

# mumbai first

## DISASTER MANAGEMENT



# Is your home quake-proof?

**ON SHAKY GROUND** Study shows homes built on reclaimed land are vulnerable during quakes. The soil in such areas could run like muddy water, damaging foundations. A susceptibility map could help developers design buildings with area-specific precautions

Watch this story on Mumbai Express on **IBN Lokmat** at 10.30 pm today

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**MUMBAI:** Residents of Bandra and Andheri are on safer ground compared to those of buildings constructed on land reclaimed from the sea in areas such as Bhandup and Borivli.

That's because buildings in Mumbai's reclaimed areas are more likely to be damaged during an earthquake than those elsewhere, according to a study done by the Indian Institute of Technology-Bombay (IIT-B) and Veermata Jijabai Institute of Technology (VJTI), Matunga. During an earthquake, the soil in reclaimed areas could take on a liquid quality and flow like muddy water, affecting building foundations.

The study, published in the March issue of the *Journal of Applied Geophysics*, is important because the different ways in which soil reacts during tremors could necessitate area-specific construction designs in Mumbai.

"A building design suitable for Andheri may not be safe for Borivli," said IIT-B Professor Deepankar Choudhury, one of the researchers. "When land is reclaimed, soil is dumped into the sea so the chances of liquefaction increase. You need to take special care while designing earthquake-resistant measures in such areas. However, this is not normally done."

The study is important for Mumbai, which falls in the moderate Seismic Zone 3 and is susceptible to earthquakes measuring 6 to 6.5 on the Richter scale. There are 23 fault lines along Panvel, Thane and Dharamtar creeks around Mumbai. On July 1, moderate tremors measuring 3.1 on the Richter scale were felt in parts of Diva and Thane.

The research team prepared a soil liquefaction susceptibility map for Mumbai's original seven islands. Soil liquefaction is a phenomenon in which cohesion-less soil — usually sandy or clay — flows like muddy water.

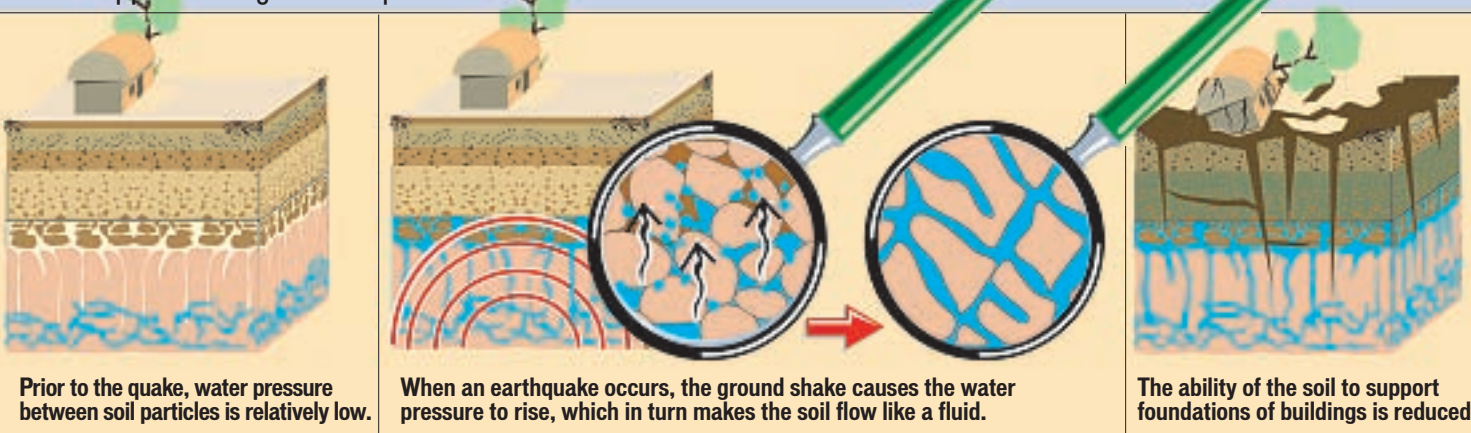
The map could help urban planners design more efficient quake-resistant buildings. "At present, soil testing is done to see how much load it can take. But there is no assessment of what will happen to the soil and or how the foundation will react during an earthquake. Knowing the intensity of soil liquefaction will help builders draw designs suited to the construction site," said VJTI Professor Sumedh Mhaske. "This would make buildings safer."

"Soil testing is done before constructing a building; we also consider the eventuality of a quake. A susceptibility map would be useful," said Sunil Mantri, proprietor, Mantri Builders.

### WHAT THE STUDY SAYS

- Professor Deepankar Choudhury of the Indian Institute of Technology - Bombay and Professor Sumedh Mhaske of Veermata Jijabai Institute of Technology, Matunga, conducted the study.
- Between 2008 and 2009, they prepared a soil liquefaction susceptibility map for Mumbai. Soil liquefaction is a phenomenon in which cohesion-less soil — usually sand or clay — flows like muddy water.
- Using Geographic Information System-based software, the researchers studied soil with the potential to liquefy at 238 spots
- at Andheri, Bandra, Bhandup, Borivli, Dahisar and Malad — at earthquake magnitudes ranging from 5 to 7.5 on the Richter scale.
- The study found that in case of tremors of the magnitude of 6.5 to 7.5, soil in Bhandup and Malvani in Malad would liquefy faster. In contrast, Dahisar and two spots at Borivli would liquefy only when the tremors measured 7 to 7.5 on the Richter scale.
- These maps will help designers and engineers to check the vulnerability of the project to soil liquefaction.

### What happens during an earthquake



Mumbai is vulnerable because it is located in peninsular India that comprises Dharwad, Aravali and Singhbhum proto-continents with high seismic activity at their intersections. A tremor stronger than 5.5 on the Richter scale is considered an earthquake since it causes structural damage. Apart from Mumbai, soil liquefaction maps have been prepared for Delhi, Bhub, Bangalore, Guwahati, Chennai.

TREMORS IN MUMBAI	July 2010	March 2005	June 2005	August 2005	May 1998	September 1993	April 1967	June 1967
Magnitude (Richter scale)	3.1	5.1	3.7	4.1	3.8	6.4	4.5	4.2

HT GRAPHIC: RICHA, RAMESH

## Study soil in reclaimed areas: Experts

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**MUMBAI:** The city's shores are likely to be transformed if the proposal to reclaim areas in Navi Mumbai, along the eastern waterfront and beyond Borivli for housing and infrastructure have a reality.

The two-member team that prepared a soil liquefaction — when soil begins to run like muddy water during an earthquake — report for Mumbai will extend its study to Navi Mumbai. "There are fault lines in the Panvel creek that can cause ground motion," said Deepankar Choudhury, of IIT-B. He added that the preliminary work has begun.

Geologists stressed the need to prepare detailed micro seismic zone maps, based on which construction projects would get the go-ahead in reclaimed areas.

Mumbai, which falls in the moderate Seismic Zone 3, may not be very prone to earthquakes but one should



IIT-B Professor Deepankar Choudhury (in blue) and VJTI Professor Sumedh Mhaske after preparing a soil liquefaction report for Mumbai will extend its study to Navi Mumbai.

not take it for granted, said V.K. Joshi, former director, Geological Survey of India. "An earthquake comes unannounced. Therefore, the emphasis must be on pre-disaster management rather

than post-disaster management." The chance of liquefaction is higher in reclaimed areas because these areas are filled with boulders or waste before soil is dumped on the top. "A map will

A map will help decide how deep the foundation should go, especially for multi-storied buildings.

S.K. GUPTA, geologist

help decide how deep the foundation should go, especially for multi-storied buildings," said S.K. Gupta, geologist and consultant to the civic body.

Currently, developers construct buildings assuming a uniform ground shake everywhere.

Having worked on similar maps for Kolkata, Delhi, Dehradun and Jabalpur, Joshi said apart from revision of norms every five years, a susceptibility map would help builders understand the earthquake-resistant precautions needed in a particular area.

"It costs only 25 per cent more to make a building safe. When residents can spend money on beautification of balconies and interiors, why not pay a little more for safety," asked Joshi.

## Decision on Juhu open space may be delayed

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**MUMBAI:** After the municipal corporation was under pressure to save four open spaces, it cleared the proposal to buy three of them. But it is yet to take a decision on the biggest space of them all — JVPD (Juhu Vile Parle Development Scheme) in Juhu worth Rs 1,000 crore.

Sources said the procedure may now get delayed as a few housing societies have raised objections to the sale of the plot.

The fate of these plots reserved for open spaces was at stake as the BMC was allegedly dilly-dallying the process to acquire them. The owners — a federation of 14 housing societies — of this plot had issued a purchase notice, asking the BMC to either develop the proposed facilities or allow them development.

It is mandatory to buy the plots before the purchase notices lapsed or else the plots would automatically return to their owners. "Though the deadline of this plot is December, I am told that a few housing societies have

### THE PLOT

- The 7,441 sq m at Juhu has been in controversy earlier as the BMC claims that residents have no right to ask them to buy the plot.
- The JVPD scheme, comprising 14 cooperative housing societies, is together known as the JVPD Cooperative Housing Association. As per a policy agreed upon by the Mhada and the BMC, the JVPD housing society was to hand over the plots free of cost to the BMC.
- Residents want the land to be de-reserved, so that they can improve infrastructure.

raised objections to the federation and said that they do not agree with the sale proposal. There are more than one housing societies that have approached the BMC," said Upendra Doshi, a corporator who first raised the issue.

He said there were four more plots at Juhu that will be coming up at the civic improvement committee meeting this week.

## 22-year-old drowns while trying to rescue friend at national park

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**MUMBAI:** In an attempt to save his friends, a 22-year-old man drowned in a pond located in the Sanjay Gandhi National Park in Borivli (West) on Sunday.

A group of 13 men from Dharavi had gone for a picnic near the pond where the incident reportedly occurred.

This comes two days after two middle-aged people drowned in the same pond.

While nine men from the group sat outside the Ganesh pond, four went in for a swim, according to the police.

Rajendra Thakur, a senior police inspector of Kasturba Marg police station, said the incident occurred near the boating area at 1.30 pm, which does not have security during weekends.

The deceased was identified as Firoz Irfan Shaikh, a resident Dharavi's 60-Foot Road.

The police said the group of men who work as zari workers went to the pond that is an immersion spot during the Ganpati festival.

"When the boys were swimming, one Taufiq ventured deep



Firemen search for the body of Firoz Irfan Shaikh who drowned while trying to save his friend at the Sanjay Gandhi National Park in Borivli on Sunday.

into the lake and started drowning. Seeing his friend drown, Shaikh jumped in to save him. However, he could not continue to hit his hands and legs due to exhaustion and sank in. Miraculously, Taufiq managed to reach the edge of the lake and save himself," said Sub Inspector Sameer Barawarkar.

Meanwhile, when Shaikh began sinking in the water, others in the group raised an alarm and notified the police. Fire brigade officers were also pressed into service, fol-

lowing which, Shaikh was fished out from the lake in the evening. He was declared dead on arrival at the civic Bhagwati Hospital in Borivli.

The police have filed an Accidental Death Report (ADR) regarding the incident. Earlier too the SGNP has seen such incidents added the officials.

On July 18, two youth drowned after they were trapped in a deep pond near a waterfall inside the Sanjay Gandhi National Park.

## State stalls NTC mills' redevelopment plans

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**MUMBAI:** The National Textile Corporation (NTC) may have hit the goldmine by garnering a record Rs 1,979 crore from the sale of its two Worli mills — Bharat Textile and Podar Processing recently but the state government has put the redevelopment plans on hold.

The state government's Urban Development (UD) Department has directed the civic body to not allow any redevelopment to take place on the 10.6-acre land in both these mills because NTC has not yet submitted the two mills' integrated development plan as mandated in Development Control (DC) regulations.

This integrated plan includes handing over one-third of the open plot to both the civic body and MHADA. "They are supposed to take our permission for the integrated plan which has not yet been done," said a senior official of the state government.

The Brihanmumbai Municipal Corporation uses this

### HOUSING MINISTER AGAINST GRANTING INCENTIVE FSI

State Minister for Housing Sachin Ahir has sounded his opposition to the granting of incentive Floor Space Index (FSI) to Indiabulls for the two mills it purchased recently. This incentive FSI is granted if the mills opt to create public parking lots.

"The whole infrastructure of this area is crumbling and we need to put some brakes on this," said Ahir.

Ahir who is also the legislator of Worli where the two mills are located, expressed his opposition to new parking lots. "Almost 25,000 lots have been sanctioned under this scheme. There is no need for any more," he added. Ahir has written a letter to the state UD department expressing his opposition to the parking scheme.

part of the plot for creating playgrounds and recreation while the MHADA uses them for housing mill workers and creating transit accommodation.

However, NTC called this just a problem of lack of communication. "We will surely give one of our mills for housing and civic amenities as in the previous case," said the senior NTC official who did not wish to be named as he was not authorised to speak to the media. "We will sort out the issue before our next auction," he added.

Instead of offering bits and pieces in all five mills it sold in 2005, the NTC gave two entire mills admeasuring their share, one each to BMC and MHADA. The Mazgaon-based New Hind Mills was given to MHADA and India United Mills Number 2 was handed over to the civic body.

Last week, the Bharat textile mill was sold at the record price of Rs 1,505 crore, the highest amount for any mill, the 2.39-acre Podar Processing went for Rs 474 crore, two weeks ago. The NTC said that this sale amount will be pumped in to revive as well as set up new mills across the country.