

**Guidelines for Electronic Submission of
Application for Water Supply
with Building Information Modelling**

Water Supplies Department

December 2021

Amendment History

Revision No.	Description	Revision Date
0	First Issue	20.12.2021

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1 Introduction

1.1 Overview

The 2017 Policy Address stated that the Government was proactively promoting the adoption of technology and innovative construction methods to improve productivity and cost-effectiveness. The Government would adopt Building Information Modelling (“BIM”) in the design and construction of major government capital works projects and would promote the use of BIM in private construction projects.

To align with the Government’s policy, the Water Supplies Department (“WSD”) will accept plumbing proposals of application for water supply (“AWS”) for projects designed using BIM in electronic format (“e-submission”) by late 2021.

This Guidelines provides the general requirements on e-submission of AWS with BIM and shall be read in conjunction with the “Guide to Application for Water Supply”, and the “Technical Requirements for Plumbing Works in Buildings”.

1.2 Objectives

This Guidelines aims to set out the submission requirements for e-submission of AWS with BIM, including:

- (a) The submission requirements of drawings and BIM files for plumbing proposal.
- (b) The technical requirements in drawings and BIM files for preparing plans, drawings and schedules.
- (c) Recommended good practices for the submission standard.

1.3 Vetting and Approval of Plumbing Proposal in BIM Format

For AWS for projects adopting BIM and e-submission, the Water Authority (“WA”) will process the vetting and approval of the plumbing proposals under the Waterworks Ordinance based on the information contained on the required documents as stipulated in Section 2 of this Guidelines. The BIM models submitted will be used *for reference only* in vetting of the plumbing proposal. Approval of the plumbing proposal will continue to be based on the Vertical Plumbing Line Diagram (“VPLD”).

2 E-Submission of WWO 542 and Plumbing Proposal for Projects adopting BIM

2.1 Dedicated Email Address for E-Submission

All the **first** e-submission of plumbing proposal for new AWS with BIM shall be submitted by email to the following dedicated WSD email address: -

wsdinfo@wsd.gov.hk

The applicants shall send the subsequent **re-submission** to another dedicated WSD email address stipulated in Section 2.2.4(d) below.

2.2 General Requirements for E-Submission

All the e-submission shall meet the following requirements: -

2.2.1 Subject Title of the Email for First Submission

The subject title of the submission email shall contain “E-Submission of AWS with BIM – Premises Address”.

2.2.2 Required List of Documents in the E-mail for First Submission

The following list of the documents / information are required and should be attached in the first submission email for e-submission: -

- (i) Form WWO 542;
- (ii) URL or web link to access internet cloud drive concerning documents as stipulated in paragraph 2.2.3. The URL or web link should be save in a Word Document (.docx) for submission;
- (iii) Copy of Business Registration (for company applicant) / Copy of HKID Card (for individual applicant); and
- (iv) Form WWO 1149 for List of Pipes and Fittings to be installed (if the applicants decide to submit together with WWO 542).

Unless otherwise mentioned, documents with all the required supporting documents shall be submitted in PDF, JPG, TIF or PNG format with a minimum resolution of 300 x 300 dpi.

2.2.3 Required List of Documents on Internet Cloud Drive

The following list of documents shall be stored on internet cloud drive with SSL encryption or SFTP for e-submission: -

- (i) The document list for AWS (i.e. Appendix 2 of “Guide to Application for Water Supply”, or the latest version where appropriate);
- (ii) Drawing plans¹ format as stipulated in Section 3; and
- (iii) BIM data files² as per our required BIM viewing format as stipulated in Section 4.

2.2.4 Others Requirements

- (a) The email size of an e-submission including attachment shall not exceed 25 MB.
- (b) All data files shall be stored on internet cloud drive with SSL encryption or SFTP for minimum 10 working days and the applicants are required to provide the URL or web link and password (if applicable) of the data files. The bandwidth of the internet cloud drive or SFTP adopted shall support downloading speed not slower than 10Mbps. The applicant is inadvisable to edit, add or remove the files being uploaded to the internet cloud drive after e-submission reaches the dedicated email address in Section 2.1. Before issuing corresponding CCID for the first e-submission by the WSD, if any necessary update is required for the uploaded files after the first e-submission, the applicant is required to write to wsdinfo@wsd.gov.hk by email with subject title “[Rev] E-Submission of AWS with BIM – Premises Address”, to provide the list of the items that have been updated and to state the reasons for the updates in the email.
- (c) The file name of submission documents / BIM file(s) should contain alphabets and numbers only. Chinese characters or special symbols as a file name should not be used in the file names of e-submission documents.
- (d) Upon the first submission of WWO 542, the applicant shall submit the subsequent re-submission ***with the corresponding CCID at the subject of the submission email to the respective Region direct by replying to the email address given in WWO1082 or other previous correspondence from the WSD.***

¹ Mandatory items stipulated in document checklist for AWS must be included in the e-submission.

² BIM will be used for reference only.

- (e) Upon approval of submission, the applicants are required to submit electronic copy of as-built records / drawings to the WSD in accordance with Appendix 8 of the “Guide to Application for Water Supply”. Furthermore, the applicant is encouraged to submit the as-built model(s) as per the requirements dictated in Section 4.8 below.

3 Submission Requirements on Drawings Mandatory for AWS

3.1 Drawings Mandatory for AWS

- (a) Drawings plans, including but not limit to Vertical Plumbing Line Diagram (VPLD), layout plan for the connection of inside services and fire services, water meter box arrangement, layout plan for all buried pipes and concealed element drawings (if applicable) etc., in PDF file format with minimum resolution 300 x 300 dpi are mandatory in e-submission. The general standards of drawings shall comply with the drawing submission standard in Section 3.2.2 of the “Guide to Application for Water Supply”.

3.2 Drawing File Naming

Applicants should standardise file naming convention for drawings submission. The drawing naming should consist of 4 fields, as shown in Tables 3-1 and 3-2 below.

WSD CCID										-	Drawing No.			-	Revision No.			-	Title															
										-				-				-																

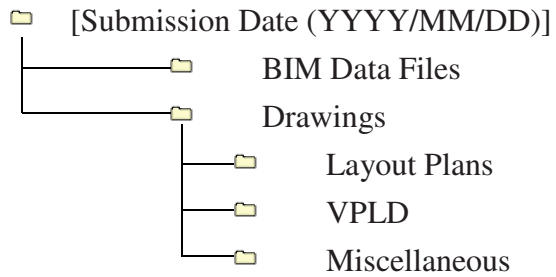
Table 3-1 - Blank Form for Drawings Naming

Field	Description	Maximum Digits
WSD CCID	CCID assigned by the WSD (the field should be blank for the 1st submission)	10
Drawing No.	User defined drawing numbers	3
Revision No.	Refers to the revision of drawings (e.g. “R01” refers to the 1st submission)	3
Title	User defined character (optional)	10

Table 3-2 - Description of Fields for Drawings Naming Reference

3.3 Requirements on Folder Structures in Internet Cloud / SFTP

The following folder structure shall be adopted on internet cloud drive / SFTP for first e-submission and re-submission: -



4 BIM File Submission Requirements

4.1 Administrative Requirements

The BIM data files for e-submission shall meet the following requirements: -

- (a) BIM model(s) shall be submitted in Industry Foundation Classes (IFC) 4.0 format or Autodesk Navisworks (*.nwd) file format in first and re-submission(s) for viewing purpose. Prior agreement with the WA shall be sought for adopting other formats of BIM files in the submission, if needed.
- (b) BIM viewing files shall be self-contained and good enough for verifying the VPLD in vetting plumbing proposals. Setting up appropriate viewpoints in BIM viewing files to facilitate viewing of plumbing proposal is encouraged, if applicable. Any link and cross-reference shall be removed. The BIM viewing files shall include but not be limited to models of site, architectural, structural, plumbing and underground utilities. The modelling guidelines should refer to the latest version of CIC BIM Standards – General. In addition, the plumbing model for the submission shall include objects stipulated in the “Guide to Application for Water Supply” and the “Technical Requirements for Plumbing Works in Buildings”, such as lighting to meter room, motors and pumps, etc.
- (c) BIM viewing files run on web platforms shall not be accepted.
- (d) BIM viewing files and electronic drawing sheets shall be stored separately into different sub-folders before uploading to internet cloud drive with SSL encryption or SFTP. Details of project folder structure shall refer to Section 3.3 in this Guidelines.
- (e) Each BIM viewing file shall be limited to the maximum size of 300MB.

4.2 Technical Requirements

- (a) The data requirement of BIM objects/elements for submission shall comply with the Waterworks Ordinance, Waterworks Regulation, the requirements specified in the “Guide to Application for Water Supply”, “Technical Requirements for Plumbing Works in Buildings” and relevant guidelines and circular letters issued by the WSD.

- (b) The BIM models shall comply with the latest version of “CIC BIM Standards for Mechanical, Electrical and Plumbing”, “CIC BIM Standards – General”, and “CIC Production of BIM Object Guide – General Requirements” published by the Construction Industry Council and all other relevant guidelines, where applicable.
- (c) Add-on programs or scripts used in the course of BIM production shall be removed.
- (d) Any irrelevant information not specified in the “Guide to Application for Water Supply” and “Technical Requirements for Plumbing Works in Buildings” shall be removed and purged from BIM models as well as BIM viewing files.

4.3 Requirements on Folder Structures in Internet Cloud / SFTP

The folder structure to be adopted in the internet cloud drive / SFTP shall refer to Section 3.3.

4.4 BIM File Naming Conventions

BIM viewing file(s) for plumbing proposal at proposal stage and for as-built deliverables, regardless of software platforms, shall follow the principles described below.

4.4.1 Model File Naming and Reference

Applicants shall standardise the file naming convention for BIM data file in e-submission. The BIM file name shall consist of 4 fields, as illustrated in Tables 4-1 to 4-2 below.

WSD CCID	Software Version	Submission No.	Remarks
-	-	-	

Table 4 - 1: Blank Form for BIM File Naming

Field	Description	Maximum Digits
WSD CCID	CCID assigned by the WSD (the field should be blank for the 1st submission)	10
Software Version	Refers to the software version which produces the BIM data file (e.g. “N20” refers to Navisworks 2020 and “4.0” for <i>.ifc</i> files)	4

Submission No.	Refers to the number of submission (e.g. “01” refers to the 1st submission)	2
Remarks	User defined character (optional)	10

Table 4 - 2: Description of Fields for BIM File Reference

4.5 BIM Modelling General Requirements

4.5.1 Model Coordinates and Orientation

BIM models shall be setup with geo-reference to the Hong Kong 1980 Grid (HK1980 Grid) and the Hong Kong Principal Datum (HKPD). The origin or base point and orientation of the BIM model shall have a ‘True North’ location taking reference to this geo-reference. The BIM model shall also have a ‘Project North’ location setting to orientate the project to project grid directions to define an orthogonal environment for ease of model authoring and presentation of plans.

The coordinate system shall be in metre unit. The project base point and rotation of orientation shall be specified accompanying the BIM submission.

4.5.2 Unit of Measurement and Symbol

BIM models shall be modelled in metric system. Model units being adopted in the WSD are shown below for reference and the lists are not exhaustive.

Name	Unit	Symbol
Angle	decimal degree	°
Area	square metre	m ²
Date	dd/mm/yyyy	31/03/2020
Length	metre or millimetre	m or mm
Mass	kilogram	kg
Volume	cubic metre	m ³

Table 4-3: Base Units

Should there be any discrepancy between the unit of measurement specified above, and the “Guide to Application for Water Supply” and “Technical Requirements for Plumbing Works in Buildings”, the latter documents shall prevail.

4.5.3 Model Division

A project BIM model shall be divided into separate services or systems which depends on the discipline, location, size and complexity of the project. When a project is composed of several building blocks, the BIM model shall be further divided into several zones (building blocks) for more efficient handling of models. Each zone shall be modelled separately.

Under special circumstances, a single BIM model may be acceptable depends on the nature and complexity of works.

4.5.4 Model Linking

Linking models enable additional geometry and data to be referenced into a single model. Models to be linked shall be of the same coordinates.

All links to irrelevant model files shall be purged and removed, and the linked model shall be maintained in a manageable file size.

When BIM submission is accompanied with native BIM model files, all linked model files shall be provided. If the submitted BIM viewing file is embedded with linked models, the applicant shall ensure that all linked models contained in the BIM submission shall be displayed as a whole.

4.5.5 Model Management

In addition to the statutory requirements stipulated in the “Guide to Application for Water Supply” and “Technical Requirements for Plumbing Works in Buildings”, the BIM models shall include associated site, architectural, structural, plumbing and underground utilities models and other information required in the “Guide to Application for Water Supply” and the “Technical Requirements for Plumbing Works in Buildings” and shall cover the whole project development in relation to the AWS.

4.5.6 Model Quality Control

Applicants shall endeavor to ensure the quality of BIM models not only the dimensions, shape, location, orientation and quantity, but also the accuracy and correctness of the graphical and non-graphical information. Prior to interdisciplinary model coordination,

BIM data shall be checked and validated.

4.6 Level of Information Need (LOIN)

The explanations and definitions of Level of Information Need (LOIN) for individual BIM object/element at different project stages shall refer to the latest version of various CIC BIM Standards.

4.6.1 Minimum Level of Information Need

The recommended minimum LOIN requirement for model object/element at different project stages is summarized as follows: -

Project Stage	Level of Graphics (LOD-G)	Level of Information (LOD-I)
Submission for plumbing proposal	300	300
As-built	400 + Field Verification	500

Table 4-4: Minimum Level of Information Need

4.7 Drawings Generated from BIM

4.7.1 Drawing Submission Standards

The drawings shall contain 2D, and if applicable, 3D views generated from BIM submitted at proposal stage and inspection stage and shall comply with Section 3.2.2 and Section 4.3.1.1 of the “Guide to Application for Water Supply” respectively and this Guidelines. Preparation of drawings using BIM should make reference to CIC BIM Guide for using BIM in generation of MEP digital drawings for statutory submissions, where applicable.

4.7.2 Drawing Symbols

The drawing symbols shall make reference to Section 3.2.2.5 of the “Guide to Application for Water Supply” as far as practicable.

4.7.3 Standard Line Type

The line type for drawings shall make reference to Section 3.2.2.6 of the “Guide to Application for Water Supply” as far as practicable.

4.8 As-Built Submission

The as-built submission for the completed works shall comply with the requirements stated in Section 4.3.1.1 of the “Guide to Application for Water Supply”.

4.8.1 As-Built BIM Deliverables

The as-built BIM models should preferably contain information and data for the plumbing works.

A sample list of As-Built deliverables is shown below for reference.

Item	As-built Deliverables
1	The as-built BIM viewing models of relevant disciplines.
2	The as-built BIM viewing files in IFC 4.0 or Navisworks format of relevant disciplines as per the requirements stipulated in Section 4.
3	A full set of drawing files in pdf format directly generated from the as-built BIM models.

Table 4-5: Sample List of As-Built BIM Deliverables

-END-