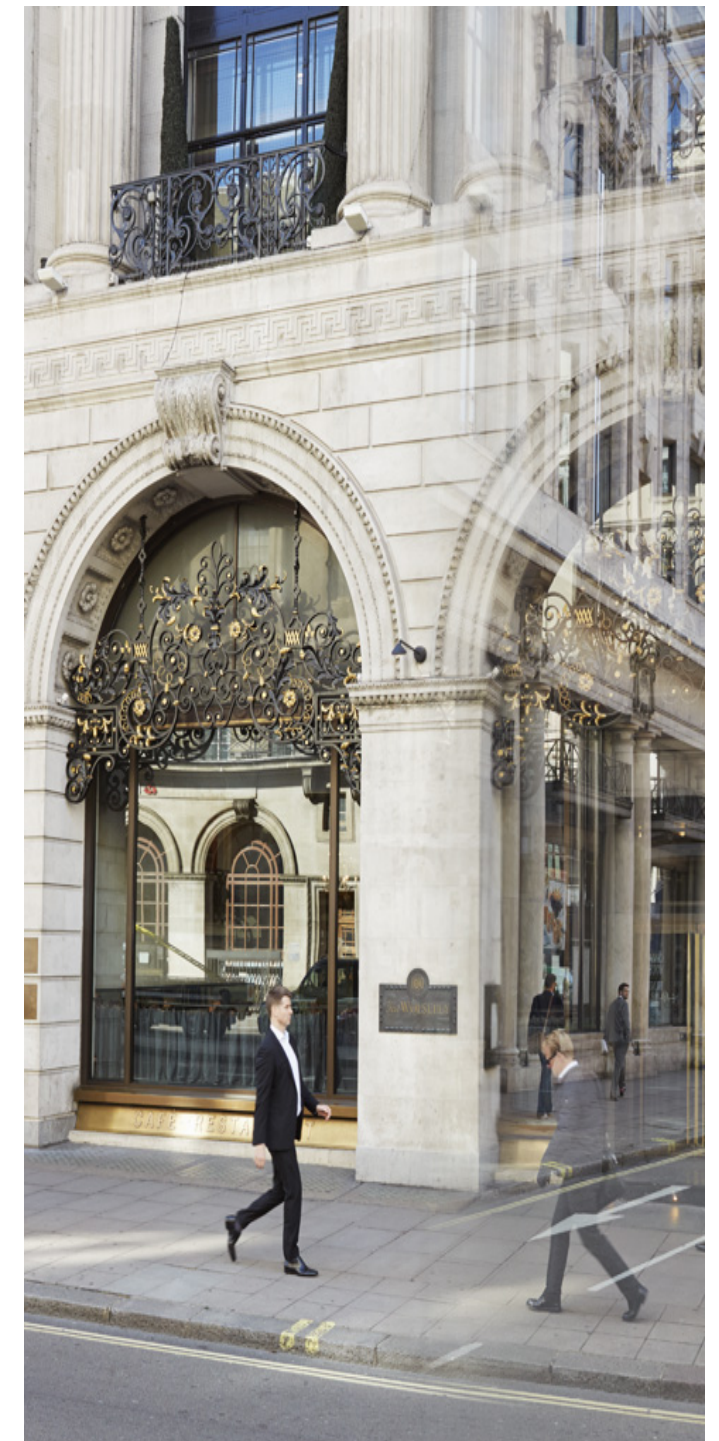
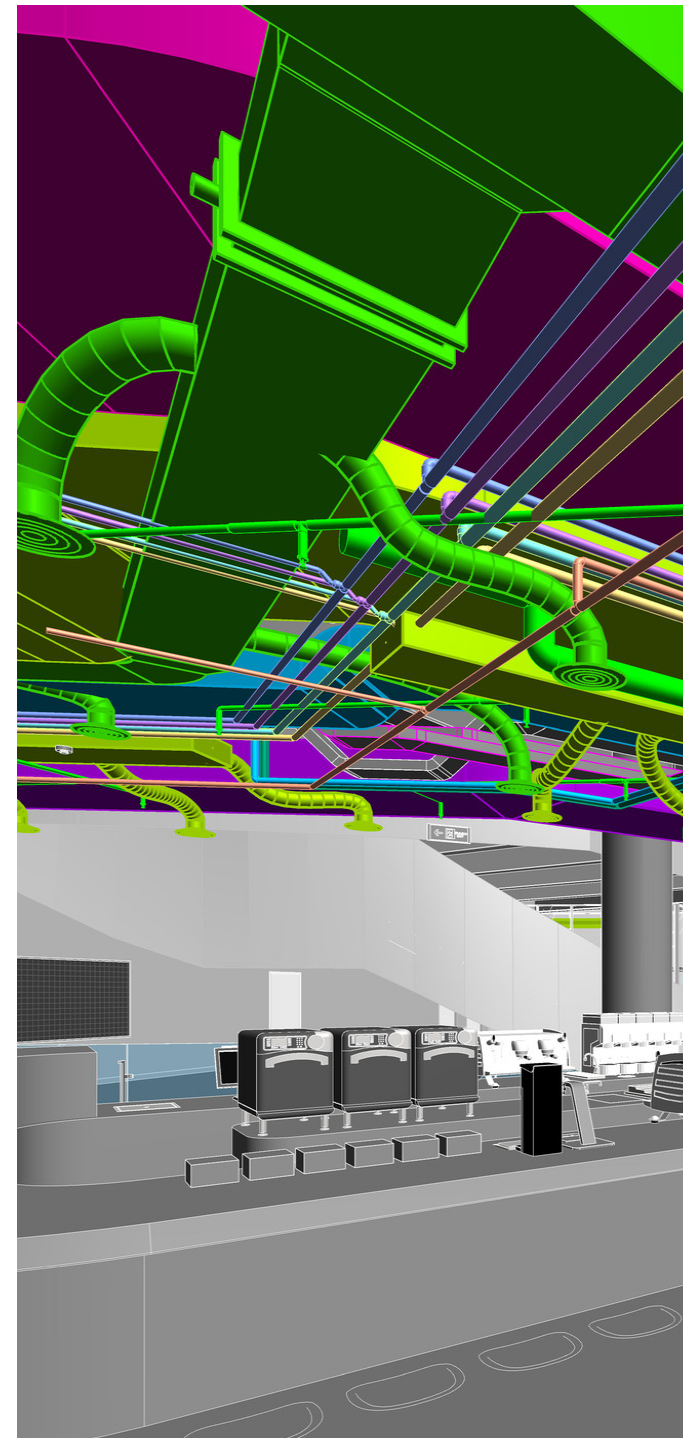


# Asset Information Model Requirements

15/09/2016  
Rev 01



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# 1 Definition of the Asset Information Model

- 1.1. The purpose of this document is to define the information requirements to be incorporated within the Asset Information Model ('the AIM') for the subject building by the Contractor. The AIM is a record model of the as-built conditions for a building, populated with data requirements provided with a bi-directional link to the online operational and maintenance manuals ('O&M manuals') and, where required, any facilities management systems. The purpose of the AIM is set out in more detail in Appendix A.
- 1.2. This document should be read in conjunction with following documents which together form The Crown Estate's BIM Requirements ('The Requirements'):
  - a) The Employer's BIM Information Requirements ('The EIRs').  
This document outlines the process requirements in relation to BIM and should be used to inform project specific BIM documents and processes so that they comply with the Crown Estate's overall BIM strategy.
  - b) The project specific BIM Execution Plan ('The BEP').  
This document contains specific processes and protocols for BIM in relation to the project being undertaken. The EIRs requires that this is developed initially by the design team and is managed and maintained by the Contractor during construction.
- 1.3. The Contractor shall be entirely responsible for fully complying with The Requirements which shall include providing any and all of the necessary information and/or components and/or services in the specified manner and form at the stated milestones.
- 1.4. The Contractor requirements for online O&M manuals are set down separately although any specified system shall be entirely compatible with the AIM.
- 1.5. Detailed requirements in any of The Requirements documents overrides general requirements in any other. Where any conflict arises between the documents that form The Requirements, the Contractor shall seek guidance from the Employer's Agent.
- 1.6. The AIM does not replace the requirement for 2D record drawings and O&M manuals outlined elsewhere in the Employer's Requirements. However, all 2D drawings and schedules should be produced directly from the Building Information Model, as far as practical, without any further editing to the material content.

# 2 The Master Asset Schedule

- 2.1 The Crown Estate's generic Master Asset Schedule is provided in Appendix B.
- 2.2 The Master Asset Schedule is a generic asset list designed to capture any asset type that may be present within the Crown Estate's Portfolio for a range of building uses and types. The AIM for each development shall include the assets in the Master Asset

Schedule only to the extent that they are incorporated in the design and specification for the completed development.

- 2.3 The AIM and the project specific asset schedule shall identify include all equipment and components below the Uniclass codes in the Master Asset Schedule. Refer to Uniclass2015 v1.3 and the example in section B1.3 for further details.
- 2.4 The data fields with which each asset is to be tagged are defined in section B1.4 of Appendix B.
- 2.5 The format of data included in the AIM shall be in line with the Crown Estate's naming conventions provided in Appendix C.
- 2.6 Each asset within the AIM shall be provided with a bi-directional link to the relevant and agreed section of the O&M manual including, where necessary, any 2D detail drawings or schedules relevant to the particular asset. The link must be directed to information that is specific to the model type of the asset. Links to generic manufacturer's information or catalogues will not be accepted.

# 3 The Model Element Authorship Matrix

- 3.1 The Crown Estate's Model Element Authorship Matrix ('the MEAM') is provided in Appendix C.
- 3.2 The MEAM defines the level of graphical detail required in the AIM and the responsibility for developing AIM information for each asset type.
- 3.3 A completed copy of the MEAM for the relevant stages for the project setting down responsibilities within the Contractor's team for the outputs is to be agreed with the Employer's Agent following contract award and included in the construction stage BEP.

# 4 Model Accuracy

- 4.1 The AIM shall accurately represent the building and all its constituent elements, including assets, as determined in the MEAM to a tolerance of +/- 50mm in relation to the asset's position/location and/or x,y and z coordinates.

# 5 Physical Asset Tagging

- 5.1 All assets in the asset schedule should be physically tagged with asset data fields agreed with the Client. As a minimum, tags will include the Global Unique Identifier ('the GUID') defined in the asset data within the AIM.
- 5.2 Labels shall be laminated white/black/white and engraved through the top layer (or another approved format). Labels shall be firmly fixed to the item of equipment, suitable for the conditions in which the asset is installed and designed to remain in place for the service life of the relevant asset.



## 6 Model Quality Control

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- 6.1 The graphical as-built conditions in the Asset Information Model shall be validated by the Contractor by means of a 3D point cloud survey as set down in Appendix D
- 6.2 The Contractor's data validation effort shall be checked by means of the Client's review of the Asset Register Data Drop (defined in the EIRs as Data Drop 5) and the draft version of that document. Data Drop 5 shall contain the information outlined in the MEAM for all relevant assets from the Master Asset Schedule for this purpose.

## 7 AIM Induction

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- 7.1 A minimum of 2 days should be allowed for AIM induction for the Client's Asset Management staff and nominated BIM support consultant, in relation to the AIM model.
- 7.2 The induction shall be run as two sessions with a minimum of 10 working days between them. The first session shall introduce an issued draft of the Handover Model (defined in the EIRs as Data Drop 6). The follow-up session should include responses to questions and feedback provided by the Employer's Agent based on their review following the initial session.

## 8 Timing of Deliverables

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- 8.1 The EIRs document defines a number of information data drops to be provided during RIBA Stages 5-6 as below:
  - a) Data Drop 5 – Asset Register;
  - b) Data Drop 6 – Handover Model; and
  - c) Data Drop 7 – Record Model.
- 8.2 The timing of these deliverables is to be agreed with the Client or the Employer's Agent following contract award and should be reflected in the project BEP.
- 8.3 A draft final version of Data Drops 5, 6 and 7 shall be provided 6 weeks in advance of the scheduled date for issue of the relevant final deliverable. Provision of a fully compliant Data Drop 6 and AIM induction will be a precondition of practical completion.
- 8.4 An independent third party review of the draft will be carried out on behalf of the Client and comments returned to the Contractor by the Employer's Agent.
- 8.5 All review comments are to be addressed and incorporated into the final deliverable at the Contractor's cost.
- 8.6 The final deliverable will also be independently reviewed and any comments are to be addressed and incorporated until approval is received.

## **Appendix A**

### **The Crown Estate's BIM Strategy – AIM Requirements**

## A1 Understanding the End Purpose

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The Crown Estate's strategy is for BIM models produced during the design and construction stages of their development projects to be developed into Asset Information Models (AIMs) to assist in the operation and maintenance of their property assets.

Understanding the end-purpose of the BIM model throughout the authoring of the RIBA plan of work stages is critical to enable its future use in this way. The AIM at handover of the development is essentially a record model of the as-built conditions populated with all the identified data requirements provided with a bi-directional link to the operation and maintenance manual and, where required, any facilities management systems.

The AIM Model itself is such that it can provide an agreed level of operational detail to the Owner Operator at any time in the future, above and beyond what is traditionally available from Drawings/Planned Preventative Maintenance (PPM) and Operation and Maintenance (O&M) systems. It is however important to recognise that not all of the information available needs to go into AIM for PPM or O&M system operations as the model should be capable of being interrogated in its own right. Only the specified data needs to be ported to the O&M and PPM systems for the purposes required. Likewise, not all of the information that is held within the PPM or O&M systems will be input back into the model.

The objectives of the model are to:

- a) Accurately represent the building and all its constituent parts as determined in the MEAM to a tolerance of +/- 50mm in relation to the assets' position/location or x,y and z coordinates.
- b) Provide information in an efficient manner to facilitate the Operation and Maintenance of the building by including asset data as outlined in the Master Asset Schedule.

### A1.1 Principles:

The AIM shall be made up of graphical and non-graphical information; more commonly referred to as; 'objects'- the 3D geometry and 'data'- the information e.g. numbers, text, etc. that resides in the background of those objects.

The AIM is intended to be a virtual digital representation of the real asset and assembly items that eventually make up the building in use and that ultimately require repair and maintenance. The objects and associated data can be created using a variety of available software technologies that have predefined tools within them to produce geometry that represents walls, windows, floors, pipework, ductwork beams, columns etc.

The terminology used across the vendors' softwares to create the objects and associated data varies but essentially facilitates the same end result, a virtual prototype of the building and its associated assets. The Crown Estate has established a common taxonomy for its models that can be recognised across the various disciplines. This identifies a common set of objects, i.e. data that can be harvested and used for the management of the building and its assets moving forward, through their association to asset codes.

## Appendix B

### The Master Asset Schedule

# B1      The Master Asset Schedule and Associated Protocols

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The Master Asset Schedule below lists the maintainable assets that are required to be identified within the AIM in accordance with section 2.6. The assets have been coded against the Uniclass 2015 Classification System. Uniclass2015 is a unified classification for the UK industry covering all construction sectors. It contains consistent tables classifying items of all scale from a facility such as a railway down through to products such as a CCTV camera in a railway station. Further information is provided in the following sections of this appendix.



Master Asset Schedule

Date	15/09/2016
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This document forms part of The Crown Estate's Asset Information Model Requirements Document and should be read in conjunction with all other parts of that document and related documents.

Category	Uniclass 2015 Classification	Asset Type	Included Elements (not limited to), Please refer to Uniclass Product Codes
M&E Services	Pr_75_50_18	Actuators: Inc Thermal, Hydraulic, Motor Driven, Power Fail	Inc Thermal, Hydraulic, Motor Driven, Power Fail - Motor Return Actuators, Power Fail - Spring Return Actuator
M&E Services	Pr_60_65_03	Air Handling Units (AHU)	Air Handling Units - General
M&E Services	Pr_60_60_08	Boiler	Inc: Atmospheric Gas Burner - Free Standing Boiler, Atmospheric Gas Burner - Condensing Boiler, Coal Fired Boilers - Bunkers and Conveyors, Coal Fired Boilers - Coal Storage Handling
M&E Services	Pr_60_60_83	Ash Handling System	
M&E Services	Pr_60_60_84	Packaged Steam Generators	
M&E Services	Pr_65_53_86_33	Gas Booster Sets	
M&E Services	Pr_65_54_33	Gas Governor or Gas Regulator	
M&E Services	Pr_65_57_02_97	Wet Scrubber System	
M&E Services	Pr_70_50_71_42	Incinerator	Inc: Gas Incinerator, Waste Incinerator, Sanitary Incinerator - Electrical
M&E Services	Pr_70_60_37	Heat Pump	Inc: Air to Water Heat Pump, Water to Water Heat Pump, Brine to Water Heat Pump
M&E Services	Pr_60_60_10	Burners	Inc: Atmospheric Gas Burners, Blown Gas Burner, Forced Draught Gas Burner, Light Oil Vaporising Pot Burner, Gas/Oil Burners - Dual Fuel, Distribution system
M&E Services	Pr_60_60_13	Chillers	Inc: Packaged Chiller Units, Lithium Bromide/Water Absorption Chillers, Gas Fired Absorption Chiller Up to 18kw Cooling Capacity, Solar Thermal Absorption Chillers
M&E Services	Pr_40_70_23_71	Refrigerated Display Cabinets	
M&E Services	Pr_75_75_94	Communications - Public Address Systems	Inc: Control Panel, Speakers
M&E Services	Pr_65_67_16	Compressor	Compressors Refrigeration - Reciprocal (Includes Hermetic, Semi-Hermetic and Open), Compressor - Screw, Compressors Refrigeration - Centrifugal, Compressor - Scroll
M&E Services	Pr_70_65_03_02	Condenser	Inc: Water Cooled, Air Cooled
M&E Services	Pr_65_72_27	Electrical protective devices	Breakers, Fuses, Supression devices, Risdual Current Monitors
M&E Services	Pr_65_72_43	Power conditioning equipment	Electrical Filters, Power Factor Correction Equipment, Optimisers, Power Condition Units
M&E Services	Pr_70_70	Power and lighting outlet products	Inc: Lamps
M&E Services	Pr_70_75_04	Audio, data and visual outlet plates and controllers	
M&E Services	Pr_75_50_76	Sensors and detectors	Sensors, Detectors, Transducers
M&E Services	Pr_65_65_23	Ductwork accessories	Access Hatches, Panels, Door Sets
M&E Services	Pr_65_65_24	Duct Dampers	Volume Control Dampers and Fire/Smoke Dampers, attenuators, InLine Equipment
M&E Services	Pr_65_65_25	Ductwork and fittings	Access Hatches, Volume Control Dampers and Fire/Smoke Dampers, attenuators, InLine Equipment
M&E Services	Pr_70_65_03	Air conditioning units	Refrigeration Evaporators
M&E Services	Pr_65_67_29	Fans	Ventilating Fans - General, Centrifugal Fans, Axial Fans, Propeller Fans, Mixed Flow Fans, Bifurcated Fans, Extract Fans - Including Fire/Smoke Extract Units, Ammonia Extract Fan,
M&E Services	Pr_65_57_02	Filters	Air Filters, Electrostatic Filters
M&E Services	Pr_75_75_30	Fire alarm detection devices and control equipment	Fire Alarms - Associated Equipment, Detectors, Panel
M&E Services	Pr_40_50_28	Extinguishers and fire blankets	Hose Reels - Pressure Boosting Sets, Hose Reels - Static or Swinging, Rising Fire Mains and Hydrants, Gas Extinguishing Systems, Carbon Dioxide Total Flooding Fire Extinguishing System,
M&E Services	Pr_65_54_30	Fire fighting valves and devices	Hose Reels - Pressure Boosting Sets, Hose Reels - Static or Swinging, Rising Fire Mains and Hydrants, Gas Extinguishing Systems, Carbon Dioxide Total Flooding Fire Extinguishing System,
M&E Services	Pr_70_65_30	Flues (All Combustible Fuels)	
M&E Services	Pr_40_20_87_24	Drinking Fountains	Bottled Water Cooler, Point of Use Water Dispenser, Water Filter
M&E Services	Pr_70_55_98_30	Fountains	Fountains Outdoor - Ornamental, Fountains Indoor - Ornamental
M&E Services	Pr_30_59_48	Louvres and components	
M&E Services	Pr_70_65_04	Air terminals and diffusers	
M&E Services	Pr_70_60	Heaters	Heat Emitters, Gas Fired Ceramic Plaque Infra-Red Heaters, Gas Fire, Gas Radiant Tube Heaters, Gas Fired Natural and Fan Assisted Heaters - Conventional and Balanced Flue, Gas Fired
M&E Services	Pr_60_60_38	Calorifiers and plate heat exchangers	Heat Exchangers - Coils, Electric/Air Heater, Plate Recuperator, Thermal Wheels - Rotary Heat Regenerators, Run Around Heat Recovery Coils, Plate Heat Exchangers
M&E Services	Pr_60_60_13	Chillers and cooling towers	Cooling Towers - Precautions against Legionnaires Disease (Legionella Pneumophila), Dry Coolers, Adiabatic Coolers
M&E Services	Pr_60_50_20	Cylinders and buffer vessels	Thermal Storage Cylinder (Individual Dwellings for DHWS), Expansion Vessels,
M&E Services	Pr_65_67_39	Humidifiers and dehumidifiers	Cold Water Evaporator, Drum Type, Direct Steam Injection Type, Electrode Boiler, Compressed Air Type, Ultrasonic, Resistance Heater Type, Spray
M&E Services	Pr_40_70_23_40	Ice Making Machines	
M&E Services	Pr_70_70_48	Lighting - Switches - Internal and External, Fittings including Luminaires General	
M&E Services	Pr_70_70_48	Lighting Fittings including Luminaires General	
M&E Services	Pr_70_70_48	Emergency Lighting - Self Contained	
M&E Services	Pr_65_70_46	Lightning protection and earthing components	
M&E Services	Pr_75_51_26	Motors - Drive Elements	
M&E Services	Pr_60_50_20_10	Buffer vessels	Water Buffer/Surge Tanks
M&E Services	Pr_65_54_33	Gas and liquid fuel valves	Emergency Solenoid Fuel Valves, Pressure Reducing Valves
M&E Services	Pr_65_55_84	Steam and condensate distribution	Steam Services
M&E Services	Pr_65_55_85	Steam and condensate recovery vessels	Flash Steam Vessel
M&E Services	Pr_65_67_16	Compressed air products	Air Compressors and Receivers
M&E Services	Pr_60_70_65	Power Generation	Power Generation - Stand-by Generator, Batteries - Lead Acid - Unsealed, Battery Charging Equipment, Uninterruptible Power Supplies, Combined Heat and Power (CHP) - Diesel Fuel
M&E Services	Pr_60_70_65_63	Photovoltaics	
M&E Services	Pr_60_70_22	Distribution boxes and switchboards	Main Switch Panel at Supply Intake, Distribution Boards, Three Phase Circuits, Isolators/Starters/Fuse Switches, Earthing, Earthing Bars, Power Distribution Unit (PDU)
M&E Services	Pr_65_53	Pumps	Circulating Pumps - General, Centrifugal Pumps, Pressurisation Pumps, Rotary Hand Pumps, Secondary Hot Water Circulating Pumps, Sewage or Drainage Pumps Submersible, Sewage

Category	Uniclass 2015 Classification	Asset Type	Included Elements (not limited to), Please refer to Uniclass Product Codes
M&E Services	Pr_70_65_03	Room Air Conditioners	
M&E Services	Pr_40_20_93	Macerators	
M&E Services	Pr_65_52_25_60	Interceptors	Interceptors - Petrol and Oil, Blowdown and Sumps
M&E Services	Pr_75_75_42	Intruder detection and alarm devices and control equipment	Security Systems - Intruder Alarms
M&E Services	Pr_75_50_76	Sensors	Pressure Measurement Sensors - Static and Differential, Temperature Measurement Sensors, Relative Humidity Sensors, Absolute Humidity Sensors, Air Quality Sensors, Carbon Dioxide
M&E Services	Pr_40_20_87_78	Showers	Showers Booster Pumps
M&E Services	Pr_25_80_79	Smoke and fire control products	Natural Smoke and Heat Exhaust Ventilators, Powered Smoke and Heat Exhaust Ventilators, Smoke Curtains
M&E Services	Pr_60_60_81	Solar Hot Water Panels and Similar Collecting Devices	
M&E Services	Pr_70_65_03	Split Systems/Heat Pumps - Air-Cooled with Direct Expansion Evaporator (DX)	
M&E Services	Pr_75_51_52	Starters	Starters - Drive Elements, Star Delta, Two Speed - Dual Wound, Two Speed - Pole Change, Reversing, Autotransformer, Quick Transition Electric Heater, Electrolyte Type, Air Break and
M&E Services	Pr_60_50	Storage Tanks	Cold Water Storage Tanks and Cisterns, Ice Storage Systems, Liquefied Petroleum Gas (LPG), Oil, Underground Oil Storage Tanks, Storage Silo - Wood Chip / Pellets, Storage Silo - Coal
M&E Services	Pr_60_55_97	Swimming Pools	Filters, Pipework, Pumps, Heating etc, Winterisation
M&E Services	Pr_75_51_17	Switches	On/Off Switching Devices, Control Relays, Automatic Transfer Switch, Occupier tap-off's & locations
M&E Services	Pr_70_65_04_94	Terminal Units	VAV - Self Powered, Vav - Fan Powered, Vav - Pneumatic Powered, Constant Volume including Mixing, Induction Units, Fan Coil, VRV Systems, Chilled Beams
M&E Services	Pr_65_54	Valves	Tap and Outlet Fittings, Service Valves, Combination Tap Assemblies, Mixing Valves/Taps, Shower Valves, Rotary Valves - Shoe or Slipper, Butterfly and Ball Valves, Self Acting and
M&E Services	Pr_25_30_86	Automatic Vehicle Barrier	
M&E Services	Pr_65_54_95_92	Underfloor Heating Including Vehicle Access Ramps	
M&E Services	Pr_60_65_94	Ventilation hoods and extract points	Wood Dust Extraction, Laboratory Fume Cupboard
M&E Services	Pr_65_67_94	Vehicle exhaust distribution products	
M&E Services	Pr_60_55_97	Water treatment products	Ion Exchange Plant - Base Exchange Softening - Commercial, Ion Exchange Plant - Base Exchange Softening - Domestic (capacity usually below 50 litres), Filtration, Conditioning and pH
M&E Services	Pr_40_20_06_9	Whirlpool/Spa Baths	
M&E Services	Pr_60_70_36	High voltage switchgear and transformers	Oil Switchgear including Oil Circuit Breakers and Oil Switches, Non - Oil Switchgear, Vacuum Indoor Switchgear, Fluid Filled Transformer, Cast Resin Transformer
M&E Services	Pr_60_45_95	Wastewater settlement product	
M&E Services	Pr_65_52_24	Drainage Fields	
M&E Services	Pr_65_55_76	Separator Systems	
M&E Services	Pr_40_70_75	Man Safe Systems	Cable and Track/Rail Based Safety Systems, Connectors, Energy Absorbing Lanyards, Eyebolts used for Personal Fall Protection, Mobile Man Anchors, Retractable Fall Arrestor
M&E Services	Pr_65_80_28	Conveyor / People Transport Systems	Disabled Platform Lifts, Escalator And Moving Walkways, Hydraulic Lifts, Stair Lifts, Traction Lifts
M&E Services	X_No Code Avaliable	Workshop Machinery	Laser Cutting Machine, Machine Tools - General, Pedestal Grinder, Pillar Drill
Catering Equipment	Pr_40_70_23	Servery Equipment	Bain Marie/Counter - Electric, Bain Marie/Counter - Gas, Cup Warmer, Heat Lamps, Heated Mobile Trolley, Hot Cupboard - Electric, Hot Cupboard - Gas, Hot Display Counter - Electric,
Catering Equipment	Pr_40_70	Coffee Machine	Coffee Machine (Non-Pressurised) - Electric, Coffee Machine (Non-Pressurised) - Gas, Coffee Machine (Pressurised) - Electric, Coffee Machine (Pressurised) - Gas
Catering Equipment	Pr_40_70_31	Fridges, Freezers and Blast Chillers	
Catering Equipment	Pr_40_70_65	Preparation catering equipment	Fat Fryer (Open Topped), Griddle / Grill, Salamander, Boiling Pan - Electric, Bratt Pan
Catering Equipment	Pr_40_70_24	Domestic cooking equipment	Kettle (Non-Pressurised), Kettle (Pressurised), Tilting Kettle (Non Pressurised) - Electric, Tilting Kettle (Non Pressurised) - Gas, Tilting Kettle (Pressurised) - Electric, Tilting Kettle
Catering Equipment	Pr_40_70	Appliances	Coffee Grinder, Crepe Machine, Degreasing Tank - Electrical, Dishwashers, Dough Kneader - Electric, Dough/Pastry Sheeter, Food Processor, Frozen Yogurt Machine, Gas Appliances -
Catering Equipment	Pr_40_70_24	Cooking	Bake Off Oven - Electric, Bake Off Oven - Gas, Baked Potato Oven - Electric, Bread Oven - Electric, Bread Oven - Gas, Bulls Eye Range - Gas, Combination Oven - Electric, Combination
Catering Equipment	Pr_40_70_65	Appliance (Cutting)	Bread Slicer, Meat Slicer, Potato Chipper, Vegetable Slicer/Prep Machine
Fabric and Furniture	X_No Code Avaliable	Fixing points - seasonal decorations	
Fabric and Furniture	Pr_40_50_05	Feature artwork	
Fabric and Furniture	Ss_25	Wall and floor tile type	
Fabric and Furniture	Ss_25_30	Doors	Internal, External, Fire Doors, Door Locks, Acoustic door partitions
Fabric and Furniture	Ss_25_30_95	Windows	
Fabric and Furniture	Ss_25_45	Architectural finishes	
Fabric and Furniture	Ss_25_45	Specialist wall finishing	
Fabric and Furniture	Ss_30_20_70	Raised flooring system and loading	
Fabric and Furniture	Ss_30_25	Ceiling tiles - type/supplier/size	
Horticultural	Pr_40_30_04	Wildlife habitat equipment	
Horticultural	Ss_55_70_42	Irrigations systems	
Fabric and Furniture	X_No Code Avaliable	Heritage and conservation elements	
Security	Pr_60_75_86	Security Systems	CCTV and Access control, Camera locations, Door entry systems, Security check/tag points
Sanitary Ware	Pr_40_20	Sanitary Fixtures	Sinks, Basin, Toilet pan, Taps, Shower hose and head, Shower tray
H&S and Access equipment	Pr_25_30_85_11	Cat ladders - periodic test and inspect required	
Horticultural	Ss_45_40_47	Planters and sedum roofs	
IT Equipment	Pr_40_70_67	AV Equipment	Cinema
IT Equipment	Pr_70_75_04	Data / Communication Systems	Data outlets, Wi-Fi unit, Data Network, Satellite, Conference systems
Fabric and Furniture	Pr_30_59_36	Access Equipment	Horizontal and Vertical, access hatch - ceiling, Floor, Destructive
Fabric and Furniture	Pr_40_10_77	Shop signs	
Fabric and Furniture	Pr_40_30_21	Cycle stands and lockers	

B1.1 Uniclass Classification System

As part of the BIM Toolkit project, NBS are working on the next version of the Uniclass classification scheme. Originally released in 1997, Uniclass allows project information to be structured to a recognised standard. This original version has now been heavily revised, to make it more suitable for use with modern construction industry practice, and to make it compatible with BIM now and in the future.

Each Uniclass code consists of either four or five pairs of characters. The initial pair identifies which table is being used and employs letters. The four following pairs represent groups, sub-groups, sections and objects. By selecting pairs of numbers, up to 99 items can be included in each group of codes, allowing plenty of scope for inclusion.

- Code
- Group
- Sub group
- Section
- Object

For example, Systems are arranged in groups with subgroups which are sub divided, which leads to the final object code.  
Example of Uni-Classification Breakdown:

Classification System Broken Down		
Field	Code	Title
Code	Pr	Product Item
Group	50	Disposal systems
Sub group	50_75	Wastewater storage, treatment and disposal systems
Section	50_75_67	Primary sewage treatment and final settlement systems
Object	50_75_67_46	Lamella tank systems

B1.2 How this is used for BIM asset data

The Master Asset Schedule indicates the equipment and components that are required to be identified within the AIM and to have asset data fields applied.

The Uniclass 2015 Code that is given indicates that all equipment and component below the given code should be included.

B1.3 Examples

Extract from Master Asset Schedule

Category	Uniclass 2015 Classification	SFG Spec Category	SFG Maintenance Code	Asset Type
M&E Services	Pr_60_65_03	3	1	Air Handling Units (AHU)
M&E Services	Pr_65_53_86_33	5	39	Gas Booster Sets
M&E Services	Pr_65_54_33	5	40	Gas Governor or Gas Regulator
M&E Services	Pr_65_57_02_97	5	43	Wet Scrubber System
M&E Services	Pr_65_67_16	12		Compressor
M&E Services	Pr_70_65_03_02	13		Condenser
M&E Services	Pr_65_72_27	14		Electrical protective devices
M&E Services	Pr_65_72_43	14		Power conditioning equipment
M&E Services	Pr_65_65_23	16	2	Ductwork accessories
M&E Services	Pr_65_65_24	16	2	Duct Dampers
M&E Services	Pr_65_65_25	16	2	Ductwork and fittings
M&E Services	Pr_70_65_03	19	1	Air conditioning units
M&E Services	Pr_65_67_29	20		Fans
M&E Services	Pr_65_57_02	21		Filters

Equipment Included: Extract from Uniclass Product Code Table (v1.3)

Example: Air Handling Units_Pr_60_65_03					
Code	Group	Sub group	Section	Object	Title
Pr_60_65_03	60	65	03		Air handling units
Pr_60_65_03_86	60	65	03	86	Supply air handling units
Pr_60_65_03_87	60	65	03	87	Supply and return air handling units
Example:Fans_Pr_65_67_29					
Code	Group	Sub group	Section	Object	Title
Pr_65_67_29	65	67	29		Fans
Pr_65_67_29_05	65	67	29	05	Axial flow fans

Pr_65_67_29_09	65	67	29	09	Bifurcated fans
Pr_65_67_29_12	65	67	29	12	Centrifugal fans
Pr_65_67_29_23	65	67	29	23	Domestic fan units
Pr_65_67_29_24	65	67	29	24	Domestic multipoint fan units
Pr_65_67_29_44	65	67	29	44	Jet fans
Pr_65_67_29_52	65	67	29	52	Mixed flow fans
Pr_65_67_29_67	65	67	29	67	Propeller fans
Pr_65_67_29_72	65	67	29	72	Roof mounted fans
Pr_65_67_29_80	65	67	29	80	Smoke extract fans
Pr_65_67_29_88	65	67	29	88	Twin axial fans
Pr_65_67_29_89	65	67	29	89	Twin centrifugal fans
Pr_65_67_29_96	65	67	29	96	Whole dwelling fan units

## B1.4 Asset Data Fields

The following fields shall be populated for all assets included in the AIM.

Guidance for populating the fields can be found in the Crown Estate’s Naming Conventions (Appendix C).

Description	
Site name	Site
Building Code	
Building Name	
Name of Asset	Type of Asset
Description of Asset	
Manufacturer Name	
Manufacturer Model Type	
Manufacturer Product Code	
Supplier Code	
Supplier Name	
Quantity of Assets	Instance / Component Identification
Unique Identifier / Asset Code	
Tag number	
Unique Barcode	
Serial Number	
Drawing Reference Number	System
System Name	
System Description	
Parent Asset code for this Asset	Location
Floor Level	
Room number	
Location description	Commissioning and Maintenance Data
Purchase Date	
Installation Date	
Installed by (including Subcontractor)	

Date Condition was tested	
Date Warranty Expires	
Date Warranty Starts	
Warranty Contact Details	
Lifespan of Asset	
Energy Performance	
Replaced (Yes/No)	
Replaced Date	
Replacement Number	
Comments connected to Asset (String 2000)	

## Appendix C

### Naming Conventions

## 1.1 File Naming

Note: file extensions should not be amended or deleted and must be separated from the file name by the period character “.”

Project Code	Originator	Volume	Level	File Type	Role	Number
--------------	------------	--------	-------	-----------	------	--------

A breakdown of each of the fields and their subsequent value for this project are as follows:

This is the abbreviated name for the project.  
*Note: do not use internal company project references.*

A 3-character unique identifier for each organization

[illegible]

**Revision P01**  
**Status S2**

## Volume

This field is a two-character alphanumeric code that represents the volume strategy of a building. Volumes allow the project to be broken down into more manageable areas allowing spatial co-ordination, concurrent working and file size management. This will be linked to break down of model files.

Code	Volume
XX	No volume applicable
00	Multiple Volumes

## Level

This field is a two-character alphanumeric code that represents the level or storey of a building.

Code	Project Level Name
XX	No level applicable
ZZ	Multiple levels
GF	Ground Floor
00	Base level of building (where ground floor is not appropriate)
01	First Floor
02	Second Floor
03	Third Floor
04	Fourth Floor
M1	Mezzanine above level 01
M2	Mezzanine above level 02
B1	Basement level 1 (below ground)
B2	Basement level 2

## File Type

This field is a two-character alphanumeric code that indicates the type of the file. It is used to represent the type of information in the file and not the file format.

### Model file types

Code	File type	Example
AF	Animation file (of a model)	Video file eg. avi
CM	Combined model (combined multidiscipline model)	A federated model file e.g. nwd
CR	Clash rendition file	A federated model file used for clash detection e.g. nwf
M2	2D Model file	A 2D dwg model space file
M3	3D Model file	A 3D native model file and its exports
MR	Model rendition file	Analysis model files e.g. cost and programme
VF	Visualisation file (of a model)	A static jpeg file or interactive image file

### Document file types

Code	File type
BQ	Bill of quantities
CA	Calculations
CH	Change order
CO	Correspondence
CP	Cost plan
CT	Comments
DB	Database
DN	Design Note
DR	2D Drawing
FN	File note
HS	Health and safety
IE	Information Exchange File
MD	Model datasheet (splash screen)
MI	Minutes/action notes
MS	Method statement
PO	Point Cloud
PP	Presentation
PR	Programme
PS	Project set-up (e.g. PEP & BEP)
RD	Room data sheet
RI	Request for information
RP	Report
SA	Schedule of accommodation
SC	Structural calculations



SH	Schedule
SN	Snagging List
SP	Specification
SU	Survey
TQ	Technical query

**GF** – Ground floor

**M3** – Model

**A** – Architect

**0001** – Number

## 1.2 Classification

With the ever increasing amounts of information required on projects it is important that a unified classification system is used to ensure that data is able to be indexed and structured. It also allows for a common and consistent construction language to be used on a project. Uniclass2015 is to be used on this project. For 3D object level classification use the Product table.  
<https://toolkit.thenbs.com/articles/classification/>

## 1.3 Areas

Standard measuring conventions used for this project should be agreed by the design team before information is exchanged. For this project we will be working to the RICS code of measuring practice 6th edition.  
<http://www.isurv.com/site/scripts/download.aspx?type=downloads&fileID=167>

Area data should be exported from models into other software packages without manual input or editing.

Area scheduling is to use the following terms:

- **GIA** – Gross Internal Area: See document RICS Code of measuring practice 6th edition, pages 12-15
- **NIA** – Net Internal Area: See document RICS Code of measuring practice 6th edition, pages 16-21
- **GSA** – Gross Site Area (in hectares): The site area\*, plus any area of adjoining roads, enclosed by extending the boundaries of the site up to the centre of the road, or 6m out from the frontage, whichever is less.

\* The total area of the site within the site title boundaries, measured on a horizontal plane

If additional file types are required, please discuss this with the Information Manager.

### Role

This field is a single character code which indicates the discipline responsible for the deliverable.

Code	Discipline
A	Architect
B	Building Surveyor
C	Civil Engineer
D	Drainage, Highways, Engineer
E	Electrical Engineer
F	Facilities Manager
G	Geographical and Land Surveyor
H	Heating and Ventilation Designer
I	Interior Designer
J	Joint Services MEP
K	Client
L	Landscape Architect
M	Mechanical Engineer
P	Public Health
Q	Quantity Surveyor
S	Structural Engineer
T	Town and Country Planner
U	Information Manager
W	Contractor
X	Sub-Contractor
Y	Specialist Designer
Z	General (No Discipline)

### Number

This will be four digits are to be used and each discipline allocates numbers **to suit their own needs**. Example 0100 could equate to GA drawings.

File naming example:

**XYZ-ABC-V1-GF-M3-A-0001**

**XYZ** - Project XYZ

**ABC** - ABC Architects

**V1** – Volume 1

**The following names are to be consistent through graphical, non-graphical and document outputs\***

**These which will form the asset information model**

*\*Graphical = 3D models*

*Non-Graphical = Asset data*

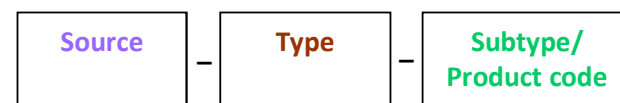
*Documents = O&M information & drawings*

## 1.4 3D/2D Model Geometry Naming

Object naming is to be to BS8541-1:2012

### 1.4.1 Model Geometry Elements - With Metadata Associated

For objects created in BIM software which can have a classification code added as additional metadata, the following convention is to be used:



*Note: All main fields are all separated by the underscore character “\_”  
This is to be used for objects such as Revit Families.*

Field	Definition
Source	Library author or manufacturer. Even if the object is generic please include this field.
Type	First level of specialisation. Taken from IFC Type.
SubType / Product code	Used to convey additional specialisation information (e.g. External or Internal) Taken from IFC Pre-defined Type (If not relevant use the Uniclass2015 description).

BIM object example:

**BoilersLtd\_Boiler\_GasFired**

### 1.4.2 Revit Type Naming

For consultants using Revit, loadable family type names will depend on how family has been created and the type of element.

Use an underscores character “\_” to delimitate between fields and a hyphen character “-” within fields. No spaces or punctuation to be used. Use the descriptors which change due to parametric programming to distinguish between types, this would generally include size and materials.

Words are abbreviated in the SubType and descriptor field.

Term	Abbreviation
External	Ext
Internal	Int
Ground Floor	GrFlr
Upper Floor	UpFlr
Pitched	Ptchd
Flat	Flat
Suspended	Susp
Raised Access	RsdAccs
Ground Bearing	GrdBrng
Aluminium	Alum
Asphalt	Asph
Battens	Bttns
Bitumen	Btumn
Block	Blck
Boarding	Brd
Bonded	Bnnd
Brick	Brk
Brick Slips	BrkSlp
Cavity	Cav
Cassette	Cass
Cement	Cmnt
Cement Particle Board	CPBrd
Ceramic	Cermc
Cladding	Clad
Composite Panel	CmpPnl
Concrete	Conc
Concrete Pre-Cast	ConcPrc
Concrete In-Situ	ConclSt
Cross Laminated Timber	CLT
Damp Proof Course	DPC
Damp Proof Membrane	DPM
Dot and Dab	DtDb
Furrings	Furr
Galvanised	Galv
Generic	Gen
Glulam	Glulm
GRP	GRP
Insulation	Ins
Insulation Full Fill	InsFF
Insulation Partial Fill	InsPF
Membrane	Mmbrn
Metal	Mtl

Metal Cladding	MtlCld
Metal Frame	MtlFrm
Metal Sections (Metsec)	Metsec
Metal Standing Seam	MtlSs
Pedestal	Pedstl
Plaster	Plstr
Plasterboard	Pb
Plywood	Ply
Polyethylene	Polyeth
Purlins	Purl
Orientated Strand Board	Osb
Render	Rndr
Screed	Scrd
Screen	Scrn
Sheeting	Sht
Steel	Stl
Stone	Stne
Structurally Insulated Panels	SIPs
Stud	Std
Suspended Grid	SuspGrd
Tile	Tle
Vapour Control Layer	Vap
Vinyl	Vnyl

Abbreviations can be amalgamated where needed (e.g. Metal Tile = MtlTle)

Revit Type Name example:

**400x350x1000**

(Always use WidthxDepthxHeight)

### 1.4.3 Non Model Geometry Elements - No Metadata Included

For objects created in CAD based software which **cannot** have a classification code added as metadata, it is recommended that the following convention is to be used.

*This is to be used for objects such as AutoCAD blocks*



*Note: All main fields are all separated by the underscore character “\_”*

Field	Definition
<b>Role</b>	Role of the object owner. To be taken from the codes in section 1.1
<b>Classification</b>	A functional or product classification code. Uniclass 2015 is to be used
<b>Presentation</b>	Indicating intended presentation. To be taken from the presentation table below.
<b>Source</b>	Library author or manufacturer. Even if the object is generic please include this field.
<b>Type</b>	First level of specialisation. Taken from IFC Type.
<b>SubType / Product code</b>	Used to convey additional specialisation information (e.g. External or Internal) Taken from IFC Pre-defined Type (If not relevant use the Uniclass2015 description).

#### Presentation

Code	Description	Comments
A	Annotation	Tags, arrows, symbols etc.
D	Dimensions	
H	Hatch/Shadows	
IL	Invert Levels	For services
M	Model related graphics	For elements exported from modelling software such as Revit
M2	2D model graphics (elements in 2D)	Element drawn in 2D
M3	3D model graphics (elements in 3D)	Element modelled in 3D
P	Plot/sheet related elements	Titleblocks/Viewports
T	Text	Text

Non BIM Object example:

**Y**\_Pr\_60\_60\_08\_33\_**M3**\_BoilersLtd\_**Boiler**\_GasFired

#### 1.4.4 Layer Naming

For software operating from a layer (or sometimes referred to as level) method of distinguishing between objects the following convention is to be adopted:

Layer naming should be composed of alphanumeric characters without text formatting (e.g. a-z, A-Z, 0-9). Names shall be created by joining together codes of specified fields, in the specified order, using only the “-” hyphen character between the first three fields and “\_” underscore character before the last field.

No spaces or other punctuation to be used.

For disciplines using a CAD based software platform layer names should follow the naming convention as set in BS1192:2007



*Note: All the first three fields are separated by the hyphen character “-” and the last field by the underscore character “\_”*

Field	Definition
<b>Role / Discipline</b>	Role of the object owner. To be taken from the codes in section 1.1
<b>Classification</b>	A functional or product classification code. Uniclass 2015 is to be used
<b>Presentation</b>	Indicating intended presentation. To be taken from the presentation table below
<b>Description</b>	Brief description of the element

Non BIM Object example:

**P\_Pr\_60\_60\_08\_33\_M3\_Boilers**

#### Property/Parameter/Attribute Naming

- Property/Parameter/Attribute naming should be composed of alphanumeric characters without text formatting (e.g. a-z, A-Z, 0-9).
- Information is to be CamelCase - capitalised first letters to words and not include spaces
- Underscore character “\_” can be used for spaces if required.
- Keep parameter names as short as possible.
- Avoid abbreviation and truncation, when possible

#### 1.4.5 Material Name

**Source\_Material\_SubType\_Differentiator**

Field	Definition
<b>Source</b>	Library author or manufacturer. Even if the object is generic please include this field
<b>Material</b>	Used to identify the material type, e.g. plastic
<b>SubType/Product Code (optional)</b>	Used to convey additional specialisation information (e.g. External or Internal)
<b>Differentiator (optional)</b>	Field to add any additional information about the content, for ease of locating.

#### 1.4.6 Material Image File Name

**Source\_Type\_SubType\_Differentiator\_ImageType**

Field	Definition
<b>Source</b>	Material manufacturer (for generic materials this shall be omitted)
<b>Type</b>	Material type e.g. CarpetTile
<b>SubType / Product code / Product Range</b>	Used to convey additional information such as product range. Can also be used to capture the sub type
<b>Differentiator (optional)</b>	Used to convey additional specialisation information not captured in attribute data e.g. Matte
<b>Image Type</b>	Used to convey the image type e.g. bump, cutout, render

Material Naming has been based upon the NBS BIM Object Standard. *Note: Role has been removed*

## 1.5 Asset Data

The asset data required at handover must adhere to the following table.

Attribute Name	Attribute Level	Attribute Type	Property Set	Example	Data Drop					
					1	2a	2b	3	4	5
SiteName	Site	AlphaNumeric	/	DevelopmentA	x	x	x	x	x	x
BuildingCode	Building	AlphaNumeric	/	BU01	x	x	x	x	x	x
BuildingName	Building	AlphaNumeric	/	Building01	x	x	x	x	x	x
FloorName	BuildingStorey	AlphaNumeric	/	Ground Floor	x	x	x	x	x	x
RoomNumber	Space	AlphaNumeric	/	1_001	x	x	x	x	x	x
RoomName	Space	AlphaNumeric	/	Plant Room 01	x	x	x	x	x	x
Name <For Revit Family Name: Type Name>	Type	AlphaNumeric	/	BoilersLtd_Boiler_GasFired: 450x300x1000		x	x	x	x	x
Description	Type	AlphaNumeric	/	Gas fired condensing boilers		x	x	x	x	x
IfcGUID	Occurrence	AlphaNumeric	/	0OyK\$e5Pd3L9mUta5u1WGI		x	x	x	x	x
Quantity <For groups of elements>	Type	Numeric	Quantity	n/a				x	x	x
Manufacturer	Type	AlphaNumeric	ManufacturerTypeInfo	BoliersLtd				x	x	x
ModelReference	Type	AlphaNumeric	ManufacturerTypeInfo	Eco Range				x	x	x
ModelNumber	Type	AlphaNumeric	ManufacturerTypeInfo	WE456				x	x	x
SupplierName	Type	AlphaNumeric	SupplierInformation	Plumbing Centre				x	x	x
SupplierCode	Type	AlphaNumeric	SupplierInformation	12547				x	x	x
SystemName	System	AlphaNumeric	SystemInformation	Heating 01				x	x	x
SystemDescription	System	AlphaNumeric	SystemInformation	Central heating system				x	x	x
ParentCode	System	AlphaNumeric	SystemInformation	n/a						x
AssetIdentifier	Occurrence	AlphaNumeric	Installation Data	Boiler 01				x	x	x
TagNumber	Occurrence	AlphaNumeric	Installation Data	01				x	x	x
Barcode	Occurrence	AlphaNumeric	ManufacturerOccurrence	123565897755				x	x	x
SerialNumber	Occurrence	AlphaNumeric	ManufacturerOccurrence	PRTK542154JUWH				x	x	x
DrawingNumber	Occurrence	AlphaNumeric	DocumentInformation	??-SEL-V1-GF-DR-P-0100				x	x	x
DocumentLink	Occurrence	URL	DocumentInformation	<a href="http://www.hyperlink.co.uk">www.hyperlink.co.uk</a>						
PurchaseDate	Occurrence	Date	Installation Data	2016-04-01				x	x	x
InstallationDate	Occurrence	Date	Installation Data	2016-08-08				x	x	x
InstallationContact	Occurrence	AlphaNumeric	Installation Data	Boiler Installers Ltd				x	x	x
TestedDate	Occurrence	Date	Installation Data	2016-09-01				x	x	x
WarrantyStartDate	Occurrence	Date	Installation Data	2016-08-08				x	x	x
WarrantyExpirationDate	Occurrence	Date	Installation Data	2021-08-08				x	x	x
WarrantyContact	Occurrence	AlphaNumeric	Installation Data	Insurance Company Direct				x	x	x
ExpectedLife	Occurrence	Numeric	Installation Data	10				x	x	x
EPCRating	Occurrence	AlphaNumeric	Installation Data	A				x	x	x
Comments	Occurrence	AlphaNumeric	Installation Data	Testing complete				x	x	x
Replaced	Occurrence	Boolean	MaintenanceData	Yes						x
ReplacedDate	Occurrence	Date	MaintenanceData	2028-05-18						x
ReplacementPartNumber	Occurrence	AlphaNumeric	MaintenanceData	WE800						x

\*This is the name which is required as an output from the modelling process - the workflow regarding this will depend on the software used.

## Appendix D

### Model Element Authorship Matrix

Model Element Authorship Matrix - MEAM

Project Name:	TBC
Status	S1
Revision	P00

This schedule sets down the level of development requirements for graphical information provided at particular data drop milestones, and ultimately, at handover by the Contractor. If an Element is not included within the list please refer to the System Heading above for a guide on the LOD required.

The Contractor shall determine the model element authorship responsibilities for all designers and contributing parties for the remainder of the project and submit this using the format below and resubmit the same in the event of any change. The initial schedule is required 6 weeks post contract award.

	Model Element Author
--	----------------------

Model Element Author - MEA			
			Contractor to complete/assign

Code	Group	Sub group	Section	Object	Title	Comments	Asset Data Required	Workstage 3 Developed Design			Workstage 4 Technical Design			Workstage 5 Construction			Workstage 6 Handover		
								LOD	MEA	NOTES	LOD	MEA	NOTES	LOD	MEA	NOTES	LOD	MEA	NOTES
UniClass 2015 (Systems)																			
Ss_15	15				Preparatory systems														
Ss_15_10	15	10			Preparation systems			200			200			200			520		
Ss_15_10_30	15	10	30		Excavating and filling systems			200			200			200			200		
Ss_15_10_32	15	10	32		Gravity retaining wall systems									200			200		
Ss_15_10_74	15	10	74		Site clearance systems									200			200		
Ss_15_10_75	15	10	75		Site vegetation clearance systems									200			200		
Ss_15_95	15	95			Temporary works systems			200			200			200			520		
Ss_15_95_25	15	95	25		Temporary wall and barrier works systems			200			200			200					
Ss_15_95_30	15	95	30		Temporary roof, floor and paving works systems			200			200			200					
Ss_15_95_70	15	95	70		Temporary electrical works systems			200			200			200					
Ss_15_95_75	15	95	75		Temporary communications, security, safety, control and protection works systems			200			200			200					
Ss_15_95_80_02	15	95	80	02	Temporary access road systems			200			200			200					
Ss_20	20				Structural systems														
Ss_20_05	20	05			Substructure systems			200			200			300			530		
Ss_20_05_15	20	05	15		Concrete foundation systems			200			200			300			300		
Ss_20_05_65	20	05	65		Piling systems			200			200			300			300		
Ss_20_10	20	10			Structural frame systems			200			300			400			540		
Ss_20_10_60	20	10	60		Structurally Insulated Panel Systems			200			300			300			530		
Ss_20_10_65	20	10	65		Prefabricated room systems			200			300			400			540		
Ss_20_20	20	20			Structural beams			200			300			400			540		
Ss_20_20_75	20	20	75		Structural beam systems			200			300			400			540		
Ss_20_30	20	30			Structural columns			200			300			400			540		
Ss_20_20_75_80	20	30	75	80	Structural column systems			200			300			400			400		
Ss_25	25				Wall and barrier systems														
Ss_25_05	25	05			Wall and barrier substructure systems			200			200			300			530		
Ss_25_05	25	05			Wall and barrier substructure systems			200			200			300			530		
Ss_25_10	25	10			Framed wall systems			200			200			300			530		
Ss_25_10_20	25	10	20		Curtain walling systems		✓	200			200			300			530		
Ss_25_10_30	25	10	30		Framed partition systems			200			200			300			530		
Ss_25_10_32_90	25	10	32	90	Timber wall framing systems			200			200			300			530		
Ss_25_10_35_35	25	10	35	35	Glazed screen systems		✓	200			200			300			530		
Ss_25_11	25	11			Monolithic wall structure systems			200			200			300			530		
Ss_25_11_16_65	25	11	16	65	Precast concrete wall system			200			200			300			530		
Ss_25_12	25	12			Panel wall structure systems			200			300			300			530		
Ss_25_12_60	25	12	60		Panel cubicle systems		✓	200			300			300			530		
Ss_25_14	25	14			Fence systems			100			200			200			520		
Ss_25_14	25	14			Fence systems			100			200			200			520		
Ss_25_15	25	15			Fixed pedestrian barrier systems			200			200			200			520		
Ss_25_15_60_05	25	15	60	05	Balustrade and guarding systems			200			200			200			520		
Ss_25_15_60_35	25	15	60	35	Handrail systems			200			200			200			520		
Ss_25_16	25	16			Fixed traffic and protective barrier systems						200			300			530		
Ss_25_16_94	25	16	94		Vehicle restraint systems						200			300			530		
Ss_25_20	25	20			Wall cladding systems			200			200			300			530		
Ss_25_20_14_52	25	20	14	52	Metal composite panel cladding systems			200			200			300			530		
Ss_25_20_70	25	20	70		Rainscreen cladding systems			200			200			300			530		
Ss_25_25	25	25			Wall lining systems			200			200			300			530		
Ss_25_25_45_35	25	25	45	35	Gypsum board wall lining systems			200			200			300			530		
Ss_25_30	25	30			Door and window systems		✓	200			200			300			530		
Ss_25_30_20_16	25	30	20	16	Collapsible gate and grille doorset systems		✓	200			300			300			530		
Ss_25_30_20_37	25	30	20	37	High security doorset systems		✓	200			300			300			530		
Ss_25_30_20_39	25	30	20	39	Hinged doorset systems		✓	200			300			300			530		
Ss_25_30_20_46	25	30	20	46	Louvre doorset systems		✓	200			300			300			530		
Ss_25_30_20_62	25	30	20	62	Pivot doorset systems		✓	200			300			300			530		
Ss_25_30_20_74	25	30	20	74	Roller shutter doorset systems		✓	200			300			300			530		
Ss_25_30_20_76	25	30	20	76	Sectional overhead doorset systems		✓	200			300			300			530		
Ss_25_30_20_77	25	30	20	77	Sliding doorset systems		✓	200			300			300			530		
Ss_25_30_29	25	30	29		Fire and smoke curtain systems		✓	200			300			300			530		
Ss_25_30_95_26	25	30	95	26	External window systems		✓	200			300			300			530		
Ss_25_30_95_41	25	30	95	41	Internal window systems		✓	200			300			300			530		
Ss_25_38	25	38			Wall and barrier opening hardware systems		✓	100			100			200			520		
Ss_25_38_20_20	25	38	20	20	Door, window and gate hardware systems		✓	100			100			200			520		
Ss_25_45	25	45			Wall covering and finish systems		✓	200			200			300			530		
Ss_25_45_02	25	45	02		Acoustic covering systems			200			300			300			530		
Ss_25_50	25	50			Wall mounted canopy and screen systems			200			200			400			540		
Ss_25_50_35	25	50	35		Grille systems			200			300			400			540		
Ss_25_95	25	95			Temporary wall and barrier systems						200			200			520		
Ss_25_95_60	25	95	60		Temporary pedestrian barrier systems						200			200			200		
Ss_25_95_85	25	95	85		Temporary traffic barrier systems						200			200			200		
Ss_30	30				Roof, floor and paving systems														
Ss_30_10	30	10			Pitched, arched and domed roof structure systems			200			300			400			540		
Ss_30_10_30_45	30	10	30	45	Light steel roof framing systems			200			300			400			540		
Ss_30_12	30	12			Flat roof, floor and deck structure systems			200			300			300			530		
Ss_30_12_85_16	30	12	85	16	Composite steel and concrete floor, roof or balcony deck systems			200			300			300			530		
Ss_30_12_85_70	30	12	85	70	Reinforced concrete floor, roof or balcony deck systems			200			200			300			530		



Code	Group	Sub group	Section	Object	Title	Comments	Asset Data Required	Workstage 3 Developed Design			Workstage 4 Technical Design			Workstage 5 Construction			Workstage 6 Handover		
								LOD	MEA	NOTES	LOD	MEA	NOTES	LOD	MEA	NOTES	LOD	MEA	NOTES
Ss_30_14	30	14			Paving systems			100			200			300			530		
Ss_30_14_05	30	14	05		Asphalt road and paving systems			100			200			300			530		
Ss_30_14_15	30	14	15		Concrete road and paving systems			100			200			300			530		
Ss_30_14_90	30	14	90		Unit paving systems			100			200			300			530		
Ss_30_20	30	20			Flooring and decking systems			200			200			300			530		
Ss_30_20_30_25	30	20	30	25	Decking systems			200			200			300			530		
Ss_30_25	30	25			Ceiling and soffit systems			200			300			300			530		
Ss_30_25_10_80	30	25	10	80	Soffit lining and beam casing systems			200			300			300			530		
Ss_30_30	30	30			Roof opening systems		✓	200			300								
Ss_30_30_71	30	30	71		Roof hatch systems		✓	200			300			300			530		
Ss_30_30_73_72	30	30	73	72	Roof smoke ventilator systems		✓	200			300			400			535		
Ss_30_36	30	36			Ceiling and soffit opening systems		✓	200			200			300			530		
Ss_30_36_10	30	36	10		Ceiling hatch systems		✓	200			300			300			530		
Ss_30_40	30	40			Roof and balcony covering and finish systems			200			200			300			530		
Ss_30_40_30_80	30	40	30	80	Single layer sheet warm roof covering systems			200			200			300			530		
Ss_30_40_65_50	30	40	65	50	Metal profiled sheet roof covering systems			200			200			300			530		
Ss_30_42	30	42			Floor covering and finishing systems		✓	200			200			300			530		
Ss_30_42_20	30	42	20		Deck covering systems		✓	200			200			300			530		
Ss_30_42_30	30	42	30		Floor paint systems		✓	200			200			300			530		
Ss_30_42_32_40	30	42	32	40	Internal floor tiling systems		✓	200			200			300			530		
Ss_30_42_72_10	30	42	72	10	Carpet tile systems		✓	200			200			300			530		
Ss_30_42_72_75	30	42	72	75	Resilient tile floor covering systems		✓	200			200			300			530		
Ss_30_47	30	47			Ceiling and soffit covering and finishing systems		✓	200			200			300			530		
Ss_30_47	30	47			Ceiling and soffit covering and finishing systems		✓	200			200			300			530		
Ss_30_60	30	60			Roof, floor and paving accessory systems			200			200			200			520		
Ss_30_60_50	30	60	50		Metal sheet roof flashing systems			200			200			200			520		
Ss_30_75	30	75			Roof, floor and paving drainage systems			200			200			300			530		
Ss_30_75_45	30	75	45		Kerb and traffic separation systems			200			200			300			530		
Ss_30_75_50	30	75	50		Metal sheet gutter lining systems			200			300			300			530		
Ss_30_95	30	95			Temporary roof, floor and paving systems			200			200			200					
Ss_30_95	30	95			Temporary roof, floor and paving systems			200			200			200					
Ss_32	32				Damp-proofing, waterproofing and plaster finishing systems														
Ss_32_20	32	20			Damp-proofing systems			200			300			300			530		
Ss_32_20_30	32	20	30		Floor damp-proofing systems			200			300			300			530		
Ss_32_46	32	46			Lath and plaster systems			200			300			300			530		
Ss_32_46_65	32	46	65		Plaster coating systems			200			300			300			530		
Ss_32_80	32	80			Waterproofing and tanking systems (including substructure)			200			300			300			530		
Ss_32_80	32	80			Waterproofing and tanking systems (including substructure)			200			300			300			530		
Ss_35	35				Stair and ramp systems														
Ss_35_10	35	10			Stair and ramp structure systems		✓	200			300			350			535		
Ss_35_10_25	35	10	25		External stair and ramp systems			200			300			350			535		
Ss_35_10_25_34	35	10	25	34	Ground bearing external ramp systems			100			200			300			530		
Ss_35_10_25_35	35	10	25	35	Ground bearing external stair systems			100			200			300			530		
Ss_35_10_25_85	35	10	25	85	Suspended external stair systems			200			200			200			520		
Ss_35_10_30_62	35	10	30	62	Permanently-fixed vertical ladder systems		✓	200			200			300			530		
Ss_35_10_30_95	35	10	30	95	Working platform and walkway systems			200			200			200			520		
Ss_35_10_85	35	10	85		Structural stair and ramp systems			200			300			350			535		
Ss_35_40	35	40			Stair and ramp covering and finishing systems		✓	200			300			300			530		
Ss_35_40	35	40			Stair and ramp covering and finishing systems		✓	200			300			300			530		
Ss_35_95	35	95			Temporary stair and ramp systems						200			200					
Ss_35_95	35	95			Temporary stair and ramp systems						200			200					
Ss_40	40				Signage, fittings, furnishings and equipment (FF&E) and general finishing systems														
Ss_40_10	40	10			Signage systems		✓	200			200			200			520		
Ss_40_10_25	40	10	25		External signage and interpretation systems		✓	200			200			200			520		
Ss_40_10_30	40	10	30		Fire and safety signage systems		✓							100			510		
Ss_40_10_40	40	10	40		Internal architectural signage systems		✓							100			510		
Ss_40_10_90	40	10	90		Traffic signage and marking systems		✓							100			510		
Ss_40_15	40	15			General fittings, furnishings and equipment (FF&E) systems		✓	200			200			300			530		
Ss_40_15_25	40	15	25		Catering FF&E systems		✓	200			200			200			520		
Ss_40_15_35	40	15	35		General and joinery FF&E systems		✓	200			200			200			520		
Ss_40_15_75	40	15	75		Sanitary appliance systems	Including Cisterns	✓	200			300			350			535		
Ss_40_15_90	40	15	90		Toilet systems		✓	200			300			350			535		
Ss_40_20	40	20			Administrative, commercial and protective service FF&E systems						200			200			520		
Ss_40_20_01	40	20	01		Administrative FF&E systems		✓				200			200			520		
Ss_40_20_01_60	40	20	01	60	Office FF&E systems		✓				200			200			520		
Ss_40_20_01_71	40	20	01	71	Reception FF&E systems		✓				200			200			520		
Ss_40_20_30_28	40	20	30	28	External furniture systems		✓				200			200			520		
Ss_40_25	40	25			Cultural, educational, scientific and information FF&E systems		✓				200			200			520		
Ss_40_25_26	40	25	26		Education and information FF&E systems		✓				200			200			520		
Ss_40_85	40	85			Transport FF&E systems		✓				200			200			520		
Ss_40_85_72	40	85	72		Road FF&E systems		✓				200			200			520		
Ss_40_90	40	90			General finishing systems (Intumescent and paint)		✓										520		
Ss_40_90_40_42	40	90	40	42	Intumescent coating systems		✓												
Ss_40_90_60	40	90	60		Painting and clear finishing systems		✓												
Ss_40_95	40	95			Temporary signage and FF&E systems									200					
Ss_40_95	40	95			Temporary signage and FF&E systems									200					
Ss_45	45				Flora and fauna systems														
Ss_45_35	45	35			Ground based flora systems									200			520		
Ss_45_35_30_75	45	35	30	75	Seeded tree and shrub systems									200			520		
Ss_50	50				Disposal systems														
Ss_50_30	50	30			Drainage collection and distribution systems		✓	200			300			400			540		
Ss_50_30_02	50	30	02		Rainwater drainage systems		✓	200			300			400			540		
Ss_50_30_04	50	30	04		Above ground waste water drainage systems		✓	200			300			400			540		
Ss_50_30_08	50	30	08		Below ground gravity drainage systems		✓	200			200			300			530		
Ss_50_30_80	50	30	80		Storm water gravity drainage systems		✓	200			200			300			530		
Ss_50_70	50	70			Water waste (drainage) storage, treatment and disposal systems		✓	200			200			200			530		
Ss_50_70_85	50	70	85		Sustainable drainage systems (SuDS)		✓	200			200			300			530		
Ss_55	55				Piped supply systems														
Ss_55_20	55	20			Gas distribution and supply systems (Including compressed air)		✓	200			300			400			540		
Ss_55_20_15_42	55	20	15	42	Industrial compressed air supply systems		✓	200			300			400			540		
Ss_55_20_34_95	55	20	34	95	Welding gas supply systems		✓	200			300			400			540		
Ss_55_30	55	30			Fire extinguishing systems		✓	200			300			400			540		

Code	Group	Sub group	Section	Object	Title	Comments	Asset Data Required	Workstage 3 Developed Design			Workstage 4 Technical Design			Workstage 5 Construction			Workstage 6 Handover		
								LOD	MEA	NOTES	LOD	MEA	NOTES	LOD	MEA	NOTES	LOD	MEA	NOTES
Ss_55_30_65	55	30	65		Portable fire extinguishing systems		✓							200			520		
Ss_55_30_96_25	55	30	96	25	Dry riser systems		✓	200			300			400			540		
Ss_55_30_96_30	55	30	96	30	Fire hydrant systems		✓	200			300			400			540		
Ss_55_70	55	70			Water distribution and supply systems		✓	200			300			400			540		
Ss_55_70_38_15	55	70	38	15	Cold water supply systems		✓	200			300			400			540		
Ss_55_70_38_20	55	70	38	20	Direct hot water storage supply systems		✓	200			300			400			540		
Ss_55_70_38_65	55	70	38	65	Pumped cold water supply systems		✓	200			300			400			540		
Ss_55_95	55	95			Temporary piped supply systems			200			300			300					
Ss_55_95	55	95			Temporary piped supply systems			200			300			300					
Ss_60	60				Heating, cooling and refrigeration systems														
Ss_60_40	60	40			Space heating and cooling systems		✓	200			300			400			540		
Ss_60_40_15_90	60	40	15	90	Combined underfloor heating and cooling systems		✓	200			300			300			530		
Ss_60_40_17_12	60	40	17	12	Chilled water systems		✓	200			300			400			540		
Ss_60_40_36_05	60	40	36	5	Air source heat pump systems		✓	200			300			400			540		
Ss_60_40_37_48	60	40	37	48	Low temperature hot water heating systems		✓	200			300			400			540		
Ss_65	65				Ventilation and air conditioning systems														
Ss_65_40	65	40			Ventilation systems		✓	200			300			400			540		
Ss_65_40_25	65	40	25		Dust extract systems		✓	200			300			400			540		
Ss_65_40_32	65	40	32		Fume extract systems		✓	200			300			400			540		
Ss_65_40_33_56	65	40	33	56	Natural ventilation systems		✓	200			300			400			540		
Ss_65_40_33_90	65	40	33	90	Toilet extract ventilation systems		✓	200			300			400			540		
Ss_65_40_42_45	65	40	42	45	Local exhaust ventilation systems		✓	200			300			400			540		
Ss_65_40_80	65	40	80		Smoke extract and control systems		✓	200			300			400			540		
Ss_70	70				Electrical systems														
Ss_70_10	70	10			Electrical power generation systems		✓	200			300			400			540		
Ss_70_10_80	70	10	80		Solar power generation systems		✓	200			300			400			540		
Ss_70_10_97	70	10	97		Wind power generation systems		✓	200			300			400			540		
Ss_70_30	70	30			Electricity distribution and transmission systems		✓	200			300			400			540		
Ss_70_30_35	70	30	35		High-voltage distribution and transmission systems		✓	200			300			400			540		
Ss_70_30_45	70	30	45		Low-voltage systems		✓	200			300			400			540		
Ss_70_30_80	70	30	80		Small power systems		✓	200			300			400			540		
Ss_70_30_94_27	70	30	94	27	Electric vehicle charging systems		✓	200			300			400			540		
Ss_70_80	70	80			Lighting systems		✓	200			300			350			535		
Ss_70_80_25	70	80	25		External lighting systems		✓	200			300			350			535		
Ss_70_80_33	70	80	33		General space lighting systems		✓	200			300			350			535		
Ss_70_95	70	95			Temporary electrical systems						200			300			530		
Ss_70_95	70	95			Temporary electrical systems						200			300			530		
Ss_75	75				Communications, security, safety, control and protection systems														
Ss_75_10	75	10			Communications systems		✓	200			300			400			540		
Ss_75_10_21	75	10	21		Data distribution and telecommunications systems		✓	200			300			400			540		
Ss_75_10_46_05	75	10	46	5	Audio-frequency induction-loop systems		✓	200			300			400			540		
Ss_75_40	75	40			Security systems		✓	200			300			300			530		
Ss_75_40_02	75	40	02		Access control systems		✓	200			300			300			530		
Ss_75_40_53_86	75	40	53	86	Surveillance systems		✓	200			300			300			530		
Ss_75_40_75	75	40	75		Security detection alarm systems		✓	200			300			300			530		
Ss_75_50	75	50			Communication, safety and protection systems		✓	200			300			300			530		
Ss_75_50_11_05	75	50	11	05	Assistance call systems		✓	200			300			300			530		
Ss_75_50_28_29	75	50	28	29	Fire detection and alarm systems		✓	200			300			300			530		
Ss_75_70	75	70			Control and management systems		✓	200			300			400			540		
Ss_75_70_52_56	75	70	52	56	Natural ventilation control systems		✓	200			300			400			540		
Ss_75_70_52_80	75	70	52	80	Smoke and heat detection extract control systems		✓	200			300			400			540		
Ss_75_70_54_10	75	70	54	10	Building monitoring and management systems		✓	200			300			400			540		
Ss_75_70_54_25	75	70	54	25	Electricity metering systems		✓	200			300			400			540		
Ss_75_70_54_30	75	70	54	30	Fuel metering systems		✓	200			300			400			540		
Ss_75_70_54_95	75	70	54	95	Water metering systems		✓	200			300			400			540		
Ss_75_80	75	80			Protection systems		✓	200			300			400			540		
Ss_75_80_45_25	75	80	45	25	Earthing and bonding systems		✓	200			300			400			540		
Ss_75_80_45_45	75	80	45	45	Lightning protection systems		✓	200			300			400			540		
Ss_80	80				Transport systems														
Ss_80_30	80	30			Crane and hoist systems		✓	200			300			300			530		
Ss_80_30_45_59	80	30	45	59	Overhead crane systems		✓	200			300			300			530		
Ss_80_50	80	50			Lift systems		✓	200			300			300			530		
Ss_80_50_60	80	50	60		Passenger and goods lift systems		✓	200			300			300			530		

## Appendix E

### Model Validation

## E1 Validation of as-built graphical information

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Validation of the AIM's graphical as-built conditions shall be audited through evaluating a 3D Point Cloud survey, overlaid against the as-built conditions geometry. Data shall be captured to an average point density and inherent mean accuracy of 2.5mm.

Requirements for 3D Point Cloud survey are:

- a) Main Plant areas
- b) Risers (minimum two levels)
- c) Core and common areas on the ground floor
- d) One typical floor plate including core and common areas.

All spaces should be surveyed with services exposed.

Procurement of the 3D point cloud should include the following:

- a) A requirement to undertake a series of checks to the existing site survey control and establish further permanent survey positions to enable any requirement for future scanning works within the site should they be required. These permanent survey positions are to be issued in orthographic drawing form for record purposes. **Note: File naming conventions apply.**
- b) A colourised 3D point cloud of target areas identified.
- c) Data captured to an average point density and inherent mean accuracy of 2.5mm.
- d) Point cloud data provided in a variety of output files such as ReCap \*.RCP, \*.PTS and Leica Truview.
- e) Data captured using equipment such as a Z+F Imager 5010 High Definition laser scanner and a dedicated Leica TCRP 1201 Total station using recognised and approved point cloud registration methodology.
- f) All laser scan site data must be fully geo-referenced using a total station and tied into the site survey grid and level datum.
- g) A method statement must be supplied to adequately plan lines of sight to ensure data voids are minimised and accuracy is achievable.
- h) All unnecessary point cloud litter is to be purged 1M from object face where feasible i.e. diggers and site workers where feasible should be purged from the deliverables.

Establishing the 3D Point Cloud's project control:

Setting the control point for the projects 3D Cloud Point and keying this information in to the projects established grid and shared co-ordinates system is identified as being the first priority in order that the projects physical location in space can be validated against the existing site.

## E2 Data Validation

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In order that the applied object data can be validated it shall be provided in the form of a project specific asset schedule containing the completed asset data fields identified in section B1.4. The Contractor should provide a methodology for validation of this information in their BEP. Checking of this validation will be carried out by the Employer's Agent.

The format of the asset schedule shall be such that should a CAFM system be in place, the data can be modified and automatically updated (synchronised) back to the AIM. This will be particularly beneficial for:

- a) the later stage input of common and unique data such as the respective O&M and PPM URL links;
- b) checking that the data is correctly completed for all assets;
- c) porting the pertinent data to the CAFM system. \*

\*subject to mapping to SFG20 spec.

**Appendix F**  
**Information Exchanges**

# F1 Information Exchanges

## F1.1 nD relative dimensions applied in a BIM/AIM environment

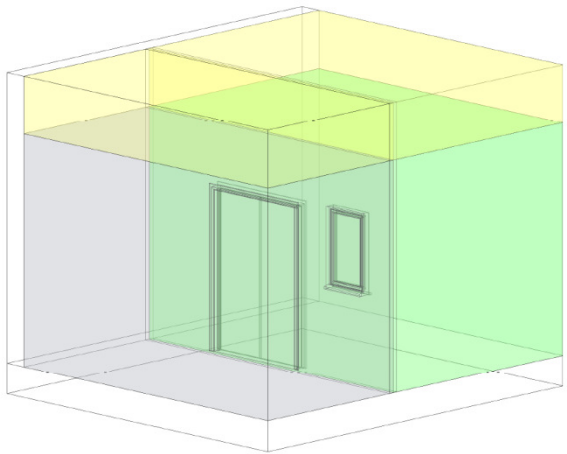
The following table describes the relevant nD dimensions.

nD	Description
2D	Lines, dimensions and text, possibly with an applied Z dimension
3D	Solids or surfaces. There is also the possibility of attributed data attached to the solid/surface
4D	A 3D model with time attributed to entities, whether those entities are single 3D objects, grouped common objects or whole systems. Entities are linked to activities in a construction program.
6D	Post-construction, a 3D ‘As Built’ model with operational data attributed to entities, such as room names and numbers, asset information such as manufacturer’s data (model, serial numbers etc.) and operation and maintenance requirements. Currently scoped is for all room spaces/zones to be tagged and main items of plant and equipment, no sub-assemblies have been allowed for at present. Note: A 6D model can be used as a direct link to a virtual/digital FM solution, or simply as a means to produce a robust schedule.
7D	At the end of the facility’s life cycle, the 6D model will have gone through various updates and revisions during its operational phase, effectively producing a final ‘As Built’ 7D model which can be used to plan decommissioning and deconstruction/demolition of the facility in a safe and environmentally friendly manner

## F1.2 BIM/AIM Level of Development (LOD)

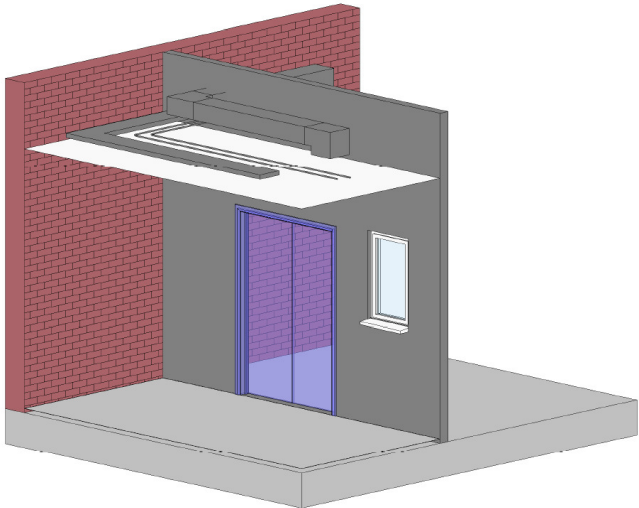
Level of Development (LOD) is numeric scale normally from 100 – 500 used to define the appropriate level of detail required aligned to the design stage level of development. Note: adding detailed too early for the projects level of development can cause inefficiencies it is important that the project team agree and adhere to the LOD required for each agreed stage this is currently described if you are uncertain in the model authorship Matrix which has applied the American Institute of Architecture LOD 2013 definitions (<http://bimforum.org/wp-content/uploads/2013/08/2013-LOD-Specification.pdf>)

**LOD 100** The Model Element may be graphically represented in the Model with a symbol or other generic representation, but does not satisfy the requirements for LOD 200. Information related to the Model Element (i.e. cost per square foot, tonnage of HVAC, etc.) can be derived from other Model Elements.



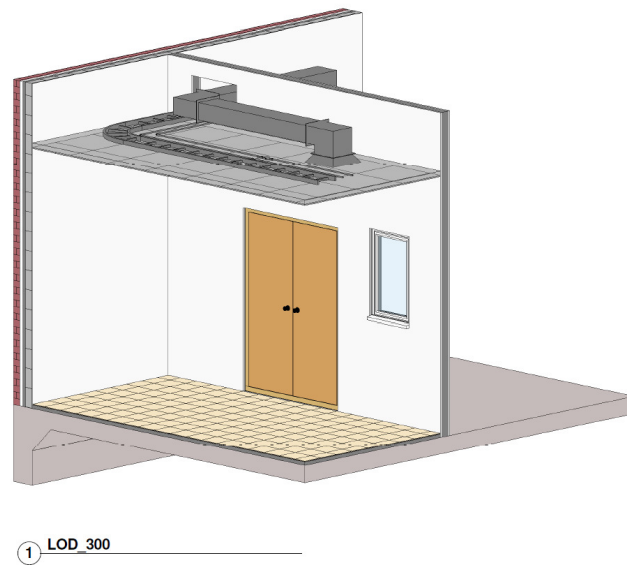
① LOD\_100

**LOD 200** The Model Element is graphically represented within the Model as a generic system, object, or assembly with approximate quantities, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.

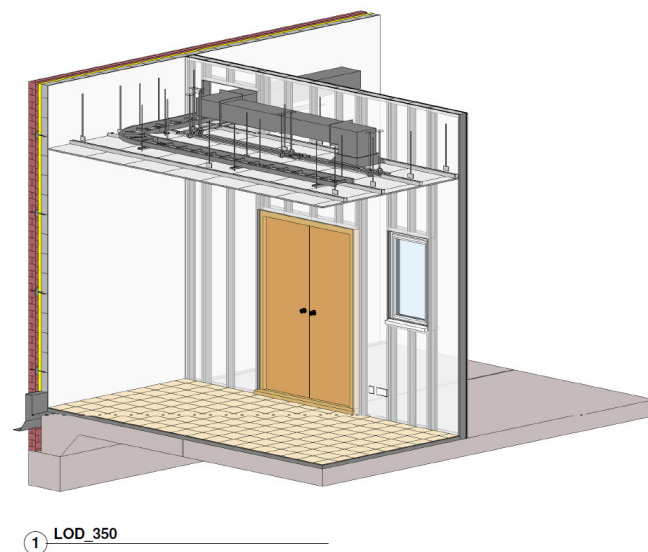


① LOD\_200

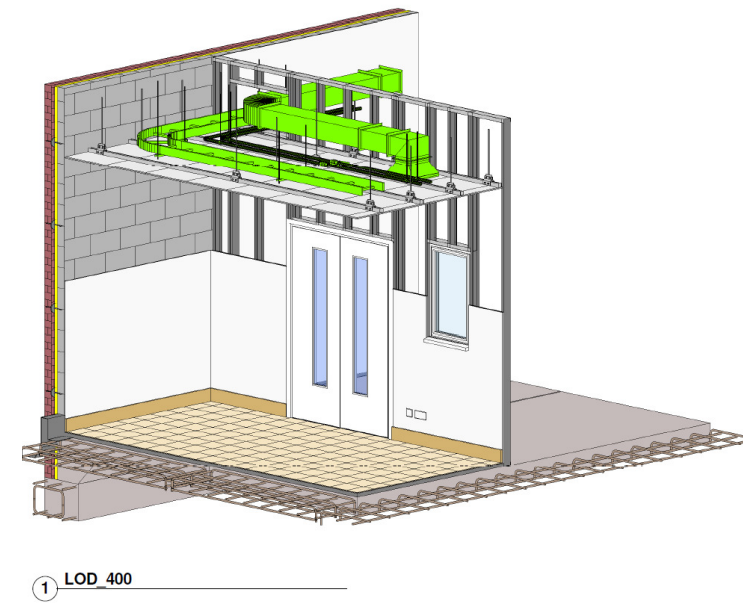
**LOD 300** The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element.



**LOD 350** The Model Element is graphically represented within the Model as a specific system, object, or assembly in terms of quantity, size, shape, orientation, and interfaces with other building systems. Non-graphic information may also be attached to the Model Element.



**LOD 400** The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing, fabrication, assembly, and installation information. Non-graphic information may also be attached to the Model Element.



**LOD 500** The Model Element is a field verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements.

The definitions for LOD 100, 200, 300, 400, and 500 included in the BEP represent the updated language that appears in the AIA's most recent BIM protocol document, G202-2013, Building Information Modelling Protocol Form. The LOD 100, 200, 300, 400 and 500 definitions are produced by the AIA and have been used by permission. Copyright © 2015. The American Institute of Architects. All rights reserved. LOD 350 was developed by the BIMForum working group. Copyright © 2015. The BIMForum and the American Institute of Architects. All rights reserved.

### F1.3 LOD Definitions as Minimum Requirements

The LOD's provide five snapshots of the progression of an element from conceptual to specified, – there are many steps in this progression between the defined LOD's. The LOD definitions, then, should be considered minimum requirements – i.e. an element has progressed to a given LOD only when all the requirements stated in the definition have been met. It should also be noted that the requirements are cumulative – for a given element each LOD definition includes the requirements of all previous LODs. Thus for an element to qualify for LOD 300 it must meet all the requirements for 200 and 100 as well as those stated in the LOD 300 definition.

Notwithstanding the above Definitions as Minimum Requirements the following sub-set of LOD definitions will be adopted for clarity on the detail required through the as-built LOD500 stage where for some elements detail will not be required to have reached LOD400/500 as defined.

The LOD 500 field verified representation may be viewed as an “as-built Model. When an



as-built Model is required, obviously not every aspect of the Project is field verified. LOD 500 provides for specific indication of which elements will be field verified. This allows the owner to be clear on what is and is not verified, and allows whoever is responsible for producing the as-built Model to determine and price the effort involved.

LOD 510: Model elements represent the project as constructed in As-Built conditions. LOD 510 models will contain LOD 100 facility and geometry data and will be configured to contain the operations & maintenance manuals, warranty information, submittal information, and/or any other documents as applicable and described within the TCE Model Element Authorship Matrix [MEAM] and TCE Master Asset Schedule.

LOD 520: Model elements represent the project as constructed in As-Built conditions. LOD 520: Model manuals, warranty information, submittal information, and/ or any other documents submittal information, and/or any other documents as applicable and described within the TCE MEAM and TCE Master Asset Schedule.

LOD 530: Model elements represent the project as constructed in As-Built conditions. LOD 530 models will contain LOD 300 facility and geometry data and will be configured to contain the operations & maintenance manuals, warranty information, submittal information, and/or any other documents as applicable and described within the TCE MEAM and TCE Master Asset Schedule.

LOD 535: Model elements represent the project as constructed in As-Built conditions. LOD 535 models will contain LOD 350 facility and geometry data and will be configured to contain the operations & maintenance manuals, warranty information, submittal information, and/or any other documents as applicable and described within the TCE MEAM and TCE Master Asset Schedule.

LOD 540: Model elements represent the project as constructed in As-Built conditions. LOD 540 models will contain LOD 400 facility and geometry data and will be configured to contain the operations & maintenance manuals, warranty information, submittal information, and/or any other documents as applicable and described within the TCE MEAM and TCE Master Asset Schedule.

LOD 550: Owner reserved, LOD 550 model elements will not be generated during planning, design, or construction. Elements represent the project as constructed in As-Built conditions.

## F1.4 Objects and Data

Some objects may exist many times within the model (an example may be a light fitting), each of these objects may look the same, but they are each individual objects in their own right; known as an instance; which has some data unique to itself. Every single object has a GUID which is a unique identifier that sets every object apart from another, no matter how similar they appear.

Some of the applied data may be common between similar objects or instances of objects (e.g. Manufacturer) some of the data will be unique (e.g. serial no.).

When working with common object data it is relatively easy to manipulate data across multiple similar objects as often authoring tools enable them to be selected and modified together.

All objects will have 'common object data' and only some objects will require manual input of 'unique object data'.

When working with unique object data it is much more labour intensive to manipulate data across similar objects as often the authoring tool requires each instance of that object to be modified individually.

Automatic model data: Within some models, some data can be derived from the model automatically such as GUID, location details, Room numbers, x/y/z coordinates and quantities.

## F1.5 Data Requirements

The ER's (Employers Requirements) indicated the minimum data requirements to fulfil the end purpose.

All authors must input the required data into their respective PIM and associate it to the corresponding objects only when the required asset information is added does the PIM (6D) then qualify as an AIM (7D). To allow the model authors to complete the data entry they will need to ensure information is added to those objects identified within the TCE Master Asset Schedule in line with the TCE protocols.