



QC

Revit Model Quality Checker Plugin
User Guide Document

For any issues or queries not found in this user guide, please contact us via the link below:

<https://go.gov.sg/uraqc-enquiries>

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2 Overview

2.1 Purpose

The URA Quality Checker Plugin (QC Plugin) is a pre-submission model quality check tool developed to support industry BIM professionals in preparing IFC+SG models for regulatory submission through CORENET X, Singapore's integrated digital platform for the built environment. The tool was developed based on insights derived from recurring modelling errors identified in both pilot projects and ongoing submissions since the soft launch of CorenetX in 2023. Such errors have imposed unnecessary burdens on both the industry and URA, as missing or misplaced information within models has resulted in additional time spent on clarifications and correspondence.

To address this, the tool adopts a "shift-left" approach, aiming to reduce modelling errors during the model creation phase rather than at the point of submission. It is designed to operate within Autodesk Revit, a widely used model creation platform, and allows users to perform checks at various stages of model development.

2.2 Overview

- Platform/Compatible Versions: Autodesk Revit 2025/2026
- Plugin is currently **NOT compatible with Cloud Shared models**. Users will have to download a local copy of the model(s) before running the plugin. This function is planned to be available in future release.
- Target Users: Architects, BIM Architect Modelers, QC Reviewers, Project Managers, Building Consultants
- It is recommended to run the checks during the modelling process to verify that the model meets the requirements from URA, and to perform a full check before final project submission to ensure the model is ready for submission. Below are the recommendations on what checks can be conducted at various stages of model development.

Model Stage	Checks
Model Setup	<ul style="list-style-type: none">• Required fields available in model template• Duplicated fields• Level naming
Model Development	<ul style="list-style-type: none">• Required fields populated• Required field populated with acceptable values• Sanity Check for populated values• Critical elements found• Georeferencing of model and its linked files
Model Completion	<ul style="list-style-type: none">• Export settings• Keyed in GFA values matches declared values

3 Setup and Installation

The installation package can be downloaded from URA website ([Link](#)) by filling up an online form ([Link](#)). Users who have provided their email addresses via FormsSG to obtain the installation package will be notified via email if there is any updated version of the plugin available for download. Installation of Plugin

1. Download the URA QC Checker installation package from the URA website.
2. Ensure all Revit applications are closed before running the installer.
3. Unzip the downloaded file and launch the QCPlugin installer.



Figure 1

4. A pop-up error message will appear if Revit is not closed before installation.

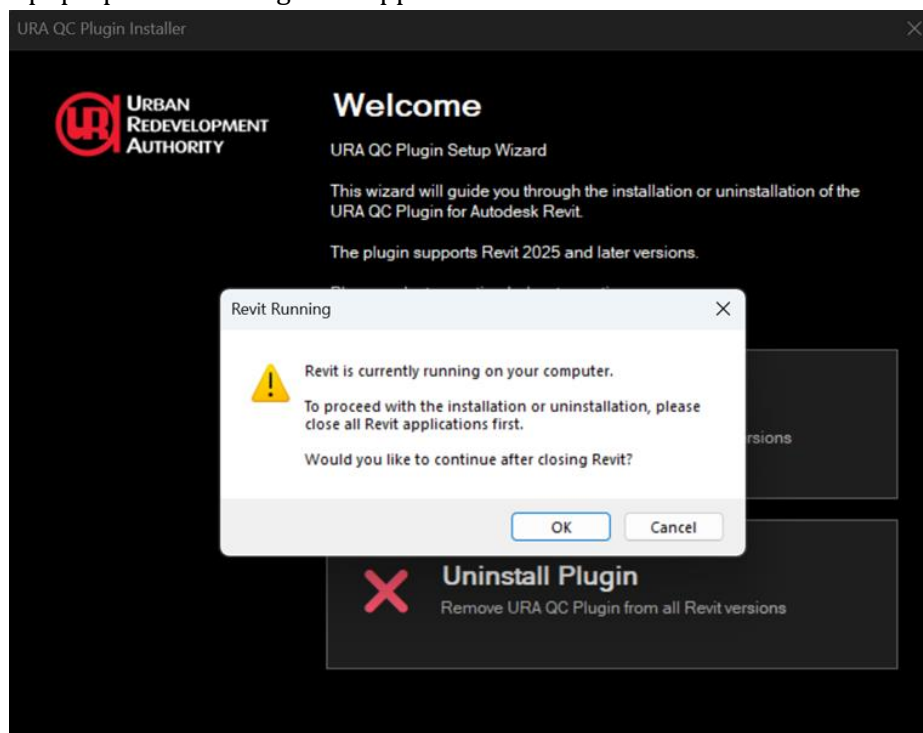


Figure 2

5. Follow the instructions on screen and select the Revit versions to install the plugin. Wait for the installation to complete and click 'Finish'.

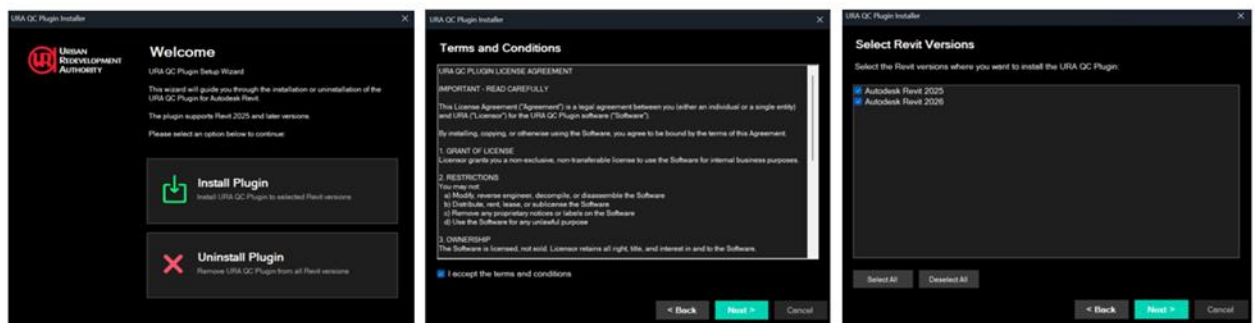


Figure 3

3.1 Launching the Plugin

1. Locate the QC Checker tab within the Revit and click on it.

2. Click on the URA Checker Icon to launch the plugin

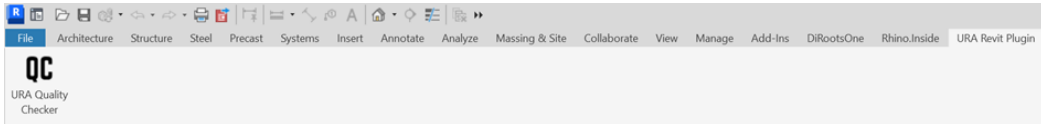


Figure 4 QC tool appearing in Revit toolbar

3. A floating UI window should appear within the Revit window. User can choose to either keep it as a floating window or dock it

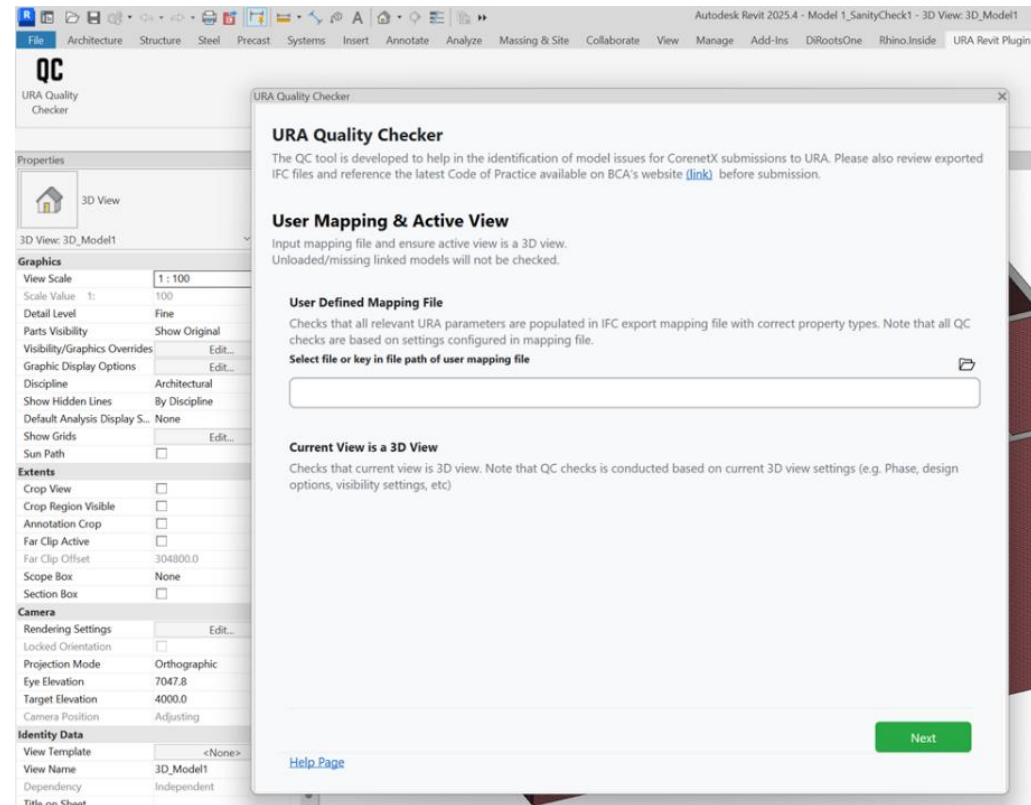


Figure 5 UI window

3.2 Uninstallation of Plugin

1. Run QCPlugin installer.
2. Click “Uninstall Plugin”.
3. Wait for the uninstallation to complete and click ‘Finish’.

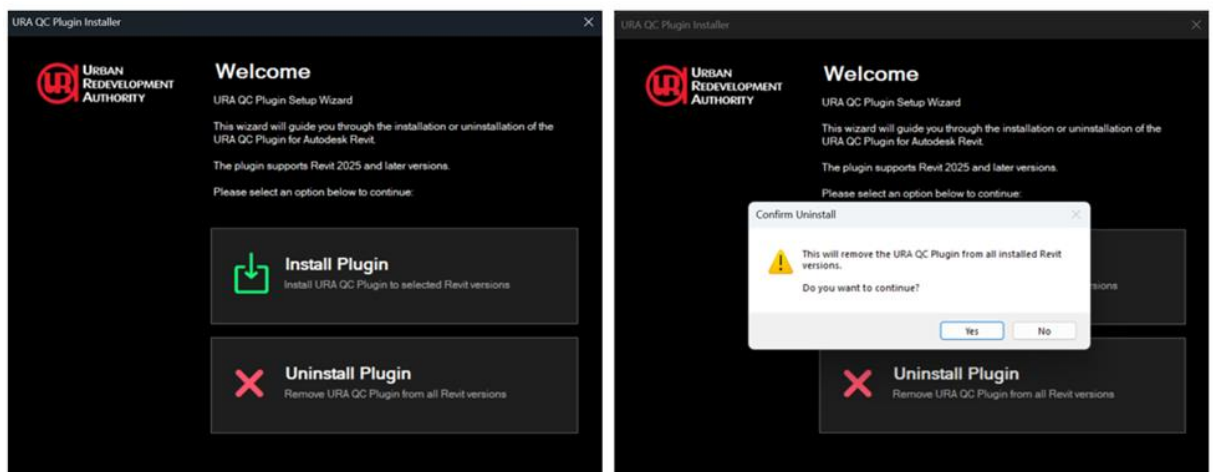


Figure 6 Uninstallation of Plugin

4 QC Check initiation

Two prerequisites tests are required to initiate the QC check:

1. Mapping file (.txt)

The mapping file refers to the .txt file used in the export of IFC as shown in Figure 7. As this file contains information on how parameters represented in the Revit model are exported to IFC, subsequent parameter checks are also dependent on the information found in this mapping file.

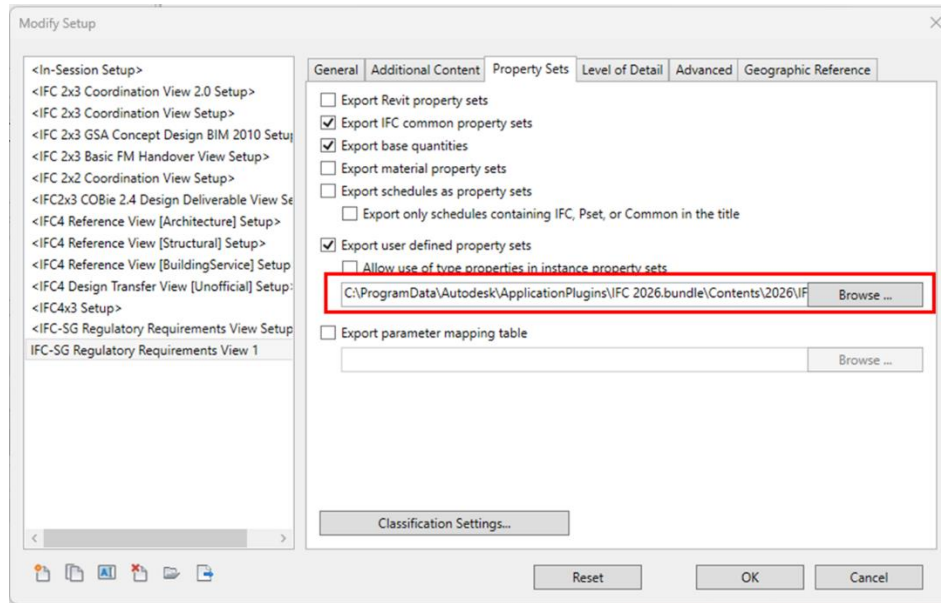


Figure 7 Mapping file used in export of IFC

The configured mapping file containing IFC+SG parameters can be downloaded from BCA's website ([Link](https://info.corenet.gov.sg/ifc-sg/templates--apps-and-more/bim-software-resources)). Users can customize the mapping file based on their company standards or project requirements. This mapping file contains the settings for how properties in the Revit model are mapped to properties in the exported IFC model.

<https://info.corenet.gov.sg/ifc-sg/templates--apps-and-more/bim-software-resources>

c) Revit	
The latest updated Autodesk interoperability tools and configuration files for IFC+SG:	
(Note: This is a temporary placeholder while the Autodesk IFC+SG Resources website is undergoing maintenance)	
Setting your IFC+SG parameters	Shared Parameters Tool (COP edition 3) for Revit 2024 and above Shared Parameters Tool (COP edition 3) for Revit 2023 Shared Parameters Tool (COP edition 3) for Revit 2022 and below
Defining IFC+SG Subtypes	Standardized Data Tool (COP edition 3) for Revit 2024 and above Standardized Data Tool (COP edition 3) for Revit 2023 Standardized Data Tool (COP edition 3) for Revit 2022 and below
Populating values using Dynamo (for Dynamo users)	Dynamo for Revit 2024 and above Dynamo for Revit 2023 Dynamo for Revit 2022 and below
Validating your IFC+SG parameter values	Model Checker (COP edition 3) for Revit 2024 and above Model Checker (COP edition 3) for Revit 2023 Model Checker (COP edition 3) for Revit 2022 and below
Exporting information to IFC	Revit IFC Exporter JSON Files Property Set (COP edition 3) for Revit 2024 and above Property Set (COP edition 3) for Revit 2023 Property Set (COP edition 3) for Revit 2022 and below
Revit IFC+SG How-to guide	IFC+SG How To Guide Revit
Revit IFC Manual	Revit IFC BIM Manual

Figure 8 Configured IFC+SG file in CorenetX website

2. 3D active view

To ensure that the checks conducted in the Revit environment will reflect what is eventually exported to IFC as closely as possible, the 3D active view selected by the User during the initiation of the check is also assumed to be the view used for the IFC export. For certain elements such as site boundary and existing terrain if it is hidden within the 3D active view or contained within a hidden linked file it will not be considered for checks.

4.1 Initial Screen

1. The QC check is initiated with the prerequisites titled “User Mapping & Active View”
Two prerequisite checks are displayed:
 - Upload URA Mapping File(txt): Select and validate the URA property definition file. Input expected would be a .txt file.
 - Verify User in 3D view: No input required from the user. The plugin will automatically detect if the current active view is a 3D view.

URA Quality Checker

The QC tool is developed to help in the identification of model issues for CorenetX submissions to URA. Please also review exported IFC files and reference the latest Code of Practice available on BCA's website ([link](#)) before submission.

User Mapping & Active View

Input mapping file and ensure active view is a 3D view.
Unloaded/missing linked models will not be checked.

User Defined Mapping File

Checks that all relevant URA parameters are populated in IFC export mapping file with correct property types. Note that all QC checks are based on settings configured in mapping file.

Select file or key in file path of user mapping file

C:\Users\qjuto\Documents\Sprint 4 Model\Sample_MappingFile.txt

Current View is a 3D View

Checks that current view is 3D view. Note that QC checks is conducted based on current 3D view settings (e.g. Phase, design options, visibility settings, etc)

[Help Page](#)

Next

Figure 9 Initial Screen

2. The “Next” button is enabled when the two checks are cleared. If any of the checks fail, the user will not be able to proceed with the subsequent checks. See Section 4.2 for more information on when the two prerequisites are not met.

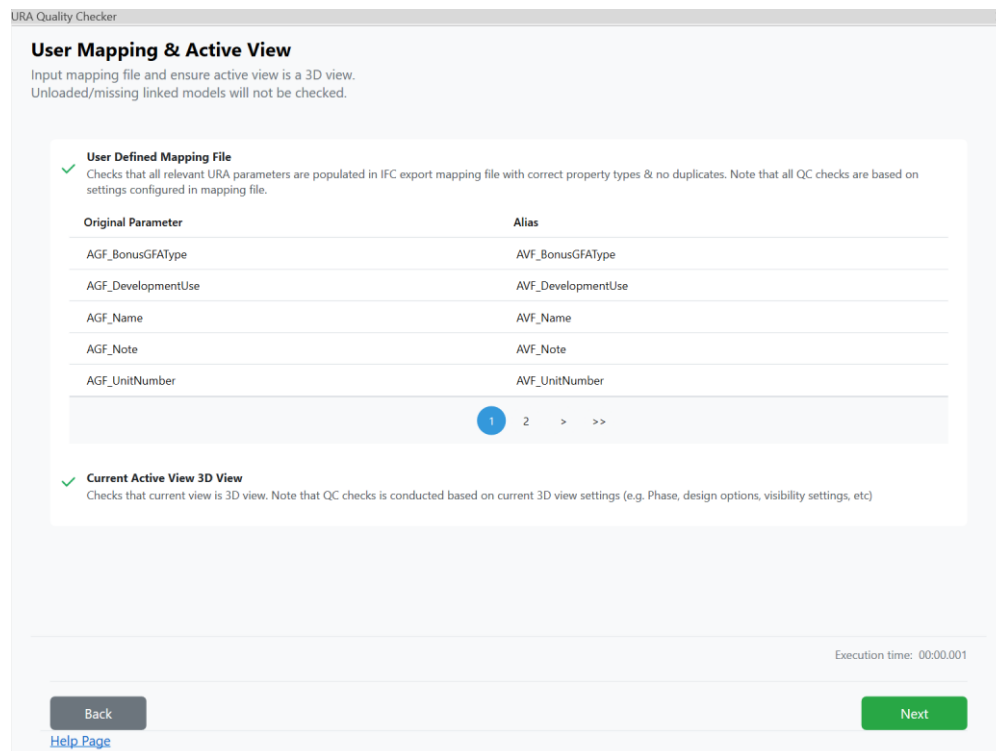


Figure 10 Passed Prerequisite tests

4.2 Prerequisites not met

Here are the common scenarios for not meeting the two prerequisite tests during QC check initiation. Please also refer to Section 7.1 for further explanations on these checks.:

Prerequisite	Possible scenario
User defined Mapping File	<p>The user-defined file is in an invalid format, for example, it is not a .txt file, or it contains empty content or formatting that does not match the required example.</p> <p>The user defined file contains:</p> <ul style="list-style-type: none"> • Duplicated values: The file contains repeated entries where values are expected to be unique. For example, the same parameter is listed more than once. • Missing parameters: One or more required URA defined parameters are empty or not provided • Invalid syntax (Warning Only): Common examples include missing tabs or using spaces instead of tabs as separators or missing lines • Wrong File Format: File provided is not in the txt file format will not be able to be parsed
Current View is a 3D View	The current active view is not a 3D view (e.g., a schedule or a 2D area/floor plan)

If either of the two checks fails, the user is required to provide a revised mapping file with the correct properties and format or switch the current view to a 3D view. Note that the view can be switched without closing the checker. After making the necessary corrections, return to the landing page of the checker and re-run the pre-checks.

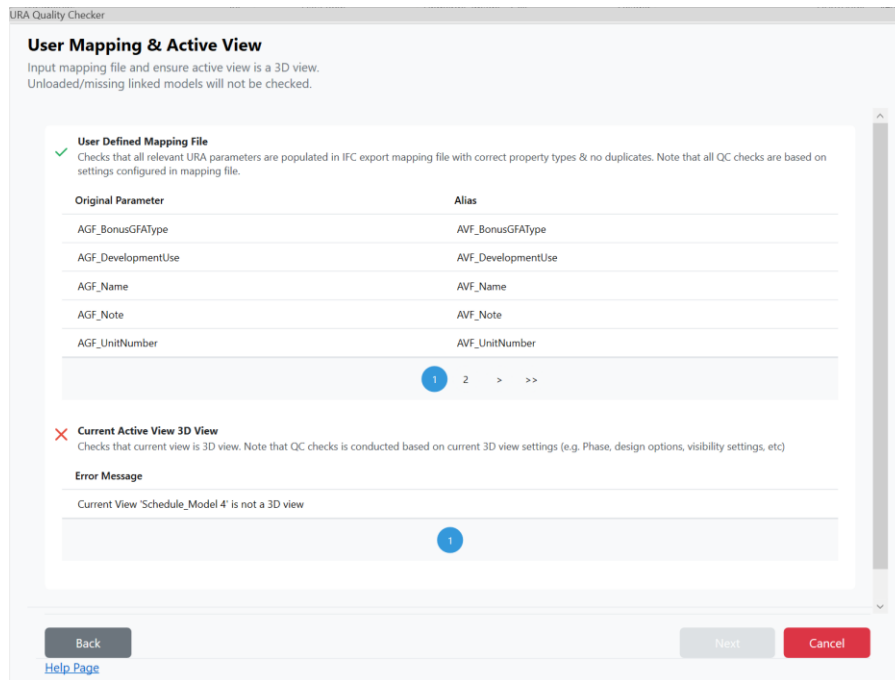


Figure 11 One of the prerequisites not met (Current View not 3D view)

4.2.1 User Defined Mapping File

As part of the QC check initiation screen, information extracted from the mapping file will also be reflected. URA parameters (parameters with prefix AGF, AST, ALS, AVF or ACN as listed in the CoP) that are configured to be overwritten in the mapping file will be listed.

Where property should be grouped under IfcEntity

PropertySet:	SGPset_SpaceArea_GFA	I	IfcSpace
AGF_BonusGFAType	Label		
AGF_DevelopmentUse	Label		
AGF_Name	Label		
AGF_Note	Label		
AGF_UnitNumber	Label		
AGF_UseQuantum	Label		
AGF_SupportingFacility	Label		
AGF_BuildingTypology	Label	Typology	

Property name Property Type Mapped Property

Figure 12 Sample Mapping File Format

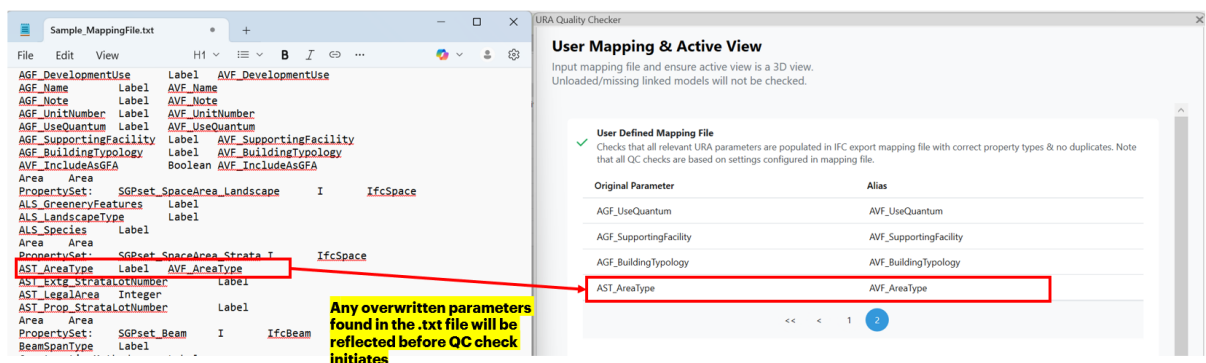


Figure 13 Overwritten parameters found in Mapping file

This configuration will also be taken into consideration in all the other QC checks. For example, in Figure 15 parameter “AST_AreaType” has been replaced with “AVF_AreaType”. All subsequent checks will be based on the overwritten parameter of “AVF_AreaType”.

4.3 Mode Selection (Interim Check Vs Full Check)

Two types of checks are available depending on the type of analysis the user intends to perform and the current stage of the project submission.

1. Interim Check (Select Check):

The Interim Check is intended for use during the design and coordination phase. It provides users with the flexibility to select specific. However, the output is limited to an Excel report.

2. Full Check:

The Full Check is intended for final-stage validation prior to formal submission. It runs all mandatory checks comprehensively on the model to ensure it meets the required standards and compliance requirements. The check produces both Excel and PDF reports, allowing users to add comments to the PDF as needed. This mode is used for final review and approval.

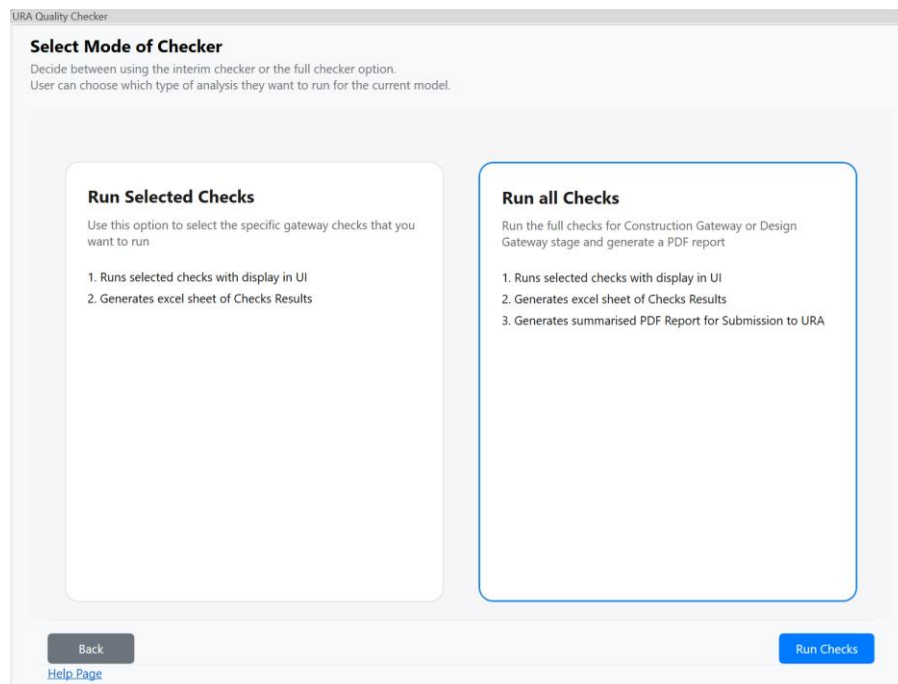


Figure 14 Selected or Full Checks

The description provided under each check type outlines the core functionality and highlights the key differences in scope across the two checks. Users can navigate using “Back” and “Next” buttons. The “Next” button is enabled after a mode has been selected.

5 QC checks

5.1 Select Checks

For the Interim Check (Run Select Checks), checks are grouped under the Design or Construction Gateways. Users can select specific checks via accordion panels, and each section can be collapsed or expanded by clicking the arrow in the section header.

Users can select the

After clicking “Next,” the checker runs the selected checks and shows both the results.

URA Quality Checker

Gateway Validation Selection

Select the validations to run for Design and Construction Gateway.

Design Gateway

1. Required Information populated in Designated Field

- ☐ Select All
- ☐ 1.1 All URA Area properties are defined without duplicates.
All URA area properties are defined and with the right value types and no duplicates.
*denotes overridden values found in Mapping file.
- ☐ 1.2 "AGF_Name" filled
At least one Area_GFA object found has "AGF_Name" filled in across all the files (main & linked)
- ☐ 1.3 "ALS_LandscapeType" filled
At least one Area_GFA object found has "ALS_LandscapeType" filled in across all the files (main & linked)

2. Checks for keyed information

3. Geo-Referencing

4. Core Elements Required For Review

5. Other Model Quality Checks

6. IFC Export Settings

Construction Gateway

[Back](#) [Run Checks](#) [Help Page](#)

Figure 15 Select Checks to run

5.2 Full Checks

When **Run all Checks** is selected, Users are required to select between Construction Gateway or Design Gateway. The corresponding sets of checks will be conducted based on this selection.

URA Quality Checker

Additional Inputs

Provide additional inputs for the validation process.

Cadastral Lot upload

Please input the file path to the geoJSON file containing the cadastral lot data where the development is located for site boundary checking. GeoJSON file can be generated from URA website ([link](#)). Alternatively, enter any 3 vertices of surveyed coordinates for geo-referencing verification.

File Upload

[Validate](#)

☒ **[Optional] Manually key in vertices (SVY21)**

Enter 3 known vertices of site boundary extracted from survey files (in Northing, Eastings metres) to check that model is correctly georeferenced

IFC Export Setup Selection

Select the IFC export setup used for exporting IFC files from your Revit project

Select IFC Export Configuration:

Gateway Check Selection

Select the gateway check to run

Select Check Type: ☒ Design Gateway ☐ Construction Gateway

[Back](#) [Run Checks](#) [Help Page](#)

Figure 16 Full Check Gateway selection

5.3 Geo-referencing Check

5.3.1 Geo-referencing check (Using GeoJson file)

The Geo-referencing check is initiated when Full Checks is selected, or Geo-referencing check is selected in Interim Check. Users will be prompted to upload the GeoJSON file containing the cadastral lot boundary. Refer to Section 5.3.2 for details on how to retrieve GeoJSON file from URA Service.

After uploading the GeoJSON file, users click “Validate” to run the checks and confirm whether the cadastral lot boundary has been successfully imported. Upon successful import, the cadastral lot and site boundary are extracted and displayed on the model.

URA Quality Checker

Additional Inputs
Provide additional inputs for the validation process.

Cadastral Lot upload
Please input the file path to the geoJSON file containing the cadastral lot data where the development is located for site boundary checking. GeoJSON file can be generated from URA website ([link](#)). Alternatively, enter any 3 vertices of surveyed coordinates for geo-referencing verification.

File Upload

Validate

[Optional] Manually key in vertices (SVY21)
Enter 3 known vertices of site boundary extracted from survey files (in Northing, Eastings metres) to check that model is correctly georeferenced

IFC Export Setup Selection
Select the IFC export setup used for exporting IFC files from your Revit project

Select IFC Export Configuration: In-Session

Gateway Check Selection
Select the gateway check to run

Select Check Type: ☒ Design Gateway ☐ Construction Gateway

Back Run Checks [Help Page](#)

Figure 17 Upload Geofjson File

As shown in Figure 18, geometry is generated on the model’s base plane based on the Geojson file in **Green** and the Site boundary (if found) in **Blue**. The Site Boundary is identified by detecting:

- any Mass or Generic Models
- Export to IFC As = IfcGeographicElement
- ObjectType = SiteBoundary

These are temporary generic objects generated by the plugin and will be deleted when Users proceed to the next step.

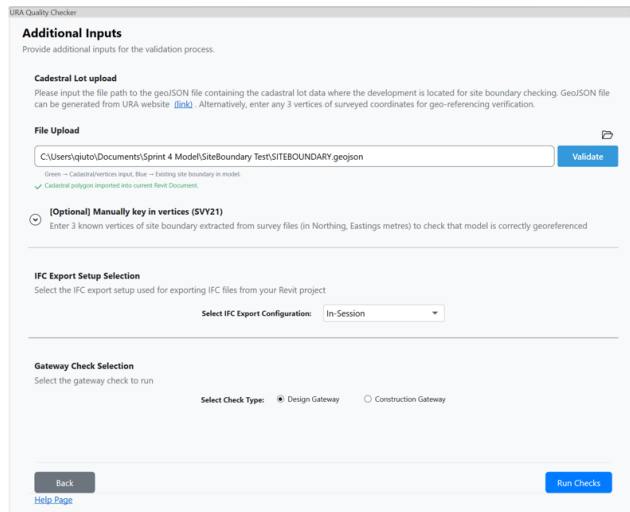
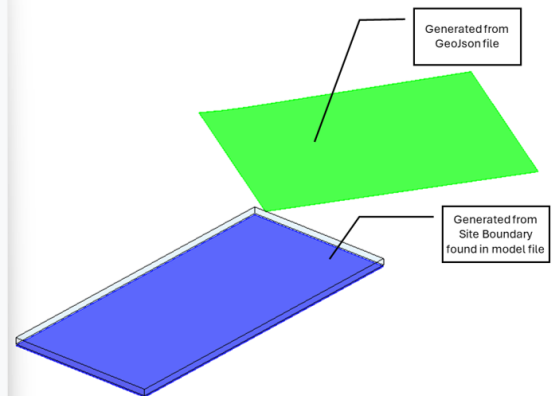
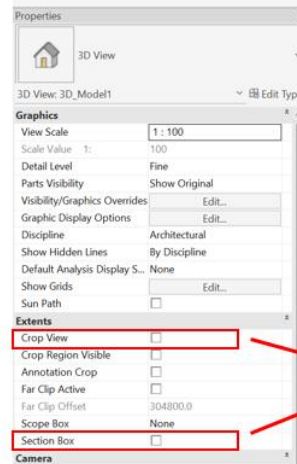



Figure 18 Geometries generated for Geo-referencing

If the cadastral lot is reflected as successfully imported but the generated drawing is not visible, please check the Revit view settings. Ensure that both **Crop View** and **Section Box** are turned off, as these settings may restrict the visibility of the imported drawing.



Please ensure these two options are turned off when generating the cadastral lot

Figure 19 Revit View Setting

5.3.2 GeoJson File generation

Users may generate the GeoJson file containing the MK lots geometry using a free service provided at URA website ([Link](#)). Users may enter the MK lot number to search for the relevant lot and click on “Download Cadastral Lot(s)”.

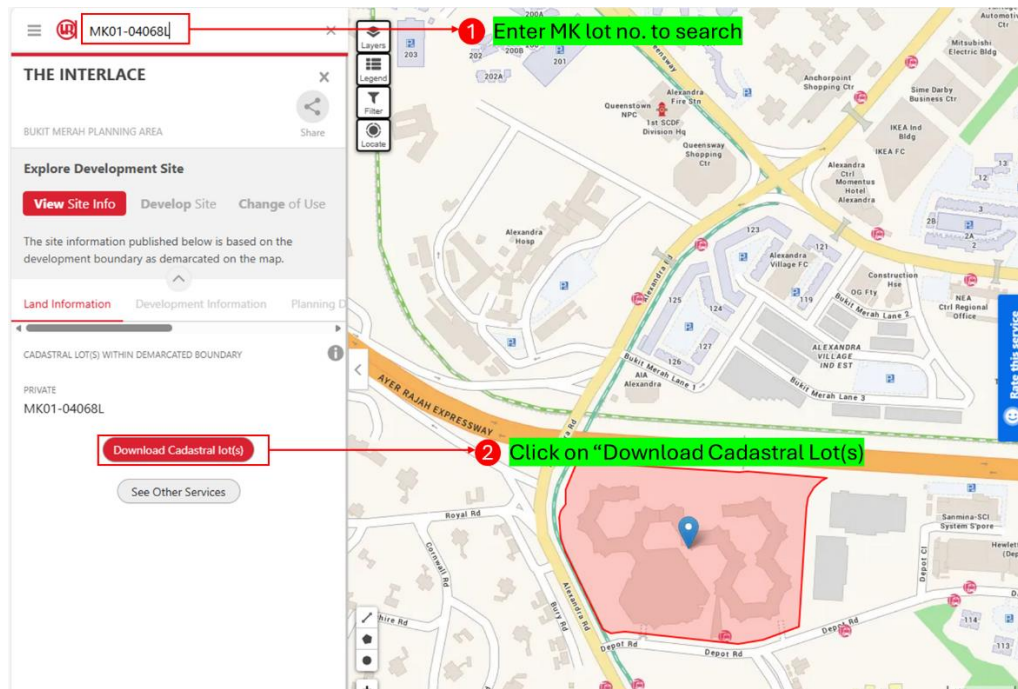


Figure 20

The MK lot identified in the search and other related MK lots will be listed in the next step. If the development to be checked has a MK lot that is not part of the list, it can be added in in by keying in the additional lot manually. Note that the QC tool can only take in 1 GeoJson file for each check. If the development involves more than 1 MK lot, these information needs to be contained in 1 Geojson file.

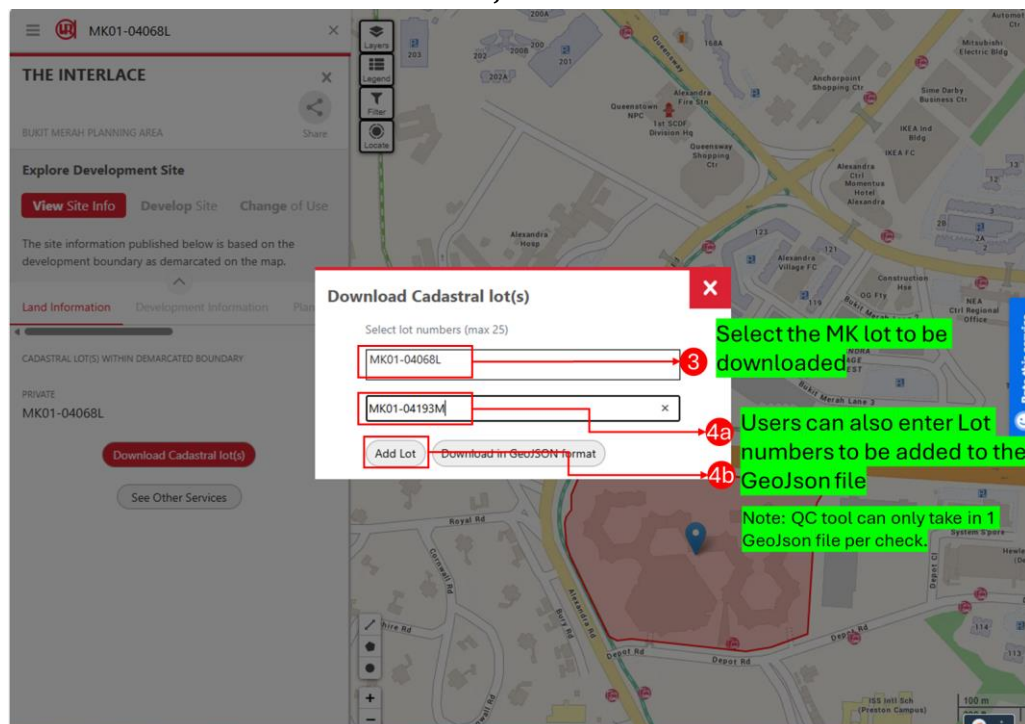


Figure 21

Selected MK lots will be highlighted in blue and the related GeoJson file will be generated when User click on “Download in GeoJson format”.

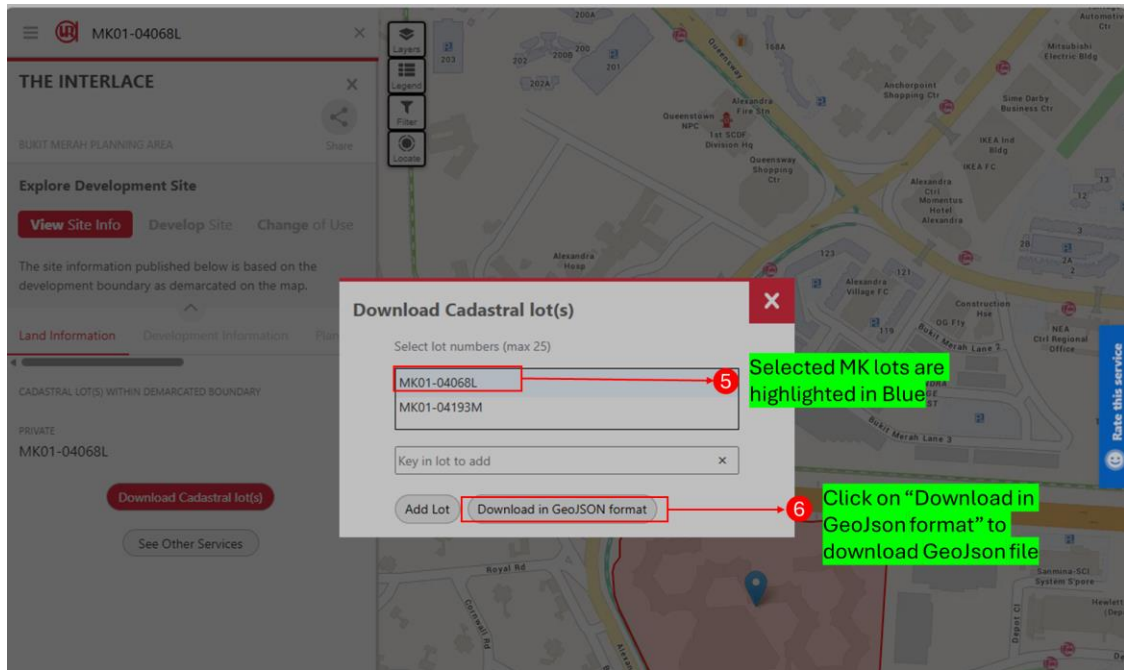


Figure 22

5.3.3 Geo-Referencing Check (Using Vertices)

If the User is unable to find the relevant Cadastral Lot no. from the SLA website's database or is unable to pass the check although they are certain that the model had been correctly geo-referenced, they can enter manually input three vertices in SVY21 coordinates for geolocation validation. These 3 vertices need to be within the range with Northing: 20,000 – 50,000m and Easting: 0-60,000m. The plugin will check if the 3 points imported lie within the acceptable offset of the extracted site boundary (+/- 20mm).

5.4 Validation Execution & Results Display

Once "Next" is clicked, the checker runs the selected checks or the Full Check. A loading screen appears while the checks are being processed, and the results are displayed when processing is complete.

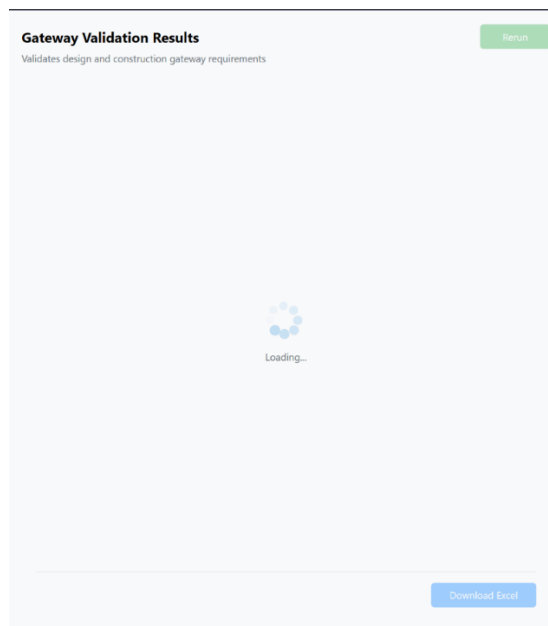


Figure 23 Loading Screen when checks are run

5.4.1 Checks Result report

Within the selected check type section, each chosen check is displayed with a pass or fail outcome. If a check fails, a table containing detailed error information such as element ID, error description, and file name are displayed. Users can expand or collapse the error details using the arrow beside the section header.

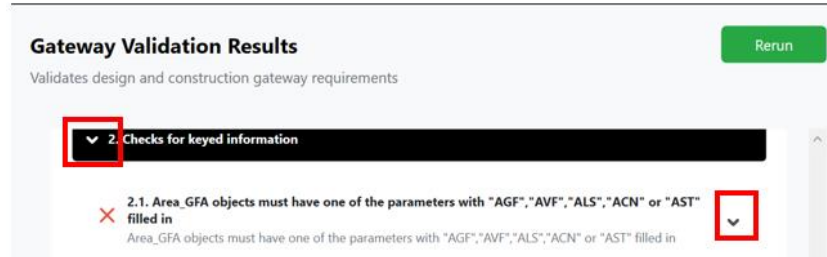


Figure 24 Dropdown to see result details

Results are presented in an interactive table where Users can:

- Filter Results
- Highlight Element (note that this function only works for elements that are present in the current model. Elements in linked files will be greyed out and will not be able to be highlighted)
- Copy all ElementID (This option is introduced to allow Users to select multiple objects in Revit by going to Manage Tab -> Select by ID)

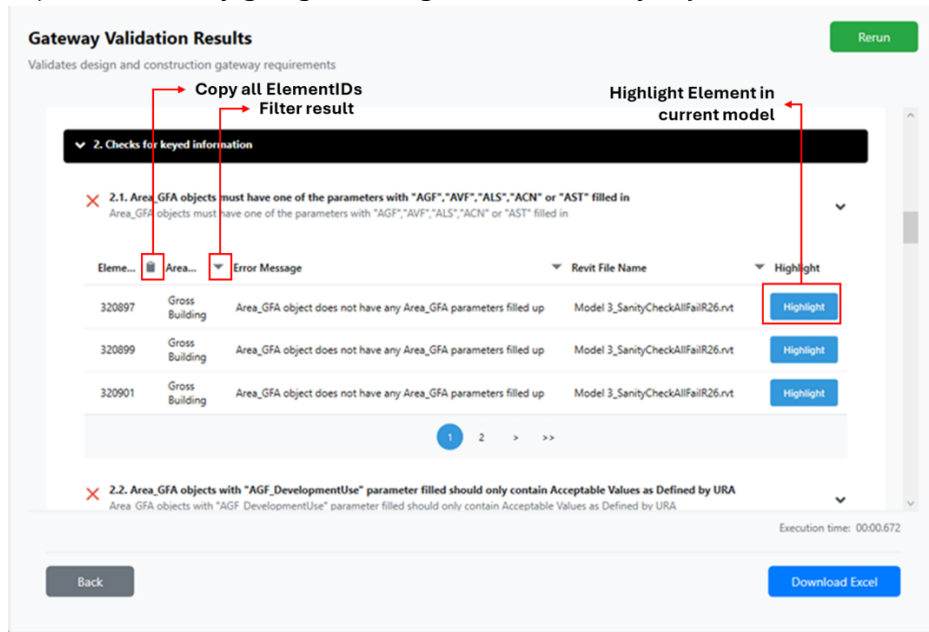


Figure 25 Review results generated from checks

5.4.2 GFA Tabulation

The GFA Tabulation section includes both a GFA summary and a GFA breakdown which enables users to review the total GFA as well as its detailed composition.

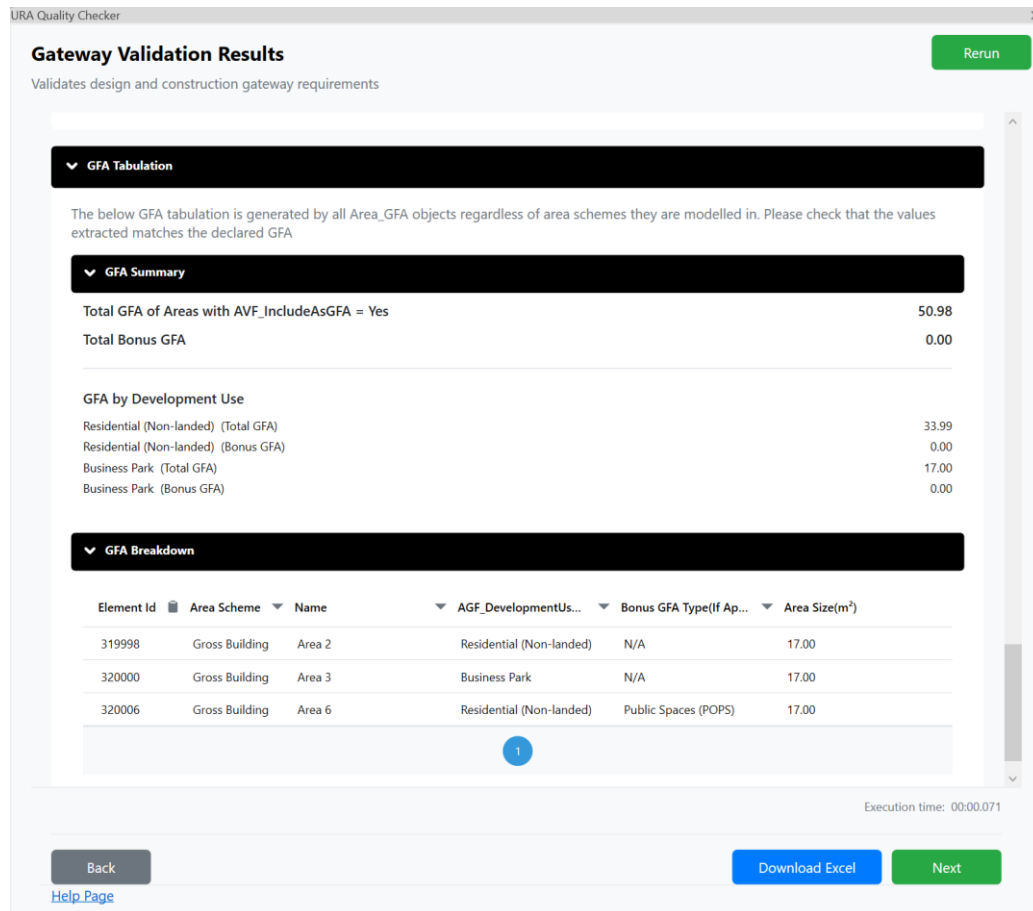


Figure 26 GFA tabulation

5.4.3 Other Result Display functions

The results window also includes interactive features listed below:

- **Rerun button:** Allows users to rerun the entire set of checks after making any updates or corrections to the model.
- **Access to Plugin page:** Hyperlink to plugin's page providing latest information on plugin including most updated User guide and Help.
- **Download Excel/PDF:** Enables users to download the check results and reports in Excel or PDF format for review, record-keeping, or sharing.
- **Finish:** End Checks and close window.

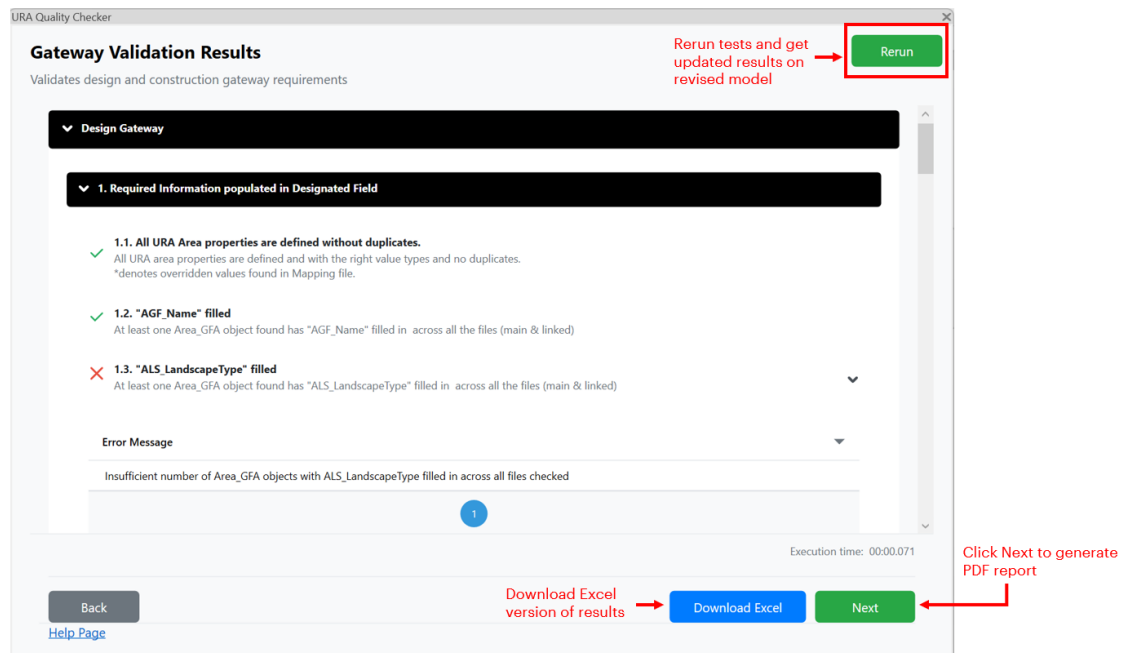


Figure 27 Other Result Display functions

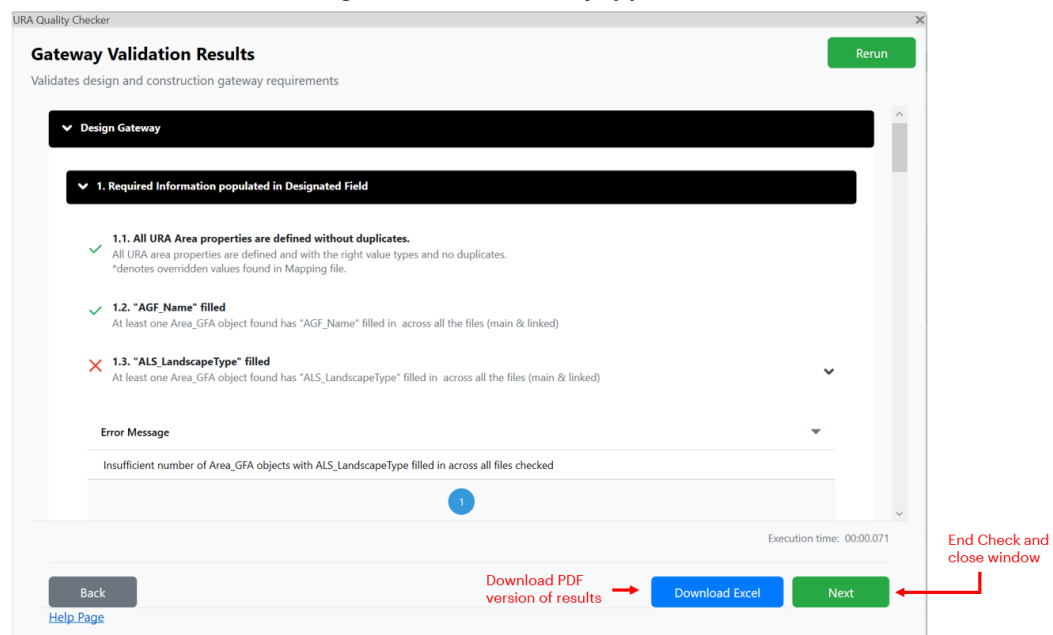


Figure 28 Other Result Display functions

5.5 Excel Report (Interim Check)

An Excel validation report can be generated by clicking the “**Download Excel**” button. The resulting workbook contains multiple sheets designed for comprehensive review and regulatory submission:

- **Validation Summary Sheet:** Provides an overview of all validation checks, displaying pass/fail status, detailed error descriptions, and affected element lists.
- **GFA Summary Sheet:** Summarizes total and bonus GFA values, with a clear breakdown by development use category, ensuring alignment with reporting standards.
- **GFA Breakdown Sheet:** Contains detailed area information at the individual element level, allowing for in-depth review, sorting, filtering, and reference to specific model components.

All sheets feature professional formatting and clear color coding, supporting both internal review and direct submission to URA portals. For report details, refer to Section 5: Report Structure.

5.6 PDF Report (Full Check)

The PDF report is available only in Full Check mode. After the check results are generated, users may either download the Excel report or click Next to proceed to the next screen to generate the PDF report.

In the next screen, the system automatically switches to Comment Mode, where users can provide justifications for the validation results. Please note that all detected errors must be justified in the Comments section before a PDF report can be generated. For more information on adding comments, refer to Section 4.7: Adding Comments.

For details on the PDF report, refer to Section 5: Report Structure.

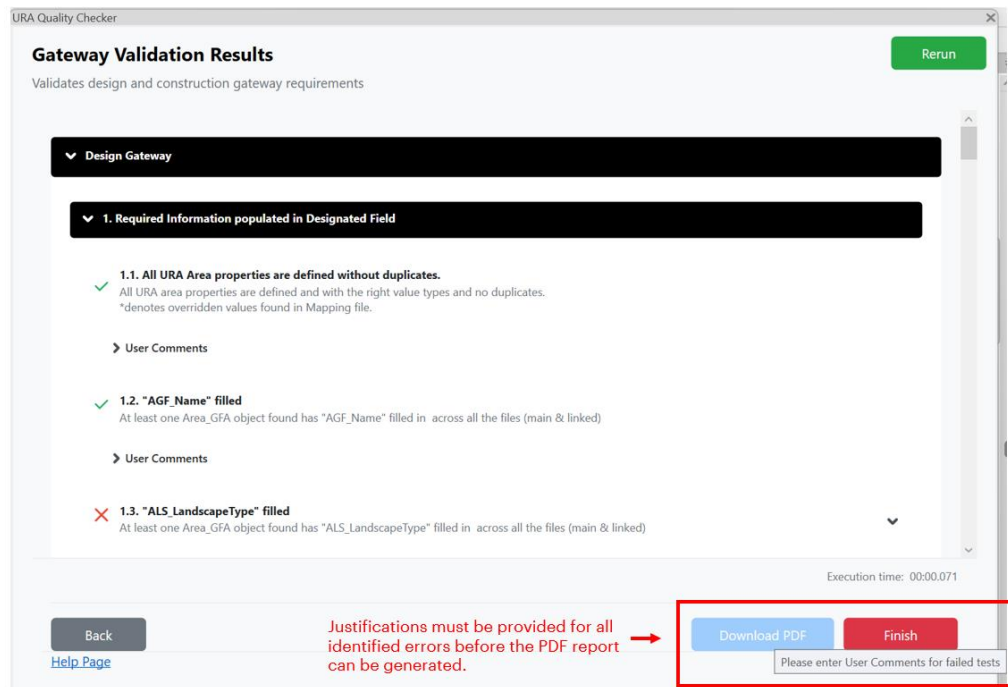


Figure 29 Before PDF Report Generation

5.7 Adding Comments

For submission of PDF report to URA as Corenet X supplementary document, users are expected to input a comment for all the failed QC checks explaining why Users would proceed with the submission despite knowing that the model is not fully complying to the QC requirements. After entering all justifications and comments, click "Download PDF" to generate a PDF report that includes the user's justifications.

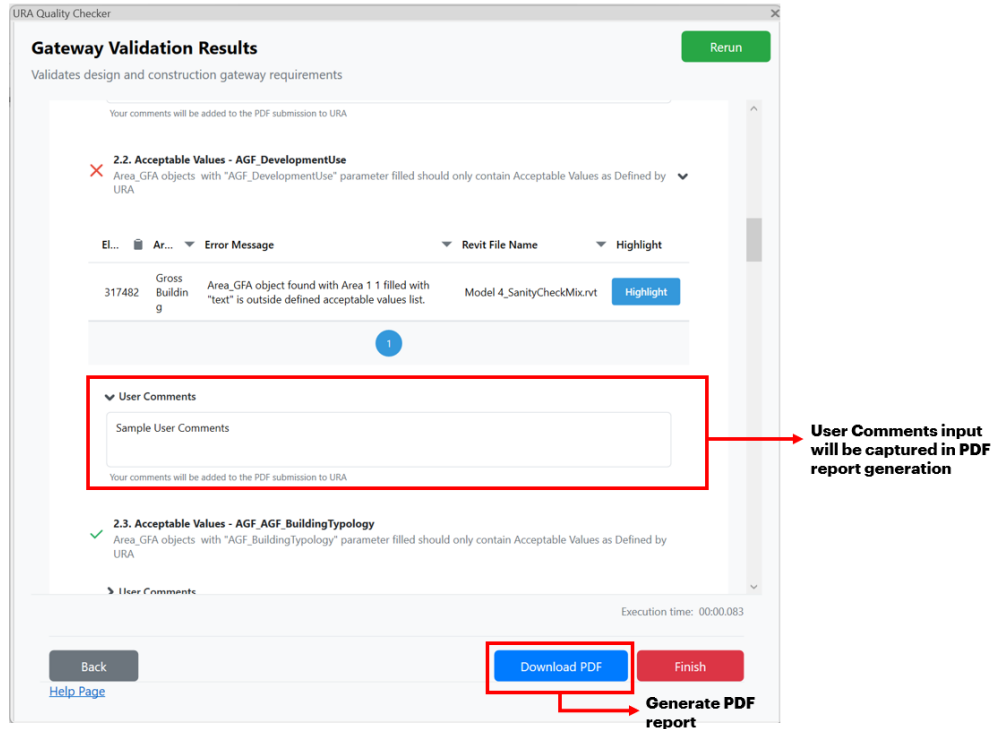


Figure 30 User Comments for PDF report

QC report for URA (CorenetX) Submission

Report Information

Revit User: User
Revit Version: 2025 (25.4.41.14)
Date & Time: 1/15/2026 3:04 PM
Check type: Construction Gateway
Main Model name: Model 4_SanityCheckMix
3D View name: NA

Files Checked

#	File Path
1	C:\Users\qiu\Documents\Sprint 3 Model\Model 4_SanityCheckMix.rvt

Construction Gateway Checks

1 Required information are populated in designated fields

CG_1.1 All URA Area Properties are defined

S/N	Result	Breakdown of Results
CG_1.1	Pass	

CG_1.2 At least 50% of all Area_GFA objects found has "AGF_Name" filled in

S/N	Result	Breakdown of Results
CG_1.2	Fail	1 errors refer to appendix CG_1.2

Error Message:

At least 50% of all Area_GFA objects found has "AGF_Name" filled in

User Justification:

Testing comments

The PDF report includes the validation results and user justification is generated.

Figure 31 PDF generated

6 Report Structure

The plugin allows users to extract two types of reports: Excel (for both checks) and PDF (for Full Check). Both formats are designed for regulatory submission and project documentation.

6.1 Excel Report

- The Excel report comprises a Validation Summary Sheet listing all validation results with pass/fail status, error details, and expandable lists of affected elements.
- A GFA Summary Sheet presenting total and bonus GFA, a breakdown by development use, and notes on the applied calculation standards.
- A GFA Breakdown Sheet providing detailed, element-level data that is sortable and filterable, with hyperlinks for easy reference.
- All sheets apply professional formatting and clear color coding and are suitable for direct upload to URA portals
- Designed for direct upload to URA portals without further modification, ensuring compliance with submission requirements.
- Serves as a practical reference for design teams, reviewers, and compliance checks.

QC Report Summary				
Official Report for URA				
Revit Username		User		
Revit Patch Version		2025, 25.4.41.14		
Date of Running Validation Checker		15 Jan 2026		
Time of Running Validation Checker		15:01:35		
Check Type		Construction Gateway		
File No	File Path of Revit File	File Size (mb)	No. of Area Objects	Checks Cleared
1	C:\Users\qian\Documents\Open3 Model\Hotel 4_SanityCheck\Hotel		6	10 out of 35
				No. of Area Objects in GFA
				3
S/N	Construction Gateway Checks		Summary of Pass/Fail for All Model 4_SanityCheckMix	
Required information are populated in designated fields				
CG 1.1	All URA Area Properties are defined	Pass	Pass	
CG 1.2	At least 10% of all Area_GFA objects found has "AGF_Name" filled in	Fail	Fail	
CG 1.3	At least 10% of all Area_GFA objects found has "AGF_DevelopmentUse" filled in	Fail	Fail	
CG 1.4	At least 20% of all Area_GFA objects found has "WOF_IncludedGFA" filled in	Pass	Pass	
CG 1.5	At least one Area_GFA object found has "ALS_LandscapeType" filled in	Fail	Fail	
Checks for linked information				
CG 2.1	Area_GFA objects must have one of the parameters with "AGF", "AGF2", "AGF3" or "AGF4" filled in	Fail	Fail	
CG 2.2	Area_GFA objects with "AGF_DevelopmentUse" parameter filled should only contain Acceptable Values as Defined by URA	Fail	Fail	
CG 2.3	Area_GFA objects with "AGF_BuildingFootprint" parameter filled should only contain Acceptable Values as Defined by URA	Pass	Pass	
CG 2.4	Area_GFA objects with "AGF_BonusGFAType" parameter filled should only contain Acceptable Values as Defined by URA	Fail	Fail	
CG 2.5	Area_GFA objects with "AGF_AreaType" parameter filled should only contain Acceptable Values as Defined by URA	Fail	Fail	
CG 2.6	AreaType Private must have IncludeAGFA = Yes	Pass	Pass	
CG 2.7	If there are any Area_GFA objects with "AGF_DevelopmentUse" = "Residential (non-torrid)" found in the model, Area_GFA objects with "AGF_Name" = "Dwelling Unit (North)" must be found in the model	Pass	Not Applicable	
CG 2.8	If there are any Area_GFA objects with "AGF_IncludedAGFA" = "Yes" found in the model, there are no Area_GFA objects with "AGF_DevelopmentUse" found empty	Fail	Fail	
CG 2.9	If there are any Area_GFA objects with "AGF_BonusGFAType" with values found in the model, these areas must have "WOF_IncludedGFA" = "Yes"	Pass	Pass	
CG 2.10	If there are any Area_GFA objects with "AGF_Name" = "Dwelling Unit (North)", "AGF_UnitNumber" cannot be blank	Pass	Pass	
Sanity Check				
CG 3.1	Site Boundary Containment	Fail	Not Applicable	
CG 3.2	Geo-Referencing of Linked Files	Pass	Not Applicable	
Data Elements Required for Review				
CG 4.1	Site Boundary Element	Fail	Not Applicable	
CG 4.2	Existing Terrain Element	Fail	Not Applicable	
CG 4.3	Area_GFA Objects present	Pass	Pass	
Other Model Quality Checks				
CG 5.1	Area Size	Pass	Pass	
CG 5.2	Level Consistency	Pass	Not Applicable	
RCC System Settings				
CG 6.1	IPC Configuration Check	Fail	Not Applicable	

Figure 32 QC report summary (Excel)

6.2 PDF Report

- The PDF report includes a Cover Page with project information, URA logo, and a validation status badge.
- Includes an Executive Summary highlighting key metrics, pass/fail statistics, major issues, and recommended next steps.
- Provided validation results providing detailed pass/fail breakdowns for each gateway and category with reviewer comments and GFA Tabulation containing summary and breakdown tables with element-level details
- Appendices covering configuration details, linked files, and report generation metadata. The PDF is formatted for official submission, with embedded fonts, clear color coding, and intuitive navigation.

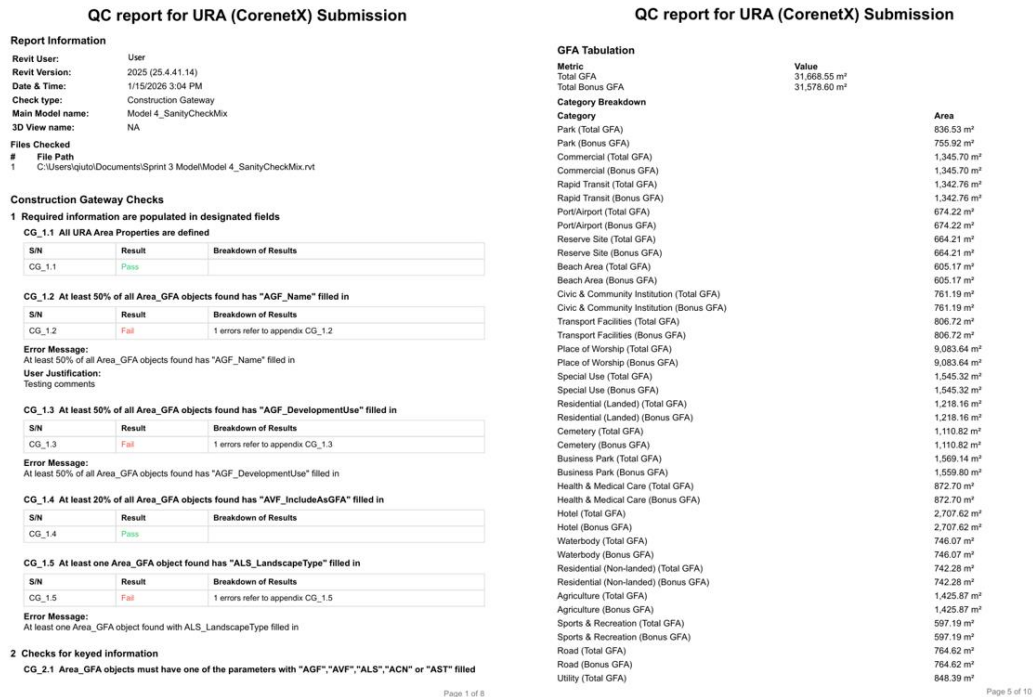


Figure 33 PDF Report

7 Validation Checks Catalogue

The URA QC Checker Plugin includes over 40 individual validation checks, organized by category and gateway type. Each validation is clearly defined with pass criteria and actionable recommendations.

7.1 Pre-Check Validations

This validation comprises two pre-checks. The first pre-check verifies that the mapping file is uploaded in the correct format and contains all required URA-defined parameters.

This includes validating that the file is provided in the required file format (.txt file), and that the contents follow the expected structure and delimiter requirements. Incorrect input like uploading files in other formats such as .xlsx or .csv, or mapping files where parameter values are separated using incorrect delimiters (e.g. semicolons) will result in failure to proceed with the validations. This ensures that the system has the necessary information to perform the validation accurately.

Error	Impact on IFC File exporting
Incorrect file format	Mapping files with incorrect file format are not accepted in IFC Export settings.
Missing parameters	Parameters will not be exported to IFC if they are missing in the IFC mapping file unless "Export Revit Property sets" is selected. "Export Revit Property sets" is not recommended in the CoP as it will export ALL Revit properties to IFC, even those not required for submission.
Invalid syntax (Warning Only)	Parameters might be incorrectly exported to IFC if incorrect syntax is used (eg. multiple tabs between parameters). As it is not fully understood how Autodesk is reading the mapping file, the QC tool will only generate a

	Warning to help users troubleshoot their IFC models after export.
Duplicated values	When values are duplicated in the mapping export file, Revit will only take 1 of the values to be exported to IFC. This might not be the correct parameter the User would like exported to IFC.

The second pre-check verifies that the current active view is a 3D view. This is required because the checker only evaluates one design option, which is the design option displayed in the active 3D view at the time the checker is run. If either pre-check fails, the validation process will be blocked, and users will not be able to proceed with subsequent checks until the issue is resolved.

7.2 All URA Properties are Defined (DG/CG 1.1)

All URA-defined key parameters must be present and populated with values in the correct data type and format. These parameters are associated with the Area family category, and this check is conducted only for files containing Area_GFA objects. Although not all parameters are applicable to every submission, users are required to ensure that all parameters are properly defined in their Revit template. Each parameter must be configured using the appropriate property type (e.g. text, number, boolean). This check verifies that the base template is correctly set up with all the required URA parameters. Please note that this requirement is applicable to both the main and linked files in the model that contains Area_GFA objects.

Possible failure scenarios:

- Missing Parameters
- Parameters with incorrect property types.

Below the complete list of parameters and their respective property types.

AGF_DevelopmentUse [Text]
AGF_UseQuantum [Text]
AGF_BuildingTypology [Text]
AGF_SupportingFacility [Text]
AGF_Name [Text]
AGF_Note [Text]
AGF_BonusGFAType [Text]
AGF_UnitNumber [Text]
AVF_IncludeAsGFA [Boolean]
AST_AreaType [Text]
AST_LegalArea [Number]
AST_Extg_StrataLotNumber [Text]
AST_Prop_StrataLotNumber [Text]
ALS_LandscapeType [Text]
ALS_GreeneryFeatures [Text]
ALS_Species [Text]
ACN_ConnectivityType [Text]
ACN_ActivityGeneratingUseType [Text]
ACN_IsPavingSpecified [Boolean]
ACN_PavingSpecification [Text]

ACN_IsOpen24HoursToPublic [Boolean]

ACN_OpenTime [Text]

ACN_CloseTime [Text]

7.3 Core Properties Populated (DG 1.2-1.3 & CG 1.2 -1.5)

Certain core properties must be populated in all submissions for review. The validation requirements for these properties differ between the Design Gateway and the Construction Gateway.

Design Gateway Check

Parameter	Criteria
AGF_Name	At least 1 Area with parameter "IfcObjectType" = "Area_GFA" found with AGF_Name filled in.
ALS_Landscape	At least 1 Area with parameter "IfcObjectType" = "Area_GFA" found with ALS_Landscape filled in.

Construction Gateway Check

Parameter	Criteria
AGF_Name	At least 50% of all Areas with parameter "IfcObjectType" = "Area_GFA" found has AGF_Name filled in.
AGF_DevelopmentUse	At least 50% of all Areas with parameter "IfcObjectType" = "Area_GFA" found has AGF_DevelopmentUse filled in
AVF_IncludeAsGFA	At least 20% of all Areas with parameter "IfcObjectType" = "Area_GFA" found has AVF_IncludeAsGFA filled in
ALS_Landscape	At least 1 Area with parameter "IfcObjectType" = "Area_GFA" found with ALS_Landscape filled in.

Possible failure scenarios:

- Insufficient number of required parameters populated

7.4 Validate Acceptable Vocabulary (DG 2.2-2.5 & CG 2.2-2.5)

Ensure that all values entered for each parameter strictly conform to the approved vocabulary defined in the list URA provides and the list of the acceptable values have been included below for reference. Any deviations or free-text entries will result in a failed check. Examples of parameters subject to this validation include AGF_DevelopmentUse, AGF_BuildingTypology, AGF_BonusGFAType, and AST_AreaType. The check is space and case insensitive in nature and will only return an error if the values keyed-in is entirely outside of the acceptable list of Acceptable value.

Parameter Name	Acceptable Values
AGF_DevelopmentUse	Residential (Landed) Residential (Non-landed) Cemetery Commercial Hotel Business Park Business 1 Business 2 Health & Medical Care Educational Institution Place of Worship

Parameter Name	Acceptable Values
	Civic & Community Institution Open Space Park Beach Area Sports & Recreation Road Transport Facilities Rapid Transit Utility Agriculture Port/Airport Special Use Waterbody Reserve Site
AGF_BuildingTypology	Flats Condominium Shophouse Terrace House Detached House Semi-Detached House Good Class Bungalow Strata-Landed Housing Light Industry Clean Industry General Industry Special Industry Serviced Apartments
AGF_BonusGFAType	Balcony Incentive Scheme Conserved Bungalows Scheme Indoor Recreation Spaces Scheme Built Environment Transformation Scheme Community and Sports Facilities Scheme Rooftop ORA on Landscaped Roofs ORA within Privately-Owned Public Spaces (POPS) CBD Incentive Scheme Strategic Development Incentive (SDI) Scheme Facade Articulation Scheme Utility GFA for DCS/CCS networks
AST_AreaType	Strata (Private) Strata (Communal) Communal Area

Possible failure scenarios:

- Populated parameters contain invalid values that are not defined in the URA vocabulary list

7.5 Sanity Checks on Keyed Information (DG/CG 2.1 & CG 2.6 -2.10)

The checks in this section verify that the model information is logically populated in accordance with the rules specified in the table below.

Gateway	S/N	Criteria
CG/DG	2.1	Area_GFA information filled

Gateway	S/N	Criteria
		Areas with parameter "IfcObjectType" = "Area_GFA" must have one of the parameters with prefixes "AGF", "AVF", "ALS", "ACN" or "AST" filled up
CG	2.6	Private Strata areas are included as GFA For Areas with parameter "IfcObjectType" = "Area_GFA", if "AST_AreaType" contains "Private", "AVF_IncludeAsGFA" = Yes
CG	2.7	Dwelling Units found in Residential (non-landed) development If there are any Areas with parameter "IfcObjectType" = "Area_GFA" with "AGF_DevelopmentUse" = "Residential (non-landed)" found in the model, Areas with "AGF_Name" = "Dwelling Unit (Nett)" must be found within the model
CG	2.8	Development use defined in all areas included as GFA If there are any Areas with parameter "IfcObjectType" = "Area_GFA" with "AVF_IncludeAsGFA" = Yes found in the model, these areas cannot have "AGF_DevelopmentUse" field empty
CG	2.9	Bonus GFA are included as GFA If there are any Areas with parameter "IfcObjectType" = "Area_GFA" with "AGF_BonusGFAType" with values found in the model, these areas must have "AVF_IncludeAsGFA" = Yes
CG	2.10	Unit numbers for dwelling units provided If there are any Areas with parameter "IfcObjectType" = "Area_GFA" with "AGF_Name" = "Dwelling Unit (Nett)", AGF_UnitNumber cannot be blank

Possible failure scenarios:

- Invalid or missing entries that do not conform to the defined rules above

7.6 Geo Referencing Checks (DG/CG 3.1 - 3.2)

This check verifies that the Revit file is correctly georeferenced by extracting the cadastral lot geometry generated from the Cadastral Lot Number or vertices entered and comparing it against the site boundary defined in the Revit model. The model must define the site boundary correctly and use the Singapore SVY21 coordinate system. All linked files must also use shared coordinates to ensure consistent geo-referencing. The Product will amalgamate all the Cadastral lots found within the Geojson file with all the site boundaries found within the model and ensure that all the site boundaries are within the mentioned Cadastral Lots. This check also ensures all the linked files are correctly geo-referenced by using shared coordinates.

Possible failure scenarios:

- Site boundary not fully contained within cadastral lot geometry
- Cadastral Lot Number or cadastral vertices are missing, incomplete, or invalid
- Entered cadastral lot information does not generate valid cadastral geometry
- Linked files are not using shared coordinates
- Missing or Invalid Site Boundary defined in the wrong format
- Site boundary geometry is incorrectly drawn (e.g. open loop, self-intersecting, wrong sketch plane)
- Model is not using the Singapore SVY21 coordinate system

7.7 Core Elements Required for Review (DG/CG 4.1- 4.3)

All objects under Gross Floor Area (GFA) must be identified by tagging them as Area_GFA under IfcObjectType. The model must contain the Area_GFA objects, correct levels and include the required basic architectural elements, such as site boundary and terrain elements with the appropriate object types and parameter values.

Element	Identified by
Site Boundary	Any Massing or Generic model with “Export to IFC As” = IfcGeographicElement and “ObjectType” = SITEBOUNDARY found within the model or its linked files. Object found cannot be made up of planes. It can only be a surface or an extrusion. If any other family categories were found meeting the 2 parameters criteria , an error message will be generated.
Existing Terrain	Any Toposolid, Floor, or Generic Model elements within the host model or linked files that have “Export to IFC As” set to IfcGeographicElement and ObjectType set to Terrain shall be identified as terrain elements. All identified terrain elements shall have their status set to “Existing.” If any other family categories were found meeting the 2 parameters criteria, an error message will be generated.
Areas	Any element modelled as Area family category with area greater than 1m ² found within the model or its linked files with parameter “IfcObjectType” = “Area_GFA”.

Possible failure scenarios:

- Site Boundary and Terrain elements are modelled under incorrect family categories
- Site Boundary and Terrain elements have incorrect values assigned to “Export to IFC As” and “ObjectType”
- Site Boundary geometry is invalid (e.g. not modelled as a solid extrusion)
- Terrain elements do not have their Status set to “Existing”
- Area elements are not correctly mapped with IfcObjectType = Area_GFA
- Site Boundary and Terrain elements are hidden in the active view
- No Area elements with an area greater than 1 m² are detected

7.8 Other Model Quality Checks (DG/CG 5.1- 5.2)

Validates mainly two file properties firstly that the maximum file size is under 800mb based on CorenetX submission requirements and secondly the consistency of level naming and elevations across all files.

File Size: As there is a file size limit to the uploading of files to the CorenetX submission portal, all the individual files that make up the submission must not be more than 800mb per file. The checker will list all the files that are more than 800mb if the criteria are not met.

Level Consistency: This check verifies that each unique level name across all linked files has the elevation levels using the project accuracy (decimal precision) defined within the

project settings. All elevations are evaluated based on Shared Coordinates instead of Project Base Point. To ensure that the levels are drawn in SHD, the check will also fail if the lowest level elevation across all files exceeds 100 m.

Possible failure scenarios:

- One or more submission files including linked files exceed the maximum file size limit of 800 MB
- Identical level names across host and linked files have inconsistent elevation values
- The lowest level elevation across all files exceeds 100 m

7.9 IFC Exporter Add-in Present (DG/CG 6.2)

This check ensures that the IFC exporter is installed and that the IFC export configuration meets URA submission requirements. Users must select the export session to be checked from the drop-down list in the checker window.

The export settings that need to be checked include:

Settings Checked	Impact on IFC File exporting
IFC Common property sets exported	Exports default IFC properties from Revit.
Base quantities exported	Exports Quantity related information from Revit. This area/volume information is useful in IFC review.
Mapping file used is the same as the one to run QC check	Since the QC check was conducted based on the mapping file provided, the IFC model exporting should use the mapping file used for the check.
Geographic Reference used is SVY21 and Coordinate Base is Shared Coordinates	If the settings are incorrect, coordinates for the IFC exported will not be correct.
Only export elements active in current views together with rooms, areas and spaces	Since the QC check was conducted in the current 3D view, the export settings should use also the active view. Areas should be exported to IfcSpaces for URA review.
Export to same IfcSite	As highlighted in BCA website, exporting to the same IfcSite will result in a model structure that is more easily reviewed.

Any deviations from the required configuration will be flagged by the checker under the IFC export settings.

Additional Inputs
Provide additional inputs for the validation process.

Cadastral Lot upload
Please input the file path to the geoJSON file containing the cadastral lot data where the development is located for site boundary checking. GeoJSON file can be generated from URA website ([link](#)). Alternatively, enter any 3 vertices of surveyed coordinates for geo-referencing verification.

File Upload

C:\Users\qiu\Documents\Sprint 4 Model\SiteBoundary Test\SITEBOUNDARY.geojson Validate

Green → Cadastral/vertices input, Blue → Existing site boundary in model.
✓ Cadastral polygon imported into current Revit Document.

[Optional] Manually key in vertices (SVY21)
Enter 3 known vertices of site boundary extracted from survey files (in Northing, Eastings metres) to check that model is correctly georeferenced

IFC Export Setup Selection
Select the IFC export setup used for exporting IFC files from your Revit project

Select IFC Export Configuration: In-Session

Gateway Check Selection
Select the gateway check to run

Select Check Type: ☒ Design Gat

Back Run Checks [Help Page](#)

Figure 34 Selection of IFC Export Configuration

Gateway Validation Results Rerun
Validates design and construction gateway requirements

6. IFC Export Settings

6.1. IFC Configuration Check
Checks if IFC Export Configurations are available and lists them.

Setting Rule...	Error Message
Property Sets	Export Base Quantities should be enabled
Property Sets	Export User Defined Property Sets
Geographic Reference	Projected Coordinate System should be SVY21
Additional Content	Linked files should be set to Export in same IFC Site
Additional Content	Export Only Elements Visible in View should be enabled

1 2 > >>

GFA Tabulation

Execution time: 00:00.280

Back Download Excel Next [Help Page](#)

Figure 35 Failed IFC Configuration Check

Possible failure scenarios:

- The latest IFC exporter is not installed
- IFC export settings are incorrect

8 GFA Tabulation

As Revit is only able to produce schedules for each area scheme and not across area schemes, Users would sometimes overlook information entered erroneously in separate area schemes.

The diagram below illustrates this problem statement where the User has overlooked erroneously entered value because there is no straightforward way to consolidate all Area components drawn in different area schemes into 1 single schedule for tabulation.

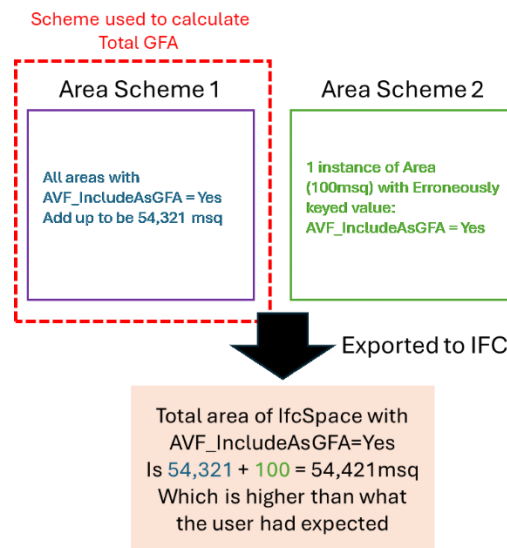


Figure 36

This check allows users to make sure that all the information is entered into the correct area scheme and matches the intended declared value.

8.1 Area Object Eligibility for GFA:

Only Area objects that meet the following criteria are included in the GFA calculation:

- a) The Area object must have:
 - IfcObjectType = "Area_GFA" and AVF_IncludeAsGFA = "Yes"
 - Area objects with the parameter AGF_DevelopmentUse populated are evaluated for GFA tabulation.
 - Only AGF_DevelopmentUse values that appear on the accepted list defined by project or authority requirements are included.
- b) Area objects that do not meet any of the conditions above are excluded from GFA calculations. This ensures that only explicitly approved and correctly classified areas contribute to reported GFA figures.

8.2 Bonus GFA Inclusion Rules:

Additionally, amongst the valid area objects identified in the previous section some will qualify as Bonus GFA and will be grouped under their respective bonus GFA schemes

- a) The Area object must have:
 - Area objects with the parameter AGF_BonusGFAType populated are evaluated for bonus eligibility.

- Only bonus types that appear on the accepted list defined by project or authority requirements are included.
 - Bonus GFA areas are reported separately from standard GFA while still contributing to the total GFA where applicable
- b) Area objects that do not meet any of the conditions above are excluded from GFA calculations. This ensures that only explicitly approved and correctly classified areas contribute to reported GFA figures.

8.3 Tabulated GFA

- **Area Units and Rounding Rules:** All GFA values are reported in square meters (m²), with both individual area values and aggregated totals rounded up to two (2) decimal places; rounding is applied after aggregation at the reporting level to ensure accuracy and consistency.
- **GFA Reporting by Development Use:** Under the Development Use category, GFA is grouped and reported according to the building's primary functional use (residential, commercial, industrial, institutional, etc.). Each Area object must be assigned a valid use classification to ensure correct grouping in GFA reports
- **GFA Reporting by Bonus GFA Type:** Within each of the identified development use categories the areas are also grouped into their respective Bonus GFA categories if it meets all the criteria listed in the previous section. Non-bonus GFA sub-totals will not be shown but is included in the total area for each of the development use categories.
- **GFA Breakdown:** the tool will also report the detailed breakdown of all the areas used to compute the total GFA. Users may use the ElementId found in the breakdown to locate the Area object for future detail. Alternatively, these details are also available in the excel generated by the tool.

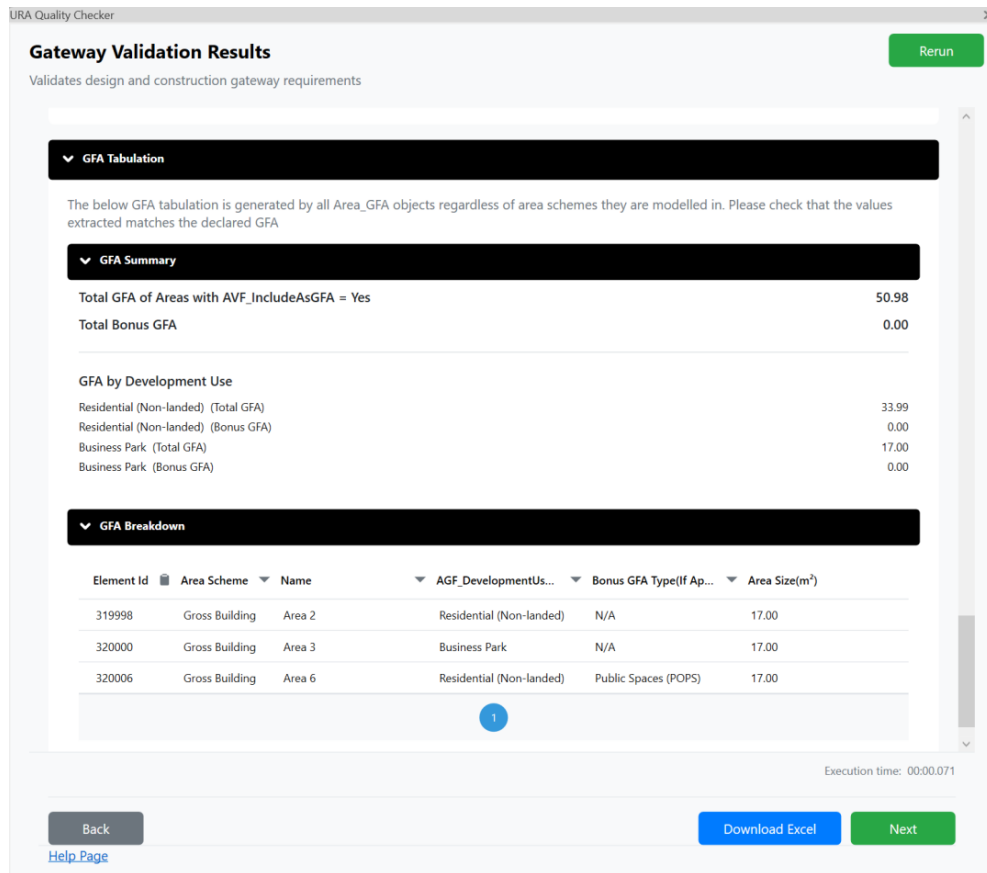


Figure 37 Tabulated GFA

9 Terms, Acronyms and Abbreviations

Term	Explanation
GFA	Gross Floor Area of a building
Area_GFA	Any valid area object in Revit with IFCObjectType parameter set to Area_GFA
BIMQT	Building information model quality testing
Validation Check	Check carried out according to URA's rule
Gateway Type	Design or Construction gateway similar to CorenetX submission process
QC	Quality checker
CX	CorenetX
URA	Urban Redevelopment Authority
BCA	Building and Construction Authority
CoP	Code of Practice