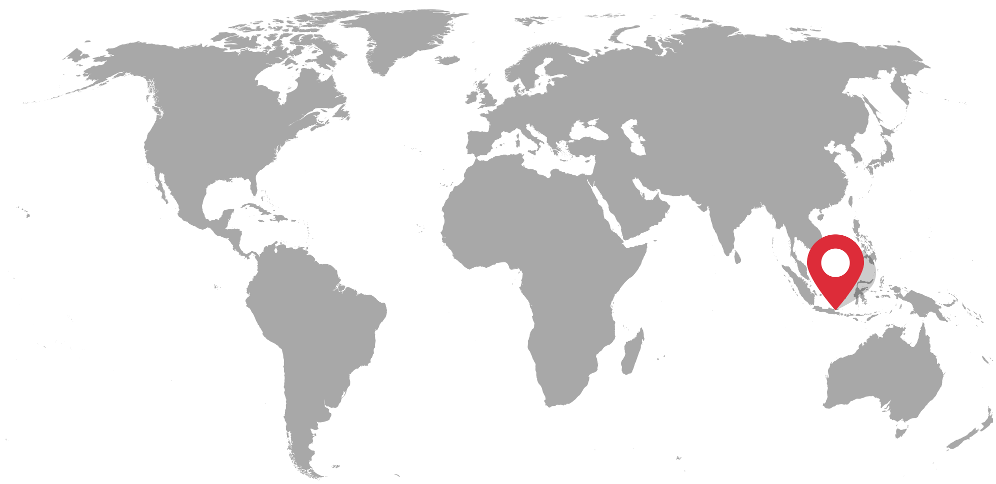
ThinkHazard!

Identify natural hazards in your project area
and understand how to reduce their impact

Kota Surabaya

Indonesia , Jawa Timur



Report generated on 2021-03-13
from https://thinkhazard.org/en/report/18080-indonesia-jawa-timur-kota-surabaya

About ThinkHazard!

ThinkHazard! is a new web-based tool enabling non-specialists to consider the impacts of disasters on new development projects. Users of *ThinkHazard!* can quickly and robustly assess the level of river flood, earthquake, drought, cyclone, coastal flood, tsunami, volcano, and landslide hazard within their project area to assist with project planning and design.

ThinkHazard! is a simple flagging system to highlight the hazards present in a project area. As such, a user is only required to enter their project location – national, provincial or district name. The results interface shows a user whether they require high, medium or low awareness of each hazard when planning their project.

ThinkHazard! also provides recommendations and guidance on how to reduce the risk from each hazard within the project area, and provides links to additional resources such as country risk assessments, best practice guidance, additional websites. *ThinkHazard!* also highlights how each hazard may change in the future as a result of climate change.

The ThinkHazard! methodology is documented here.

Developed by

GFDRR
Global Facility for Disaster Reduction and Recovery

In partnership with

brgm
Geoscience for a sustainable Earth

camp to camp
INNOVATIVE SOLUTIONS BY OPEN SOURCE EXPERTS

Deltares
Enabling Delta Life

WORLD BANK GROUP

UR

The following organizations have contributed data and / or expert input to the development of this tool:

GNS SCIENCE
TE PŪ AO

VU UNIVERSITY AMSTERDAM
Faculty of Earth and Life Sciences
IVM Institute for Environmental Studies

FATHOM

UC
UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

The tool code is open source, to encourage other users to adapt the tool to their needs. The code can be found on Github.

Current instance version is .
Source of Administrative boundaries: The Global Administrative Unit Layers (GAUL) dataset, implemented by FAO within the CountrySTAT and Agricultural Market Information System (AMIS) projects.

The data was published for the last time on *Tue Jun 30 15:57:03 2020*.

Disclaimer

The hazard levels and guidance given in *ThinkHazard!* do not replace the need for detailed natural hazard risk analysis and/or expert advice. While *ThinkHazard!* does its best to scientifically determine the hazard level, there are still uncertainties in the data and analysis. Users of the tool should access more information by contacting relevant national authorities, reviewing the recommended resources, and through accessing detailed hazard data.

Information in this screening tool is provided for informational purposes only and does not constitute legal or scientific advice or service. The World Bank makes no warranties or representations, express or implied as to the accuracy or reliability of this tool or the data contained therein. A user of this tool should seek qualified experts for specific diagnosis and analysis of a particular project. Any use thereof or reliance thereon is at the sole and independent discretion and responsibility of the user. No conclusions or inferences drawn from the tool or relating to any aspect of any of the maps shown on the tool, should be attributed to the World Bank, its Board of Executive Directors, its Management, or any of its member countries.

The *ThinkHazard!* administration team periodically adds, changes, improves, or updates the Materials on this Site without notice. This Site also contains links to third-party websites. The linked sites are not under the control of the World Bank and it is not responsible for the contents of any linked site or any link contained in a linked site. These links are provided only as a convenience, and the inclusion of a link does not imply endorsement of the linked site by The World Bank.

The boundaries, colors, denominations, and other information shown on any map in the tool do not imply any judgment or endorsement on the part of the World Bank or any providers of hazard data, concerning the delimitation or the legal status of any territory or boundaries. In no event will the World Bank be liable for any form of damage arising from the application or misapplication of the tool, any maps, or any associated materials.

Administrative boundaries are sourced from The Global Administrative Unit Layers (GAUL) dataset, implemented by FAO within the CountrySTAT and Agricultural Market Information System (AMIS) projects, with some amendment to administrative unit names.

Kota Surabaya

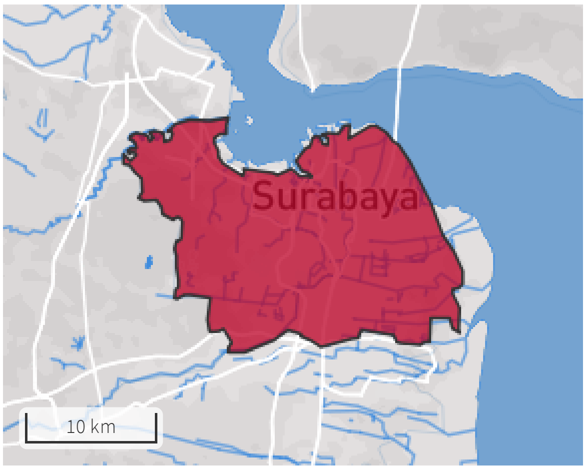
Indonesia , Jawa Timur

Coastal flood

Hazard level: ***High***

In the area you have selected (Kota Surabaya) coastal flood hazard is classified as **high** according to the information that is currently available. This means that potentially-damaging waves are expected to flood the coast at least once in the next 10 years. Based on this information, the impact of coastal flood **must be** considered in different phases of the project for any activities located near the coast. **Project planning decisions, project design, and construction methods must take into account the level of coastal flood hazard**. Further detailed information should be obtained to adequately account for the level of hazard.

Climate change impact: According to the IPCC (2013), there is high confidence that extremes in sea level will increase with mean sea level rise yet there is low confidence in region-specific projections in storm surges. Projects in low-lying coastal areas such as deltas, or in island states should be designed to be robust to projected increases in global sea level.



© Mapbox © OpenStreetMap

High Medium Low Very low

Data source: Muis-et-al

Further resources

- Climate risk management in Indonesia
- Country Adaptation Profile: Indonesia
- National Agency for Disaster Management (BNPB) disaster loss and damage database
- Turn Down the Heat : Climate Extremes, Regional Impacts, and the Case for Resilience
- Overview of Natural Disasters and their Impacts in Asia and the Pacific 1970 - 2014
- Global Assessment Report on Disaster Risk Reduction: Country Profiles
- INFORM: Index for Risk Management
- Shock Waves : Managing the Impacts of Climate Change on Poverty
- Turn Down the Heat : Why a 4 Degree Centrigrade Warmer World Must be Avoided
- Understanding Risk in an Evolving World - Emerging Best Practices in Natural Disaster Risk Assessment
- Building Urban Resilience - Principles, Tools, and Practice
- Climate Change Knowledge Portal

- EMDAT: Country Profile on Historical Disaster Events
- FLOPROS: A global database of Flood Protection Standards

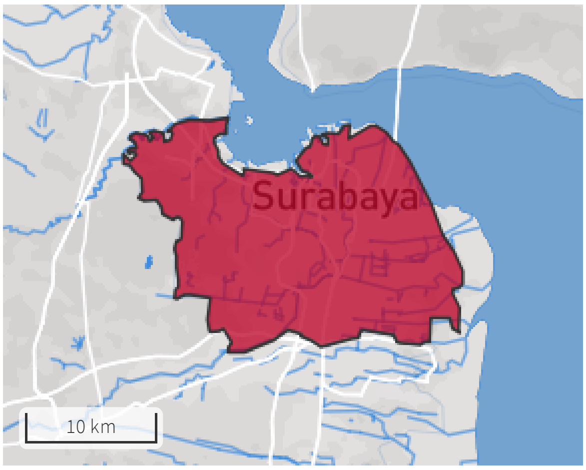
Kota Surabaya

Indonesia , Jawa Timur

Volcano

*Hazard level: **High***

In the area you have selected (Kota Surabaya) volcanic hazard is classified as **high** according to the information that is currently available. This means that the selected area is located at less than 50 km from a volcano for which a potentially damaging eruption has been recorded in the past 2,000 years and that future damaging eruptions are possible. Based on this information, **the impact of volcanic eruption must be considered in all phases of the project, in particular during project design, implementation and maintenance**. Further detailed information should be obtained to adequately account for the level of risk posed by individual volcanoes.



© Mapbox © OpenStreetMap

High Medium Low Very low

Data source: GFDRR

Further resources

- Indonesia: Advancing a National Disaster Risk Financing Strategy – Options for Consideration
- National Agency for Disaster Management (BNPB) disaster loss and damage database
- Overview of Natural Disasters and their Impacts in Asia and the Pacific 1970 - 2014
- EMDAT: Country Profile on Historical Disaster Events
- Earthquake-report.com - Independent Earthquake Reporting Site
- Global Assessment Report on Disaster Risk Reduction: Country Profiles
- Guidance on Safe School Construction
- Guidelines on preparedness before, during and after an ashfall
- Living with volcanoes - The sustainable livelihoods approach for volcano-related opportunities
- The health hazards of volcanic ash - A guide for the public
- Towards Safer School Construction
- Understanding Risk in an Evolving World - Emerging Best Practices in Natural Disaster Risk Assessment
- Volcanic Ash impacts on critical infrastructure
- Volcanic Ash: What it can do and how to prevent damage

- Volcanic ash fall hazard and risk
- Volcanic gases and aerosols guidelines
- Volcanic hazards and their mitigation - Progress and problems
- Volcano Observatory database - World Organization of Volcano Observatories (WOVO)
- Database of Volcanoes - Global Volansim Program
- Defining disaster resilience: a DFID approach paper

Kota Surabaya

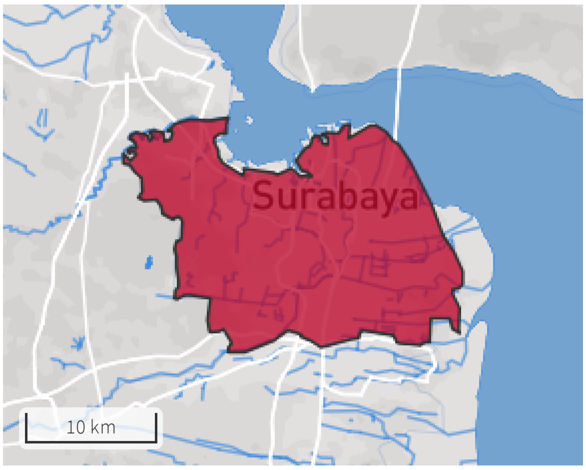
Indonesia , Jawa Timur

Wildfire

Hazard level: ***High***

In the area you have selected (Kota Surabaya) the wildfire hazard is classified as **high** according to the information that is currently available to this tool. This means that there is greater than a 50% chance of encountering weather that could support a significant wildfire that is likely to result in both life and property loss in any given year. Based on this information, the impact of wildfire **must be considered** in all phases of the project, in particular during design and construction. **Project planning decisions, project design, construction and emergency response planning methods should take into account the high level of wildfire hazard.** Note that damage can not only occur due to direct flame and radiation exposure but may also include ember storm and low level surface fire. In extreme fire weather events, strong winds and wind born debris may weaken the integrity of infrastructure. It would be prudent to consider this effect in the design and construction phase of the project. Further detailed information specific to the location and planned project should be obtained to adequately understand the level of hazard.

Climate change impacts: Modeled projections of future climate identify a likely increase in the frequency of fire weather occurrence in this region, including an increase in temperature and greater variance in rainfall. In areas already affected by wildfire hazard, the fire season is likely to increase in duration, and include a greater number of days with weather that could support fire spread because of longer periods without rain during fire seasons. Climate projections indicate that there could also be an increase in the severity of fire. It would be prudent to design projects in this area to be robust to increases in the severity and frequency of wildfire hazard. Areas of very low or low wildfire hazard could see an increase in hazard, as climate projections indicate an expansion of the wildfire hazard zone. Consider local studies on the impacts of climate change on wildfire trends, before deciding whether to design projects to withstand fire of greater intensity than those previously experienced in this region.



High Medium Low Very low

Data source: World Bank

Further resources

- Climate risk management in Indonesia
- Country Adaptation Profile: Indonesia
- Turn Down the Heat : Climate Extremes, Regional Impacts, and the Case for Resilience
- Building Urban Resilience - Principles, Tools, and Practice
- Shock Waves : Managing the Impacts of Climate Change on Poverty

▶ Turn Down the Heat : Why a 4 Degree Centrigrade Warmer World Must be Avoided

Kota Surabaya

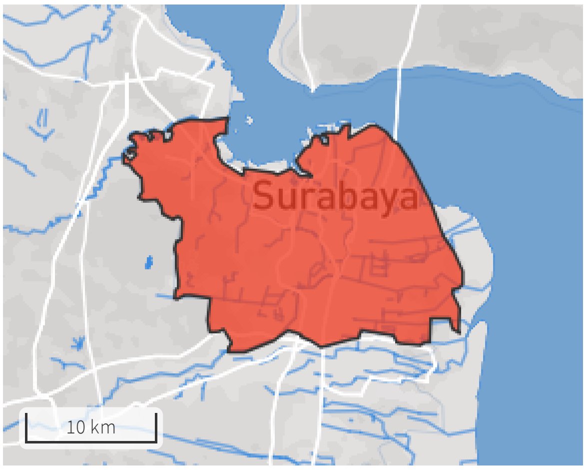
Indonesia , Jawa Timur

Extreme heat

Hazard level: ***Medium***

In the area you have selected (Kota Surabaya) extreme heat hazard is classified as **medium** based on modeled heat information currently available to this tool. This means that there is more than a 25% chance that at least one period of prolonged exposure to extreme heat, resulting in heat stress, will occur in the next five years. **Project planning decisions, project design, and construction methods should take into account the level of extreme hazard**. The following is a list of recommendations that could be followed in different phases of the project to help reduce the risk to your project. Please note that these recommendations are generic and not project-specific.

According to the most recent assessment report of the Intergovernmental panel on Climate Change (IPCC, 2013), continued emissions of greenhouse gases will cause further warming, and it is virtually certain that there will be more frequent hot temperature extremes over most land areas during the next fifty years. Warming will not be regionally uniform. In the area you have selected, the temperature increase in the next fifty years will be much lower than the worldwide average, but still significant. It would be prudent to design projects in this area to be robust to global warming in the long-term.



High Medium Low Very low

Data source: World Bank

Further resources

- Climate risk management in Indonesia
- Country Adaptation Profile: Indonesia
- Turn Down the Heat : Climate Extremes, Regional Impacts, and the Case for Resilience
- Heatwaves and Health: Guidance on Warning-System Development
- Shock Waves : Managing the Impacts of Climate Change on Poverty
- Turn Down the Heat : Why a 4 Degree Centrigrade Warmer World Must be Avoided
- Building Urban Resilience - Principles, Tools, and Practice
- Excessive Heat Events Guidebook

Kota Surabaya

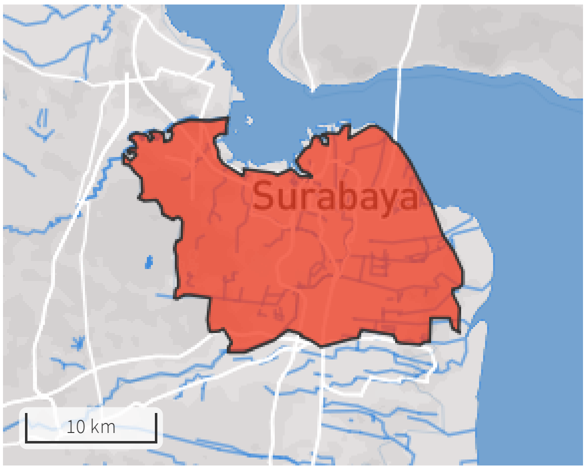
Indonesia , Jawa Timur

Water scarcity

Hazard level: ***Medium***

In the area you have selected (Kota Surabaya) water scarcity is classified as **medium** according to the information that is currently available to this tool. This means that there is up to a 20% chance droughts will occur in the coming 10 years. Based on this information, the impact of drought **must be considered** in all phases of the project, in particular its effect on personnel and stakeholders, and during the design of buildings and infrastructure. **Project planning decisions, project design, and construction methods should take into account the level of drought hazard**. Further detailed information should be obtained to adequately account for the level of hazard.

Climate change impact: Model projections are inconsistent in their estimates of change in drought hazard, which influences water scarcity. The present hazard level may increase in the future due to the effects of climate change. It would be prudent to design projects in this area to be robust to increased drought hazard and water scarcity in the long-term.



High Medium Low Very low

Data source: IVM / VU University Amsterdam

Further resources

- Country Adaptation Profile: Indonesia
- Indonesia: Advancing a National Disaster Risk Financing Strategy – Options for Consideration
- National Agency for Disaster Management (BNPB) disaster loss and damage database
- Climate risk management in Indonesia
- Turn Down the Heat : Climate Extremes, Regional Impacts, and the Case for Resilience
- Overview of Natural Disasters and their Impacts in Asia and the Pacific 1970 - 2014
- Global Assessment Report on Disaster Risk Reduction: Country Profiles
- Guidance on Safe School Construction
- INFORM: Index for Risk Management
- National Drought Management Policy Guidelines: A Template for Action
- Shock Waves : Managing the Impacts of Climate Change on Poverty
- Towards Safer School Construction

- Turn Down the Heat : Why a 4 Degree Centrigrade Warmer World Must be Avoided
- Understanding Risk in an Evolving World - Emerging Best Practices in Natural Disaster Risk Assessment
- Building Urban Resilience - Principles, Tools, and Practice
- Climate Change Knowledge Portal
- Defining disaster resilience: a DFID approach paper
- Drought Risk Reduction: Framework and Practices
- EMDAT: Country Profile on Historical Disaster Events

Kota Surabaya

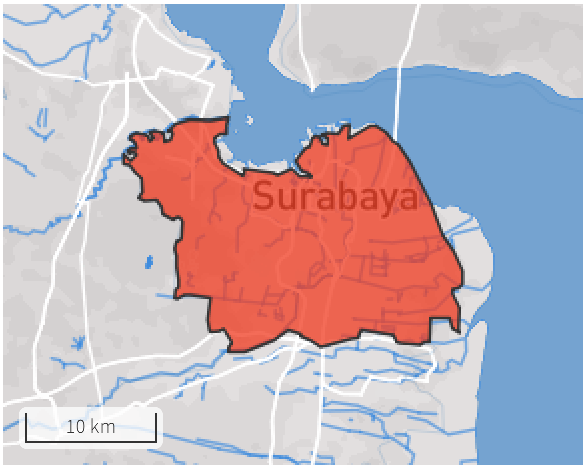
Indonesia , Jawa Timur

Tsunami

Hazard level: ***Medium***

In the area you have selected (Kota Surabaya) tsunami hazard is classified as **medium** according to the information that is currently available. This means that there is more than a 10% chance of a potentially-damaging tsunami occurring in the next 50 years. Based on this information, the impact of tsunami **should be** considered in different phases of the project for any activities located near the coast. **Project planning decisions, project design, and construction methods should take into account the level tsunami hazard**. Further detailed information should be obtained to adequately account for the level of hazard.

Climate change impact: The areas at risk of tsunami will increase as global mean sea level rises. According to the IPCC (2013), global mean sea level rise depends on a variety of factors, and estimates for 2100 range from ~20 cm to nearly 1 m. However, regional changes in sea level are difficult to predict. Projects in low-lying coastal areas such as deltas, or in island states should be designed to be robust to projected increases in global sea level.



High Medium Low Very low

Data source: GFDRR

Further resources

- National Agency for Disaster Management (BNPB) disaster loss and damage database
- The Impact of the Conflict, the Tsunami and Reconstruction on Poverty in Aceh
- Indonesia: Advancing a National Disaster Risk Financing Strategy – Options for Consideration
- The Indian Ocean Tsunami of 26 December 2004
- A Probabilistic Tsunami Hazard Assessment of the Indian Ocean Nations
- The Indian Ocean Tsunami of 26 December 2004
- Overview of Natural Disasters and their Impacts in Asia and the Pacific 1970 - 2014
- Learning from Megadisasters: Lessons from the Great Japan Earthquake
- Preparing your community for tsunamis
- Towards Safer School Construction
- Tsunami Runup Database

- Understanding Risk in an Evolving World - Emerging Best Practices in Natural Disaster Risk Assessment
- Defining disaster resilience: a DFID approach paper
- EMDAT: Country Profile on Historical Disaster Events
- Global Assessment Report on Disaster Risk Reduction: Country Profiles
- Guidance on Safe School Construction
- INFORM: Index for Risk Management
- Learning from Megadisasters: Lessons from the Great Japan Earthquake

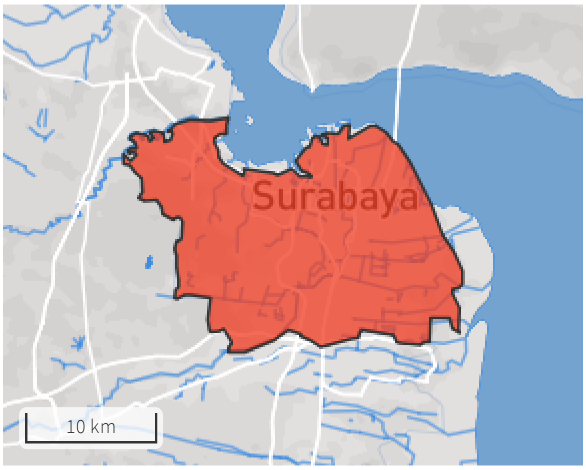
Kota Surabaya

Indonesia , Jawa Timur

Earthquake

Hazard level: ***Medium***

In the area you have selected (Kota Surabaya) earthquake hazard is classified as **medium** according to the information that is currently available. This means that there is a 10% chance of potentially-damaging earthquake shaking in your project area in the next 50 years. Based on this information, the impact of earthquake **should be considered** in all phases of the project, in particular during design and construction. **Project planning decisions, project design, and construction methods should take into account the level of earthquake hazard**. Further detailed information should be obtained to adequately account for the level of hazard.



High Medium Low Very low

Data source: World Bank

Further resources

- The Padang, Sumatra - Indonesia earthquake of 30 September 2009
- Indonesia: Advancing a National Disaster Risk Financing Strategy – Options for Consideration
- National Agency for Disaster Management (BNPB) disaster loss and damage database
- Overview of Natural Disasters and their Impacts in Asia and the Pacific 1970 - 2014
- Building Urban Resilience - Principles, Tools, and Practice
- Defining disaster resilience: a DFID approach paper
- EMDAT: Country Profile on Historical Disaster Events
- Global Assessment Report on Disaster Risk Reduction: Country Profiles
- Global Earthquake Model - GEM Foundation
- Global Risk Patterns and Trends in Global Assessment Report
- Guidance on Safe School Construction
- INFORM: Index for Risk Management
- Reducing Earthquake Risk in Hospitals
- Temblor

- Towards Safer School Construction
- Understanding Risk in an Evolving World - Emerging Best Practices in Natural Disaster Risk Assessment
- Comprehensive Safe Hospital Framework
- E-learning course: Understanding Risk (World Bank)
- Hospital Safety Index Guide

Kota Surabaya

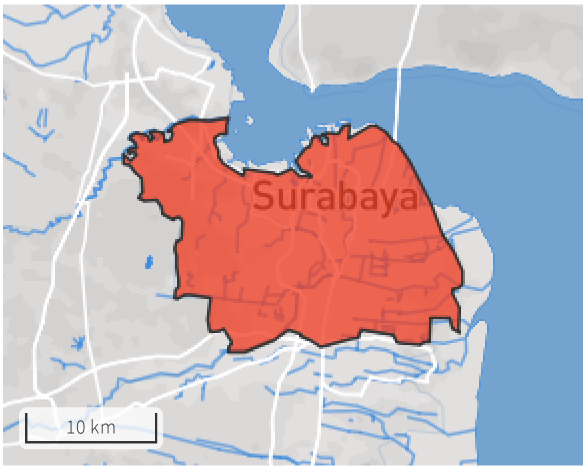
Indonesia , Jawa Timur

River flood

Hazard level: ***Medium***

In the area you have selected (Kota Surabaya) river flood hazard is classified as **medium** based on modeled flood information currently available to this tool. This means that there is a chance of more than 20% that potentially damaging and life-threatening river floods occur in the coming 10 years. **Project planning decisions, project design, and construction methods must take into account the level of river flood hazard**. Surface flood hazard in urban and rural areas is not included in this hazard classification, and may also be possible in this location. Please see 'Urban Flood' for consideration of urban surface and river flooding.The following is a list of recommendations that could be followed in different phases of the project to help reduce the risk to your project. Please note that these recommendations are generic and not project-specific.

Climate change impacts: Medium confidence in more frequent and intense heavy precipitation days and an increase in the number of extreme rainfall events. The present hazard level may increase in the future due to the effects of climate change. It would be prudent to design projects in this area to be robust to river flood hazard in the long-term.



High Medium Low Very low

Data source: GFDRR

Further resources

- Climate risk management in Indonesia
- National Agency for Disaster Management (BNPB) disaster loss and damage database
- Country Adaptation Profile: Indonesia
- Indonesia: Advancing a National Disaster Risk Financing Strategy – Options for Consideration
- Turn Down the Heat : Climate Extremes, Regional Impacts, and the Case for Resilience
- Overview of Natural Disasters and their Impacts in Asia and the Pacific 1970 - 2014
- Analysis and evaluation of Flood risk management practice in selected megacities
- FLOPROS: A global database of Flood Protection Standards
- Global Assessment Report on Disaster Risk Reduction: Country Profiles
- Global Risk Patterns and Trends in Global Assessment Report

- Guidance on Safe School Construction
- INFORM: Index for Risk Management
- Shock Waves : Managing the Impacts of Climate Change on Poverty
- Towards Safer School Construction
- Turn Down the Heat : Why a 4 Degree Centrigrade Warmer World Must be Avoided
- Understanding Risk in an Evolving World - Emerging Best Practices in Natural Disaster Risk Assessment
- Understanding the Economics of Flood Risk Reduction
- Weather and Climate Resilience: Effective Preparedness through National Meteorological and Hydrological Services
- Weather and Climate Resilience: Effective Preparedness through National Meteorological and Hydrological Services
- Cities and Flooding: A Guide to Integrated Urban Flood Risk Management for the 21st Century
- Building Urban Resilience - Principles, Tools, and Practice
- Cities and Flooding: A Guide to Integrated Urban Flood Risk Management for the 21st Century
- Climate Change Knowledge Portal
- Defining disaster resilience: a DFID approach paper
- EMDAT: Country Profile on Historical Disaster Events

Kota Surabaya

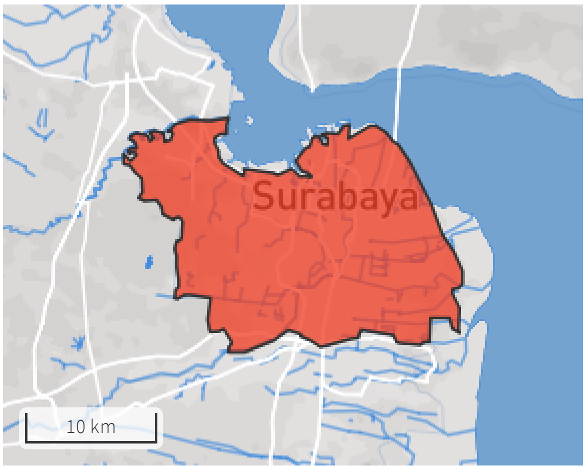
Indonesia , Jawa Timur

Urban flood

Hazard level: ***Medium***

In the area you have selected (Kota Surabaya) urban flood hazard is classified as **medium** based on modeled flood information currently available to this tool. This means that there is a chance of more than 20% that potentially damaging and life-threatening urban floods occur in the coming 10 years. **Project planning decisions, project design, and construction methods must take into account the level of urban flood hazard**. The following is a list of recommendations that could be followed in different phases of the project to help reduce the risk to your project. Please note that these recommendations are generic and not project-specific.

Climate change impacts: Medium confidence in more frequent and intense heavy precipitation days and an increase in the number of extreme rainfall events. The present hazard level may increase in the future due to the effects of climate change. It would be prudent to design projects in this area to be robust to river flood hazard in the long-term.



© Mapbox © OpenStreetMap

High Medium Low Very low

Data source: Fathom Global

Further resources

- Climate risk management in Indonesia
- Country Adaptation Profile: Indonesia
- Turn Down the Heat : Climate Extremes, Regional Impacts, and the Case for Resilience
- Turn Down the Heat : Why a 4 Degree Centrigrade Warmer World Must be Avoided
- Building Urban Resilience - Principles, Tools, and Practice
- FLOPROS: A global database of Flood Protection Standards
- Shock Waves : Managing the Impacts of Climate Change on Poverty

Kota Surabaya

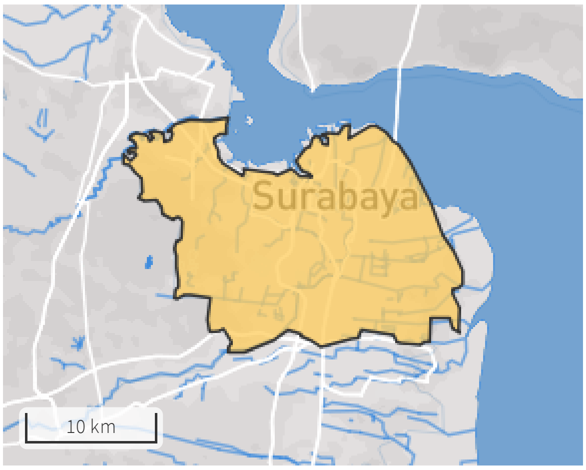
Indonesia , Jawa Timur

Landslide

*Hazard level: **Very low***

In the area you have selected landslide susceptibility is classified as very low according to the information that is currently available. This means that this area has rainfall patterns, terrain slope, geology, soil, land cover and (potentially) earthquakes that make localized landslides a rare hazard phenomenon. Based on this information, planning decisions such as project siting, project design, and construction methods, may want to consider the potential for landslides. Further detailed information should be obtained to better understand the level of landslide susceptibility in your project area.

Climate change impact: Climate change is likely to alter slope and bedrock stability through changes in precipitation and/or temperature. It is difficult to determine future locations and timing of large rock avalanches, as these depend on local geological conditions and other non-climatic factors.



High Medium Low Very low

Data source: GFDRR

Further resources

- Climate risk management in Indonesia
- Country Adaptation Profile: Indonesia
- Indonesia: Advancing a National Disaster Risk Financing Strategy – Options for Consideration
- National Agency for Disaster Management (BNPB) disaster loss and damage database
- Turn Down the Heat : Climate Extremes, Regional Impacts, and the Case for Resilience
- Overview of Natural Disasters and their Impacts in Asia and the Pacific 1970 - 2014
- Global Assessment Report on Disaster Risk Reduction: Country Profiles
- Global Risk Patterns and Trends in Global Assessment Report
- Guidance on Safe School Construction
- Shock Waves : Managing the Impacts of Climate Change on Poverty
- Towards Safer School Construction
- Turn Down the Heat : Why a 4 Degree Centrigrade Warmer World Must be Avoided

- Understanding Risk in an Evolving World - Emerging Best Practices in Natural Disaster Risk Assessment
- Building Urban Resilience - Principles, Tools, and Practice
- Climate Change Knowledge Portal
- Community Based Landslide Risk Reduction
- Defining disaster resilience: a DFID approach paper
- EMDAT: Country Profile on Historical Disaster Events