

Environmental Impact Assessment

October 2020

India: Bengaluru Metro Rail Project

Phase 2A (Outer Road Ring Metro Line)

Volume 7
Annex 5

Prepared by Bangalore Metro Rail Corporation Ltd. (BMRCL), India for the Asian Development Bank.

NOTES

- (i) The fiscal year (FY) of the Government of India and its agencies ends on 31 March. "FY" before a calendar year denotes the year in which the fiscal year ends, e.g., FY2019 ends on 31 March 2019.
- (ii) In this report, "\$" refers to United States dollars.

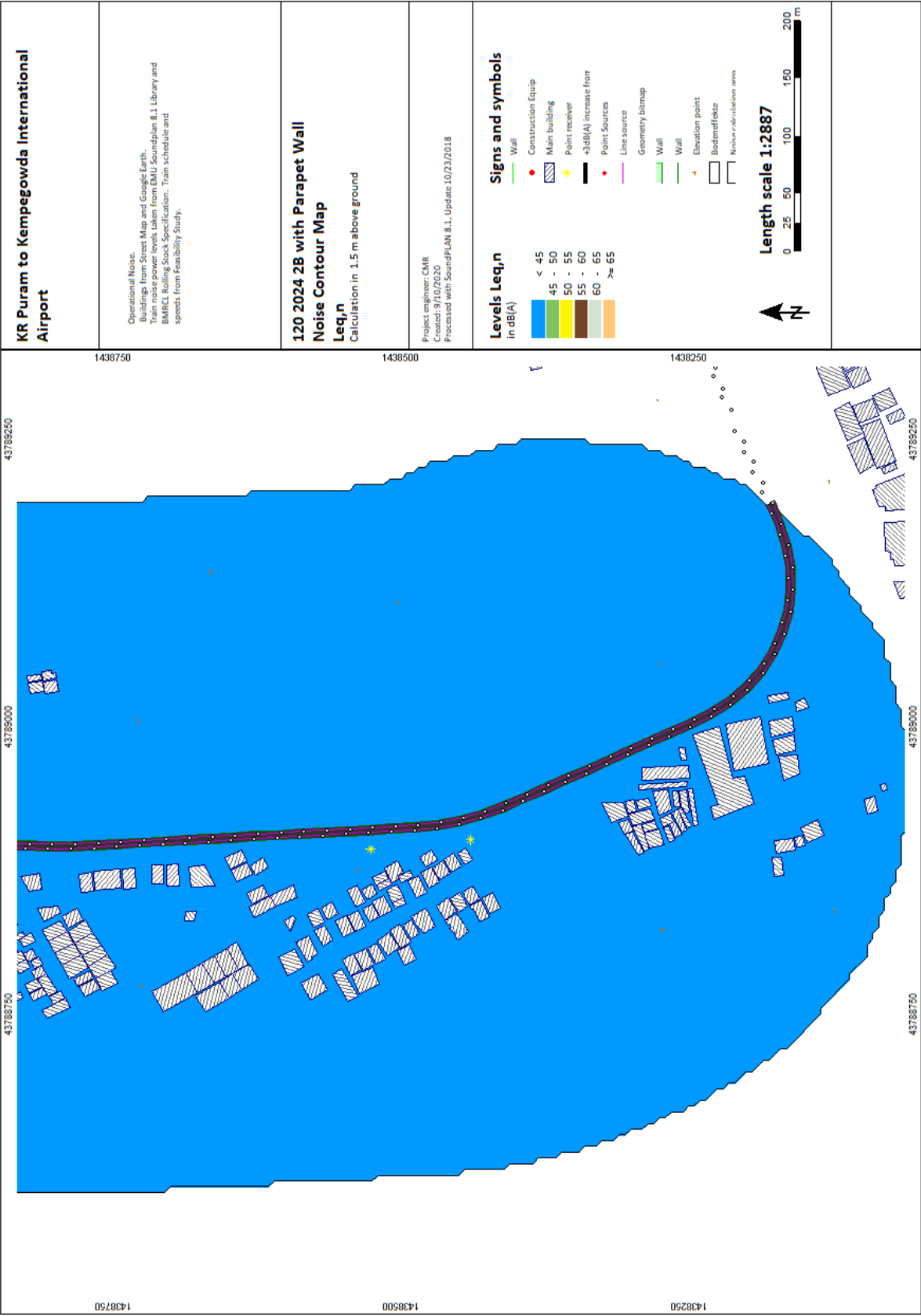
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APPENDIX C NOISE CONTOUR MAPS

ORR- KR PURAM

YEARS 2024, 2031, 2041



MR Puram to Kempegowda International Airport

Prepared for: **MR Puram to Kempegowda International Airport**
 Date: 15/01/2024
 Project: **MR Puram to Kempegowda International Airport**
 Location: **MR Puram to Kempegowda International Airport**
 Scale: **1:2887**

120 2024 2B with Parapet Wall
Noise Contour Map
Leq,d
 Calculation in 1.5 m above ground

Project: **MR Puram to Kempegowda International Airport**
 Location: **MR Puram to Kempegowda International Airport**
 Scale: **1:2887**

Levels Leq,d
in dB(A)

< 45	Blue
45 - 50	Light Blue
50 - 55	Yellow
55 - 60	Orange
60 - 65	Red
>= 65	Dark Red

Signs and symbols

Wall	Green line
Construction Equip	Red circle
Main building	Blue hatched rectangle
Point receiver	Yellow star
+3dB(A) increase from	Black line
Point Sources	Red circle
Line source	Purple line
Geometry blimp	Green line
Wall	Green line
Wall	Green line
Elevation point	Red star
Bottomplate	White rectangle
Noise evaluation area	White rectangle

Length scale 1:2887

0 25 50 100 150 200 m



KR Puram to Kempegowda International Airport

Operational Noise:
Buildings from Street Map and Google Earth.
Main receiver locations from BWU Soundplan 8.1 Library and
BMBCL Building and Specification. Train schedule and
speeds from Feasibility Study.

**120 2024 2B with Parapet Wall
Noise Contour Map
Leq,n**
Calculation in 1.5 m above ground

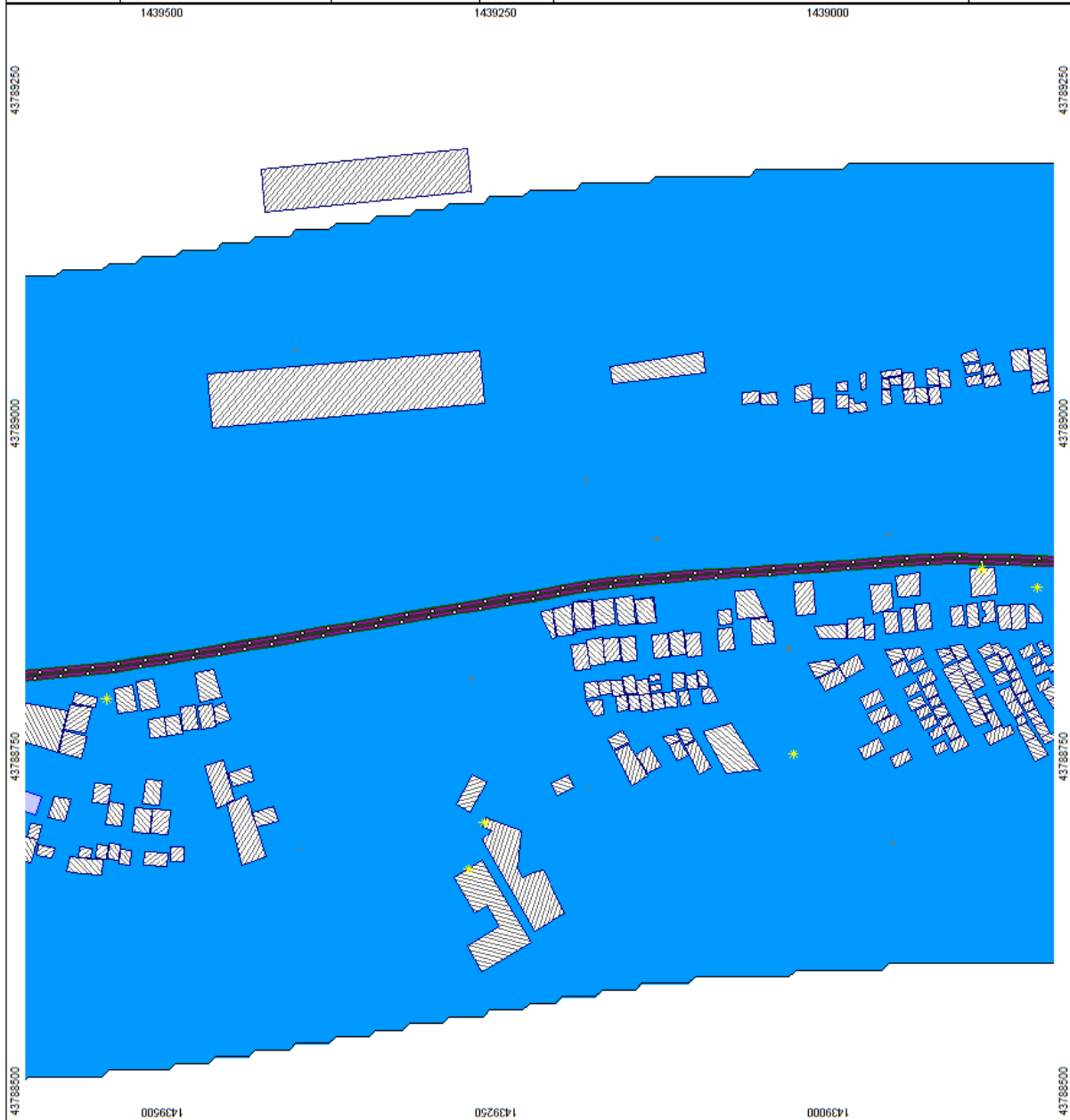
Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,n in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

Wall	Construction Equip
Main building	Point receiver
+3dB(A) increase from Point Sources	Line source
Geometry bitmap	Wall
Elevation point	Bodenreflekte
Receiver calculation area	



KR Puram to Kempegowda International Airport

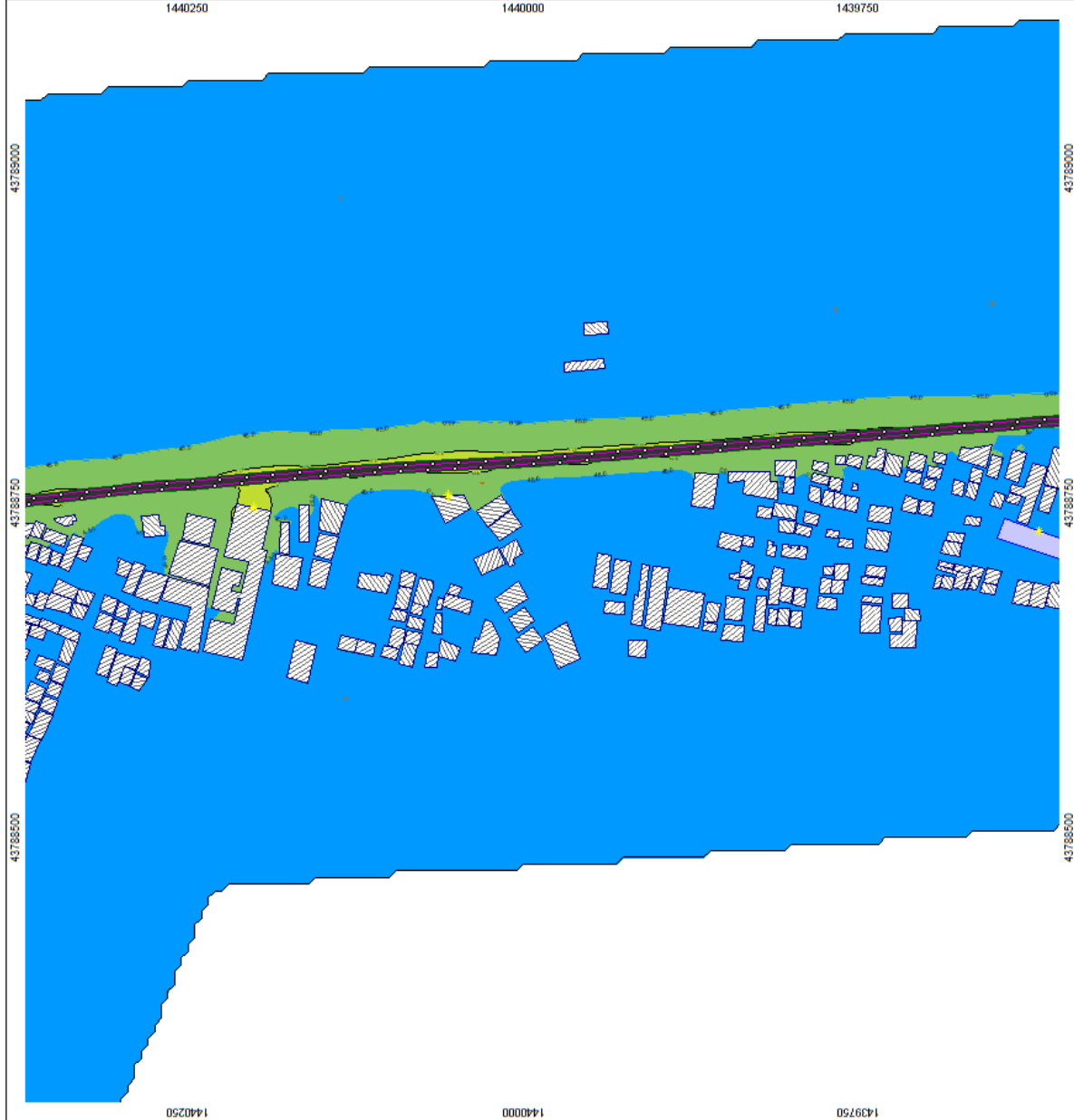
Operational Noise:
 Street Map and Google Earth
 Train noise power levels taken from EMU Soundplan 8.1 Library and
 BMRL Rolling Stock Specification. Train schedule and
 speeds from Feasibility Study.

**120 2024 2B with Parapet Wall
 Noise Contour Map
 Leg,d**

Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update: 10/23/2018

- Levels Leg,d
 in dB(A)**
- < 45
 - 45 - 50
 - 50 - 55
 - 55 - 60
 - 60 - 65
 - >= 65
- Signs and symbols**
- Construction Equip
 - Main building
 - Point receiver
 - 3dB(A) increase front
 - Point Sources
 - Line source
 - Geometry bitmap
 - Wall
 - Wall
 - Elevation point
 - Border/edge
 - Noise calculation area

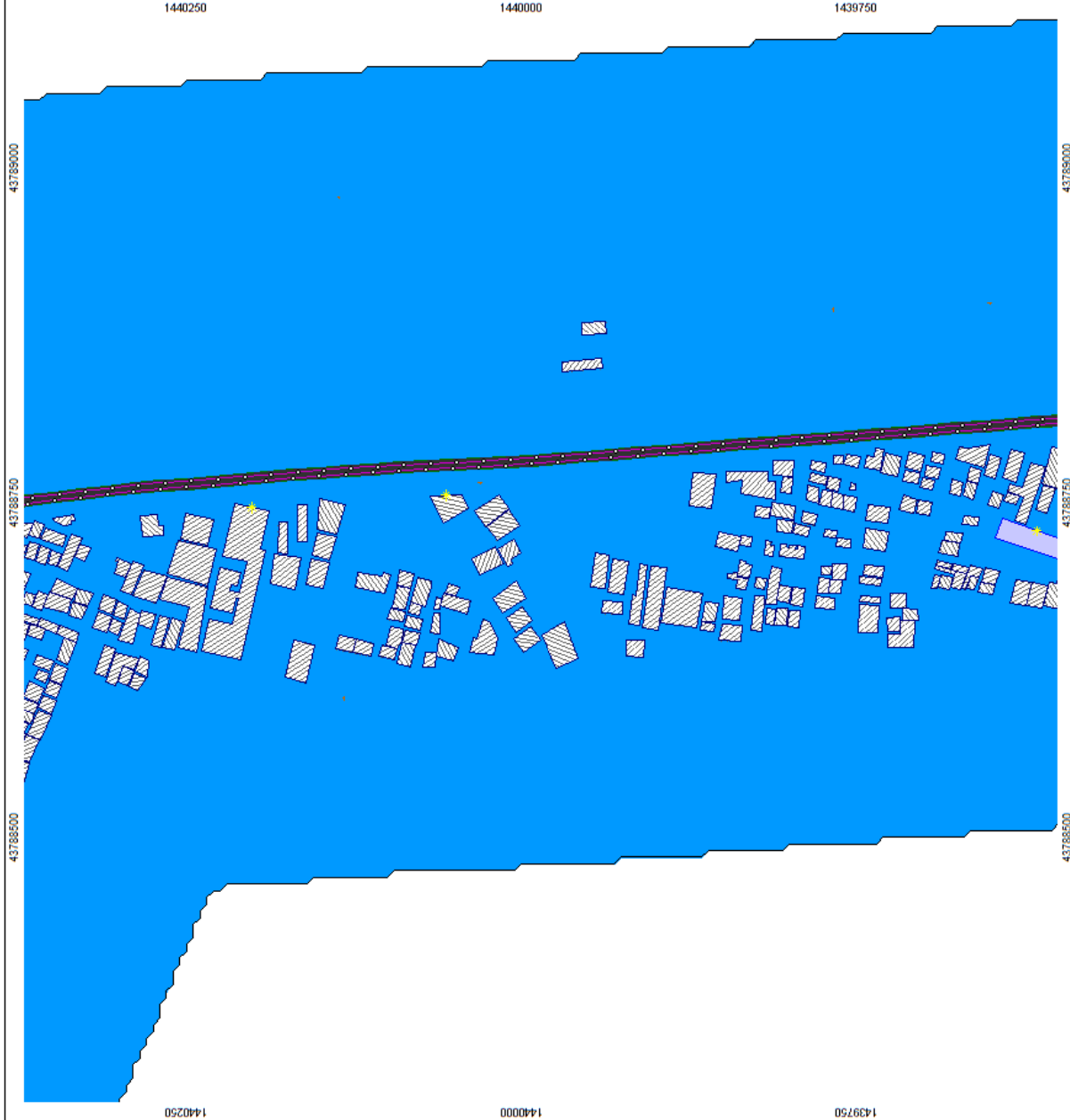


KR Puram to Kempegowda International Airport

Operational Noise:
Buildings from Street Map and Google Earth.
Noise contours from SoundPLAN 8.1 Library and
BMRCL Rolling Stock Specification. Train schedule and
speeds from Feasibility Study.

**120 2024 2B with Parapet Wall
Noise Contour Map
Leq,n**
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update 10/03/2018

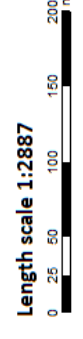


**Levels Leq,n
in dB(A)**



Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry blimp
- Wall
- Elevation point
- Bodeneffekte
- Noise calculation area



KR Puram to Kempegowda International Airport

Operational Noise:
Buildings: From Street Map and Google Earth.
Train noise power levels taken from EMU Soundplan 8.1, Library and BIMBCL Rolling Stock specification. Train schedule and speeds from Feasibility Study.

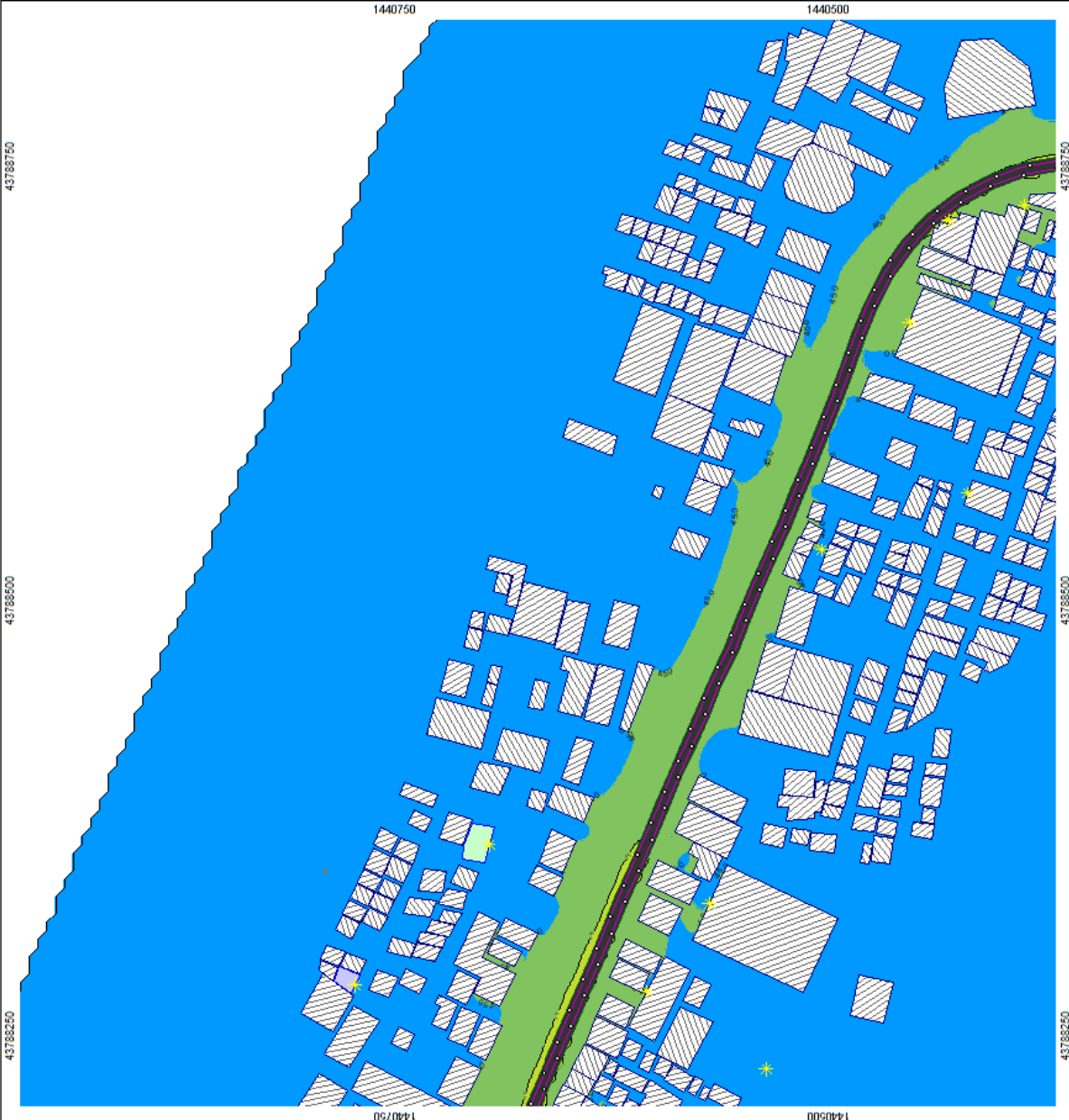
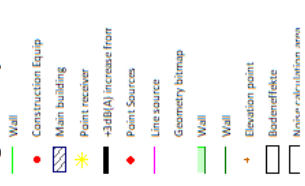
**120 2024 2B with Parapet Wall
Noise Contour Map
Leq,d**
Calculation in 1.5 m above ground

Project engineer: CMR
Issued: 31/10/2024
Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,d
in dB(A)



Signs and symbols



KR Puram to Kempegowda International Airport

Operational Noise, Buildings from Street Map and Google Earth, Train noise power levels taken from EMU Soundplan 8.1 Library and BMKCL Rolling Stock Specification, Train schedule and speeds from Feasibility Study.

120 2024 28 with Parapet Wall Noise Contour Map

Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,n in dB(A)

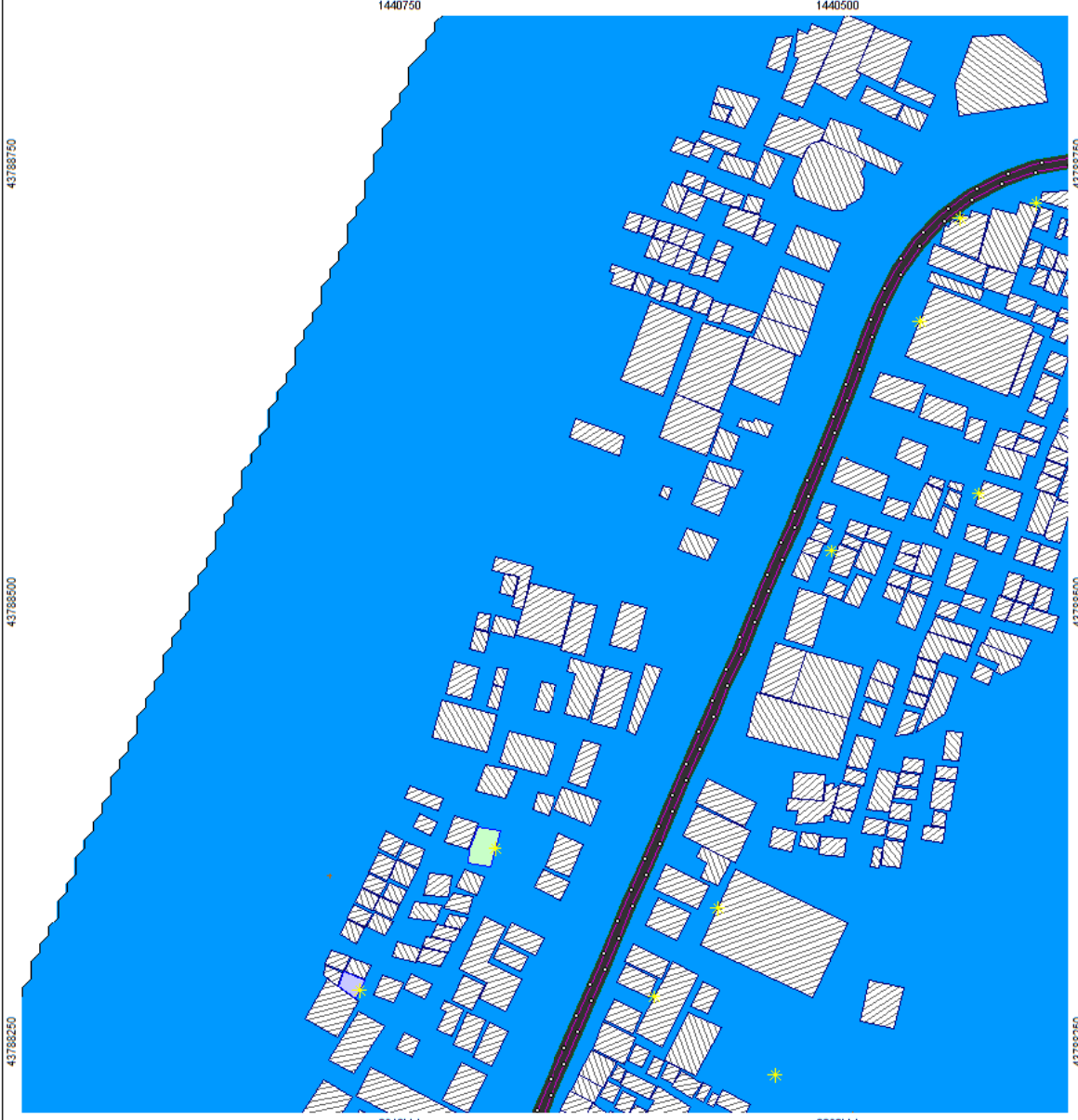
< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry blimpap
- Wall
- Elevation point
- Bodenreflekt
- Nischenabschirm area

Length scale 1:2232

0 20 40 80 120 160 m

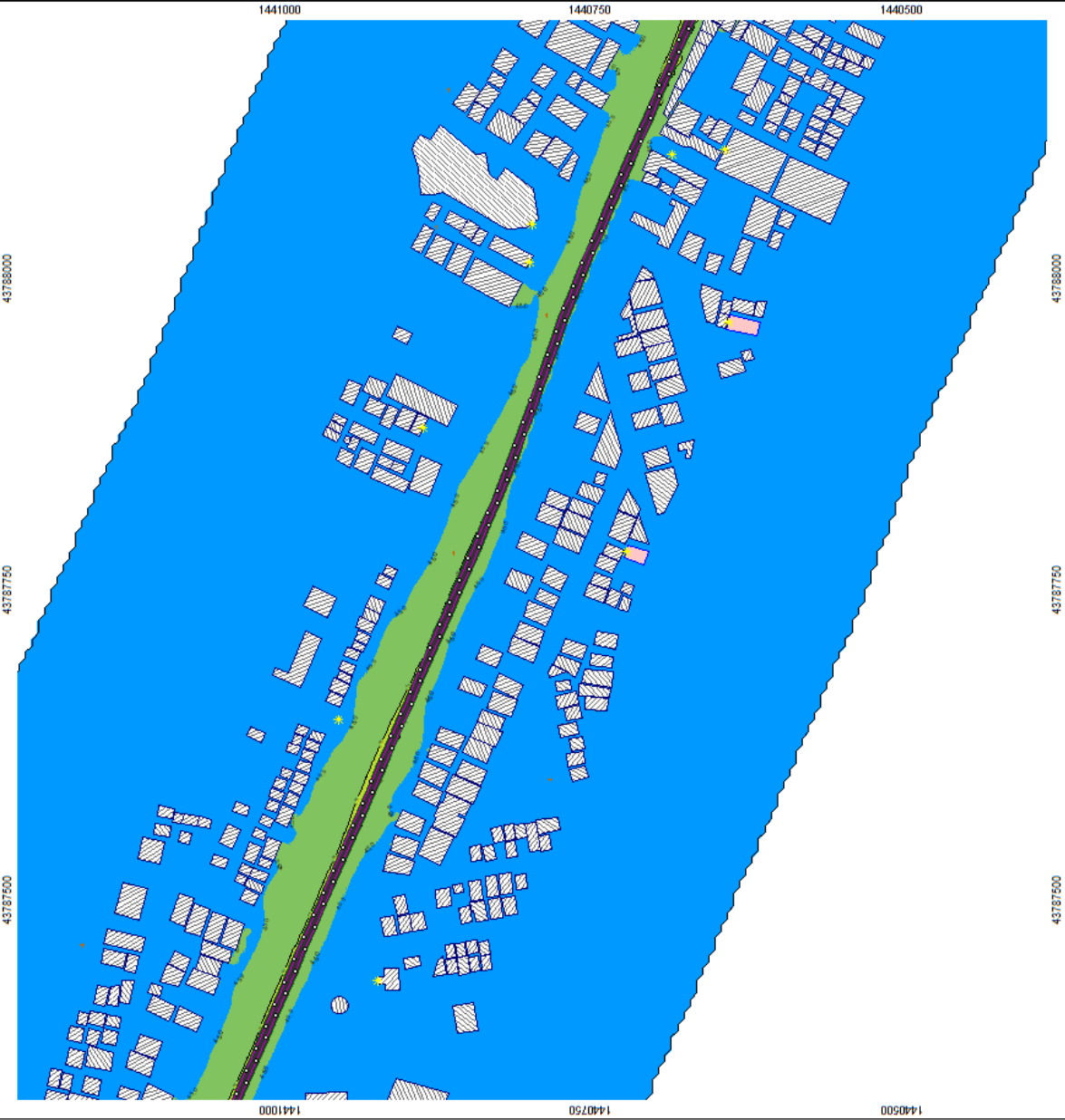


KR Puram to Kempegowda International Airport

Operational Noise, Noise Map and Grade-Earth. Train noise power levels taken from BMJ Soundplan 8.1. Library and BMRII Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

120 2024 2B with Parapet Wall Noise Contour Map
Leq,d
 Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1. Update: 10/23/2018

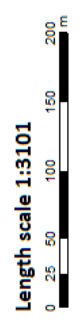


Levels Leq,d
 in dB(A)



Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase front
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wall
- Elevation point
- Bodenreflekte
- Noise calculation area

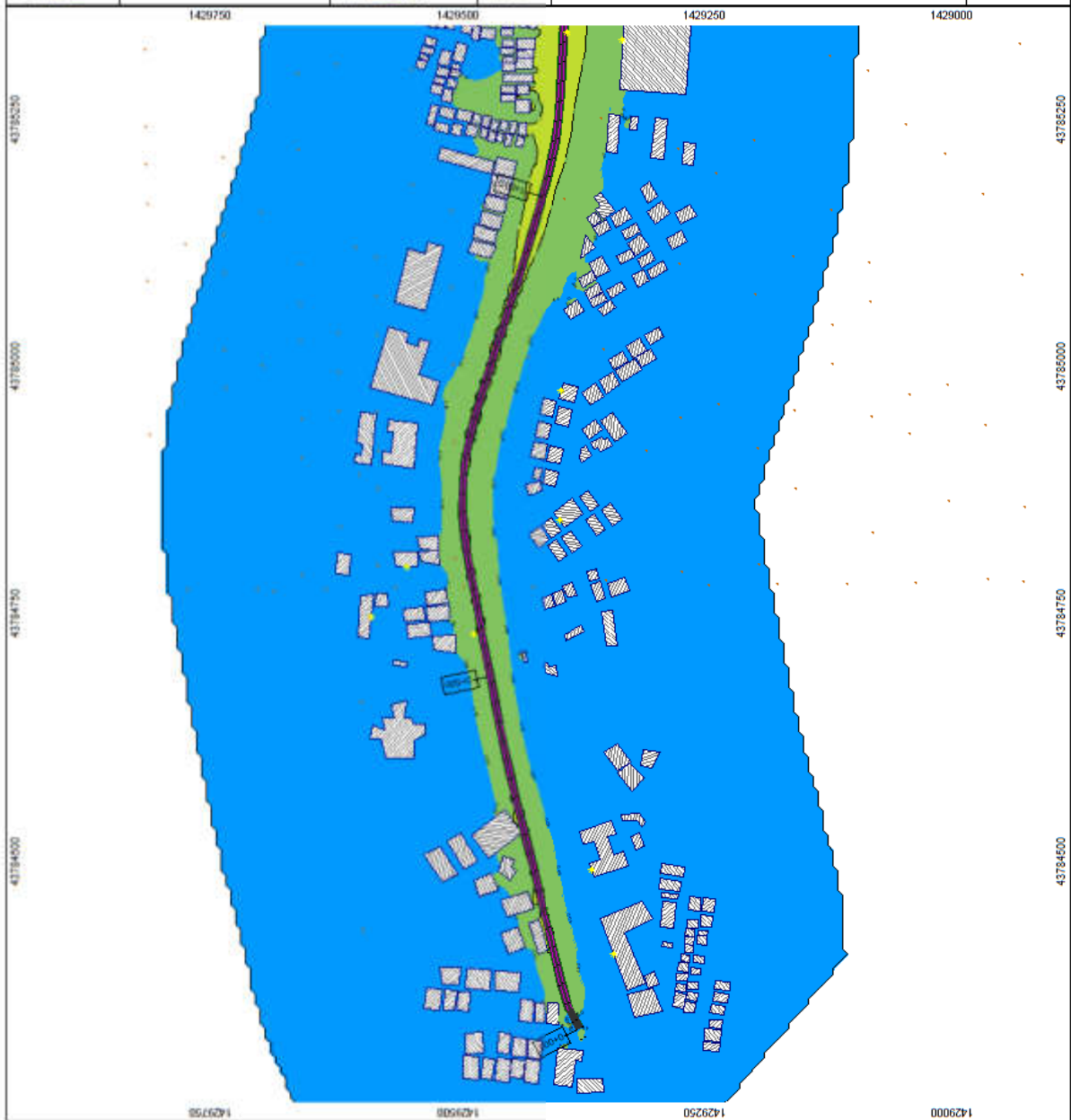


"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise Contour Map and Graphical Train receiver levels from (MR) SoundPLAN 8.1.1 Library and (MBC) Building Stock Specification. Train schedule and month from Feasibility Study.

110 2024 2A with Parapet Wall Noise Contour Map
Leq,d
 Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 8/10/2020
 Produced with SoundPLAN 8.1.1, Update 16/2/2018



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Prepared by
 B. Srinivas Reddy, Sr. Surveyor
 Bangalore Urban District Council, Bangalore
 10/17, Central Silk Board, 1st Floor, 1st Stage,
 100th Cross, 10th Mile, Bangalore

**110 2024 2A with Parapet Wall
 Noise Contour Map**

Leq,1h
 Calculated in 1.2 m above ground

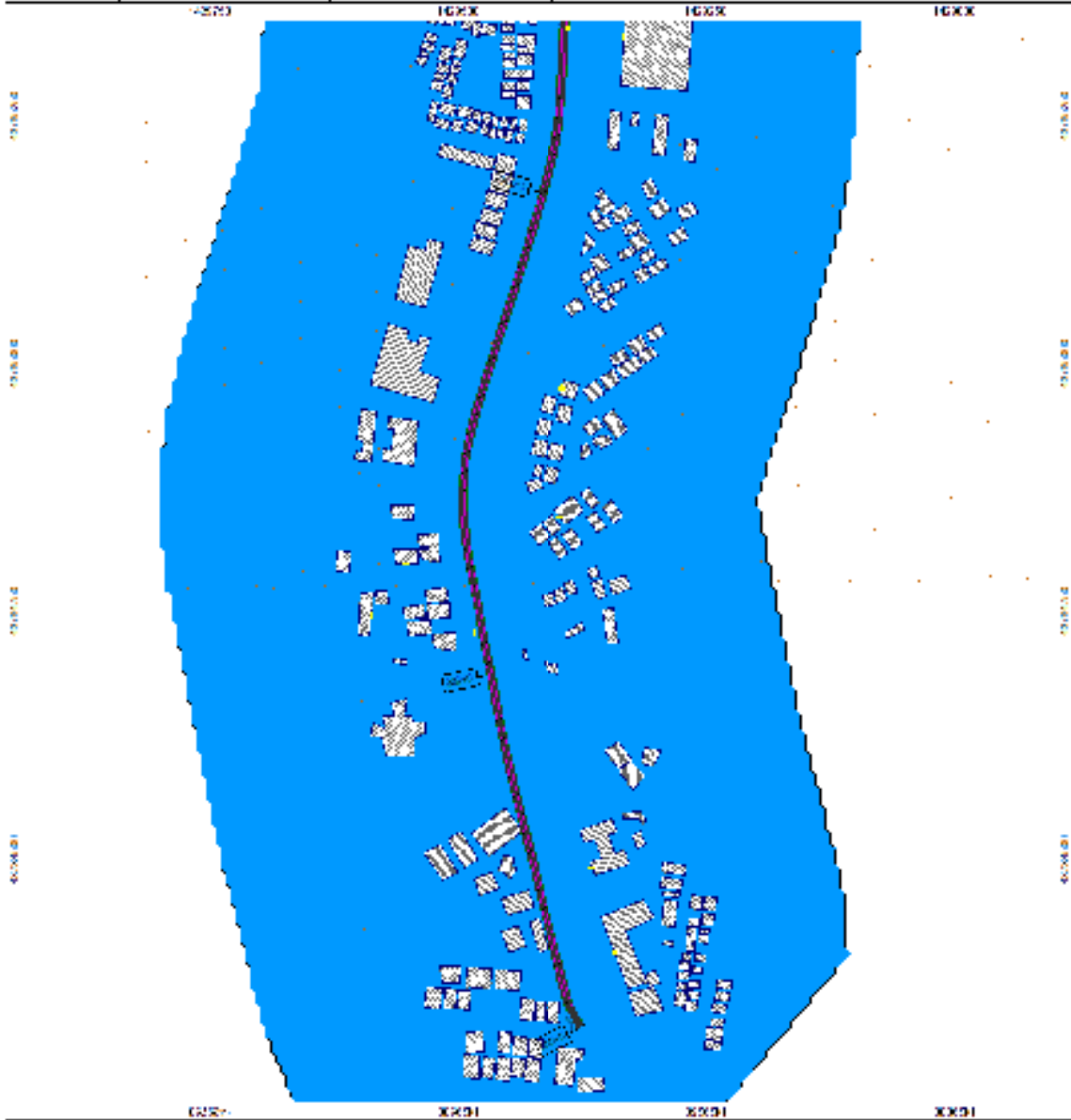
Project number: 2024
 Date: 10/17/2024
 Project location: Bangalore

Levels Leq,1h

40
45
50
55
60
65
70

Signs and symbols

- Level contour lines
- Track boundary
- Plot number
- Plot boundary
- Plot corners
- Intersect
- Street boundary
- Plot
- Manhole cover
- Plot center
- Plot corner location



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Traffic noise power levels from BMJ Soundplan 8.1, Library and BMJCL using Street Classification, train schedule and speeds from Feasibility Study.

110 2024 2A with Parapet Wall Noise Contour Map
Leq,d
Calculation in 1.5 m above ground

Project engineer: CMR
Project start: 9/10/2020
Processed with SoundPLAN 8.1, Update:10/23/2018

Levels Leq,d
in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

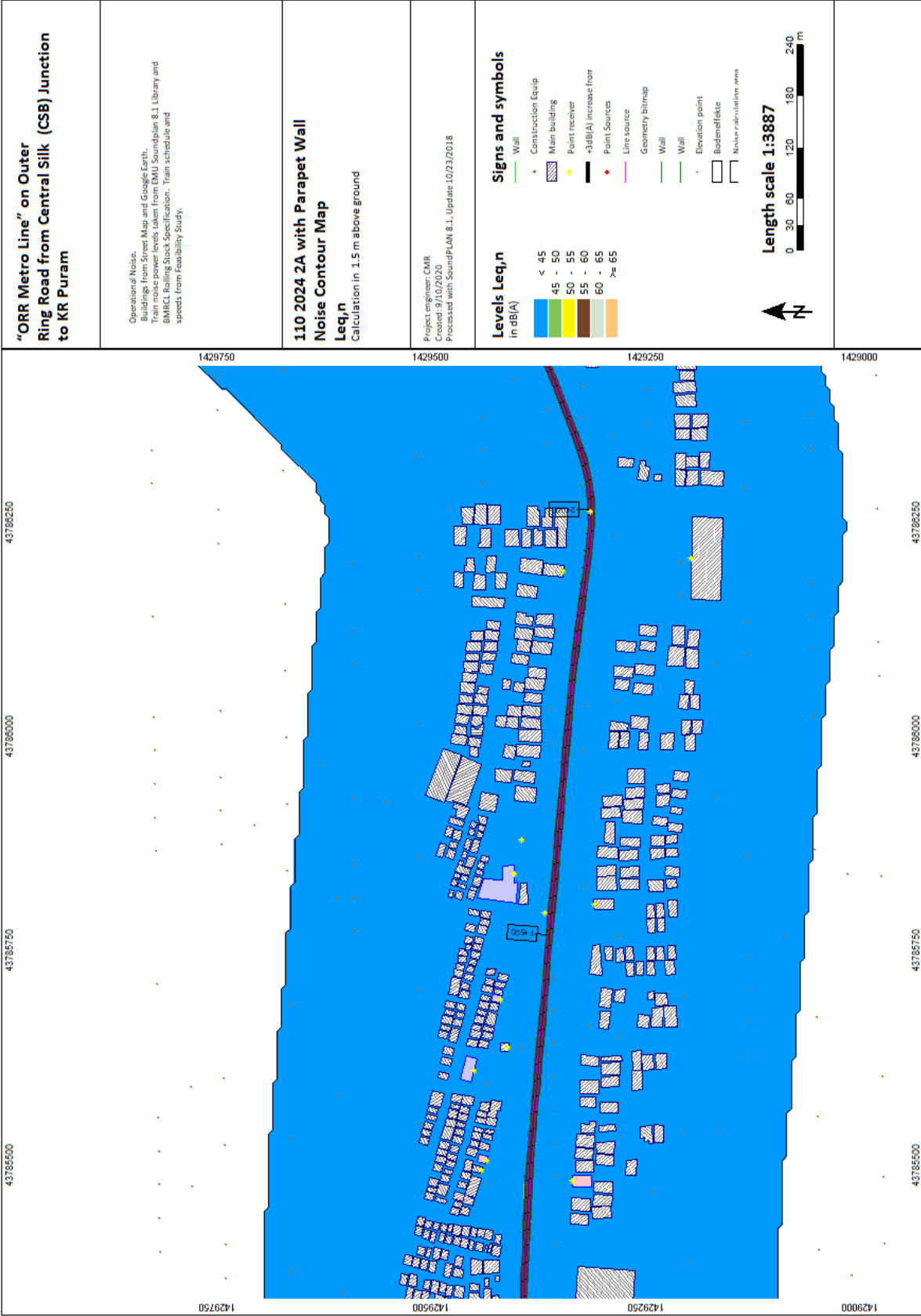
Signs and symbols

Construction Equip
Main building
Parapet wall
-10dB(A) increased height
Point Sources
Line sources
Geometry obstacle
Wall
Obstacle points
Acoustic facade
Noise calculation area

Length scale 1:3887

0 30 60 120 180 240 m





“ORR Metro Line” on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise.
Buildings: From Street Map and Google Earth.
Train noise power levels: taken from DMU Soundplan 8.1. Library and BIMBCL Rolling Stock Specification. Train schedule and speeds: from Feasibility Study.

110 2024 2A with Parapet Wall Noise Contour Map
Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,n in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
≥ 65

Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry blimp
- Wall
- Elevation point
- Bodenreflekte
- Naturerholungs areas

Length scale 1:3887
0 30 60 120 180 240 m

"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Buildings from Street Map and Google Earth.
 Topography from SRTM30 PLUS and BGM1 Soundshape 8.1 Library and
 BMRCI Rolling Stock Specification, Train schedule and
 speeds from Feasibility Study.

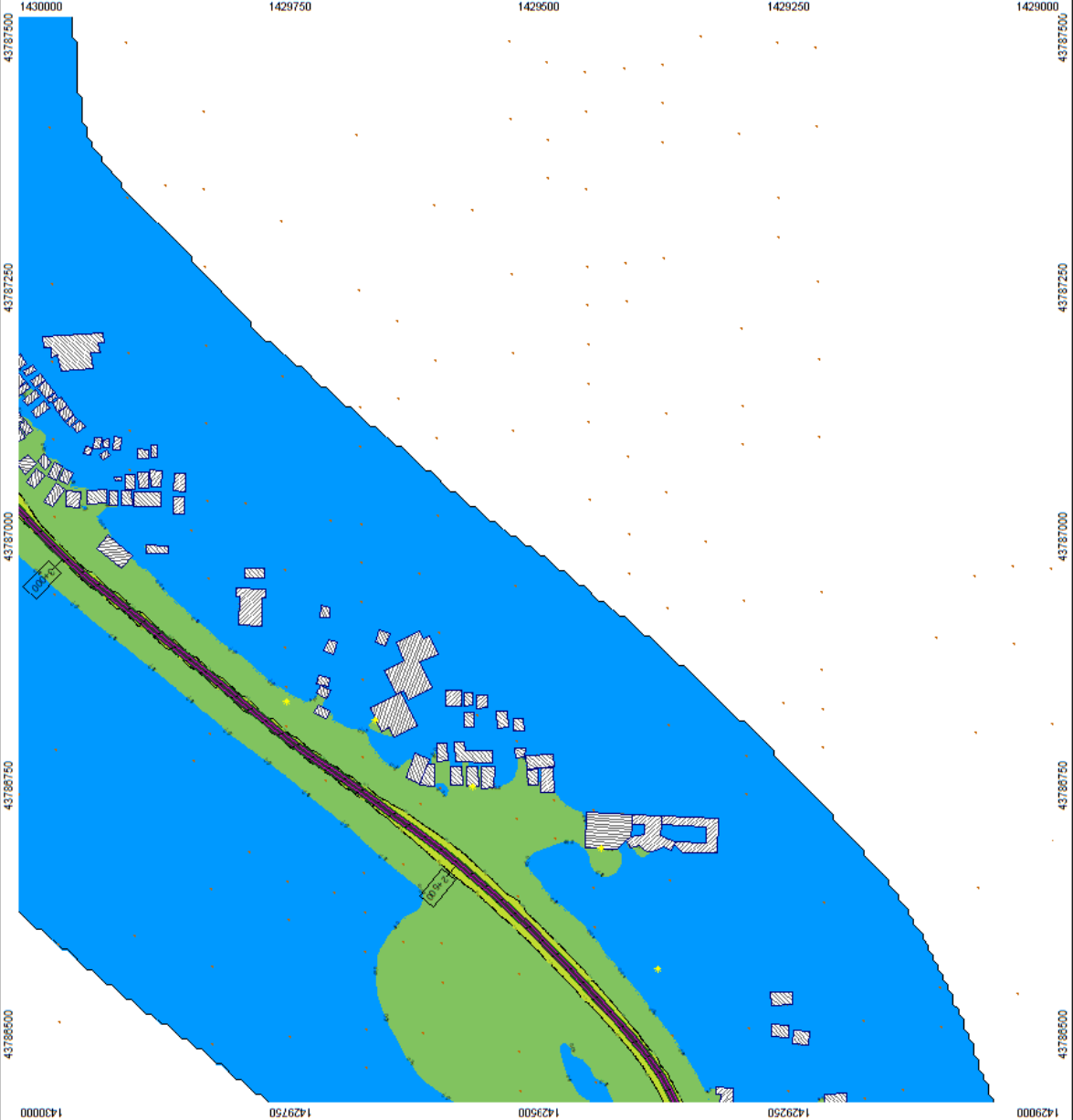
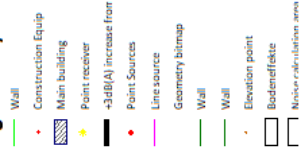
110 2024 2A with Parapet Wall Noise Contour Map
 Leq,d
 Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update: 10/23/2018

Levels Leq,d
 in dB(A)



Signs and symbols



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise Buildings from Street Map and Google Earth. Train noise power levels taken from BML Soundplan 8.1 Library and BMRCL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2024 2A with Parapet Wall Noise Contour Map

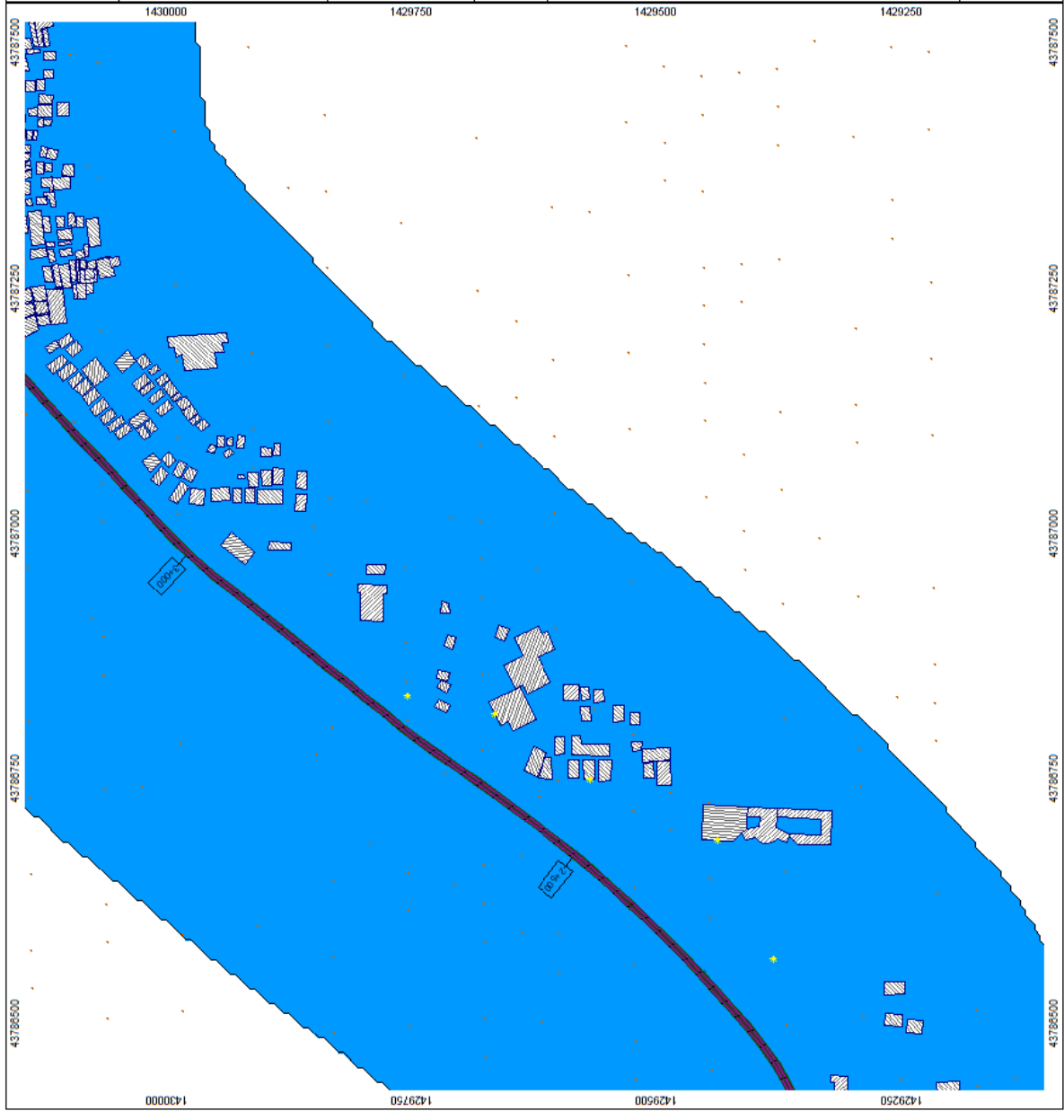
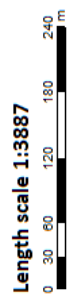
Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1. Update 10/23/2018

Signs and symbols

Levels Leq,n in dB(A)

	< 45		Construction Equip
	45 - 50		Main building
	50 - 55		Point receiver
	55 - 60		+3dB(A) increase floor
	60 - 65		Point Sources
	>= 65		Line source
			Geometry bitmap
			Wall
			Wall
			Elevation point
			Bodenreflekte
			Noise calculation area



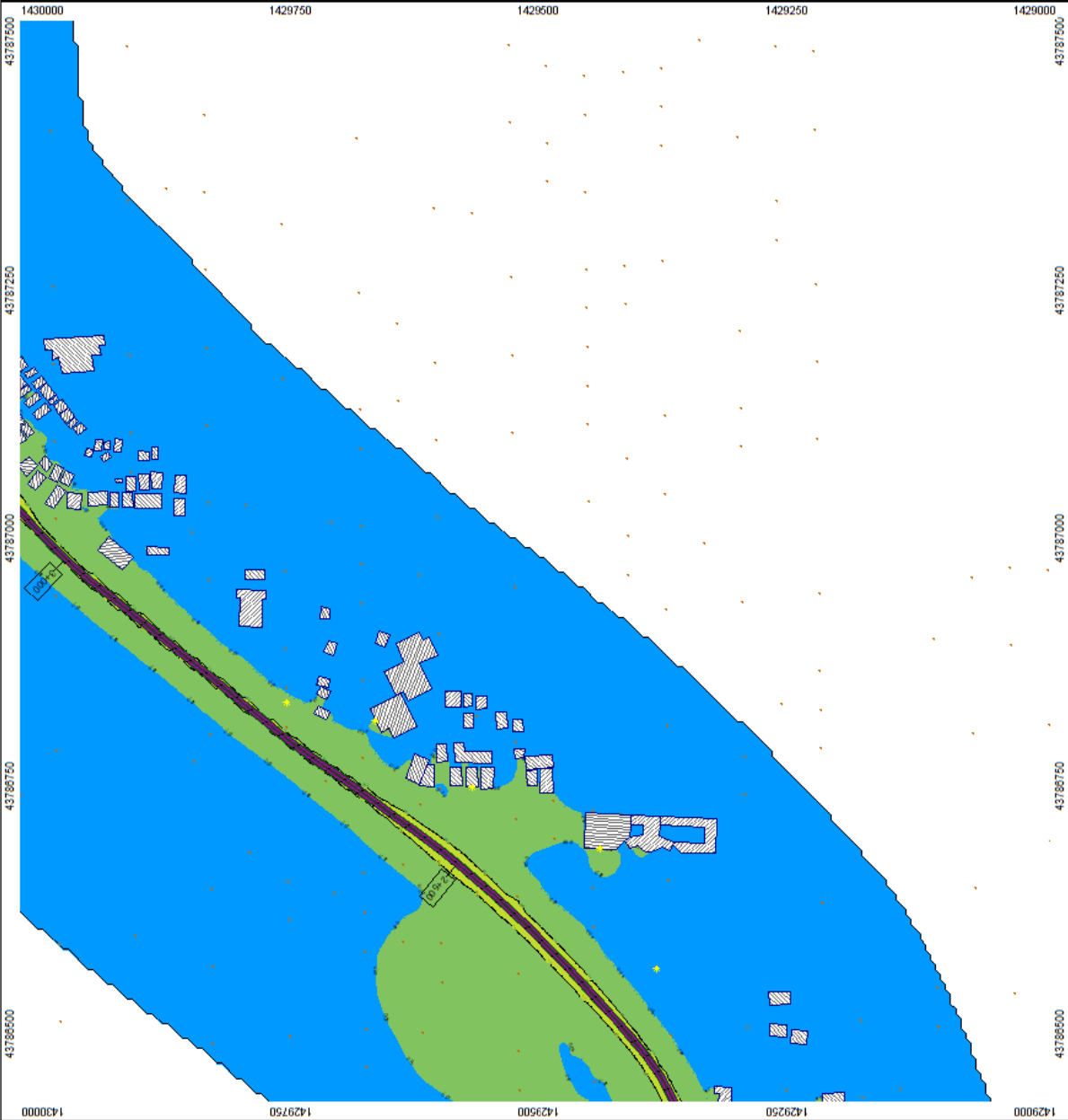
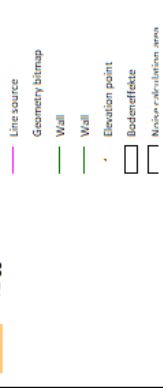
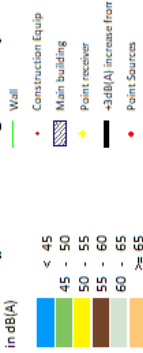
"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from BMW Soundplan 8.1, Library and BIMBL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2024 2A with Parapet Wall Noise Contour Map
Leq,d
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update: 10/23/2018

Levels Leq,d in dB(A)



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise
 1. Map from Open Street Map/Aerial Photo
 2. Noise contours from the model
 3. Noise contours from the model
 4. Noise contours from the model
 5. Noise contours from the model

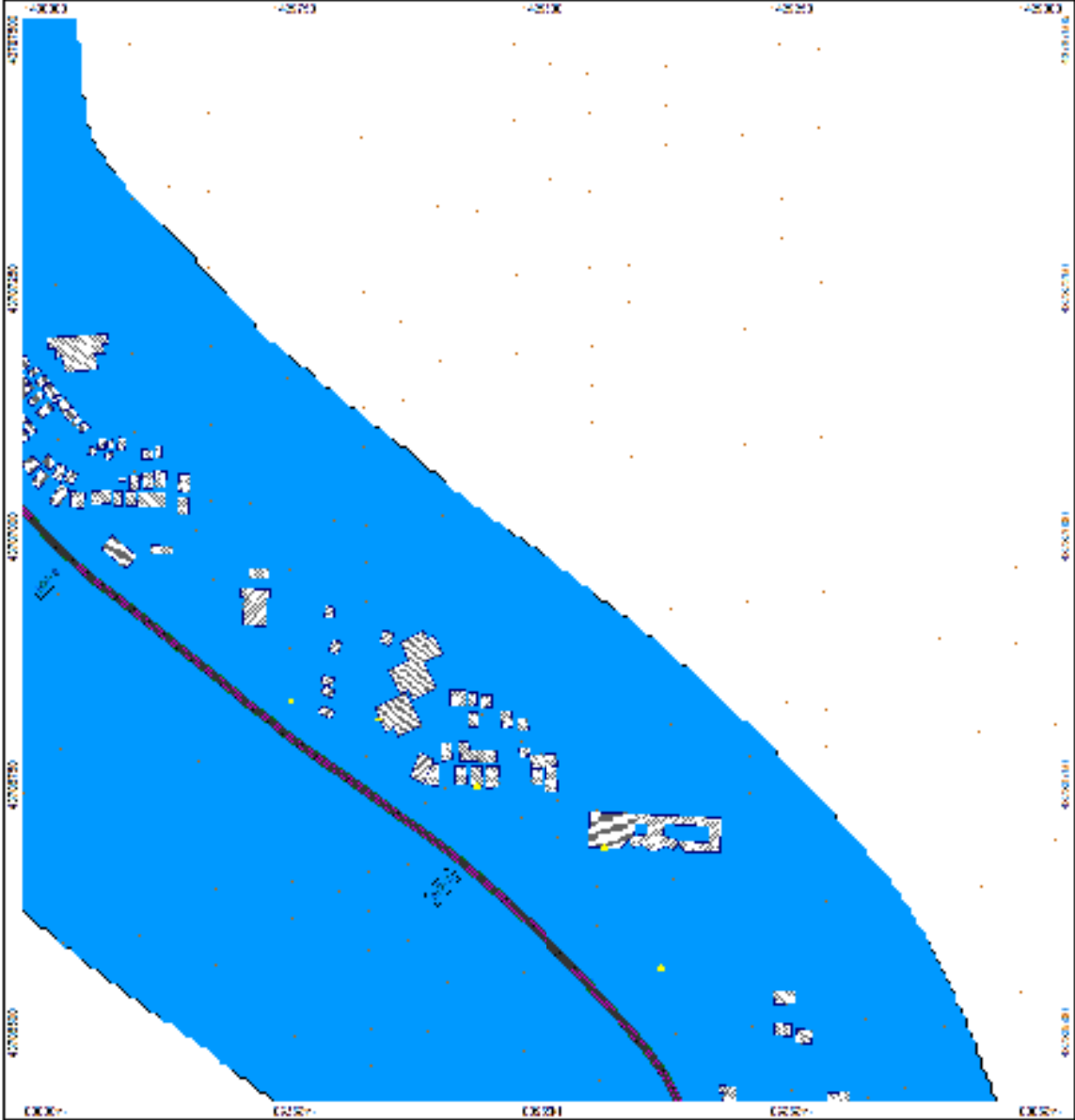
**110 2024 ZA with Parapet Wall
 Noise Contour Map
 Leq1h**

Project Name: 110 2024 ZA with Parapet Wall
 Project No: 110 2024 ZA with Parapet Wall
 Project Location: 110 2024 ZA with Parapet Wall

Signs and symbols

- | | |
|--|----------------------|
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
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| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |
| | Construction barrier |

Length scale 1:3887
 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 360 380 400 420 440 460 480 500 520 540 560 580 600 620 640 660 680 700 720 740 760 780 800 820 840 860 880 900 920 940 960 980 1000



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Building Footprint Map and Ground Elevation
The noise contours were taken from OMI Simulation B.1 Library and BARKO Building Stock Simulation. Train schedule and approach from feasibility study.

110 2024 2A with Parapet Wall Noise Contour Map

Leq,d
Calculation in 1.5 m above ground

Project engineer: CMR
Contract: 10/12/2020
Processed with SoundPLAN 8.1, Update: 10/03/2018

Levels Leq,d in dB(A)

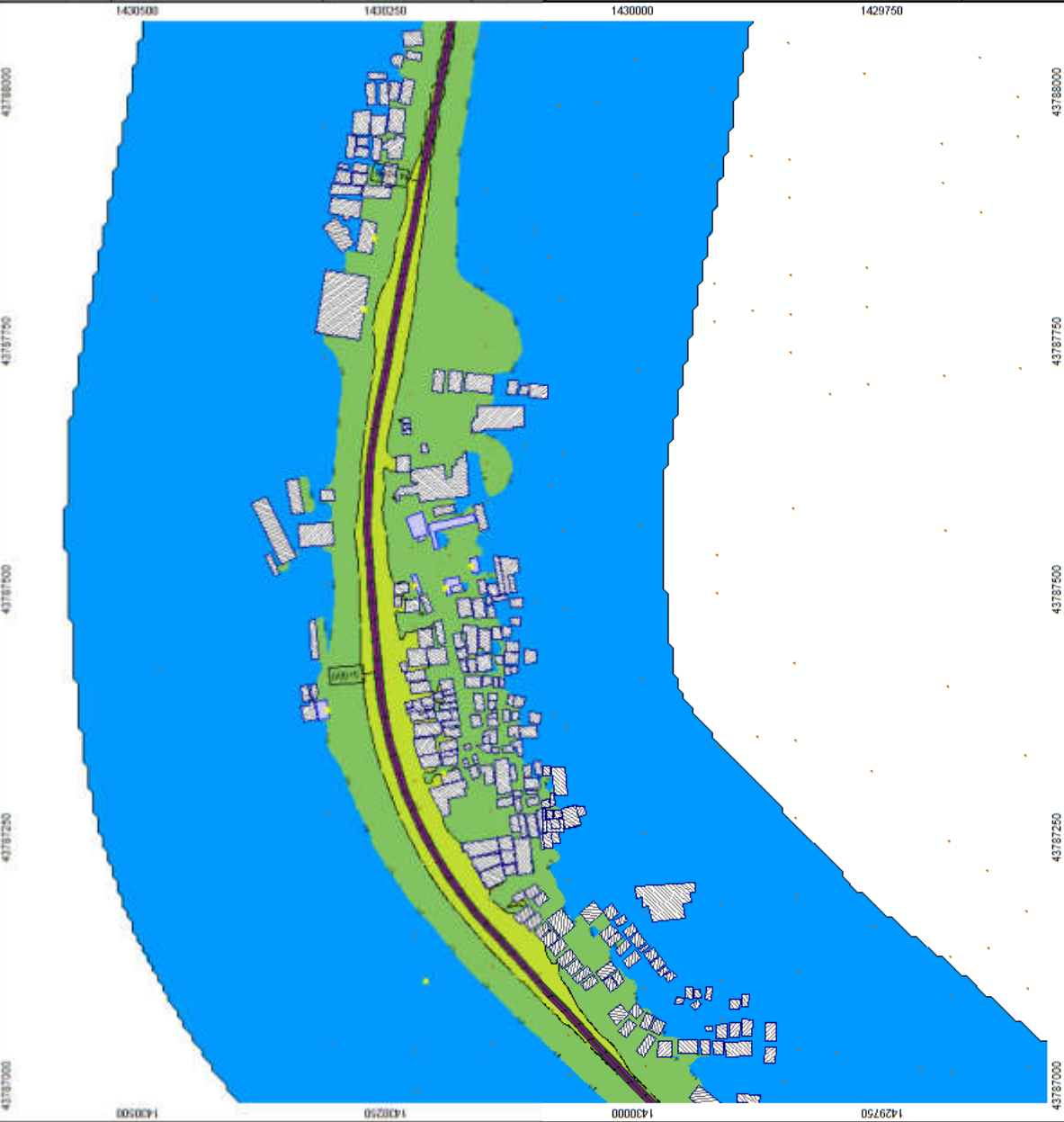
	< 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	>= 65

Signs and symbols

	Wall
•	Construction Equip
▨	Main building
*	Point receiver
—	+3dB(A) increase from
•	Point Sources
—	Line source
—	Geometry bitmap
—	Wall
—	Wall
•	Elevation point
□	Bodeneffekte
□	Noise reduction area

Length scale 1:3887

0 30 60 120 180 240 m



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise: Contour Map and Grade/Earth. Train receiver levels taken from BMU Soundplan 8.1 Library and BMIRCL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2024 2A with Parapet Wall Noise Contour Map
 Leq,d
 Calculation in 1.5 m above ground

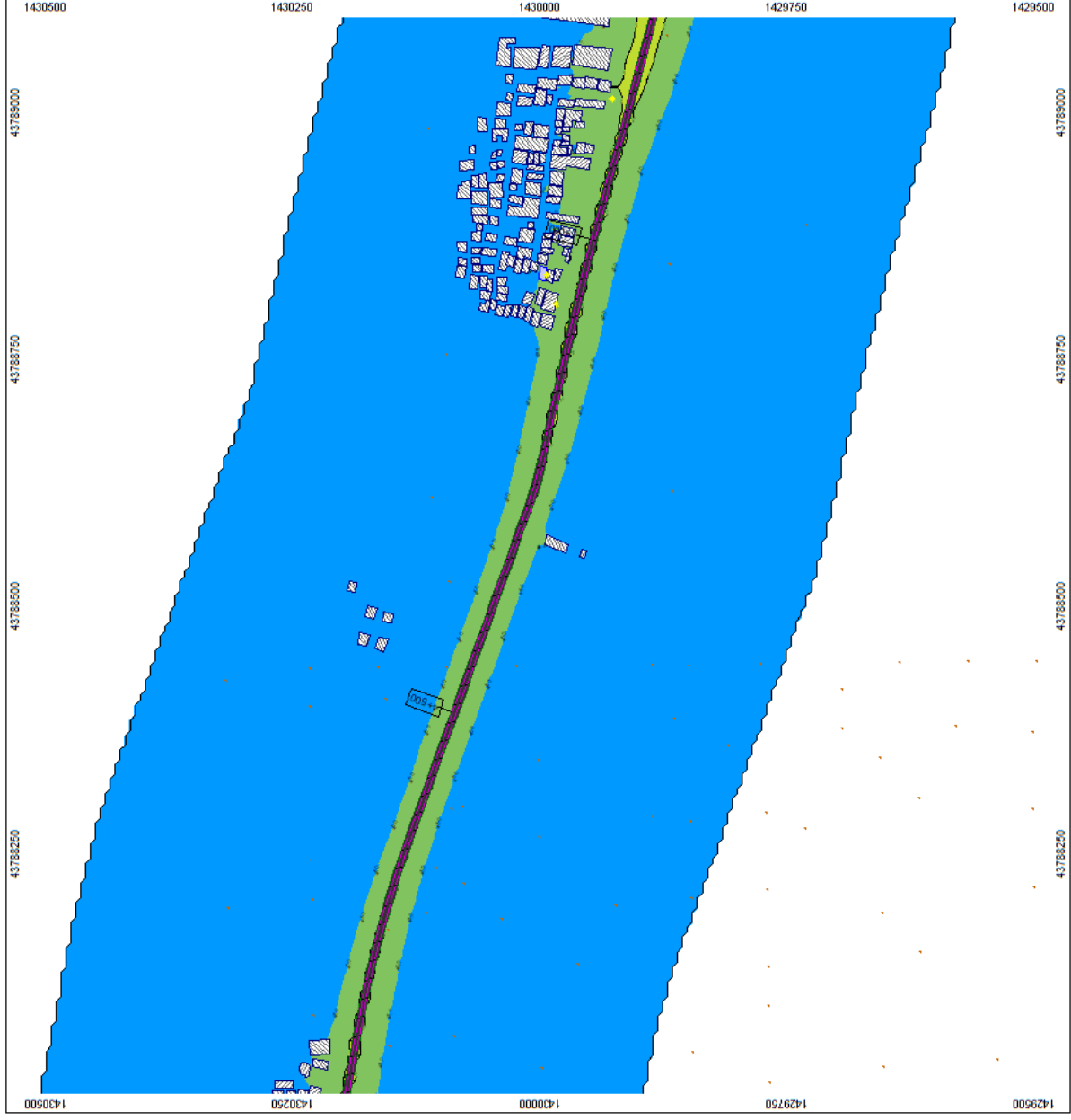
Project engineer: CMR
 Created: 9/10/2020
 Processed with: SoundPLAN 8.1, Update:10/23/2018

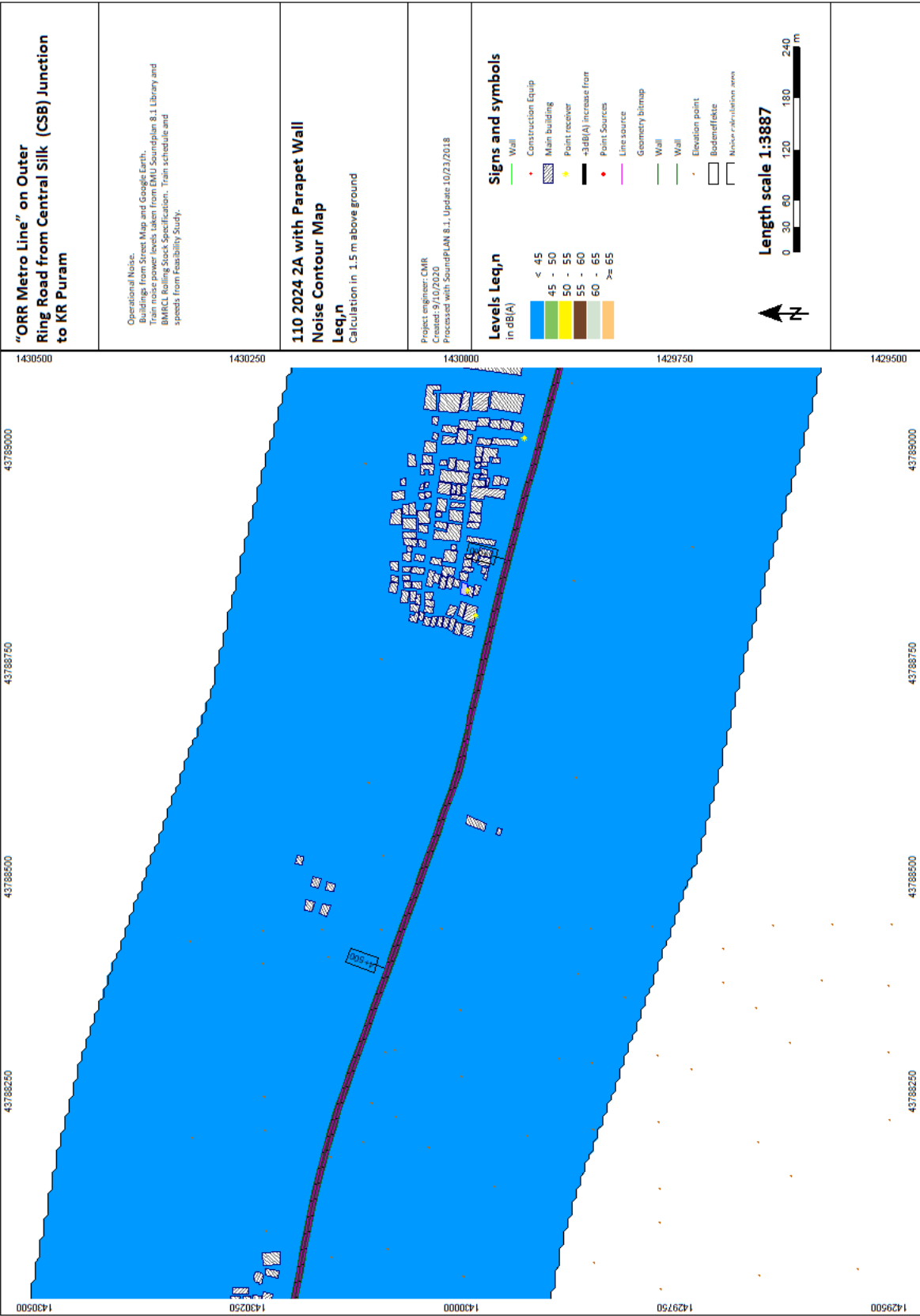
Levels Leq,d in dB(A)

Blue	< 45
Light Blue	45 - 50
Yellow	50 - 55
Orange	55 - 60
Red	60 - 65
Dark Red	>= 65

Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry blimp
- Wall
- Wall
- Elevation point
- Bodenreflekt
- Noise calculation area





"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Open Map and Google Earth.
Train movement levels taken from DMU Soundmap E.I. Library and
SMBCL Building Data Structures. Train schedule and
speeds from Feasibility Study.

**110 2024 2A with Parapet Wall
Noise Contour Map
Leq,d**
Calculation in 1.5 m above ground

Project engineer: OMB
Created: 01/02/2024
Project: with SoundPLAN E.I. Update: 10/23/2024

Levels Leq,d
in dB(A)

Blue	< 45
Light Blue	45 - 50
Yellow	50 - 55
Orange	55 - 60
Red	60 - 65
Dark Red	>= 65

Signs and symbols

- Construction Equip
- Main building
- Point receiver
- dB(A) increase due
- Point Source
- Line source
- Geometry (bridge)
- Wall
- Deviation (open)
- Substructure
- Non-sound reflecting area



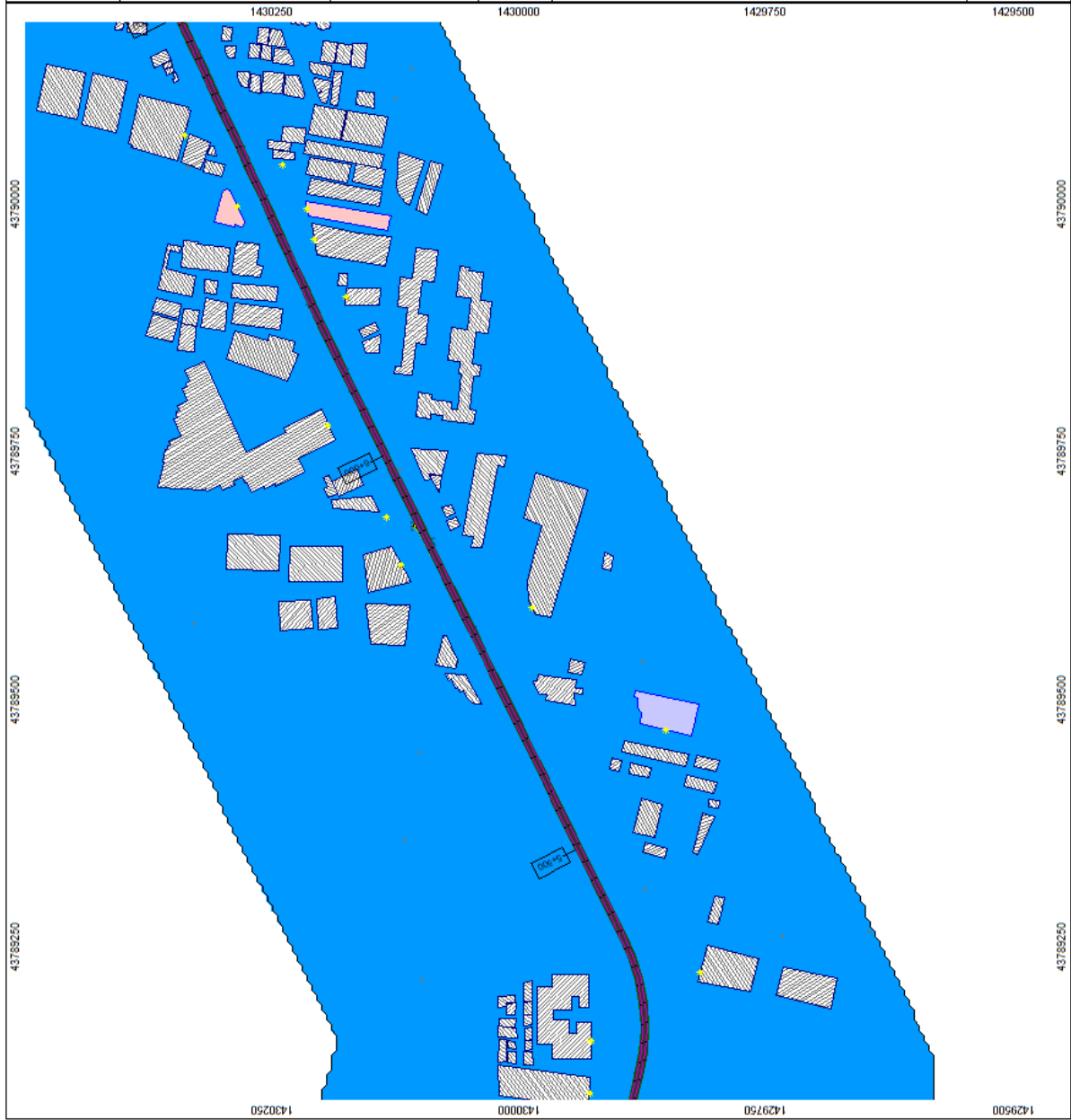
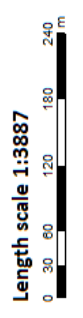
"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise Levels from Level Map and Grade Earth. Train noise levels taken from EMU Soundplan 8.1 Library and BMIRCL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2024 2A with Parapet Wall Noise Contour Map
Leq,n
 Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update: 10/23/2018

- Levels Leq,n in dB(A)**
- < 45
 - 45 - 50
 - 50 - 55
 - 55 - 60
 - 60 - 65
 - >= 65
- Signs and symbols**
- Construction Equip
 - Main building
 - Point receiver
 - +3dB(A) increase from
 - Point Sources
 - Line source
 - Geometry bitmap
 - Wall
 - Elevation point
 - Bodeneffekte
 - Noise calculation area



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Construction of Noise Barrier from Noise Map and Google Earth. This noise barrier length taken from BMU Soundmap 8.1. Library and BMRC Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2024 2A with Parapet Wall Noise Contour Map Leq,d
 Calculation in 1.5 m above ground

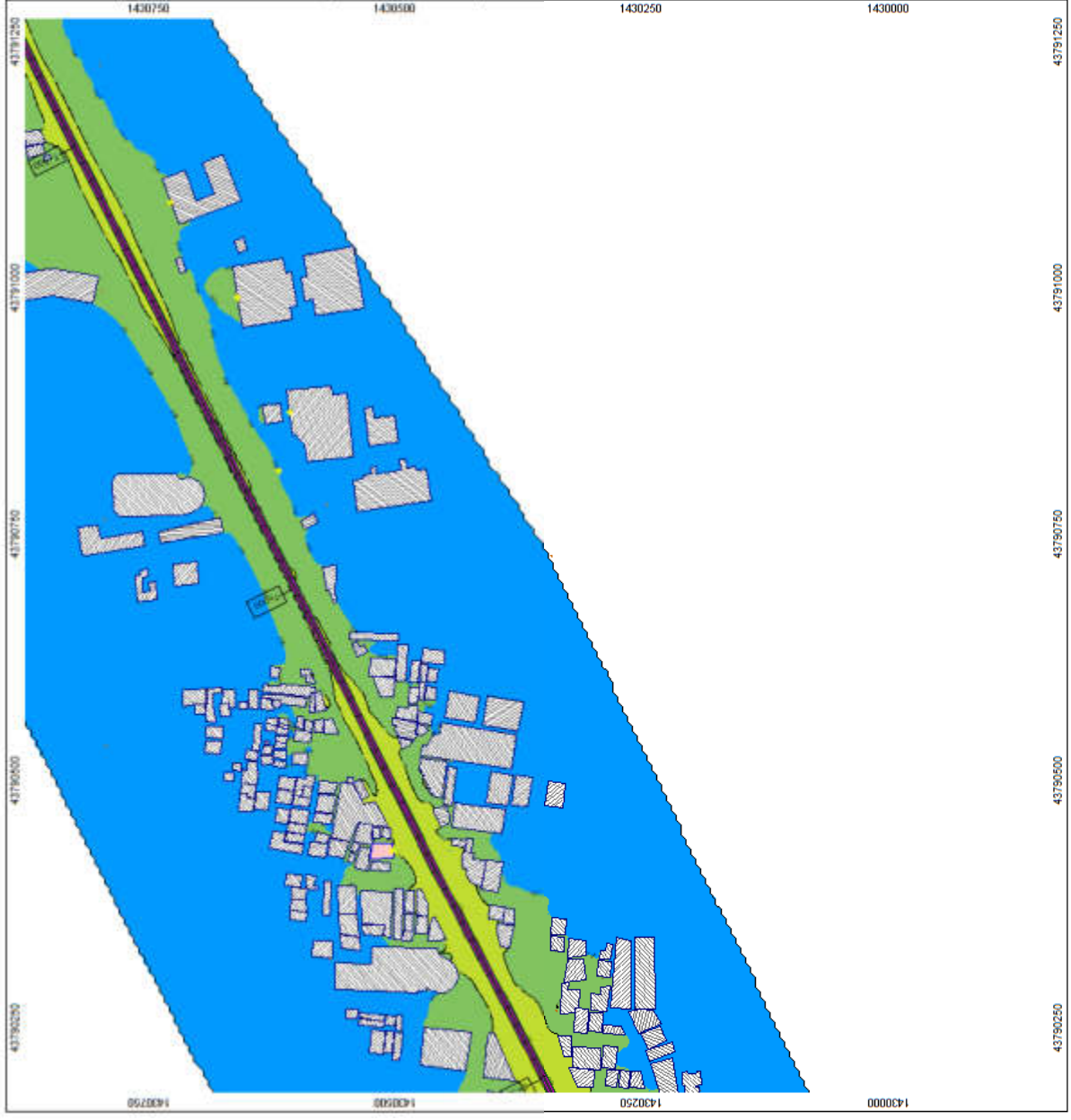
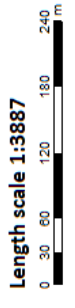
Project engineer: GMR
 Created: 8/10/2020
 Processed with SoundPLAN 8.1. Update: 10/21/2018

Levels Leq,d in dB(A)



Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry blimp
- Wall
- Wall
- Elevation point
- Boundary/edge
- Noise calculation area



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

110 2024 2A with Parapet Wall Noise Contour Map
Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2024
Processed with SoundPLAN 8.1, Update 10/23/2018

Operational Noise:
Buildings from Street Map and Google Earth.
Main building from point receiver. Main building from BIMBL Best-Stack-Selection. Train schedule and speeds from Feasibility Study.

Levels Leq,n in dB(A)

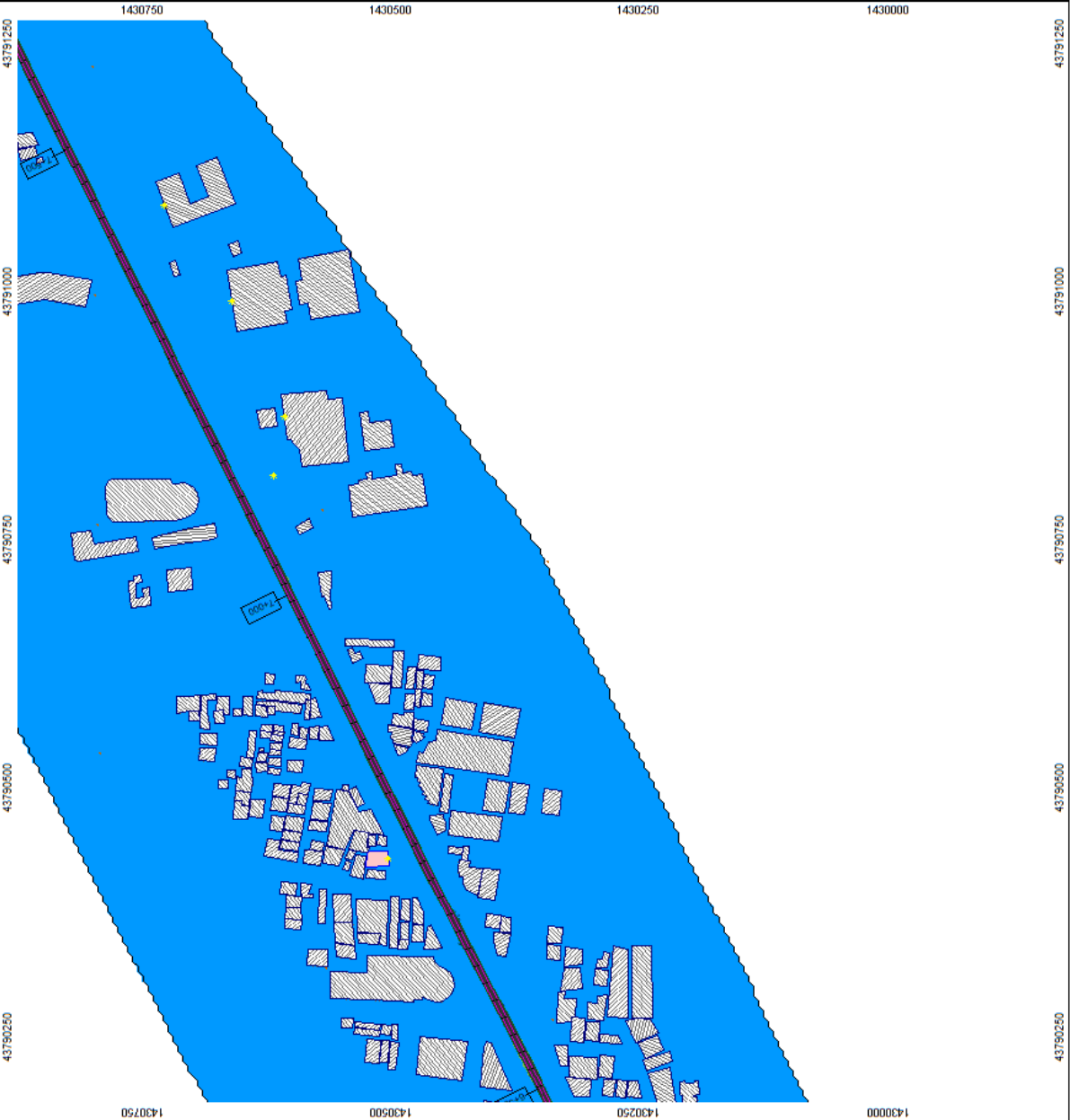
< 45	Construction Equip
45 - 50	Main building
50 - 55	Point receiver
55 - 60	+3dB(A) increase from
60 - 65	Point Sources
>= 65	Line source

Signs and symbols

Wall	Geometry bitmap
Construction Equip	Wall
Main building	Wall
Point receiver	Elevation point
+3dB(A) increase from	Bodeneffekte
Point Sources	Noise-reduction area
Line source	

Length scale 1:3887

0 30 60 120 180 240 m



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Night from 10pm to 6am
 Train from 6am to 10pm
 BMBCL Rolling Stock Specification, Train schedule and speeds from Feasibility Study.

110 2024 2A with Parapet Wall Noise Contour Map

Leq,n
 Calculation in 1.5 m above ground

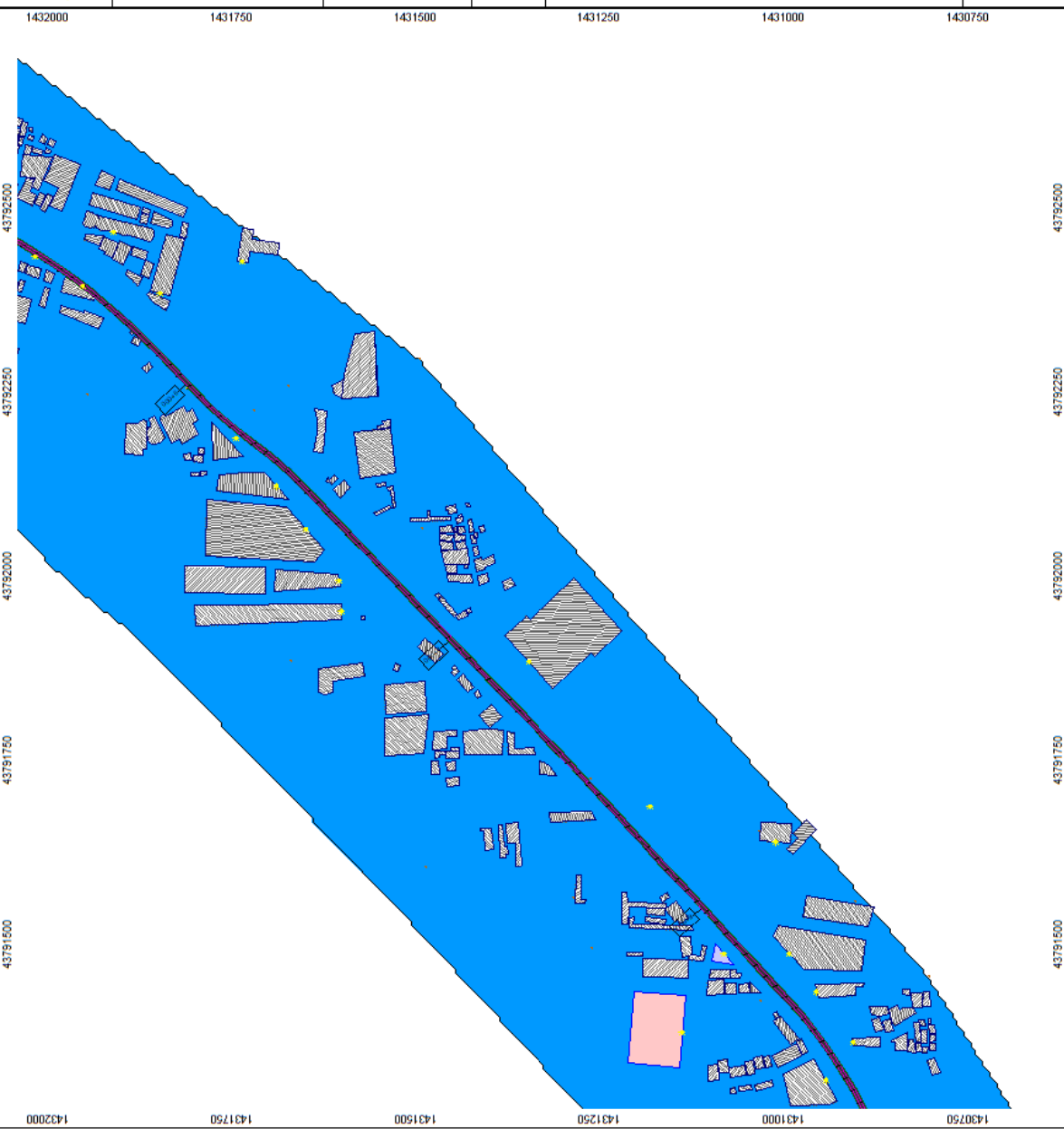
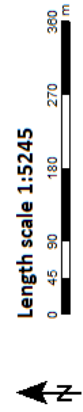
Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update:10/23/2018

Levels Leq,n in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

Construction Equip
Main building
Point receiver
+dB(A) increase from
Point Sources
Line source
Geometry bitmap
Wall
Wall
Elevation point
Border/edge
Noise calculation area



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise.
Buildings from Street Map and Google Earth.
Train noise power levels taken from DMU Soundplan 8.1 Library and BMRC Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

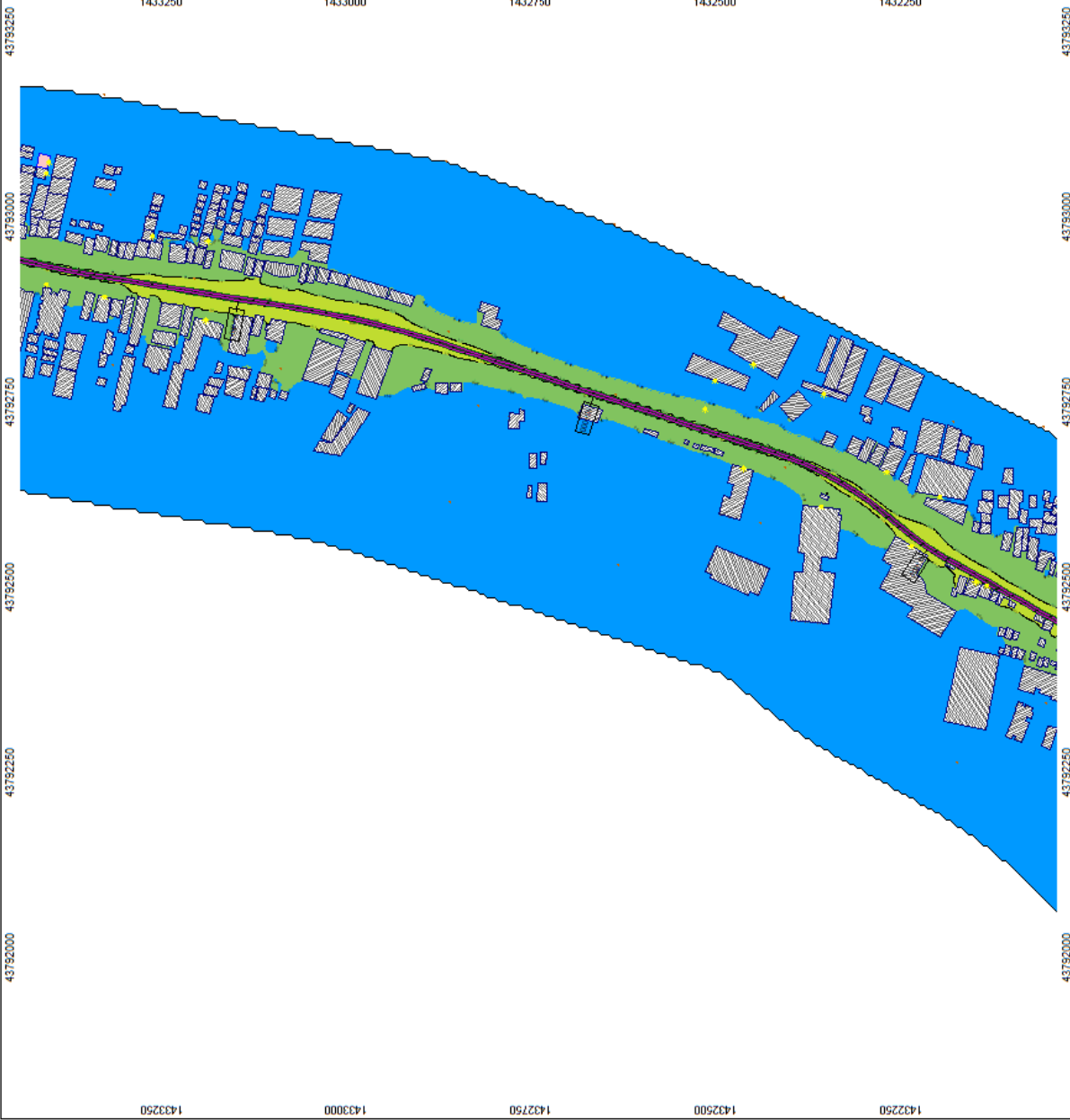
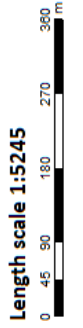
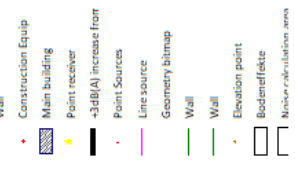
110 2024 2A with Parapet Wall Noise Contour Map
Leq,d
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update: 10/23/2018

Levels Leq,d in dB(A)



Signs and symbols



43792000 43792250 43792500 43792750 43793000 43793250
1433250 1433300 1433350 1433400 1433450

“ORR Metro Line” on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from BMU Soundplan 8.1, Library and BMICL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2024 2A with Parapet Wall Noise Contour Map
Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update: 10/23/2018

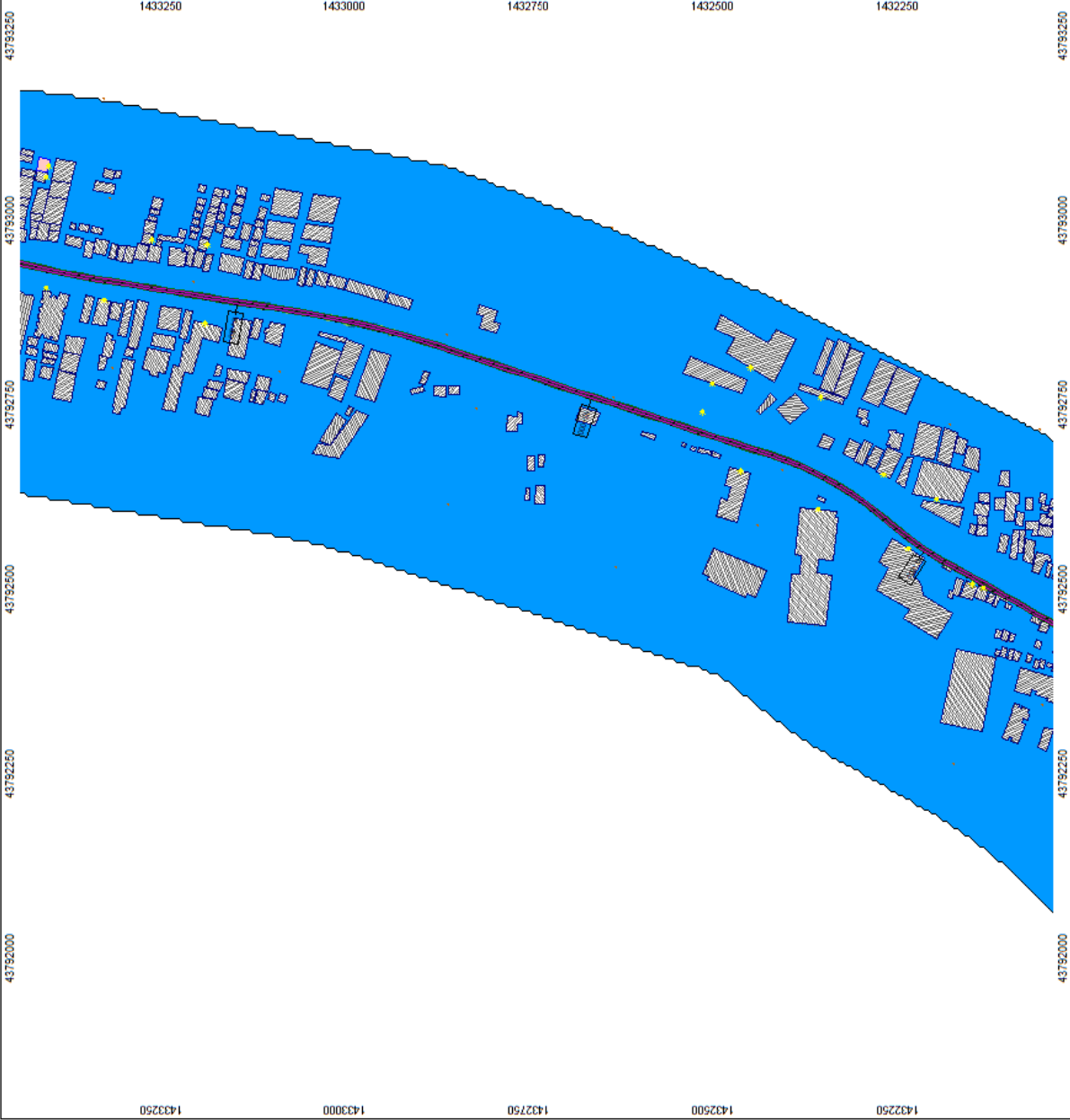
Levels Leq,n
in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

Wall
Construction Equip
Main building
Point receiver
-3dB(A) increase from Point Sources
Line source
Geometry blimp
Wall
Wall
Elevation point
Bodenreflekt
Noise calculation area

Length scale 1:5245

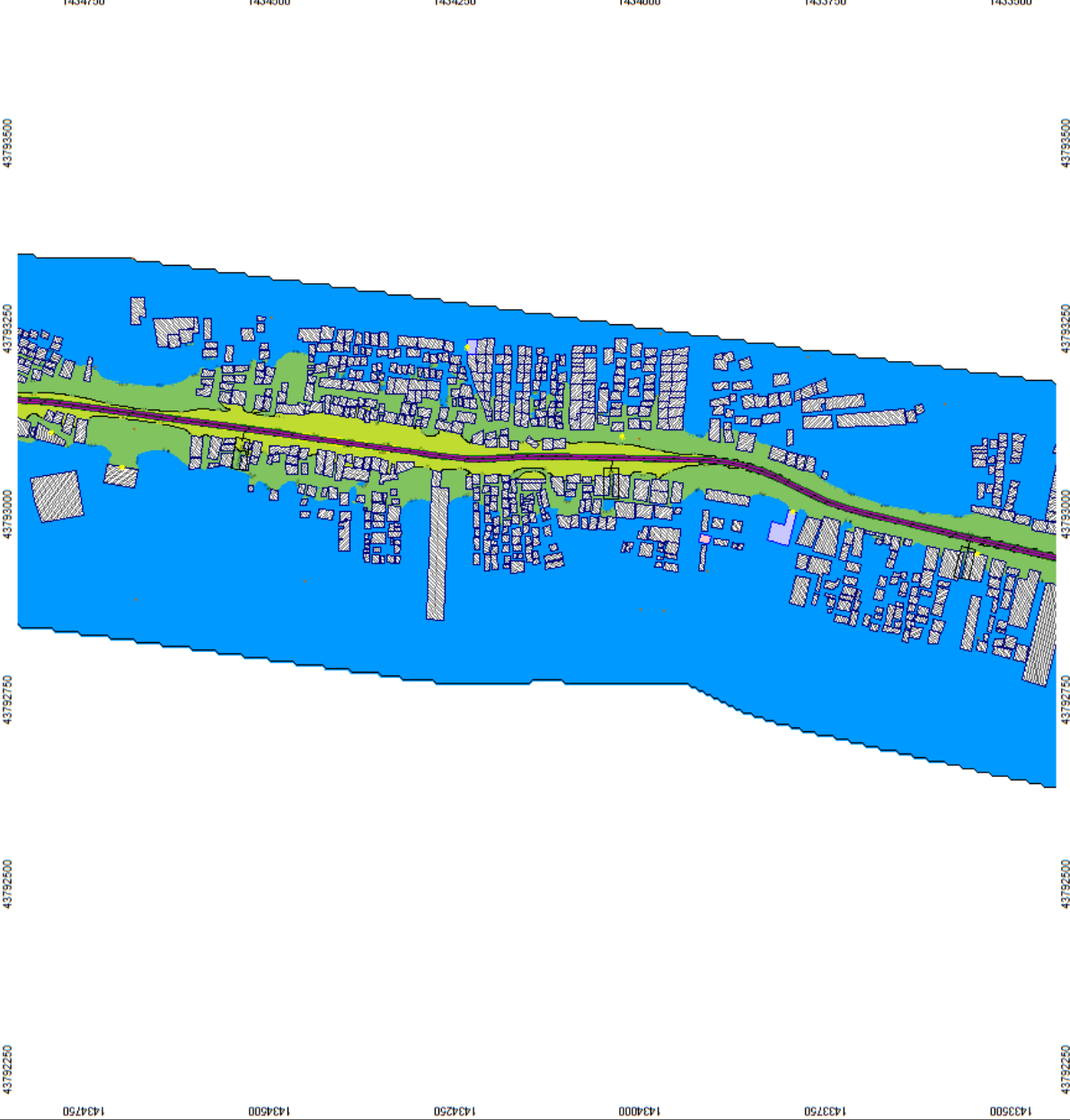


"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from BMU Soundplan 8.1 Library and
BIMBCL Hoisting Stock Specification. Train schedule and
speeds from Feasibility Study.

**110 2024 2A with Parapet Wall
Noise Contour Map
Leq,d**
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update: 10/23/2018

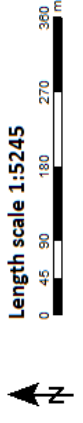


**Levels Leq,d
in dB(A)**

- < 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- >= 65

Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wall
- Elevation point
- Bodeneffekte
- Noise contribution area



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Building from Street Map and Google Earth.
 Train noise power levels taken from EMU Soundplan 8.1 Library and
 BMRCL Rolling Stock Specification. Train schedule and
 speeds from Feasibility Study.

**110 2024 2A with Parapet Wall
 Noise Contour Map
 Leq,n**

Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1. Update: 10/23/2018

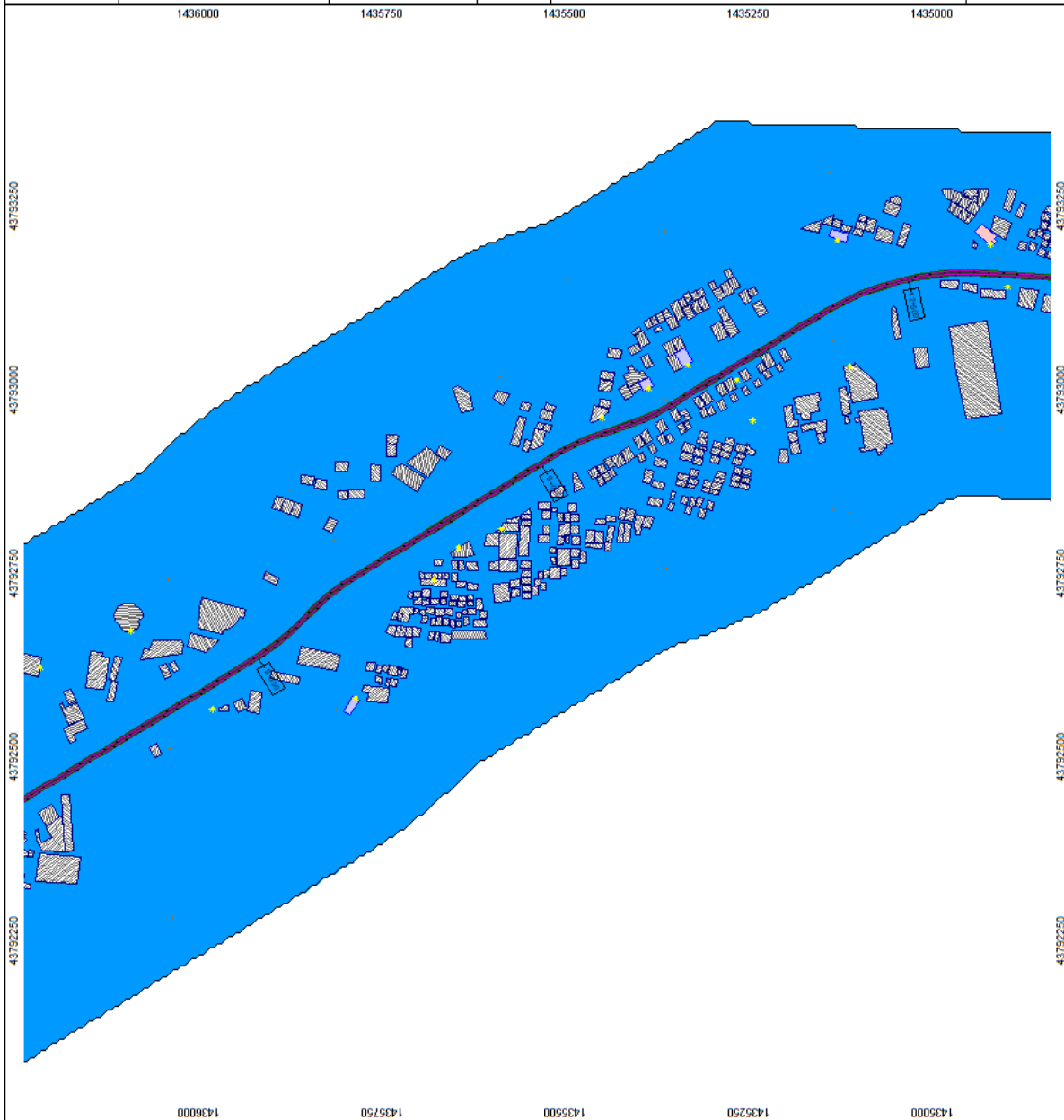
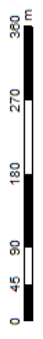
**Levels Leq,n
 in dB(A)**



Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- 3dB(A) increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wall
- Elevation point
- Borderoffset
- Noise calculation area

Length scale 1:5245



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Department of Noise
 Bangalore Urban District Council
 Town and Country Planning
 Bangalore
 Bangalore Urban District Council
 Bangalore Urban District Council
 Bangalore Urban District Council
 Bangalore Urban District Council

110 2024 2A with Parapet Wall Noise Contour Map Leq,d
 Calculation in 1.5 m above ground

Project engineer: CNM
 Created: 31/03/2020
 Processed with SoundPLAN 8.1, Update 16/03/2018

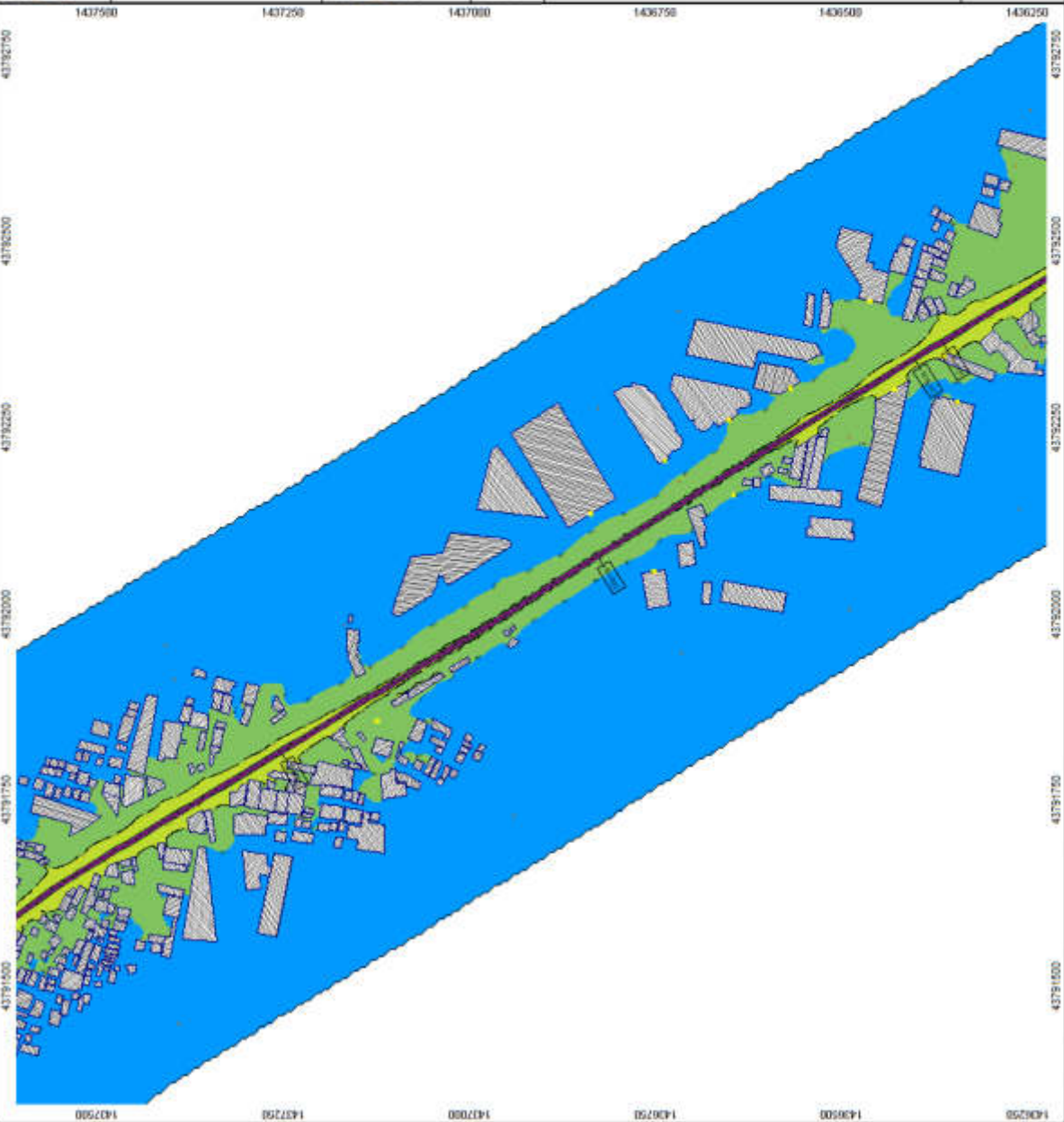
Levels Leq,d in dB(A)

45 - 50
50 - 55
55 - 60
60 - 65
65 - 70

Signs and symbols

Construction barrier
Main building
Point receiver
-2dB(A) increase from
Point sources
Ultra-sources
Geometry barrier
Wall
Wall
Obstacle point
Barrier/fence
Noise reduction area

Length scale 1:5181
 0 45 90 180 270 360 m



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from DMU Soundplan 8.1 Library and BMRCL Hoisting Stock Specification. Train schedule and speeds from Feasibility Study.

110 2024 2A with Parapet Wall
Noise Contour Map
Leq,n
Calculation in 1.5 m above ground

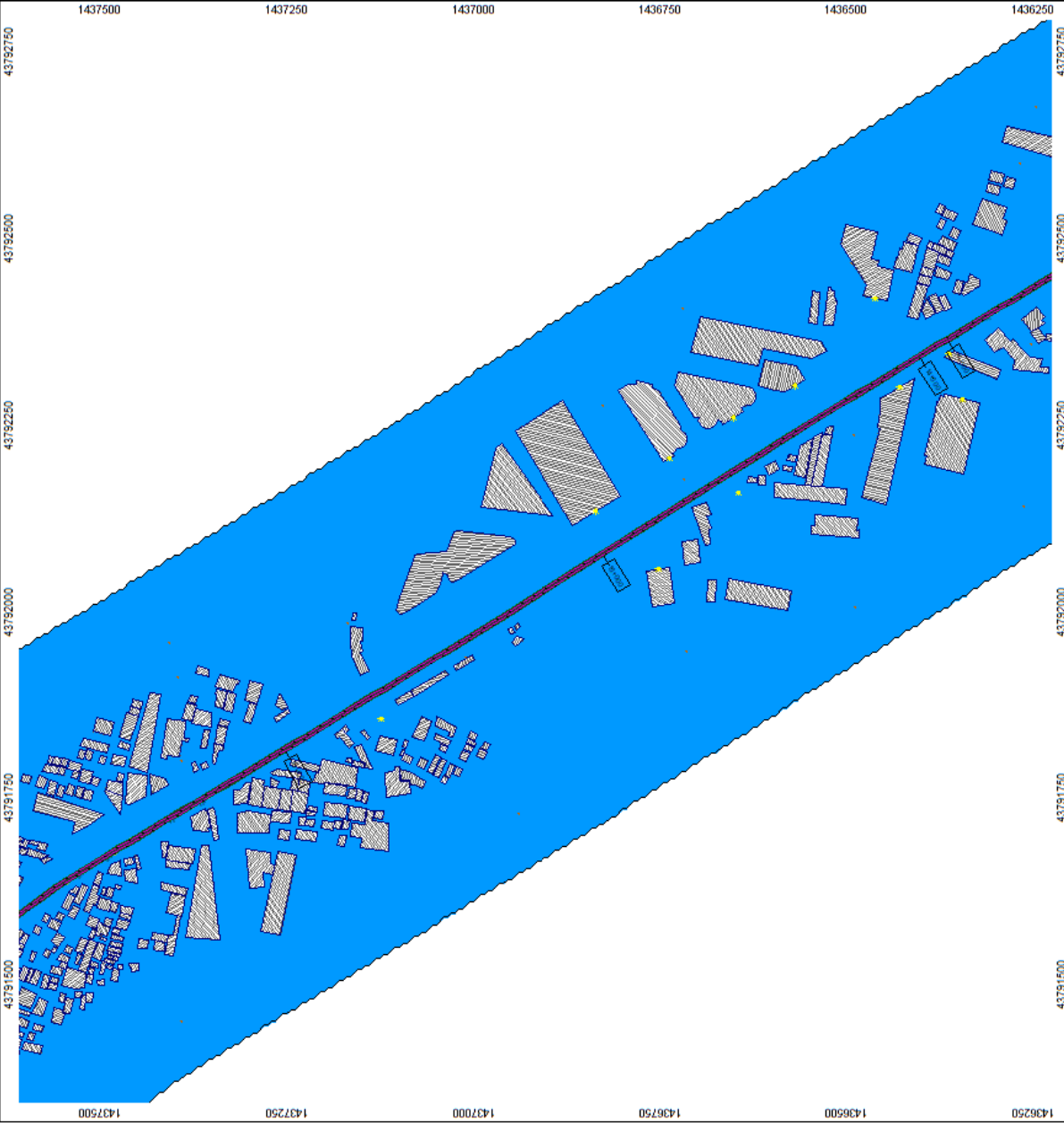
Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update: 10/23/2018

Levels Leq,n
In dB(A)

	< 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	>= 65

Signs and symbols

	Wall
	Construction Equip
	Main building
	Point receiver
	+3dB(A) increase from
	Point Sources
	Line source
	Geometry bitmap
	Wall
	Wall
	Elevation point
	Bodemeffekte
	Noise reduction area



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise, Building Footprint Map and Geoside Earth. Building footprint map and noise contour map. Train noise power levels taken from BMJ Soundplan 8.1. Library and BMRCL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2024 2A with Parapet Wall Noise Contour Map
Leq,d
 Calculation in 1.5 m above ground

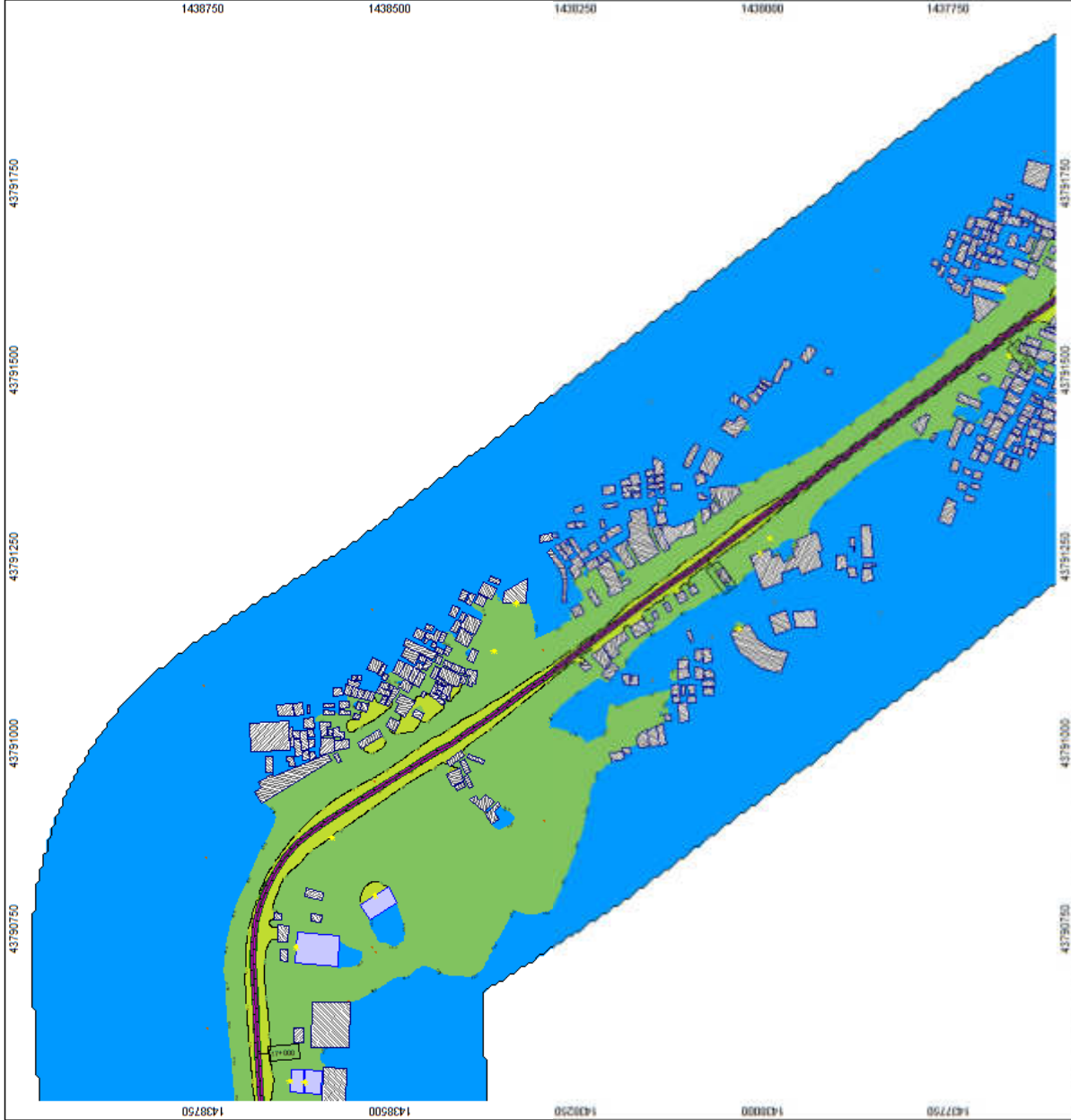
Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,d (in dB(A))

Blue	< 45
Light Blue	45 - 50
Green	50 - 55
Yellow	55 - 60
Orange	60 - 65
Red	> 65

Signs and symbols

Green line	Construction Easement
Blue hatched	Main building
Yellow star	Point receiver
Black line	+2dB(A) increase from
Red star	Point Sources
Black line	Line source
Green line	Geometry Intervis
Blue line	Wall
Green line	Wall
Red star	Elevation points
Black box	Barriers/plate
Black box	Receptor (noise sensitive zone)



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from DMU Soundplan 8.1. Library and BMRCL Rolling Stock Specification. Train schedule and speeds from feasibility study.

110 2024 2A with Parapet Wall Noise Contour Map
Leq,n
Calculation in 1.5 m above ground

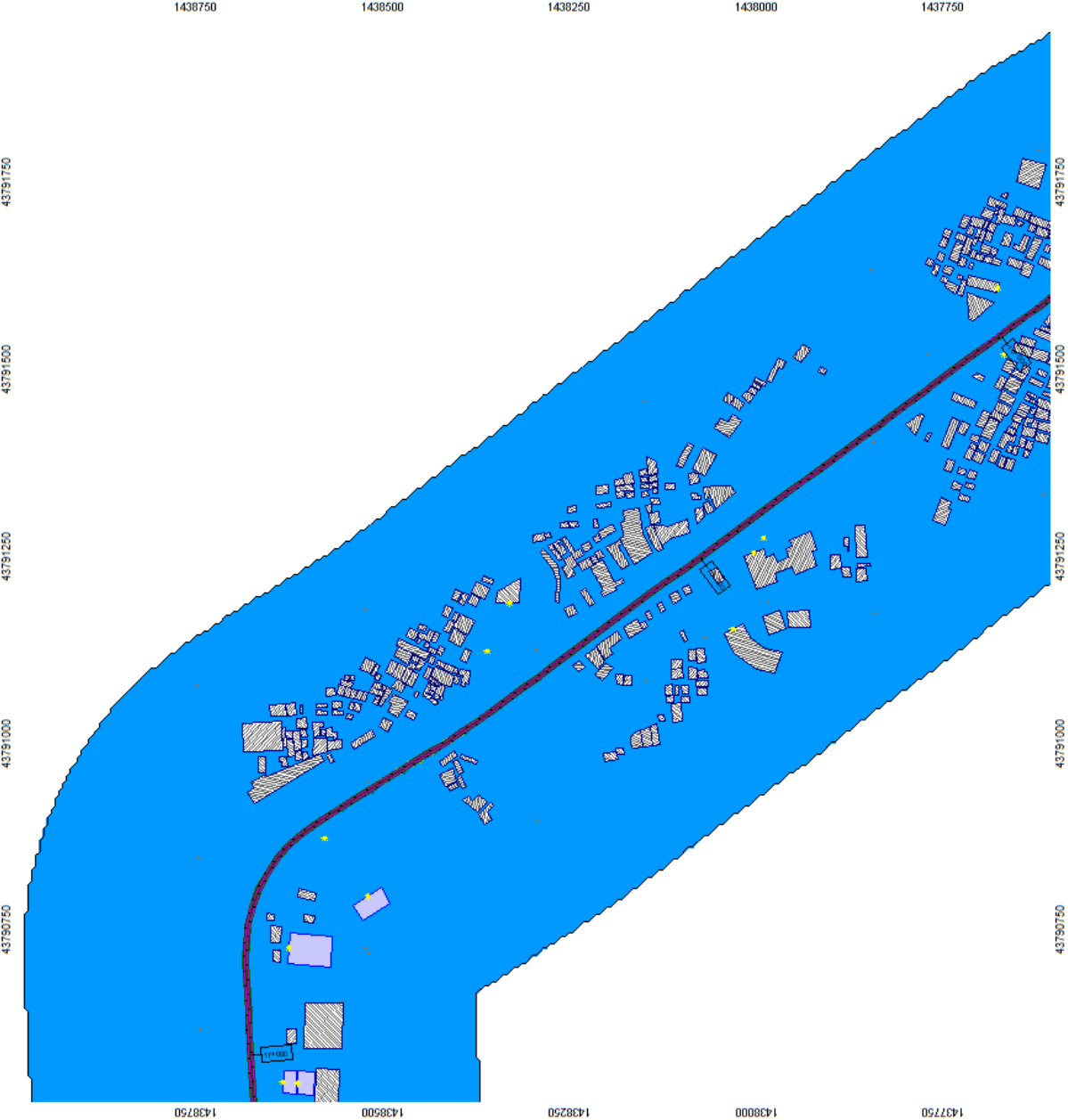
Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1. Update 10/23/2018

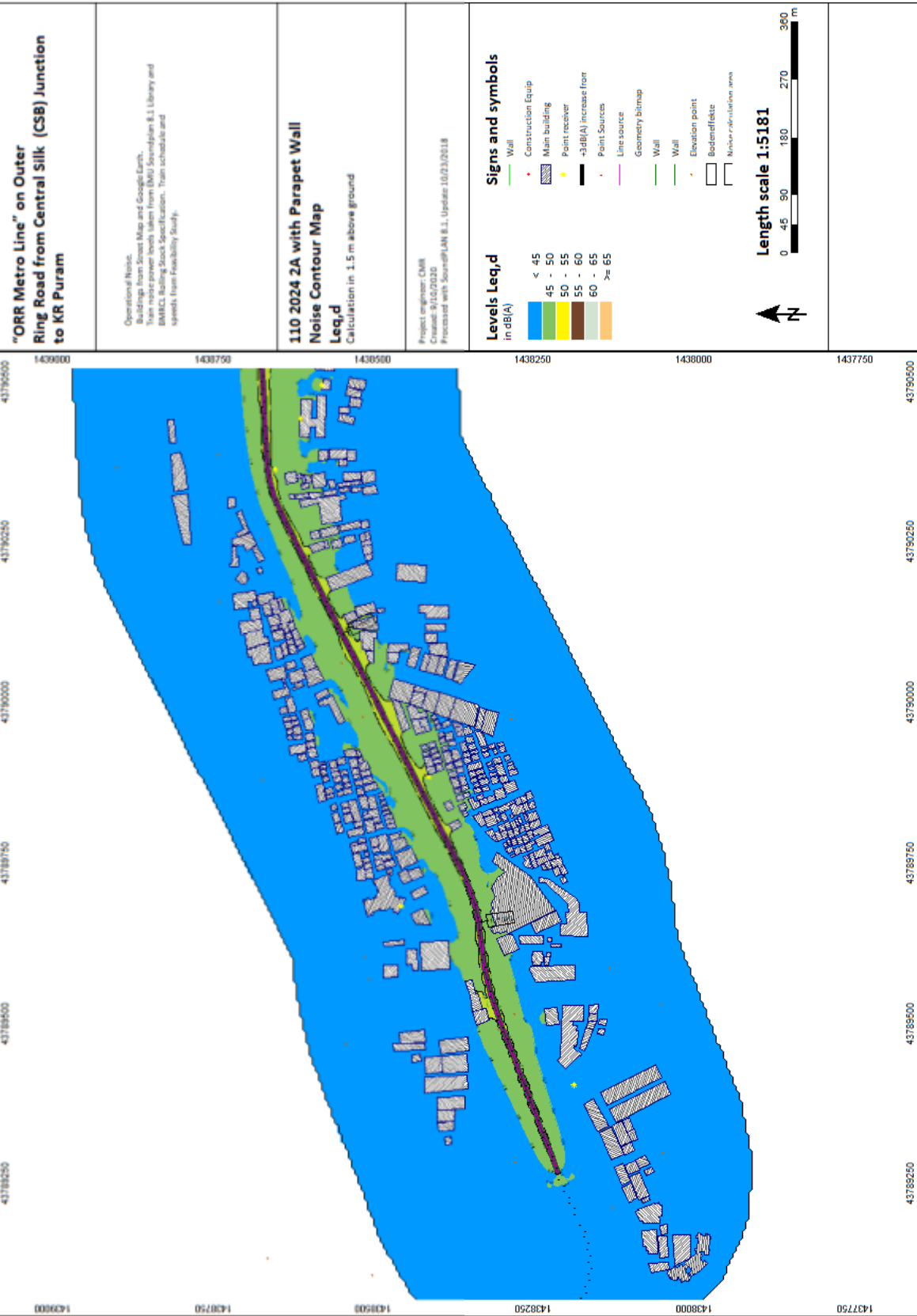
Levels Leq,n
In dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
≥ 65

Signs and symbols

Construction Equip	Point receiver	+3dB(A) increase from	Point Sources	Line source	Geometry blimp	Wall	Wall	Elevation point	Bodenreflekt	Noise calculation area
Wall	Main building	Point receiver	Point Sources	Line source	Geometry blimp	Wall	Wall	Elevation point	Bodenreflekt	Noise calculation area





"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Noise power levels taken from BMU Soundplan 8.1 Library and
BANC's existing Soundplan 8.1. Calculation: Train schedule and
speeds from Feasibility Study.

**110 2024 2A with Parapet Wall
Noise Contour Map
Leq,n**
Calculation in 1.5 m above ground

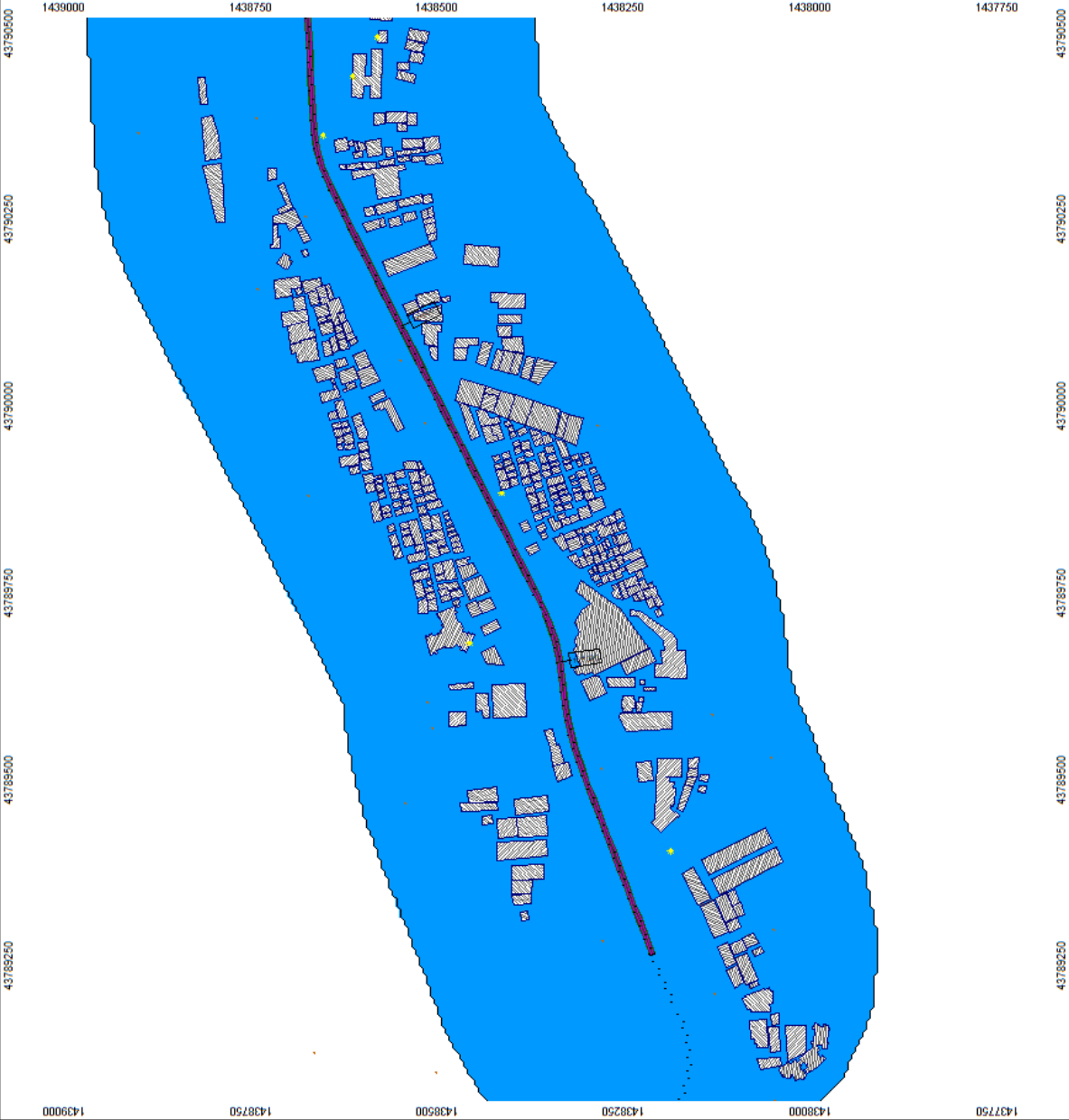
Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,n
in dB(A)

Blue	< 45
Light Blue	45 - 50
Green	50 - 55
Yellow	55 - 60
Orange	60 - 65
Red	>= 65

Signs and symbols

Green line	Wall
Red dot	Construction Equip
Blue hatched box	Mash building
Yellow star	Point receiver
Black line	-3dB(A) increase from
Red dot	Point Sources
Purple line	Line source
Green line	Geometry bitmap
Green line	Wall
Green line	Wall
Yellow star	Elevation point
White box	Border/offset
White box	Noise calculation area



Year 2031

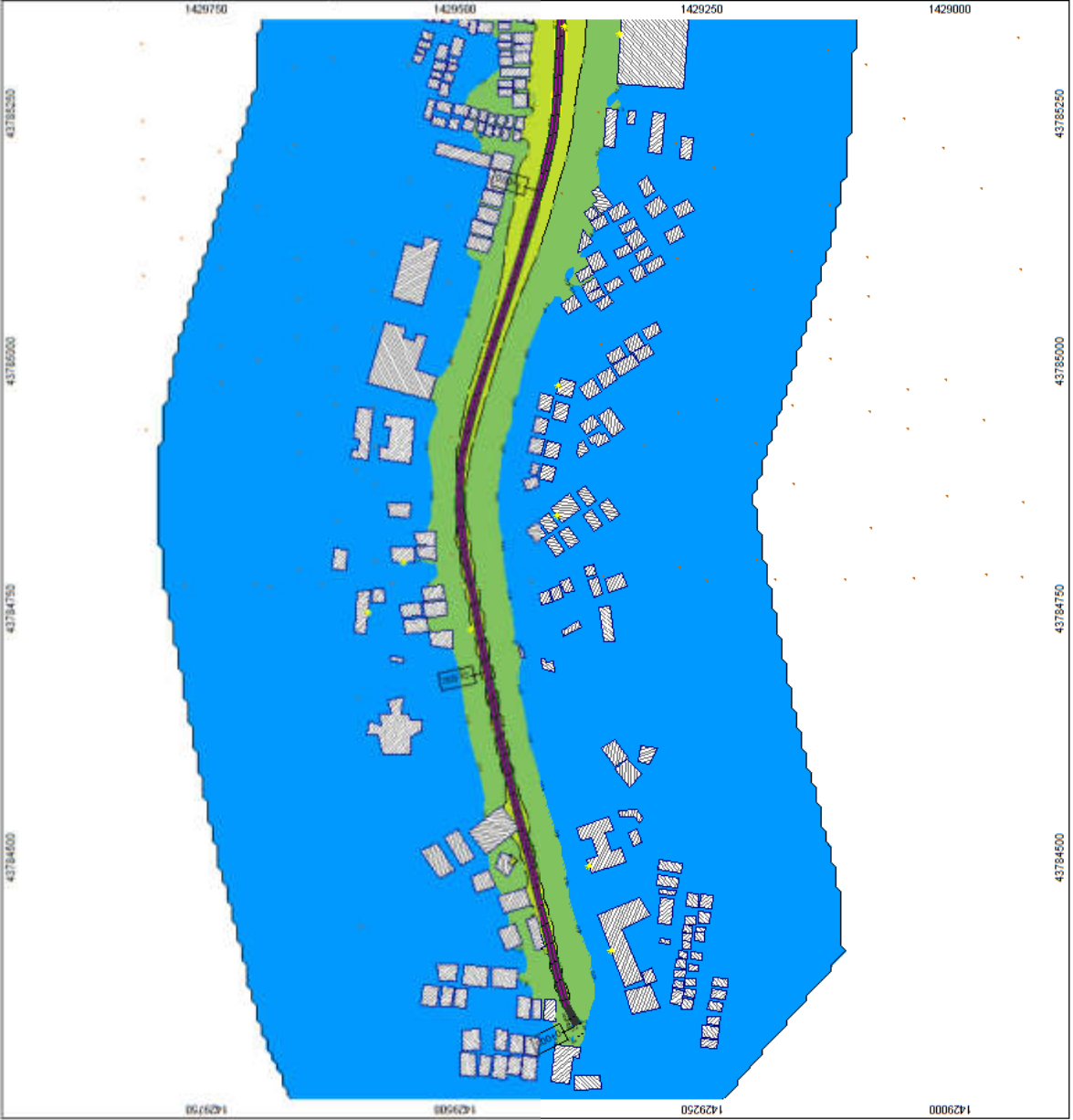
"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Buildings from Street Map and Google Earth.
 Building footprint from Bangalore Urban District
 (BUD) Bangalore South Division. The residential area
 is from the feasibility study.

**110 2031 2A with Parapet Wall
 Noise Contour Map
 Leq,d**
 Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 11/10/2020
 Processed with: SoundPLAN 8.1.1, Update: 10/21/2018

- Levels Leq,d**
 in dB(A)
- < 45
 - 45 - 50
 - 50 - 55
 - 55 - 60
 - 60 - 65
 - >= 65
- Signs and symbols**
- Wall
 - Construction Equip
 - Main building
 - Point receiver
 - +3dB(A) increase from
 - Point Sources
 - Line source
 - Geometry bitmap
 - Wall
 - Wall
 - Elevation point
 - Bedeneffekte
 - Noise-reduction area



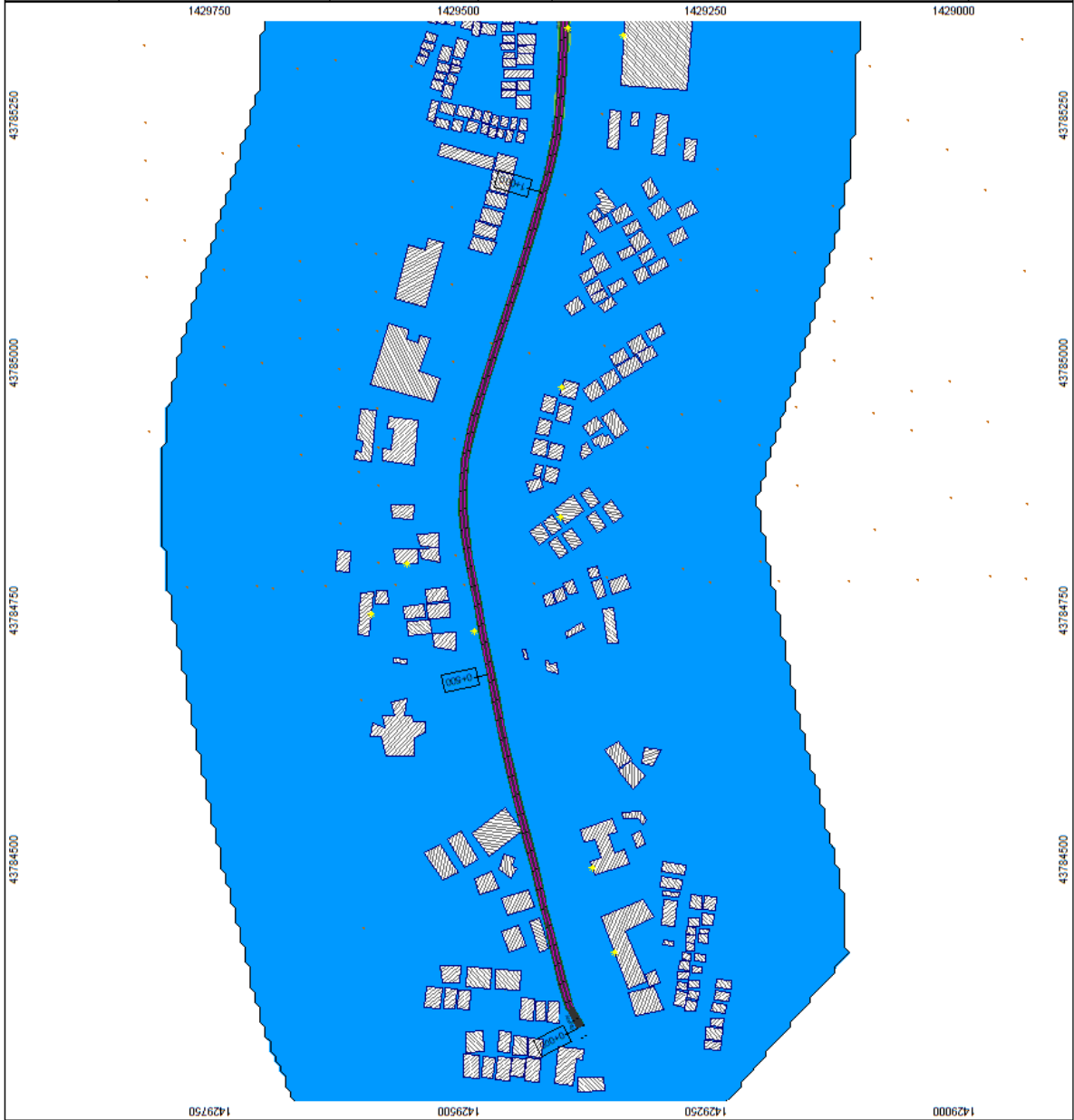
"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise, Buildings from Street Map and Google Earth, Train noise power levels taken from BMU Soundplan 8.1, Library and BMRCL Rolling Stock Specification, Train schedule and speeds from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map

Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update: 10/23/2018



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 - Level Map and Grade/Earth
 - Train noise power levels taken from EMU Soundplan 8.1 Library and
 - BMIRCL Rolling Stock Specification. Train schedule and
 - speeds from Feasibility Study.

**110 2031 2A with Parapet Wall
 Noise Contour Map
 Leq,d**
 Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,d
 in dBS(A)

Blue	< 45
Light Blue	45 - 50
Yellow	50 - 55
Orange	55 - 60
Red	60 - 65
Dark Red	>= 65

Signs and symbols

- Construction Equip
- Main building
- Point receiver
- 0.00(A) reference floor
- Point Source
- Line source
- Geometry strips
- Wall
- Wall
- Elevation point
- Background
- Noise calculation area



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise
Buildings from Street Map and Google Earth.
Train noise power levels taken from EMU Soundplan 8.1 Library and
BMIRCL Rolling Stock Specification. Train schedule and
speeds from Feasibility Study.

**110 2031.2A with Parapet Wall
Noise Contour Map
Leq,n**
Calculation in 1.5 m above ground

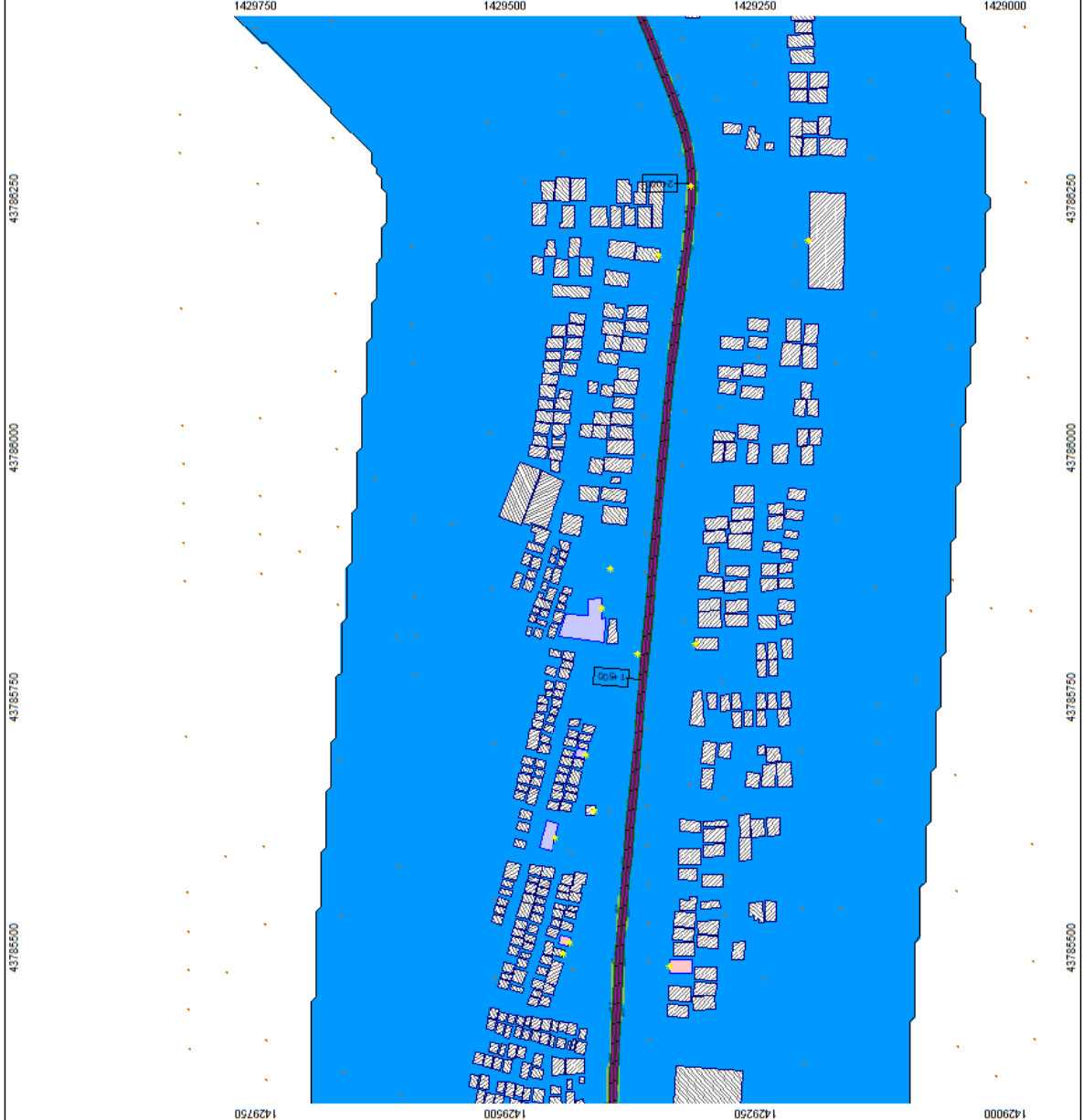
Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1. Update: 10/23/2018

Levels Leq,n in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

Construction Equip
Main building
Point receiver
+3dB(A) increase from
Point Sources
Line source
Geometry bitmap
Wall
Wall
Elevation point
Bodeneffekte
Noise reduction area

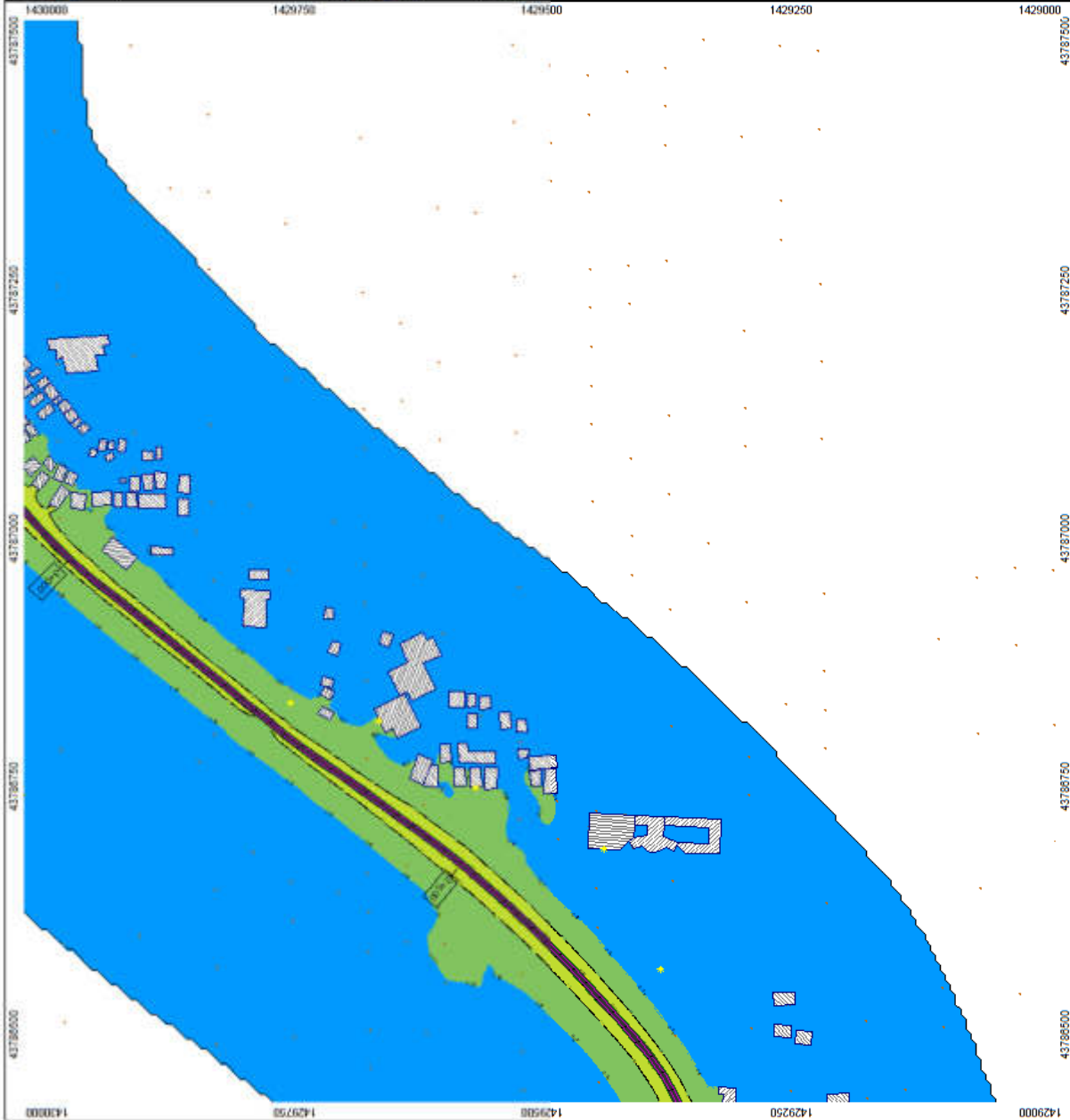


"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Building from Street Map and Google Earth
 The noise is calculated from the 2011 Census of India and
 (MRC) Building Stock Specifications. Train schedule and
 speed from Feasibility Study.

**110 2031 2A with Parapet Wall
 Noise Contour Map
 Leq,d**
 Calculation in 1.5 m above ground

Project engineer: CNR
 Project No: 1102031
 Produced with SoundPLAN 8.1.1 Update 16.07.2018



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from EMU Soundplan 8.1, Library and BMRC Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map
Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update: 10/23/2018

Levels Leq,n
in dB(A)

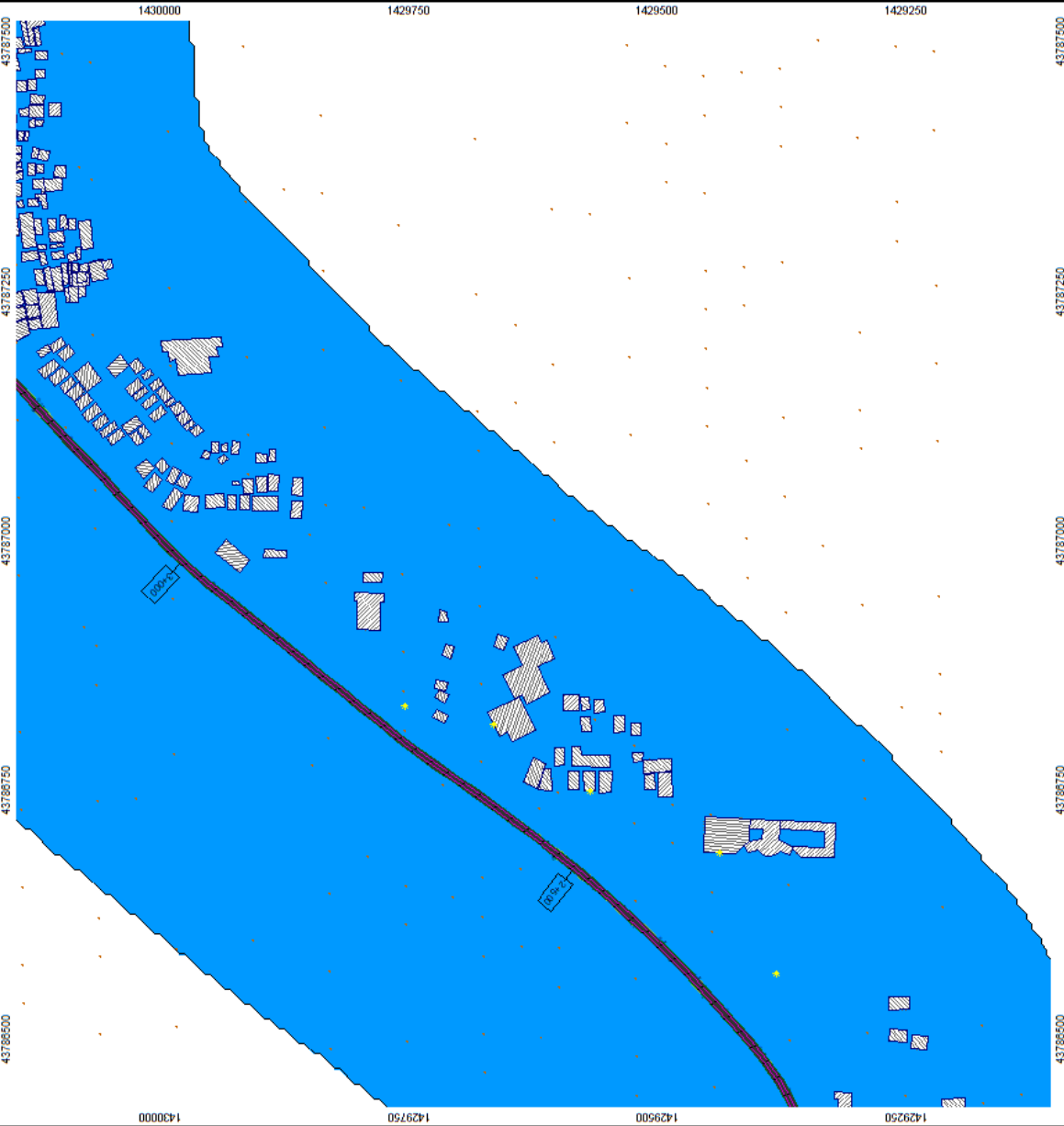
	< 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	>= 65

Signs and symbols

	Wall
	Construction Equip
	Main building
	Point receiver
	+3dB(A) increase from
	Point Sources
	Line source
	Geometry bitmap
	Wall
	Wall
	Elevation point
	Border/diète
	Noise calculation area

Length scale 1:3887

0 30 60 120 180 240 m



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from DMO Soundmap 8.1. Library and
BIMBA. Killing Black Spot Functions. Train schedule and
speeds from feasibility study.

110 2031 2A with Parapet Wall Noise Contour Map
Leq,d
Calculation in 1.5 m above ground

Project engineer: OMB
Client: RRDC/RRD
Project#: RRDC/RRD/2031/2A Update: 10/03/2018

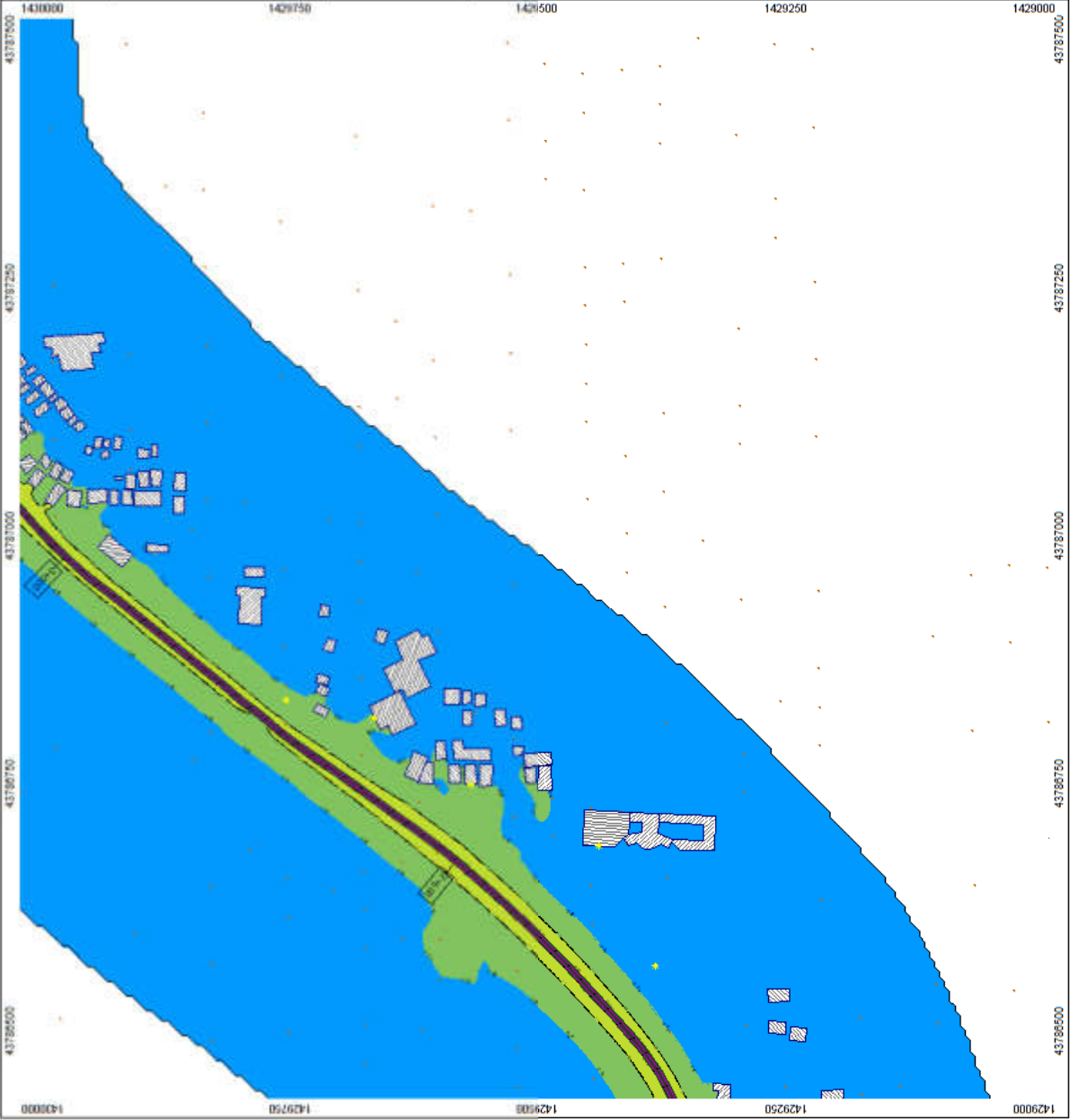
Levels Leq,d in dB(A)

	< 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	>= 65

Signs and symbols

	Wall
	Construction Equip
	Main building
	Point receiver
	-3dB(A) increase from
	Point Sources
	Line source
	Geometry blimap
	Wall
	Wall
	Elevation point
	Bodeneffekte
	Noise-reduction area

Length scale 1:3887



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from BMW Soundplan 8.1, Library and BMVCL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map
Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update: 10/23/2018

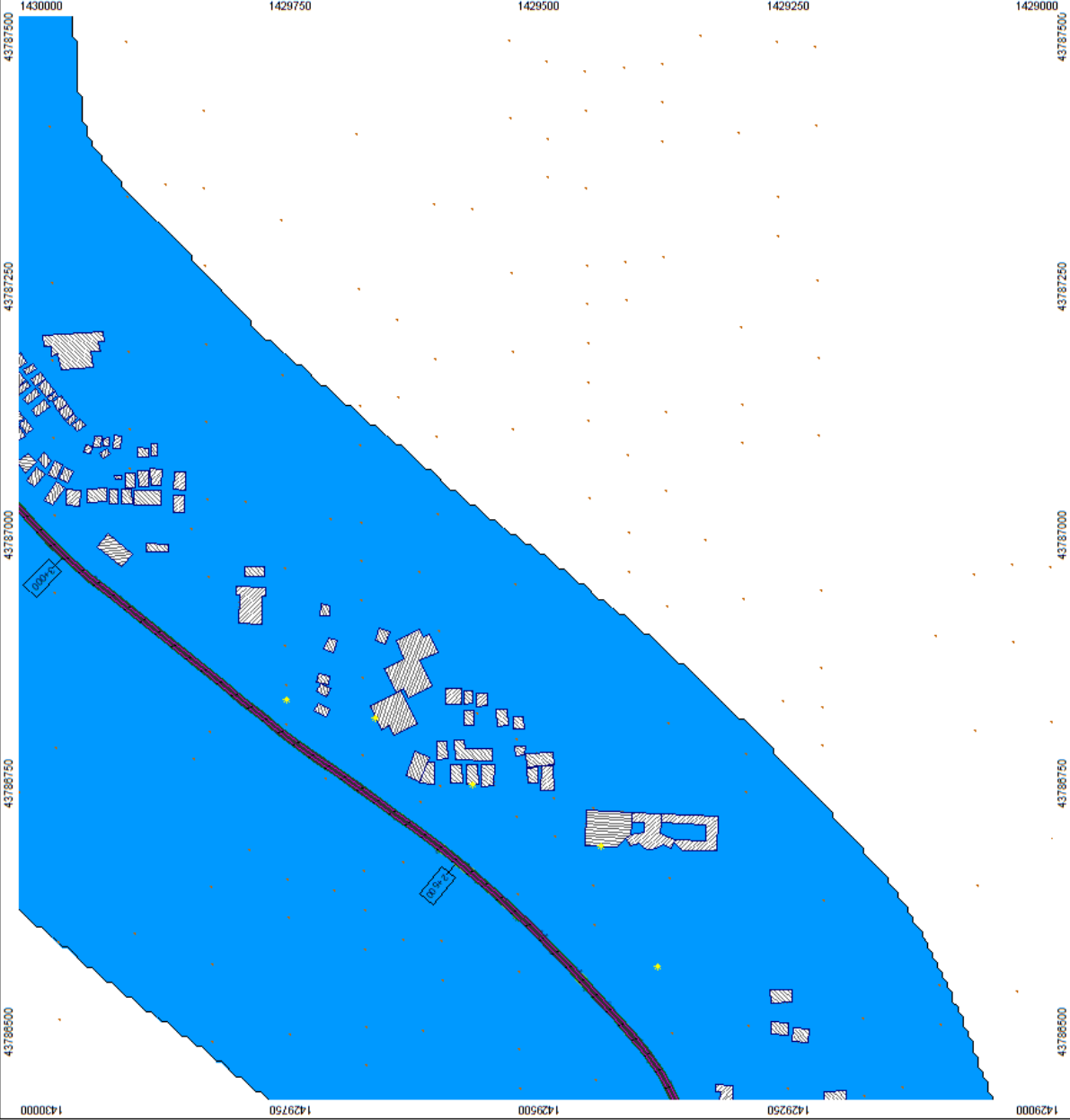
Levels Leq,n
in dB(A)

Blue	< 45
Light Blue	45 - 50
Yellow	50 - 55
Orange	55 - 60
Red	60 - 65
Dark Red	>= 65

Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- 3dB(A) increase from
- Point Sources
- Line source
- Geometry blimp
- Wall
- Elevation point
- Bodenreflekte
- Noise calculation area

Length scale 1:3887



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise Buildings from Street Map and Google Earth. Train noise power levels taken from BMJ Soundplan 8.1. Library and BMRCL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map
Leq,n
 Calculation in 1.5 m above ground

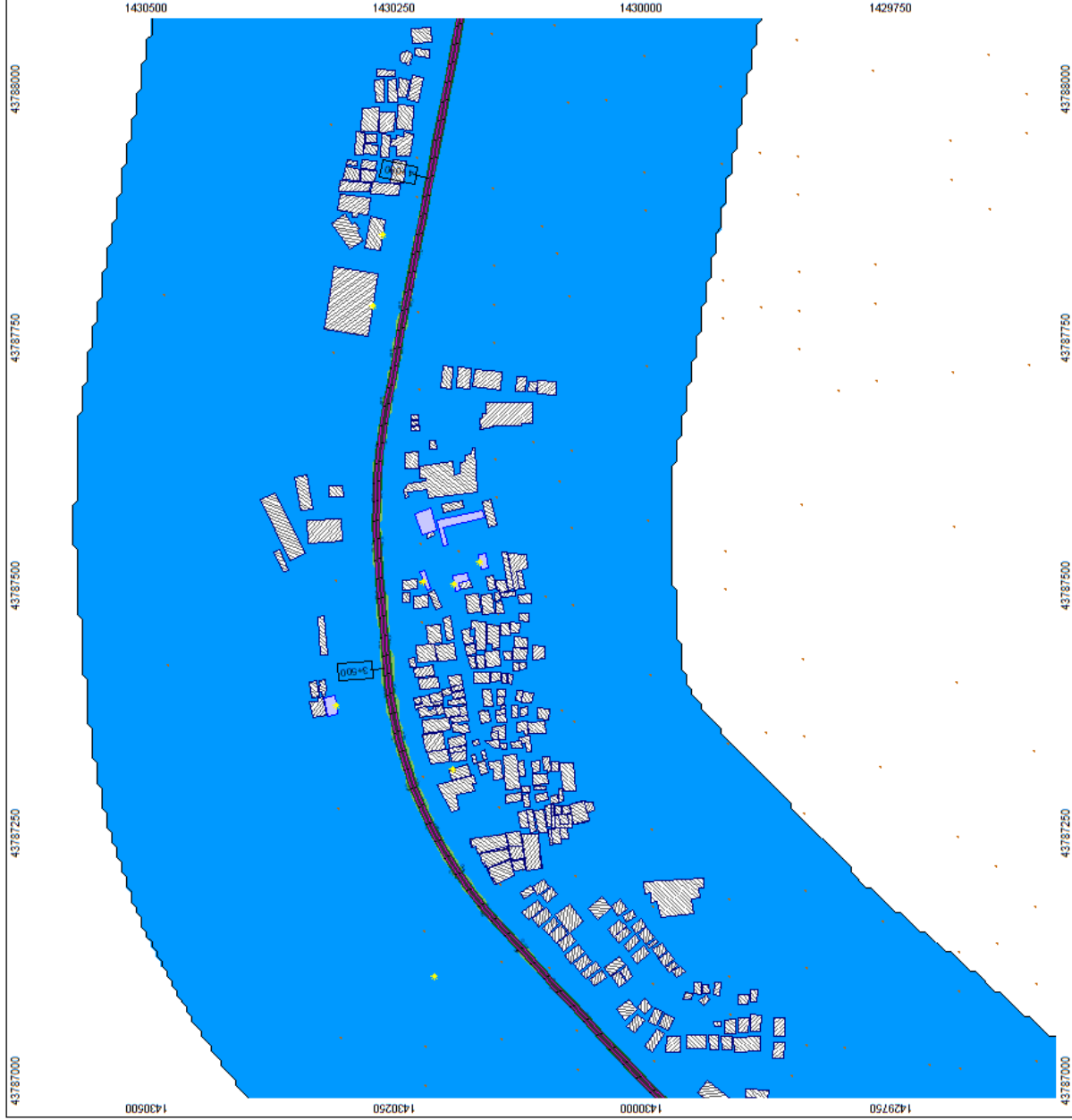
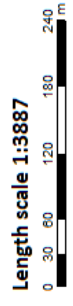
Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update 10/23/2018

Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wall
- Elevation point
- Bodemeffekte
- Noise calculation area

Levels Leq,n in dB(A)

- < 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- >= 65



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise, Buildings from Street Map and Google Earth, Train noise power levels taken from BMU Soundplan 8.1, Library and BMRCL Rolling Stock Specification, Train schedule and speeds from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map
Leq,d
 Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update:10/23/2018

Levels Leq,d in dB(A)

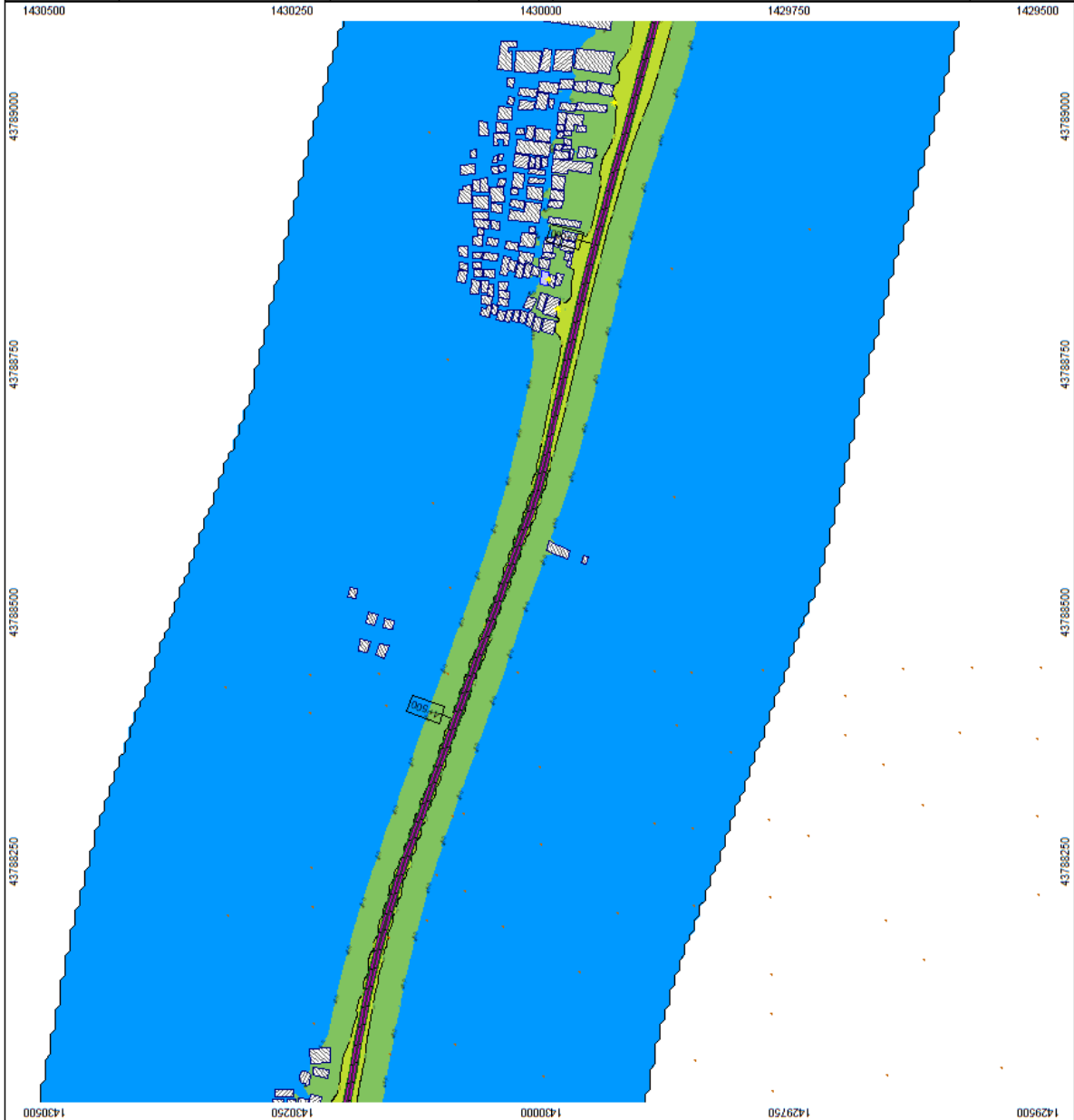
- < 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- ≥ 65

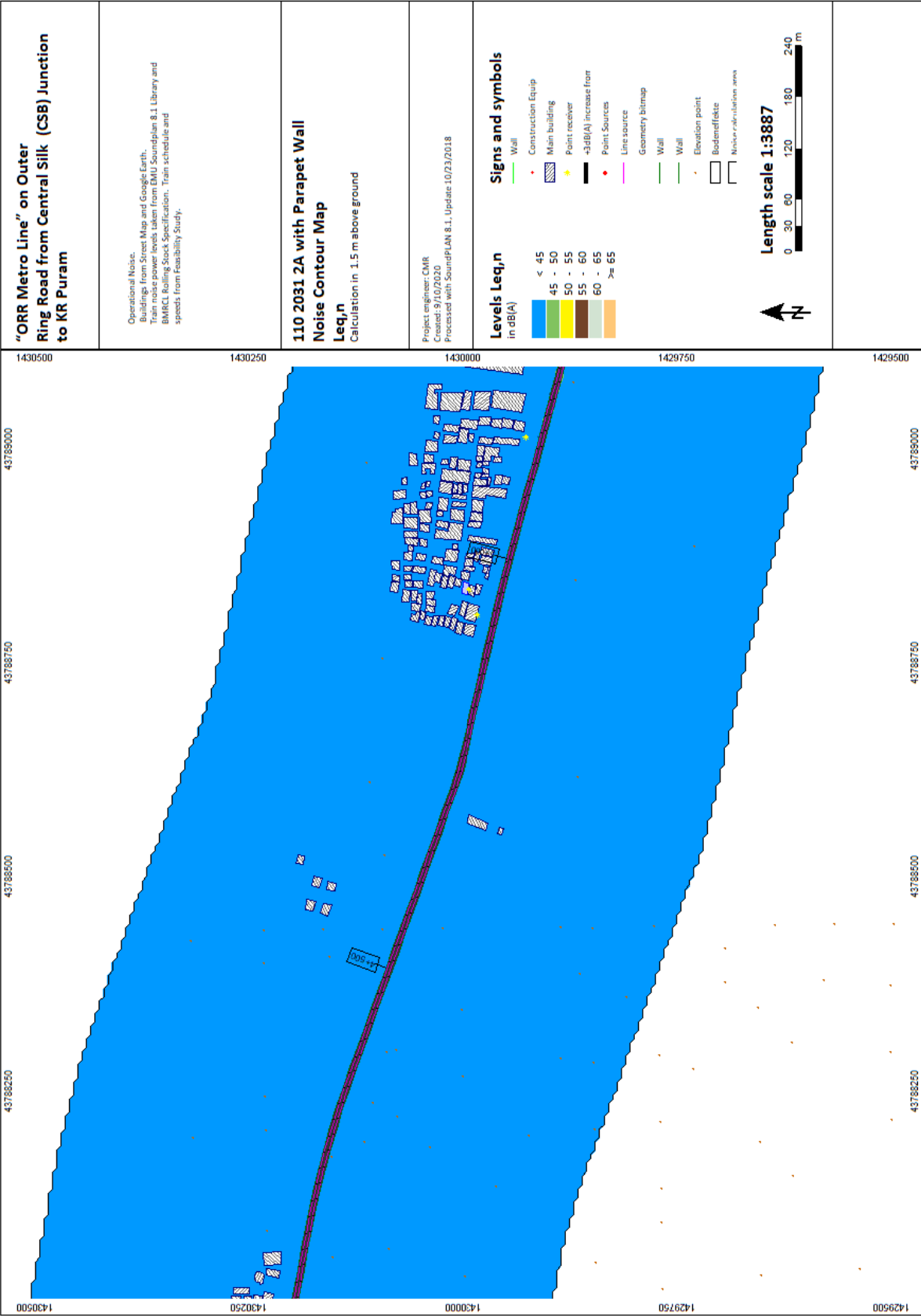
Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry blimp
- Wall
- Wall
- Elevation point
- Bodeneffekte
- Noise calculation area

Length scale 1:3887

0 30 60 120 180 240 m





“ORR Metro Line” on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Traffic parameters from DDU Soudanhan B.1 Library and
BMRL Road Stack Specifications. Train schedule and
speeds from Feasibility Study.

**110 2031 2A with Parapet Wall
Noise Contour Map
Leq,n**
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN B.1. Update 10/23/2018

- Levels Leq,n in dB(A)**
- < 45
 - 45 - 50
 - 50 - 55
 - 55 - 60
 - 60 - 65
 - >= 65
- Signs and symbols**
- Wall
 - Construction Equip
 - Main building
 - Point receiver
 - +3dB(A) increase from
 - Point Sources
 - Line source
 - Geometry bitmap
 - Wall
 - Wall
 - Elevation point
 - Bodeneffekte
 - Notkalkulations area



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from (AMU) Section 8.1. Library and (BMRC) Rolling Stock Specifications. Train schedule and speeds from Feasibility Study.

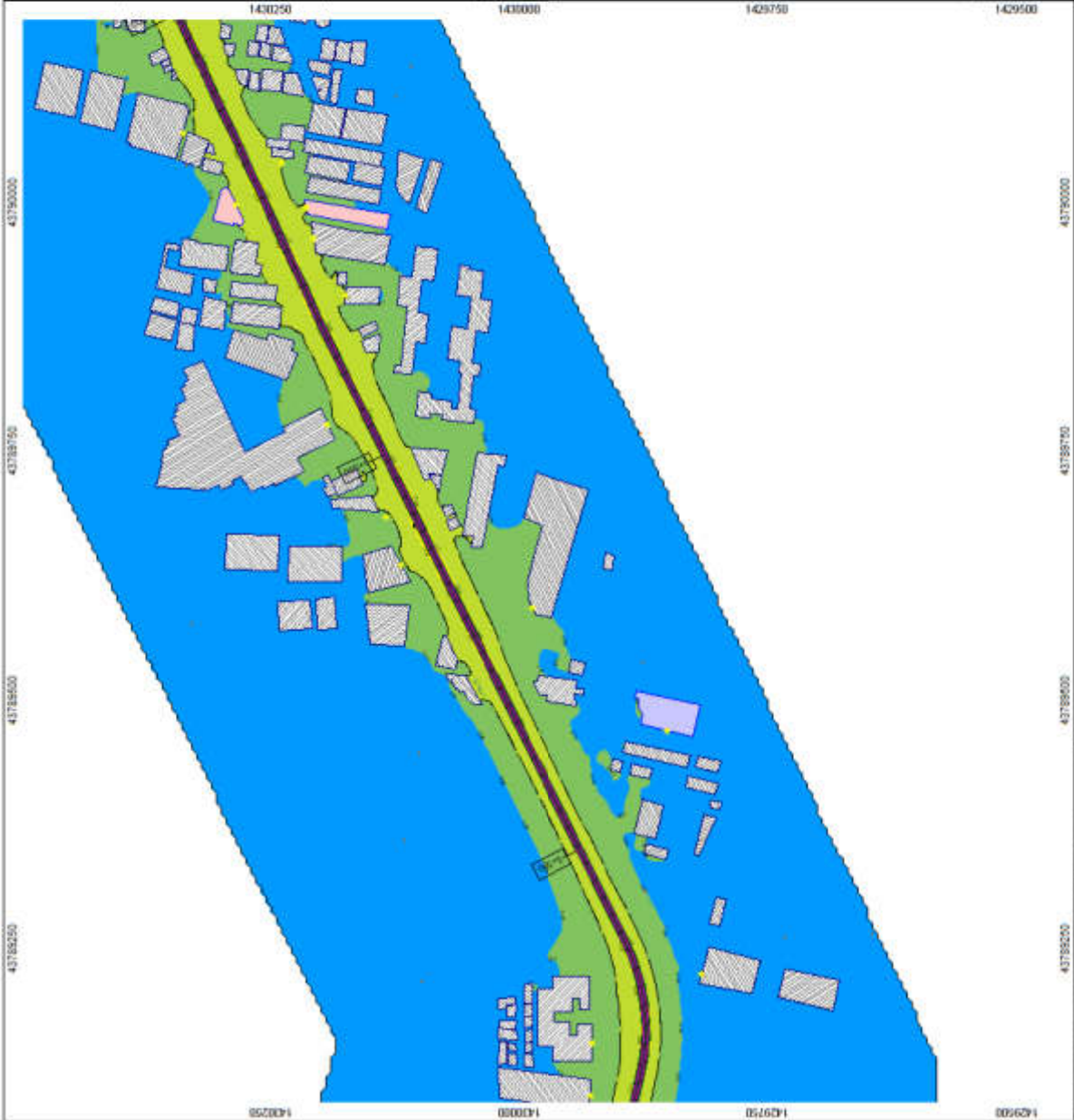
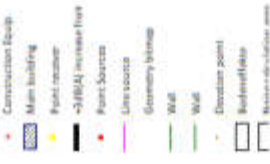
110 2031 2A with Parapet Wall Noise Contour Map
Leq,d
Calculation in 1.5 m above ground

Project engineer: DMH
Created: 8/10/2022
Processed with SourcePLAN 8.1.1, Update: 10/01/2023

Levels Leq,d
in dB(A)



Signs and symbols



“ORR Metro Line” on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Background noise from BNL Soundplan 8.1 Library and BMCL Background Specification. Train schedule and speeds from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map
Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,n in dB(A)

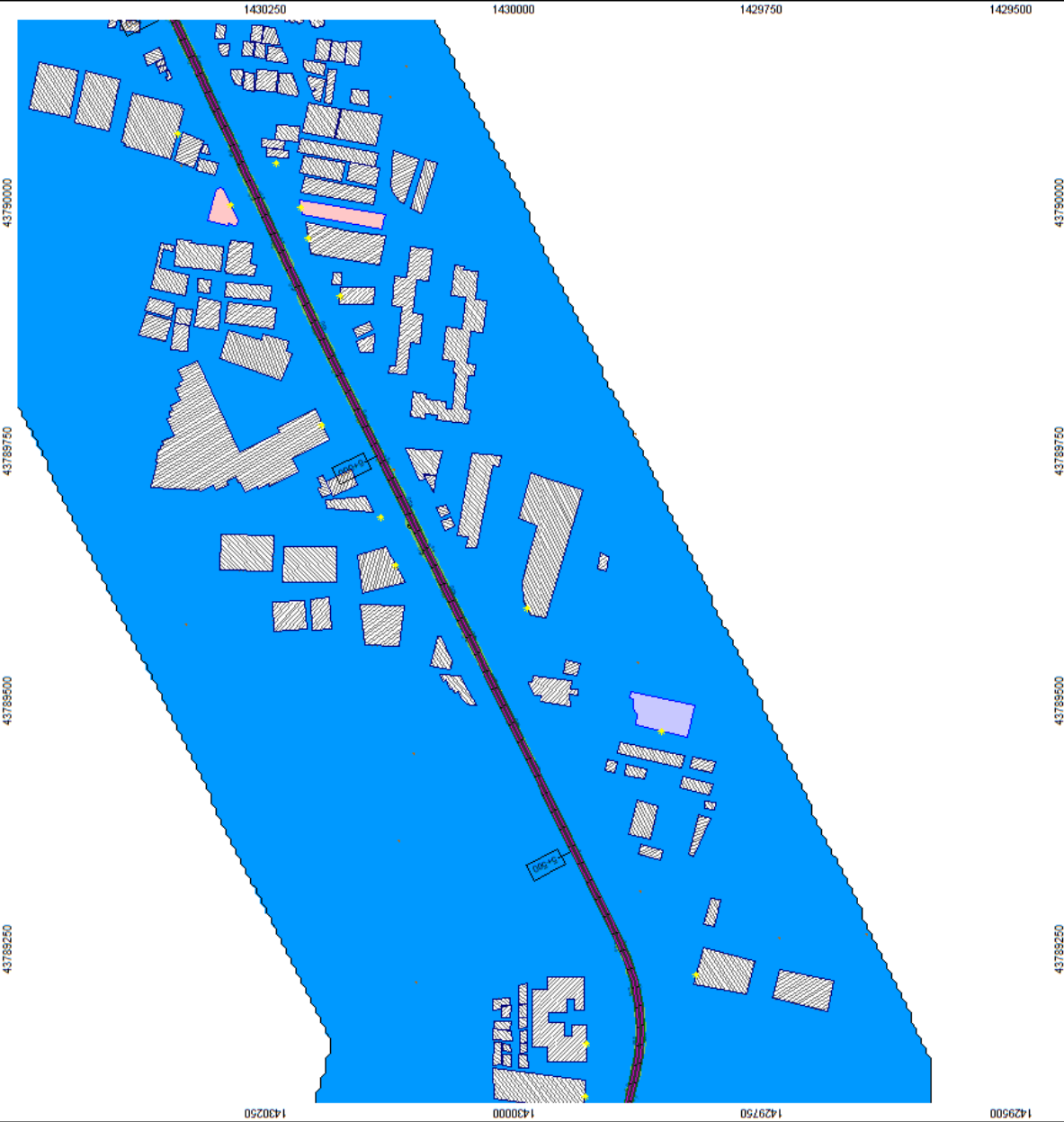
< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry blimap
- Wall
- Elevation point
- Bodeneffekte
- Noise calculation area

Length scale 1:3887

0 90 180 240 m

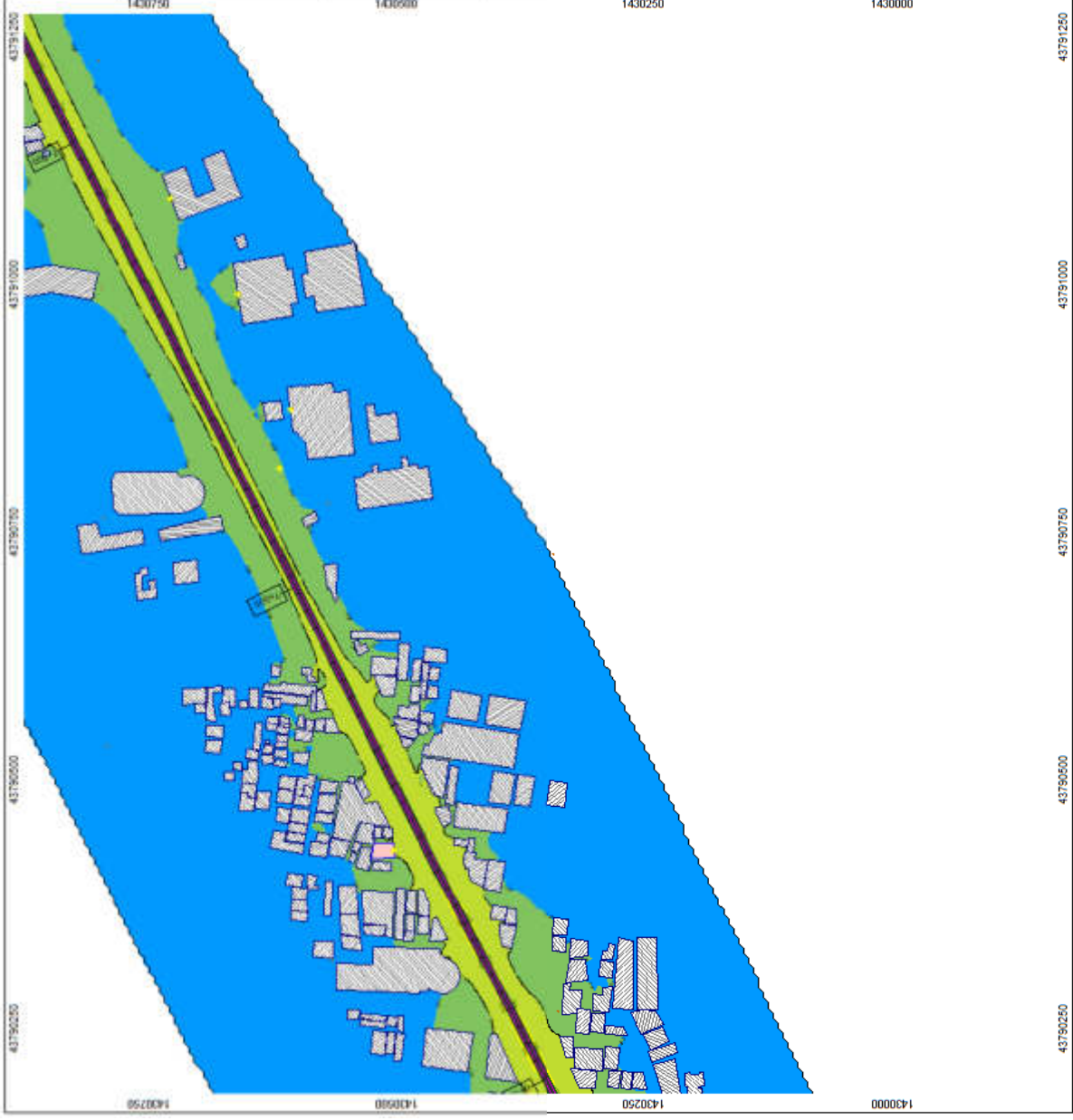


"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Building from Street Map and Google Earth.
 Train noise power levels taken from IAS/10/2010 and
 BMRL Rolling Stock Specifications. Train structure and
 levels from Probability Study.

**110 2031 2A with Parapet Wall
 Noise Contour Map
 Leq,d**
 Calculation in 1.5 m above ground

Project engineer: OMR
 Created: 31/10/2018
 Processed with SoundPLAN 8.1. Update: 10/01/2018

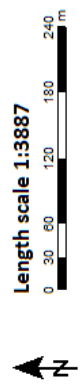


**Levels Leq,d
 in dB(A)**



Signs and symbols

- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wzll
- Elevation point
- Bodenefekte
- Noise calculation area



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Quantified Noise Levels are presented in this map. These are based on the noise levels from the BMRCL Building Stock Specification, train schedule and speed from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map

Calculation in 1.5 m above ground

Project engineer: CNB
 Checked: S/10/2020
 Processed with: SoundPLAN 8.1.1, Update 10/21/2018

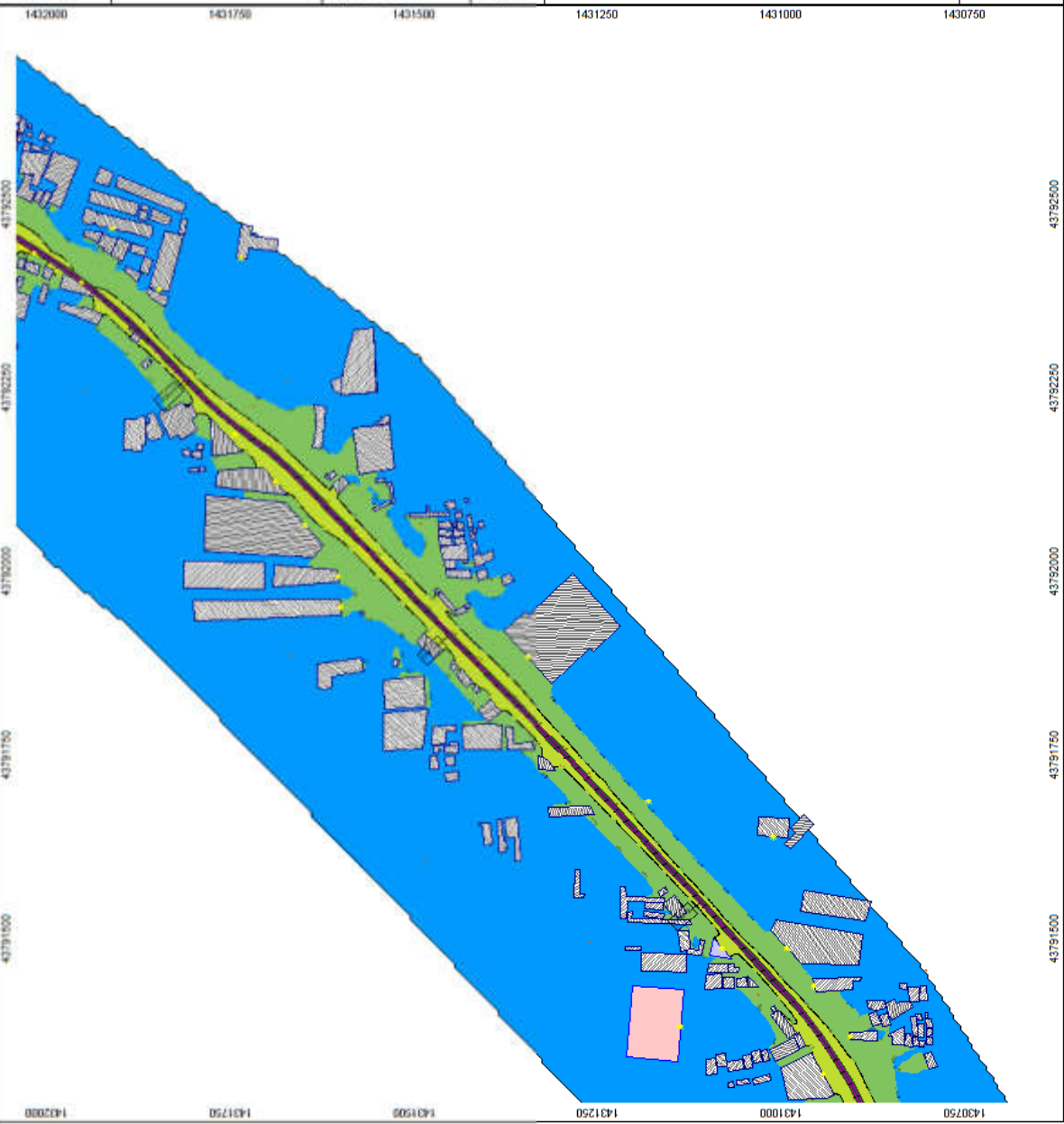
Levels Leq,d in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +dB(A) increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wall
- Elevation point
- Boundaryline
- Noise calculation area

Length scale 1:5245



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from EMU Soundplan 8.1 Library and BMRCL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map
Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update: 10/23/2018

Levels Leq,n
in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

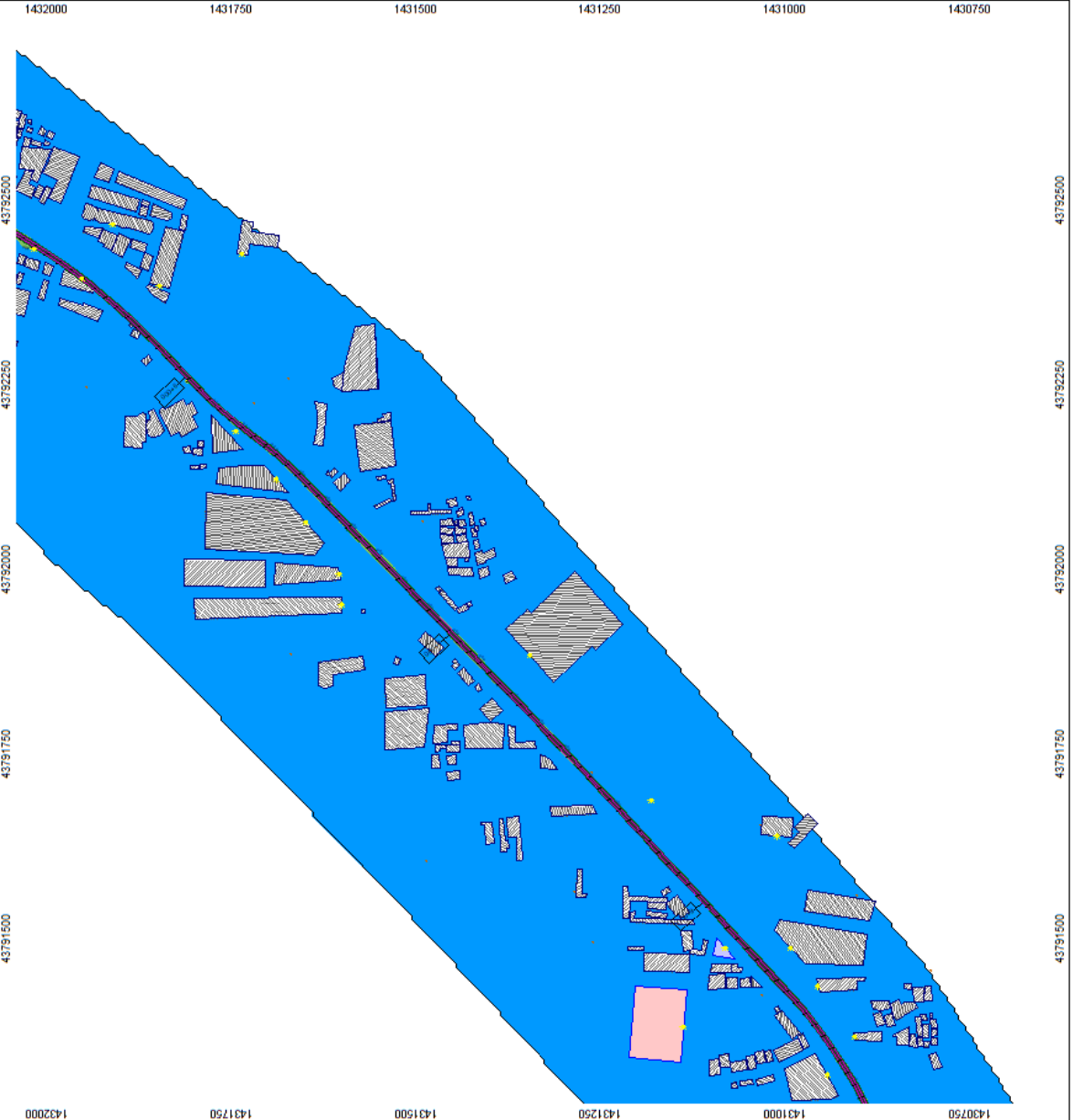
Signs and symbols

Wall
Construction Equip
Main building
Point receiver
+3dB(A) increase from
Point Sources
Line source
Geometry blimp
Wall
Wall
Elevation point
Barrier/levee
Noise calculation area

Length scale 1:5245

0 45 90 180 270 360 m

← N



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise: Street Map and Google Earth. Train noise power levels taken from BMU Soundplan 8.1 Library and BMRL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map
Leq,d
 Calculation in 1.5 m above ground

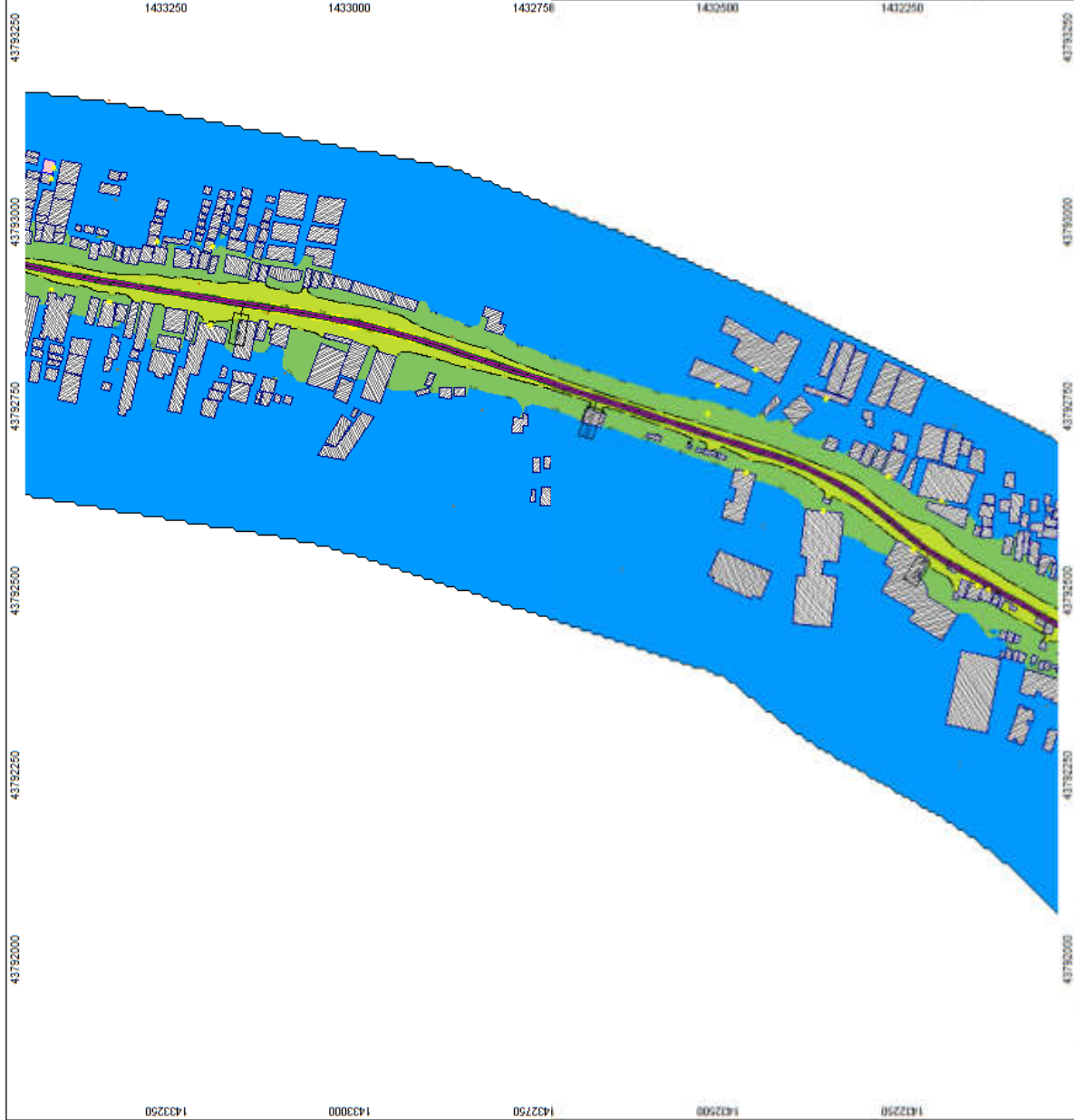
Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,d
 in dB(A)

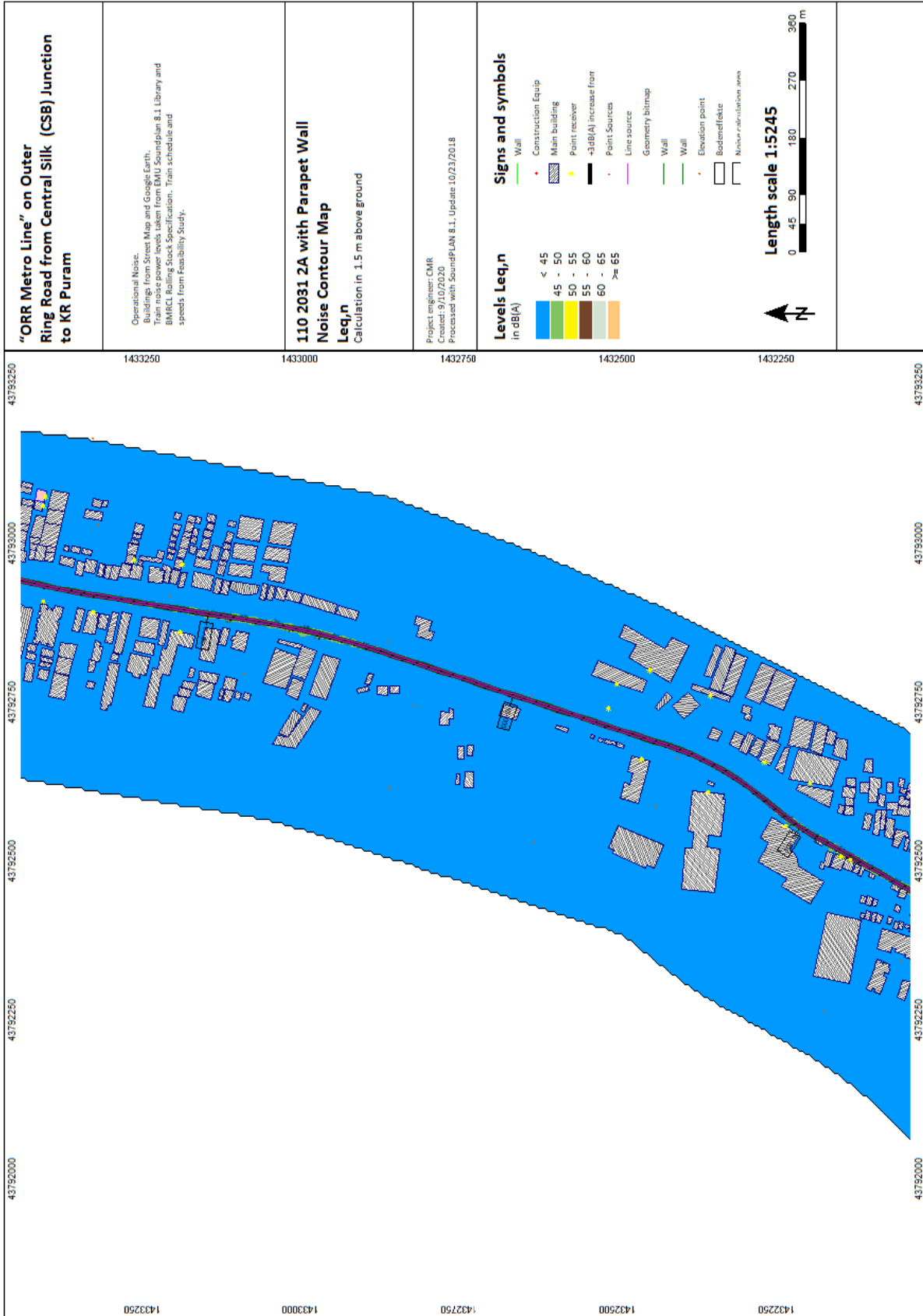
Blue	< 45
Light Blue	45 - 50
Yellow	50 - 55
Orange	55 - 60
Red	60 - 65
Dark Red	>= 65

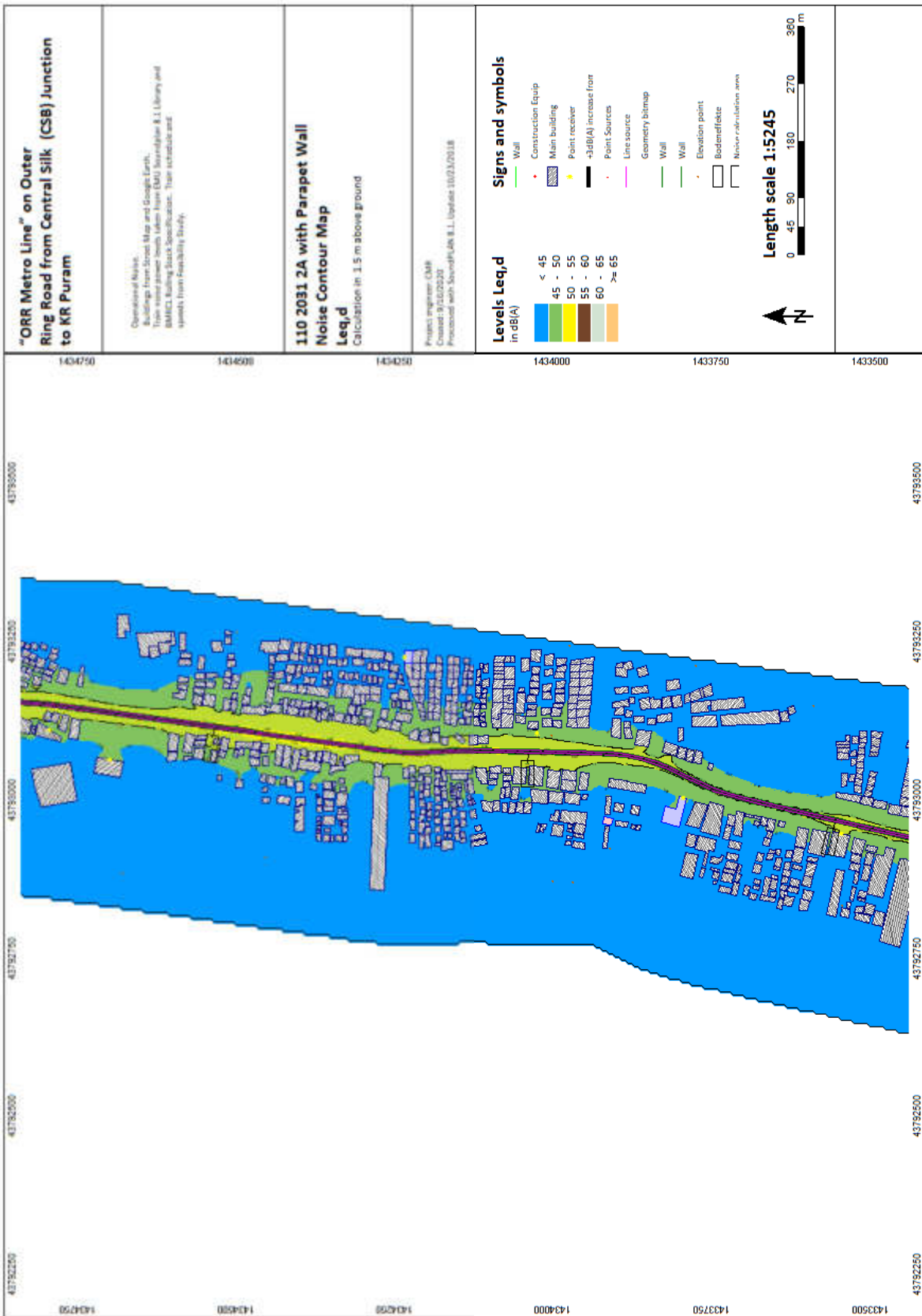
Signs and symbols

- Construction Equip
- Main building
- Point receiver
- dB(A) increase due to
- Point Sources
- Line sources
- Geometry building
- Wall
- Wall
- Direction points
- Soundwall/hoop
- Receiver calculation area



C:\Users\jagruj\OneDrive\Desktop\BANGALORE METRO\Noise Assessment\JA_10d_2031.apr





"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels from EMU Surveyor R.I. Library and
BMCL Building Stock Specifications. Train schedule and
speeds from Feasibility Study.

**110 2031 2A with Paraspit Wall
Noise Contour Map
Leq,d**
Calculation in 1.5 m above ground

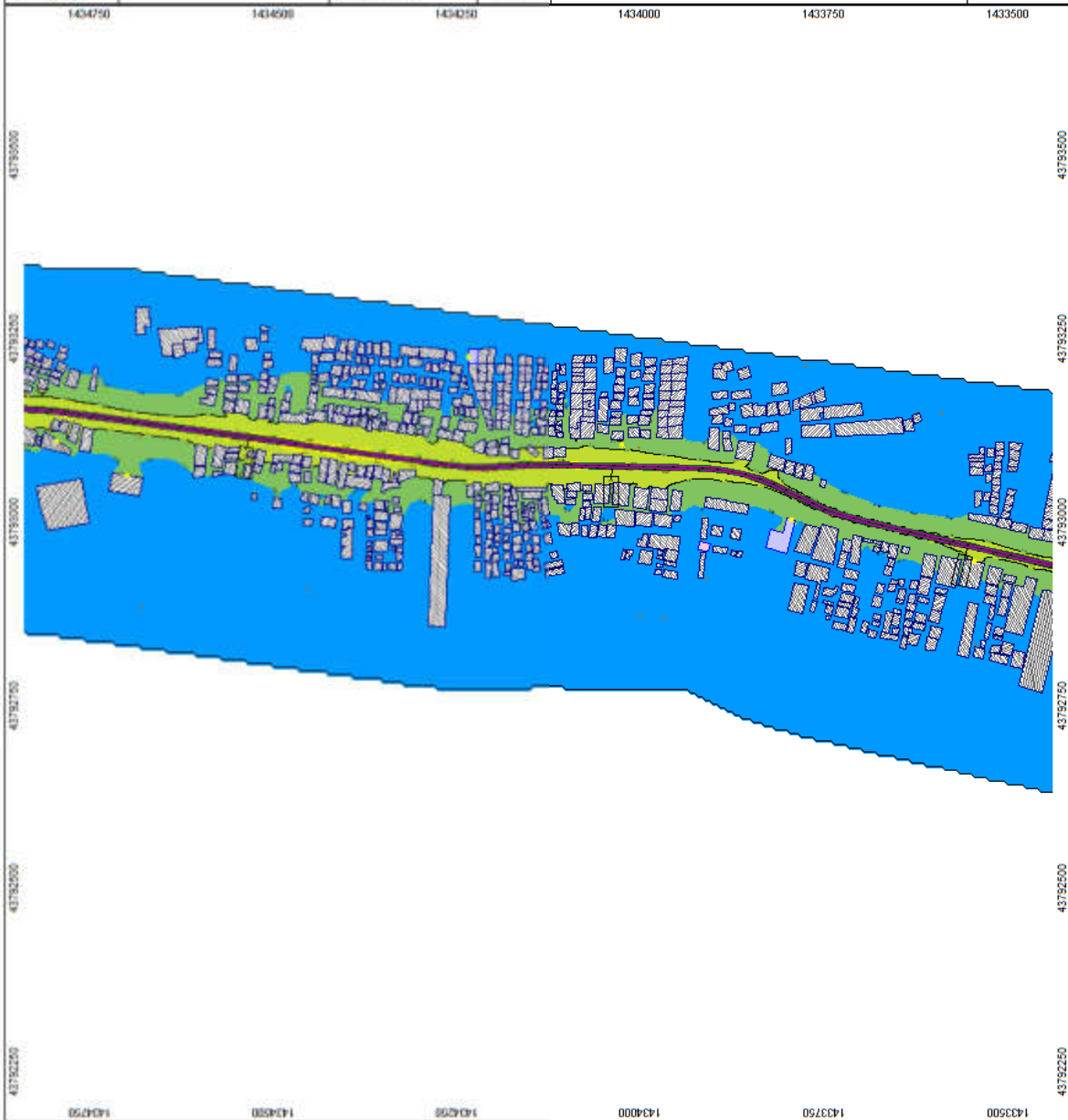
Project engineer: DMK
Checked by: DMK
Prepared with AutoCAD 2018, Update 10/23/2018

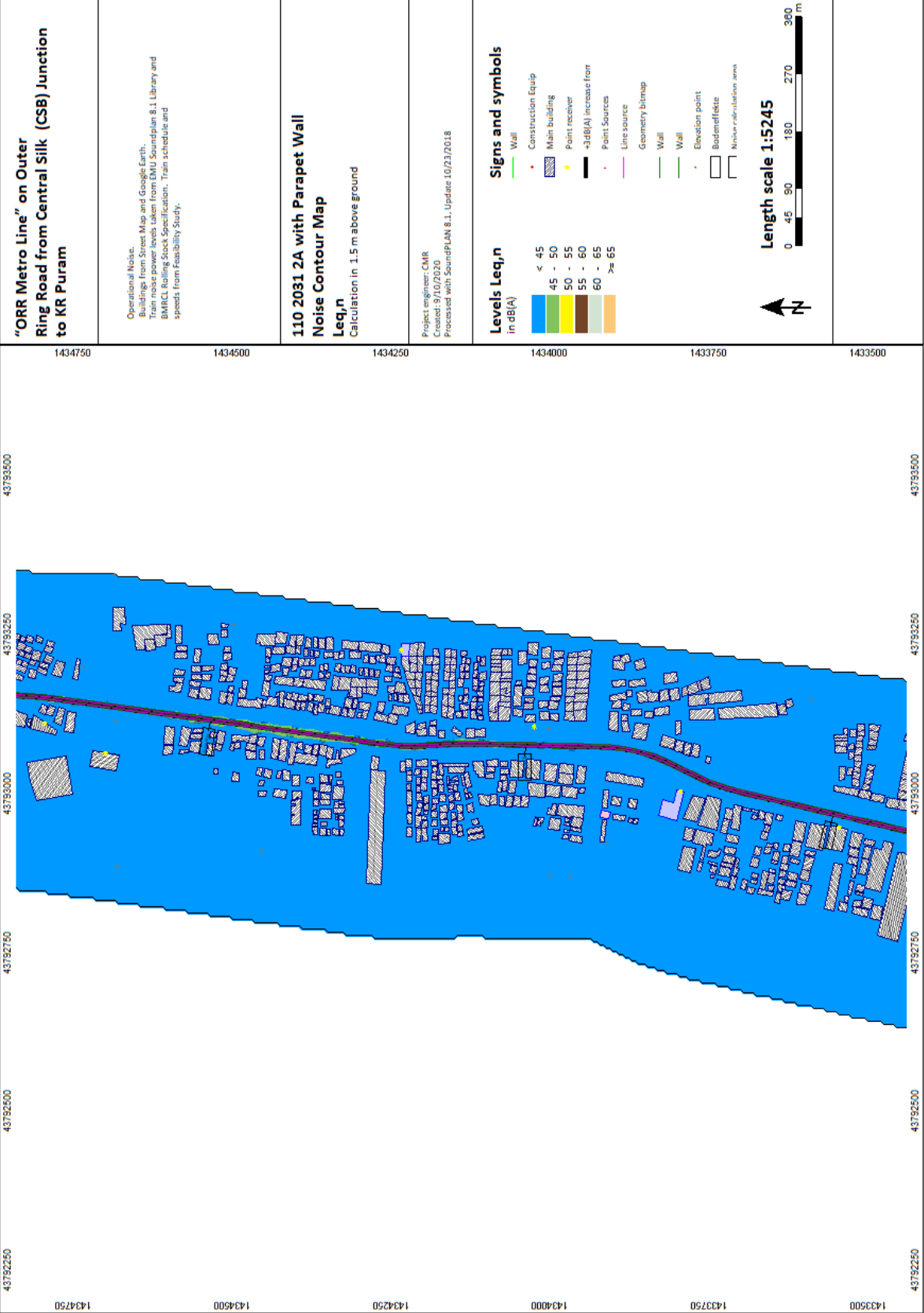
- Levels Leq,d in dB(A)**
- < 45
 - 45 - 50
 - 50 - 55
 - 55 - 60
 - 60 - 65
 - ≥ 65
- Signs and symbols**
- Wall
 - Construction Equip
 - Main building
 - Point receiver
 - +3dB(A) increase from
 - Point Sources
 - Line source
 - Geometry bitmap
 - Wall
 - Wall
 - Elevation point
 - Bodenreflekte
 - Noise reduction area

Length scale 1:5245

0 45 90 180 270 360 m

↑ N





"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise Buildings from Street Map and Google Earth. Train noise power levels taken from BMU Soundplan 8.1. Library and BMRL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map
Leg,d
 Calculation in 1.5 m above ground

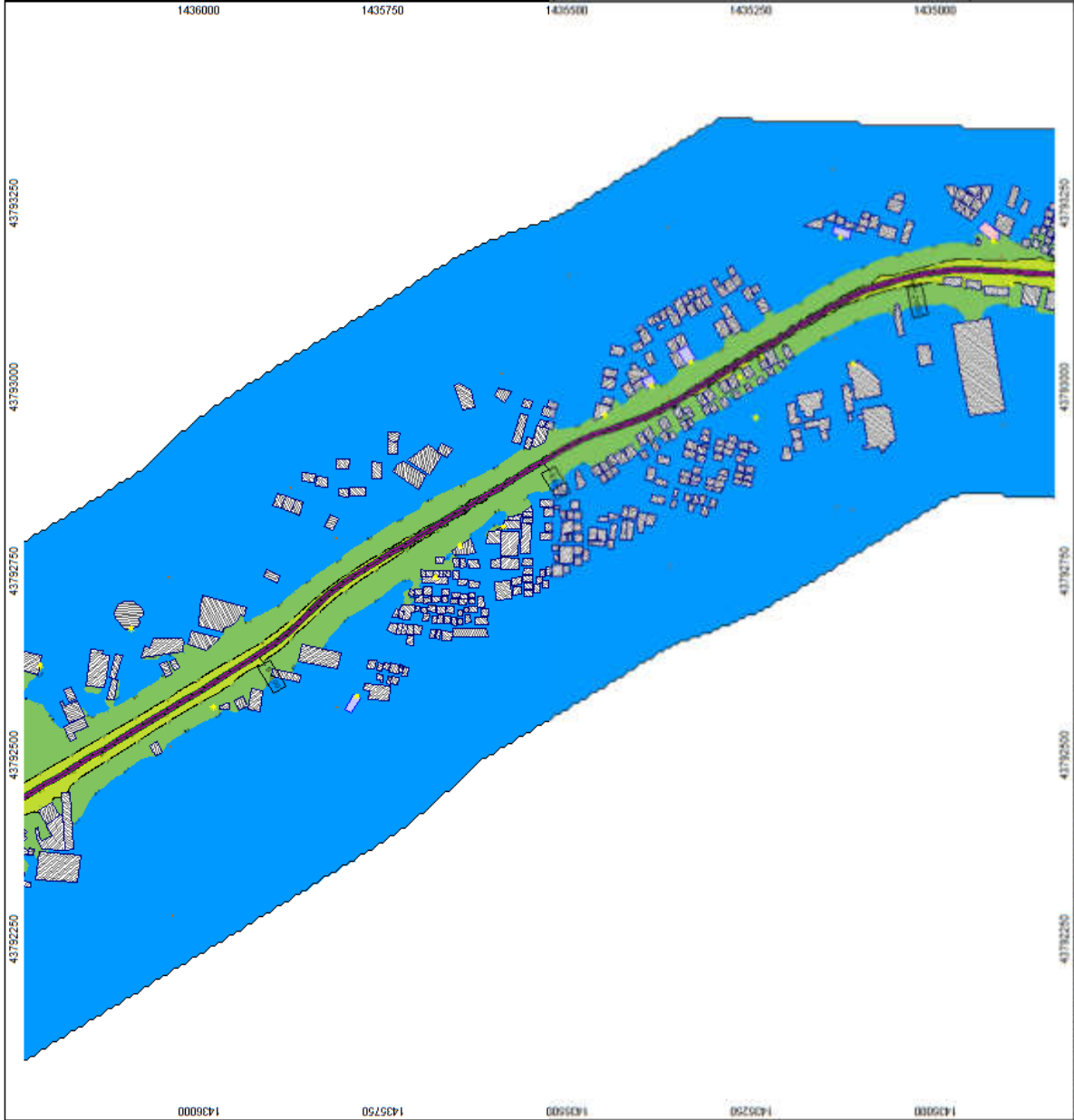
Project engineer: CMR
 Created: 9/10/2020
 Processed with SounPLAN 8.1, Update 10/23/2018

Levels Leg,d
 in dB(A)



Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- 3dB(A) increase floor
- Point Source
- Line source
- Geometry Storage
- Wall
- Wall
- Deviation points
- Soundfield
- Reference station



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise Buildings from Street Map and Google Earth. Train noise power levels taken from BMU Soundplan 8.1. Library and BMRCL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map
Leq,n
 Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update 10/23/2018

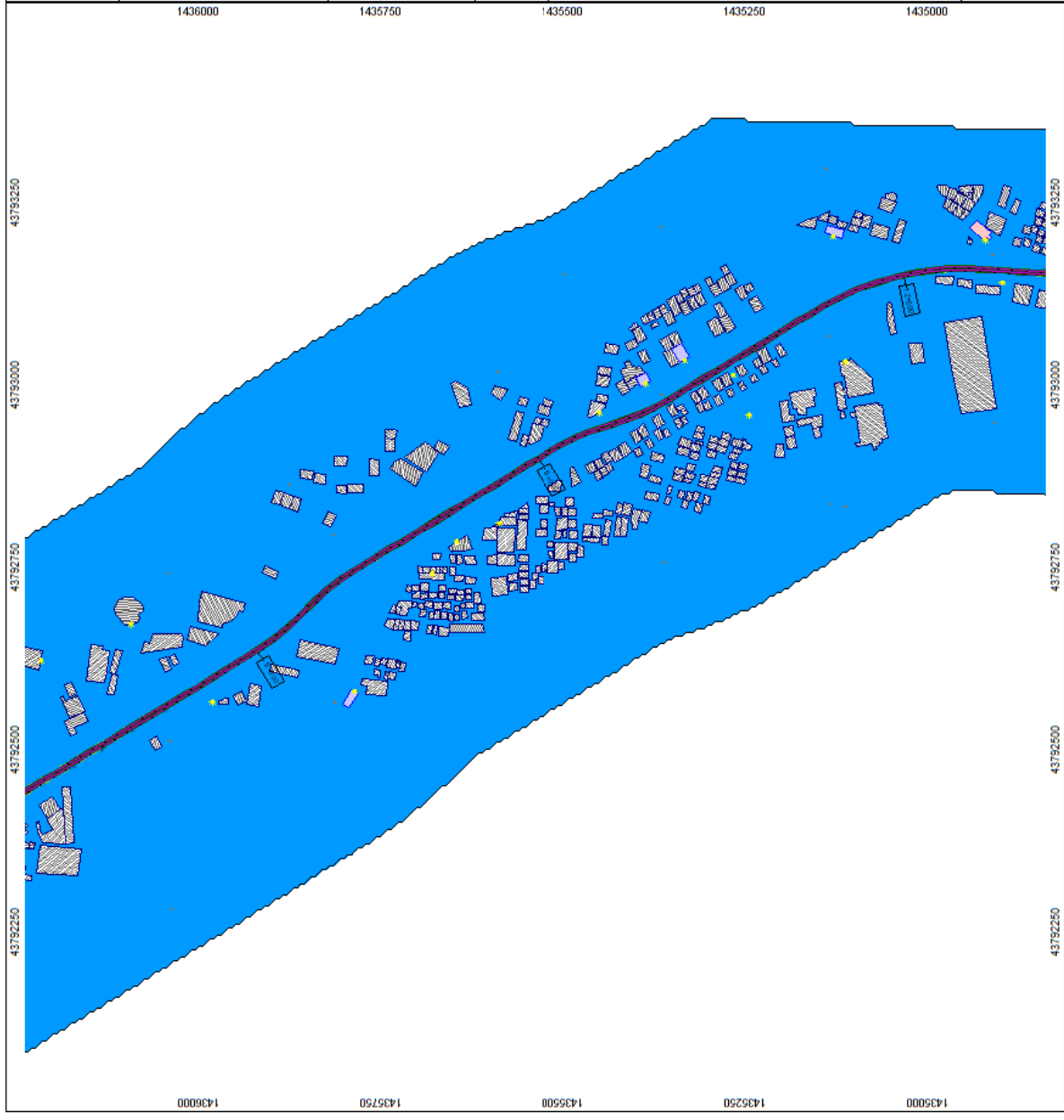
Levels Leq,n
 in dB(A)



Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wall
- Elevation point
- Bodenreflekte
- Noise calculation area

Length scale 1:5245



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operation of Noise:
 Buildings from Street Map and Google Earth.
 Train noise power levels from EMU Specification 3.1 Library and
 BHEL Rolling Stock Specifications. Train schedule and
 speeds from Feasibility Study.

**110 2031 2A with Parapet Wall
 Noise Contour Map
 Leq,d**

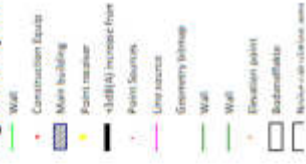
Calculation in: 1.5 m above ground

Project engineer: DMK
 Contact: 910000200
 Prepared with StreetPlan 6.1.1, Update 10/23/2018

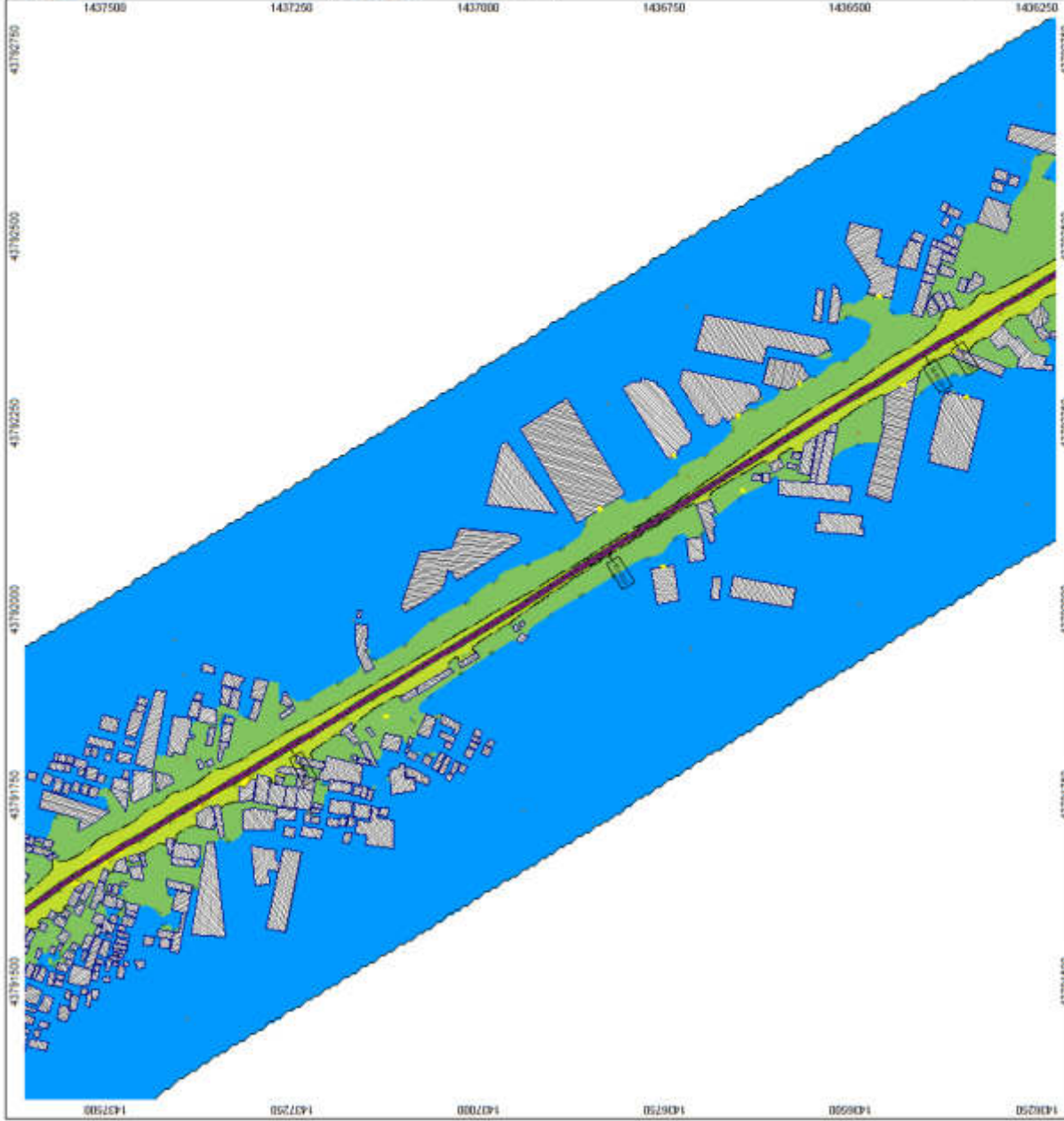
Levels Leq,d



Signs and symbols



Length scale 1:5181



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Operational Map and Grade/Elev.
 Train receiver levels taken from BMU Soundplan 8.1 Library and
 BMIRCL Rolling Stock Specification. Train schedule and
 speeds from Feasibility Study.

**110 2031 2A with Parapet Wall
 Noise Contour Map
 Leq,n**

Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with: SoundPLAN 8.1, Update: 10/23/2018

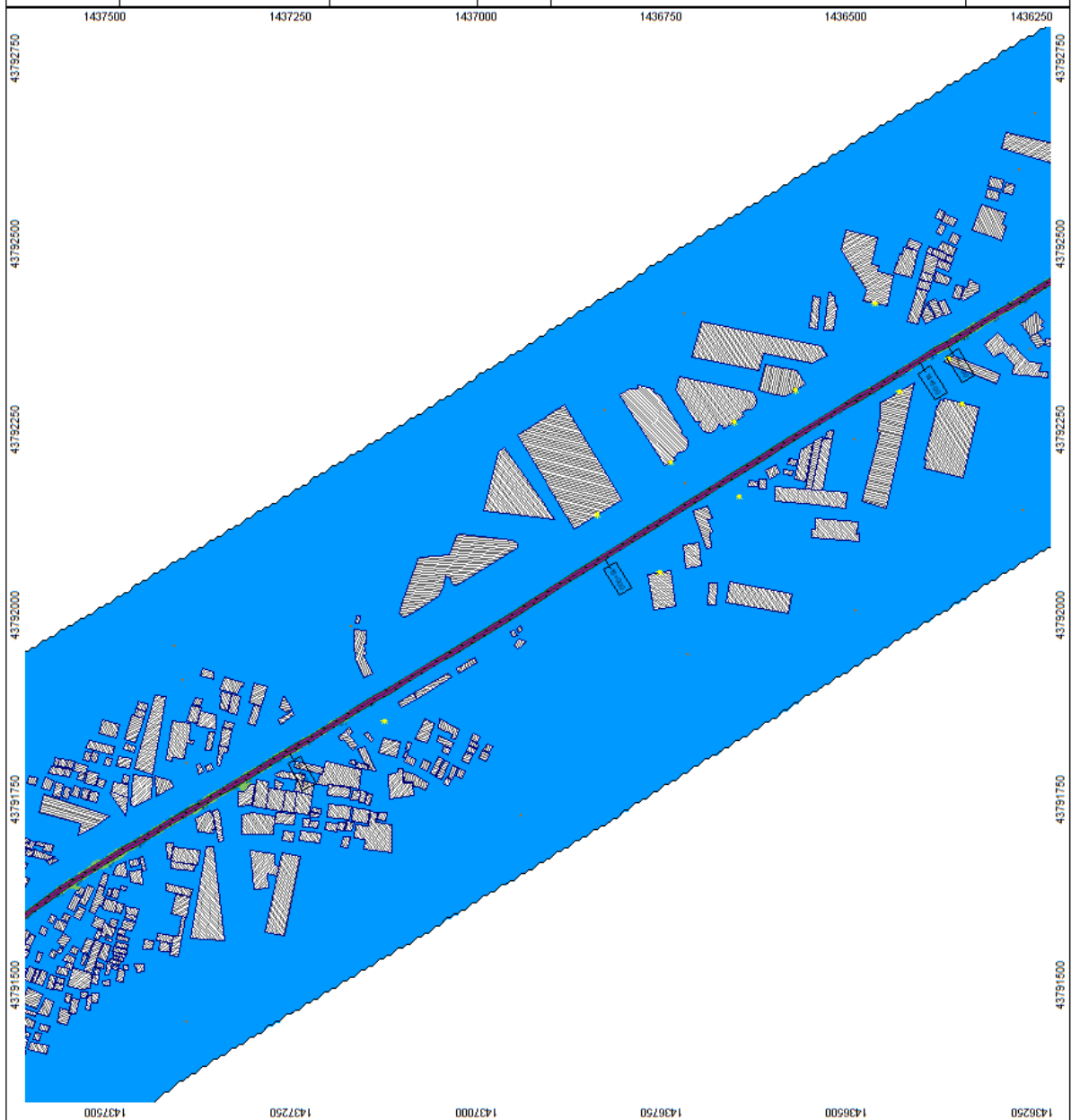
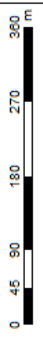
**Levels Leq,n
 in dB(A)**



Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry bumpup
- Wall
- Wall
- Elevation point
- Boundary/edge
- Noise calculation area

Length scale 1:5181



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from DMU Soundplan 8.1 Library and BMRCL Rolling Stock Specification. Train schedule and speeds from feasibility study.

**110 2031 2A with Parapet Wall
Noise Contour Map
Leq,d**
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,d (in dB(A))

Blue	< 45
Light Blue	45 - 50
Yellow	50 - 55
Orange	55 - 60
Red	60 - 65
Dark Red	≥ 65

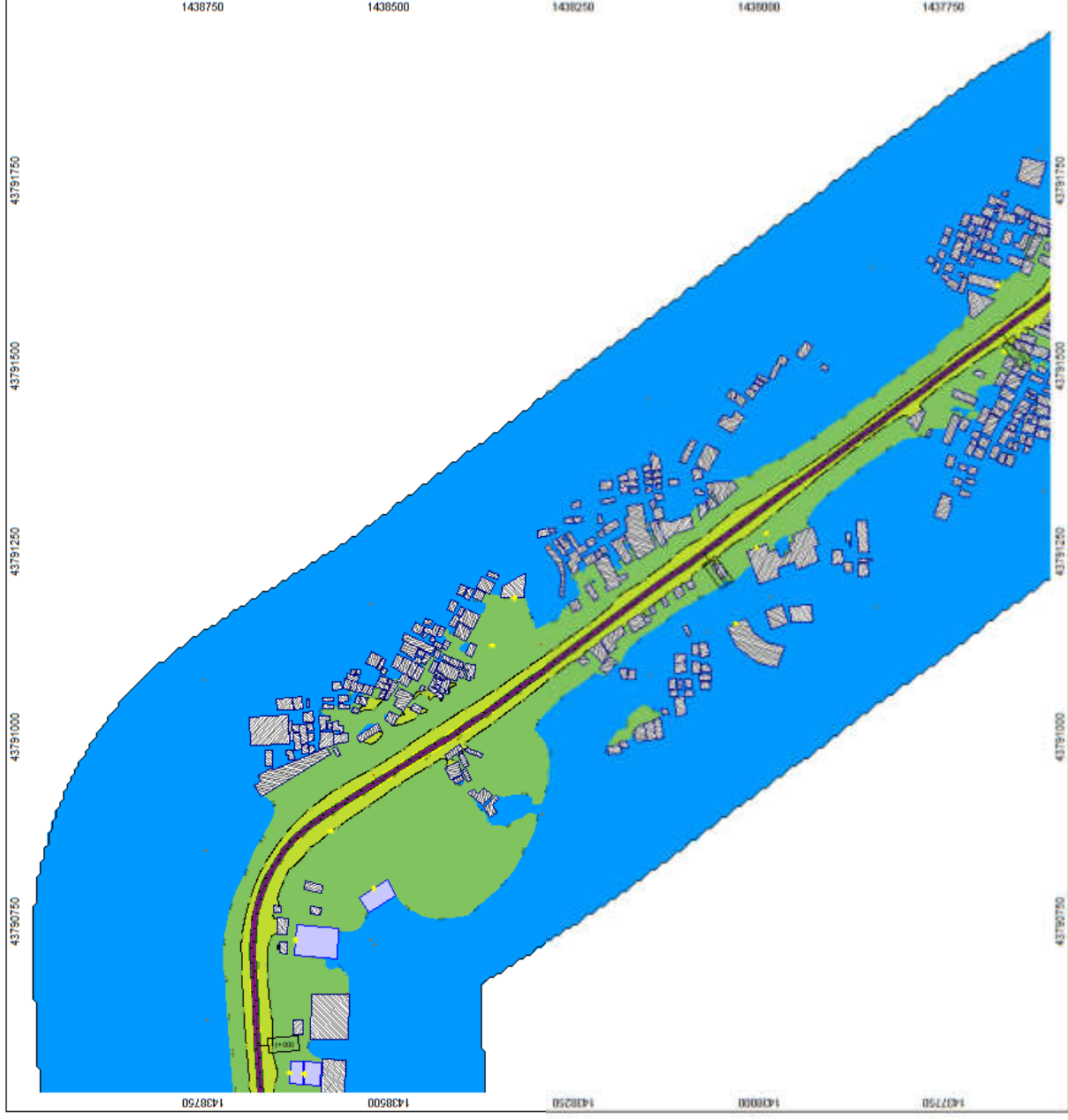
Signs and symbols

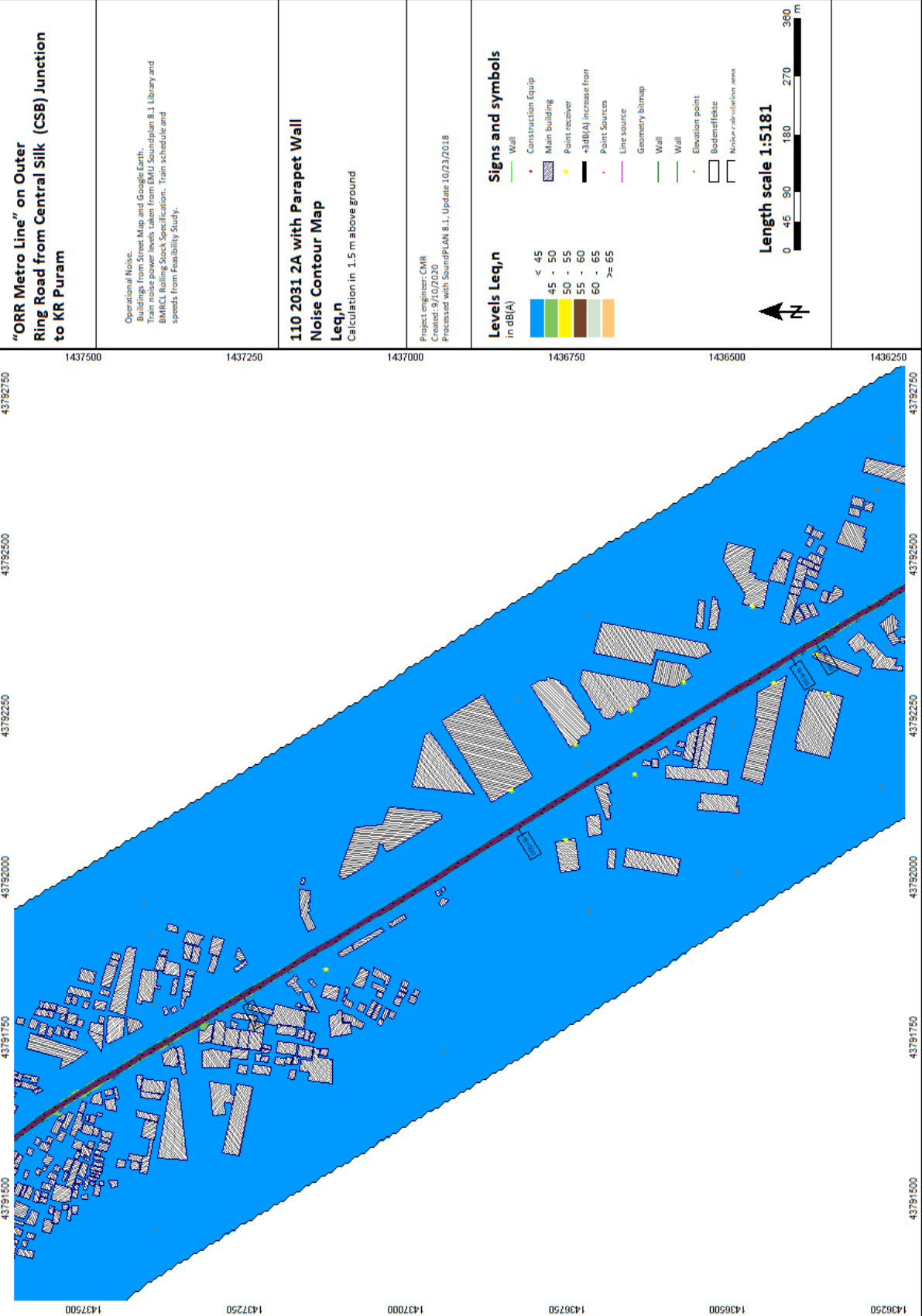
Green line	Construction fence
Red line	Wall
Blue hatched	Main building
Yellow dot	Point receiver
Black line	-3dB(A) increased line
Purple line	Point Sources
Green line	Line receiver
Green line	Geometry change
Green line	Wall
Green line	Elevation points
White box	Street/fence
White box	Multiple receiver areas

North arrow pointing up

Length scale 1:5181

0 45 90 180 270 360 m





"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Buildings from Street Map and Google Earth.
 Topography from SRTM30 PLUS from BMJ Soundingplan 8.1. Library and
 BMRCL Rolling Stock Specification. Train schedule and
 speeds from Feasibility Study.

**110 2031 2A with Parapet Wall
 Noise Contour Map**
 Leq,n
 Calculation in 1.5 m above ground

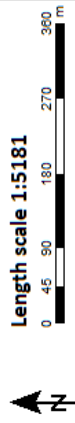
Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update 10/23/2018

Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- 3dB(A) increase from
- Point Sources
- Line source
- Geometry blimap
- Wall
- Wall
- Elevation point
- Bodeneffekte
- Noise calculation area

**Levels Leq,n
 in dB(A)**

- < 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- >= 65



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise Buildings from Street Map and Google Earth. Train noise power levels taken from BML Soundplan 8.1 Library and BMRCL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2031 2A with Parapet Wall Noise Contour Map
Leq,n
 Calculation in 1.5 m above ground

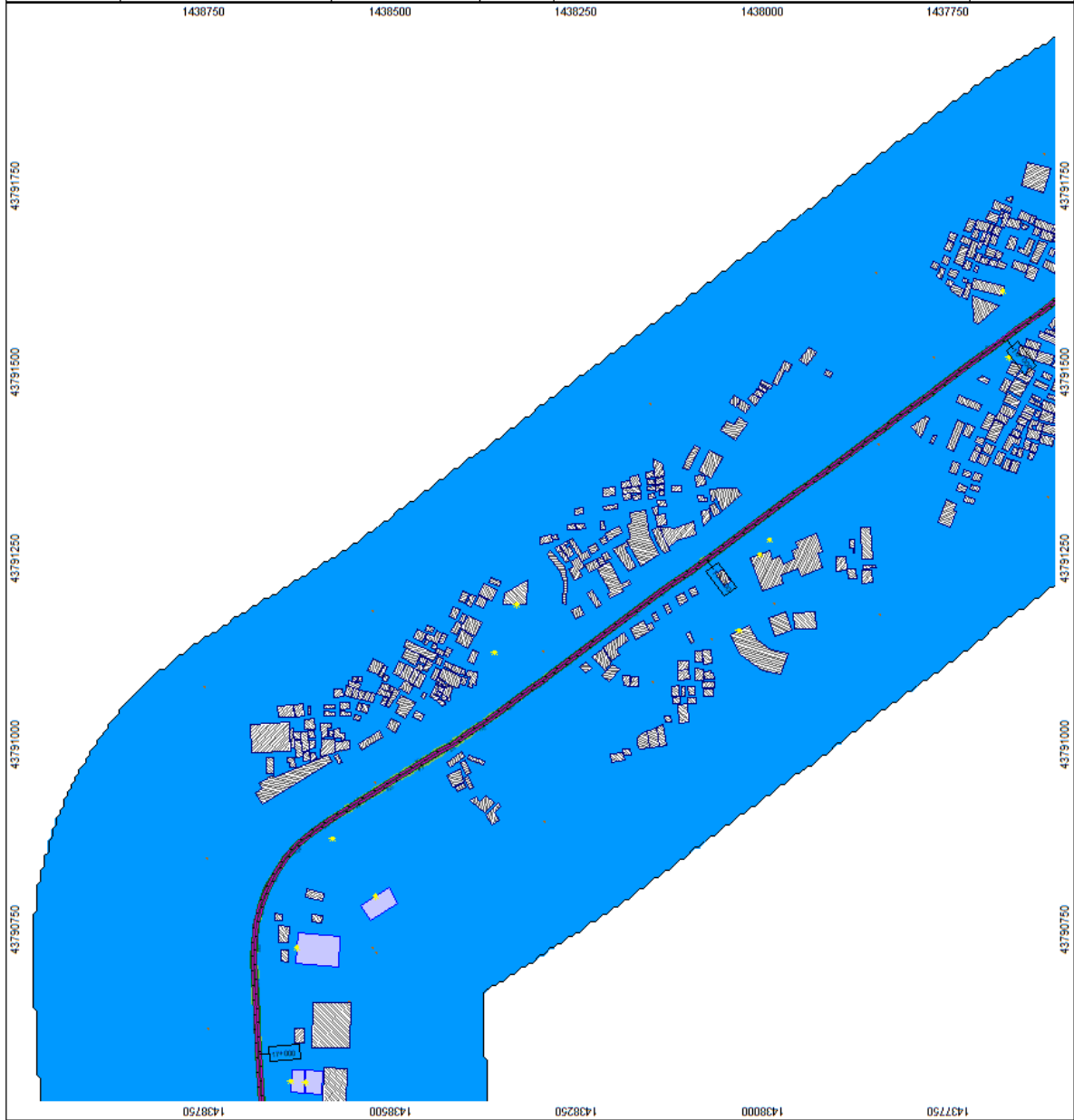
Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,n in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

- Construction Equip
- Main building
- Point receiver
- +3dB(A) Increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wall
- Elevation point
- Bodeneffekte
- Nature calculation area

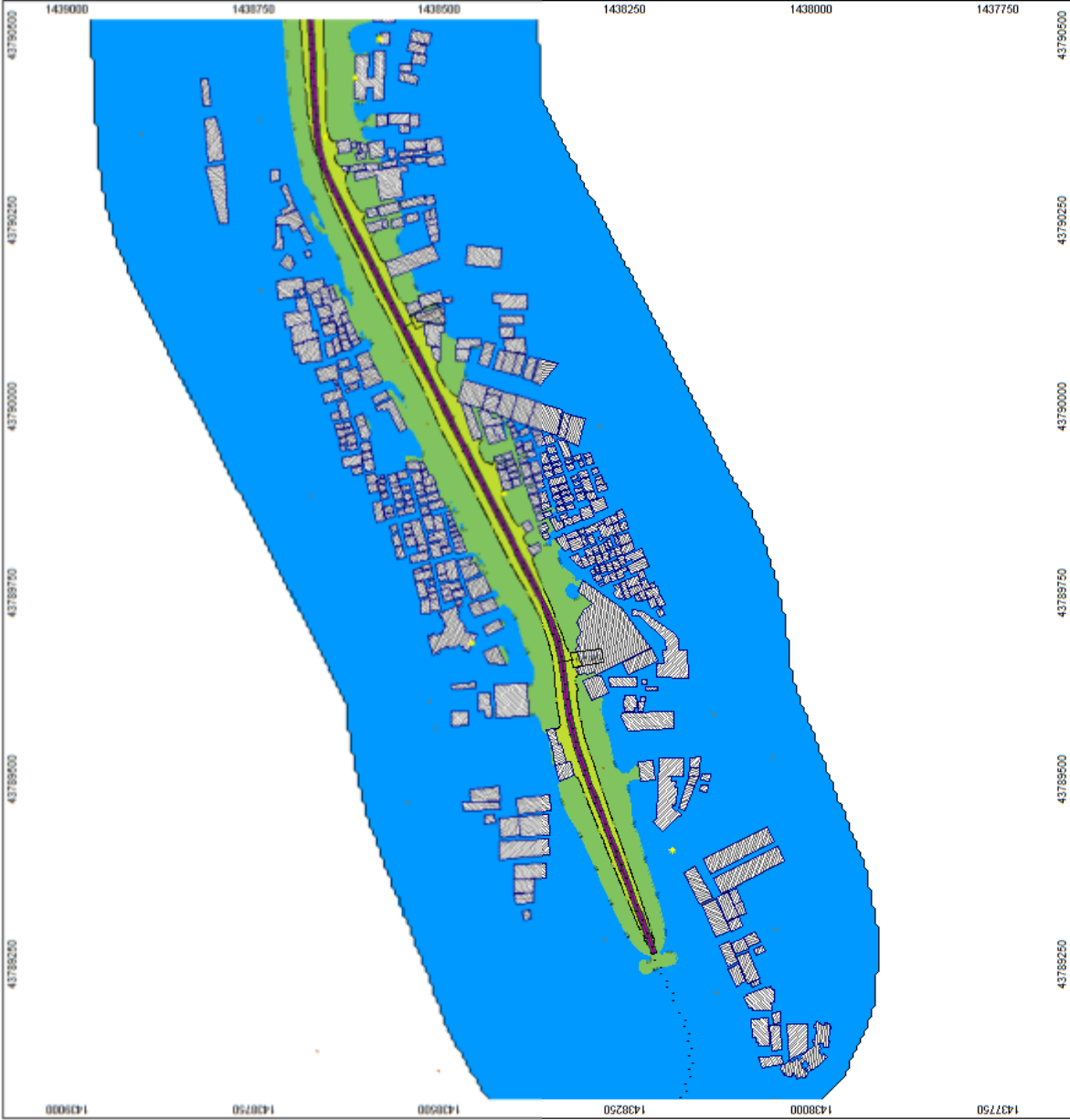


"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from (MI) SoundPLAN 8.1 Library and
BMMCL Building Stock Specification. Train schedule and
speeds from Feasibility Study.

**110 2031 2A with Parapet Wall
Noise Contour Map
Leq,d**
Calculation in 1.5 m above ground

Project engineer: CMH
Created: 30/02/2020
Processed with SoundPLAN 8.1, Update 10/23/2018



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 - Street Map and Google Earth.
 - Train noise power levels taken from EMU Soundplan 8.1 Library and
 - BMIRCL Rolling Stock Specification, Train schedule and
 - speeds from Feasibility Study.

**110 2031 2A with Parapet Wall
 Noise Contour Map
 Leq,n**

Calculation in 1.5 m above ground

Project engineer: CMR
 Date: 9/10/2020
 Processed with SoundPLAN 8.1, Update 10/23/2018

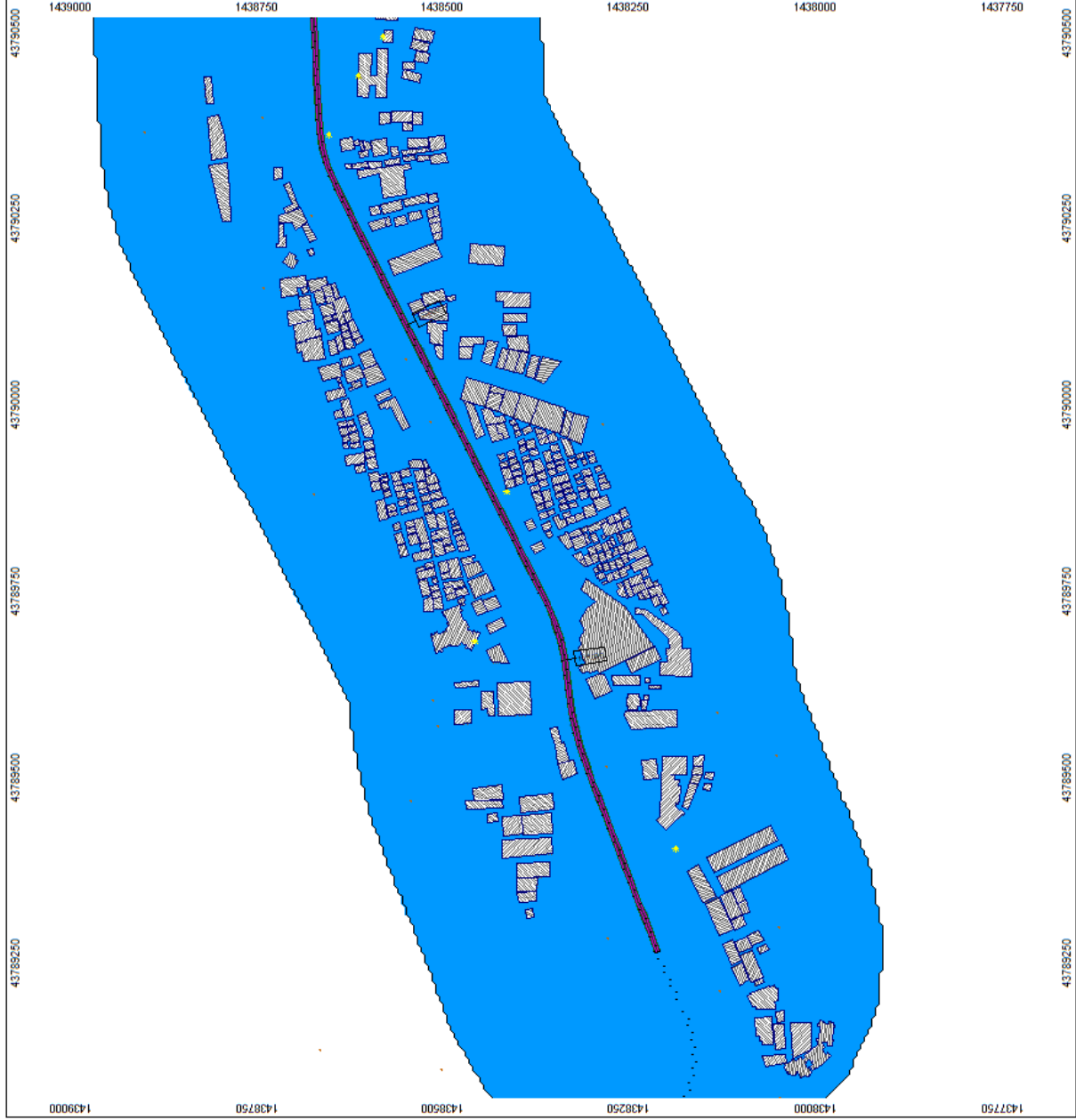
**Levels Leq,n
 in dB(A)**

- < 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- ≥ 65

Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Elevation point
- Bodemeffekte
- Noise calculation area

Length scale 1:5181



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Building from Street Map and Google Earth.
 Train noise power levels taken from DNV Soundplan 8.1 Library and
 BNSCL Rolling Stock Specifications. Train schedule and
 speeds from Feasibility Study.

**110 2041 2A with Parapet Wall
 Noise Contour Map
 Leq,d**
 Calculation in 1.5 m above ground

Project language: CMR
 Created: 05/05/2020
 Project: with SoundPLAN 8.1, Update: 10/23/2018

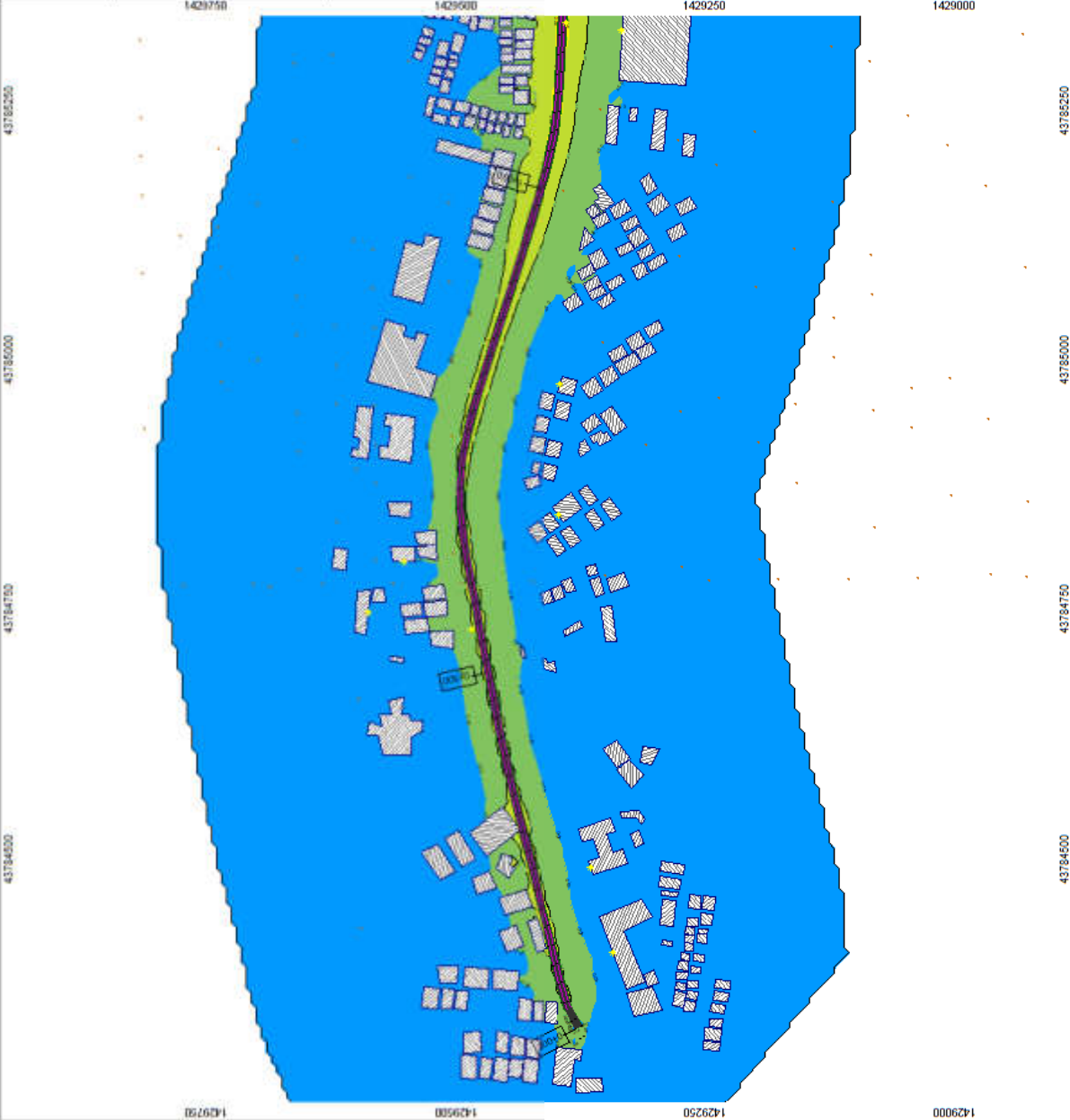
Levels Leq,d
 in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

Construction Equip
Main building
Point receiver
+3dB(A) increase from
Point Sources
Line source
Geometry bitmap
Wall
Elevation point
Bodenreflekt
Noise calculation area

Length scale 1:3887
 0 30 60 120 180 240 m



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise Building from Street Map and Google Earth. Train noise power levels taken from EMU Soundplan 8.1 Library and BMRC Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2041 2A with Parapet Wall Noise Contour Map

Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with SoundPLAN 8.1. Update: 10/23/2018

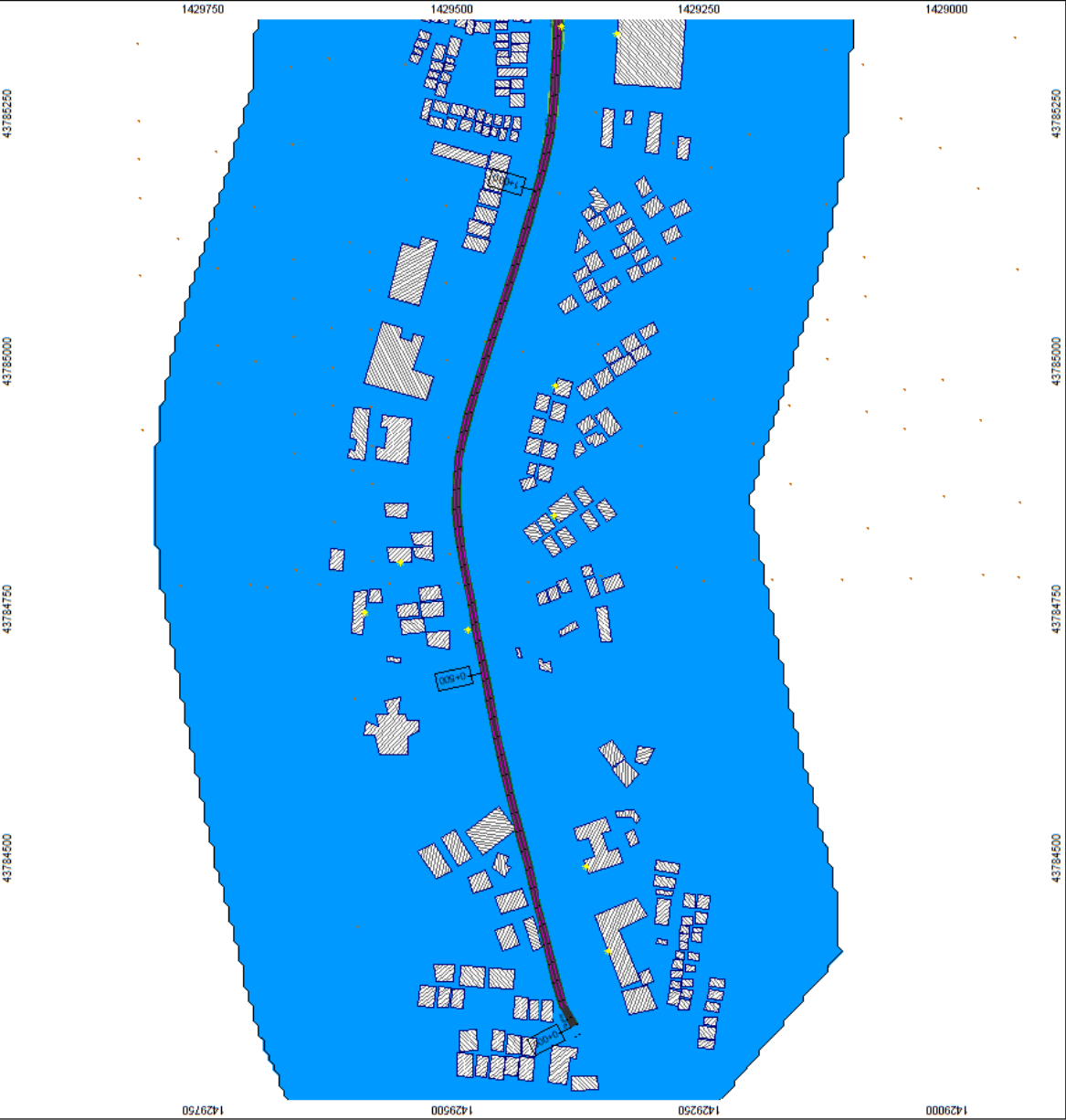
Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wall
- Elevation point
- Border/diote
- Noise calculation area

Levels Leq,n
in dB(A)

- < 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- ≥ 65

Length scale 1:3887



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Building from Street Map and Google Earth.
 Train noise power levels taken from EMU Soundplan 8.1 Library and
 BMRCL Rolling Stock Specification. Train schedule and
 speeds from Feasibility Study.

**110 2041 2A with Parapet Wall
 Noise Contour Map
 Leq,d**
 Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,d
 (in dB(A))

Blue	< 45
Light Blue	45 - 50
Yellow	50 - 55
Orange	55 - 60
Red	60 - 65
Dark Red	>= 65

Signs and symbols

Green line	Wall
Red square	Construction Equip
Blue square	Main building
Yellow square	Point receiver
Black line	-5dB(A) increase from
Red square	Point barriers
Purple line	Line source
Green line	Geometry barrier
Green line	Wall
Green line	Wall
Green line	(Elevation point)
White square	Background
White square	Receiver calculation area

Length scale 1:3887
 0 30 60 120 180 240 m

North arrow



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise Building from Street Map and Google Earth. Train noise power levels taken from EMD Soundplan 8.1 Library and BMRC Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2041 2A with Parapet Wall Noise Contour Map
Leq,n
 Calculation in 1.5 m above ground

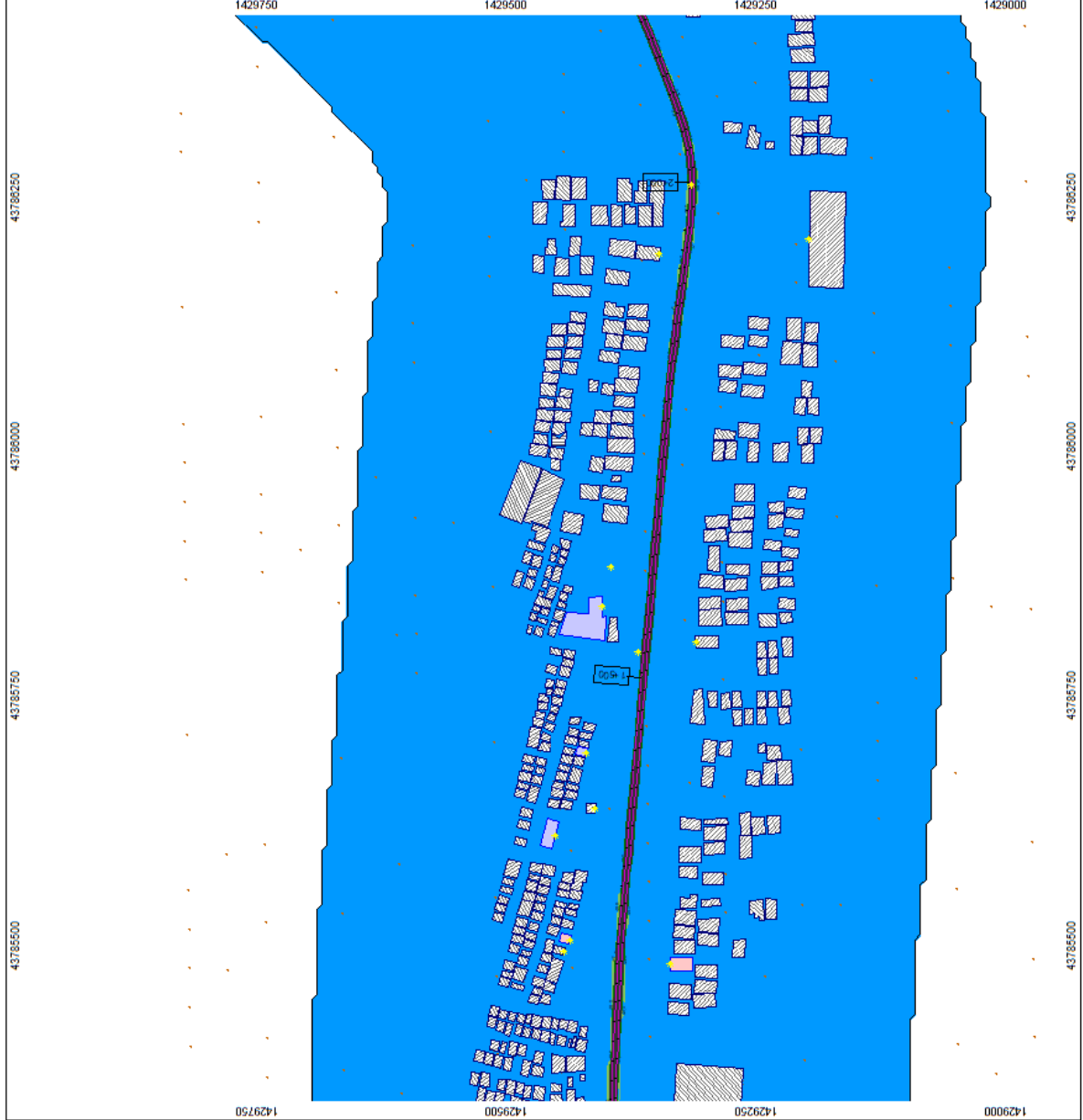
Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.L Update: 10/23/2018

Levels Leq,n in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wall
- Elevation point
- Bodeneffekte
- Noise calculation area



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Building from Street Map and Google Earth.
 Train noise power levels taken from DMU Soundpower L.L. Library and
 BMRC Building Level Specifications. Train schedule and
 speeds from feasibility study.

110 2041 2A with Parapet Wall Noise Contour Map
Leq,d
 Calculation in 1.5 m above ground

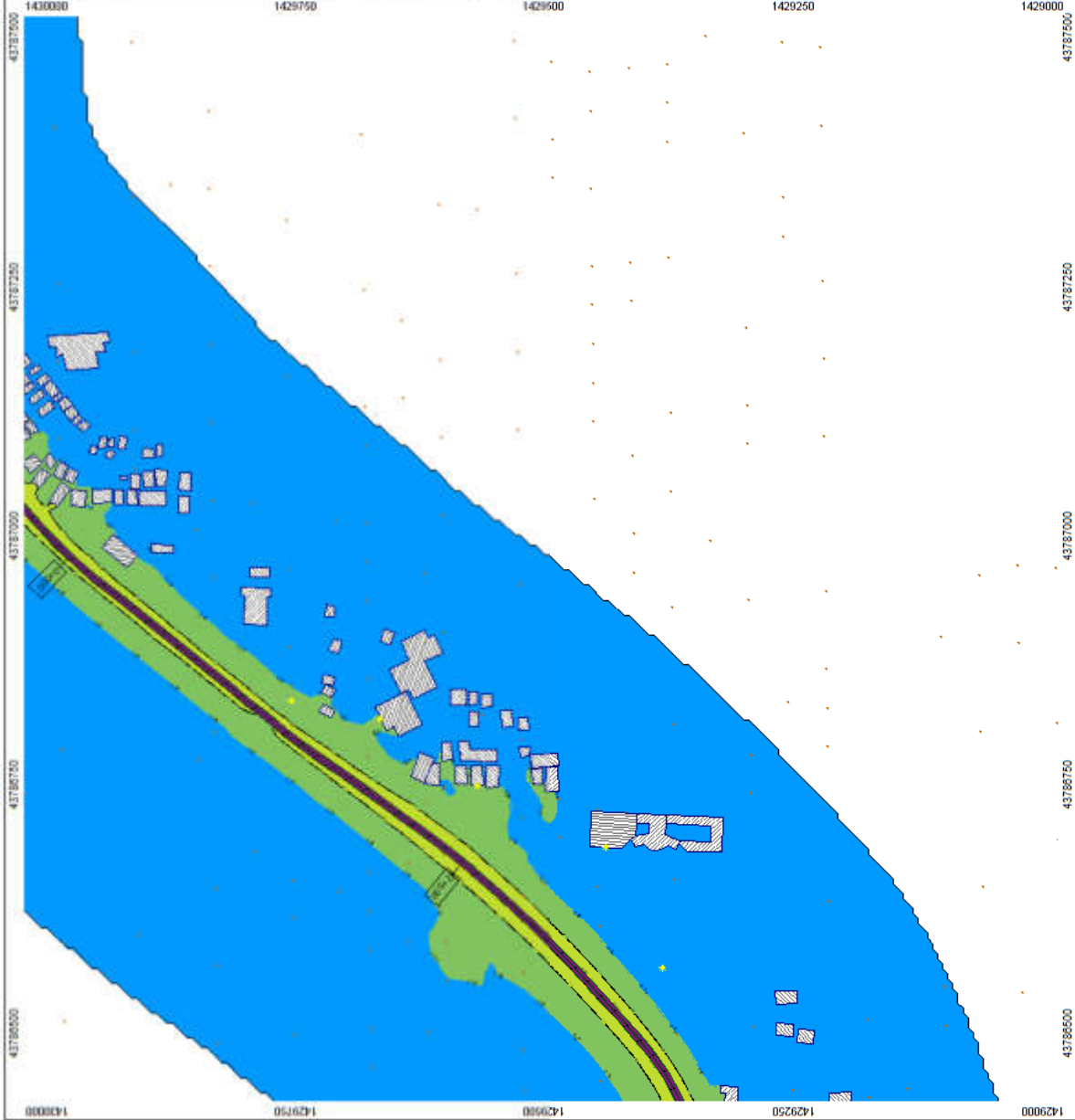
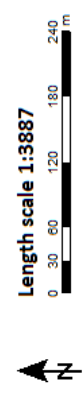
Project engineer: CMK
 Drawing No: 1102041
 Prepared with SoundPLAN 8.1.1, Update 10/21/2018

Levels Leq,d
 in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

Wall
Construction Equip
Main building
Point receiver
+3dB(A) increase from
Point Sources
Line source
Geometry bitmap
Wall
Wall
Elevation point
Barrier/plate
Noise calculation area



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise Buildings from Street Map and Google Earth. Train noise power levels taken from EMU Soundplan 8.1 Library and BMRC Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2041 2A with Parapet Wall Noise Contour Map
Leq,n
 Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update: 10/23/2018

Levels Leq,n in dB(A)

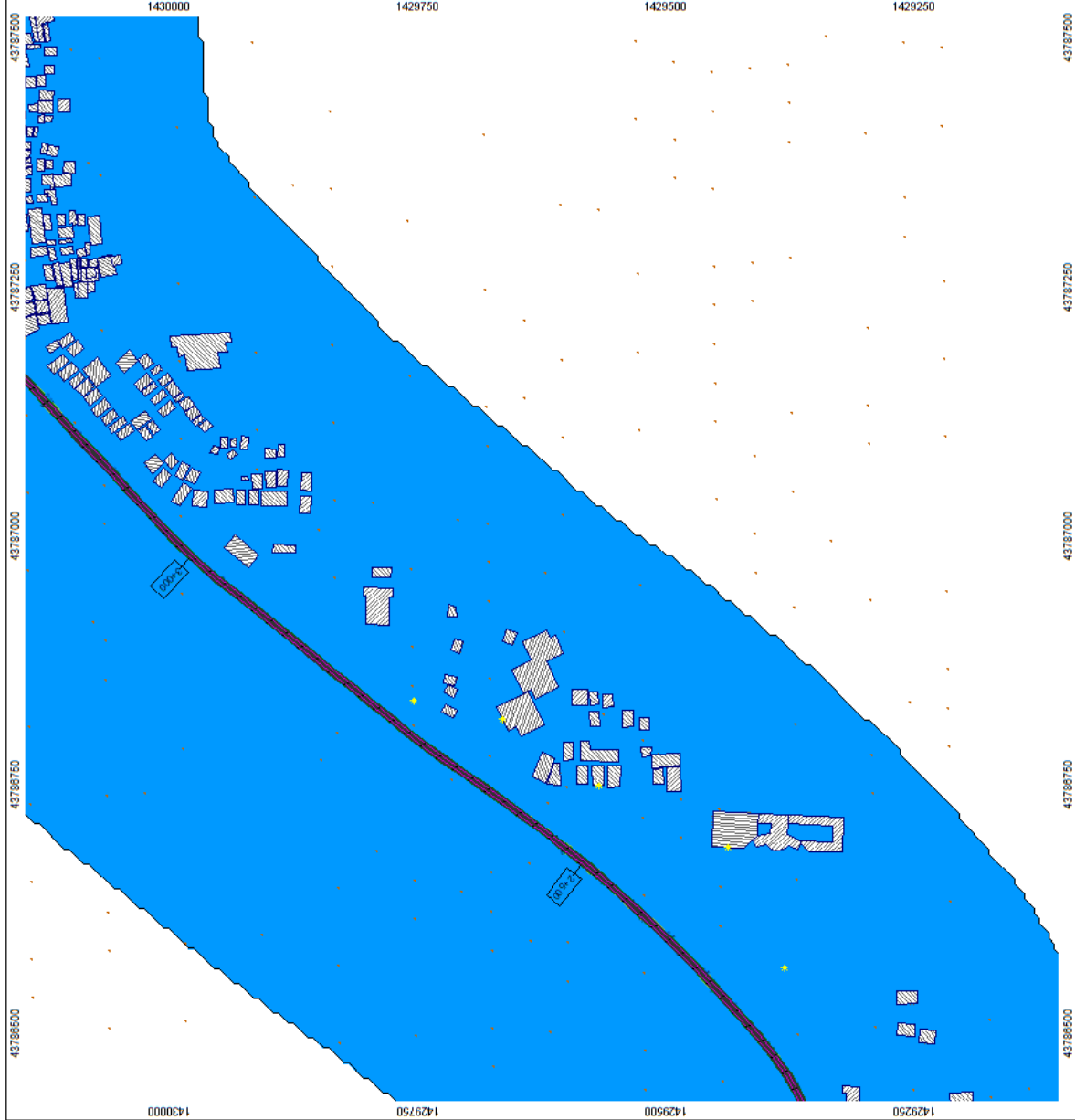
Blue	< 45
Light Blue	45 - 50
Yellow	50 - 55
Orange	55 - 60
Red	60 - 65
Dark Red	>= 65

Signs and symbols

Green line	Wall
Red star	Construction Equip
Blue hatched box	Main building
Yellow star	Point receiver
Black line	+3dB(A) increase from
Red star	Point Sources
Pink line	Line source
Green line	Geometry bitmap
Green line	Wall
Green line	Wall
Green star	Elevation point
White box	Bodeneffekte
White box	Noise reduction area

Length scale 1:3887
 0 30 60 120 180 240 m

North arrow pointing up



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
 Buildings from Street Map and Google Earth.
 From noise power levels taken from (DMS) Soundmap 8.1. Library and
 (MARC) Building Stock Specifications. Train schedule and
 speeds from Feasibility Study.

**110 2041 2A with Parapet Wall
Noise Contour Map
Leq,d**

Calculation in 1.5 m above ground

Project engineer: CMR
 Contact: 91002025
 Projected with SoundPLAN 8.1. Update: 10.03.2018

**Levels Leq,d
in dB(A)**

	< 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	≥ 65

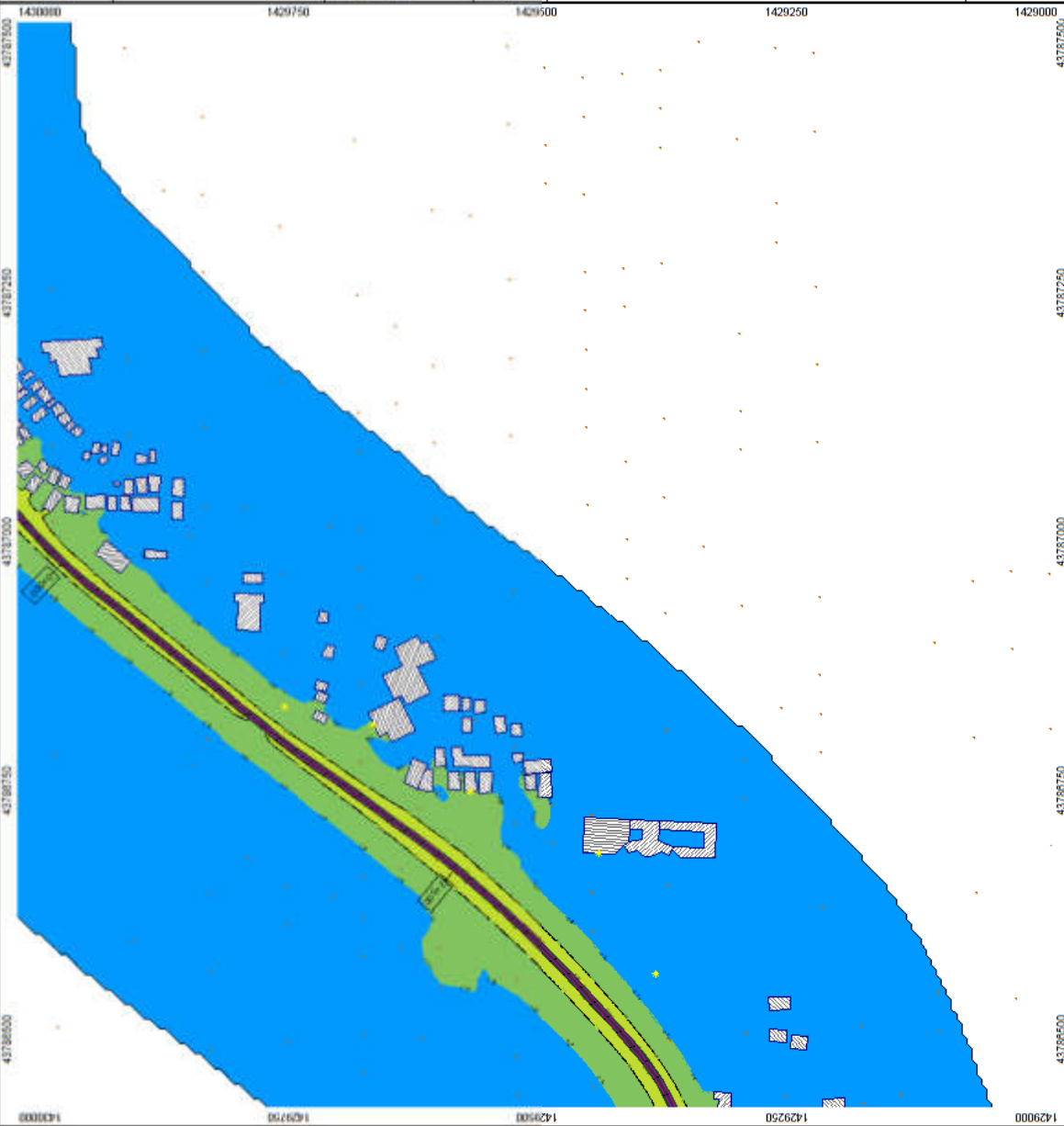
Signs and symbols

	Wall
	Construction Equip
	Main building
	Point receiver
	+3dB(A) increase from
	Point Sources
	Line source
	Geometry blimp
	Wall
	Wall
	Elevation point
	Bottomfalte
	Noise calculation area

Length scale 1:3887

0 30 60 120 180 240 m

↑ N



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from IASG Supplement 8.1.1 library and
BMMCL Rolling Stock Specifications. Train schedule and
speeds from Feasibility Study.

110 2041 2A with Parapet Wall
Noise Contour Map
Leq,d
Calculation in 3.3 m above ground

Project engineer: CMR
Client: MTRD/000
Processed with SoundPLAN 8.1.1, Update 100310018

Levels Leq,d
in dB(A)

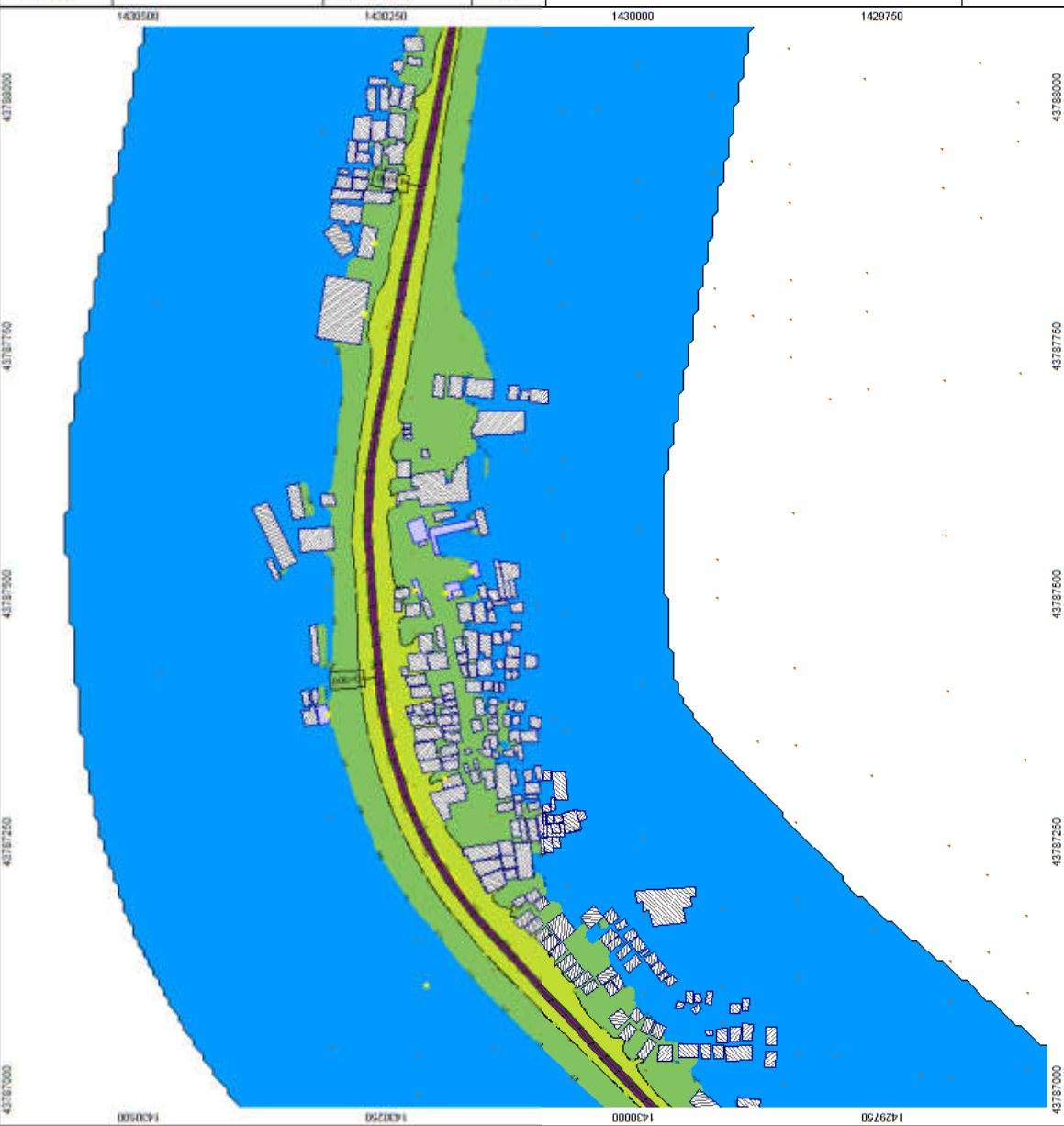
< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

- Wall
- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wall
- Elevation point
- Bodeneffekte
- Noise calculation area

Length scale 1:3887

0 30 60 120 180 240 m



"DRR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Client: Bangalore Metro Rail Corporation Limited
 Project: Outer Ring Road from Central Silk (CSB) Junction to KR Puram
 Date: 15/05/2023
 Scale: 1:3000

**110 2041 2A with Parapet Wall
Noise Contour Map
Leq,m**
 Calculation in 1.5 m above ground

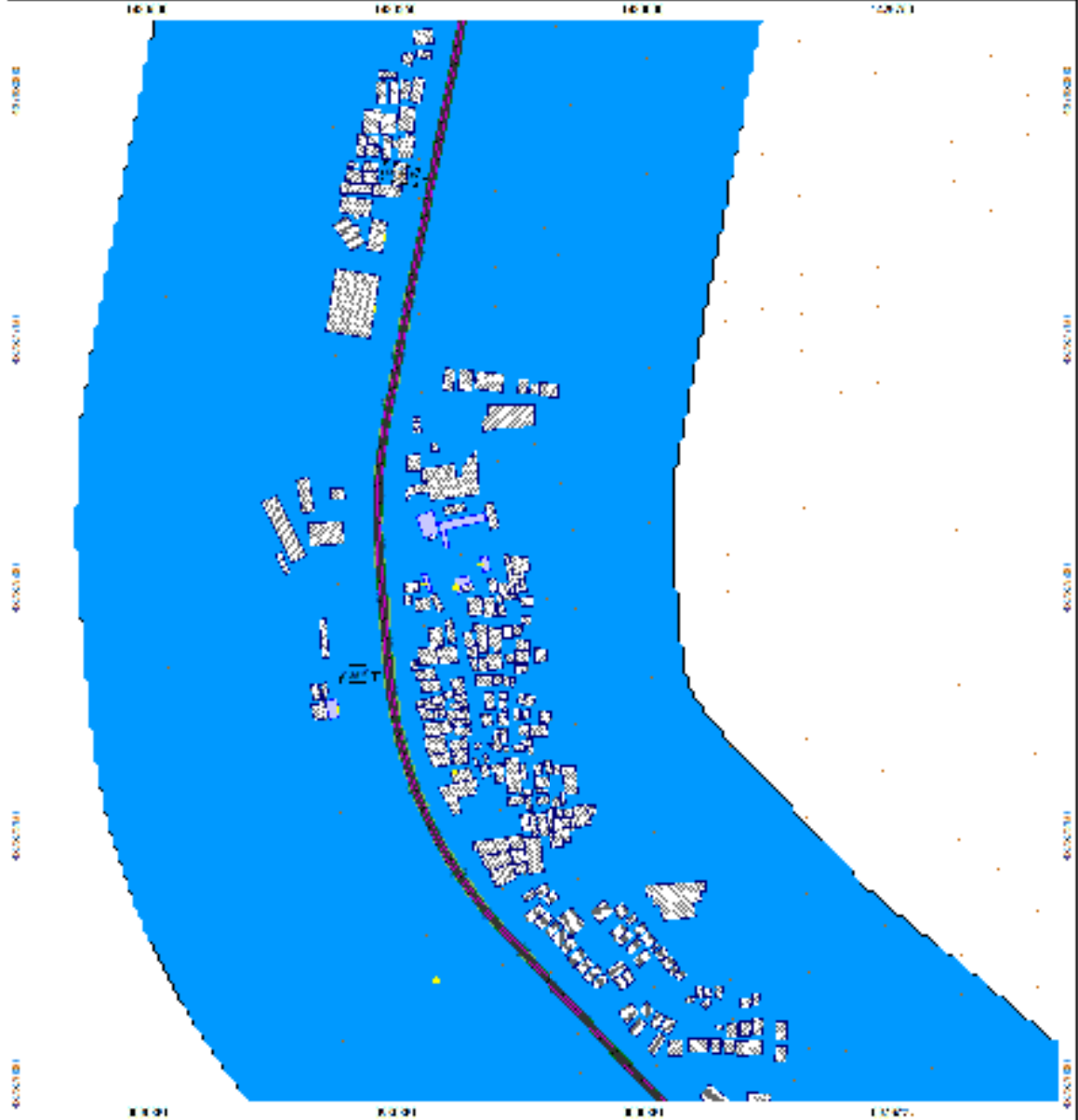
Project engineer: P. S. Srinivasan
 Date: 15/05/2023
 Revision: 01

Levels Leq,m

45
50
55
60
65
70

Signs and symbols

Green line	Level 45
Yellow line	Level 50
Orange line	Level 55
Red line	Level 60
Purple line	Level 65
Pink line	Level 70
Blue line	Level 75
Black line	Level 80
Black line	Level 85
Black line	Level 90
Black line	Level 95
Black line	Level 100
Black line	Level 105
Black line	Level 110
Black line	Level 115
Black line	Level 120
Black line	Level 125
Black line	Level 130
Black line	Level 135
Black line	Level 140
Black line	Level 145
Black line	Level 150
Black line	Level 155
Black line	Level 160
Black line	Level 165
Black line	Level 170
Black line	Level 175
Black line	Level 180
Black line	Level 185
Black line	Level 190
Black line	Level 195
Black line	Level 200
Black line	Level 205
Black line	Level 210
Black line	Level 215
Black line	Level 220
Black line	Level 225
Black line	Level 230
Black line	Level 235
Black line	Level 240
Black line	Level 245
Black line	Level 250
Black line	Level 255
Black line	Level 260
Black line	Level 265
Black line	Level 270
Black line	Level 275
Black line	Level 280
Black line	Level 285
Black line	Level 290
Black line	Level 295
Black line	Level 300
Black line	Level 305
Black line	Level 310
Black line	Level 315
Black line	Level 320
Black line	Level 325
Black line	Level 330
Black line	Level 335
Black line	Level 340
Black line	Level 345
Black line	Level 350
Black line	Level 355
Black line	Level 360
Black line	Level 365
Black line	Level 370
Black line	Level 375
Black line	Level 380
Black line	Level 385
Black line	Level 390
Black line	Level 395
Black line	Level 400
Black line	Level 405
Black line	Level 410
Black line	Level 415
Black line	Level 420
Black line	Level 425
Black line	Level 430
Black line	Level 435
Black line	Level 440
Black line	Level 445
Black line	Level 450
Black line	Level 455
Black line	Level 460
Black line	Level 465
Black line	Level 470
Black line	Level 475
Black line	Level 480
Black line	Level 485
Black line	Level 490
Black line	Level 495
Black line	Level 500
Black line	Level 505
Black line	Level 510
Black line	Level 515
Black line	Level 520
Black line	Level 525
Black line	Level 530
Black line	Level 535
Black line	Level 540
Black line	Level 545
Black line	Level 550
Black line	Level 555
Black line	Level 560
Black line	Level 565
Black line	Level 570
Black line	Level 575
Black line	Level 580
Black line	Level 585
Black line	Level 590
Black line	Level 595
Black line	Level 600
Black line	Level 605
Black line	Level 610
Black line	Level 615
Black line	Level 620
Black line	Level 625
Black line	Level 630
Black line	Level 635
Black line	Level 640
Black line	Level 645
Black line	Level 650
Black line	Level 655
Black line	Level 660
Black line	Level 665
Black line	Level 670
Black line	Level 675
Black line	Level 680
Black line	Level 685
Black line	Level 690
Black line	Level 695
Black line	Level 700
Black line	Level 705
Black line	Level 710
Black line	Level 715
Black line	Level 720
Black line	Level 725
Black line	Level 730
Black line	Level 735
Black line	Level 740
Black line	Level 745
Black line	Level 750
Black line	Level 755
Black line	Level 760
Black line	Level 765
Black line	Level 770
Black line	Level 775
Black line	Level 780
Black line	Level 785
Black line	Level 790
Black line	Level 795
Black line	Level 800
Black line	Level 805
Black line	Level 810
Black line	Level 815
Black line	Level 820
Black line	Level 825
Black line	Level 830
Black line	Level 835
Black line	Level 840
Black line	Level 845
Black line	Level 850
Black line	Level 855
Black line	Level 860
Black line	Level 865
Black line	Level 870
Black line	Level 875
Black line	Level 880
Black line	Level 885
Black line	Level 890
Black line	Level 895
Black line	Level 900
Black line	Level 905
Black line	Level 910
Black line	Level 915
Black line	Level 920
Black line	Level 925
Black line	Level 930
Black line	Level 935
Black line	Level 940
Black line	Level 945
Black line	Level 950
Black line	Level 955
Black line	Level 960
Black line	Level 965
Black line	Level 970
Black line	Level 975
Black line	Level 980
Black line	Level 985
Black line	Level 990
Black line	Level 995
Black line	Level 1000



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise.
Buildings from Street Map and Google Earth.
Traffic power levels from ENO SoundPLAN 8.1, Library and BMRCL Engineering Services Corporation. Train schedule and speeds from Feasibility Study.

110 2041 2A with Parapet Wall Noise Contour Map
Leq,d
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with: SoundPLAN 8.1, Update 10/23/2018

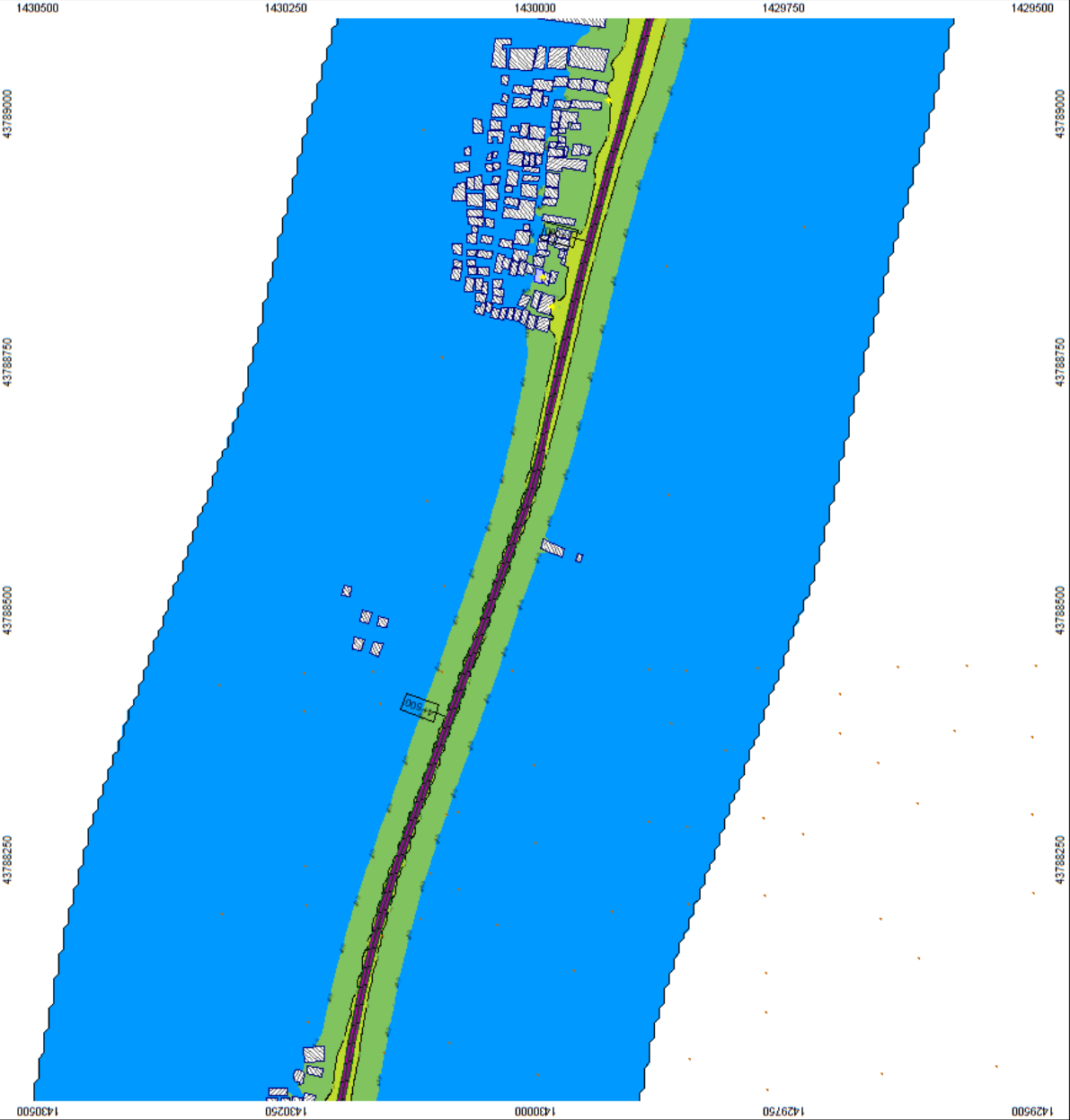
Levels Leq,d in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

	Construction Equip
	Main building
	Point receiver
	-3dB(A) increase floor
	Point Sources
	Line source
	Geometry blimp
	Wall
	Wall
	Elevation point
	Bodenreflekte
	Noise-reduction area

Length scale 1:3887



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise:
Buildings from Street Map and Google Earth.
Train noise power levels taken from EMU Soundplan 8.1 Library and BMIRCL Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2041 2A with Parapet Wall Noise Contour Map
Leq,n
Calculation in 1.5 m above ground

Project engineer: CMR
Created: 9/10/2020
Processed with soundPLAN 8.1. Update: 10/23/2018

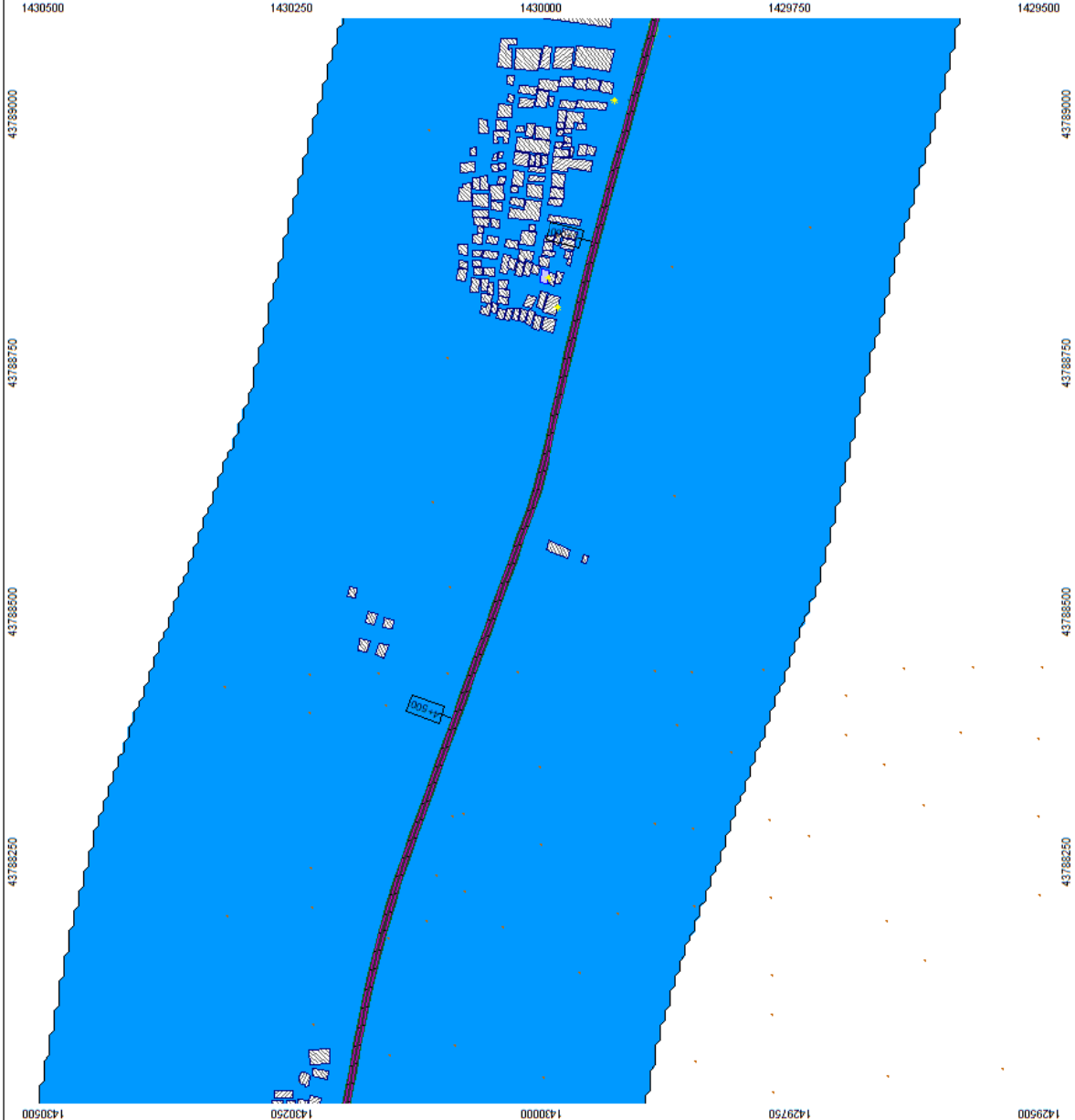
Levels Leq,n
in dB(A)

	< 45
	45 - 50
	50 - 55
	55 - 60
	60 - 65
	>= 65

Signs and symbols

	Wall
	Construction Equip
	Main building
	Point receiver
	-3dB(A) increase from
	Point Sources
	Line source
	Geometry bitmap
	Wall
	Wall
	Elevation point
	Border/edge
	Water calculation area

Length scale 1:3887
0 30 60 120 180 240 m



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Metric:
Buildings from Street Map and Google Earth.
From noise power levels taken from (M) Soundfiles & J Liberty and
SMMCT Building Stock Specifications. Then standardized
values from Feasibility Study.

**110 2041 ZA with Parapet Wall
Noise Contour Map
Leq,d**

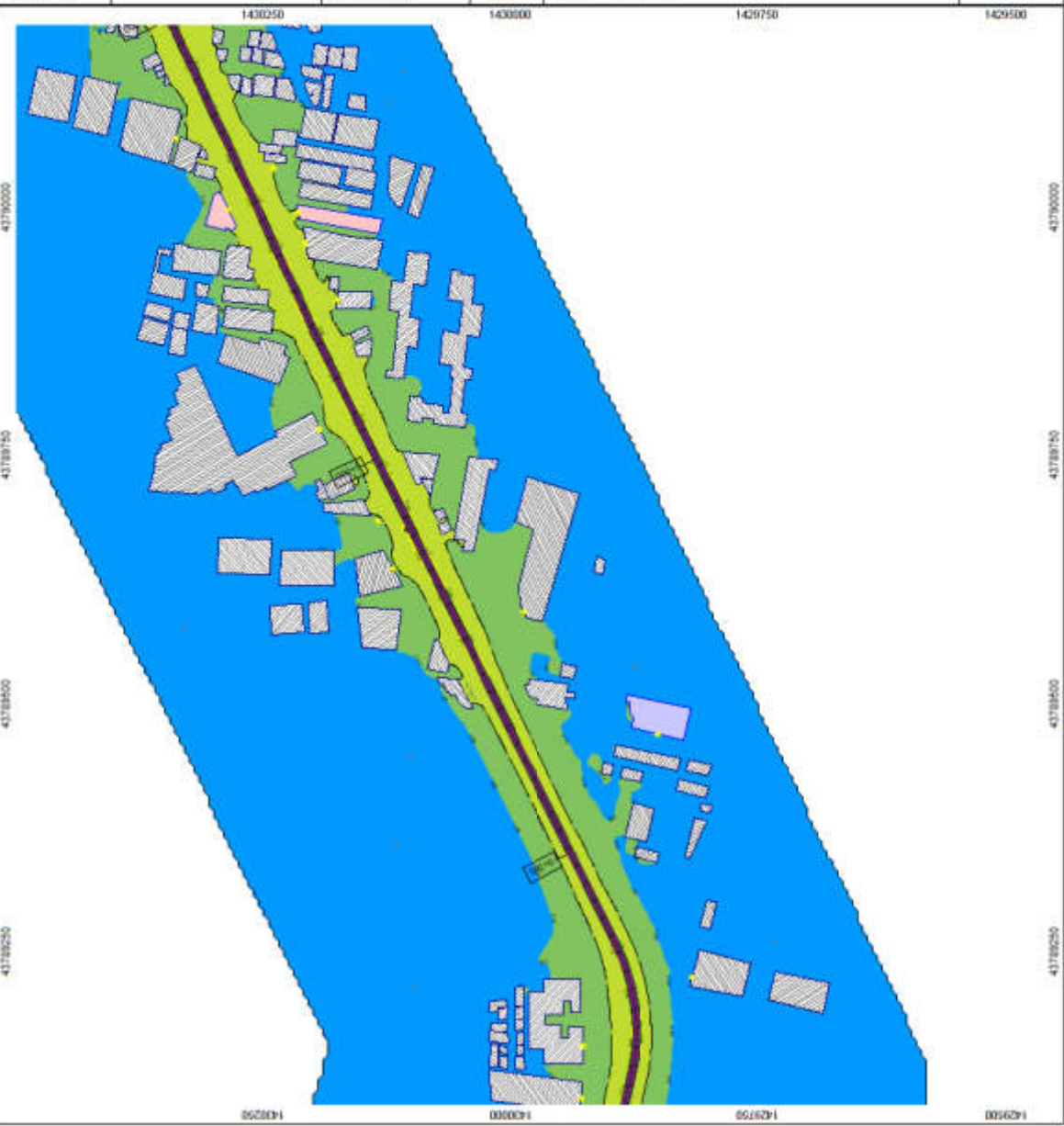
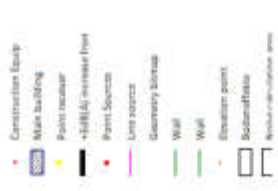
Calculation in 1.5 m above ground

Project engineer (M)
Contact: 97400230
Proposed with SoundPLAN 8.1, Update 10/03/2018

**Levels Leq,d
in dB(A)**



Signs and symbols



"ORR Metro Line" on Outer Ring Road from Central Silk (CSB) Junction to KR Puram

Operational Noise Budget, Street Map and Google Earth. Train noise power levels taken from EMU Soundplan 8.1 Library and BMRC Rolling Stock Specification. Train schedule and speeds from Feasibility Study.

110 2041 2A with Parapet Wall Noise Contour Map
Leq,n
 Calculation in 1.5 m above ground

Project engineer: CMR
 Created: 9/10/2020
 Processed with SoundPLAN 8.1, Update 10/23/2018

Levels Leq,n in dB(A)

< 45
45 - 50
50 - 55
55 - 60
60 - 65
>= 65

Signs and symbols

- Construction Equip
- Main building
- Point receiver
- +3dB(A) increase from
- Point Sources
- Line source
- Geometry bitmap
- Wall
- Wall
- Elevation point
- Bodeneffekte
- Noise calculation area

