the end of Concept Design onwards until handover.</td>
</tr>
<tr>
<td>3D Design Review Meetings</td>
<td>It is expected that the graphical models (and associated data) will be used throughout Delivery Team meetings in accordance with the project delivery schedule</td>
</tr>
</tbody>
</table>

### 4.4 Information Containers

The information delivery plan shall identify the information containers (BIM, cost planning, SoA, CDE etc) that constitute the PIM. The objective is to establish where information will reside and how this information will be federated together to form an overall PIM for the project. The Delivery Team can then determine what information should exist in BIM and what information should exist externally in another data source, such as the space planning, costing or other database tools.

This must be documented in the BEP by way of a diagram explaining the information containers and the relationships between these containers. As the BEP is broken down into project stages and then subsequent discipline/trades within those stages, enabling understanding what information will be contained in the relevant discipline-specific information containers at any point during delivery.

### 4.5 Model Federation and Coordination

The BIM Manager shall combine all design/construction/trade BIM/s into a single Federated Model. This Federated Model shall form the basis for all design reviews and shall remain in alignment with project progress.

It is expected that the Federated Model shall be used internally by the Delivery Team to coordinate and as such should be well organised with useful views and ease of navigation a paramount consideration, relevant to the specific project needs.

At a minimum, the BIM Manager shall submit to Queensland Health an IFC Federated Model for milestone reviews. Other Federated Model formats can be discussed on a case by case basis. These Federated Models will be used primarily for progress tracking, data validation against this PIR and general scope compliance as well as operational reviews.
4.6 Coordination and Clash Detection

Design and Construction clash detection reviews shall be carried out intermittently as required to satisfy the project stage requirements and to minimise project risk. As a minimum, this shall take place fortnightly and at mid-point before each project milestone from the end of Schematic Design onwards.

Focus shall be on hard clashes, construction tolerances and safe working/maintenance zones.

The pre-award BEP shall identify details of the clash detection process including:

a) Proposed software to be used for model federation and clash detection/management
b) Responsibilities and accountabilities, including timeframes for resolution of identified clashes/issues
c) The clash detection priorities and overall management process
d) Tolerance strategy
e) Outputs (e.g. Clash reports, excel, dashboarding etc.)

4.7 Quality Control

The Delivery Team shall provide evidence to the BIM Manager and Queensland Health Project Manager that activities identified in this PIR and BEP are taking place (i.e. design reviews, RDS, scheduling, linkage to SoA etc.). The BEP shall detail model and data quality control, consideration shall be given to:

a) Quality assurance/control procedures
b) Software used to support quality control procedures
c) Retaining data integrity/accuracy in BIM and highlighting the integrations with cost planning, construction staging/sequencing, SoA, space planning and resulting 2D drawing and schedule outputs

4.8 Software

Queensland Health does not stipulate the BIM authoring tools used by the Delivery Team and are encouraged to use whichever BIM authoring tools are best suited to their discipline or trade. Information created in their chosen platform shall be interoperable with other BIM authoring, space planning and collaboration tools. Agreement between Appointed Parties on the chosen software and any interoperability testing shall be performed prior to the first deliverable.

At a minimum, the chosen tools shall support the buildingSMART IFC 2X3 format, for both import and export.

4.8.1 Software version update policy

Versioning of software shall be managed by the BIM Manager throughout the project delivery stages. Any software version update(s) shall be agreed with the Delivery Team across all disciplines/trades prior to updating. Once agreed, Queensland Health will review the upgrade. At this stage, the BIM’s shall be upgraded if approved. It is recommended that the timing of any updates shall align with the end/start of project milestone dates to avoid disruption to the Delivery Team deliverables.
4.9 Common Data Environment

The CDE is defined as a source of information for any given project. It will function as a digital hub within, which internal and external stakeholders can collect, manage and disseminate all relevant approved project data in a managed environment. This shall be provided by the Delivery Team and Queensland Health shall have access to the “Published” data area.

All work in progress models shall be transmitted and saved to the shared folder within the CDE, replacing the previously issued model, therefore model naming can remain consistent.

![Figure 6 - Common Data Environment](image)

4.10 Computer Maintenance Management System

The CMMS is currently used by Queensland Health and the HHS utilise SAP. Consultation with the HHS Facilities Manager on how critical information will be transposed between the PIM and the AIM shall be sought early in the project. Collaboration with the HHS Facilities Manager during the Functional Design Brief stage agrees the extent of the AIR.

Refer to the Standard for Functional Locations in the CMMS (standard_fl.pdf) for functional location requirements (see Figure 7).
Refer to Standard for Equipment in the CMMS (standard_eq.pdf) for equipment information standards. Only equipment that qualifies as “maintainable items” require the following fields (see Table 4) to be captured in the BIM/s.

Table 4 - Standard Equipment Fields

<table>
<thead>
<tr>
<th>Field Name</th>
<th>Rating</th>
<th>Populated by</th>
<th>Stage Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item Code</td>
<td>Mandatory</td>
<td>Design Consultants</td>
<td>Detailed Design</td>
</tr>
<tr>
<td>Description</td>
<td>Mandatory</td>
<td>Design Consultants</td>
<td>Detailed Design</td>
</tr>
<tr>
<td>SAID Number</td>
<td>Mandatory</td>
<td>Design Consultants</td>
<td>Construction Documentation</td>
</tr>
<tr>
<td>Asset</td>
<td>Best Practice</td>
<td>Design Consultants</td>
<td>Construction Documentation</td>
</tr>
<tr>
<td>FunctLocation</td>
<td>Mandatory</td>
<td>Contractor</td>
<td>As Built</td>
</tr>
<tr>
<td>Physical Location</td>
<td>Mandatory</td>
<td>Contractor</td>
<td>As Built</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Best Practice</td>
<td>Contractor</td>
<td>As Built</td>
</tr>
<tr>
<td>Model number</td>
<td>Best Practice</td>
<td>Contractor</td>
<td>As Built</td>
</tr>
<tr>
<td>ManufSerialNo.</td>
<td>Best Practice</td>
<td>Contractor</td>
<td>As Built</td>
</tr>
<tr>
<td>Begin guarantee</td>
<td>Best Practice</td>
<td>Contractor</td>
<td>As Built</td>
</tr>
<tr>
<td>Warranty end</td>
<td>Best Practice</td>
<td>Contractor</td>
<td>As Built</td>
</tr>
<tr>
<td>Address (fields)</td>
<td>Best Practice</td>
<td>Contractor</td>
<td>As Built</td>
</tr>
</tbody>
</table>

4.11 Key Deliverables

Below are the suggested key deliverables for each project stage. The BEP shall nominate the specific deliverables and quantities as related to the project scale and scope.
### Table 5: Key deliverables - timing and formats

<table>
<thead>
<tr>
<th>Stage</th>
<th>Key Deliverable</th>
<th>PDF or equivalent all-viewer format</th>
<th>Native Format (Consultant/Contractor chosen software)</th>
<th>Open Standard Format (Agreed Base File Format)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDB</td>
<td>Draft DBEP</td>
<td>Yes</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Masterplan (2D drawings)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Masterplan (Documentation)</td>
<td>Yes</td>
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