

# Environmental Impact Assessment

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October 2020

## India: Bengaluru Metro Rail Project

Phase 2A (Outer Road Ring Metro Line)

Volume 10  
Annex 5

## 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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**KR Puram to Kempegowda International Airport**

Operational Noises.  
Buildings from Street Map and Google Earth.  
Contours from BHO SoundPLAN 8.1 Library and  
BABC Building Stock Specification. Train schedule and  
speeds from Feasibility Study.

**120 2031 2b with Parapet Wall  
Noise Contour Map  
Leq,d**  
Calculation in 1.5 m above ground

Project engineer: CMR  
Created: 9/11/2020  
Processed with SoundPLAN 8.1, Update: 10/23/2018

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

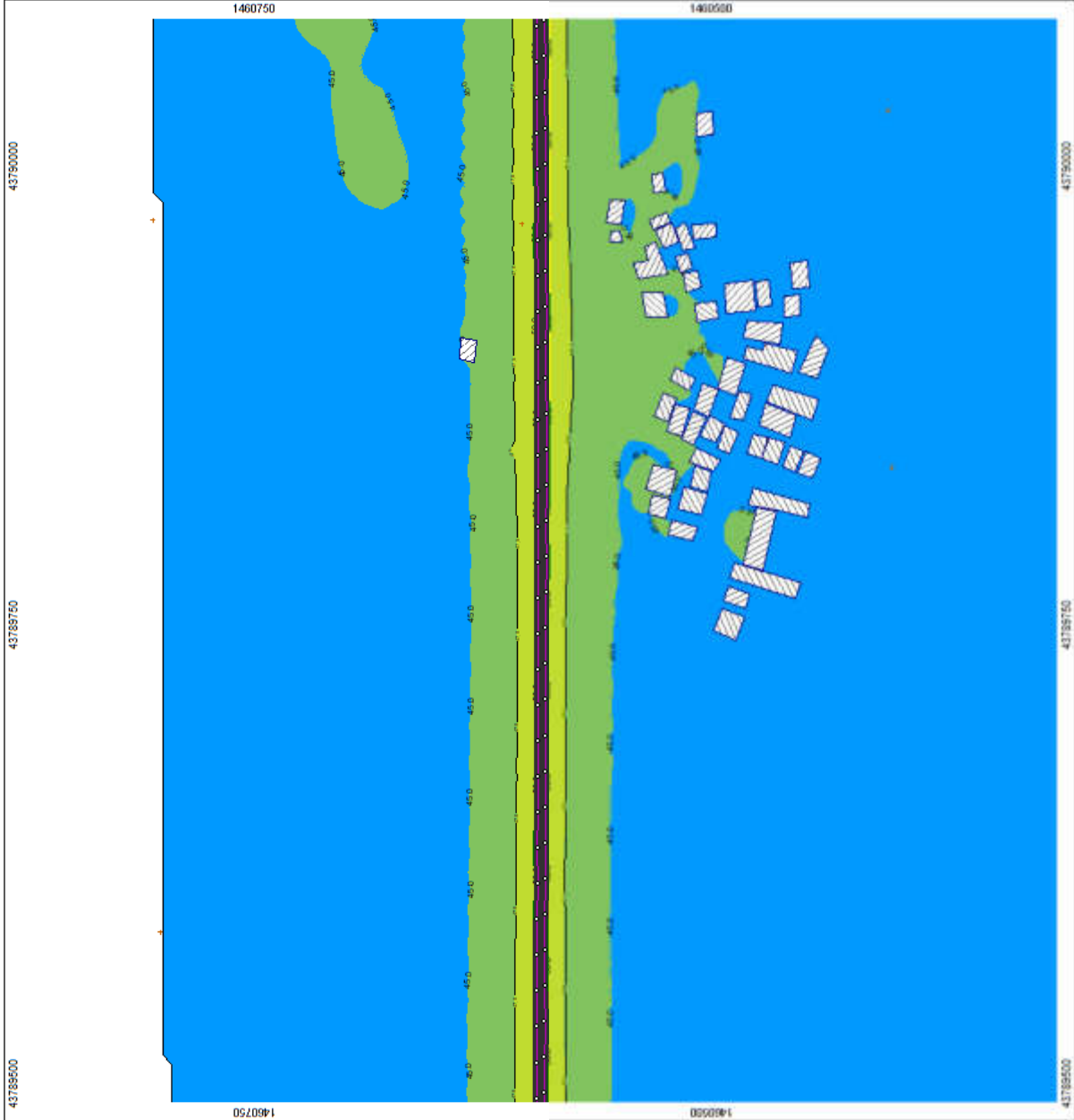
Blue	< 45
Light Blue	45 - 50
Yellow	50 - 55
Orange	55 - 60
Red	60 - 65
Dark Red	>= 65

**Signs and symbols**

- Wall
- Construction fence
- Main building
- Point marker
- >[dB(A)] increase ban
- Point marker
- Line source
- Line source
- Geometric shadow
- Wall
- Wall
- Elevation point
- Bottomplate
- Water level above sea

**Length scale 1:2109**

0 20 40 80 120



**KR Puram to Kempegowda International Airport**

Operational Noise:  
 Buildings from Street Map and Google Earth.  
 Main noise power levels taken from DNU Soundplan 8.1 Library and  
 BMRCC Noise Study Specification. Train schedule and  
 speeds from feasibility Study.

**120 2031 2b with Parapet Wall  
 Noise Contour Map  
 Leq,n**

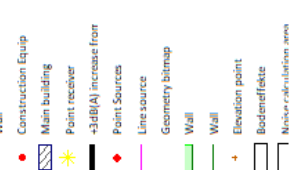
Calculation in 1.5 m above ground

Project engineer: CMR  
 Created: 9/11/2020  
 Processed with SoundPLAN 8.1, Update 10/23/2018

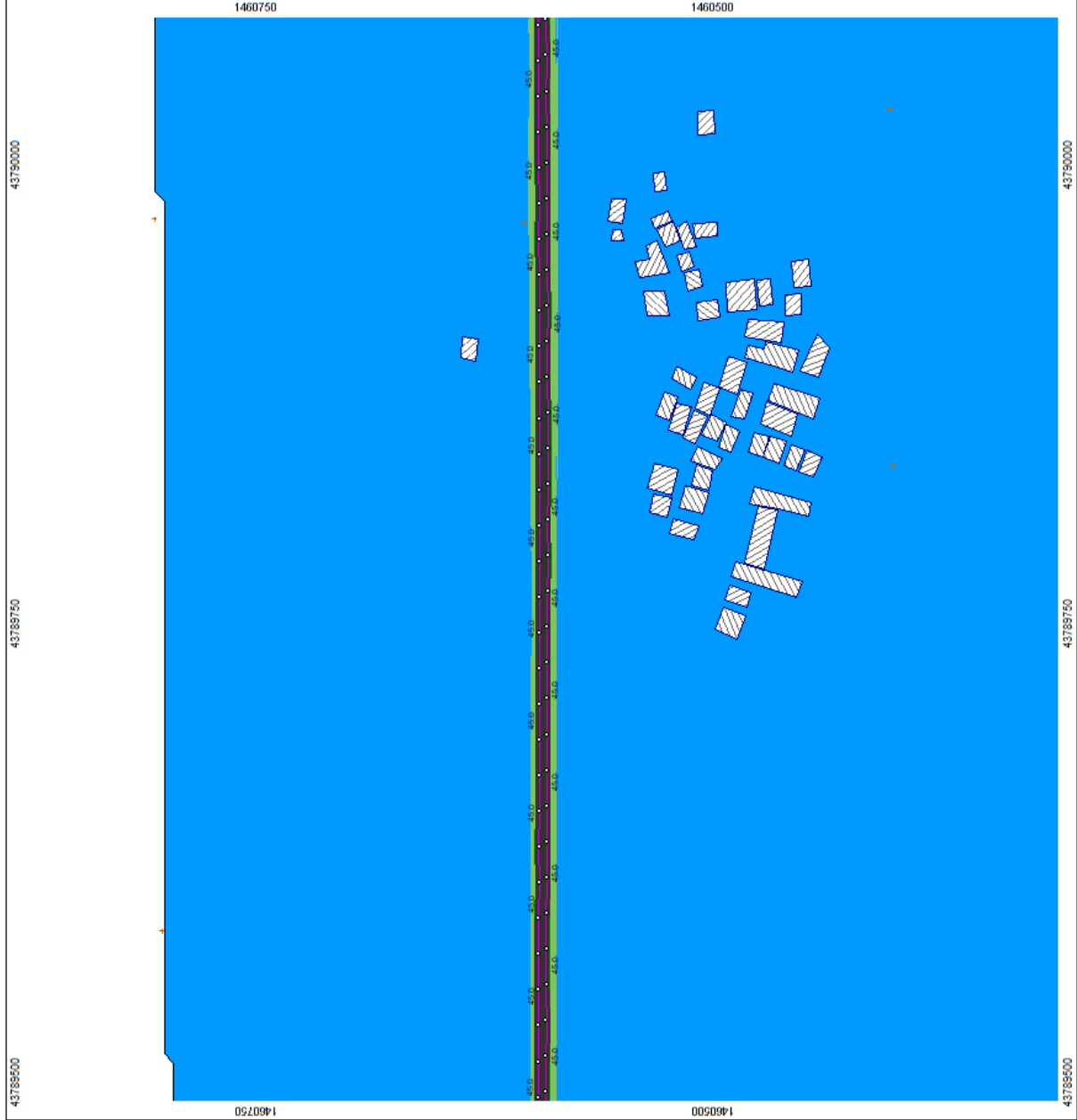
**Levels Leq,n  
 in dB(A)**



**Signs and symbols**



Length scale 1:2109



**KR Puram to Kempegowda International Airport**

Operational Noise:  
 Building from Street Map and Google Earth.  
 from noise power levels taken from EMU Soundplane 8.1 Library and  
 aircraft taking track specification. Train schedule and  
 speeds from Feasibility Study.

**120 2031 2b with Parapet Wall  
 Noise Contour Map  
 Leq,d**  
 Calculation in 1.5 m above ground

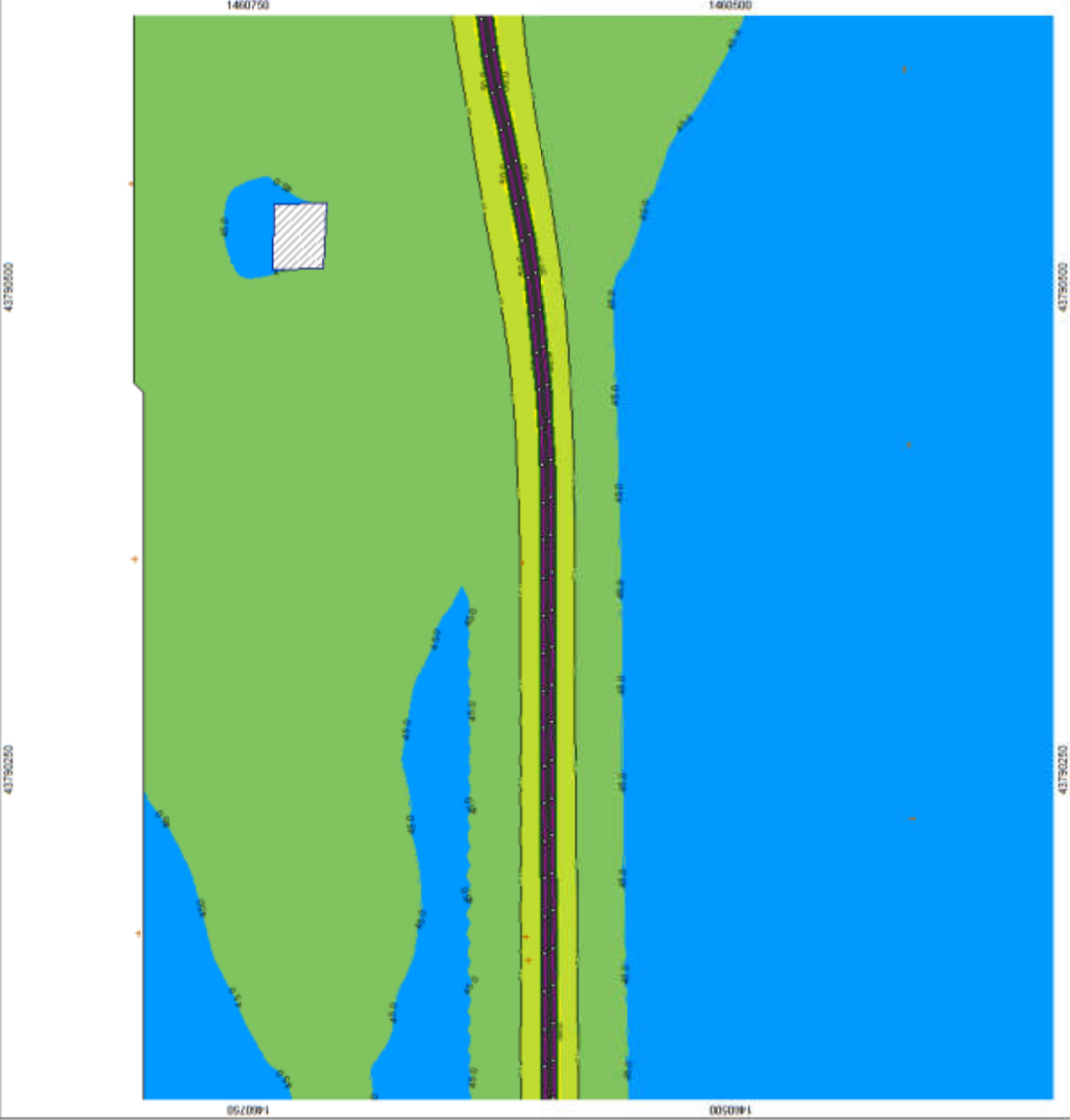
Project engineer: OMR  
 Project: 91110200  
 Produced with SoundPLAN 8.1, Update 10/23/2018

**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
-1dB(A) increase from
Point receiver
Line source
Geometry strip
Wall
Wall
Driveline points
Receiver label
Receiver calculation area



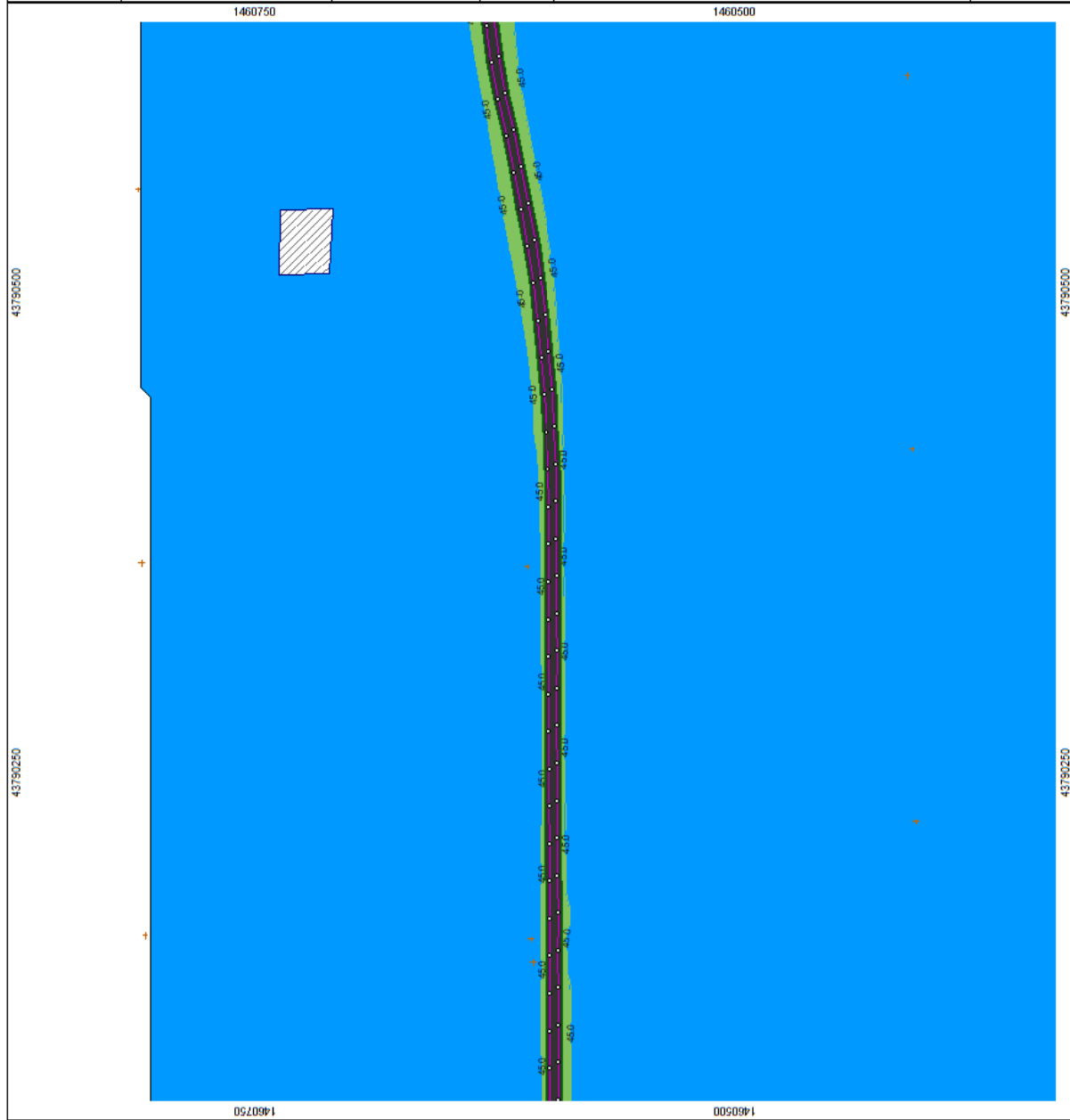
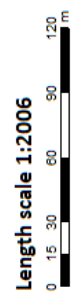
**KR Puram to Kempgowda International Airport**

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

**120 2031 2b with Parapet Wall  
Noise Contour Map  
Leq,n**  
Calculation in 1.5 m above ground

Project engineer: CMR  
Created: 9/11/2020  
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
  - Bodeneffekte
  - Noise calculation area









**KR Puram to Kempegowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Elevation points taken from BMU Soundplan 8.1. Library and  
BANC. Rooming Schedule, Location, Train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map**

**Leq,n**  
Calculation in 1.5 m above ground

Project engineer: CMR  
Created: 9/11/2020  
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
- Bodeneffekt
- Rekulturationsfläche area

Length scale 1:2887



**KR Puram to Kempgowda International Airport**

Operational Noise:  
Buildings from Green Mass and Ganga Earth.  
Other power loads taken from DMU South-East B.I. Library and  
MMA. Long distance calculation: 1km x 100m and  
South from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,d**  
Calculation in 1.5 m above ground

Project engineer: GMR  
Checked by: J. J. J. J. J.  
Processed with soundPLAN 8.1.1, Update 10/21/2018

**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**

Red dot	Construction level
Green line	Wall
Blue hatched box	Main building
Yellow hatched box	Point receiver
Black line	+3dB(A) increase type
Red dot	Point Source
Pink line	Line source
Green hatched box	Geometry shape
Green line	Wall
Green line	Wall
Red dot	Elevation point
Blue hatched box	Businesslike
Blue hatched box	Businesslike area



**KR Puram to Kempgowda International Airport**

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.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,n**  
Calculation in 1.5 m above ground

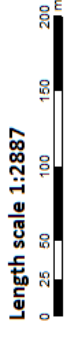
Project engineer: CMR  
Created: 9/11/2020  
Processed with SoundPLAN 8.1. Update: 10/23/2018

**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
- Bodenreflekt
- Noise calculation area



**KR Puram to Kempegowda International Airport**

Department of Roads  
 Building Layout Plans and Grading Levels  
 Train station level taken from DMU/Soundglobe 8.1.1 Library and  
 BMBCI building Stock Specification. Train schedule and  
 speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map  
 Leq,d**  
 Calculation in 1.5 m above ground

Project engineer: OMB  
 Created: 9.11.2020  
 Processed with SoundPLAN 8.1.1 Update 102732018

**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**

Red line	Wall
Green line	Construction Equip.
Blue hatched box	Main building
Yellow hatched box	Point receiver
Black line with red dot	+10dB(A) increase due to
Red line with black dot	Point Source
Black line	Line source
Green hatched box	Geometry change
Green line	Wall
Black line	Wall
Red dot	Elevation point
Black box	Receiver
Black box	Receiver calculation area



**KR Puram to Kempegowda International Airport**

Operational Noise:  
Buildings: from Street Map and Google Earth.  
Train noise-power levels: taken from ENVU Soundplan 8.1. Library and  
BMNCL Rolling Stock Specifications. Train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,n**  
Calculation in 1.5 m above ground

Project engineer: CMR  
Created: 9/11/2020  
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 floor
  - Point Sources
  - Line source
  - Geometry bitmap
  - Wall
  - Wall
  - Elevation point
  - Bodenreflekte
  - Noise calculation area





**KR Puram to Kempegowda International Airport**

Operational Basics:  
 Buildings from Green Map and Google Earth.  
 Train noise power levels taken from DMU SoundPLAN 8.1 Library and  
 BMRB Rolling Stock Specification. Train schedule and  
 speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map  
 Leq,d**  
 Calculation in 1.5 m above ground

Project engineer: DMH  
 Created: 01/10/2020  
 Project start with SoundPLAN 8.1: Update 10/01/2018

**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 line	Construction Equip
Blue hatched box	Main building
Yellow hatched box	Point receiver
Black line	-3dB(A) increase front
Red dot	Point Source
Purple line	Line source
Green hatched box	Geometry building
Green line	Wall
Red dot	Elevation point
White box	Background
White box	Noise contour lines area



**KR Puram to Kempegowda International Airport**

Operational Noise:  
 Night time noise map and contours:  
 From noise prediction levels taken from BMU SoundPLAN 8.1 Library and  
 BMBCI Rolling Stock Specification. Train schedule and  
 spreads from Feasibility Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map  
 Leq,n**  
 Calculation in 1.5 m above ground

Project engineer: CMR  
 Created: 9/11/2020  
 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
Bodentiefen
Noise calculation area



**KR Puram to Kempegowda International Airport**

Operational Noise  
 Buildings from Street Map and Google Earth.  
 Main building, Main tower, Main tower, South Tower & Library and  
 MTRC, existing Street Map, existing, Train, International and  
 South from Feasibility Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map  
 Leq,d**

Calculation in 1.5 m above ground

Project engineer: CNR  
 Drawn: 3/11/2020  
 Processor with soundPLAN 8.1. Update: 10/21/2018

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

- 4 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- >= 65

**Signs and symbols**

- Construction Equip.
- Main building
- Point receiver
- +3dB(A) increase from
- Point Source
- Line source
- Geometry change
- Wall
- Elevation point
- Subsoilplate
- Receiver identification area





**KR Puram to Kempgowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Traffic power levels taken from BMU Soundplan 8.1 Library and  
Black Flying Stock Association. Train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map**  
Leq<sub>n</sub>  
Calculation in 1.5 m above ground

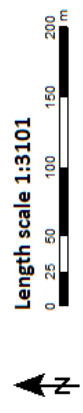
Project engineer: CMR  
Created: 9/11/18 02:0  
Processed with soundPLAN 8.1. Update: 10/23/2018

**Levels Leq<sub>n</sub> 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
- Badreflekte
- Noise calculation area



**KR Puram to Kempegowda International Airport**

Operational Noise  
 Buildings from Street Map and Google Earth  
 Buildings from Street Map and Google Earth  
 BMSCL Building Stock Specification, Train schedule and  
 speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map  
 Leq,d**

Calculation in 1.5 m above ground

Project engineer: OMR  
 Created: 01/12/2020  
 Project: 2041 2B with Parapet Wall, 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 fence
- Main building
- Point receiver
- +1dB(A) increase from
- Point Source
- Line source
- Geometry cleanup
- Wall
- Wall
- Elevation point
- Bottomplate
- Receiver elevation area



**KR Puram to Kempgowda International Airport**

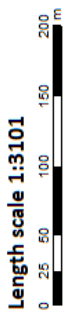
Operational Noise:  
Buildings from Street Map and Google Earth.  
Elevation points from BMLR Soundplan 8.1 Library and  
BMLR 8.1. Building absorption coefficient, train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map**

Leq,n  
Calculation in 1.5 m above ground

Project engineer: CMR  
Created: 9/11/2020  
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
  - Bodeneffekt
  - Nuclear installation area



**KR Puram to Kempegowda International Airport**

Operational Noise:  
 Buildings from Street Map and Google Earth.  
 True water power levels taken from IBM's National 8.1 Library and  
 BATH's Rating Stack Specification. True soundbar and  
 speech from Feasibility Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map  
 Leq,d**

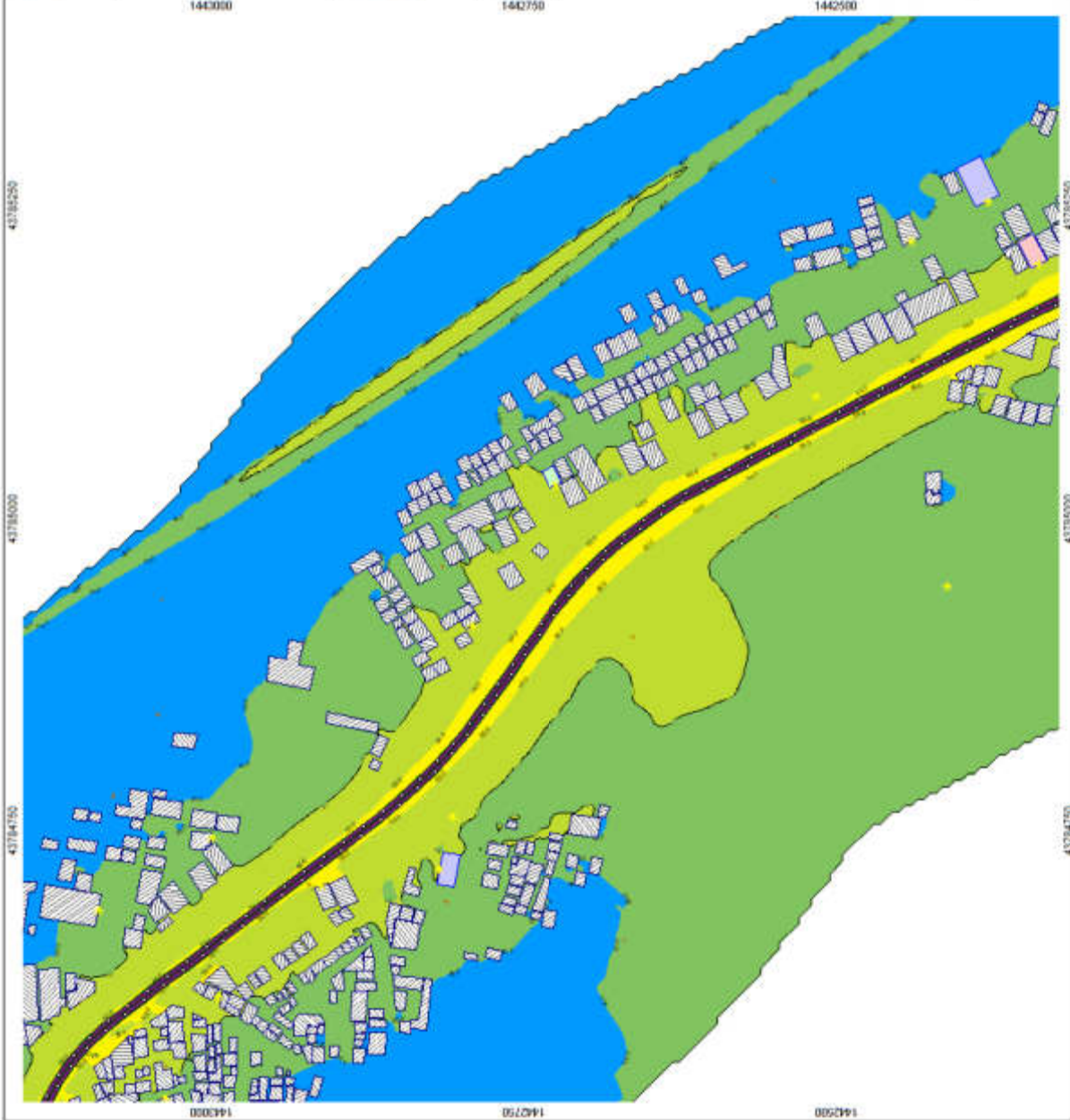
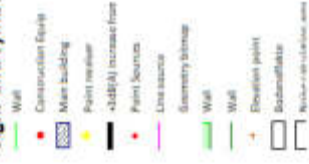
Calculation in: 1.5 m above ground

Project engineer: DMK  
 Created: 3/11/2010  
 Projector with SoundPLAN 8.1, Update 10/31/2018

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



**Signs and symbols**





**KR Puram to Kempegowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Elevation from DEM. Roadway from DMU Survey.  
BMRCL Rolling Stock Specifications, Train schedule and speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,n**  
Calculation in 1.5 m above ground

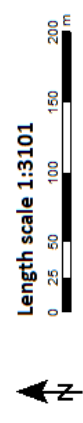
Project engineer: CMR  
Created: 9/11/2020  
Processed with SoundPLAN 8.1, Update 10/03/2018

**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**

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



**KR Puram to Kempegowda International Airport**

Operational Noise  
 Acoustic Environment Map and Graphical Links  
 Train and Airport Levels taken from ICAO Annex 14.1 Library and  
 ICAO Building Stock Specification. Train schedule and  
 speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map**

Leq,d  
 Calculation in 1.5 m above ground

Project engineer: CMR  
 Created: 30.11.2018  
 Project: with SoundPLAN 8.1.1 Update: 10/23/2018

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

≤ 45
45 - 50
50 - 55
55 - 60
60 - 65
≥ 65

**Signs and symbols**

Construction fence
Main building
Parapet wall
+10dB(A) increase line
Point Source
Line source
Geometry sketch
Wall
Director point
Background
Stationary observation area

Length scale 1:2727



1443500 43784000 43784250 43784500

1443250 1443000 43784000 43784250

**KR Puram to Kempegowda International Airport**

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

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,1n**  
Calculation in 1.5 m above ground

Project engineer: CMR  
Created: 9/11/2020  
Processed with SoundPLAN 8.1, Update 10/23/2018

- Levels Leq,1n**  
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
  - Bodenreflekte
  - Noise calculation area



**KR Puram to Kempegowda International Airport**

Operational Noise  
Buildings from Street Map and Google Earth.  
Noise contours were generated using the Noise Model Software (NMS) using South Indian location, from Worldbank and Health Transparency Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,d**  
Calculation in 1.5 m above ground

Project engineer: OMR  
Created: 30/11/2020  
Revised with StreetMap & L Update: 10/21/2021

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

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

**Signs and symbols**

- Construction Equip
- Main building
- Point receiver
- 10dB(A) increase from
- Point Source
- Line source
- Secondary airport
- Wall
- Elevation point
- Background
- Reference elevation area





**KR Puram to Kempgowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Receiver power levels taken from BMU SoundPLAN 8.1 Library and  
BANC. Building Sound Prediction. Train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,n  
Calculation in 1.5 m above ground**

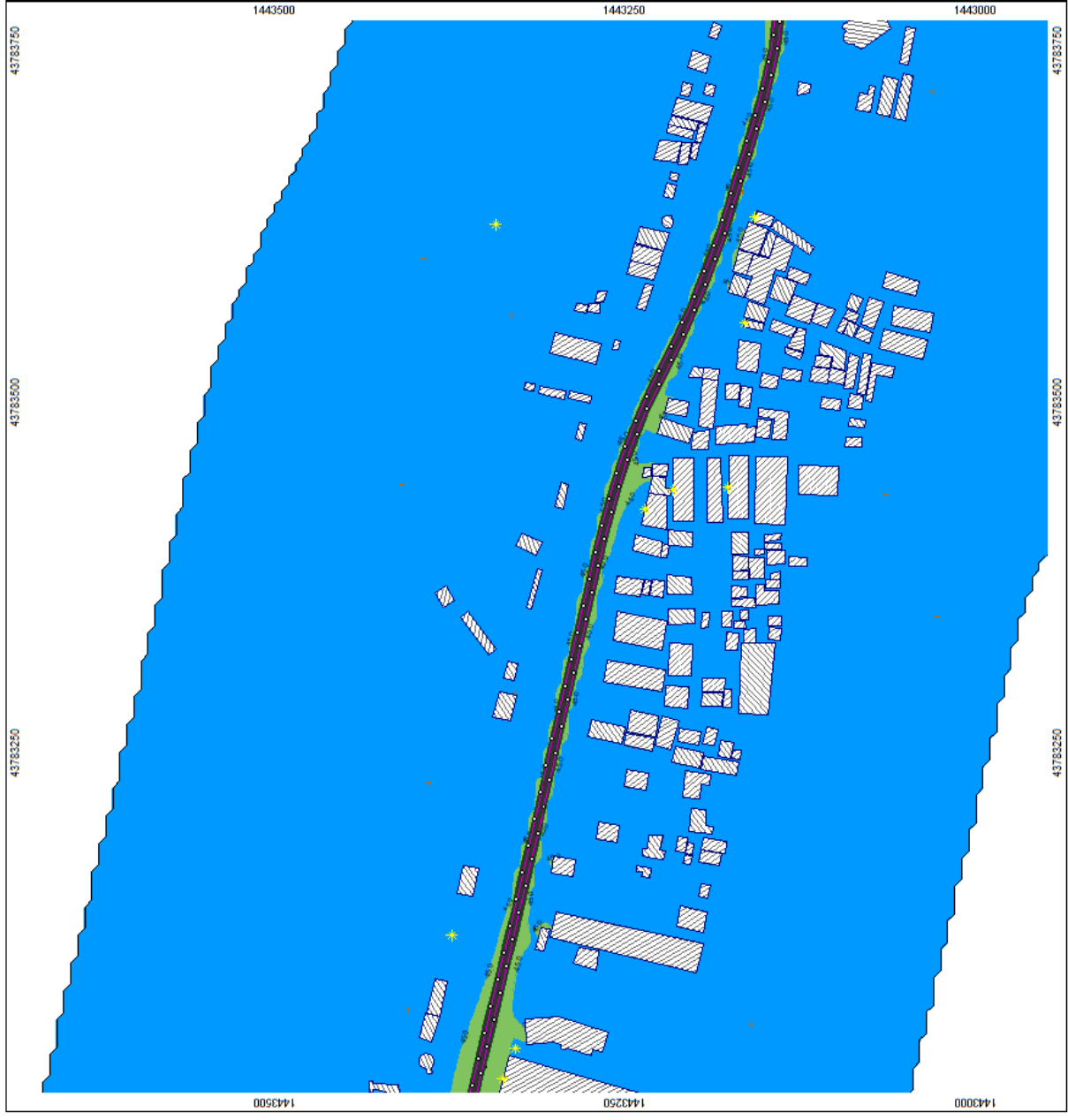
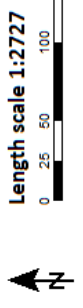
Project engineer: CMR  
Created: 9/11/2020  
Processed with SoundPLAN 8.1, Update: 10/23/2018

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



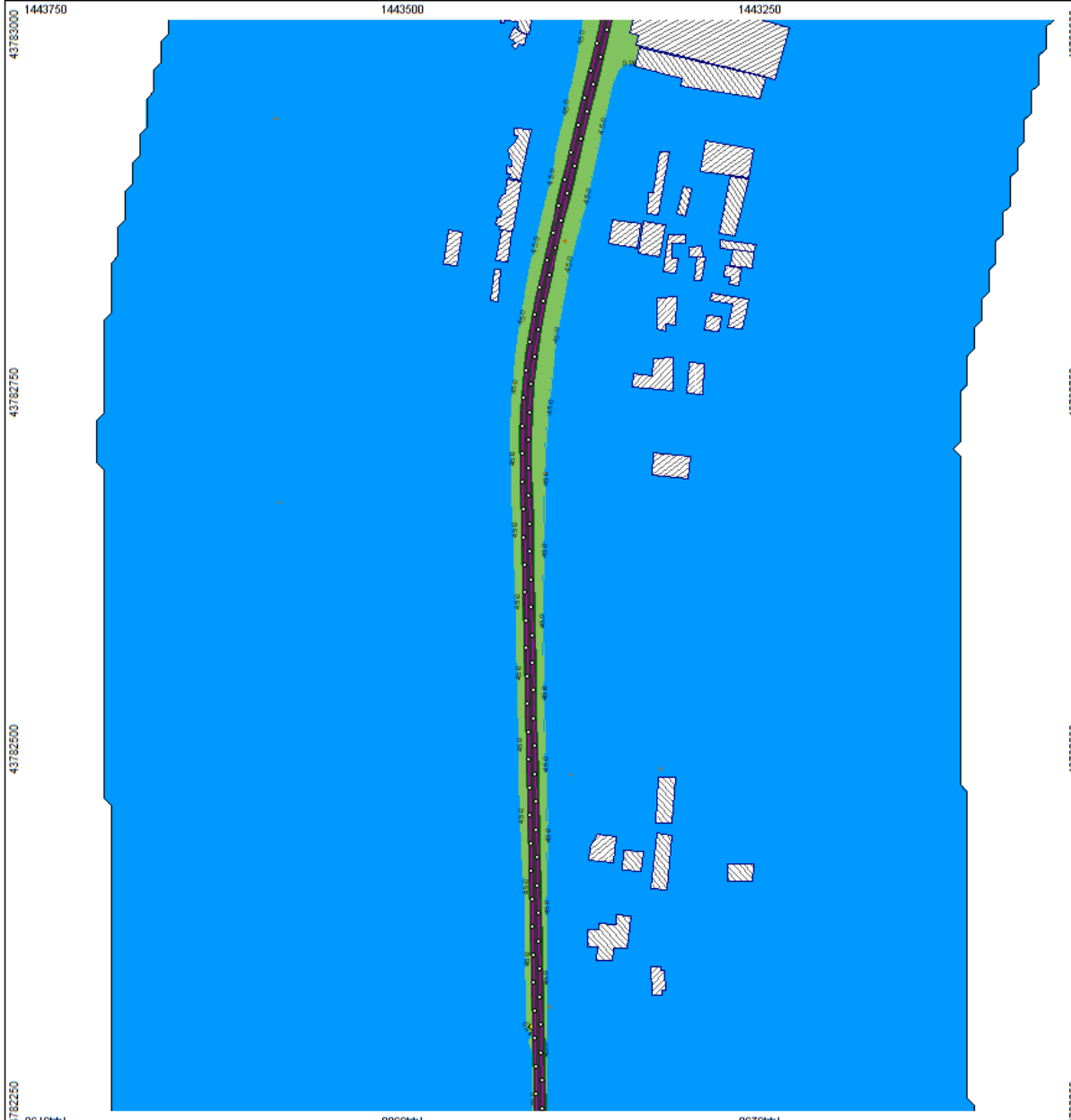


**KR Puram to Kempegowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Ground level from DEM and SRTM30 Plus  
BMRCL Rolling Stock Specification, Train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,n**  
Calculation in 1.5 m above ground

Project engineer: CMR  
Created: 9/11/2020  
Processed with SoundPLAN 8.1, Update 10/23/2018



4378250 1443250 43782750 1443500 43783000 1443250 43783000

**KR Puram to Kempegowda International Airport**

Operational Noise:  
 Trajectory from Direct Map and Contour Graph.  
 Trajectory from Direct Map from DNO Soundmap B.1 Library and  
 (MNO) Building Stock Specification. Train schedule and  
 speeds from Feasibility Study.

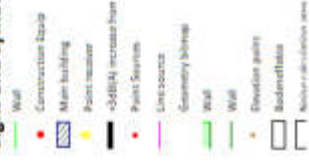
**120 2041 26 with Parapet Wall  
 Noise Contour Map  
 Leq,d**  
 Calculation in 1.5 m above ground

Project engineer: OMR  
 Created: 9/11/2010  
 Projected with SoundPLAN B.1. Update 10/21/2018

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



**Signs and symbols**



Length scale 1:2727



**KR Puram to Kempgowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Noise contours from SoundPLAN 8.1.1 Library and  
BMBCL Rolling Stock Specification. Train schedule and  
speeds from Feasibility Study.

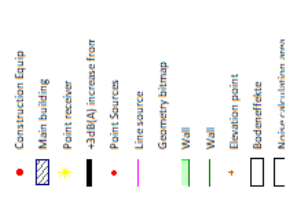
**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,n**  
Calculation in 1.5 m above ground

Project engineer: CMR  
Created: 9/11/2018  
Processed with SoundPLAN 8.1. Update: 10/23/2018

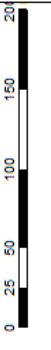
**Levels Leq,n  
in dB(A)**



**Signs and symbols**



Length scale 1:2727



**KR Puram to Kemppegowda International Airport**

Operational Noise:  
 Buildings from Street Map and Google Earth.  
 Train noise power levels taken from DMU Quantitative S.I. Utility and  
 BMBCL Rolling Stock Specification. Train schedule and  
 speeds from Facility Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map  
 Leq,d**  
 Calculation in 1.5 m above ground

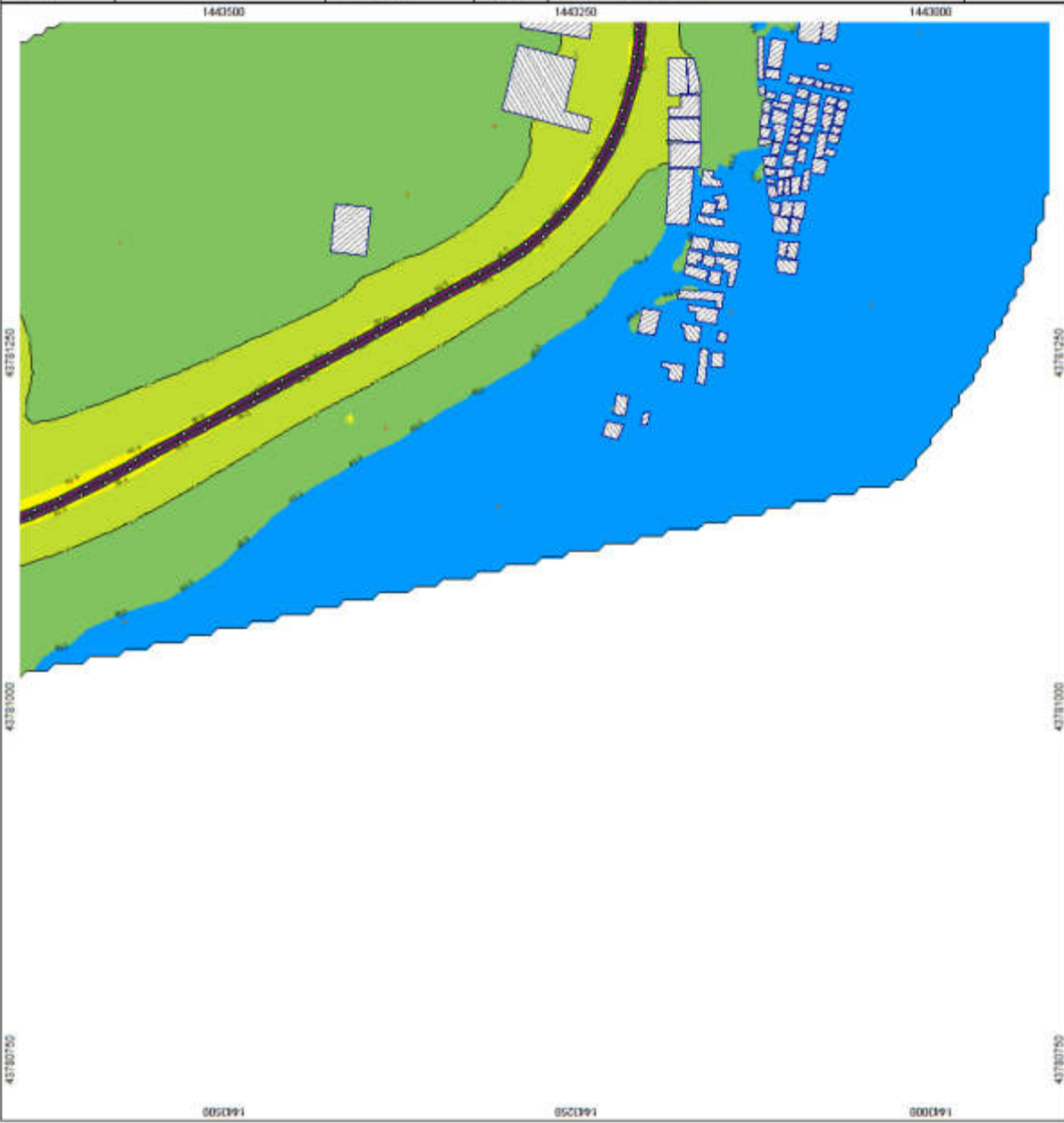
Project engineer: CNM  
 Created: 8/11/2020  
 Projected with StreetPlan 8.1. Update: 10/7/2020

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

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

**Signs and symbols**

Red line	Wall
Green line	Construction Equip
Blue hatched box	Area building
Yellow hatched box	Point receiver
Black line	+dB(A) increase from
Red dot	Point Source
Pink line	Line source
Green hatched box	Geometry building
Green line	Wall
Blue line	Wall
Orange dot	Elevation point
White box	Subreceiver
White box	Noise propagation area



# KR Puram to Kempegowda International Airport

Operational Noise:  
 Flight from Street Map and Google Earth.  
 Train noise from Street Map and Google Earth.  
 BIMBCL Rolling Stock Specification, Train schedule and speeds from Feasibility Study.

## 120 2041 2B with Parapet Wall Noise Contour Map Leq,n Calculation in 1.5 m above ground

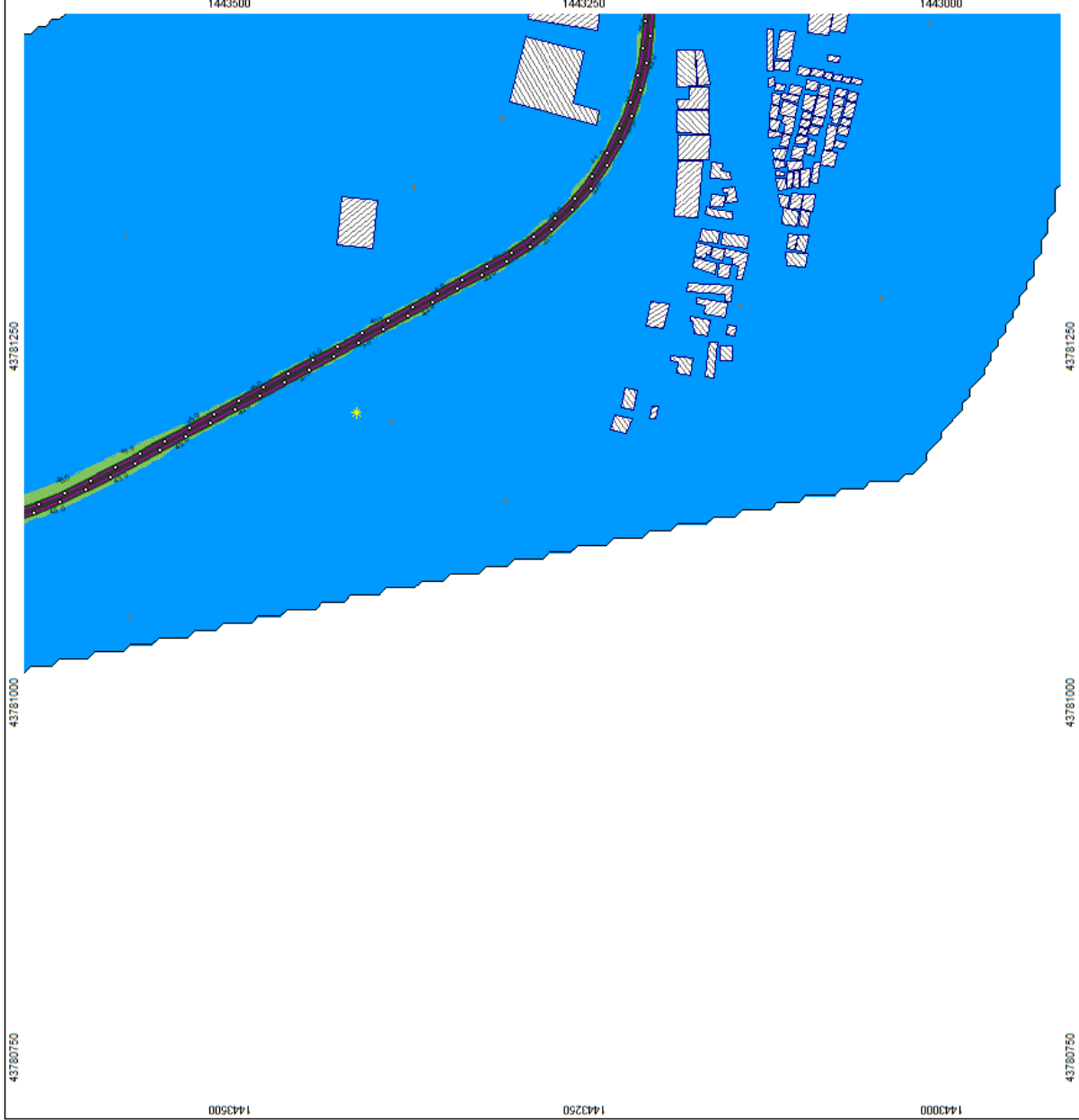
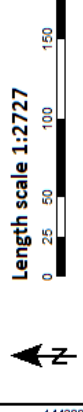
Project engineer: CMR  
 Created: 9/11/2020  
 Processed with SoundPLAN 8.1, Update: 10/23/2018

**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





**KR Puram to Kempegowda International Airport**

Operational Noise:  
 Drawings from Street Map and Google Earth  
 Topography with noise contours (DNL, SEL, L<sub>50</sub>, L<sub>10</sub>) and  
 ICAO/IMC/Boeing Aircraft Specifications. This standard and  
 speech level feasibility study.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,d**  
 Calculation in 1.5 m above ground

Project engineer: CHM  
 Created: 30/11/2020  
 Provisional with SoundPLAN 8.1, Update 15/02/2018

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

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

**Signs and symbols**

	Wall
	Construction layout
	Main building
	Point receiver
	+20dB(A) increase from
	Point Sources
	Library
	Secondary building
	Wall
	Wall
	Elevation point
	Soundfield
	Multiple calculation areas

**Length scale 1:2727**





**KR Puram to Kempgowda International Airport**

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

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,n**  
Calculation in 1.5 m above ground

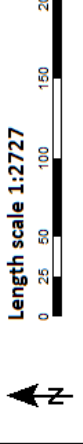
Project engineer: CMR  
Created: 9/11/2020  
Processed with SoundPLAN 8.1, Update: 10/23/2018

**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 circle	Wall
Red circle	Construction Equip
Blue hatched rectangle	Main building
Yellow star	Point receiver
Black line	-3dB(A) increase from
Red dot	Point Sources
Purple line	Line source
Green hatched rectangle	Geometry bimap
Green line	Wall
Green line	Wall
Green line	Elevation point
White rectangle	Bodeneffekte
White rectangle	Noise calculation area



**KR Puram to Kempegowda International Airport**

Operational Noise  
 Buildings from Street Map and Google Earth  
 Topography from DEM (BML) Sonitronics 8.1 Library and  
 MIRC3 Building Stock Specification. Train schedule and  
 speed from Feasibility Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map  
 Leq,d**  
 Calculation in 1.5 m above ground

Project engineer: CMR  
 Content: 9.11.2020  
 Processed with SoundPLAN 8.11, Update 10/21/2018

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

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

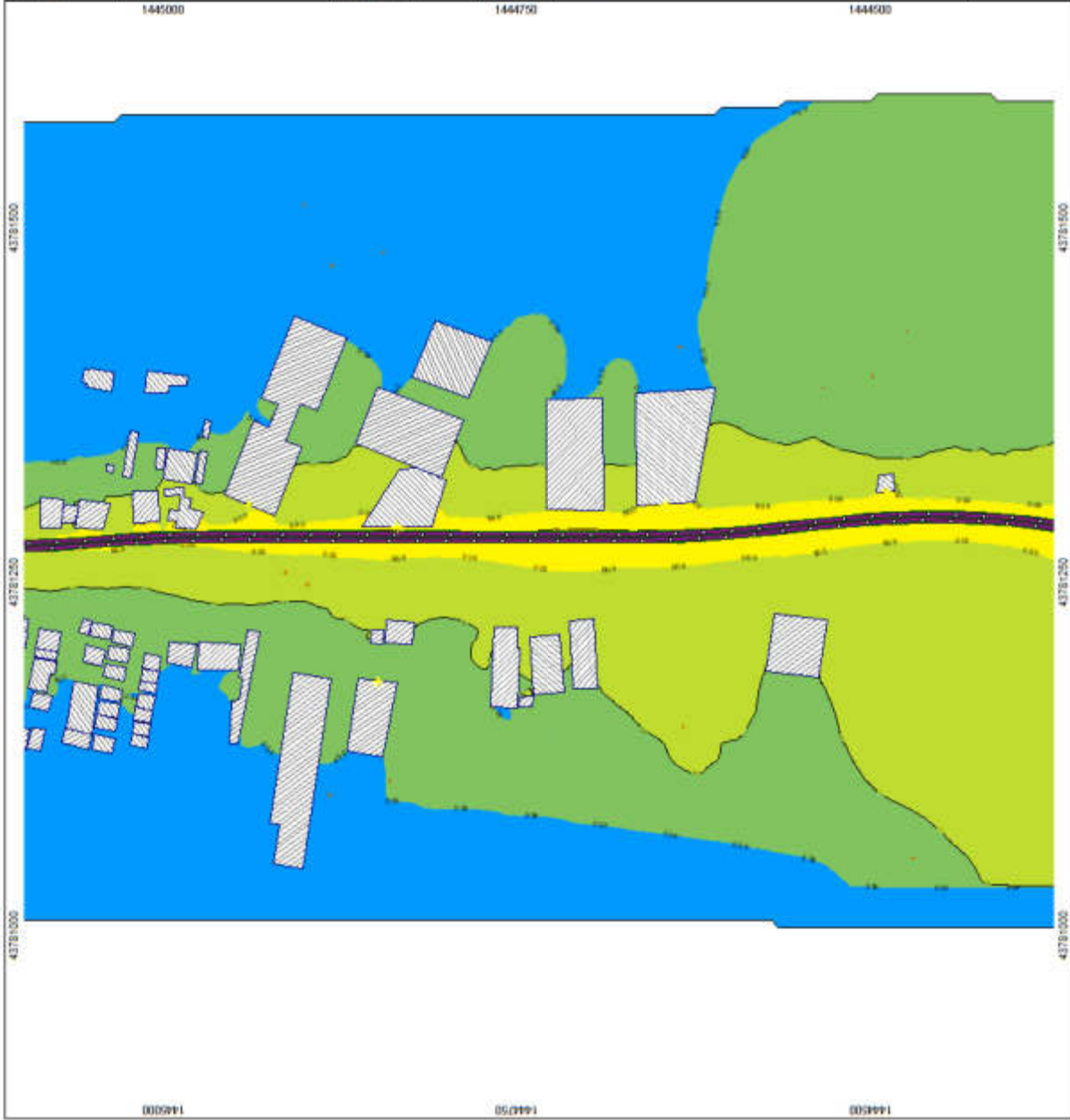
**Signs and symbols**

Wall
Construction Equip
Main building
Paint receiver
-1.00(d) increase from
Paint Source
Line source
Geometry bitmap
Wall
Elevation point
Background
Non-urbanisation area

**Length scale 1:2727**

0 25 50 100 150 200

← N



**KR Puram to Kempegowda International Airport**

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

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,n**  
Calculation in 1.5 m above ground

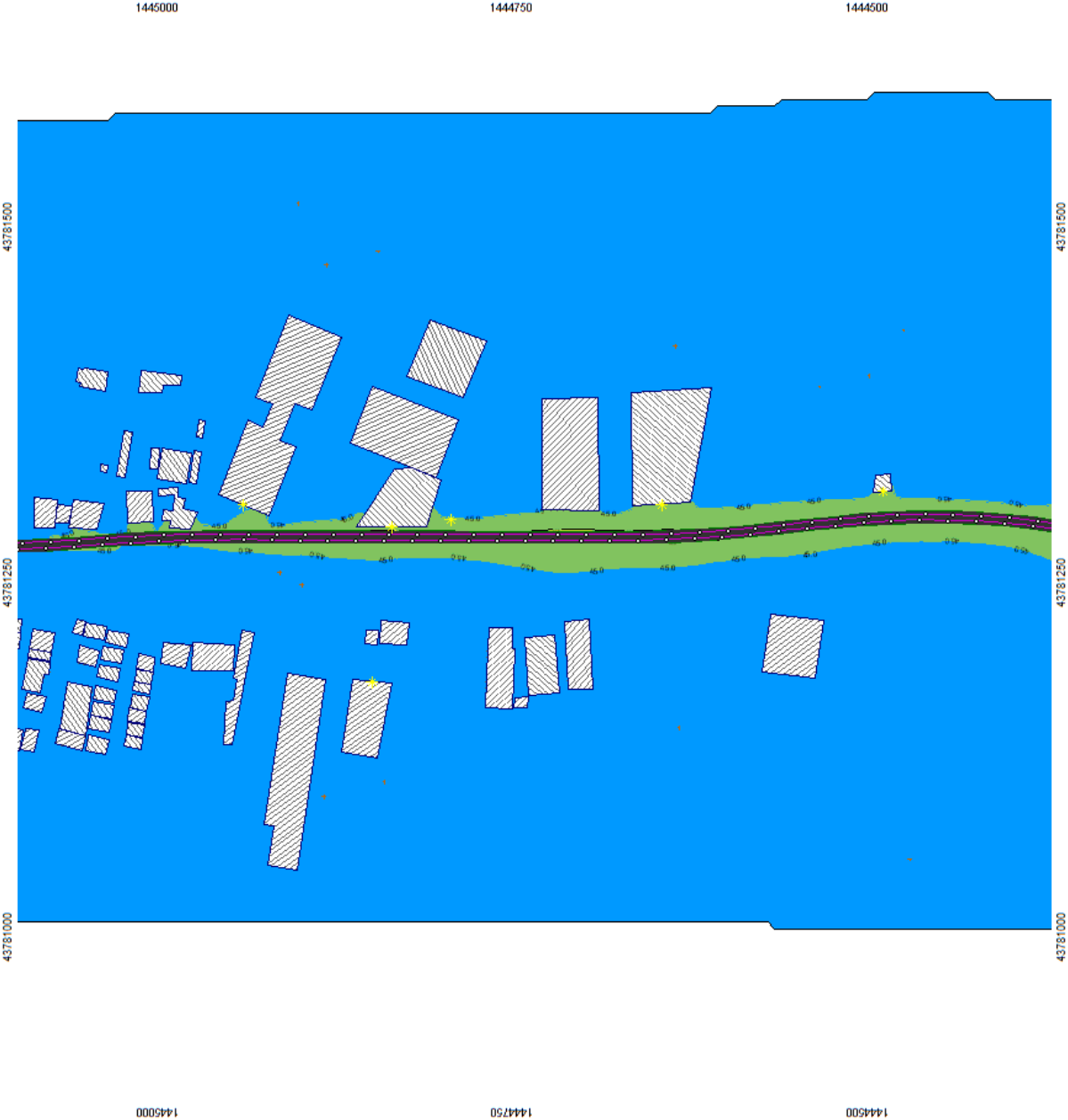
Project engineer: CMR  
Created: 9/11/2020  
Processed with SoundPLAN 8.1, Update 10/23/2018

**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**

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



**KR Puram to Kempegowda International Airport**

Operational Noise  
 Buildings, Street Map and Google Earth.  
 Top reference levels taken from (B&I) Soundplan 8.1 Library and  
 (MBCI) Building Stock specifications. Train schedule and  
 speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map  
 Leq,d**

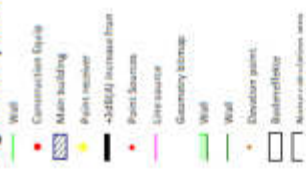
Calculation in 1.5 m above ground

Project engineer: OMR  
 Control No: 11/0020  
 Prepared with SoundPLAN 8.1, Update 10/21/2018

**Levels Leq,d**



**Signs and symbols**



**KR Puram to Kempegowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Noise power levels taken from BMU Soundplan 8.1 Library and  
BMRCL Forming Stage 3. Location, train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map**

**Leq,n**  
Calculation in 1.5 m above ground

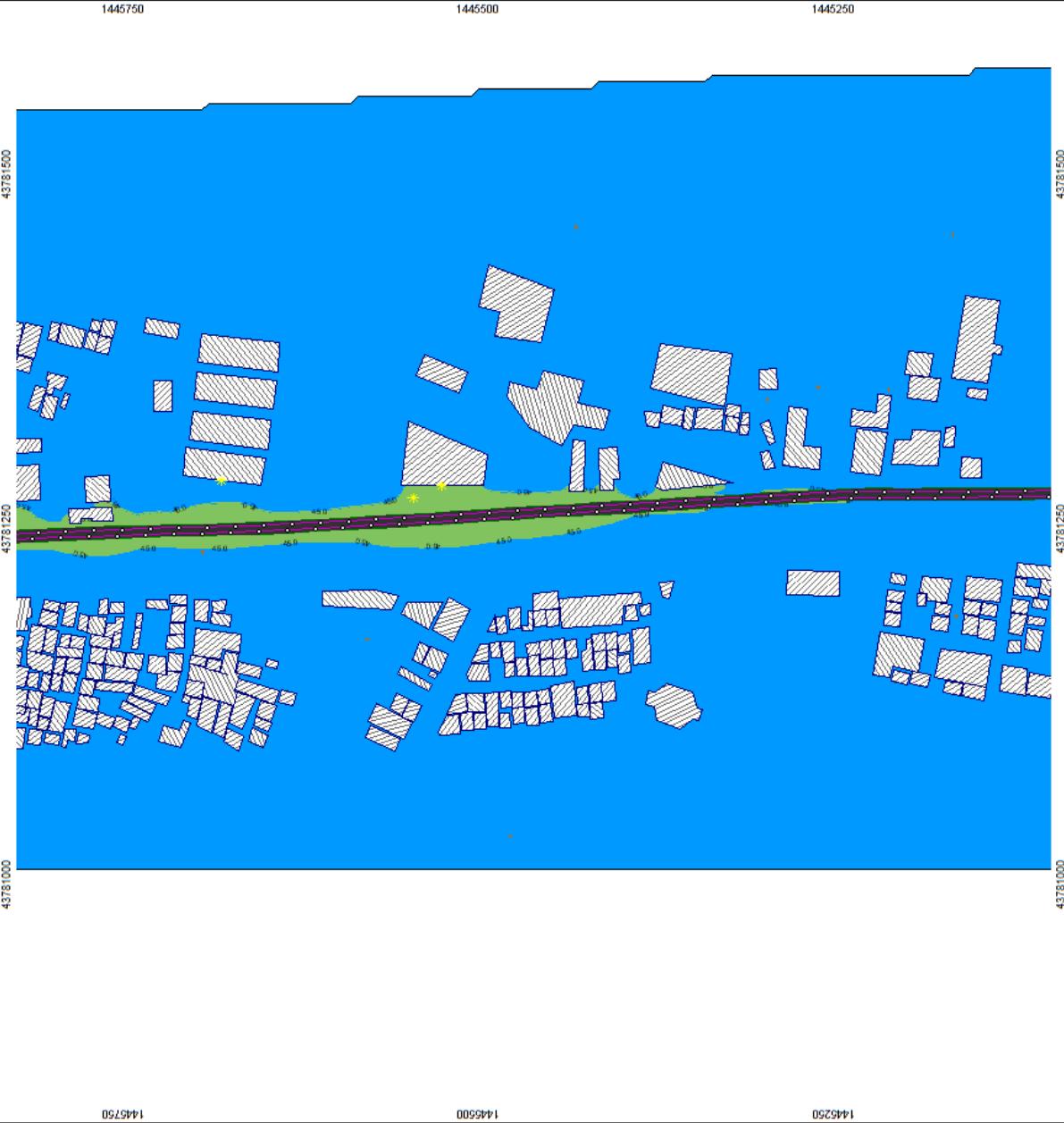
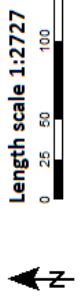
Project engineer: CMR  
Created: 9/11/2020  
Processed with SoundPLAN 8.1, Update 10/23/2018

**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
Bodemeffekte
Noise calculation area



**KR Puram to Kempegowda International Airport**

Directional Noise Contour Map and Google Earth File using various data from DMU Soundplan & J Library and IARC, Building Mass Specification, Train schedule and speeds from Feasibility Study.

**120 2041 2B with Parapet Wall Noise Contour Map**

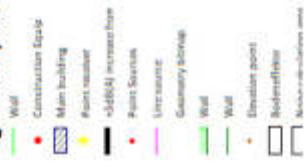
Leq,d  
Calculation in 1.5 m above ground

Project engineer: CMB  
Created: 8/11/2020  
Processed with: SoundPLAN 8.1, Update: 10/23/2018

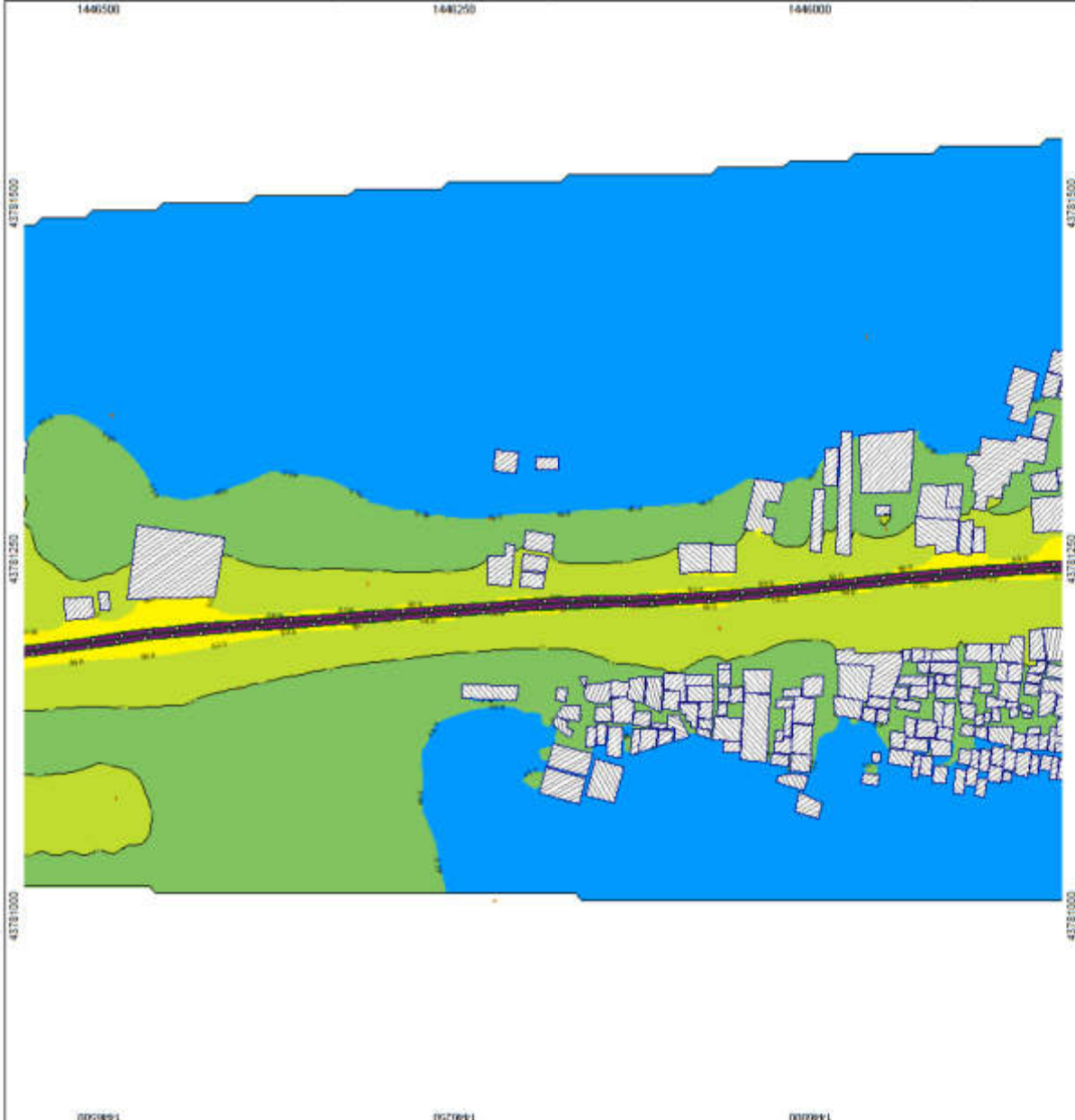
**Levels Leq,d**



**Signs and symbols**



Length scale 1:2727





**KR Puram to Kempegowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Main noise power levels taken from DMU Soundplan 8.1 Library and  
BMRCC Noise Study. Location, train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map**

Leq<sub>1h</sub>  
Calculation in 1.5 m above ground

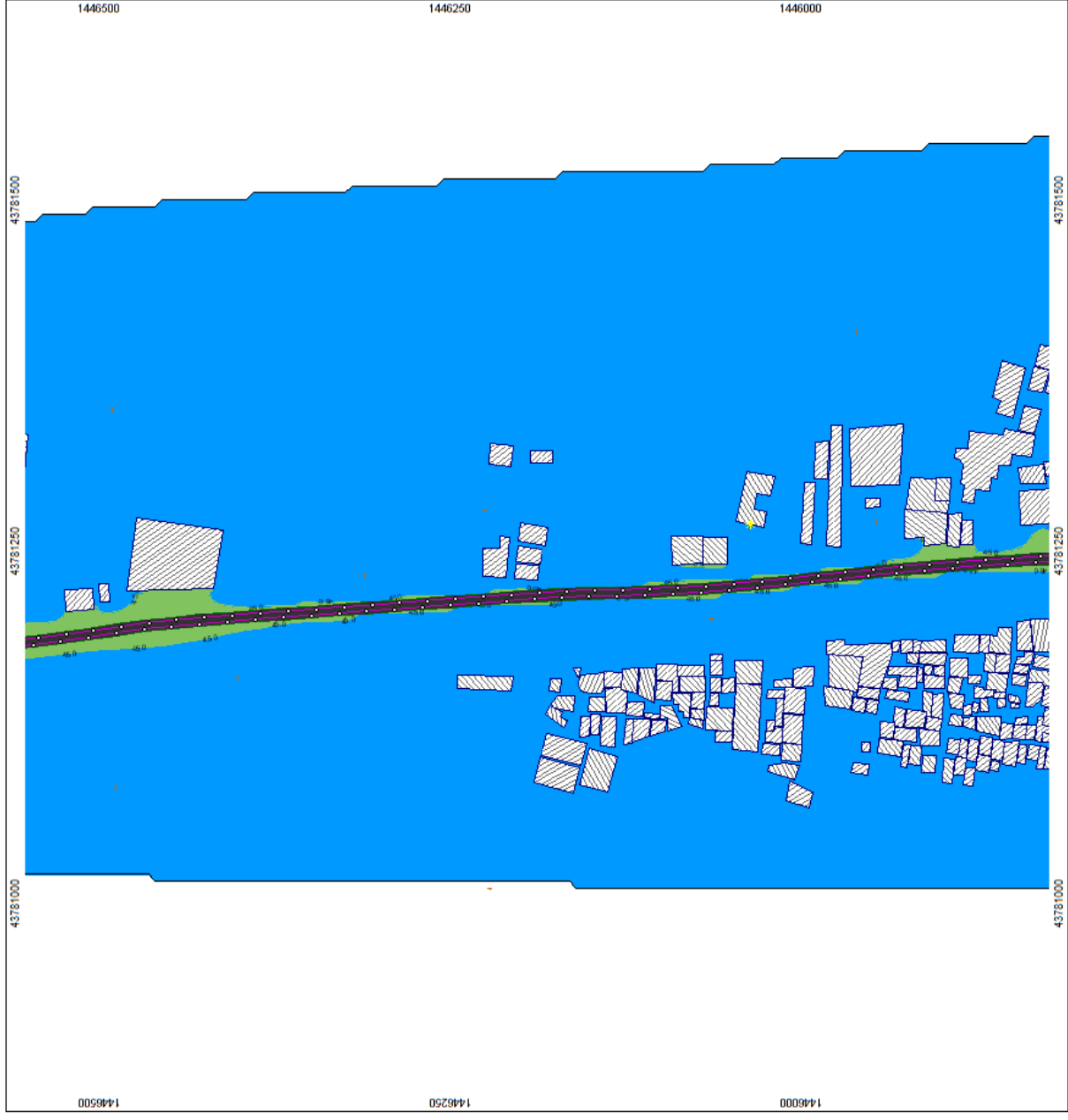
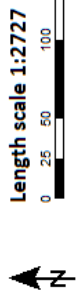
Project engineer: CMR  
Created: 9/11/2020  
Processed with SoundPLAN 8.1, Update 10/23/2018

**Levels Leq<sub>1h</sub>**  
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
- Mischverhaltenslinien areas



**KR Puram to Kempegowda International Airport**

Operational Noise, Buildings from Street Map and Google Earth, Main road power eq. taken from DMR/Scanned & Library and BAPCO, Existing Urban Specifications, Urban standards and Health from Feasibility Study.

**120 2041 2B with Parapet Wall Noise Contour Map**  
**Leq,d**  
 Calculation in 1.5 m above ground

Project engineer: CMH  
 Created: 3/11/2020  
 Project: Road with soundPLAN 8.1, Update 10/23/2018

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

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

**Signs and symbols**

Red dot	Construction Equip
Green line	Wall
Blue hatched box	Main building
Yellow hatched box	Point receiver
Black line	-10dB(A) Increase from
Red dot	Point Source
Pink line	Line source
Green line	Geometry (obstacle)
Green line	Wall
Red dot	Elevation point
White box	Boundary/obstacle
White box	Receptor/obstacle area



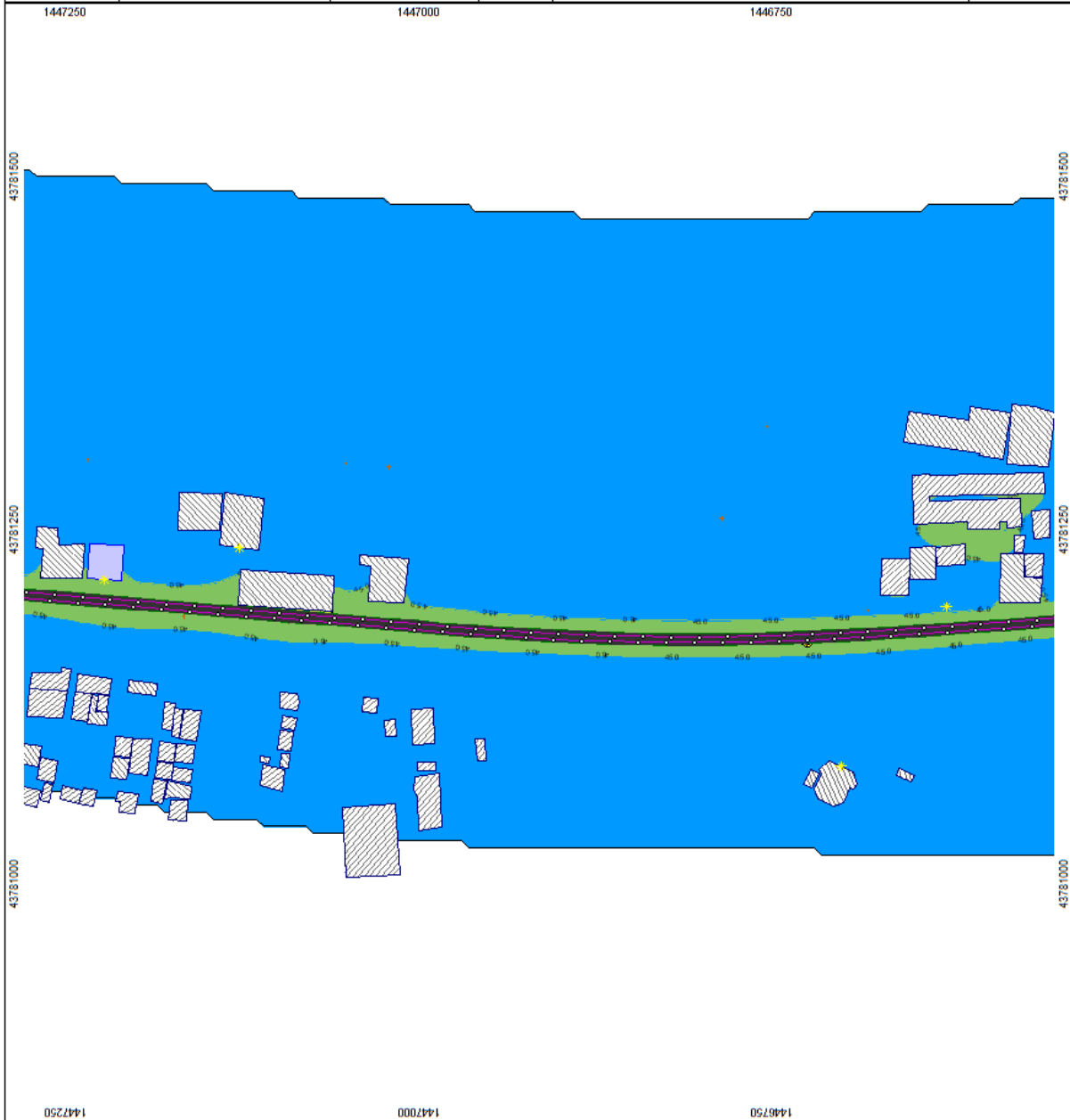


**KR Puram to Kempegowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Topography from DEM (10m resolution) and  
BMBCI Building Stock Specification. Train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,n  
Calculation in 1.5 m above ground**

Project engineer: CMR  
Created: 11/10/20  
Processed with SoundPLAN 8.1, Update 10/23/2018



**KR Puram to Kempgowda International Airport**

Operational Noise:  
Buildings from Street Maps and Google Earth.  
Predictions from the BAM Soundplan 8.1.1 Library and  
BAMCL Rolling Stock Specification. Train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,d**  
Calculation in 1.5 m above ground

Project engineer: CMR  
Created: 19.11.2020  
Processed with SoundPLAN 8.1.1, 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 Escape
Main building
Paint receiver
+15dB(A) increase from
Paint Source
Line source
Geometry Volume
Wall
Wall
Elevation point
Rechnungsbereich
Rechnungsbereichs-Änderung



**KR Puram to Kempegowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Tracks and stations from EMU Soundplan 8.1 Library and  
BMRC's Rolling Stock Specification. Train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,n**  
Calculation in 1.5 m above ground

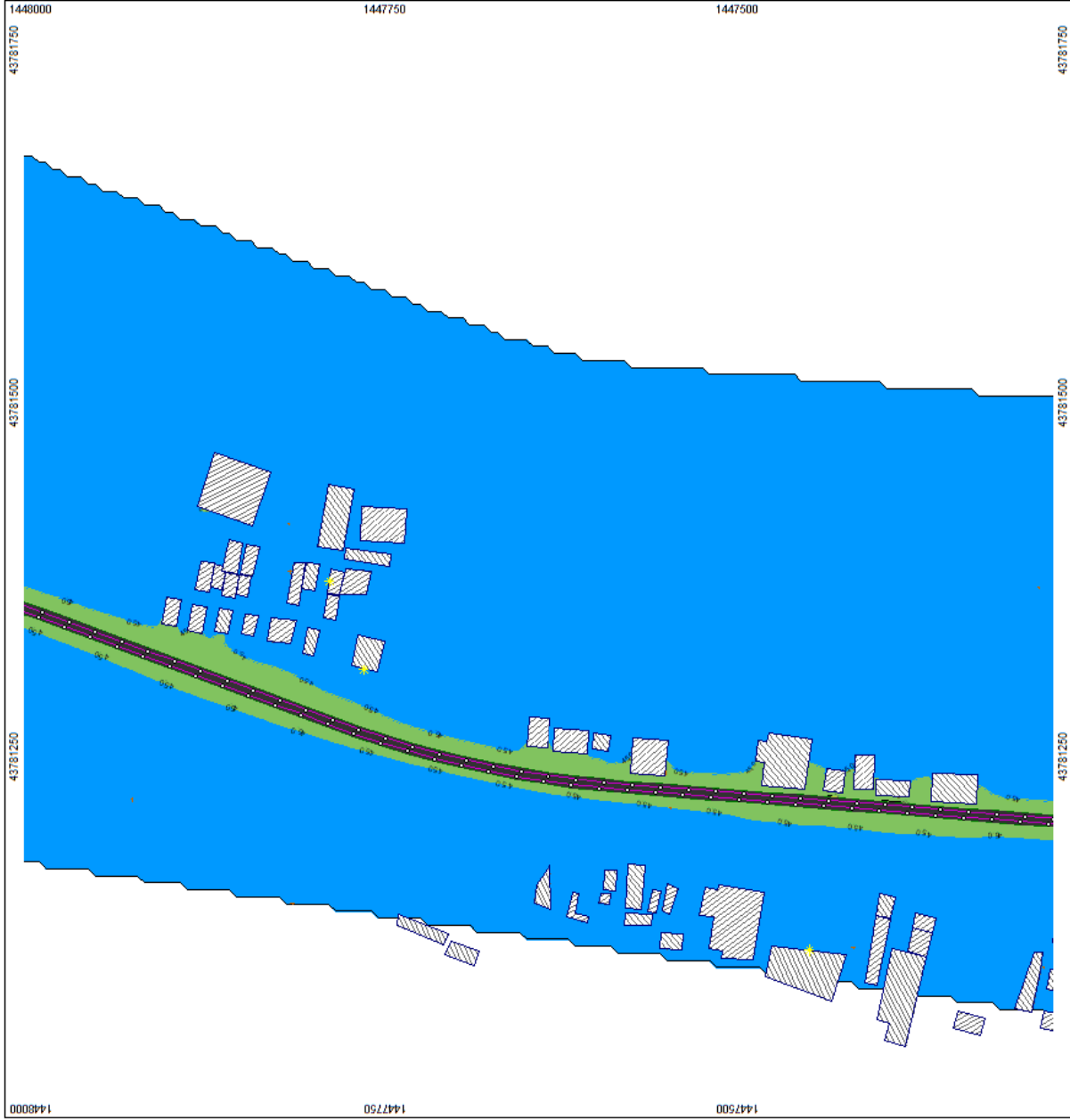
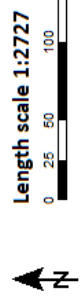
Project engineer: CMR  
Created: 9/11/2020  
Processed with SoundPLAN 8.1, Update: 10/23/2018

**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
Bodeneffekte
Noise reduction area



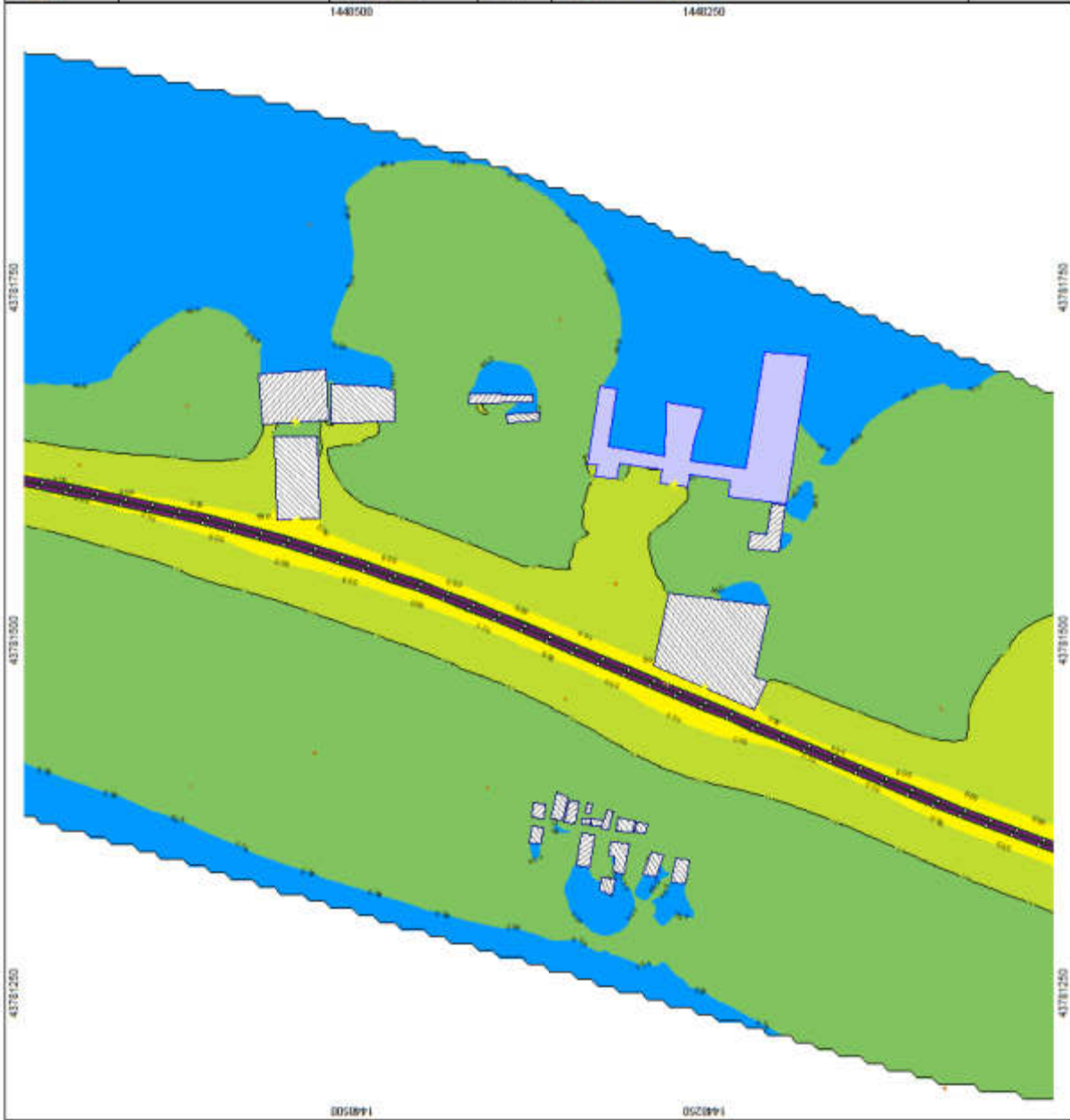
**KR Puram to Kempegowda International Airport**

Operational Noise:  
 Predicted from Screen Map and Single-Event  
 Predicted from Screen Map from DBU Soundplan 8.1 Library and  
 BMRZ. Building Stock Specification: Train schedule and  
 spreads from Trackability Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map  
 Leq,d**  
 Calculation in 1.5 m above ground

Project Engineer: CMR  
 Contact: 911120130  
 Prepared with SoundPLAN 8.1, Update 10/21/2014

- Levels Leq,d**  
 in dB(A)
- < 45
  - 45 - 50
  - 50 - 55
  - 55 - 60
  - 60 - 65
  - >= 65
- Signs and symbols**
- Wall
  - Construction square
  - Main building
  - Point number
  - +3dB(A) increase type
  - Point level
  - Library
  - Geometry storage
  - Wall
  - Wall
  - Structure point
  - Bookmarks
  - Marker coloration area

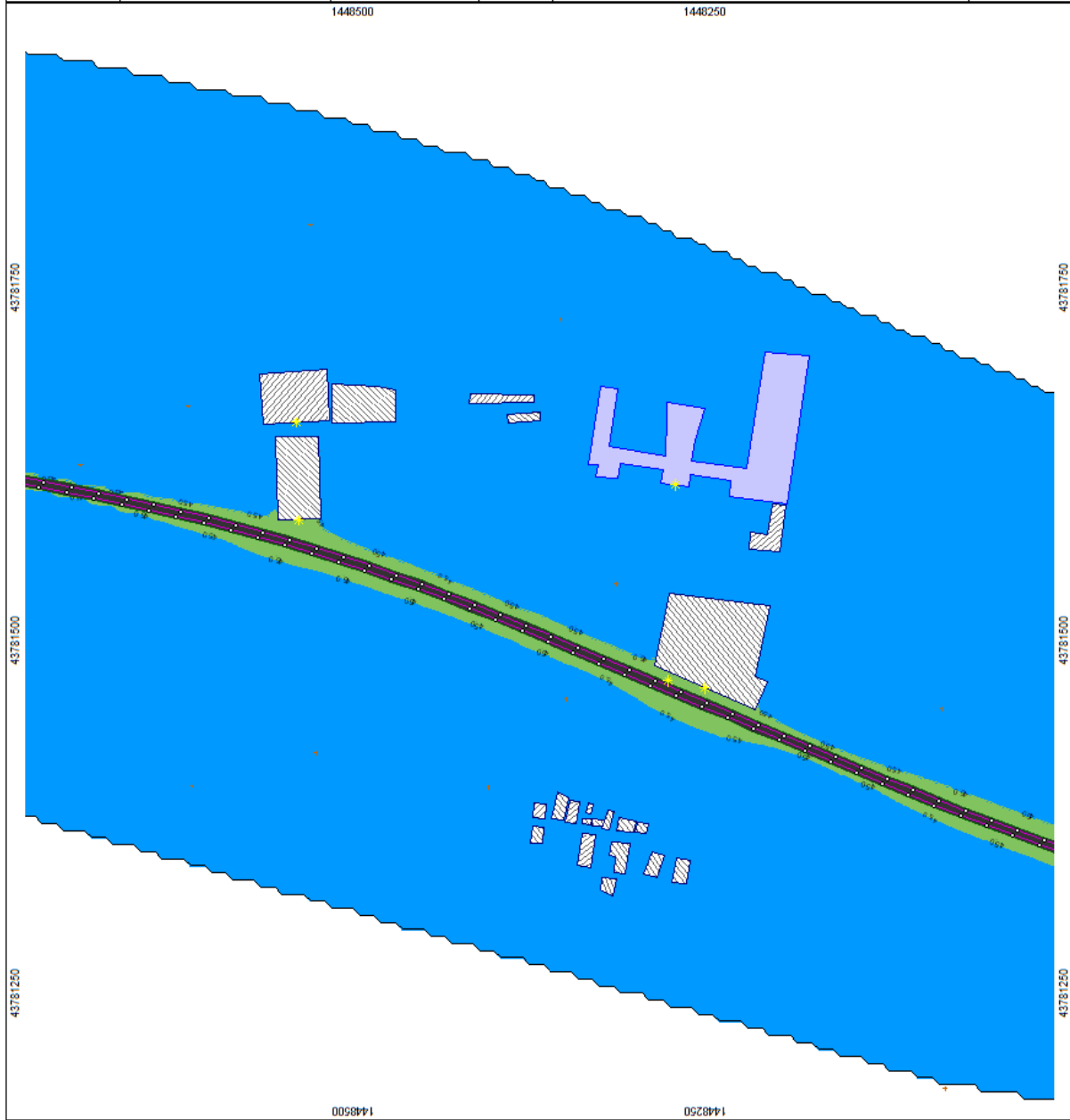


**KR Puram to Kempegowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Elevation from BfU Soundplan 8.1 Library and  
BMBCL Building Stock Specification. Train schedule and  
speeds from Feasibility Study.

**120 2041 2B with Parapet Wall  
Noise Contour Map**  
Leq,n  
Calculation in 1.5 m above ground

Project engineer: CMR  
Created: 31/12/2018  
Processed with SoundPLAN 8.1, Update 10/23/2018



**KR Puram to Kempegowda International Airport**

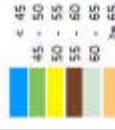
Quantified Noise  
 Map based on Noise Map and Sample Levels  
 Train noise power levels taken from DMU Soundpower & Library and  
 BANC Building Stock Specification, train schedule and  
 length from Feasibility Study.

**120 2041 2B with Parapet Wall  
 Noise Contour Map  
 Leq,d**

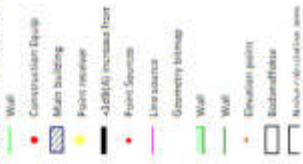
Calculation in 1.5 m above ground

Project Engineer: CNR  
 Contact: 961120036  
 Prepared with NoisePLAN 8.1.1, Update 10/21/2018

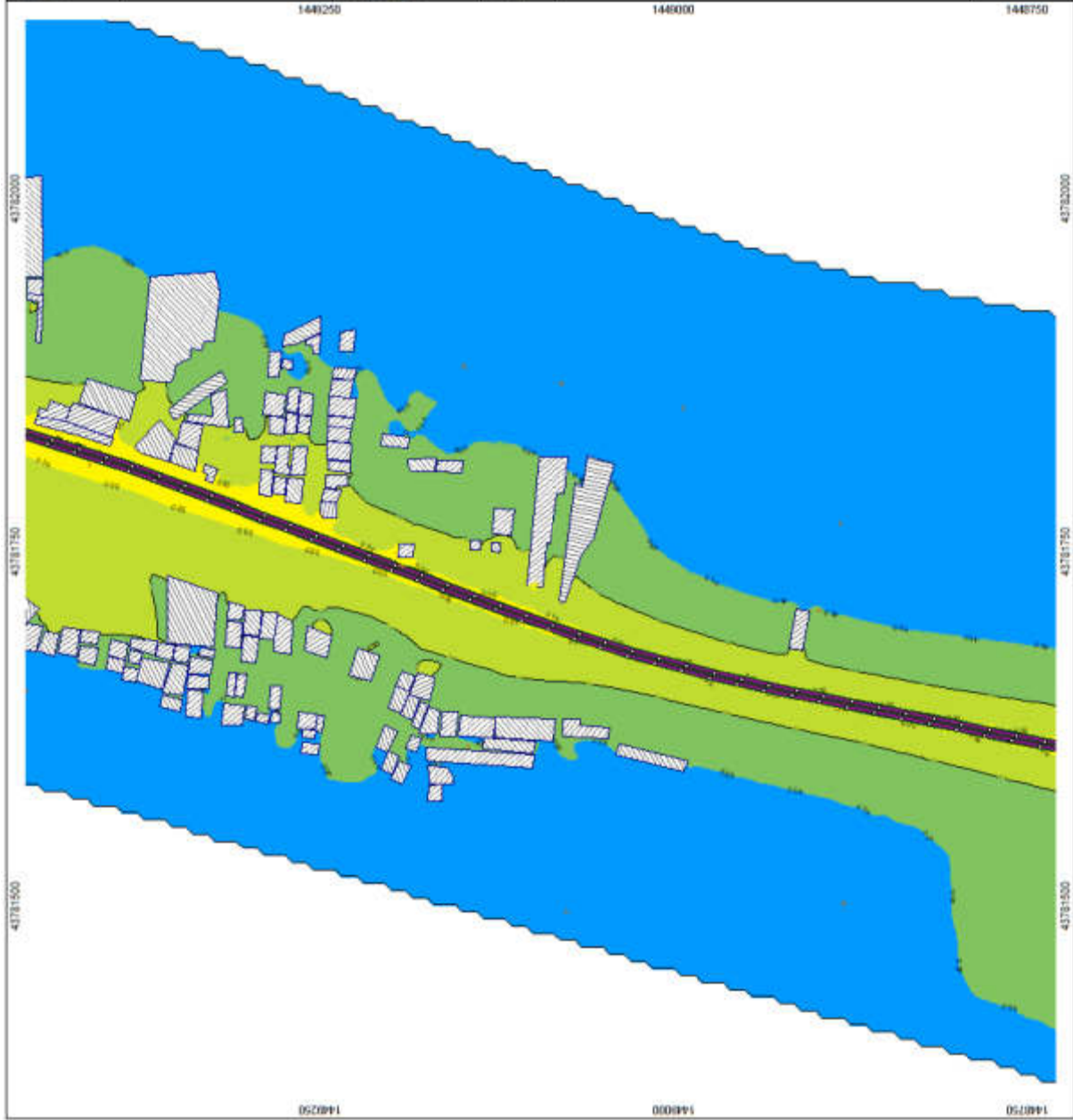
**Levels Leq,d  
 in dB(A)**



**Signs and symbols**



Length scale 1:2727



**KR Puram to Kempegowda International Airport**

Operational Noise:  
Buildings from Street Map and Google Earth.  
Noise contours are generated from BNO, Soundplan 8.1 Library and  
BMRCL Noise Study Software. Station, train schedule and  
speeds from feasibility study.

**120 2041 2B with Parapet Wall  
Noise Contour Map  
Leq,n**  
Calculation in 1.5 m above ground

Project engineer: CMR  
Created: 9/11/2020  
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
Bodemeffekte
Noise calculation area

