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 RONOSS-HK program
 - Section 2 Presents the computer system requirements and installation procedures for the *RONOSS-HK* program
 - Section 3 Presents the steps of getting start of the RONOSS-HK program
 - Section 4 Presents the steps for importing and digitizing functions in the RONOSS-HK program
 - Section 5 Presents the steps for the *RONOSS-HK* model run
 - Section 6 Presents the steps for showing the *RONOSS-HK* 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.

🔠 Esri ArcGIS Add	d-In Installation Utility X					
	Please confirm Add-In file installation.					
	Active content, such as Macros and Add-In files, can contain viruses or other security hazards. Do not install this content unless you trust the source of this file.					
Name:	RONOSS					
Version:	1.0					
Author:	Arup					
Description:	This is an add-in developed by Arup. All Rights Reserved.					
This Add-In file is not digitally signed.						
	Install Add-In Cancel					

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

😫 🚔 🚋 - 근 - ㅋ		RONOSS-HK			Untit	led - Map - ArcGIS	S Pro
Project Map Insert Analysis	View Edit Imagery Share	RONOSS-HK					
😫 🚍 🗟 🌘 🚔 🔶	R 🕅 🗹 🗹 🔲	X					
New Open Save Zoom Full Add Explore Extent Data	Save Discard Create Rectangle Clear Attrib Tabl	ute Edit Delete e Vertices	Generate Open Workspace Tables	ROAD BLDG	Create Model	Result INMD Vi	isualize in 3D
General	Editing		Workspace	Import	Create Model	Run	

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**.







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.

				Featu	ure Layer		F	ONOSS-	HK Proje	ct1 - Map - A	rcGIS Pro
View E	dit Imagery	Share	Appeara	ince	Labeling	Data	R	onoss	-НК		
	E k	7		×							
Save Discard	Create Rectangle	Clear Attribu Table	te Edit Vertices	Delete	Generate Workspace	Open Tables	ROAD	BLDG	Create Model	Result INN	D Visualize in 3D
	Editi	ng			Worksp	ace	Imp	port	Create Model	R	In





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	
	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.

	RONOSS-HK		Untitled - Map - ArcGIS Pro
View Edit Imagery Share	RONOSS-HK		
Save Discard Create Rectangle Clear Attr Edition	ibute Edit Delete	Generate Open Workspace Tables	AD BLDG Create Model Run
Eating		workspace	import refeate modern Ram
Receiver_Point Road BAR	III REC III	Traffic ×	
Field: 📰 Add 🔢 Calculate Selection: 🗳	Select By Attributes	🛛 Zoom To 🛛 📲 Switch 📃	Clear 🙀 Delete 🖶 Copy 🛛 Rows: 📮 Insert
OBJECTID * Name Flo	ow ID FLO_1	FLO_2 FLO_3 FLO_4 S	Speed
Click to add new row.			



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

Field	t: 🗊 Add 📑	Calculate	Selection:	Select By Attribut	tes 🖑 Zoom To	탑 Switch	Clear								
-	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 Categor
1	1	Polyline Z	90.438558	Road	1	A101	5	5	837372.75	818982.125	837373.1875	819072.5625	No Correction	<null></null>	
2	2	Polyline Z	54.242115	Road	2	A101	5	5	837152.5	818738.0625	837122.875	818692.625	No Correction	<null></null>	
3	3	Polyline Z	55.435351	Road	3	A101	5	5	837122.875	818692.625	837076.75	818723.375	No Correction	<null></null>	
4	4	Polyline Z	54.454468	Road	4	A101	5	5	837023.0625	818759.1875	837054	818804	No Correction	<null></null>	
5	5	Polyline Z	129.435825	Road	5	A101	5	5	837023.0625	818759.1875	836915.375	818831	No Correction	<null></null>	
б	6	Polyline Z	93.94758	Road	6	A101	5	5	837301.3575	818691.6841	837224.0825	818745.1137	No Correction	<null></null>	
7	7	Polyline Z	56.177032	Road	7	A101	5	5	837224.0825	818745.1137	837177.875	818777.0625	No Correction	<null></null>	
8	8	Polyline Z	35.996275	Road	8	A101	5	20	837168.3526	819103.4443	837177.7517	819138.1918	Others	3.5	
9	9	Polyline Z	15.865397	Road	9	A101	5	5	837218.9862	819103.1824	837205.0458	819110.7571	No Correction	<null></null>	
10	10	Polyline Z	12.746287	Road	10	A101	5	5	837205.0458	819110.7571	837192.4466	819112.6879	No Correction	<null></null>	

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.

8 8 8	5.9.1									Table	Standalo	one Table	RONOS	IS-HK	
Project	Map Inser	rt -	Analysis	View	Ec	tit	Imagery	Sh	are	View	Da	ata	RONOS	SS-HK	
😤 🖂		+	۱.	R	Ů.		KN	7			×				
New Open	Save Zoom Full Extent	Add Data	Explore	Save	Discard	Create	Rectangle	Clear	Attribut Table	e Edit Vertices	Delete	Generate Workspace	Open Tables	ROAD	BLDG
	General		/	_			Editir	ng				Worksp	ace	Imp	ort



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.

📓 📾 🗃 ち・さ・ ፣		Table S	standalone Table	RONOSS-HK	
Project Map Insert Analysis	View Edit Imagery Share	View	Data	RONOSS-HK	
😫 🗁 📷 🔘 📠 🄶 🗎	😼 🝺 📝 🖗 🖸 🔳		× 🔲		
New Open Save Zoom Foll Add Explore Extent Data	Save Discard Create Rectangle Clear Attribu Table	te Edit Vertices	Delete Generate Workspac	e Tables	D BLDG
General	Editing		Works	pace in	nport

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".





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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" und	ler "Workspace	" toolbar to oper	the attribute
table of "BLDG".			

_						_					
					RONOSS-HK				Unti	itled - Map - A	ArcGIS Pro
	View Edi	t Ima <u>c</u>	gery :	Share	RONOSS-H	(
	2 🕅 🤅	i	Y	1 💷		<					
Sa	ive Discard (Create Recta	angle Clea	ar Attribu Table	te Edit De	lete Gene	erate Open space Tables	ROAD BLDG	Create	Result INN	ID Visualize
			Editing	lubic	venices	W	/orkspace	Import	Create Mode	I R	un
_	Receiver Point	E Ro	ad 🎹	BAR	REC	Traffic	Building		×		
Fiel	d: E Add E	Calculate	Selectio	n: 🖙 Sele	ect By Attributes	Zoom	To Switch	Clear	Delete 🗐 Co	DV	
	OBJECTID *	Shape *	Barrier II	D	Elevation	Height	Shape Length	Start X	Start Y	End X	End Y
1	1	Polyline Z	1		28.799999	51.299999	24.260173	837148.9868	819142.0051	837136.2972	819121.3283
2	2	Polyline Z	2		28.799999	51.299999	8.954011	837136.2972	819121.3283	837128.5686	819125.8497
3	3	Polyline Z	3		28.799999	51.299999	3.976318	837128.5686	819125.8497	837130.6393	819129.2443
4	4	Polyline Z	4		28.799999	51.299999	4.565203	837130.6393	819129.2443	837126.7521	819131.6382
5	5	Polyline Z	5		28.799999	51.299999	3.033973	837126.7521	819131.6382	837128.3316	819134.2286
6	6	Polyline Z	6		28.799999	51.299999	2.595362	837128.3316	819134.2286	837126.1466	819135.6292
7	7	Polyline Z	7		28.799999	51.299999	8.95854	837126.1466	819135.6292	837130.8596	819143.2478
В	arrier ID		:	ID o	f building	g barri	er (auto-	generati	ion)		
E	levation		:	Leve	l in mPL) of th	e base o	f the bu	ilding b	arrier	
				(aut	o-aenera	ation)	-		5		
н	eiaht			Δhs	nlute he	viaht d	of harrie	prin m	etres (auto-	
	cigitt		•	aen	pration)	igni (by burne	., ,, ,, ,,	(<i>uu</i> 10-	
S	art X			Xco	ordinate	s of th	ne start o	f the hu	ildina h	arrier	
5	.urc /		•	/+		stion)		j the bu	nunig o	anner	
~				luur	o-yenero			c			
51	tart y		:	Y CO	orainate	's of th	e start o	f the bu	ilaing b	arrier	
				(aut	o-genero	ation)					
E	nd X		:	Х со	ordinate	es of th	he end og	f the bu	ilding b	arrier	
				(aut	o-genera	ation)					
E	nd Y		:	Y co	ordinate	s of th	ne end or	f the bu	ildina b	arrier	
										-	

4.2 Digitising

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

	RONOSS-HK			Untit	led - Map - ArcGIS Pro
View Edit Imagery Share	RONOSS-HK				
Save Discard Create Rectangle Clear Attrib Tab	ute Edit Delete le Vertices	Generate Open Workspace Tables	ROAD BLDG	Create Model	Result INMD Visualize in 3D
Editing		Workspace	Import	Create Model	Run



4.2.2 Road Segment

- 4.2.2.1 To digitise road segment:
 - Step 1: In "Create Features" tab, select "Road".

Create Features	?	*	Ψ×
Search	p	Ŧ	
Templates Favorites			
✓ BAR — BAR			
✓ Building Building			
✓ REC — REC			
 Receiver_Point Receiver_Point 			
∀ Road			
— Road / ౣ X 抺 ➡ ‰ Д			→
Y Traffic III Traffic			

- 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".

Template Properties: Ro	pad	×
General	/ Line Tool	
Tools	∧ Right Angle Line Tool	
Attributes	× Split	
	🔸 Radial Line Tool	\circ
	Two-Point Line Tool (Default Tool)	• 🗸
	Circle Tool	0 🗆
	Rectangle Tool	0
	🔿 Regular Polygon Tool	
	🔿 Ellipse Tool	0
	€ Freehand Line Tool	~ 🗸 -
	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 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.

III Rece	eiver_Point	🛄 Road	BAR III	REC III 1	Traffic 🗰 Building	K 📰 BLDG				
Field:	Add 🕎 C	alculate	Selection: 🖷 Select	By Attributes 🔅	Zoom To 📲 Switch	Clear 💂	Delete 🗐 🕻	Сору		
	OBJECTID *	Shape *	LASTUPDATEDATE	Building ID *	Type of Building Block	Base Level	Roof Level	Base Level Data Source	Roof Level Data Source	Status
340426	340426	Polygon Z	6/4/2023	1810142453	Open-sided Structure	<null></null>	<null></null>	<null></null>	<null></null>	Existing
340427	340427	Polygon Z	6/4/2023	1810142325	Temporary Structure	<null></null>	<null></null>	<null></null>	<null></null>	Existing
340428	340428	Polygon Z	6/4/2023	1810142454	Open-sided Structure	<null></null>	<null></null>	<null></null>	<null></null>	Existing
340429	340429	Polygon Z	<null></null>	0	Building Block	<null></null>	<null></null>	Photogrammetry	Photogrammetry	Existing
340430	340430	Polygon Z	<null></null>	0	Building Block	4	24	Photogrammetry	Photogrammetry	Existing
340431	340431	Polygon Z	<null></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.





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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
Н	:	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
Receiver_Point Road BAR ×	REC	Traffic III Building III BLDG
Heid: Balance Selection: Calculate Selection:	t By Attribute	s @ ² ∠oom lo 福 Switch ⊟ Llear 戻 Delete @ Copy

	Receiver_Point	t 🔳 Ro	ad III BAR	× 🖩 R	EC 🔳	Traffic		Building	BLDG									
Fiel	d: 🗊 Add 🛛	Calculate	Selection:	Select By	Attributes	June 200m	To	Switch 🗐	Clear 💭 De	elete 🖶	Сору							
-	OBJECTID *	Shape *	Shape_Length	Name	BAR ID	BAR TYPE	н	Start X	Start Y	Start Z	End X	End Y	End Z	CantiLength (L)	CantiAngle (L)	CantiLength (R)	CantiAngle (R)	Elevate
1	3	Polyline Z	20.165804	Platform	B3	No	6	837181.0283	819043,8882	6	837191.5893	819061.0674	6	4	30	<null></null>	<null></null>	No
2	6	Polyline Z	66.955814	Barrier	B6	No	0	837169.6224	819102.1848	20	837136.3624	819044.0741	5	<null></null>	<null></null>	5	0	Yes
3	7	Polyline Z	66.955814	Barrier	B7	No	5	837169.6224	819102.1848	20	837136.3624	819044.0741	5	<null></null>	<null></null>	<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)	J
Y	: Y coordinates of the receiver (auto-generation)	١
Ζ	: Level in mPD of the first noise assessment point	
No. of Floor	: Number of floors to be calculated, including first floor	
Calculation		
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.

	出 り	· (* · · ·								1	lable	Standalo	one Table	RONO	SS-HIK	
Project	Ma	ip Inse	rt	Analysis	View	E	dit	Imagery	Sh	are 1	View	D	ata	RONO	SS-HK	
New Open	Save	Zoom Full	+ Add	Explore	Save	Discard	Create	Rectangle	Clear	Attribute	Edit	X	Generate	Open	ROAD	BLDG
		Extent General	Data			N.		Editir	ng	Table	Vertices		Workspace Worksp	Tables ace	Imp	oort

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
Receiver_Point	Road	🖩 BAR 🖩 REC 🗍 🇰 Traffic 🗙 📰 Building 📰 BLDG
Cald, DO Add DO C	Salaulata 6	Calactions Per Salact Dis Attributer 2 7 agen To Suitch Class Delate Const Power Las

	Receiver_Point	📰 Road 📰	BAR 📰 REC		Traffic ×	III B	uilding	📰 Bl	.DG		
Fiel	d: 🐺 Add 📗	Calculate Selection	: 🕞 Select By Att	ibutes (Zoom	To 📑	Switch		Delete	Copy	Rows: 📮 Insert •
1	OBJECTID *	Name	Flow ID	FLO_1	FLO_2	FLO_3	FLO_4	Speed			
1	1	Traffic	A101	40	20	10	<null></null>	41			
2	2	Traffic	A102	200	120	60	<null></null>	38			
	Click to add no	ew row.									

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

6 6	目ち・	G + ±									Table	Standalo	one Table	RONOS	S-HK	
Project	Ma	p Inse	rt	Analysis	View	E	dit	Imagery	Sh	are	View	Da	ata	RONO	SS-HK	
			+	1 .	R	ŵ.		N.S.	7			х				
New Open	Save	Zoom Full Extent	Add Data	Explore	Save	Discard	Create	Rectangle	Clear	Attribute Table	Edit Vertices	Delete	Generate Workspace	Open Tables	ROAD	BLDO
	G	ieneral						Editi	ng				Worksp	ace	Imp	troc

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".

Generating segment points	?	×
No Parameters		
	OK	

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").

					RONOSS	-HK					Untitl	led - Ma	p - Arc	GIS Pro
View	Edit	Imagery	Sha	are	RONOSS	-нк								
R	D 🗹	K Y	7		\square	X								
Save [Discard Create	Rectangle	Clear	Attribute Table	Edit Vertices	Delete	Generate Workspace	Open Tables	ROAD BL	DG	Create Model	Result	INMD	Visualize in 3D
		Editir	ng				Worksp	ace	Import	t	Create Model		Run	



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".

III 1	raffic 📰	Road	🔢 Building 🔛 Rec	eiver_Point 📰 BAR	REC	III Se	gment_LineIn	put_Points_3D		Receiver_Poin	tall 🔟	Barrier	ALL × 📰 BLD	G
Field	t: 📰 Add 📑	Calculate	Selection:	By Attributes 🛛 Zoom Ti	⊳ 🖶 Switch	Clear	📕 Delete 🍵	Сору						
4	OBJECTID *	Shape *	Name	BAR ID	BAR TYPE	н	Start X -	Start Y	Start Z	End X	End Y	End Z	CantiLength (L)	CantiAngle (L)
1	68	Polyline Z	<null></null>	68	Yes	13.6	<null></null>	<null></null>	3.3	<null></null>	<null></null>	3.3	<null></null>	<null></null>
2	71	Polyline Z	<null></null>	71	Yes	13.6	<null></null>	<null></null>	3.3	<null></null>	<null></null>	3.3	<null></null>	<null></null>
3	123	Polyline Z	<null></null>	123	Yes	13.6	<null></null>	<null></null>	3.3	<null></null>	<null></null>	3.3	<null></null>	<null></null>
4	151	Polyline Z	<null></null>	151	Yes	13.6	<null></null>	<null></null>	3.3	<null></null>	<null></null>	3.3	<null></null>	<null></null>
5	165	Polyline Z	<null></null>	165	Yes	13.6	<null></null>	<null></null>	3.3	<null></null>	<null></null>	3.3	<null></null>	<null></null>
6	230	Polyline Z	<null></null>	230	Yes	51.599998	<null></null>	<null></null>	13.6	<null></null>	<null></null>	13.6	<null></null>	<null></null>
7	261	Polyline Z	<null></null>	261	Yes	51.599998	<null></null>	<null></null>	13.6	<null></null>	<null></null>	13.6	<null></null>	<null></null>
8	266	Polyline Z	<null></null>	266	Yes	51.599998	<null></null>	<null></null>	13.6	<null></null>	<null></null>	13.6	<null></null>	<null></null>
9	352	Polyline Z	<null></null>	352	Yes	51.599998	<null></null>	<null></null>	13.6	<null></null>	<null></null>	13.6	<null></null>	<null></null>
10	398	Polyline Z	<null></null>	398	Yes	51.700001	<null></null>	<null></null>	13.6	<null></null>	<null></null>	13.6	<null></null>	<null></null>
11	414	Polyline Z	<null></null>	B2	Yes	2	836827.8879	817828.7859	20	836753.4969	817814.028	19	<null></null>	<null></null>
12	413	Polyline Z	<null></null>	B1	Yes	2	836904.0242	817856.5237	22	836831.183	817829.6986	20	<null></null>	<null></null>
13	412	Polyline Z	<null></null>	412	Yes	15.3	837041.4747	818538.3554	4	837043.0132	818540.9985	4	<null></null>	<null></null>
14	409	Polyline Z	<null></null>	409	Yes	15.3	837043.0132	818540.9985	- 4	837045.6367	818539,4994	- 4	<null></null>	<null></null>
15	411	Polyline 7	zMolls	411	Ver	15.2	827044 1572	010526-0265		827041 4747	010520 2554		< Nulls	< Nolls

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.

	Table	Standalone Table	RONOSS-HK	
View Edit Imagery Share	View	Data	RONOSS-HK	
🕞 📴 📓 🖓 🖸 🖩		×		
Save Discard Create Rectangle Clear Attrib	le Vertices	Workspace	e Tables) BLDG
	s View Edit Imagery Share	Save Discard Create Rectangle Clear Attribute Edit	s View Edit Imagery Share View Data Save Discard Create Rectangle Clear Attribute Edit Delete Workspace Save Discard Create Rectangle Clear Attribute Edit Delete Workspace	Table Standalone Table RONOSS-HK View Edit Imagery Share View Data RONOSS-HK Image: Save Image: Save

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.

ptions		Х
Current Settings	Set quality and performance options for drawing maps and scenes	^
Units Tasks	Antialiasing mode Fast	- 11
Application General	Stereoscopic mode Off •	- 11
Map and Scene	Rendering quality	
Navigation	Low (speed) High (quality)	
Selection Editing Geoprocessing Device Location Catalog Browsing Share and Download Raster and Imagery E-11 Mation Video	Rendering engine © DirectX OpenGL Zenable vertical synchronization Enable hardware antialiasing Local cache [CvUsersiasonJau\AppData\LocaNESR\Local Caches	
Display	☑ Clear cache (current cache size 336.96 MB)	
Layout Text and Graphics	▲ Note: Updates to these settings require closing and reopening the project if you click (DK.
	OK	Cancel



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:

Starting	~
Time for inputs (s): 00:00:06.5398803	
Time for barrier distance (s): 00:00:00.1105428	
Time for noise contribution (s): 00:00:00.0152598	
lime to filter barriers (s): 00:00:0441851	



Step 5:





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.

						Featu	ire Layer		R	ONOSS-	HK Proje	ct1 - Map - Ar	cGIS Pro
View	Edit	Imagery	Sha	ire A	Appeara	nce	Labeling	Data	R		нк		
₽[1	K P	2		\square	×							
Save Dis	scard Create	Rectangle	Clear	Attribute Table	Edit Vertices	Delete	Generate Workspace	Open Tables	ROAD	BLDG	Create Model	Result INME	Visualize in 3D
		Editir	ng				Worksp	ace	Imp	ort	Create Model	Ru	1

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.

Segment_Liv	nelnput_Points_3D 🔤 Receiver_Point_ALL	Barrier_ALL Receiver_Result ×						
Сору								
Uses	GUID	GlobalID *	Floor Level	Noise Level	Criteria	Exceed	INMD Type	INMD Config
Domestic	{318281C0-2436-48C8-90E1-E1614819572A}	{3BF1A1F3-E3A4-4C0A-BBF4-19B1F6DBBD34}	1	75	70	4.1	<null></null>	<null></null>
Office	{26560C8E-5A16-4C16-B174-468A39A47ADA}	{054C88C7-D33F-4ECF-985C-08512E3485DD}	1	69	70	0	<null></null>	<null></null>
Education	{50755717-0870-426A-AEF6-8C9D659BC157}	{969340FB-F1FA-4D7B-82B5-67799E4A511F}	1	66	65	0.3	<null></null>	<null></null>
Worship	{AF21AB9E-8DA1-40CD-A432-E6AF3A81C1D6}	{625AE296-14D8-450F-9EE1-12F4FF4C3331}	1	67	65	1.5	<null></null>	<null></null>
Diagnostic	{FCAE77CF-1825-403E-9688-12B6BEFE6F48}	{7E01DD91-ED14-42A0-A8A9-F2AB7B6BA2C7}	1	69	55	13.9	<null></null>	<null></null>
Domestic	<null></null>	{C90DDD65-8500-4007-84FD-4FBF259C5528}	2	77	70	6.1	<null></null>	<null></null>
Domestic	<null></null>	{3A672E62-5B47-4A6C-A157-248996BF12E1}	3	72	70	1.2	<null></null>	<null></null>
Domestic	<null></null>	{FCE38D77-02B4-4826-9CA6-71C09AE526CF}	4	74	70	3.1	<null></null>	<null></null>
Office	<null></null>	{1EA74CB1-D7BD-44B3-B111-7AF307FF2693}	2	69	70	0	<null></null>	<null></null>
Office	<null></null>	{B4A3B1A1-7F81-40FA-B576-11BBCAB0D804}	3	66	70	0	<null></null>	<null></null>

Name	:	:User-defined receiver name
REC ID	:	Receiver ID
Side	:	Opening side of window, i.e. noise assessment point)
		<i>"Left" (i.e. clockwise from start to end of the digitized receiver line)</i>
		"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)
Ζ	:	Level in mPD of the first noise assessment point
No. of Floor	:	Number of floors to be calculated, including first
Calculation		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 INMD Config

: Type of INMD shown in S6.2)

: 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.

		1 in			ResultSumn	hary.csv • Saved				, P Sear	ch						
File	Home	Insert P	age Layout	Formulas	Data Re	view View	Automate	Develope	r Help	Acrobat	Team						
Past	Cut Copy ~ Format F Clipboard	Calib Painter	ri I U ~ ⊞ Font	 11 < A[*] A[*] A[*] 	A [*] ≡ ≡ * ≡ ≡	≡ ≫~ ≡ ⊡ ⊡ Aligna	환 Wrap Text 텔 Merge & C tent	enter ~ \$	neral ~ % 9 1 Number	Co 00 - 10 Fo Fo	onditional Forma rmatting ~ Table Styles	t as Cell • Styles •	Insert Delete Cells	Format €	AutoSum Y Fill Y S Clear Y F Editin	iort & Find & itter ~ Select ~	Analyze Data Analysis
A1	Ŧ	I × ✓	∫∝ REC	ID													
	Α	В	С	D	E	F	G	н	1.1	J	K	L	M	N	0	Р	Q
1	REC ID	X	Y	Z	FI Level	Uses	Criterion-	Overall-di	Exceedan	INMD Ty	r INMD Cor	Mitigated	Mit Exceed	Overall Rc	Mitigated	Rounded-o	iB(A)
2	C101-000	837185	819053	0	1	Domestic	70	74.5	4.1	None	None	74.5	4.1	75	75		
3	C101-000	837185	819053	4	2	Domestic	70	76.5	6.1	None	None	76.5	6.1	77	77		
4	C101-000	837185	819053	8	3	Domestic	70	71.6	1.2	None	None	71.6	1.2	72	72		
5	C101-000	837185	819053	12	4	Domestic	70	73.5	3.1	None	None	73.5	3.1	74	74		
6	C102-000	837162	819074	5	1	Office	70	69	0	None	None	69	0	69	69		
7	C102-000	837162	819074	13	2	Office	70	69.1	0	None	None	69.1	0	69	69		
8	C102-000	837162	819074	21	3	Office	70	65.6	0	None	None	65.6	0	66	66		
9	C103-000	837256	819012	5	1	Education	65	65.7	0.3	None	None	65.7	0.3	66	66		
10	C103-000	837256	819012	8	2	Education	65	64.3	0	None	None	64.3	0	64	64		
11	C103-000	837256	819012	11	3	Education	65	64	0	None	None	64	0	64	64		
12	C104-000	837084	819046	5	1	Worship	65	66.9	1.5	None	None	66.9	1.5	67	67		
13	C104-000	837084	819046	8	2	Worship	65	66.9	1.5	None	None	66.9	1.5	67	67		
14	C104-000	837084	819046	11	3	Worship	65	66.8	1.4	None	None	66.8	1.4	67	67		
15	C105-000	837235	818961	5	1	Diagnostic	55	69.3	13.9	None	None	69.3	13.9	69	69		
16	C105-000	837235	818961	8	2	Diagnostic	55	68.4	13	None	None	68.4	13	68	68		
17	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.





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

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".

	Conv											-
F-F Height	Uses	GUID	GlobalID *	Floor Level	Noise Level	Criteria	Exceed	INMI	D Type	INMD	- Config	-
4	Domestic	{318281C0-2436-48C8-90E1-E1614819572A}	{3BF1A1F3-E3A4-4C0A-BBF4-19B1F6DBBD34}	1	75	70	4.1	<nul< td=""><td></td><td><null></null></td><td></td><td>1</td></nul<>		<null></null>		1
8	Office	{26560C8E-5A16-4C16-B174-468A39A47ADA}	{054C88C7-D33F-4ECF-985C-08512E3485DD}	1	69	<null></null>			_			
3	Education	{50755717-0870-426A-AEF6-8C9D659BC157}	{969340FB-F1FA-4D7B-82B5-67799E4A511F}	1	66	NA		_				
3	Worship	{AF21AB9E-8DA1-40CD-A432-E6AF3A81C1D6}	{625AE296-14D8-450F-9EE1-12F4FF4C3331}	1	67	Acoustic	Acoustic Windows (Iop-hung Type) Acoustic Windows (Baffle Type)					
3	Diagnostic	{FCAE77CF-1825-403E-9688-12B6BEFE6F48}	{7E01DD91-ED14-42A0-A8A9-F2AB7B6BA2C7}	1	69	Acoustic	Window	s (Abso	orptive Ba	affle Typ	oe)	
4	Domestic	<null></null>	{C90DDD65-8500-4007-84FD-4FBF259C5528}	2	77	Acoustic Windows (Baffle Type) + Fin						
4	Domestic	<null></null>	{3A672E62-5B47-4A6C-A157-248996BF12E1}	3	72	Acoustic	: Window: d Acousti	s (Abso ic Balco	orptive Ba	offle Typ - hung '	be) + Fin Type)	
4	Domestic	<null></null>	{FCE38D77-02B4-4826-9CA6-71C09AE526CF}	4	74	Enhance	d Acousti	ic Balco	ony (Abso	orptive	Side-hun	g
8	Office	<null></null>	{1EA74CB1-D7BD-44B3-B111-7AF307FF2693}	2	69	Enhance	d Acousti	ic Balco	ony (Baffl	le Type)	1	
8	Office	<null></null>	{B4A3B1A1-7F81-40FA-B576-11BBCAB0D804}	3	66	Enhance /0	d Acousti U	< Nul	ony (Abso	orptive <null></null>	Baffle Typ	Je
3	Education <null></null>		{B17BB95C-2C9A-48E9-8FA3-7D2024EFA893}	2	64	65	0	<nul< td=""><td colspan="2">ill> <nul< td=""><td colspan="2"> ></td></nul<></td></nul<>	ill> <nul< td=""><td colspan="2"> ></td></nul<>		>	
3	Education	<null></null>	{AA578058-E1EB-4410-9442-36D095FAF1DB}	3	64	65	0	<nul< td=""><td> > ·</td><td><null></null></td><td></td><td></td></nul<>	> ·	<null></null>		
									<null></null>			
3	Worship	<null></null>	{E89AFD87-2446-4D5E-A3F3-A8F0A0E9FF8D}	2	67	65	1.5	<nul< th=""><th> > -</th><th><null></null></th><th></th><th>_</th></nul<>	> -	<null></null>		_
3	Worship	<null> put_Points_3D I Receiver_Point_ALL</null>	(E89AFD87-2446-4D5E-A3F3-A8F0A0E9FF8D) Barrier_ALL Receiver_Result ×	2	67	65	1.5	<nul< td=""><td>Þ</td><td><null></null></td><td></td><td></td></nul<>	Þ	<null></null>		
3 Seg	Worship ment_Lineln Copy	<null> put_Points_3D III Receiver_Point_ALL</null>	(E89AFD87-2446-4D5E-A3F3-A8F0A0E9FF8D) Barrier_ALL Receiver_Result ×	2	67	65	1.5	<nul< td=""><td> > .</td><td><null></null></td><td></td><td></td></nul<>	> .	<null></null>		
3 Seg elete	Worship ment_Lineln Copy Uses	<null> put_Points_3D I Receiver_Point_ALL GUID</null>	(E89AFD87-2446-4D5E-A3F3-A8F0A0E9FF8D)	2 Floor Le	67 vel Noise L	65 evel Crit	1.5 teria Ex	<nul< td=""><td>INMD 1</td><td><null></null></td><td>INMD G</td><td>21</td></nul<>	INMD 1	<null></null>	INMD G	21
3 Seg elete	Worship ment_LineIn Copy Uses Domestic	<null> Endstand</null>	(E89AFD87-2446-4D5E-A3F3-A8F0A0E9FF8D) Barrier_ALL GlobalID * (3BF1A1F3-E3A4-4C0A-8BF4-19B1F6DB8D3	2 Floor Le 4}	evel Noise Le	evel Crit	1.5 teria Ex 70	<nul< td=""><td>INMD T <null></null></td><td><null></null></td><td>INMD G <null></null></td><td>ж</td></nul<>	INMD T <null></null>	<null></null>	INMD G <null></null>	ж
3 Elete F Height 4 8	Worship ment_LineIn Copy Uses Domestic Office	<null> Entry 200 Receiver_Point_ALL GUID (318281C0-2436-48C8-90E1-E1614619572A) (26560C8E-5A16-4C16-B174-468A39A47ADA)</null>	(E89AFD87-2446-4D5E-A3F3-A8F0A0E9FF8D) Image: Barrier_ALL Image: Receiver_Result GlobalD * (36F1A1F3-E3A4-4C0A-8BF4-1981F6D8BD3) (054C88C7-D33F-4ECF-985C-08512E3465DD) (364C88C7-D33F-4ECF-985C-08512E3465DD)	2 Floor Le 4}	vel Noise Le	65 evel Crit 75 69	1.5 teria Ex 70 70	<nul< td=""><td>INMD T <null> <null></null></null></td><td><null></null></td><td>INMD G <null> <null></null></null></td><td>01</td></nul<>	INMD T <null> <null></null></null>	<null></null>	INMD G <null> <null></null></null>	01
3 Elete F Height 4 8 3	Worship ment_LineIn Copy Uses Domestic Office Education	CNull> Receiver, Point, ALL GUID [31281C0-2436-48C8-90E1-E1614819572A] [26560C8E-5A16-4C16-B174-468A39A47ADA] [26560C8E-5A16-4C16-B174-468A39A47ADA]	(E89AFD87-2446-4D5E-A3F3-A8F0A0E9FF8D) Image: Barrier_ALL Image: Receiver_Result GlobalID * (38F1A1F3-E3A4-4C0A-88F4-1981F6098D3 (054C88C7-D33F-4ECF-985C-08512E3485D0 (0954068-F1FA-4078-2825-6779954A511F)	2 Floor Le 4}	67 vel Noise Lo 1 1 1	65 evel Crit 75 69 66	1.5 teria Ex 70 70 65	<nul cceed 4.1 0 0.3</nul 	>	<null></null>	INMD G <null> <null> Parallel</null></null>	0
3 Seg Seg F Height 4 8 3 3	Worship ment_LineIn Copy Uses Domestic Office Education Worship	CNull> put_Points_3D Image: Receiver_Point_ALL GUID (318281C0-2436-48C8-90E1-E1614819572A) (26550026E-5A16-4C16-8174-468A39A477ADA) (2655077-0870-426A-AEF6-8C905598QE157) (A721489E-8DA1-40C0-A432-E64F3A81C1D6 (A721489E-8DA1-40C0-A432-E64F3A81C1D6	[E89AFD87-2446-HD5E-A3F3-A8F0A0E9FF8D] Image: Barrier_ALL Image: Receiver_Result GlobalD * [38F1A1F3-E3A4-4C0A+88F4-1981F6088D3] (054C887-033F-4ECF-985C-08512E348D3) [069340F8-F1FA-4D78-9285-67795EA511F] (052AE295-4108-450F-9EE1-124FF4C3331) [052AE295-4108-450F-9EE1-124FF4C3331]	2 Floor Le 4}	67 vvel Noise La 1 1 1 1 1	65 evel Crit 75 69 66 67	1.5 teria Ex 70 65 65	<nul tceed 4.1 0 0.3 1.5</nul 	>	<null></null>	INMD Co <null> Parallel 30°-60° 30°</null>	0
3 Sec F Height 4 3 3 3 3	Worship ment_LineIn Copy Uses Domestic Office Education Worship Diagnostic	<null> GUID GUID [318281C0-2436-48C8-90E1-E1614819572A) [26590C8E-5A16-4C16-8174-468A39A47ADA) [0775717-0870-426A-4E6-4C3059EC157) [4F21A89E-8DA1-40CD-A432-E6AF3A81C1D6 [CAET7CF-1025-4032-68687E06EF454)] [CAET7CF-1025-4032-9088-1268EFEF6F45]]</null>	Giobali D Receiver_Nexult Globali D IIII. Receiver_Nexult	2 Floor Le 4}	67 vel Noise Le 1 1 1 1 1 1 1	65 evel Crit 75 66 66 67 69	1.5 teria Ex 70 65 65 55	<nul acceed 4.1 0.3 1.5 13.9</nul 	INMD 1 <null> <null> <null> <null> <null></null></null></null></null></null>	<null></null>	INMD C <null> Parallel 30°-60° 30° 60°</null>	0)
Sec Elete F Height 4 3 3 3 3 4	Worship ment_Lineln Copy Uses Domestic Office Education Worship Diagnostic Domestic	CNull> gut_Points_30 Im Receiver_Point_ALL GUID [318281C0-2436-49C8-90E1-E1614819572A] [25590C8E-5A16-4C16-8174-468A39A47ADA] [50755717-0870-426A-AEF6-8C90559BC157] [AF21A89E-8DA1-40C0-A432-66873A81C106 [FCAE7CF-1823-4032-9088-12868EFE6F48] (Null> -Null>	EE99AFD87-2446-HD5E-A3F3-A8F0A0E9FF8D) Image: State of the stat	2 Floor Le 4) 	67 Noise Le 1 1 1 1 1 2	65 evel Crit 75 69 66 67 69 77	1.5 teria Ex 70 65 65 55 70	<nul cceed 4.1 0 0.3 1.5 13.9 6.1</nul 	INMD 1 <null> <null> <null> <null> <null> <null> <null></null></null></null></null></null></null></null>	<null></null>	INMD Co <null> <null> Parallel 30°-60° 30° 60° <null></null></null></null>	0
3 Sec F Height 4 8 3 3 3 4 4 4 4 4 4 4 4 4 4 4 4 4	Worship ment_LineIn Copy Uses Domestic Office Education Worship Diagnostic Domestic Domestic	CNull> Receiver, Point, ALL GUID [318281C0-2436-4808-90E1-E1614819572A] (26560C8E-5A16-4C16-B174-468A39A47ADA) [26560C8E-5A16-4C16-B174-468A39A47ADA] (2755717-0870-426A-AEF6-8C306598C157) [AF21A89E-8DA1-40CD-A432-E6AF3A81C1D6 (FCAE77CF-1825-403E-9688-12868EFE6F48) <null></null>	(E89APD87-2446-4D5E-A3P3-A8F0A0E9FF8D) Image: Barrier_ALL Image: Receiver_Result GlobalID * (BobalID * (954C88C7-D33F-4ECF-985C-08512E3455DC) (954C88C7-D33F-4ECF-985C-08512E3455DC) (954C88C7-D33F-4ECF-985C-08512E3455DC) (954C88C7-D33F-4ECF-985C-08512E3455DC) (954C98C7-D33F-4ECF-985C-08512E3455DC) (954C98C7-D33F-4ECF-985C-08512E3455DC) (95340F8-F1EA-4078-2825-67799E4A511F) (95340F8-F1EA-4078-2825-67799E4A511F) (95340F8-F1EA-4078-2825-67799E4A511F) (95340F8-F1EA-4078-2825-67799E4A511F) (95340F8-F1EA-4078-2825-67799E4A511F) (95340F8-51EA-4078-2825-67799E4A511F) (95340F8-51EA-4078-2825-67799E4A511F) (95340F8-51EA-4078-2825-67799E4A511F) (95340F8-51EA-4078-2825-67799E4A511F) (95340F8-51EA-4078-2825-67799E4A5116) (95340F8-51EA-4078-2825-67799E4A5116) (95340F8-51EA-4078-2847-4825-657522 (95340F8-51EA-4078-2847-4825-657522	2 Floor Le 4) 77 3 4 5 6	vel Noise Li 1 1 1 1 1 2 3 3	65 evel Crit 75 69 66 67 77 72	1.5 teria Ex 70 70 65 65 55 70 70	<nul cceed 4.1 0.3 1.5 13.9 6.1 1.2</nul 	INMD 1 <null> <null></null></null></null></null></null></null></null></null></null></null></null></null>	<null></null>	INMD C <null> <null> Parallel 30°-60° 30° 60° <null></null></null></null>	0
3 Elete F Height 4 8 3 3 3 4 4 4 4 4 4	Worship ment_LineIn Copy Uses Domestic Office Education Worship Diagnostic Domestic Domestic Domestic	CNull> guit_points_3D Image: Receiver_Point_ALL GUID (318281C0-2436-48C8-90E1-E1614819572A) (26590C8E-5A16-4C16-B174-486A39A471ADA) (26590C8E-5A16-4C16-B174-486A39A471ADA) (S0735717-0870-426A-AEF6-8C906598C157) (Ar21489E-8DA1-49CC)-A432-E6AF3A81C1D6 (FCAE77CF-1823-403E-9688-1286BEFE6F48) <null> <null></null></null>	[E89AFD87-2446-4D5E-A3F3-A8F0A0E9FF8D] ■ Barrier_ALL ■ Receiver_Result × GlobalD * [3671A1F3-E3A4-4C0A-8BF4-1981F60B8D3] (969340F8-F1FA-4D78-82B5-67796E4A511F) [369340F8-F1FA-4D78-82B5-67796E4A511F] (969340F8-F1FA-4D78-82B5-67796E4A511F] [3261D90]-ED14-42A0-A8A9-F2AB786BA2C (7501D90]-ED14-42A0-A8A9-F2AB786BA2C [36672E5-5847-4A9C-A17-248976BF12E] (7662D875-8847-4A9C-A17-248976BF12E] [36672E5-5847-3485-67706485265]	2 Floor Le 4) Floo	67 vel Noise Lo 1 1 1 1 2 3 4	65 evel Crit 75 69 66 67 69 77 72 74	1.5 teria Ex 70 65 55 70 70 70 70	<nul cceed 4.1 0 0.3 1.5 13.9 6.1 1.2 3.1</nul 	INMD 1 <null> <null></null></null></null></null></null></null></null></null></null></null></null></null></null></null>	<null></null>	INMD C <null> Parallel 30°-60° 30° 60° <null> <null></null></null></null>	0

{B4A3B1A1-7F81-40FA-B576-11BBCAB0D804} 3 66 70 0 <Null> <Null>

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

8 Office <Null>

Project Map Insert Analysis View Edit Imagery Share View Data RONOSS-HK Image: A constraint of the state of the sta	🖹 🖻 🗑	ار د ا	¢• ∓								Table	Standalo	one Table	RONO	S-HK	
New Open Save Zoom Full Add Explore Discard Create Rectangle Clear Attribute Edit Delete Workspace Tables RoAD BLOG	Project	Map	o Inse	rt	Analysis	View	Edit	Imagery	Sh	are	View	Da	ata	RONO	SS-HK	
E dikin a	New Open	Save 3	Zoom Full Extent	Add Data	Explore	R Save	Discard Crea	te Rectangle	Clear	Attribute Table	Edit Vertice	X Delete	Generate Workspac	Open e Tables	ROAD	BLDG

Step 4:



"INMD" under "Run" toolbar to calculate the mitigated cases.

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

Result	Х
Completed	
Start Time: Tuesday, November 14, 2023 11:00:26 AM	
Succeeded at Tuesday, November 14, 2023 11:00:26 AM (Elapsed Time: 0.51 second	nds)
	Close



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 I	Voise L	evel		: Mitigated Noise Level	rounded	d to near	est dB(A

Mit Exceedance

: Wittigated Noise Level rounded to nearest dB(A)

e : 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]			
				Name	User-defined name		
				SEG ID	Segment ID		
				Flow ID Start X	X coordinate of the start of the road segment		
				Start X Start Y	Y coordinate of the start of the road segment		
			e.g. Common Spatial	Start Z	Level in mPD of the start of the road segment		
	Import	.shp	(CSDI)	End X	X coordinate of the end of the road segment		
(i) Road	mport	.onp	(https://www.csdi.gov.	End Y	Y coordinate of the end of the road segment		
(Existing/ Planned)			hk/) (existing road)	End Z	Level in mPD of the end of the road segment		
				Road Surface	"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		
				Name	User-defined name for traffic flow		
				Flow ID	Traffic flow ID Traffic flow for Vahiala Catagory 1 in yeh/hr		
(ii) Traffic Flow	Manual Input	_	_		Traffic flow for Vehicle Category 2 in veh/hr		
(ii) Hame How	Manual Input			VC2 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	Import	11	e.g. iB1000 basemap				
(Existing)	(Existing building)	.gab	(existing building)	-	-		
				Name	User-defined barrier name		
				BAR ID	Barrier ID		
				BAR TYPE	"Yes" for reflective barrier		
				п	"No" for non-reflective barrier 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		
(iv) Building				Start Z	Level in mPD of the start of the base of barrier		
(Existing/	Manual	_	_	End X	X coordinate of the end of the barrier		
Planned), Noise	Digitization			End Y	Y coordinate of the end of the barrier		
Barrier, Terrain				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		
				Conti Angle (D)	(i.e. right = anti-clockwise from start to end of the barrier)		
				CantiAngle (K)	"Yes" for elevated barrier		
				Elevated	"No" for non-elevated barrier		
				Name	User-defined receiver name		
				REC ID	Receiver ID Opening side of window, i.e. poise assessment point		
				Side	"Left" = clockwise from start to end of the digitised window line "Right" = anti-clockwise from the start to end of the digitised window line		
				Х	X coordinate of the noise assessment point		
				Y	Y coordinate of the noise assessment point		
	Manual			Z	Level in mPD of the first noise assessment point		
(v) Receiver	Digitization	-	-	No. of Floor Coloulation	Number of floors to be calculated, including first floor		
				F-F Height	Height between floor and floor in metre		
				i i indigiti	Uses of the receiver,		
					"Domestic",		
				Uses	"Office",		
				0505	"Education",		
					"Worship", or "Diagnostic"		
					Types of INMD.		
					"NA",		
					"Acoustic Windows (Top-hung Type)",		
					"Acoustic Windows (Baffle Type)",		
					"Acoustic Windows (Absorptive Battle Type)",		
				INMU Type	Acoustic Windows (Danie Type) + Fill, "Acoustic Windows (Absorptive Raffle Type) + Fin"		
(vi) Innovative	Manual Input				"Enhanced Acoustic Balcony (Side-hung Type)".		
Noise Mitigation	to Result	-	-		"Enhanced Acoustic Balcony (Absorptive Side-hung Type)",		
Design (INMD)	Table				"Enhanced Acoustic Balcony (Baffle Type)", or		
	1 4010				"Enhanced Acoustic Balcony (Absorptive Baffle Type)		
					Configuration of INMD,		
					"Parallel (0°)",		
				INMD Config	"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?

	Receiver_Point	III Road	BAR	E REC		Fraffic ×	🖽 BL	.DG	🔠 Build	ling
Fiel	d: 📮 Add 📑	Calculate	Selection:	elect By Attri	butes 💮	Zoom 🕽	То	Switch	Clear	D D
1	OBJECTID *	Name	Flov	v ID	FLO_1	FLO_2	FLO_3	FLO_4	Speed	
1	1	<null></null>	A1		320	43	0	1	50	
2	2	<null></null>	A2		320	43	0	1	50	
3	3	<null></null>	A3		58	2	0	1	50	
4	4	<null></null>	A4		241	13	0	1	50	
5	5	<null></null>	A5		241	13	0	1	50	
6	6	<null></null>	A6		96	4	0	1	50	
7	7	<null></null>	A7		386	20	0	1	50	
8	8	<null></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.

Gen	erating segment points	?	×
0	No Parameters		
	Γ	OK	
		UK	

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.

	🛙 Traffic 💷 Road 💷 Building 💷 Receiver_Point 💷 BAR 💷 REC 💷 Segment_LineInput_Points_3D 💷 Receiver_Point_ALL 🔛 Barrier_ALL 🗡 🛄 BLDG													
Field: 🕅 Add 🕮 Calculate 🛛 Selection: 🖫 Select By Attributes 🚭 Zoom To 🖶 Switch 📄 Clear 💭 Delete 🖶 Copy														
	OBJECTID *	Shape *	Name	BAR ID	BAR TYPE	н	Start X 🗠	Start Y	Start Z	End X	End Y	End Z	CantiLength (L)	CantiAngle (L)
1	68	Polyline Z	<null></null>	68	Yes	13.6	<null></null>	<null></null>	3.3	<null></null>	<null></null>	3.3	<null></null>	<null></null>
2	71	Polyline Z	<null></null>	71	Yes	13.6	<null></null>	<null></null>	3.3	<null></null>	<null></null>	3.3	<null></null>	<null></null>
3	123	Polyline Z	<null></null>	123	Yes	13.6	<null></null>	<null></null>	3.3	<null></null>	<null></null>	3.3	<null></null>	<null></null>
4	151	Polyline Z	<null></null>	151	Yes	13.6	<null></null>	<null></null>	3.3	<null></null>	<null></null>	3.3	<null></null>	<null></null>
5	165	Polyline Z	<null></null>	165	Yes	13.6	<null></null>	<null></null>	3.3	<null></null>	<null></null>	3.3	<null></null>	<null></null>
6	230	Polyline Z	<null></null>	230	Yes	51.599998	<null></null>	<null></null>	13.6	<null></null>	<null></null>	13.6	<null></null>	<null></null>
7	261	Polyline Z	<null></null>	261	Yes	51.599998	<null></null>	<null></null>	13.6	<null></null>	<null></null>	13.6	<null></null>	<null></null>
8	266	Polyline Z	<null></null>	266	Yes	51.599998	<null></null>	<null></null>	13.6	<null></null>	<null></null>	13.6	<null></null>	<null></null>
9	352	Polyline Z	<null></null>	352	Yes	51.599998	<null></null>	<null></null>	13.6	<null></null>	<null></null>	13.6	<null></null>	<null></null>
10	398	Polyline Z	<null></null>	398	Yes	51.700001	<null></null>	<null></null>	13.6	<null></null>	<null></null>	13.6	<null></null>	<null></null>
11	414	Polyline Z	<null></null>	B2	Yes	2	836827.8879	817828.7859	20	836753.4969	817814.028	19	<null></null>	<null></null>
12	413	Polyline Z	<null></null>	B1	Yes	2	836904.0242	817856.5237	22	836831.183	817829.6986	20	<null></null>	<null></null>
13	412	Polyline Z	<null></null>	412	Yes	15.3	837041.4747	818538.3554	4	837043.0132	818540.9985	4	<null></null>	<null></null>
14	409	Polyline Z	<null></null>	409	Yes	15.3	837043.0132	818540.9985	4	837045.6367	818539.4994	4	<null></null>	<null></null>
15	A11	Dolyline 7	z Molls	/11	Ver	15.3	837044 1573	818536 8365	4	8370/1 //7/7	818538 3554		ZNolls	< Nolls

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_LineInput_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".

Calo	culate Reflection	?	\times
0	Pending edits.		×
0	No Parameters		
		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.

Options		×
Project Current Settings	Set quality and performance options for drawing maps and scenes	^
Units Tasks	Antialiasing mode Fast - Text antialiasing mode Force -	н
Application General	Stereoscopic mode Off •	н
Map and Scene Navigation	Rendering quality Low (speed) High (quality)	н
Selection Editing	Rendering engine	н
Versioning Geoprocessing	OpenGL	н
Device Location	Enable vertical synchronization	н
Share and Download	Local cache	н
Full Motion Video	C:\Users\jason.lau\AppData\Local\ESR\Local Caches	2
Display Table	Clear cache (current cache size 336.96 MB)	~
Layout Text and Graphics	Note: Updates to these settings require closing and reopening the project if you click OK.	
	ОК С	ancel

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.

■ ● ● 5・0・1		Table	Standalone Table	RONOSS-H	IK
Project: Map Insert Analysi	View Edit Imagery Share	View	Data	RONOSS-	łK
😫 🖂 📷 🍈 🗯 🔶			×		
New Open Save Zoom Full Add Explore Extent Data	Save Discard Create Rectangle Clear Attribu Table	te Edit Vertices	Delete Generati Workspar	e Open Ro ce Tables	AD BLDG
General	Editing		Work	space	Import