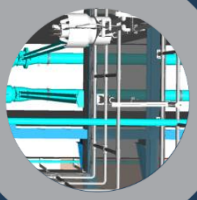

Digital Asset Information & Modelling

LEVEL OF DEVELOPMENT SPECIFICATION

Version: 1

Published Date: 26 January 2024

Watercare

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More information
If you have further queries, contact the Watercare Enterprise Model team or standards@water.co.nz

DOCUMENT CONTROL

Document owner

Role	Interface and Improvement Manager
Organisation	Watercare Services Limited

Version History

Version	Section	Description of revision	Date
0.1	N/A	The first draft shared for review and comment	16/12/2022
1	All Sections	Document revised	23/01/2024

Approvers / Reviewers

Name	Title	Role
Farzam Farzadi	Value Realisation Digital Programme Lead	Author
Waldo Strydom	Principal Asset Lifecycle Engineer	Reviewer
Tuan Hawke	Interface and Improvement Manager	Reviewer / Approver

Table of Contents

1. Purpose

1.1 Background

The purpose of this document is to provide clarity to model authors and reviewers ensuring consistency of model authoring across Watercare projects. It is intended that this document will be appropriately referenced in Model Element Authoring (MEA) Schedules and Digital Engineering Execution Plans.

This document is one in a suite of Watercare documents which relate to Digital Engineering. It is assumed that the reader is familiar with the content of these documents shown below.

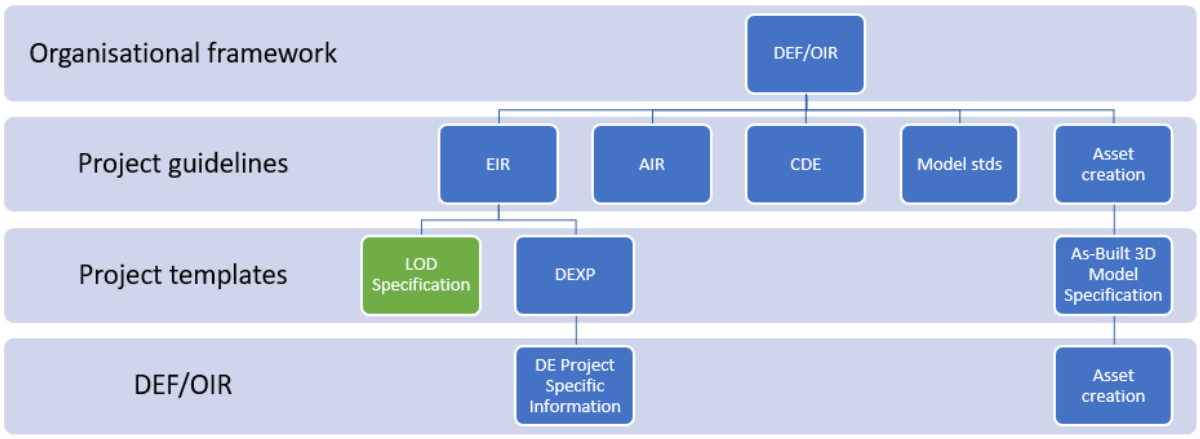


Figure 1 - Watercare Digital Delivery Documents

1.1.1 Updates to this document

This document will be reviewed regularly and in accordance with Watercare documentation and governance policies. The document owner is responsible for managing future updates. Any feedback or proposed changes should be sent to the document owner who will be responsible for revising, correcting, or updating this document.

The Document Owner commits to undertake the following:

- The updates are validated by those whom they affect. Changes to this plan may affect other plans.
- The changes will then be built into the next formal review process and an updated version will be identified.
- Seek approval from the Watercare Enterprise Model leadership group and Watercare Operations, Strategy and Planning, and Digital representatives regarding proposed changes to the document.
- Consult with and inform digital representatives of all contracted partners regarding proposed changes to the document.
- Takes responsibility for updating the controlled document status, communicating the changes, and circulating the revised plan.

1.2 Compliance requirements

This document needs to be utilised in conjunction with Watercare standards and other Digital Engineering documents listed in Section B-3.

1.3 Watercare Supporting documentation

- BIM Forum Level of Development Specification – December 2021
- Digital Engineering Execution Plan – January 2024
- Digital Engineering Project Specific Information – January 2024
- As-Built Model Specification – January 2024

2. Introduction

This document is applicable to all Watercare projects. It sets out the Watercare's Level of Development (geometry refinement) requirements for objects modelled using 3D modelling authoring tools and covers the various stages of a projects' lifecycle.

Model Element Authors (MEA) are responsible for developing each Model Element at the end of each phase of the project to a minimum Level of Development (LOD) in accordance with the *BIM Forum Level of Development Specification (December 2021)*.

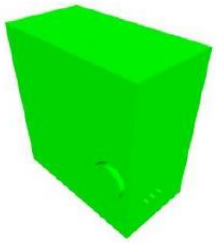
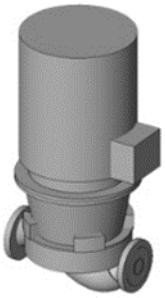
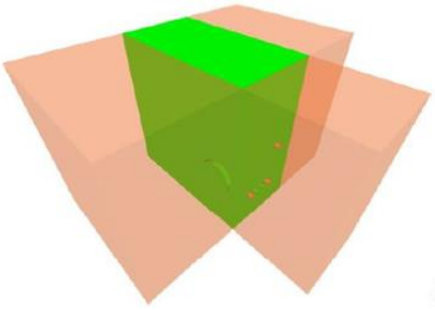
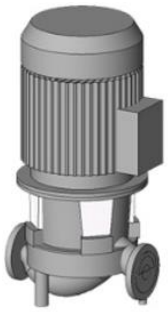
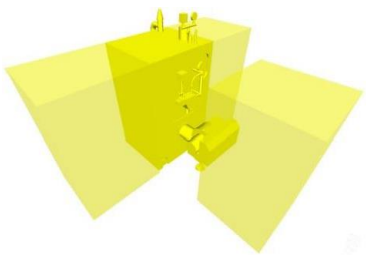
A summary of LOD definitions and responsibilities is provided in the tables below. If there is a conflict between the definitions of these tables and the *BIM Forum Level of Development Specification December 202*1, the tables below take precedence.

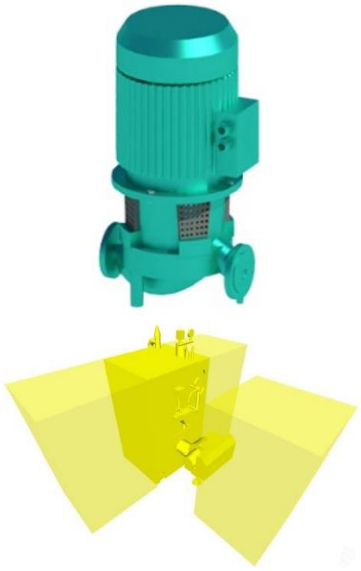
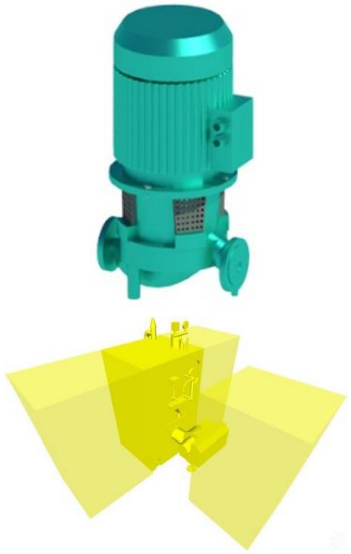
Note that LOD 500 relates to site verification and is not an indication of progression to a higher level of model, element geometry or non-graphic information. Refer to the Watercare's *As-Built 3D Model Specification* for information relating to the as built model requirements.

2.1 LOD Definitions for Mechanical and Process

Table 1 – LOD Definitions for Mechanical and Process Elements

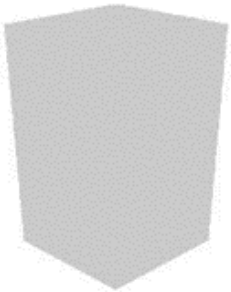
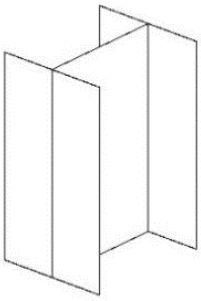
LOD	Descriptions	Example - Equipment
LOD 100	**Diagrammatic or schematic symbols** or elements; conceptual and/or schematic layout/flow diagram. Required non-graphic information: Not Applicable	**LOD 100** – Symbols, Diagrammatic or schematic model elements. 
LOD 200	Generic model elements with **approximate** size, shape, and location; approximate access and clearance requirements to be considered. Note: The location of all Mechanical and Process elements modelled to LOD200. Prior to the detailed design, the location will be approximate only. **Required non-graphic information:** Not Applicable	**LOD 200** – Generic 3D placeholder with approximate size, shape, and location. 

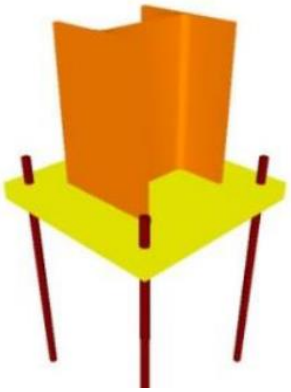
LOD	Descriptions	Example - Equipment
		
LOD 300	Modelled as **design-specified** size, shape, spacing, and location; approximate allowances for spacing and clearance requirements considered and coordinated. **Required non-graphic information:** Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable.	**LOD 300** - Modelled as design-specified size, shape, spacing, and location.  
LOD 350	Modelled as **actual design** elements size, shape, spacing, and location. Connections of equipment and interface with other elements to be modelled. Actual access code clearance requirements are considered and coordinated. **Required non-graphic information**: Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable	**LOD 350** - 3D actual design geometry, specific size, shape, location; connection and interface with other elements and disciplines modelled.  

LOD	Descriptions	Example - Equipment
LOD 400	Accurate **3D fabrication** elements. Supplementary components added to the model required for fabrication and field installation. **Required non-graphic information**: Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable. Tag/Equipment Number & Equipment Description.	**LOD 400** – Accurate 3D fabrication geometry. 
LOD 500	The Model Element is a **site verified** representation in terms of size, shape, location, quantity, and orientation. Refer to the Watercare As-Built Model Specification – December 2022 for information relating to the as built model requirements.	**LOD 500** - verified as-built model geometry. 

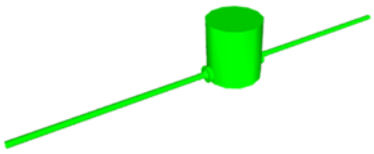
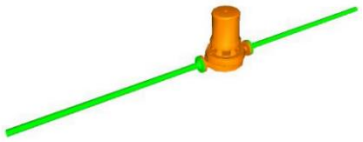
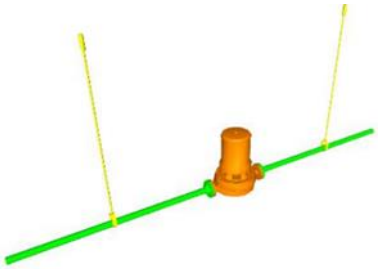
2.2 LOD Definitions for Structural

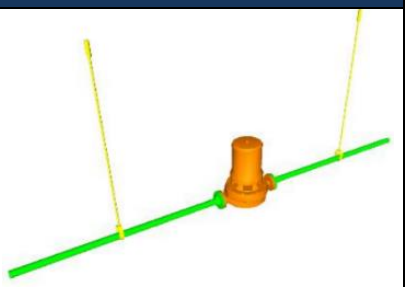
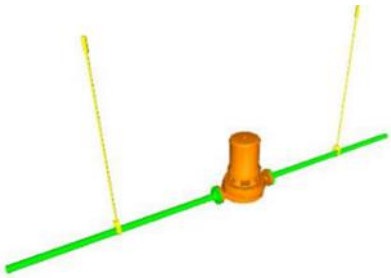
Table 2 -LOD Definitions for Structural Elements

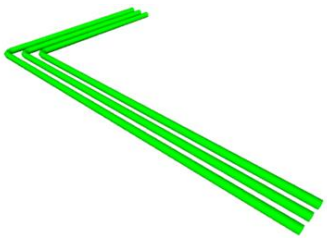
LOD	Descriptions	Example - Column
LOD 100	The Model Element may be graphically represented in the Model with a symbol or other generic representation but does not satisfy the requirements for LOD 200. Note: LOD 100 elements are not always geometric representations. Examples are information attached to other model elements or symbols showing the existence of a component. **Required non-graphic information**: Not Applicable	**LOD100** - 2D or 3D geometry, generic column element. 
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. Note: At this LOD elements are generic placeholders. They may be recognizable as the components they represent, or they may be volumes for space reservation. Any information derived from LOD 200 elements must be considered approximate. **Required non-graphic information**: Not Applicable	**LOD 200** – generic 3D geometry, approximate size, shape and location – generic 3D geometry, approximate size, shape and location. 
LOD 300	The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of quantity, size, shape, location, and orientation. Non-graphic information may also be attached to the Model Element. Note: The quantity, size, shape, location, and orientation of the primary elements as designed that are shown on drawings at a scale of 1:50 or above can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs. **Required non-graphic information**: Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable.	**LOD 300** - 3D design intent geometry, specific size, shape and location. 
LOD 350	The Model Element is graphically represented within the Model as a specific system, object, or assembly in terms of quantity, size, shape, location, orientation, and interface with other building systems. Non-graphic information may also be attached to the Model Element. Note. Parts necessary for the coordination of the element with nearby or attached elements are	**LOD 350** - 3D actual design geometry, specific size, shape, location and interface with other elements.

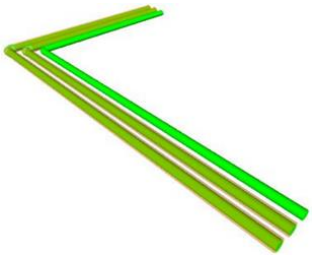
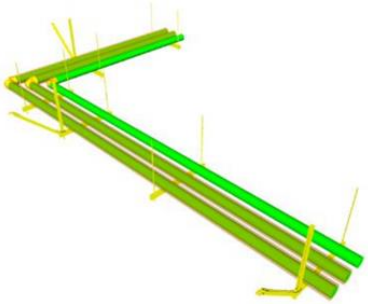
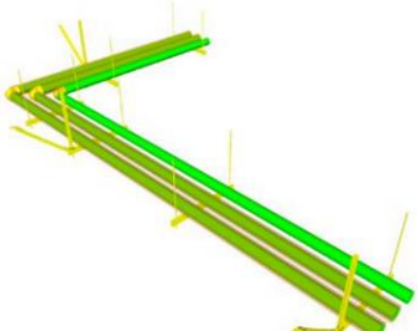
LOD	Descriptions	Example - Column
	modelled. These parts will include such items as supports and connections. The quantity, size, shape, location, and orientation of the primary elements as designed that are shown on drawings at a scale of 1:50 or above can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs. **Required non-graphic information**: Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable.	
LOD 400	The Model Element is graphically represented within the Model as a specific system, object or assembly in terms of size, shape, location, quantity, and orientation with detailing fabrication, assembly, and installation information. Non-graphic information may also be attached to the Model Element. Note. A LOD 400 element is modelled at sufficient detail and accuracy for the fabrication of the represented component. The quantity, size, shape, location, and orientation of the element as designed can be measured directly from the model without referring to non-modelled information such as notes or dimension call-outs. **Required non-graphic information**: Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable.	**LOD 400** - 3D fabrication geometry including member coping, end plates, washers, nuts, etc. 
LOD 500	The Model Element is a site verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements. Refer to the Watercare As-Built Model Specification – December 2022 for information relating to the as built model requirements.	**LOD 500** - verified as-built model geometry. 

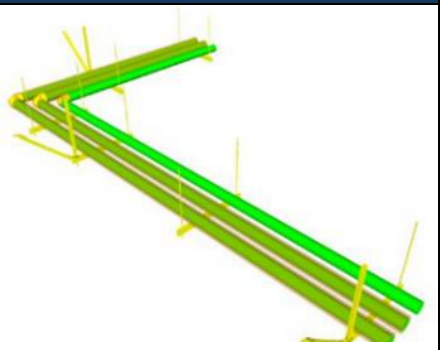
2.3 LOD Definitions for Services

LOD	Descriptions	Example - Equipment
LOD 100	Diagrammatic or schematic model elements; conceptual and/or schematic layout/flow diagram; design performance parameters as defined in the BEP to be associated with model elements as non-graphic information. **Required non-graphic information**: Not Applicable	**LOD 100** - Diagrammatic or schematic model elements.
LOD 200	Schematic model elements and layout with **approximate** size, shape, and location of equipment; approximate access and clearance requirements modelled. Note: The external dimensions of ducts and pipework will be accurate in terms of design intent. The location of all services elements modelled to LOD200 will be accurate to +/-50mm where applicable at Detailed Design. Prior to the detailed design, the location will be approximate only. **Required non-graphic information**: Not Applicable	**LOD 200** - Schematic layout with approximate size, shape, and location (to +/-50mm where applicable at Detailed Design) of mains and risers 
LOD 300	Modelled as design-specified size, shape, spacing, and location of equipment; approximate allowances for spacing and clearances required for all specified anchors, supports, vibration and seismic control that are utilized in the layout of equipment; access/code clearance requirements modelled. **Required non-graphic information**: Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable.	**LOD 300** - 3D design intent geometry, specific size, shape and location. 
LOD 350	Modelled as actual construction elements size, shape, spacing, and location/connections of equipment; Actual size, shape, spacing, and clearances required for all specified anchors, supports, vibration and seismic control that are utilized in the layout of equipment. actual access/code clearance requirements modelled. **Required non-graphic information**: Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable.	**LOD 350** - 3D actual design geometry, specific size, shape, location and interface with other elements. 
LOD 400	Supplementary components added to the model required for fabrication and field installation. **Required non-graphic information**: Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable. Tag/Equipment Number & Equipment Description.	**LOD 400** - 3D fabrication geometry including bracing, field installation components, etc.

LOD	Descriptions	Example - Equipment
		
LOD 500	The Model Element is a site verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements. Refer to the Watercare As-Built Model Specification – December 2022 for information relating to the as built model requirements..	**LOD 500** - verified as-built model geometry 

LOD	Descriptions	Example - Pipeworks
LOD 100	Diagrammatic or schematic model elements; conceptual and/or schematic layout/flow diagram; design performance parameters as defined in the BEP to be associated with model elements as non-graphic information. Required **non-graphic information**: Not Applicable	**LOD 100** - Diagrammatic or schematic model elements.
LOD 200	Schematic model elements and layout with **approximate** size, shape, and location of equipment; approximate access and clearance requirements modelled. Note: The external dimensions of ducts and pipework will be accurate in terms of design intent. The location of all services elements modelled to LOD200 will be accurate to +/-50mm where applicable at Detailed Design. Prior to the detailed design, the location will be approximate only. Required **non-graphic information**: Not Applicable	**LOD 200** - Schematic layout with approximate size, shape, and location (to +/-50mm where applicable at Detailed Design) of mains and risers 

LOD	Descriptions	Example - Pipeworks
LOD 300	Modelled as design-specified size, shape, spacing, and location of equipment; approximate allowances for spacing and clearances required for all specified anchors, supports, vibration and seismic control that are utilized in the layout of equipment; access/code clearance requirements modelled. Required **non-graphic information**: Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable.	**LOD 300** - 3D design intent geometry, specific size, shape and location. 
LOD 350	Modelled as actual construction elements size, shape, spacing, and location/connections of equipment; Actual size, shape, spacing, and clearances required for all specified anchors, supports, vibration and seismic control that are utilized in the layout of equipment. actual access/code clearance requirements modelled. Required **non-graphic information**: Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable.	**LOD 350** - 3D actual design geometry, specific size, shape, location and interface with other elements. 
LOD 400	Supplementary components added to the model required for fabrication and field installation. Required non-graphic information: Size, Material, Length, Width, Height, Diameter, Weight, Depth, and Elevation when applicable. Tag/Equipment Number & Equipment Description.	**LOD 400** - 3D fabrication geometry including bracing, field installation components, etc. 
LOD 500	The Model Element is a site verified representation in terms of size, shape, location, quantity, and orientation. Non-graphic information may also be attached to the Model Elements. Refer to the Watercare As-Built Model Specification – December 2022 for information relating to the as built model requirements.	**LOD 500** - verified as-built model geometry

LOD	Descriptions	Example - Pipeworks
		

3. Level of Development

3.1 Model Element Author Schedule

The following section assigns responsibilities to Model Elements via a Model Element Author (MEA) and defines the Level of Development of model elements.

Table 3 – MEA Key

Architectural and Landscape consultant	ARC
Structural consultant	STR
HVAC (Heating, ventilation, and air conditioning) consultant	HVA
Electrical, Instruments and Controls consultant (Process)	EIC
Fire consultant	FIR
Civil consultant	CIV

Process and Mechanical consultant	PCS
Contractor / Sub-contractor	CON
Fabricators, Suppliers and Vendors	SUP
Plumbing & Drainage consultant	PLU
Survey Consultant	SUR
Electrical Consultant (Services)	ELE

Table 4 - LOD Definitions

LOD	
100	Conceptual
200	Approximate Design Geometry
300	Accurate Design Geometry
350	Interface Coordination
400	Fabrication and Assembly
500	Site Verified

3.1 Model Element Author & Level of Development Schedule

Spatial related elements such as site boundaries, grids, levels, zones, and spaces are not assigned a Level of Development because these aren't technically elements that are modelled in 3 dimensions. There is a requirement to show them in the table below to make sure that they are assigned a model element author (MEA).

The LOD's indicated below are a minimum requirement by the end of each of the design and construction phases noted, the design and / or construction team may choose to implement a higher LOD. For model handover requirements which will be developed during the Construction phase.

Refer to the Watercare As-Built Model Specification – December 2022 for information relating to the as built model handover requirements.

Table 5 - Model Element Author & Level of Development Schedule

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
Spatial													
Site boundaries, setbacks	ARC	-	ARC	-	ARC	-	ARC	-	-	-	-	-	To be coordinated between PCS, ARC, and other design teams during Preliminary design and to be finalised during first two weeks of developed design.
Process Grids	PCS	-	PCS	-	PCS	-	PCS	-	SUP	-	-	-	
ARC Grids	ARC	-	ARC	-	ARC	-	ARC	-	-	-	-	-	
Building Levels	ARC	-	ARC	-	ARC	-	ARC	-	-	-	-	-	
Process Levels	PCS	-	PCS	-	PCS	-	PCS	-	SUP	-	-	-	
Process zones	PCS	-	PCS	-	PCS	-	PCS	-	SUP	-	-	-	
Process spaces, rooms	PCS	-	PCS	-	PCS	-	PCS	-	SUP	-	-	-	
ARC Spaces, rooms	ARC	-	ARC	-	ARC	-	ARC	-	-	-	-	-	
ARC zones	ARC	-	ARC	-	ARC	-	ARC	-	-	-	-	-	
Reality Capture	SUR	-	SUR	-	SUR	-	SUR	-	SUR	-	SUR	-	
Site													
Topography - Existing	CIV	-	CIV	200	CIV	200	CIV	200	-	-	-	-	
Site Services & Utilities - Existing	CIV	100	CIV	200	CIV	200	CIV	200	-	-	-	-	Where required for the development of new design
Topography	CIV	-	CIV	200	CIV	200	CIV	300	-	-	-	-	
Site Water, Stormwater, Sewer pipe works	CIV	100	CIV	200	CIV	200	CIV	300	-	-	-	-	
Roading	CIV	-	CIV	200	CIV	200	CIV	300	-	-	-	-	
Road kerb	CIV	-	CIV	100	CIV	200	CIV	300	-	-	-	-	

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
Surface finishes	CIV	-	CIV	100	CIV	200	CIV	300	-	-	-	-	
Parking	ARC	100	ARC	200	ARC	200	ARC	300	-	-	-	-	
Paths	ARC	100	ARC	100	ARC	200	ARC	300	-	-	-	-	
Fences	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Site Power	ELE	100	ELE	200	ELE	200	ELE	300	-	-	-	-	
Site Communications	ELE	100	ELE	100	ELE	200	ELE	300	-	-	-	-	
Site lighting	ELE	100	ELE	200	ELE	200	ELE	300	-	-	-	-	
Site Furniture (gates, Bollards, etc)	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Site landscaping	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Process													
Plant - Existing	PCS	100	PCS	200	PCS	200	PCS	200	-	-	-	-	Where required for the development of new design
Plant - New	PCS	100	PCS	200	PCS	200	PCS	300	-	-	-	-	
Tanks	PCS	100	PCS	200	PCS	200	PCS	300	-	-	-	-	
Tanks - Vendor Supply	SUP	100	SUP	200	SUP	200	SUP	300	SUP	400	-	-	Models provided by vendors must be developed with respect to the project coordinate system.
Plant – Vendor Supply	SUP	100	SUP	200	SUP	200	SUP	300	SUP	400	-	-	Models provided by vendors must be developed with respect to the project coordinate system.
Plant - Foundations	PCS	-	PCS	200	STR	200	STR	300	-	-	-	-	PCS-STR Dev. first week
Plant Ground improvements	STR	-	STR	100	STR	200	STR	300	-	-	-	-	CIV-STR Dev. first week

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
Mechanical and Process Pipework	PCS	100	PCS	200	PCS	200	PCS	300	-	-	-	-	
Mechanical and Process Pipework - Vendor Supply	SUP	100	SUP	200	SUP	200	SUP	300	SUP	400	-	-	Models provided by vendors must be developed with respect to the project coordinate system.
Pipework Supports	PCS	-	PCS	100	STR	200	STR	300	-	-	-	-	PCS-STR Dev. first week
Pipework fittings, flanges, couplings, actuators, and valves	PCS	100	PCS	200	PCS	200	PCS	300	-	-	-	-	
Pipework fittings, flanges, couplings, actuators, and valves - Vendor Supply	SUP	100	SUP	200	SUP	200	SUP	300	SUP	400	-	-	Models provided by vendors must be developed with respect to the project coordinate system.
Pipe Penetrations – non structural	PCS	-	PCS	100	ARC	200	ARC	300	-	-	-	-	Penetration in architectural fire walls need to be modelled by architectural team and coordinated with passive fire consultant. Penetration in architectural framing and walls are not required.
Pipe penetrations - structural	PCS	-	PCS	100	STR	200	STR	300	-	-	-	-	All penetrations in structural elements that require specific details (greater than 150mm diameter or width for concrete elements and greater than 50mm for steel elements) need to be added in structural model. Typical penetrations in structural elements (less than 149mm diameter or width for concrete elements and less than 49mm for steel elements) are not required.
Piping underground encasements	PCS	-	PCS	100	STR	200	STR	300	-	-	-	-	PCS-STR Dev. first week
Plant access structures	PCS	-	PCS	100	STR	200	STR	300	-	-	-	-	PCS-STR Dev. first week
Plant handrailing & gates	PCS	-	PCS	100	STR	200	STR	300	-	-	-	-	PCS-STR Dev. first week

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
Plant hold down bolts	PCS	-	PCS	-	STR	200	STR	350	-	-	-	-	PCS-STR Dev. first week
Pumps	PCS	100	PCS	200	PCS	200	PCS	300	-	-	-	-	
Pumps - Vendor Supply	SUP	100	SUP	200	SUP	200	SUP	300	SUP	400	-	-	Models provided by vendors must be developed with respect to the project coordinate system.
Screening and Process Equipment	PCS	100	PCS	200	PCS	200	PCS	300	-	-	-	-	
Inline Instrumentation	EIC	-	EIC	100	EIC	200	EIC	300	-	-	-	-	
Instrumentation Tapping	EIC	-	EIC	100	EIC	200	EIC	300	-	-	-	-	
Switches	EIC	-	EIC	100	EIC	200	EIC	300	-	-	-	-	
Motors	EIC	-	EIC	100	EIC	200	EIC	300	-	-	-	-	
Motors - Vendor Supply	SUP	100	SUP	200	SUP	200	SUP	300	SUP	400	-	-	Models provided by vendors must be developed with respect to the project coordinate system.
Indicators	EIC	-	EIC	100	EIC	200	EIC	300	-	-	-	-	
Junction boxes	EIC	-	EIC	100	EIC	200	EIC	300	-	-	-	-	
Cable trays	EIC	-	EIC	100	EIC	200	EIC	300	-	-	-	-	
Conduits	EIC	-	EIC	100	EIC	200	EIC	300	-	-	-	-	
Substructure													
Foundations	STR	100	STR	200	STR	200	STR	300	-	-	-	-	CIV to provide inputs
Slabs	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Rafts	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Sumps	STR	100	STR	200	STR	200	STR	300	-	-	-	-	

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
Pits	STR	100	STR	200	STR	200	STR	300	-	-	-	-	
Ground Beams	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Thickenings	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Underground encasements	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Ground improvements	STR	100	STR	200	STR	200	STR	300	-	-	-	-	CIV to provide inputs
Retaining Walls	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Pond	CIV	100	CIV	200	CIV	200	CIV	300	-	-	-	-	
Chambers	CIV	100	CIV	200	CIV	200	CIV	300	-	-	-	-	
Manholes	CIV	100	CIV	200	CIV	200	CIV	300	-	-	-	-	
Structure													
Structural Floors	STR	-	STR	200	STR	200	STR	300	-	-	-	-	
Cantilevered slabs	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Steel beams	STR	-	STR	200	STR	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Concrete beams	STR	-	STR	200	STR	200	STR	300	-	-	-	-	
Shaft openings	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Wall openings – load bearing	STR	-	STR	100	STR	200	STR	300	-	-	-	-	All penetrations in structural elements that require specific details (greater than 150mm diameter or width for concrete elements and greater than 50mm for steel elements) need to be added in structural model. Typical penetrations in structural elements (less than 149mm diameter or width for concrete elements and less than 49mm for steel elements) are not required.

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
Penetrations	STR	-	STR	100	STR	200	STR	300	-	-	-	-	All penetrations in structural elements that require specific details (greater than 150mm diameter or width for concrete elements and greater than 50mm for steel elements) need to be added in structural model. Typical penetrations in structural elements (less than 149mm diameter or width for concrete elements and less than 49mm for steel elements) are not required.
Steel stairs, landings, and platforms	STR	100	STR	200	STR	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Concrete stairs	STR	100	STR	200	STR	200	STR	300	-	-	-	-	
Ramps	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Walls – load bearing	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Steel columns	STR	100	STR	200	STR	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Concrete columns	STR	100	STR	200	STR	200	STR	300	-	-	-	-	
In-situ Concrete Elements	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Masonry Elements	STR	-	STR	100	STR	200	STR	300	-	-	-	-	
Secondary support frames carrying significant loads (>1000kg) where set-out can be frozen at the beginning of developed design	STR	-	STR	100	STR	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Secondary support frames carrying significant loads (>1000kg) where setout is determined by an architectural element (wall /	STR	-	STR	100	STR	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
ceiling / cladding / feature etc.)													
Purlins	STR	-	STR	100	STR	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Fly braces	STR	-	STR	100	STR	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Seismic Restraint	STR	-	STR	100	STR	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Precast Elements	STR	-	STR	100	STR	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Building Enclosure													
Architectural Roofing	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Structural Roofing	STR	-	STR	100	STR	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Cladding	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Column cladding	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Curtain walls	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Windows	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
External doors	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Wall openings – non structural	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Building Interior													
Partitions	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Internal doors	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
Internal openings – non structural	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Internal openings – structural	STR	-	STR	100	STR	200	STR	300	-	-	-	-	All penetrations in structural elements that require specific details (greater than 150mm diameter or width for concrete elements and greater than 50mm for steel elements) need to be added in structural model. Typical penetrations in structural elements (less than 149mm diameter or width for concrete elements and less than 49mm for steel elements) are not required.
Ceilings	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
ARC Flooring	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Balustrading	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Furniture	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Fixtures	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Fittings	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Equipment – non-services	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Signage	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
Speed walls	ARC	-	ARC	100	ARC	200	ARC	300	-	-	-	-	
HVAC													
Fans	HVA	100	HVA	200	HVA	200	HVA	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Dampers	HVA	-	HVA	200	HVA	200	HVA	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Louvers	ARC	-	ARC	200	ARC	200	HVA	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
Ductwork	HVA	100	HVA	200	HVA	200	HVA	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Registers	HVA	-	HVA	100	HVA	200	HVA	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Pipework	HVA	100	HVA	200	HVA	200	HVA	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Flexible pipes	HVA	-	HVA	100	HVA	200	HVA	200	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Controls	HVA	100	HVA	200	HVA	200	HVA	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Penetrations - Structural	HVA	-	HVA	100	HVA	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Mechanical services in risers	HVA	100	HVA	200	HVA	200	HVA	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Air circulator and ventilation	HVA	100	HVA	200	HVA	200	HVA	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Electrical													
Electrical fixtures	ELE	-	ELE	100	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Power outlets	ELE	-	ELE	100	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Switches	ELE	-	ELE	100	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Distribution boards	ELE	100	ELE	200	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Cable trays	ELE	-	ELE	100	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
Lighting	ELE	100	ELE	200	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Communications	ELE	100	ELE	200	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Security	ELE	100	ELE	200	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Controls	ELE	100	ELE	200	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Electrical services in risers	ELE	100	ELE	200	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Penetrations - Structural	ELE	-	ELE	100	ELE	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Devices	ELE	100	ELE	200	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Transformers	ELE	100	ELE	200	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Security controls and devices	ELE	100	ELE	200	ELE	200	ELE	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Plumbing & Drainage													
Sanitary fixtures	PLU	-	PLU	100	PLU	200	PLU	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Plant	PLU	100	PLU	200	PLU	200	PLU	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Equipment	PLU	100	PLU	200	PLU	200	PLU	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Pipework	PLU	100	PLU	200	PLU	200	PLU	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
Plumbing & Drainage services in risers	PLU	100	PLU	200	PLU	200	PLU	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Penetrations - Structural	PLU	-	PLU	100	PLU	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Fire													
Sprinklers	FIR	-	FIR	100	FIR	200	FIR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Hydrants	FIR	-	FIR	100	FIR	200	FIR	300	-	-	-	-	Fabrication models to be upgraded to As Built where applicable.
Extinguishers	FIR	-	FIR	100	FIR	200	FIR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Pipework (main)	FIR	100	FIR	200	FIR	200	FIR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Pipework (branch)	FIR	-	FIR	100	FIR	200	FIR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Detection	FIR	-	FIR	100	FIR	200	FIR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Alarm systems	FIR	100	FIR	200	FIR	200	FIR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Fire services in risers	FIR	100	FIR	200	FIR	200	FIR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Penetrations - Structural	FIR	-	FIR	100	FIR	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Fire stopping elements	FIR	-	FIR	100	FIR	200	FIR	200	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Conveying													

Project Phase	Feasibility & Optioneering		Concept Design		Developed Design		Detailed Design		Fabrication		Construction		Comments
Responsible Parties	SPP		SSP		DDP		DDP		CP & Suppliers		CP & Suppliers		
Model Element	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	MEA	LOD	
Cranes	ARC	-	ARC	100	ARC	200	ARC	200	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.
Structural supports	ARC	-	ARC	100	ARC	200	STR	300	SUP	350	-	-	Fabrication models to be upgraded to As Built where applicable.

4. Standard terms and acronyms

4.1 Standard terms

Table 6 - Standard terms and definitions

Terms	Definitions
Appointing Party	From ISO 19650. The client or employer. The organization that is commissioning the project or owns the asset.
As-Built	Describing or representing the actual appearance, condition, structure, and location of a constructed asset.
Building Information Model	A coordinated set of processes, supported by technology, that add value through the sharing of structured information for assets.
Exchange Information Requirements	Information requirements in relation to an agreed instruction for the provision of information concerning works, goods or services.
Level of Development	A scale used to describe the level of completeness to which a model element can be relied on at different times during model development.
Level of Development	A scale used to describe the level of completeness to which a model element can be relied on at different times during model development.
Model Element	3D model object
Model Element Authors	A model element author is the project participant responsible for developing the building information model during the project delivery process. Model element authors are tasked with facilitating BIM uses and BIM goals.
Object	A modelled item within and asset.
Reality Capture	Software for creating models out of photographs or laser scans without seams.

4.2 Acronyms

Table 7 - Acronyms

Acronyms	Definitions
BIM	Building Information Management
SPP	Strategic and Planning Partner
DDP	Design and Delivery Partner
CP	Construction Partner
DE	Digital Engineering
EIR	Exchange Information Requirements
HVAC	Heating, Ventilation and Air Conditioning
LOD	Level of Development
MEA	Model Element Authors

Acronyms	Definitions
RFP	Request for Proposal
WSL	Watercare Services Limited