

**User Manual for
Road Traffic Noise Assessment Method
Hong Kong
(RONOSS-HK)**

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Environmental Protection Department
The Government of the Hong Kong
Special Administrative Region

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1 Introduction

1.1 Introduction to *RONOSS-HK* Program

1.1.1.1 The Road Traffic Noise Assessment Method - Hong Kong (*RONOSS-HK*) program is developed for the prediction of road traffic noise in Hong Kong. The *RONOSS-HK* program follows the calculation methodology of *RONOSS-HK* developed by the Environmental Protection Department (EPD), HKSAR, which could cater for specific situations in Hong Kong. Details of the calculation methodology of *RONOSS-HK* is given in EPD's website (https://www.epd.gov.hk/epd/sites/default/files/epd/english/environmentinhk/noise/guide_ref/files/ronoss.pdf).

1.1.1.2 The *RONOSS-HK* program runs on ArcGIS Pro 2.9.x platform. This User Manual is prepared to provide guidance on the installation and utilisation of the *RONOSS-HK* program.

1.2 Structure of User Manual

1.2.1.1 The structure of this User Manual is as follows:

Section 1	Introduction to <i>RONOSS-HK</i> program
Section 2	Presents the computer system requirements and installation procedures for the <i>RONOSS-HK</i> program
Section 3	Presents the steps of getting start of the <i>RONOSS-HK</i> program
Section 4	Presents the steps for importing and digitizing functions in the <i>RONOSS-HK</i> program
Section 5	Presents the steps for the <i>RONOSS-HK</i> model run
Section 6	Presents the steps for showing the <i>RONOSS-HK</i> model output and application of Innovative Noise Mitigation Designs (INMDs) to receivers

1.3 Abbreviations

1.3.1.1 The abbreviations used in the *RONOSS-HK* program are given in the table below:

Table 1.1 - List of Abbreviations

Abbreviation	Meaning
.gdb	Geodatabase
.shp	shapefile
BAR	Barrier
BLDG	Building
EPD	Environmental Protection Department
INMDs	Innovative Noise Mitigation Designs
REC	Receiver
Road	Road segment
RONOSS-HK	Road Traffic Noise Assessment Method - Hong Kong

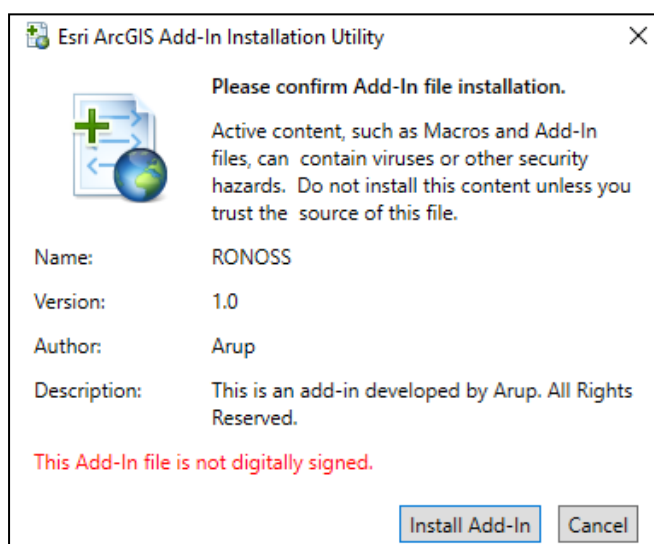
2 Computer System Requirements and Installation

2.1 Minimum Computer System Requirements

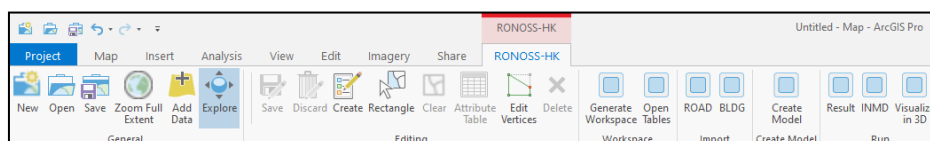
2.1.1.1 The *RONOSS-HK* program runs under ArcGIS Pro 2.9.x Standard License. The basic operation of the ArcGIS Pro 2.9.x can be found in the online help in ArcGIS Pro.

2.1.2 Installation Procedures

- Step 1: Install ArcGIS Pro 2.9.x Standard License.
- Step 2: Download *RONOSS-HK* Add-in from EPD's website.
- Step 3: Double click *RONOSS-HK* Add-in for installation.
Click "Install Add-In" when a window pops up.



- Step 4: Open ArcGIS Pro.
- Step 5: The *RONOSS-HK* program toolbar is ready to use.

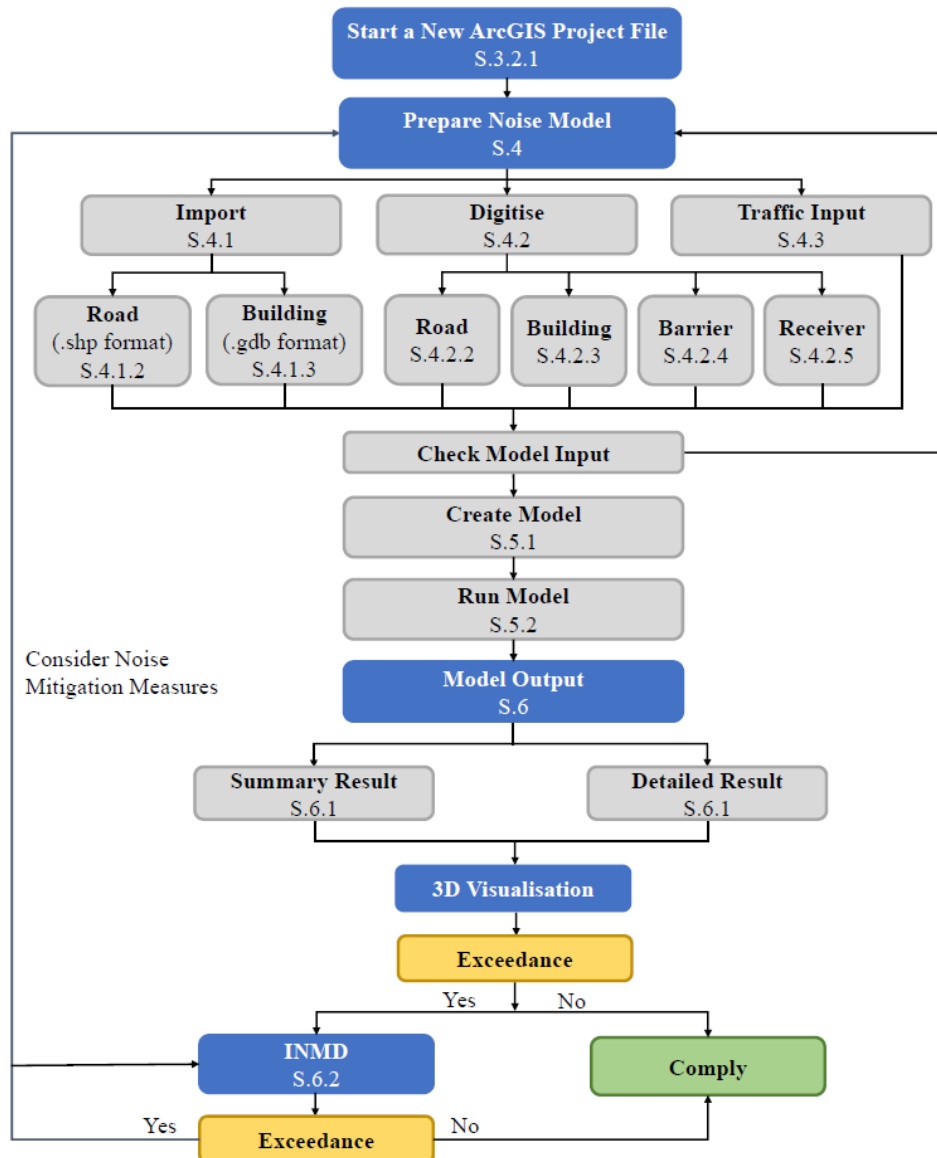


3 Getting Started

3.1 General Procedures

3.1.1.1 The general procedures of using the *RONOSS-HK* program are shown in **Chart 3.1** and described in subsequent sections. The requirement for data inventory is given in **Appendix 3.1**, and frequently asked questions (FAQ) in **Appendix 3.2**.

Chart 3.1 - Flow Chart of using *RONOSS-HK* Program

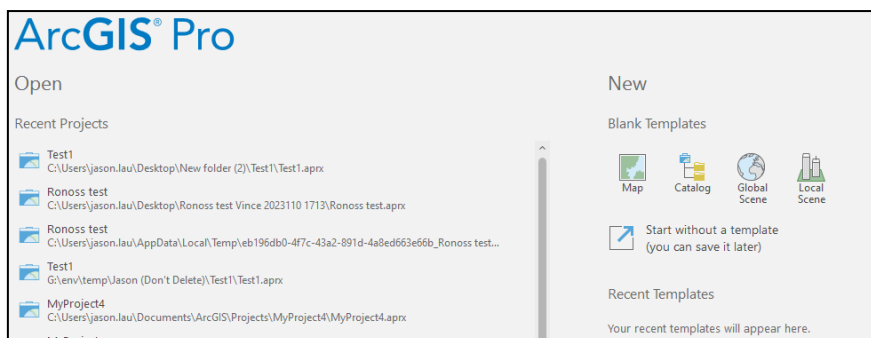


3.2 ArcGIS Project File

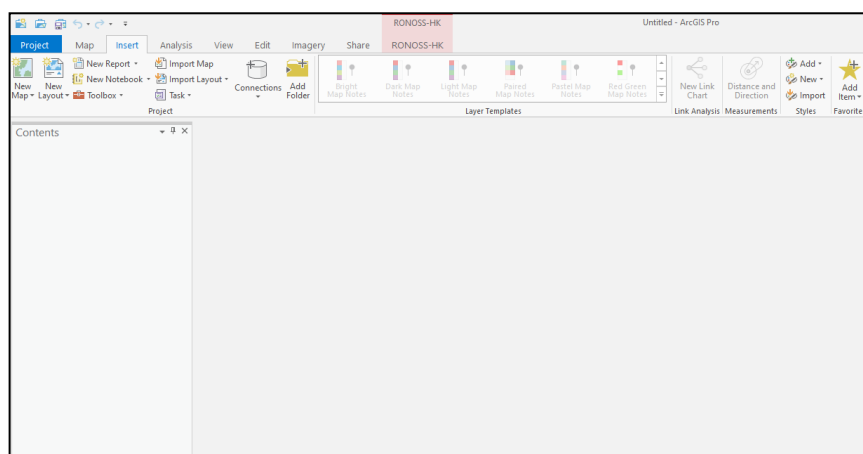
3.2.1 New ArcGIS Project File

3.2.1.1 To start a new ArcGIS project file, the following steps could be followed:

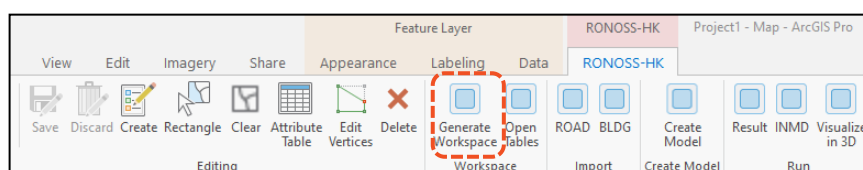
Step 1: Open ArcGIS Pro and click “Start without a template” under “New” to generate a blank workspace.



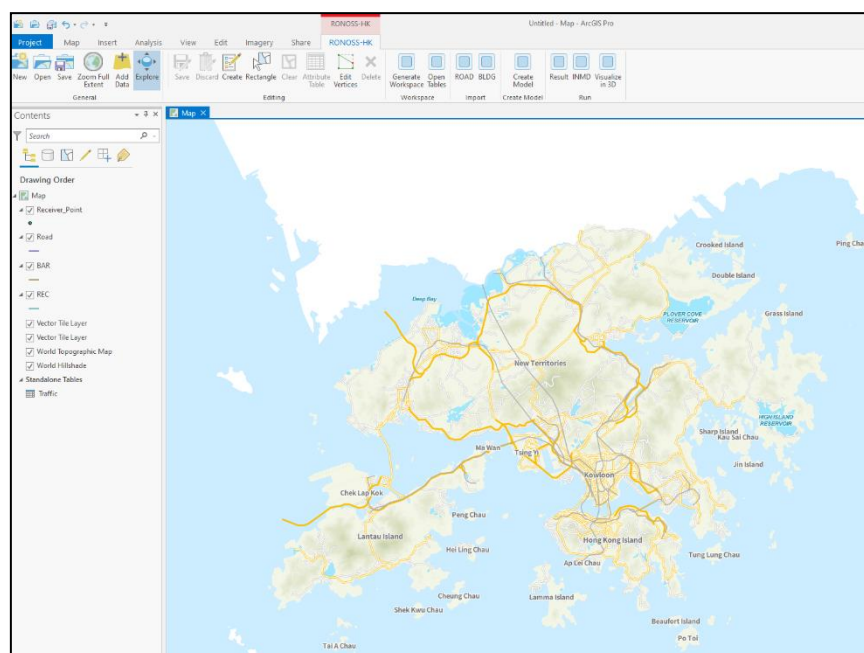
Step 2: A blank workspace will be generated as follows.



Step 3: Click “Generate Workspace” under “Workspace” toolbar to generate “Map” and geodatabase for subsequent modelling.



Step 4: A geodatabase containing the following layers will be added to “Map”:



Step 5: Click “Save” or “Save as” under “General” toolbar to save the new ArcGIS Project. Avoid using space in the folder path and project name.

Step 6: The ArcGIS Project folder would contain the following items:

Default.gdb	11/16/2023 5:44 PM	File folder	
ImportLog	11/16/2023 5:44 PM	File folder	
Index	11/16/2023 5:44 PM	File folder	
RONOSS.gdb	11/16/2023 5:45 PM	File folder	
Default.tbx	11/16/2023 5:44 PM	ArcGIS Toolbox	4 KB
Project1.aprx	11/16/2023 5:44 PM	ArcGIS Project File	44 KB

3.2.2 Open an Existing ArcGIS Project File

3.2.2.1 Basic operation of ArcGIS Pro could be used to open a previously established ArcGIS project file (e.g. “Ctrl + O” keys).

3.2.3 Save ArcGIS Project File

3.2.3.1 To save the newly created or updated content to the ArcGIS project file, it could be done by clicking “Save” under “Editing” toolbar.

4 Model Preparation

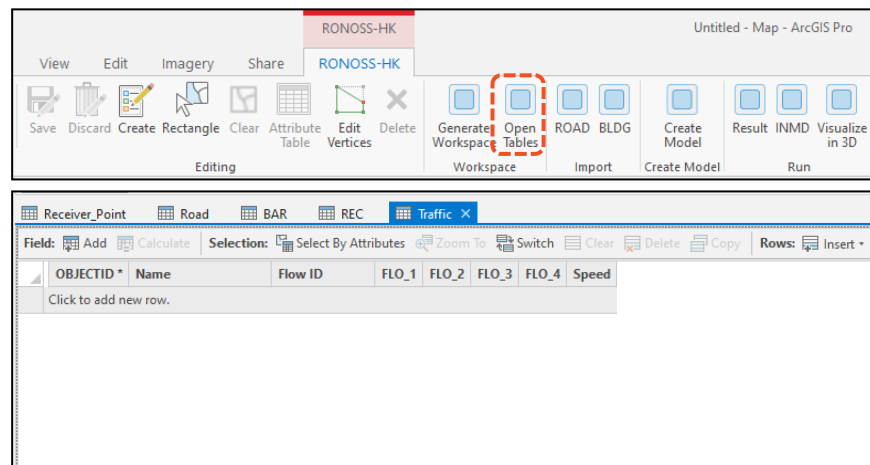
4.1 Importing

4.1.1.1 In the “Import” toolbar, two features, i.e. roads and buildings, could be imported to the ArcGIS geodatabase.

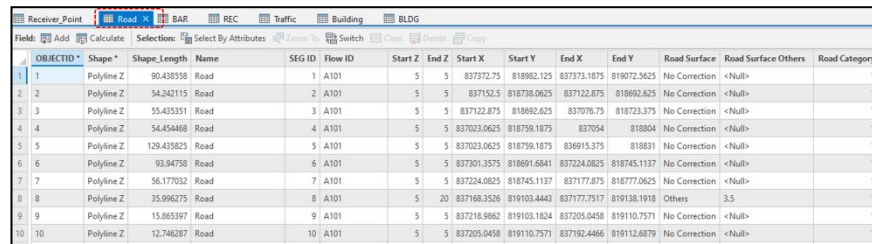
4.1.2 Road Segment

4.1.2.1 The road segment (in .shp format) could be imported according to the following steps:

- Step 1: Click “Road” under “Import” toolbar.
- Step 2: Click “Browse” to select the shapefile containing road segment.
- Step 3: Click “OK” and the road segment will be automatically added to the geodatabase and shown in “Road” attribute table.
- Step 4: Click “Open Tables” under “Workspace” toolbar to open all attribute tables.



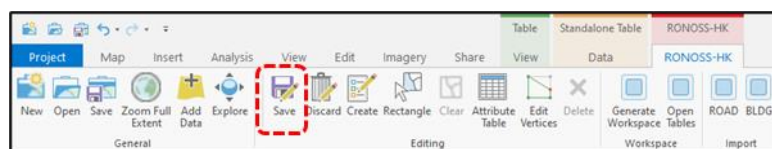
Step 5: Check the “Road” attribute table for all fields, and input or update if needed.



OBJECTID	Shape	Shape_Length	Name	SEG ID	Flow ID	Start Z	End Z	Start X	Start Y	End X	End Y	Road Surface	Road Surface Others	Road Category
1	Polyline Z	90.438558	Road	1	A101	5	5	837372.75	818862.125	837373.1875	819072.5625	No Correction	<Null>	1
2	Polyline Z	54.242115	Road	2	A101	5	5	837152.5	818738.0625	837122.875	818692.625	No Correction	<Null>	1
3	Polyline Z	55.435351	Road	3	A101	5	5	837122.875	818692.625	837076.75	818723.375	No Correction	<Null>	1
4	Polyline Z	54.454468	Road	4	A101	5	5	837023.0625	818759.1875	837054	818804	No Correction	<Null>	1
5	Polyline Z	129.435825	Road	5	A101	5	5	837023.0625	818759.1875	836915.375	818831	No Correction	<Null>	1
6	Polyline Z	93.94758	Road	6	A101	5	5	837301.3575	818691.6841	837224.0825	818745.1137	No Correction	<Null>	1
7	Polyline Z	56.177032	Road	7	A101	5	5	837224.0825	818745.1137	837177.875	818777.0625	No Correction	<Null>	1
8	Polyline Z	35.996275	Road	8	A101	5	20	827168.3526	819103.4443	837177.7517	819138.1918	Others	3.5	1
9	Polyline Z	15.863397	Road	9	A101	5	5	837218.5862	819103.1824	837205.0458	819110.7571	No Correction	<Null>	1
10	Polyline Z	12.746287	Road	10	A101	5	5	837205.0458	819110.7571	837192.4466	819112.6879	No Correction	<Null>	1

- Name** : Road name
- SEG ID** : No input required (auto-generation)
- Flow ID** : User defined
- Start X** : X coordinates of the start of the road segment (auto-generation)
- Start Y** : Y coordinates of the start of the road segment (auto-generation)
- Start Z** : Level in mPD of the start of the road segment
- End X** : X coordinates of the end of the road segment (auto-generation)
- End Y** : Y coordinates of the end of the road segment (auto-generation)
- End Z** : Level in mPD of the end of the road segment
- Road Surface** : “No correction” as default,
“PMFC” for Polymer Modified Friction Course,
“PMSMA6” for 6mm Polymer Modified Stone Mastic Asphalt, or
“Others” to be user defined.
- Road Surface Others** : User to input the correction if “Others” is selected under “Road Surface”, e.g. 3 if 3dB(A) deduction for specific road surface type
- Road Category** : Grouping of roads to be defined. “1” as default.

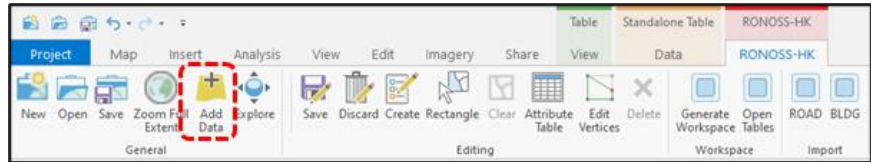
Step 6: Click “Save” under “Editing” toolbar to save data.



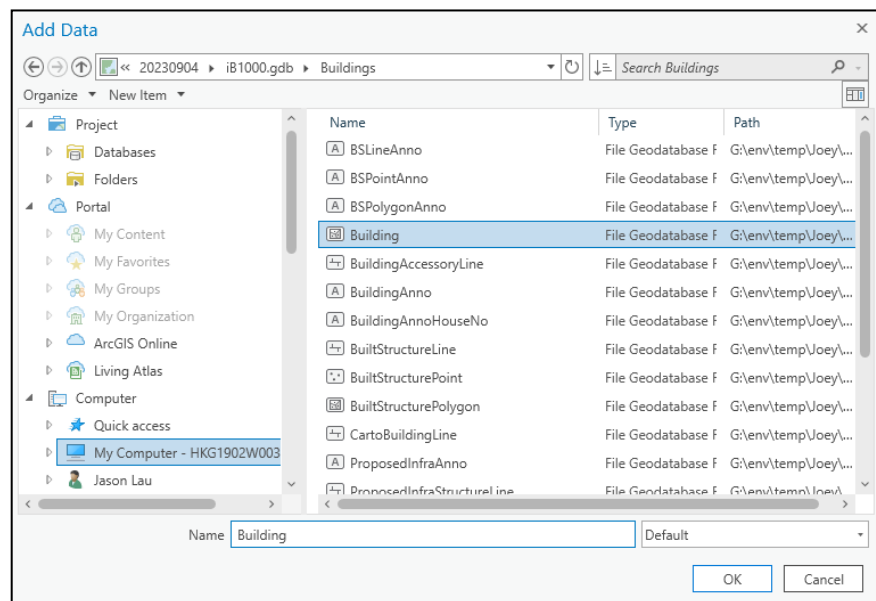
4.1.3 Building

4.1.3.1 The building polygon in .gdb format could be imported according to the following steps:

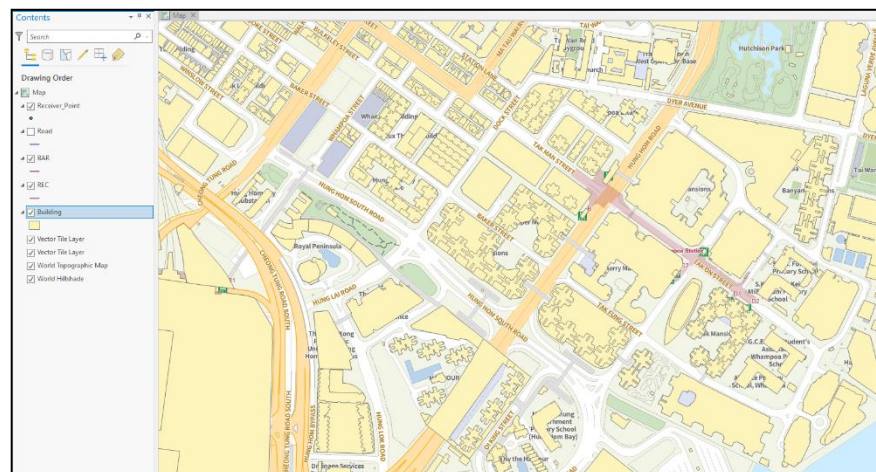
Step 1: Click “Add Data” under “General” toolbar.



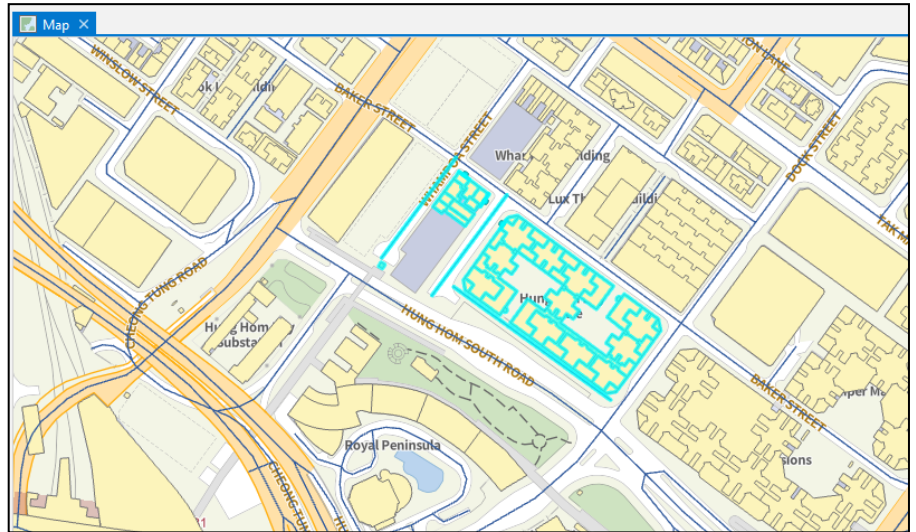
Step 2: Load iB1000 basemap in “Add Data” prompt by selecting “Building” layer under “Buildings” in iB1000.gdb.



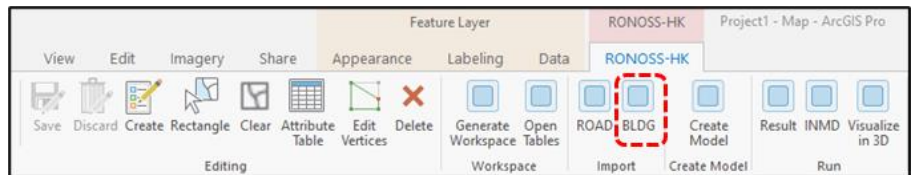
Step 3: Click “OK” and a Building layer will be loaded to “Map”.



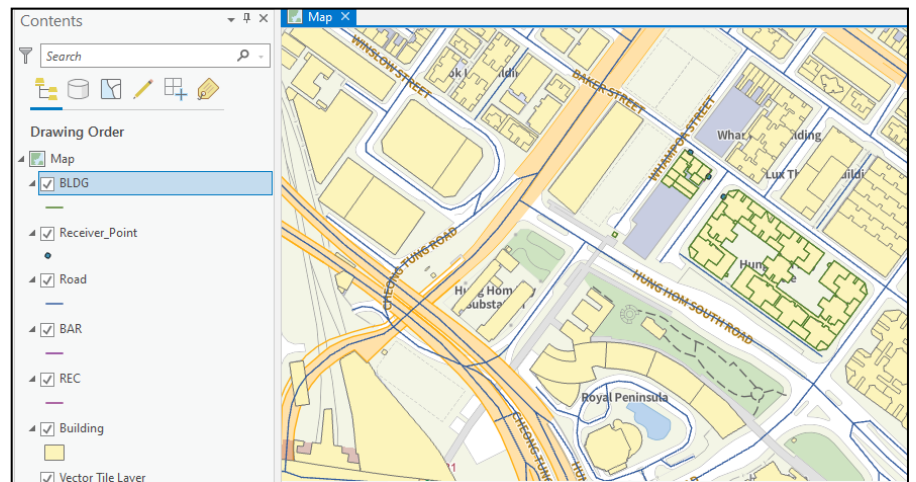
Step 4: Select the buildings to be included in the model in “Map from Step 3.



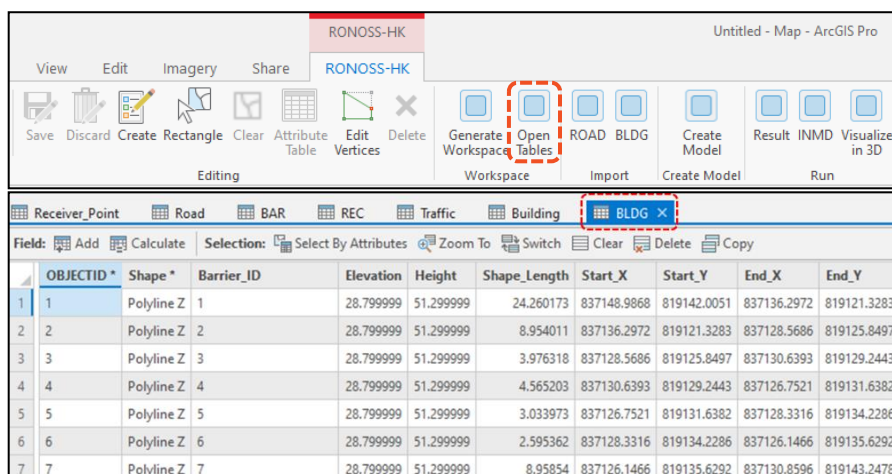
Step 5: Click “BLDG” under “Import” toolbar to import the selected buildings.



Step 6: The “BLDG” shapefile will be added into the geodatabase and “Map”.



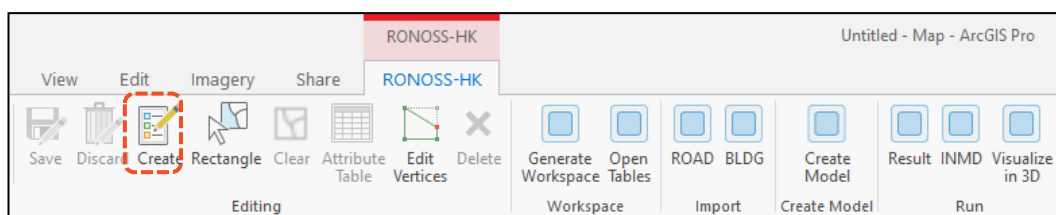
Step 7: Click “Open Tables” under “Workspace” toolbar to open the attribute table of “BLDG”.



- Barrier ID** : ID of building barrier (auto-generation)
- Elevation** : Level in mPD of the base of the building barrier (auto-generation)
- Height** : Absolute height of barrier in metres (auto-generation)
- Start X** : X coordinates of the start of the building barrier (auto-generation)
- Start Y** : Y coordinates of the start of the building barrier (auto-generation)
- End X** : X coordinates of the end of the building barrier (auto-generation)
- End Y** : Y coordinates of the end of the building barrier (auto-generation)

4.2 Digitising

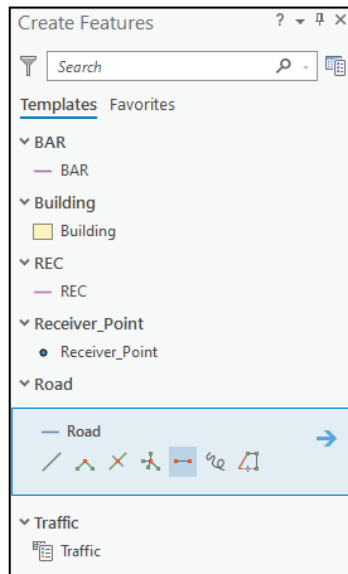
4.2.1.1 The “Create” button under “Editing” toolbar is used for digitising the road segment, building, barrier, and receiver.



4.2.2 Road Segment

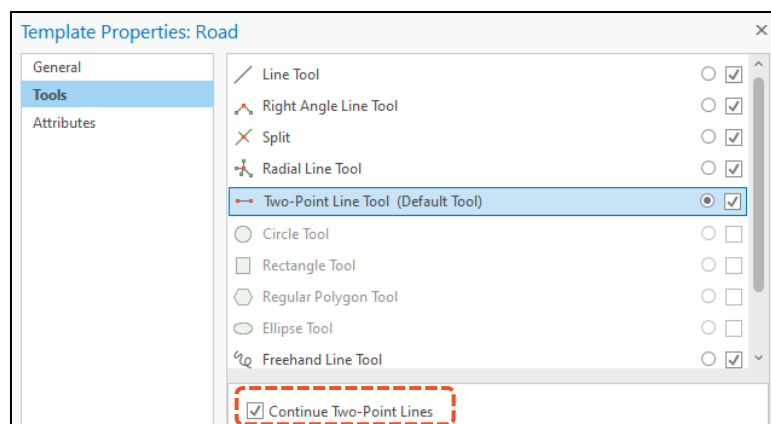
4.2.2.1 To digitise road segment:

Step 1: In “Create Features” tab, select “Road”.



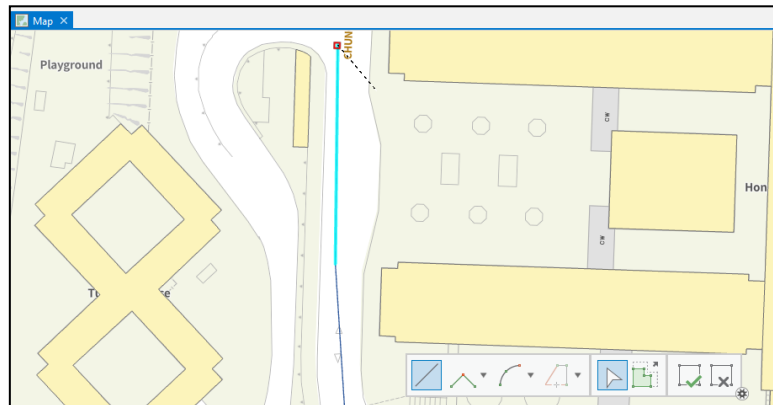
Step 2: Right click line next to “Road” and click “Properties”

Step 3: In “Tools” tab, select “Two-Point Line Tool” as default. Check box next to “Continue Two-Point Lines”.



Step 4: Click “OK” to exit Properties Window

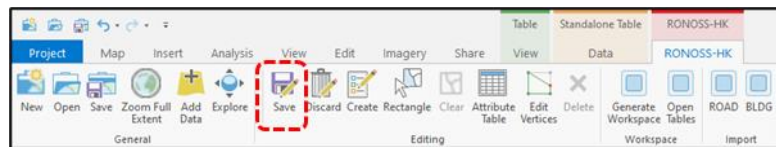
Step 5: Digitise the road segments by clicking on the start point in the “Map”, then the end point. The end point of a segment is the start point of the next segment.



Step 6: Press “Esc” key to complete digitising.

Step 7: In attribute table for “Road”, check for all fields, and input or update as described in Step 5 of **Section 4.1.2** if needed.

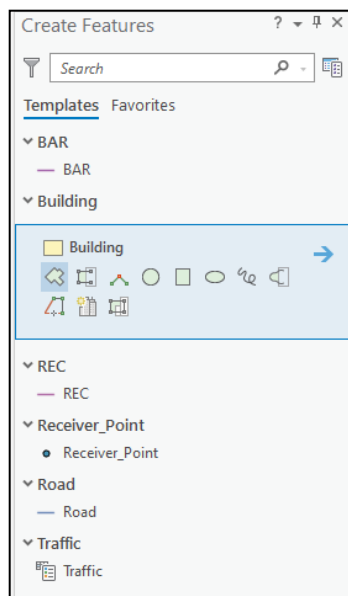
Step 8: Click “Save” under “Editing” toolbar to save data.



4.2.3 Building

4.2.3.1 To digitise building:

Step 1: In “Create Features” tab, select first icon (polygon) under “Building”



Step 2: Digitise building outline in “Map”.



Step 3: Click “Finish” Button (button with check mark) to complete digitising.



Step 4: In attribute table for “Building”, update the attributes listed below, and update of other attributes is optional.

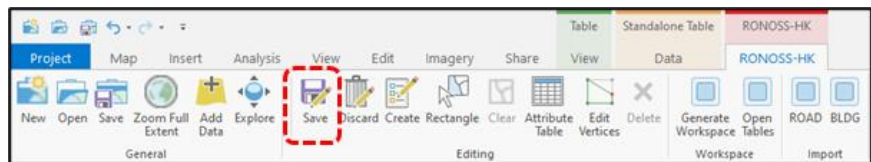
OBJECTID	Shape	LASTUPDATEDATE	Building ID *	Type of Building Block	Base Level	Roof Level	Base Level Data Source	Roof Level Data Source	Status
340426	Polygon Z	6/4/2023	1810142453	Open-sided Structure	<Null>	<Null>	<Null>	<Null>	Existing
340427	Polygon Z	6/4/2023	1810142325	Temporary Structure	<Null>	<Null>	<Null>	<Null>	Existing
340428	Polygon Z	6/4/2023	1810142454	Open-sided Structure	<Null>	<Null>	<Null>	<Null>	Existing
340429	Polygon Z	<Null>	0	Building Block	<Null>	<Null>	Photogrammetry	Photogrammetry	Existing
340430	Polygon Z	<Null>	0	Building Block	4	24	Photogrammetry	Photogrammetry	Existing
340431	Polygon Z	<Null>	0	Building Block	5	18	Photogrammetry	Photogrammetry	Existing

Building ID : User defined for newly digitized building

Base Level : Level in mPD of the building’s base

Roof Level : Level in mPD of the building’s roof

Step 5: Click “Save” under “Editing” toolbar to save data.

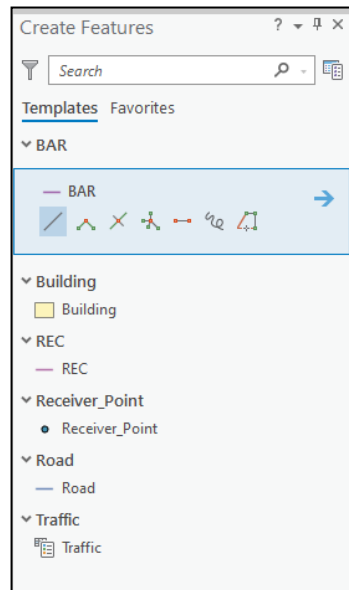


Step 6: Repeat Steps 4 to 7 in **Section 4.1.3** to create “BLDG” shapefile with newly digitised building.

4.2.4 Barrier

4.2.4.1 To digitise barrier:

Step 1: In “Create Features” tab, select first icon (line) under “BAR”.



Step 2: Digitise barrier in “Map” with each digitised barrier no more than 40m in length. To simulate a flyover decking with curvature, digitise the barrier on the outer edge of the turning.



Step 3: Click “Finish” Button (button with check mark) to complete barrier.

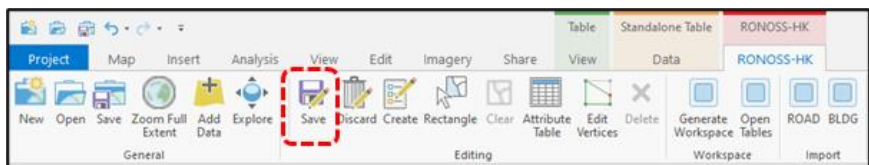


Step 4: In attribute table for “BAR”, update the following attributes:

- Name : Barrier name
- BAR ID : No input required (auto-generation)
- BAR TYPE : “Yes” for reflective,
“No” for absorptive
- H : Absolute height of barrier in metres (enter 0 for decks)
- Start X : X coordinates of the start of the barrier (auto-generation)
- Start Y : Y coordinates of the start of the barrier (auto-generation)
- Start Z : Level in mPD of the start of the base of the barrier
- End X : X coordinates of the end of the barrier (auto-generation)
- End Y : Y coordinates of the end of the barrier (auto-generation)
- End Z : Level in mPD of the end of the base of the barrier
- CantiLength (L) : Length of the left cantilevered arm in metres
(i.e. left = clockwise from start to end of the barrier)
- CantiAngle (L) : Angle of the left cantilevered arm in degrees
- CantiLength (R) : Length of the right cantilevered arm in metres
(i.e. left = anti-clockwise from start to end of the barrier)
- CantiAngle (R) : Angle of the right cantilevered arm in degrees
- Elevated : “Yes” for elevated barrier,
“No” for at-grade barrier

OBJECTID	Shape	Shape_Length	Name	BAR ID	BAR TYPE	H	Start X	Start Y	Start Z	End X	End Y	End Z	CantiLength (L)	CantiAngle (L)	CantiLength (R)	CantiAngle (R)	Elevated
3	Polyline.Z	20.165804	Platform	83	No	6	837181.0283	819043.8882	6	837191.5893	819061.0674	6	4	30	<Null>	<Null>	No
6	Polyline.Z	66.955814	Barrier	86	No	0	837169.6234	819102.1848	20	837136.3624	819044.0741	5	<Null>	<Null>	5	0	Yes
7	Polyline.Z	66.955814	Barrier	87	No	5	837169.6224	819102.1848	20	837136.3624	819044.0741	5	<Null>	<Null>	<Null>	<Null>	Yes

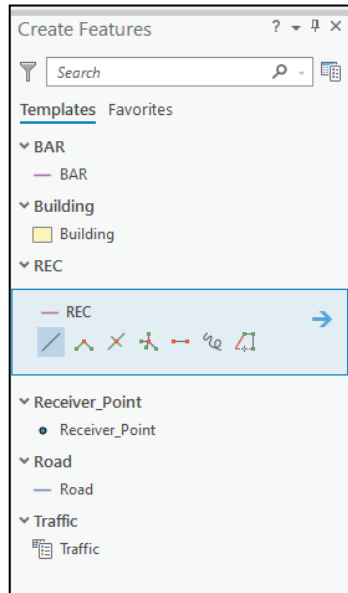
Step 5: Click “Save” under “Editing” toolbar to save data.



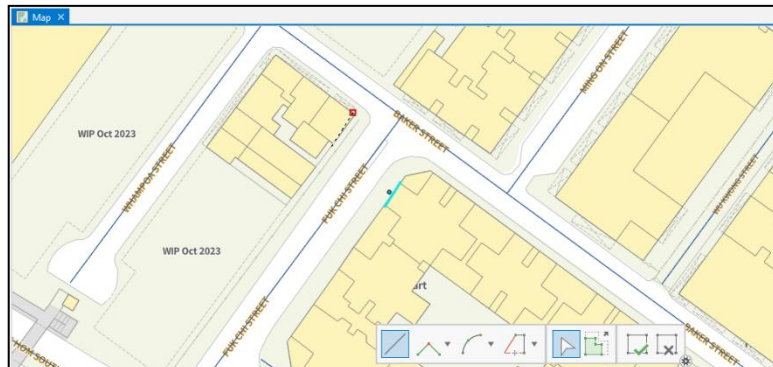
4.2.5 Receiver

4.2.5.1 To digitise receiver:

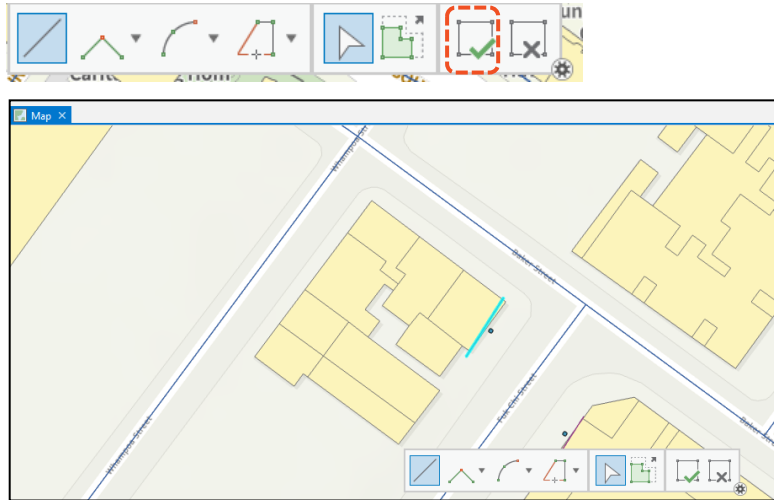
Step 1: In “Create Features” tab, select first icon (line) under “REC”.



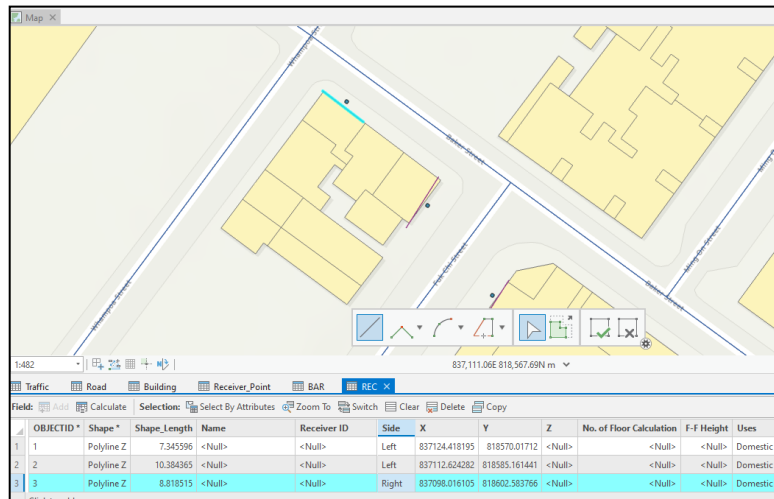
Step 2: Digitise receiver line along building window in “Map”.



Step 3: Click “Finish” Button (button with check mark) to complete. A point shape is generated at 1 metre from the digitised line.



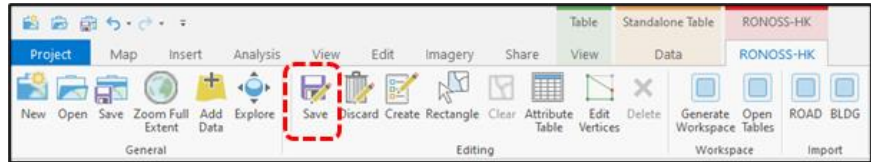
Step 4: Update the following attributes:



- Name** : User-defined receiver name
- REC ID** : Receiver ID
- Side** : Opening side of window, i.e. noise assessment point)
 - “Left” (i.e. clockwise from start to end of the digitized receiver line)
 - “Right” (i.e. anti-clockwise from start to end of the digitized receiver line)
- X** : X coordinates of the receiver (auto-generation)
- Y** : Y coordinates of the receiver (auto-generation)
- Z** : Level in mPD of the first noise assessment point
- No. of Floor Calculation** : Number of floors to be calculated, including first floor
- F-F Height** : Height between floor and floor in metres

Uses : Uses of the receiver,
"Domestic",
"Office",
"Education",
"Worship", or
"Diagnostic"

Step 5: Click "Save" under "Editing" toolbar to save data.



4.3 Traffic Flow Input

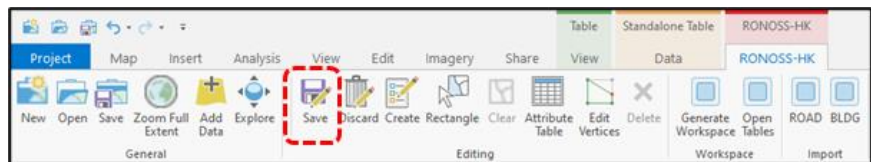
4.3.1.1 To input traffic flow:

Step 1: Enter the following information to the attribute table of "Traffic"

Name : User-defined name for traffic flow in text format
 Flow ID : Traffic flow ID
 FLO_1 : Traffic flow for Vehicle Category 1 (i.e. Light Vehicles) in veh/hr
 FLO_2 : Traffic flow for Vehicle Category 2 (i.e. Heavy Vehicles) in veh/hr
 FLO_3 : Traffic flow for Vehicle Category 3 (i.e. Powered Two-wheelers) in veh/hr
 FLO_4 : Traffic flow for Vehicle Category 4 (i.e. Open Category) in veh/hr (not used for this version)
 Speed : Traffic speed in km/hr

OBJECTID	Name	Flow ID	FLO_1	FLO_2	FLO_3	FLO_4	Speed
1	Traffic	A101	40	20	10	<Null>	41
2	Traffic	A102	200	120	60	<Null>	38

Step 2: Click "Save" under "Editing" toolbar to save data.



5 Model Run

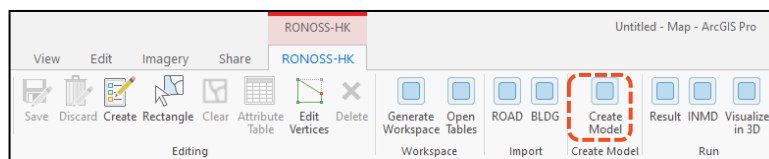
5.1 Finalising the Project File

5.1.1.1 After importing and digitising of features for the *RONOSS-HK*, the ArcGIS project file could be ready for program run with the following steps:

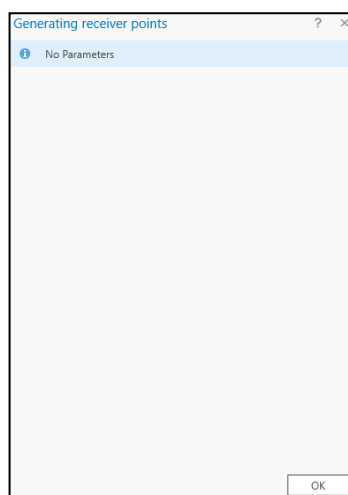
5.1.2 Generate Model

5.1.2.1 To generate the noise model:

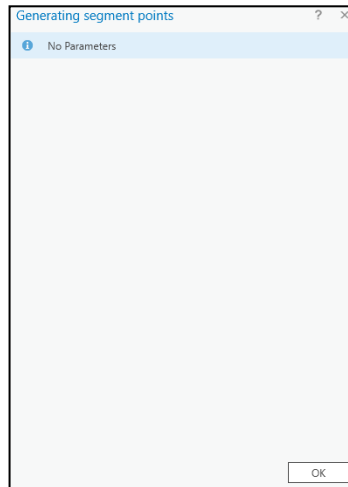
Step 1: Click “Create Model” under “Create Model” toolbar to finalise and generate model input.



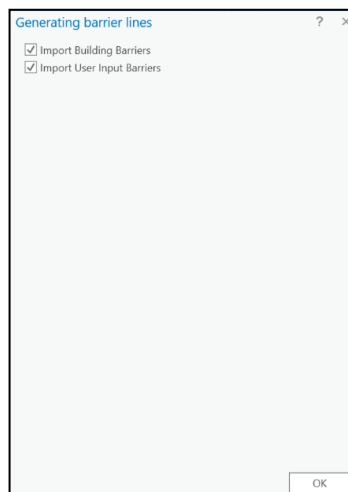
Step 2: Click “OK”. A new shapefile “Receiver_Points_All”, containing receiver points, will be added to the geodatabase and “Map”.



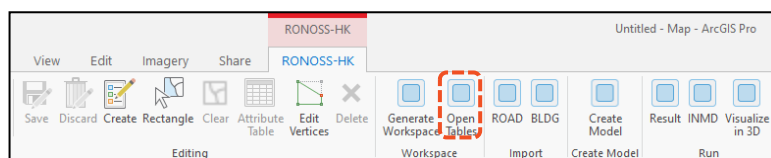
Step 3: Click “OK”. A new shapefile “Segment_LineInput_Points_3D”, containing segment points, will be added to the geodatabase and “Map”.



Step 4: Check boxes as appropriate and click “OK”. A new shapefile “Barrier_All”, containing building walls and digitised barriers, will be added to the geodatabase and “Map”



Step 5: Click “Open Tables” under “Workspace” toolbar to open the attribute tables for newly created shapefiles (“Receiver_Points_All”, “Segment_LineInput_Points_3D”, “Barrier_All”).

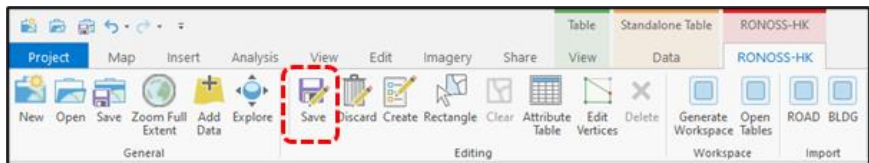


Step 6: Identify any missing values in “Barrier_All” layer, and update “H”, “Start Z” and “End Z” values etc as appropriate. Delete barriers with missing “Start X” or “Start Y”.

OBJECTID	Shape	Name	BAR ID	BAR TYPE	H	Start X	Start Y	Start Z	End X	End Y	End Z	CantLength (L)	CantAngle (L)
1	68	Polyline Z	<Null>	68	Yes	13.6	<Null>	<Null>	3.3	<Null>	<Null>	3.3	<Null>
2	71	Polyline Z	<Null>	71	Yes	13.6	<Null>	<Null>	3.3	<Null>	<Null>	3.3	<Null>
3	123	Polyline Z	<Null>	123	Yes	13.6	<Null>	<Null>	3.3	<Null>	<Null>	3.3	<Null>
4	151	Polyline Z	<Null>	151	Yes	13.6	<Null>	<Null>	3.3	<Null>	<Null>	3.3	<Null>
5	165	Polyline Z	<Null>	165	Yes	13.6	<Null>	<Null>	3.3	<Null>	<Null>	3.3	<Null>
6	230	Polyline Z	<Null>	230	Yes	51.599998	<Null>	<Null>	13.6	<Null>	<Null>	13.6	<Null>
7	261	Polyline Z	<Null>	261	Yes	51.599998	<Null>	<Null>	13.6	<Null>	<Null>	13.6	<Null>
8	266	Polyline Z	<Null>	266	Yes	51.599998	<Null>	<Null>	13.6	<Null>	<Null>	13.6	<Null>
9	352	Polyline Z	<Null>	352	Yes	51.599998	<Null>	<Null>	13.6	<Null>	<Null>	13.6	<Null>
10	398	Polyline Z	<Null>	398	Yes	51.700001	<Null>	<Null>	13.6	<Null>	<Null>	13.6	<Null>
11	414	Polyline Z	<Null>	62	Yes	2	836827.8879	817828.7859	20	836753.4969	817814.028	19	<Null>
12	413	Polyline Z	<Null>	81	Yes	2	836804.0242	817856.5237	22	836831.183	817829.6986	20	<Null>
13	412	Polyline Z	<Null>	412	Yes	15.3	837041.4747	818538.3554	4	837043.0132	818540.9985	4	<Null>
14	409	Polyline Z	<Null>	409	Yes	15.3	837043.0132	818540.9985	4	837045.6367	818539.4994	4	<Null>
15	411	Polyline Z	<Null>	411	Yes	15.3	837044.4275	818538.4365	4	837044.4747	818539.3454	4	<Null>

Step 7: Change attribute value “Barrier_All” to “No” for absorptive barriers (i.e. no reflection). Default setting to be “Yes” for reflective barriers.

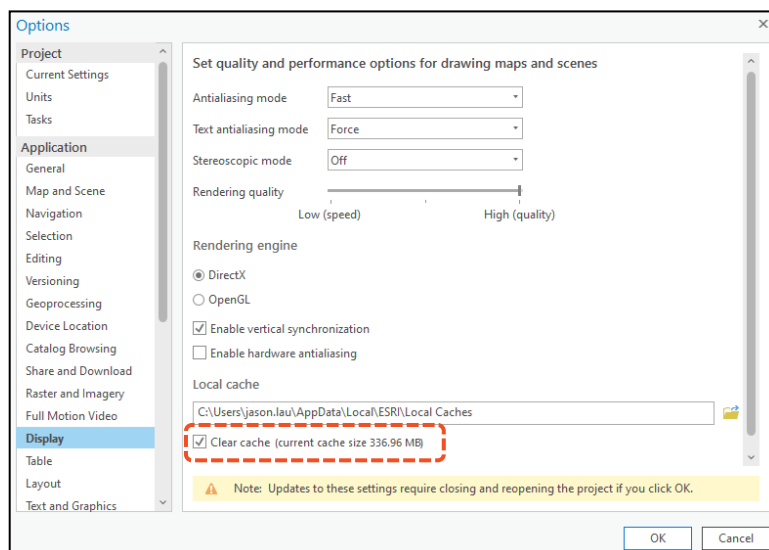
Step 8: Click “Save” under “Editing” toolbar to save data.



5.2 Running the Model

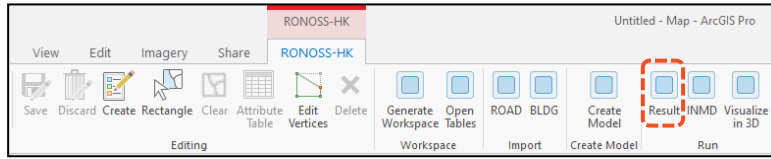
5.2.1.1 With the ArcGIS project file ready, the following steps could be followed for model run.

Step 1: Click “Project”, then “Options”. In “Display” tab, check box next to “Clear Cache” and click “OK”. Save the model.

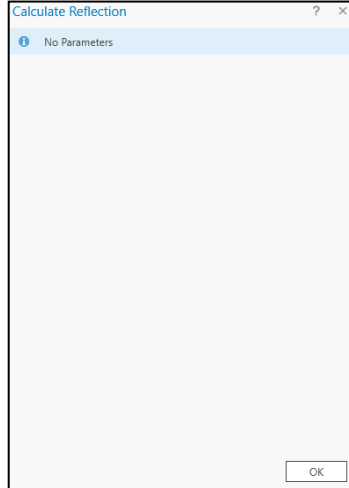




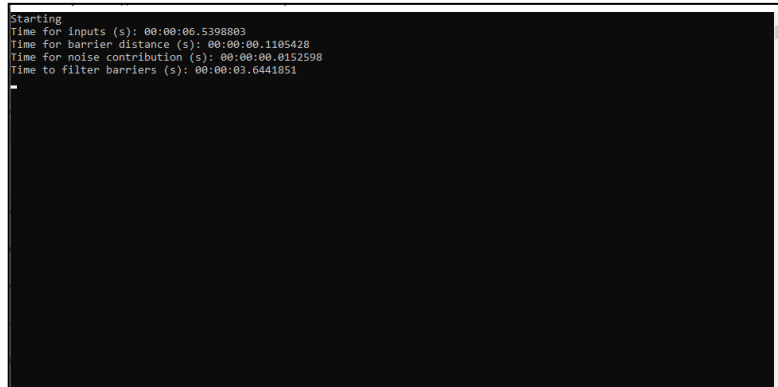
Step 2: Click "Result" under "Run" toolbar to start model run.



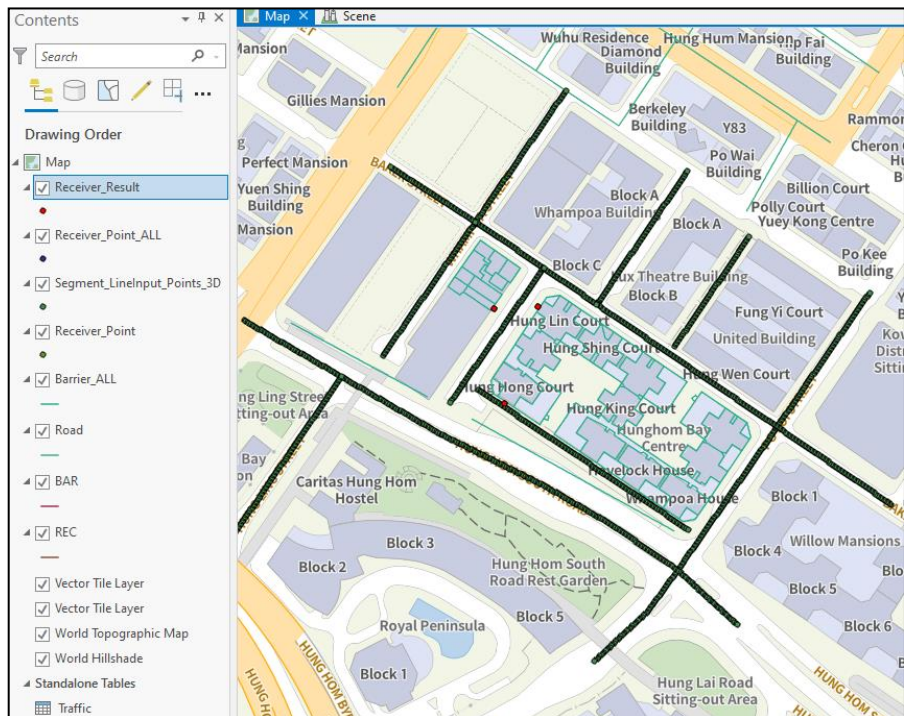
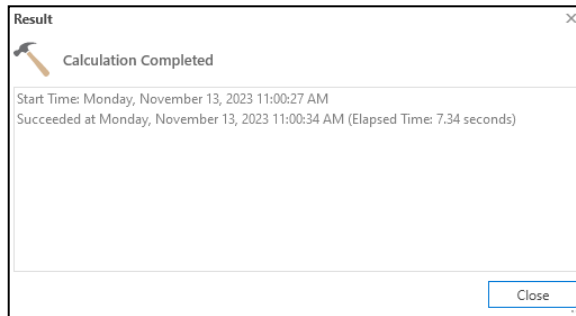
Step 3: Click "OK" to start noise calculation.



Step 4: A window pops up during calculation:



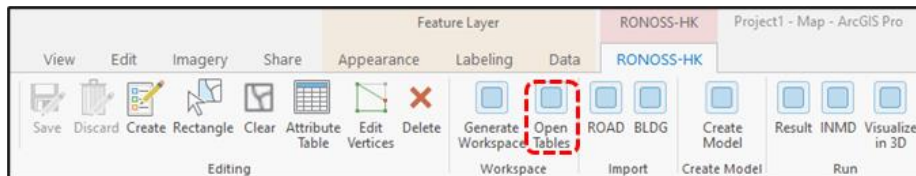
Step 5: The following window pops up after calculation is completed. A new shapefile “Receiver_Result” will be added to the geodatabase and “Map”.



6 Model Output

6.1 Result Output

6.1.1.1 The results table (“Receiver_Results” shapefile) could be opened by clicking “Open Tables” under “Workspace” toolbar.



6.1.1.2 The attributes from “Receiver_Point_All” are copied to “Receiver_Results”. The attributes “Noise Level”, “Criteria”, “Exceed”, “INMD Type” and “INMD Config” are added to “Receiver_Results” during model run.

Uses	GUID	GlobalID *	Floor Level	Noise Level	Criteria	Exceed	INMD Type	INMD Config
Domestic	{318281C0-2436-48C8-90E1-E1614819572A}	{38F1A1F3-E3A4-4C0A-8BF4-19B1F6DB8D34}	1	75	70	4.1	<Null>	<Null>
Office	{26560C8E-5A16-4C16-B174-468A39A47ADA}	{054C88C7-D33F-4ECF-985C-08512E3485DD}	1	69	70	0	<Null>	<Null>
Education	{50755717-0870-426A-AEF6-8C9D659BC157}	{969340FB-F1FA-4D7B-82B5-67799E4A511F}	1	66	65	0.3	<Null>	<Null>
Worship	{AF21AB9E-8DA1-40CD-A432-E6AF3A81C1D6}	{625AE296-14D8-450F-9EE1-12F4FF4C3331}	1	67	65	1.5	<Null>	<Null>
Diagnostic	{FCAE77CF-1825-403E-9688-12B6BFE6F48}	{7E01DD91-ED14-42A0-A8A9-F2AB7B6BA2C7}	1	69	55	13.9	<Null>	<Null>
Domestic	<Null>	{C90DD65-8500-4007-84FD-4FBF259C5528}	2	77	70	6.1	<Null>	<Null>
Domestic	<Null>	{3A672E62-5B47-4A6C-A157-248996BF12E1}	3	72	70	1.2	<Null>	<Null>
Domestic	<Null>	{FCE38D77-02B4-4826-9CA6-71C09AE526CF}	4	74	70	3.1	<Null>	<Null>
Office	<Null>	{1EA74CB1-D7BD-44B3-B111-7AF307FF2693}	2	69	70	0	<Null>	<Null>
Office	<Null>	{B4A2B1A1-7F81-40FA-B576-11BBCAB0D804}	3	66	70	0	<Null>	<Null>

- Name** : :User-defined receiver name
- REC ID** : Receiver ID
- Side** : Opening side of window, i.e. noise assessment point)
“Left” (i.e. clockwise from start to end of the digitized receiver line)
“Right” (i.e. anti-clockwise from start to end of the digitized receiver line)
- X** : X coordinates of the receiver (auto-generation)
- Y** : Y coordinates of the receiver (auto-generation)
- Z** : Level in mPD of the first noise assessment point
- No. of Floor Calculation** : Number of floors to be calculated, including first floor
- F-F Height** : Height between floor and floor in metres
- Uses** : Uses of the receiver,
“Domestic”,
“Office”,
“Education”,
“Worship”, or
“Diagnostic”
- Noise Level** : Noise Level in dB(A) rounded to the nearest dB(A)
- Criteria** : Noise criteria for receiver’s use
- Exceed** : Exceedance of noise criteria in dB(A) in one decimal place shown (0 if no exceedance)

INMD Type : Type of INMD shown in S6.2)
INMD Config : Configuration of INMD (shown in Section 6.2)

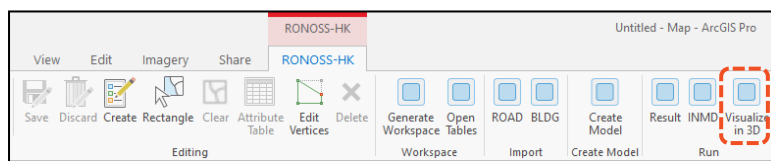
6.1.1.3 Noise level showing noise level rounding to nearest 0.1 dB(A) can be found in “ResultSummary.csv” saved in “Result” folder.

REC ID	X	Y	Z	FI Level	Uses	Criterion	Overall-df	Exceedant	INMD Type	INMD Cor	Mitigated	Mit Exceed	Overall Rc	Mitigated	Rounded-dB(A)
C101-000	837185	819053	0	1	Domestic	70	74.5	4.1	None	None	74.5	4.1	75	75	
C101-000	837185	819053	4	2	Domestic	70	76.5	6.1	None	None	76.5	6.1	77	77	
C101-000	837185	819053	8	3	Domestic	70	71.6	1.2	None	None	71.6	1.2	72	72	
C101-000	837185	819053	12	4	Domestic	70	73.5	3.1	None	None	73.5	3.1	74	74	
C102-000	837162	819074	5	1	Office	70	69	0	None	None	69	0	69	69	
C102-000	837162	819074	13	2	Office	70	69.1	0	None	None	69.1	0	69	69	
C102-000	837162	819074	21	3	Office	70	65.6	0	None	None	65.6	0	66	66	
C103-000	837256	819012	5	1	Education	65	65.7	0.3	None	None	65.7	0.3	66	66	
C103-000	837256	819012	8	2	Education	65	64.3	0	None	None	64.3	0	64	64	
C103-000	837256	819012	11	3	Education	65	64	0	None	None	64	0	64	64	
C104-000	837084	819046	5	1	Worship	65	66.9	1.5	None	None	66.9	1.5	67	67	
C104-000	837084	819046	8	2	Worship	65	66.9	1.5	None	None	66.9	1.5	67	67	
C104-000	837084	819046	11	3	Worship	65	66.8	1.4	None	None	66.8	1.4	67	67	
C105-000	837235	818961	5	1	Diagnostic	55	69.3	13.9	None	None	69.3	13.9	69	69	
C105-000	837235	818961	8	2	Diagnostic	55	68.4	13	None	None	68.4	13	68	68	
C105-000	837235	818961	11	3	Diagnostic	55	67.7	12.3	None	None	67.7	12.3	68	68	

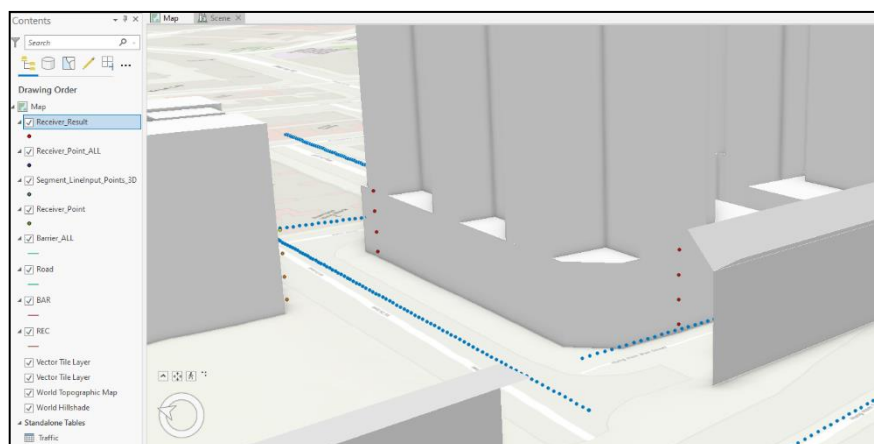
6.1.2 3D Visualization

6.1.2.1 The following steps can be followed to create the 3D view of the noise model:

Step 1: Click “Visualize in 3D” under “Run” toolbar to generate 3D view.



Step 2: A new tab “Scene” will be generated showing 3D view of segment points, barriers and receiver noise level.



6.2 Apply INMD to Receivers

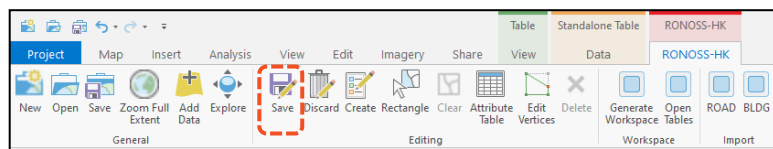
6.2.1.1 To apply INMD to receivers, the following steps can be followed:

- Step 1: Identify receivers with exceedance shown in the “Exceed” attribute in the “Receiver_Result” table.
- Step 2: Select appropriate INMD type in attribute “INMD Type” and INMD configuration in attribute “INMD Configuration”.

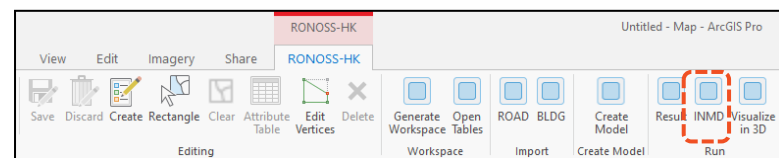
F-F Height	Uses	GUID	GlobalID *	Floor Level	Noise Level	Criteria	Exceed	INMD Type	INMD Config
4	Domestic	{318281C0-2436-48C8-90E1-E1614819572A}	{38F1A1F3-E3A4-4C0A-BBF4-19B1F60BBD34}	1	75	70	4.1	<Null>	<Null>
8	Office	{26560C8E-5A16-4C16-B174-468A39A47ADA}	{054C88C7-D33F-4ECF-985C-08512E3485DD}	1	69	70	0	<Null>	<Null>
3	Education	{50755717-0870-426A-AEF6-8C9D659BC157}	{969340FB-F1FA-4D7B-82B5-67799E4A511F}	1	66	65	0.3	<Null>	Parallel (0°) 30°-60°
3	Worship	{AF21AB9E-8DA1-40CD-A432-E6AF3A81C1D6}	{625AE296-14D8-450F-9EE1-12F4FF4C3331}	1	67	65	1.5	<Null>	30° 60°
3	Diagnostic	{FCAE77CF-1825-403E-9688-12B6BEFF6F48}	{7E01DD91-ED14-42AD-ABA9-F2AB7B68A2C7}	1	69	55	13.9	<Null>	<Null>
4	Domestic	<Null>	{C90DD065-8500-4007-84FD-4FBF259C5528}	2	77	70	6.1	<Null>	<Null>
4	Domestic	<Null>	{3A672E62-5B47-4A6C-A157-248996BF12E1}	3	72	70	1.2	<Null>	<Null>
4	Domestic	<Null>	{FCE38D77-02B4-4826-9CA6-71C09AE526CF}	4	74	70	3.1	<Null>	<Null>
8	Office	<Null>	{1EA74CB1-D7BD-44B3-B111-7AF307FF2693}	2	69	70	0	<Null>	<Null>
8	Office	<Null>	{84A3B1A1-7F81-40FA-B576-11BBCAB0D804}	3	66	70	0	<Null>	<Null>
3	Education	<Null>	{B17B895C-2C9A-48E9-8FA3-7D2024FA893}	2	64	65	0	<Null>	<Null>
3	Education	<Null>	{AA578058-E1EB-4410-9442-36D095FAF1DB}	3	64	65	0	<Null>	<Null>
3	Worship	<Null>	{E89AFD87-2446-4D5E-A3F3-8F0A0E9FF8D}	2	67	65	1.5	<Null>	<Null>

F-F Height	Uses	GUID	GlobalID *	Floor Level	Noise Level	Criteria	Exceed	INMD Type	INMD Config
4	Domestic	{318281C0-2436-48C8-90E1-E1614819572A}	{38F1A1F3-E3A4-4C0A-BBF4-19B1F60BBD34}	1	75	70	4.1	<Null>	<Null>
8	Office	{26560C8E-5A16-4C16-B174-468A39A47ADA}	{054C88C7-D33F-4ECF-985C-08512E3485DD}	1	69	70	0	<Null>	<Null>
3	Education	{50755717-0870-426A-AEF6-8C9D659BC157}	{969340FB-F1FA-4D7B-82B5-67799E4A511F}	1	66	65	0.3	<Null>	Parallel (0°) 30°-60°
3	Worship	{AF21AB9E-8DA1-40CD-A432-E6AF3A81C1D6}	{625AE296-14D8-450F-9EE1-12F4FF4C3331}	1	67	65	1.5	<Null>	30° 60°
3	Diagnostic	{FCAE77CF-1825-403E-9688-12B6BEFF6F48}	{7E01DD91-ED14-42AD-ABA9-F2AB7B68A2C7}	1	69	55	13.9	<Null>	<Null>
4	Domestic	<Null>	{C90DD065-8500-4007-84FD-4FBF259C5528}	2	77	70	6.1	<Null>	<Null>
4	Domestic	<Null>	{3A672E62-5B47-4A6C-A157-248996BF12E1}	3	72	70	1.2	<Null>	<Null>
4	Domestic	<Null>	{FCE38D77-02B4-4826-9CA6-71C09AE526CF}	4	74	70	3.1	<Null>	<Null>
8	Office	<Null>	{1EA74CB1-D7BD-44B3-B111-7AF307FF2693}	2	69	70	0	<Null>	<Null>
8	Office	<Null>	{84A3B1A1-7F81-40FA-B576-11BBCAB0D804}	3	66	70	0	<Null>	<Null>

Step 3: Click “Save” under “Editing” toolbar to save data.



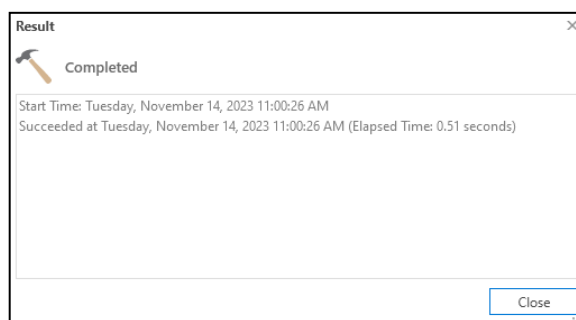
Step 4:



Click

“INMD” under “Run” toolbar to calculate the mitigated cases.

Step 5: The following window pops up after calculation is complete.



Step 6: Attribute table for “Receiver_Result” will be reloaded and the mitigated results with INMD are added.

Floor Level	Noise Level	Criteria	Exceed	INMD Type	INMD Config	Mit Noise Level	Mit Exceedance
1	70	65	4.1	Acoustic Windows (Absorptive Baffle Type)	Parallel (0°)	62	0
1	69	55	13.5	Acoustic Windows (Absorptive Baffle Type)	30°-60°	60	5
2	69	70	0	Acoustic Windows (Baffle Type) + Fin	30°	61	0
3	68	70	0	Acoustic Windows (Baffle Type) + Fin	60°	58	0
4	67	70	0	Acoustic Windows (Absorptive Baffle Type) + Fin	30°	58	0
2	75	70	5	Acoustic Windows (Absorptive Baffle Type) + Fin	60°	65	0
3	75	70	4.3	Enhanced Acoustic Balcony (Side-hung Type)	Parallel (0°)	73	2.3
2	69	65	3.8	Enhanced Acoustic Balcony (Side-hung Type)	30°-60°	66	0.8
3	69	65	3.7	Enhanced Acoustic Balcony (Absorptive Side-hung Type)	Parallel (0°)	66	0.2
2	68	65	2.1	Enhanced Acoustic Balcony (Absorptive Side-hung Type)	30°-60°	63	0
3	67	65	1.4	Enhanced Acoustic Balcony (Baffle Type)	Parallel (0°)	59	0
2	68	55	13	Enhanced Acoustic Balcony (Baffle Type)	30°-60°	57	2

Mit Noise Level : Mitigated Noise Level rounded to nearest dB(A)

Mit Exceedance : Exceedance after mitigation in dB(A) in one decimal place shown (0 if no exceedance)

Step 7: Repeat Steps 1 to 6 if considered necessary.

--- End ---

Appendix 3.1 Data Inventory Requirement

Data Inventory Requirement

Data Category	Input Method	Supported File Format (Import)	Source of Data Reference (Import)	Required Input to Attribute Table ^[1]	
(i) Road (Existing/ Planned)	Import	.shp	e.g. Common Spatial Data Infrastructure (CSDI) (https://www.csd.gov.hk/) (existing road)	Name	User-defined name
				SEG ID	Segment ID
				Flow ID	Traffic flow ID
				Start X	X coordinate of the start of the road segment
				Start Y	Y coordinate of the start of the road segment
				Start Z	Level in mPD of the start of the road segment
				End X	X coordinate of the end of the road segment
				End Y	Y coordinate of the end of the road segment
				End Z	Level in mPD of the end of the road segment
				Road Surface	"No correction", "PMFC" for Polymer Modified Friction Course, "PMSMA6" for 6mm Polymer Modified Stone Mastic Asphalt, or "Others"
Road Surface Others	Correction to be input if "Others" is selected under "Road Surface"				
Manual Digitization	-	-	Road Category	Grouping of roads defined	
(ii) Traffic Flow	Manual Input	-	-	Name	User-defined name for traffic flow
				Flow ID	Traffic flow ID
				VC1	Traffic flow for Vehicle Category 1 in veh/hr
				VC2	Traffic flow for Vehicle Category 2 in veh/hr
				VC3	Traffic flow for Vehicle Category 3 in veh/hr
				VC4	Traffic flow for Vehicle Category 4 in veh/hr
				Speed	Traffic speed in km/hr
(iii) Building (Existing)	Import (Existing building)	.gdb	e.g. iB1000 basemap (existing building)	-	-
(iv) Building (Existing/ Planned), Noise Barrier, Terrain	Manual Digitization	-	-	Name	User-defined barrier name
				BAR ID	Barrier ID
				BAR TYPE	"Yes" for reflective barrier "No" for non-reflective barrier
				H	Absolute height of barrier in metre
				Start X	X coordinate of the start of the barrier
				Start Y	Y coordinate of the start of the barrier
				Start Z	Level in mPD of the start of the base of barrier
				End X	X coordinate of the end of the barrier
				End Y	Y coordinate of the end of the barrier
				End Z	Level in mPD of the end of the base of barrier
				CantiLength (L)	Length of the left cantilevered arm in metre (i.e. left = clockwise from start to end of the barrier)
				CantiAngle (L)	Angle of the left cantilevered arm to the left
				CantiLength (R)	Length of the right cantilevered arm in metre (i.e. right = anti-clockwise from start to end of the barrier)
CantiAngle (R)	Angle of the right cantilevered arm to the right				
Elevated	"Yes" for elevated barrier "No" for non-elevated barrier				
(v) Receiver	Manual Digitization	-	-	Name	User-defined receiver name
				REC ID	Receiver ID
				Side	Opening side of window, i.e. noise assessment point "Left" = clockwise from start to end of the digitised window line "Right" = anti-clockwise from the start to end of the digitised window line
				X	X coordinate of the noise assessment point
				Y	Y coordinate of the noise assessment point
				Z	Level in mPD of the first noise assessment point
				No. of Floor Calculation	Number of floors to be calculated, including first floor
				F-F Height	Height between floor and floor in metre
				Uses	Uses of the receiver, "Domestic", "Office", "Education", "Worship", or "Diagnostic"
				(vi) Innovative Noise Mitigation Design (INMD)	Manual Input to Result Attribute Table
INMD Config	Configuration of INMD, "Parallel (0°)", "30°-60°", "30°", or "60°"				

Note:

[1] Bold items require user input, while grey highlighted items will be as default/ auto-generation.

Appendix 3.2 Frequently Asked Questions (FAQ)

Getting Started

1. Which license of ArcGIS Pro is required for running the *RONOSS-HK*?

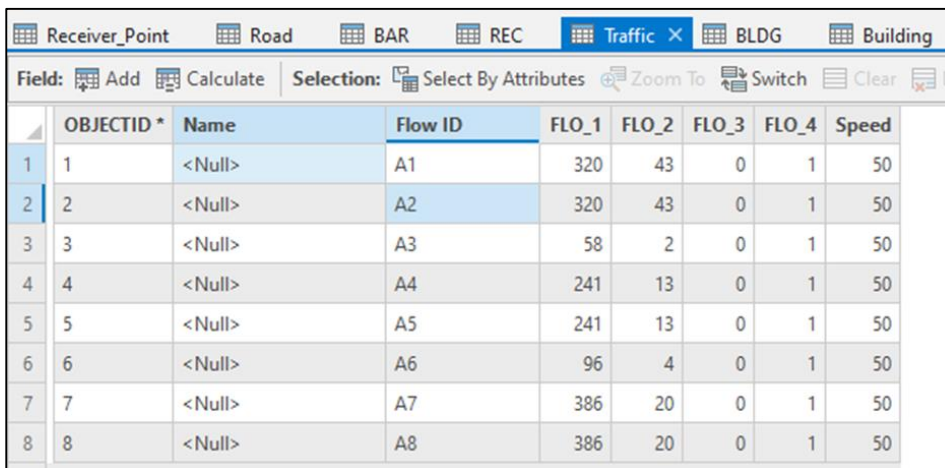
The *RONOSS-HK* can be run in ArcGIS Pro version 2.9.x with standard or advanced license.

2. Are there any rules on naming the project file?

The project folder, project name and the folder path shall not contain any space.

Model Preparation

3. I have entered values to “FLO_4” in the “Traffic” table. Would this affect the program run and noise calculation?

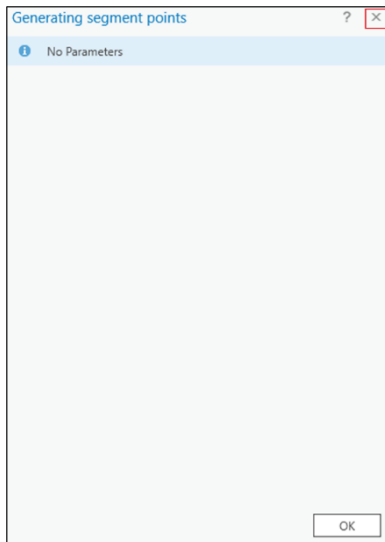


	OBJECTID *	Name	Flow ID	FLO_1	FLO_2	FLO_3	FLO_4	Speed
1	1	<Null>	A1	320	43	0	1	50
2	2	<Null>	A2	320	43	0	1	50
3	3	<Null>	A3	58	2	0	1	50
4	4	<Null>	A4	241	13	0	1	50
5	5	<Null>	A5	241	13	0	1	50
6	6	<Null>	A6	96	4	0	1	50
7	7	<Null>	A7	386	20	0	1	50
8	8	<Null>	A8	386	20	0	1	50

FLO_4 is not used in current version of *RONOSS-HK*. Any input in FLO_4 will be disregarded and only “FLO_1”, “FLO_2” and “FLO_3” are considered in the noise calculation.

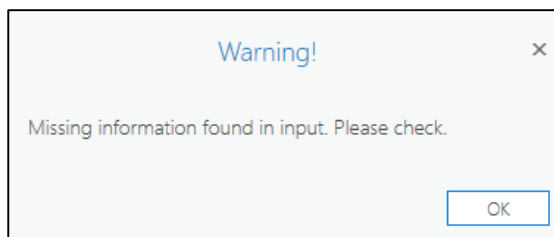
4. If I have only modified the receivers or digitized additional receivers in the current project without change on roads and barriers, do I need to create the entire model again?

In the “Create Model” button, you only need to click “OK” on those updated items in the window pops up (receivers in this case). For unchanged items (roads and barriers in this case), you can close the window pops up instead of clicking “OK”. Follow similar steps if only roads and/or barriers are modified or additionally digitized.



Noise Calculation

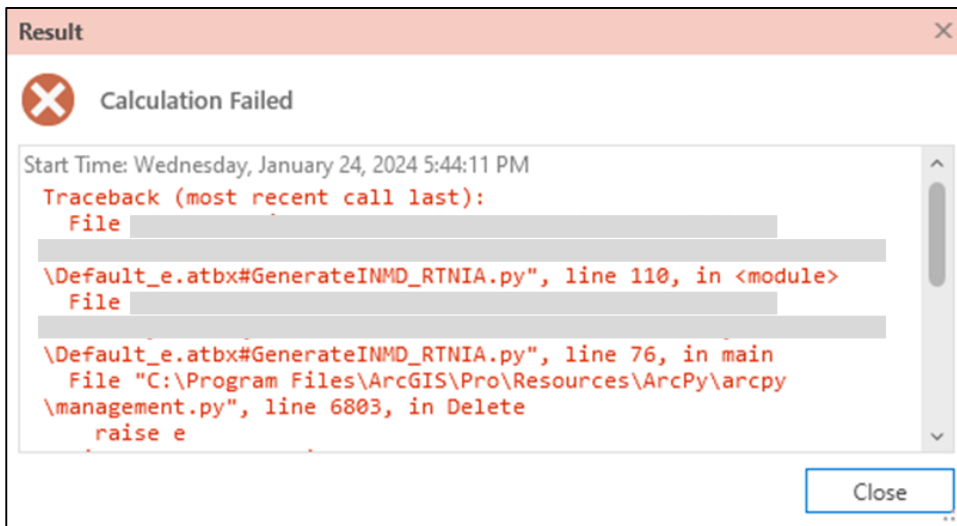
5. A warning window pops up after I click the “Result” button. What should I do?



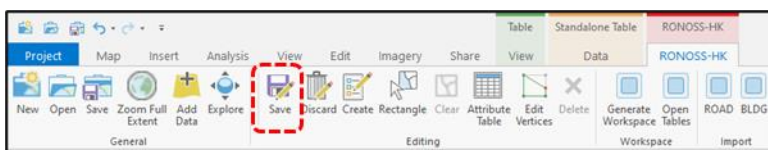
This warning window pops out if there are missing inputs in “Barrier_All”. You should check and update any missing attribute values, including “H”, “Start Z” and “End Z” values, etc. Those barriers with missing “Start X” or “Start Y” should be deleted.

OBJECTID *	Shape *	Name	BAR ID	BAR TYPE	H	Start X	Start Y	Start Z	End X	End Y	End Z	CantLength (L)	CantiAngle (L)
68	Polyline Z	<Null>	68	Yes	13.6	<Null>	<Null>	3.3	<Null>	<Null>	3.3	<Null>	<Null>
71	Polyline Z	<Null>	71	Yes	13.6	<Null>	<Null>	3.3	<Null>	<Null>	3.3	<Null>	<Null>
123	Polyline Z	<Null>	123	Yes	13.6	<Null>	<Null>	3.3	<Null>	<Null>	3.3	<Null>	<Null>
151	Polyline Z	<Null>	151	Yes	13.6	<Null>	<Null>	3.3	<Null>	<Null>	3.3	<Null>	<Null>
165	Polyline Z	<Null>	165	Yes	13.6	<Null>	<Null>	3.3	<Null>	<Null>	3.3	<Null>	<Null>
230	Polyline Z	<Null>	230	Yes	51.599998	<Null>	<Null>	13.6	<Null>	<Null>	13.6	<Null>	<Null>
261	Polyline Z	<Null>	261	Yes	51.599998	<Null>	<Null>	13.6	<Null>	<Null>	13.6	<Null>	<Null>
266	Polyline Z	<Null>	266	Yes	51.599998	<Null>	<Null>	13.6	<Null>	<Null>	13.6	<Null>	<Null>
352	Polyline Z	<Null>	352	Yes	51.599998	<Null>	<Null>	13.6	<Null>	<Null>	13.6	<Null>	<Null>
398	Polyline Z	<Null>	398	Yes	51.700001	<Null>	<Null>	13.6	<Null>	<Null>	13.6	<Null>	<Null>
414	Polyline Z	<Null>	B2	Yes	2	836827.8879	817828.7859	20	836753.4969	817814.028	19	<Null>	<Null>
413	Polyline Z	<Null>	B1	Yes	2	836904.0242	817856.5237	22	836831.183	817829.6986	20	<Null>	<Null>
412	Polyline Z	<Null>	412	Yes	15.3	837041.4747	818538.3554	4	837043.0132	818540.9985	4	<Null>	<Null>
409	Polyline Z	<Null>	409	Yes	15.3	837043.0132	818540.9985	4	837045.6367	818539.4994	4	<Null>	<Null>
411	Polyline Z	<Null>	411	Yes	15.3	837041.4747	818538.3554	4	837041.4747	818538.3554	4	<Null>	<Null>

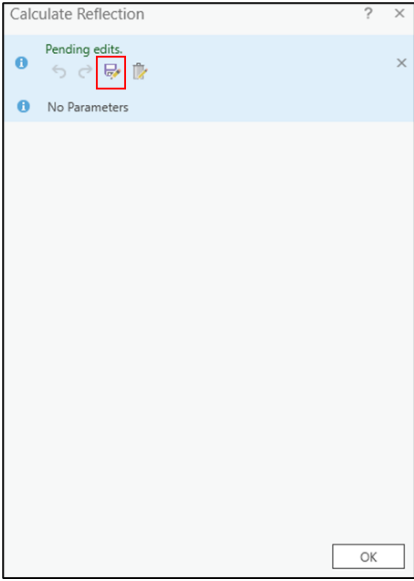
6. A “calculation failed” window pops up after I click the “Result” button. What should I do?



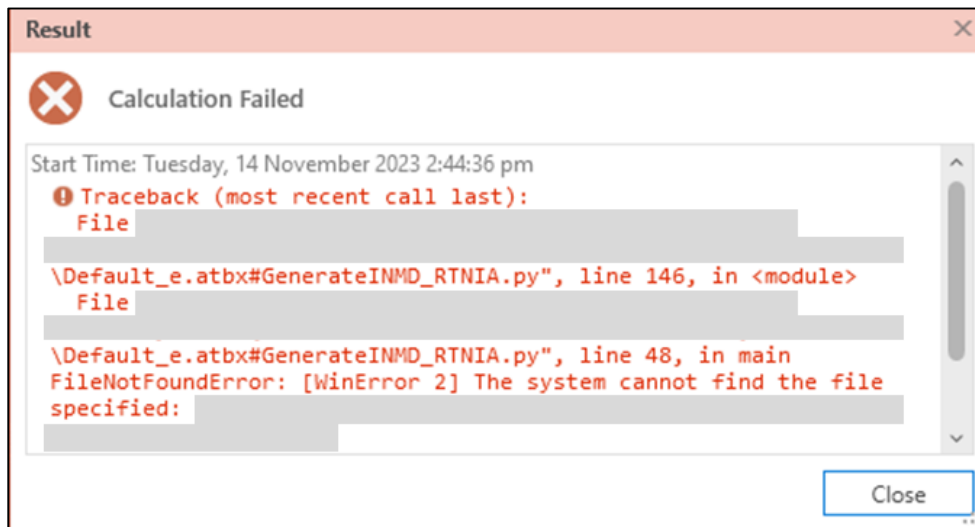
This window pops out if there are unsaved changes to any of “Segment_LinInput_Points_3D”, “Barrier_ALL” and “Receiver_Point_ALL”. You are reminded to click “Save” under “Editing” toolbar to save the updates before clicking the “Result” button.



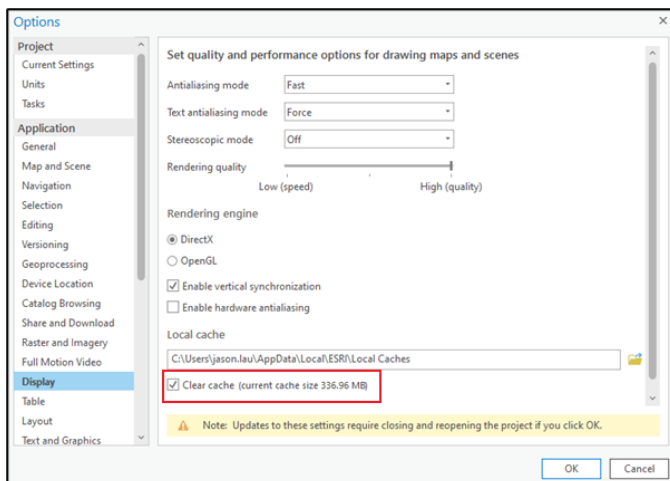
If the “Result” button is clicked without clicking the “Save” button beforehand, a “Pending edits” reminder would appear in the “Calculate Reflection” pop up window. You should click the “Save” button to save the updates before clicking “OK”.



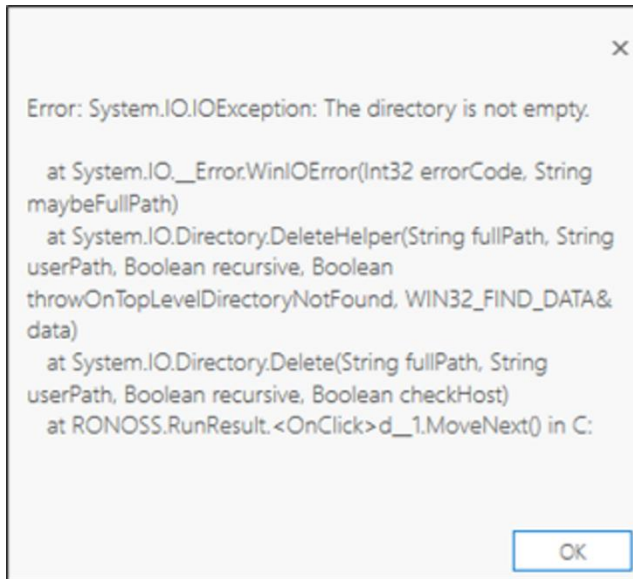
7. Another “calculation failed” window pops up after I click the “Result” button. What should I do?



This window pops out due to the cache. You should clear the cache by clicking “Project”, then “Options”. In “Display” tab, please check the box next to “Clear Cache” and click “OK”. It is always recommended to clear the cache before running the model and clicking “Result” button.



8. The following error window pops up after I click the “Result” button. What should I do?



This window pops up due to either of the following:

- Traffic data for one or more “Flow ID” assigned in “Road” table is missing in “Traffic” table; or
- Missing attribute values (e.g. ID, height) in “Road” and/or “REC” tables.

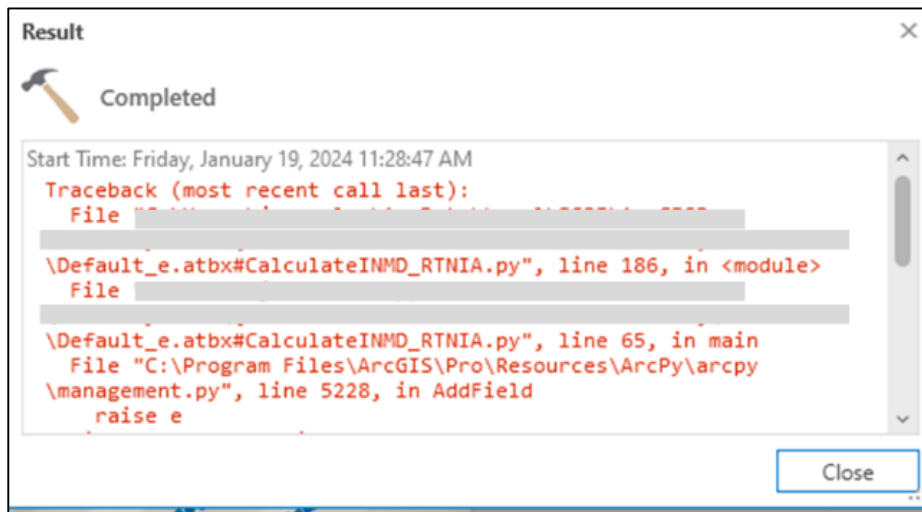
You should check all tables and ensure no missing information. Afterwards you should re-create the model by clicking “Create Model” button (refer to Q4 above).

9. Why the programme keeps hanging after I click the “Result” button?

One of the possible causes is insufficient storage.

Post-Processing

10. The following window pops up after I click the “INMD” button. Is there any calculation error?



This window pops up because the “INMD Type” and “INMD Config” attributes in “Receiver_Result” are not saved before clicking the “INMD” button. “Mit Noise Level” and “Mit Exceedance” attributes will not be created, or the mitigated noise level is therefore calculated based on previously saved INMD settings. You are reminded to click “Save” under “Editing” toolbar to save the INMD setting and any updates before clicking the “INMD” button.

