

VIBRATION

KL-SG HSR FACT SHEET SERIES / ENVIRONMENT



THE KUALA LUMPUR - SINGAPORE HIGH SPEED RAIL PROJECT

The Kuala Lumpur-Singapore High Speed Rail (KL-SG -HSR) is a transformative transportation project that aims to facilitate seamless travel between Kuala Lumpur, Sepang-Putrajaya, Seremban, Melaka, Muar, Batu Pahat, Iskandar Puteri in Malaysia and Jurong East in Singapore.

This fact sheet is one of a series of fact sheets which aims to provide accurate information relating to environmental impact to the public.

WHAT ARE THE POTENTIAL SOURCES OF VIBRATION?

The KL-SG HSR project will go through 3 distinct phases - design, construction and operations. During the design phase, no vibration is expected as works will be confined to desktop related activities. However, vibration may be generated during the construction and operations phases.

The key project activities that will generate vibration during construction phase are:

- Land clearing
- Demolition of buildings
- Earthworks
- Transportation of materials/ equipment
- Piling works
- Tunnelling works

The key project activities that will generate vibration during operations phase are:

- Movement of trains
- Stations, depots and maintenance bases daily activities
- Repair and maintenance works on tracks

WHAT ARE THE EXISTING VIBRATION LEVELS?

MyHSR has performed an Environmental Impact Assessment (EIA)* study and the existing vibration levels have been recorded along the alignment:

State	Vibration Level [PVS, mm/s] #
Day Time (7.00am to 10.00pm)	
Schools and Institution	0.156 - 2.184
Plantations	0.139 - 1.367
Residential Areas	0.147 - 2.924
Commercial Areas	0.174 - 1.425
Public Facilities	0.286 - 0.833
Night Time (10.00pm to 7.00am)	
Schools and Institution	0.142 - 1.498
Plantations	0.137 - 0.839
Residential Areas	0.119 - 1.461
Commercial Areas	0.147 - 1.201
Public Facilities	0.139 - 0.204

Note: # Vibration levels vary based on land uses along the alignment.

WHAT ARE THE PREDICTED VIBRATION LEVELS?

The vibration impacts are highly dependent on the geological profile of the areas along the HSR alignment. The impact may be higher in areas of hard bedrocks, such as granite and quartzite foundations. For areas with the geological make up of alluvium, schists and limestones, the vibration impact is negligible or minimal.

The vibration impact during construction is expected to be significant for areas located within 30 to 50m from the alignment mainly due to the piling works.

The vibration levels during the construction and operational phases of KL-SG HSR shall comply with the vibration limits stated by the Department of Environment (DOE) guidelines.

* Environmental Impact Assessment study for the KL-SG HSR project available for reference at www.myhsr.com.my.

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WHAT ARE THE DEPARTMENT OF ENVIRONMENT GUIDELINES FOR VIBRATIONS?

The Department of Environment (DOE) has published “The Planning Guidelines for Vibration Limits and Control in the Environment” in 2007 which states the recommended limits for short term vibrations (during construction) and steady state vibrations (during operation) (refer to the tables below).

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Vibration Sensitive Areas	Curve 1	Curve 1
Residential	Curve 8 to Curve 16	Curve 4
Commercial, Business	Curve 16 to Curve 20	Curve 16 to Curve 20
Industrial	Curve 32	Curve 32

Recommended Limits for Human Response and Annoyance from Short Term Vibrations | DOE, 2007

Receiving Land Use Category	Day Time 7.00 am - 10.00 pm	Night Time 10.00 pm - 7.00 am
Vibration Sensitive Areas	Curve 1	Curve 1
Residential	Curve 2 to Curve 4	Curve 2
Commercial, Business	Curve 4 to Curve 8	Curve 4
Industrial	Curve 8 to Curve 16	Curve 8 to Curve 16

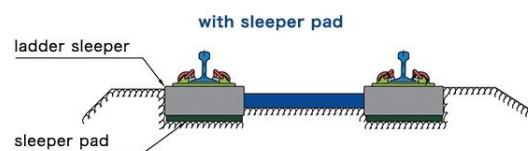
Recommended Limits for Human Response and Annoyance from Steady State Vibrations | DOE, 2007

Curve 1 is based on the vibration perception threshold for human response as defined by BS 6472:1992 and ISO 2631.

PROPOSED MITIGATION MEASURES

Vibration mitigation measures have been incorporated into the project’s design. In addition, further mitigation measures have been proposed in the EIA study* to reduce the vibration impacts generated from the construction and operations of the KL-SG HSR as follows:

- Bored piling, hydraulic press-in or jack-in spun piling shall be used to employ more silent and low-vibration piling methods.
- Vibration isolation device should be installed at track sleepers, ballasts or viaducts to properly isolate vibration signals from being propagated to residential areas.
- Continuously perform vibration measurement throughout the construction period to confirm compliance to DOE acceptance limits.



Example of Ladder Tacks with Sleeper Pad to Minimize Vibration



Example of Rail Fastening System with Pad to Minimize Vibration (Pandrol Vanguard Type)

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* Environmental Impact Assessment study for the KL-SG HSR project available for reference at www.myhsr.com.my.