THE INTEGRATION OF GEOINFORMATION TECHNOLOGIES IN CIVIL ENIGNEERING : FROM CLOUD TO COAST

Presented for:
Simposium Maklumat Geospatial Kebangsaan ke 6: Fostering the Potential of Geospatial Technology in Facing National Challenges
18 March 2014

Presented by:

Dato' Ir. Dr. Nik Mohd Kamel bin Nik Hassan
Ir. Hjh. Mazura Nor binti Zulkifli
Dr. Nik & Associates Sdn. Bhd.

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INTRODUCTION

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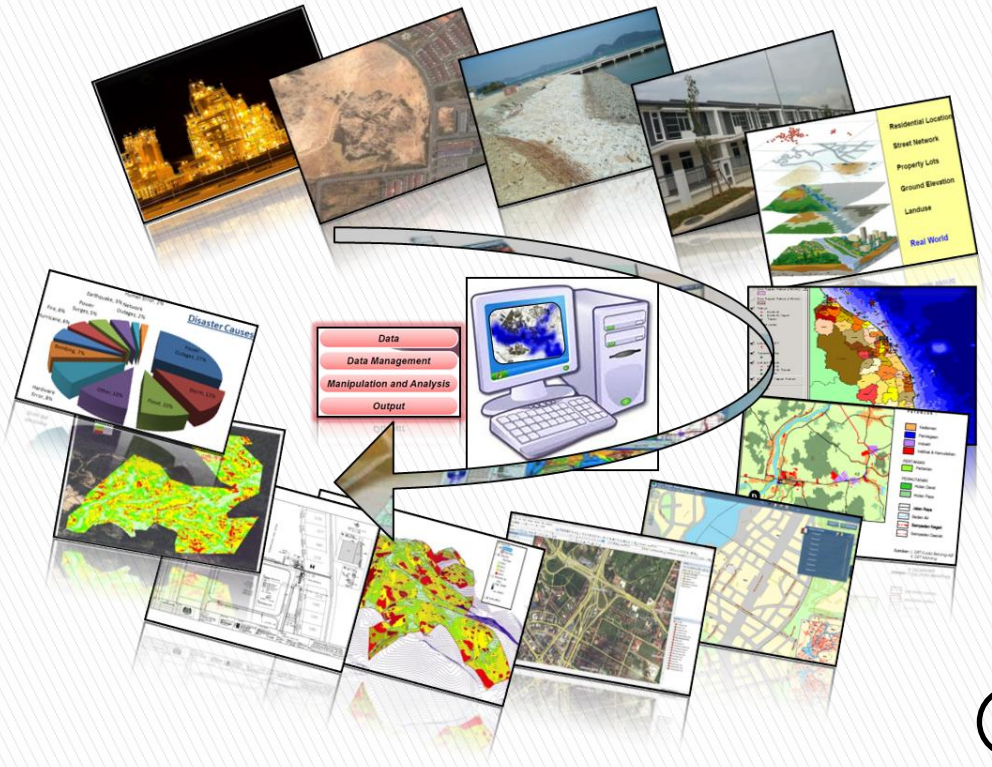
FOCUS

- To present in a macro scale regarding the integrated approach using Geospatial Technologies for multi-disciplines of Civil Engineering



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CIVIL ENGINEERING

- Civil engineering comprises of the design, construction, and maintenance of the physical and natural-built environments for;
  - Hydrology
  - Water resources
  - Geotechnical
  - Structural
  - Transportation
  - Environmental
  - Coastal

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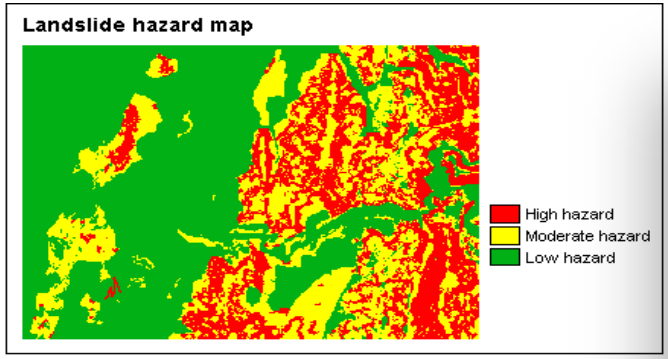
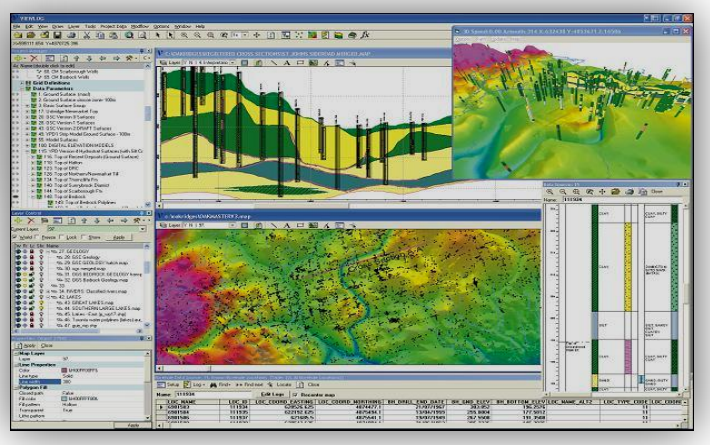
WHY ENGINEERING NEEDS GIS

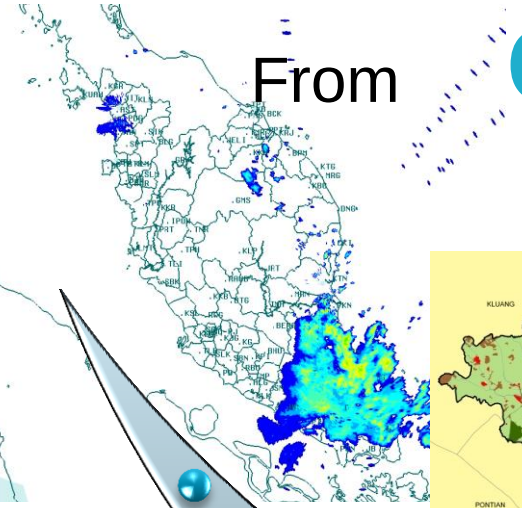
- To integrate engineering desktop analysis and fieldwork with geographical information technology in enhancing productivity and optimize performance with GIS analysis and visualization.

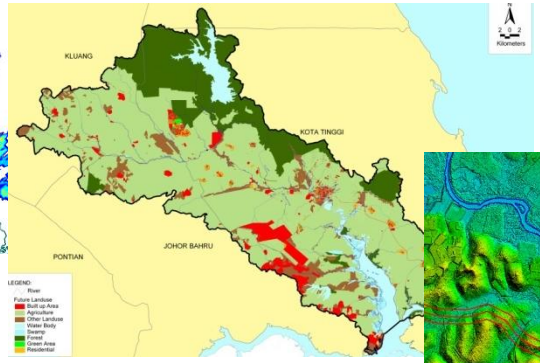


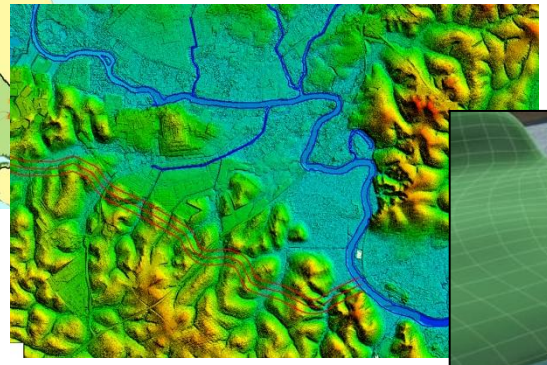


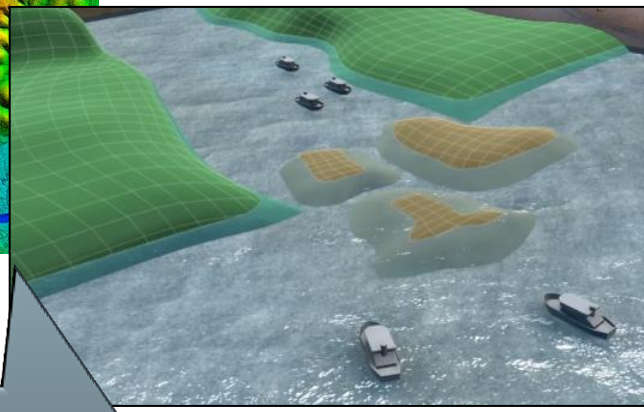
GIS IN CIVIL ENGINEERING

From **CLOUD** to **COAST**









Hydrology and Water Resources

Geotechnical Engineering

Structural and Transport Engineering

Environmental Science

Coastal Engineering

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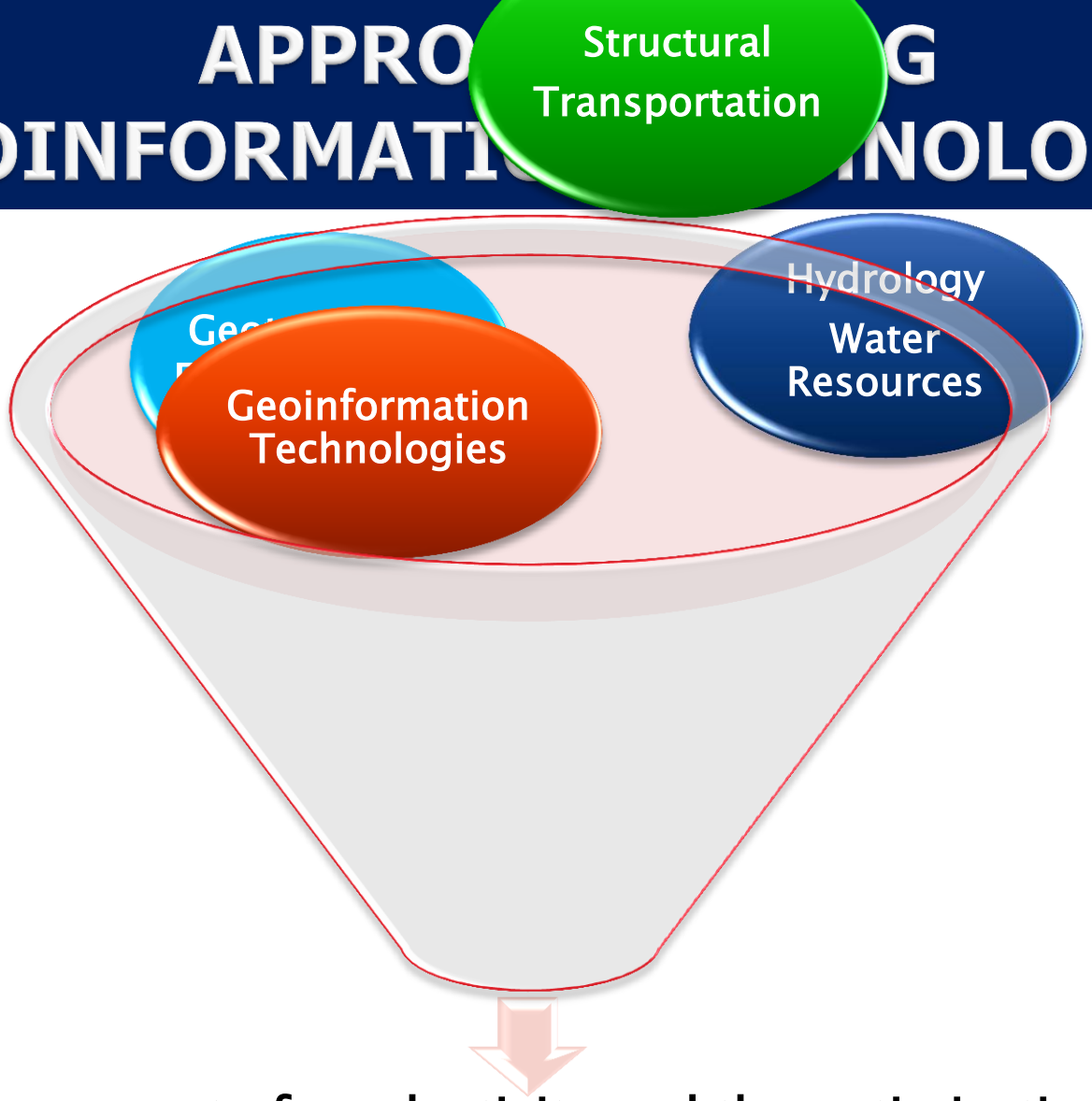
APPRO G GEOINFORMATI NOLOGIES



Enhancement of productivity and the optimisation of performance in Civil Engineering practices, planning and management

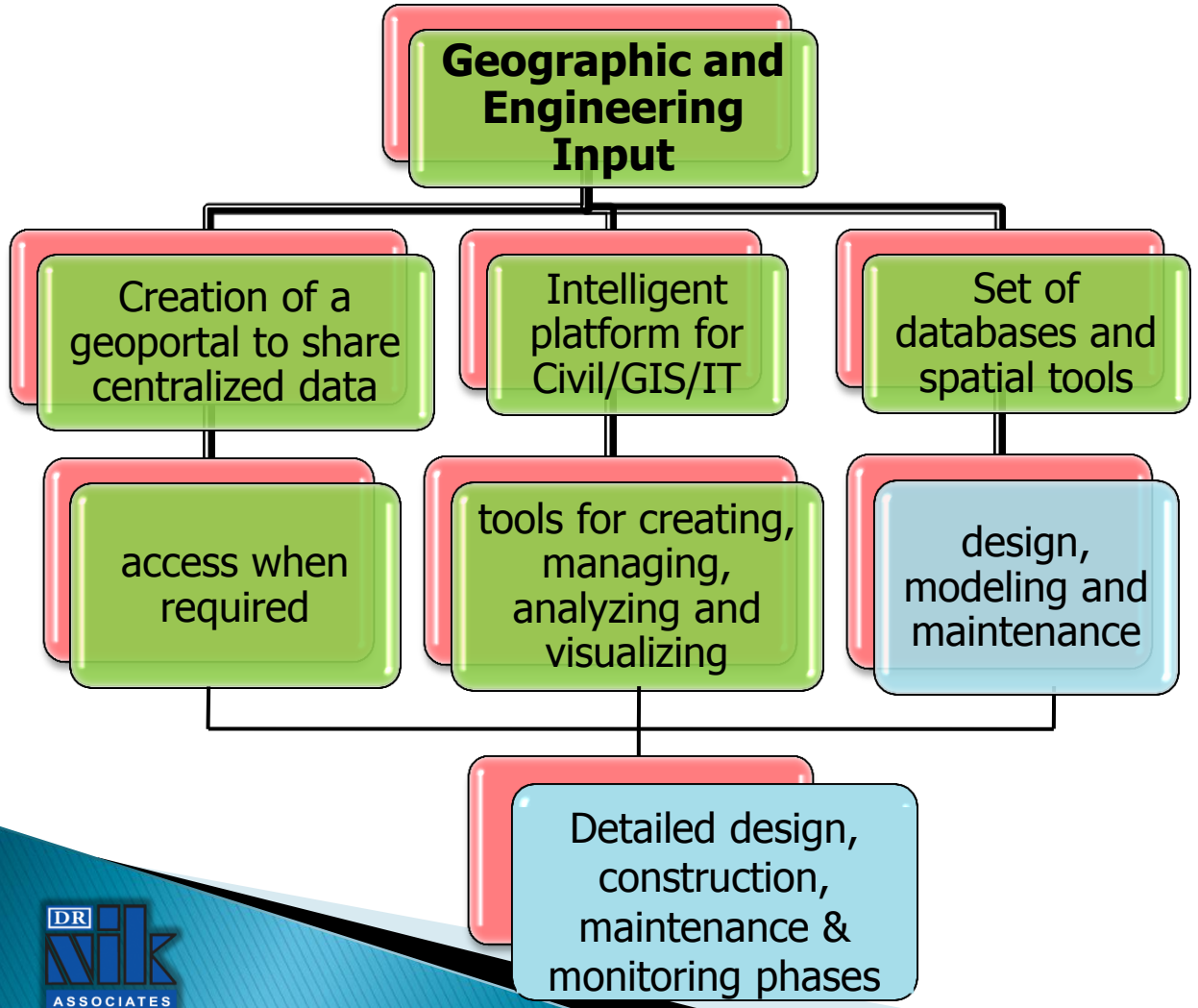
BETTER APPROACH WITH GEOSPATIAL TECHNOLOGIES

The application of advanced functions of GIS in replacing manual methods in planning, developing and managing the Civil Engineering project

1. To provide a holistic approach and methodology in addressing assorted scientific and issues to be studied
2. To provide a better platform for planning and management

BETTER APPROACH WITH GEOSPATIAL TECHNOLOGIES

Adding Value to Engineering



Efficient Planning and Management

- **Overall picture**
- **Integrated**
- **Less conflict**
- **Accuracy**

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CHALLENGES AND OPPORTUNITIES

There are many factors that will affect the direction of GIS application in Civil Engineering for the coming years in Malaysia

The factors can generally be classified as

i. Global challenges, Global opportunities,

ii. National challenges, National opportunities,

iii. Professional challenges, Professional opportunities.

Advanced Integrated Support System

Data Accuracy

New Technologies

Rapid Urbanization

Integrated decision-making tools

Environmental Friendly Approach

Climate Variability and Change

Awareness

Collaborative management

Linking Technologies

3-D Modelling

Securing Livelihoods

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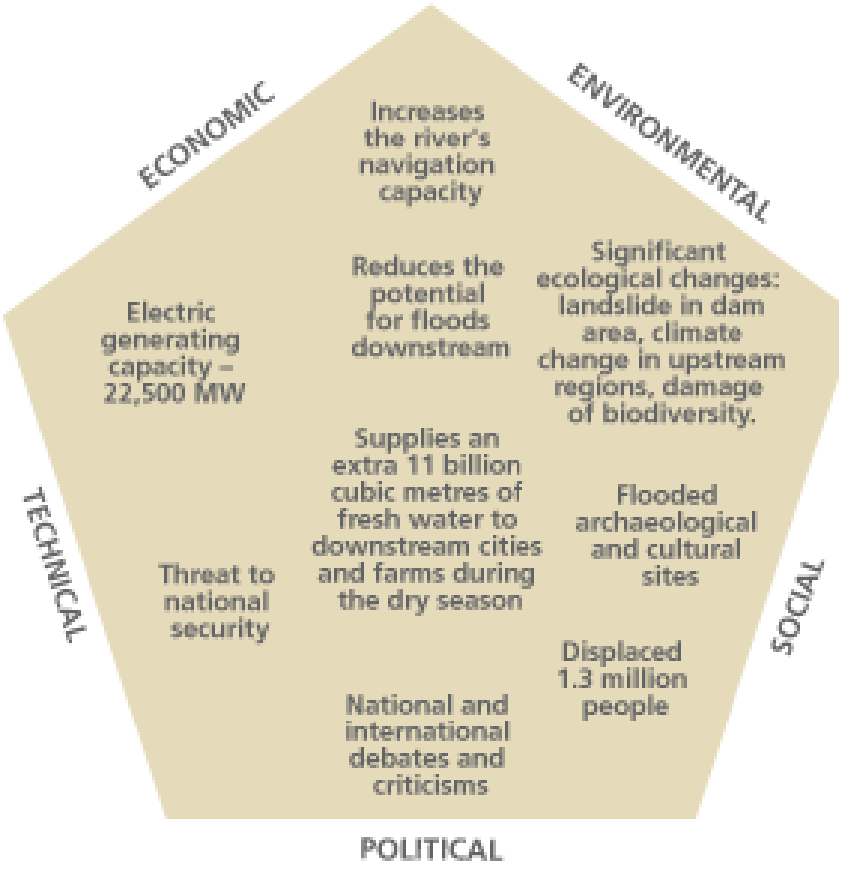
BETTER DECISION MAKING WITH GEOSPATIAL TECHNOLOGIES

Support decision making regarding the influences and implications due to implementation of a project

i. Technical
ii. Economic
iii. Environmental
iv. Social
v. Politics



Example: Hydropower project

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AREA OF GIS APPLICATION FOR CIVIL ENGINEERING

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BETTER PROJECT MANAGEMENT WITH GEOSPATIAL TECHNOLOGIES

To improve project management and implementation, a decision support system need to capitalize on the latest advances of

i. Unmanned Areal Vehicle (UAV)
ii. Remote Sensing
iii. Geographic Information Systems
iv. GIS-based Engineering Software
v. Information Technology
vi. Decision Theory.

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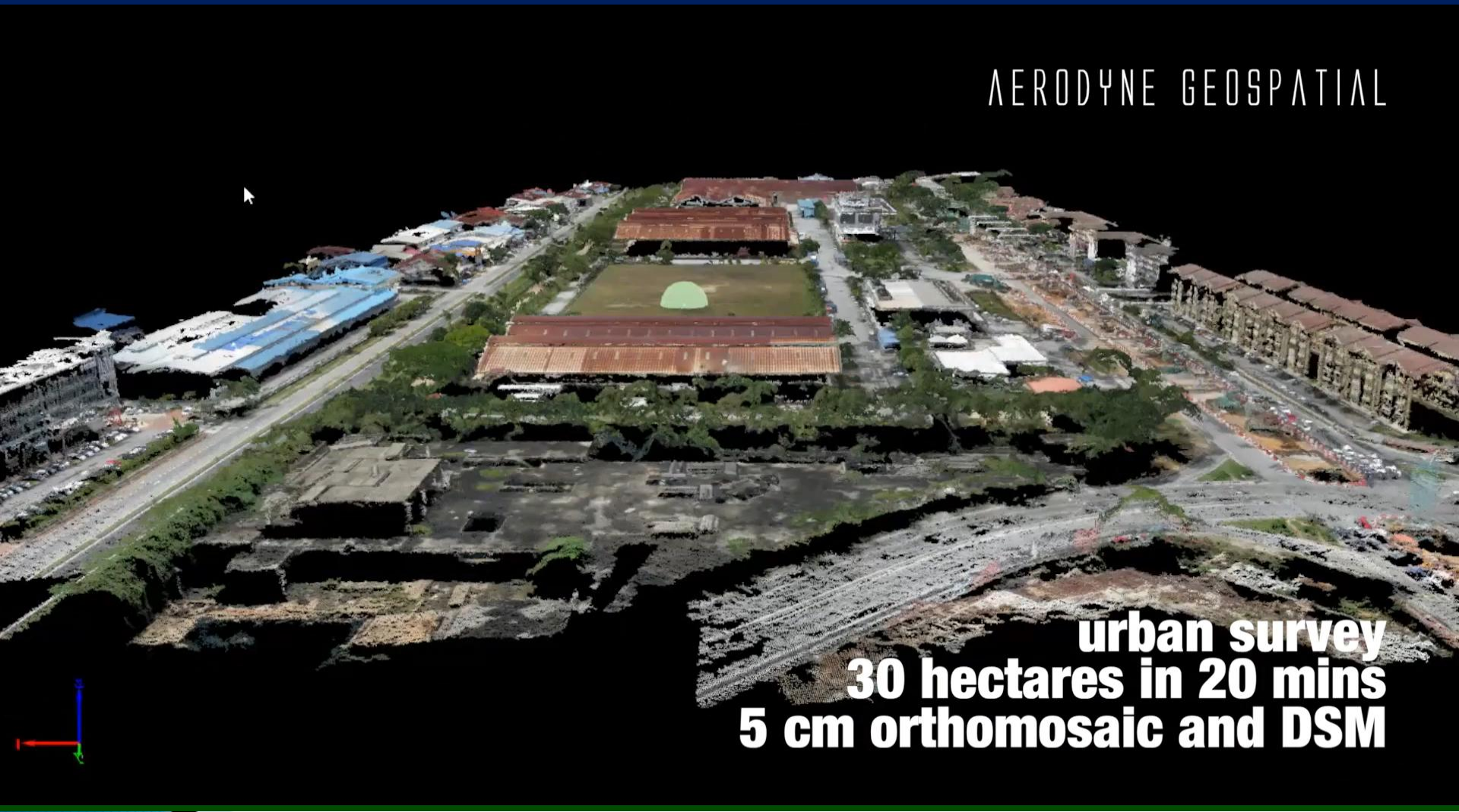
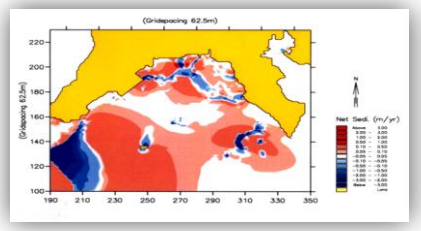
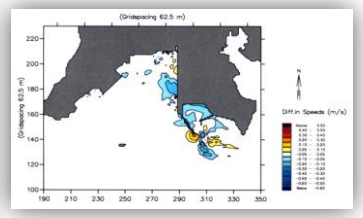
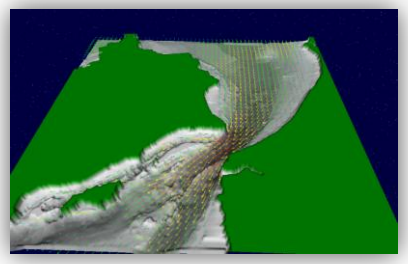
GEOSPATIAL DATA TECHNOLOGIES

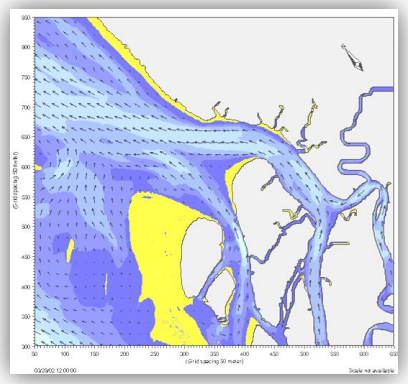


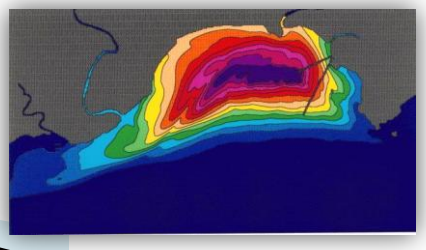
GIS-BASED ENGINEERING MODEL



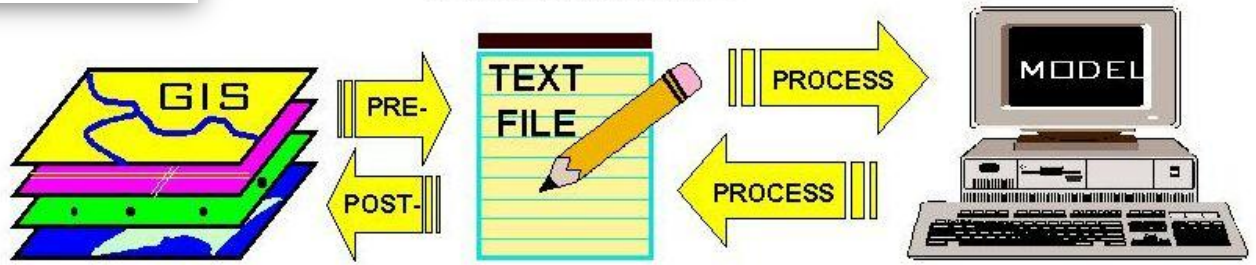




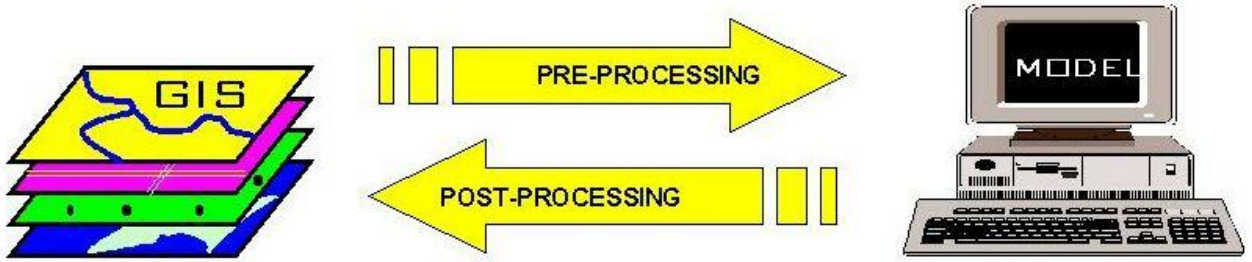




1. INTERCHANGE



2. INTERFACE



3. INTEGRATION

Source: ESRI

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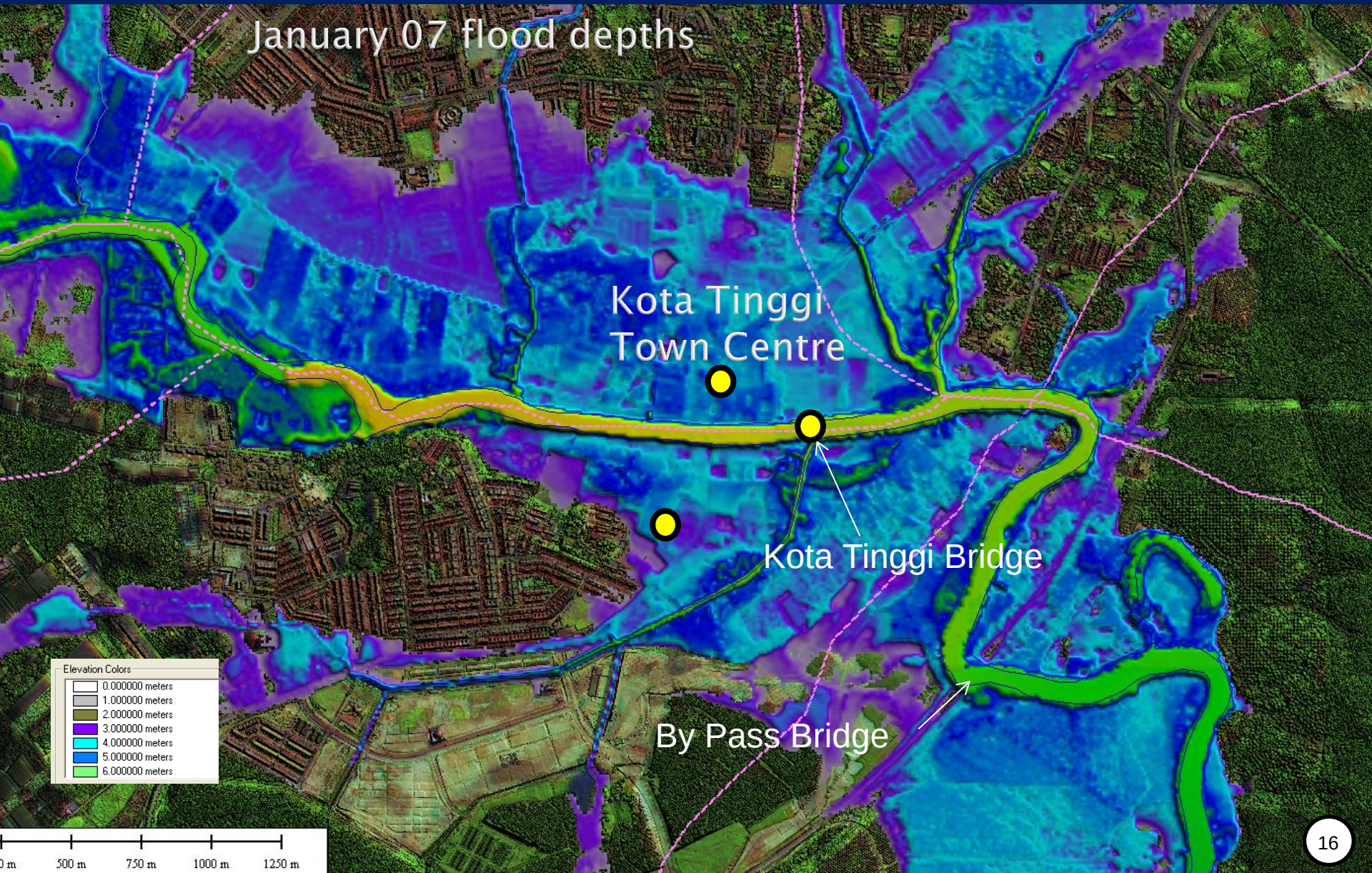
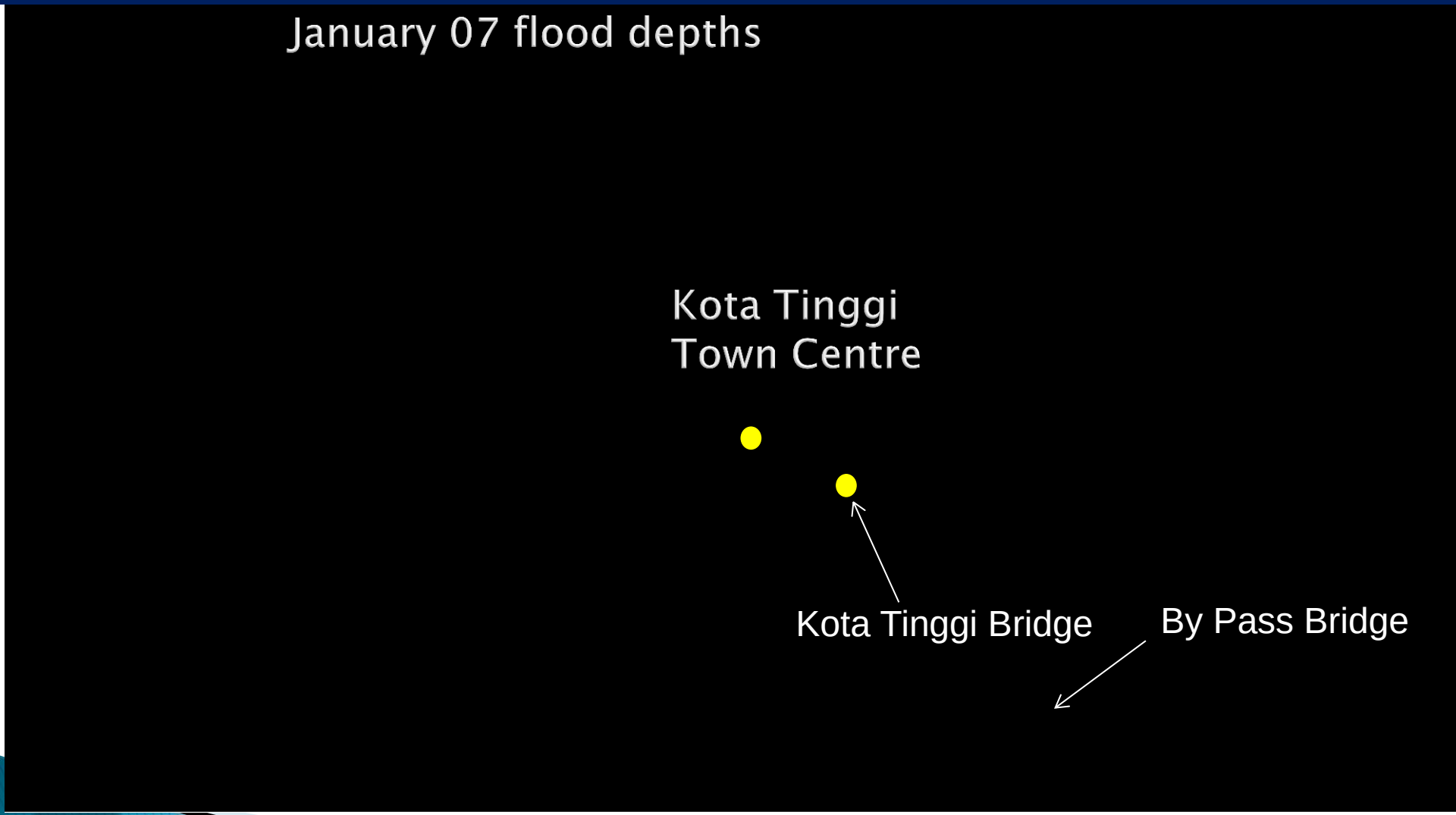
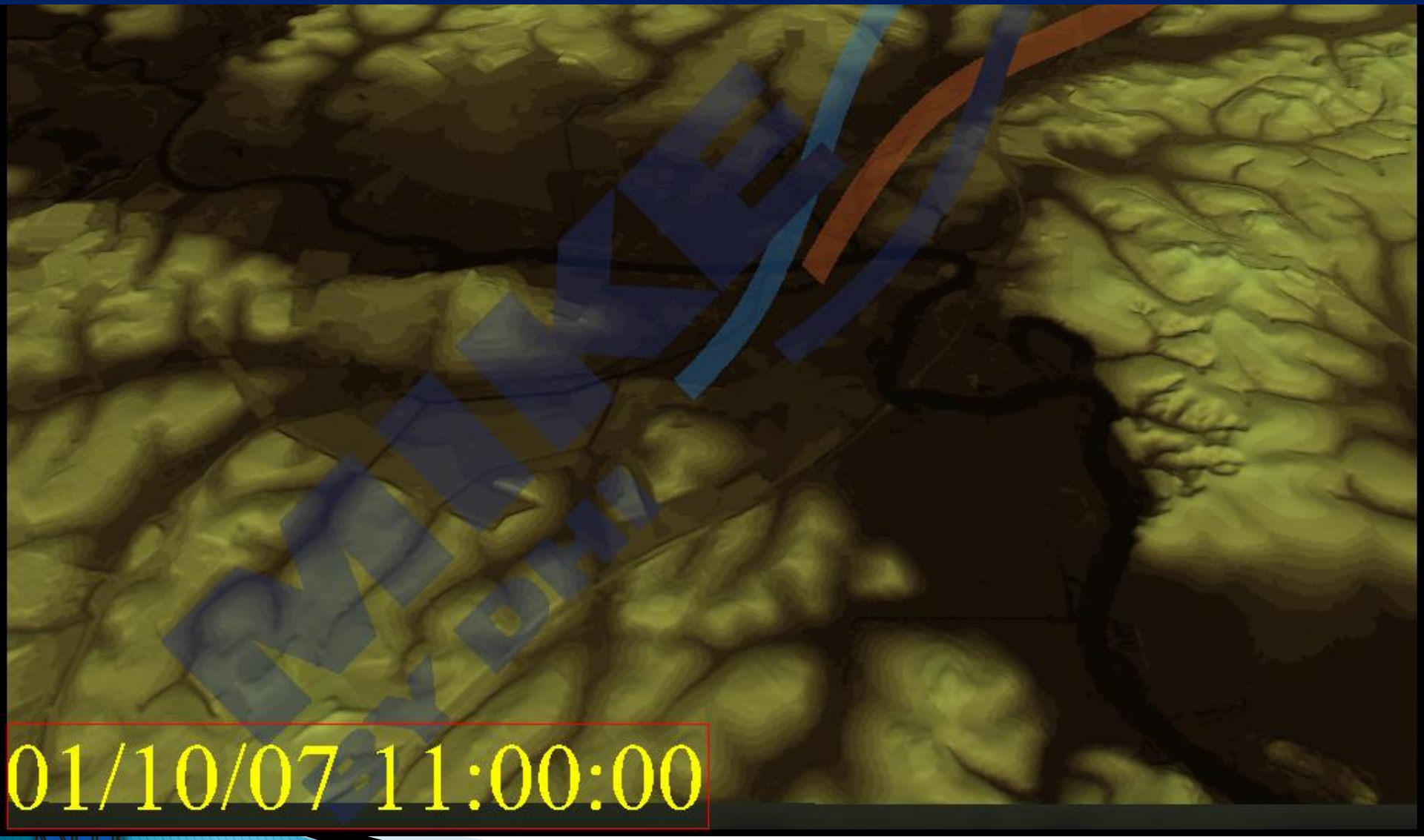
RIVER FLOOD MODELLING IN 2D VIEW



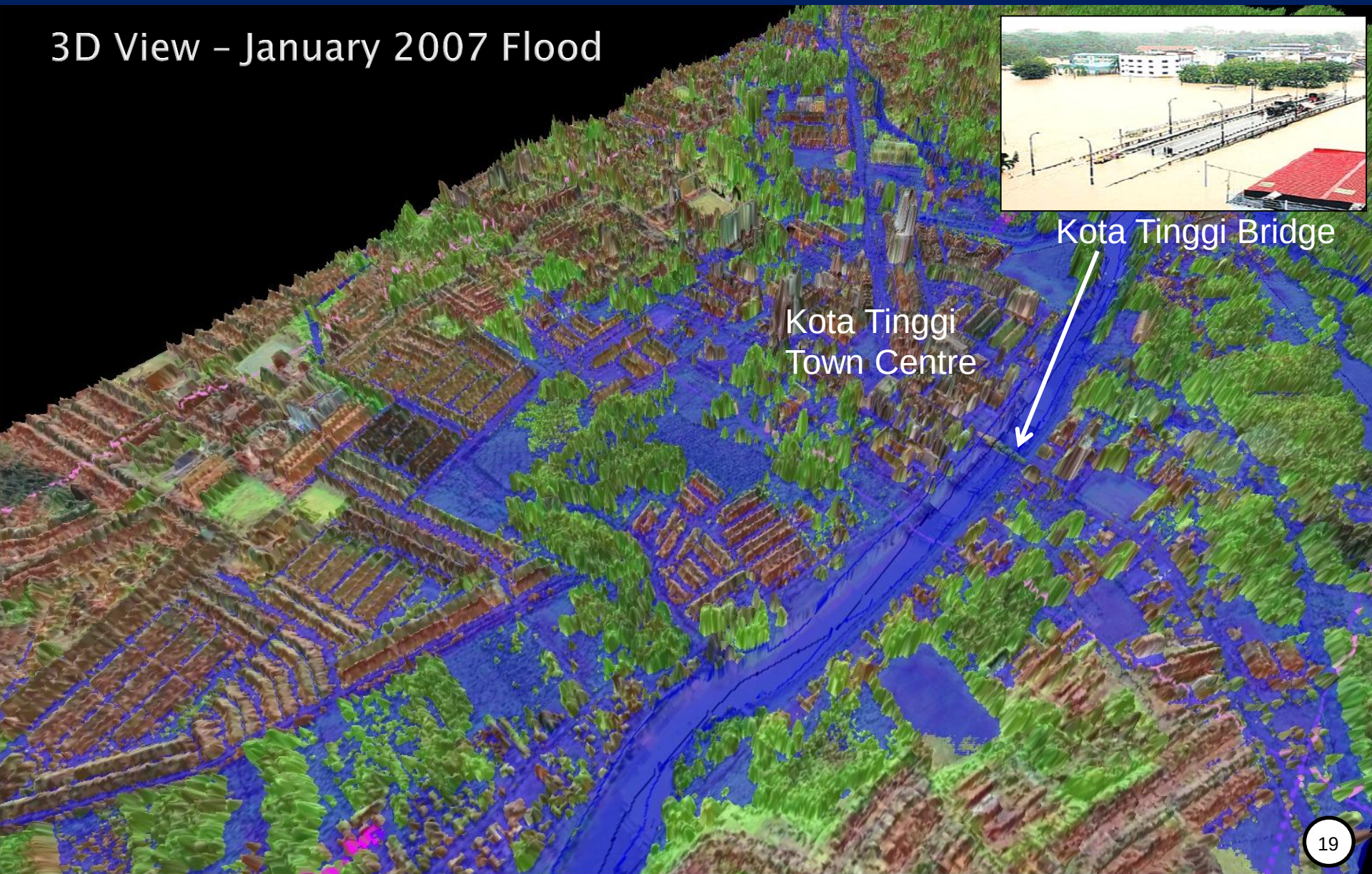
RIVER FLOOD MODELLING IN 2D VIEW



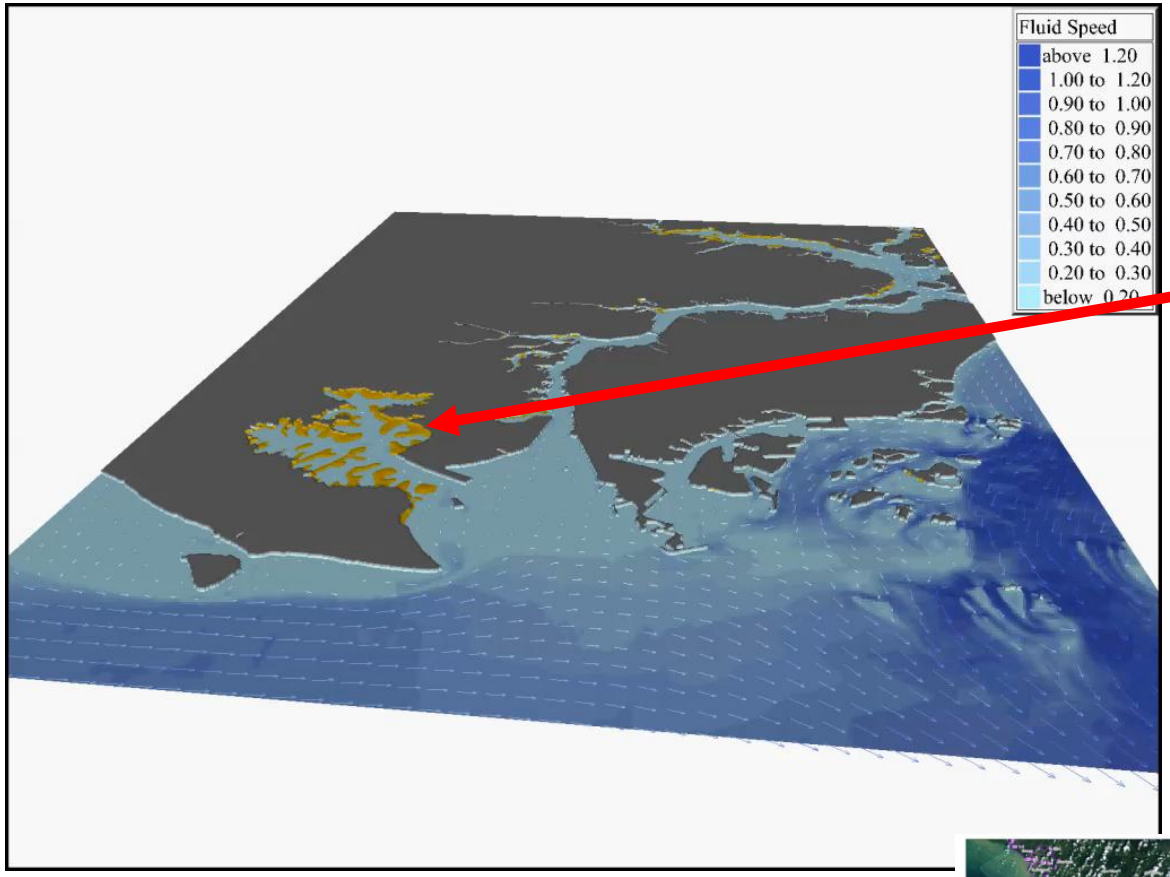
RIVER FLOOD MODELLING IN 3D VIEW

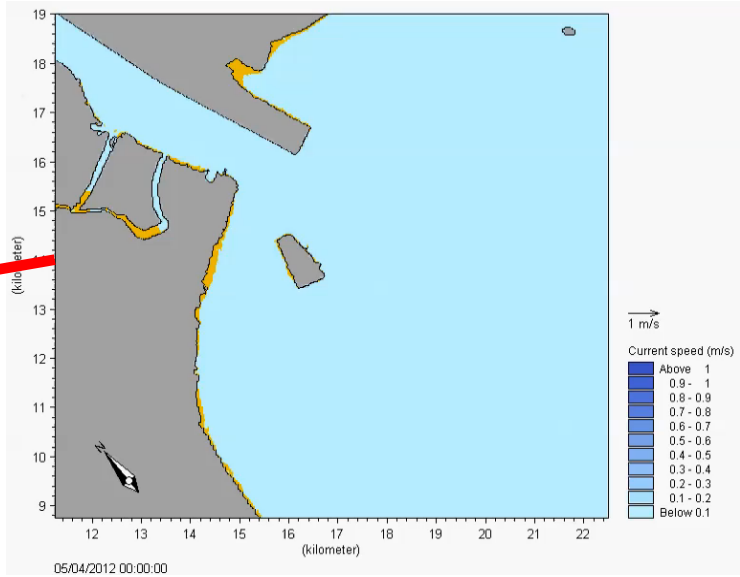


RIVER FLOOD MODELLING IN 3D VIEW

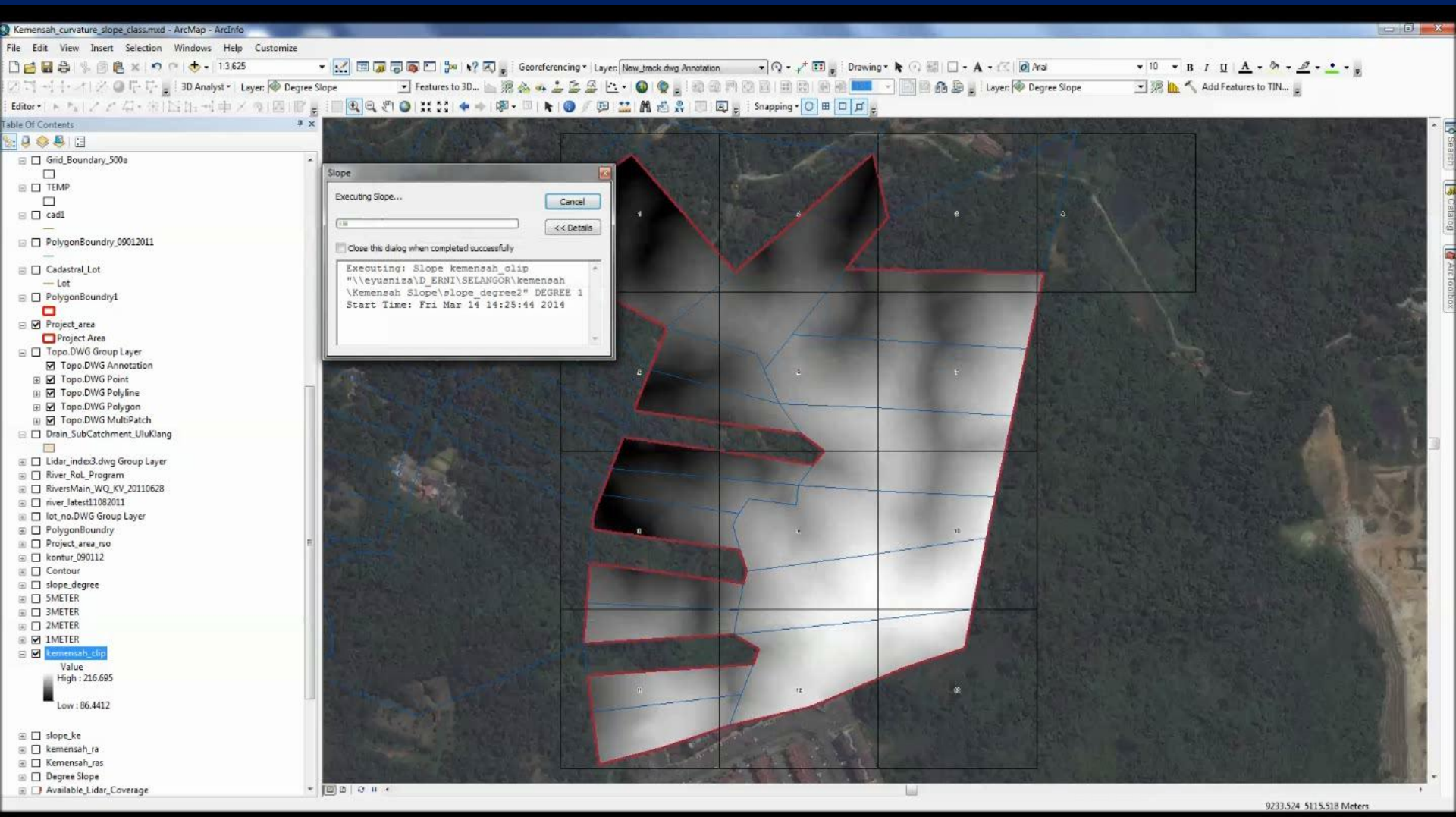


COASTAL FLOOD MODELLING IN 2D VIEW





GEOTECHNICAL ANALYSIS IN 2D/3D VIEW



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GEOINFORMATION TECHNOLOGIES TO SUPPORT COLLABORATIVE MANAGEMENT

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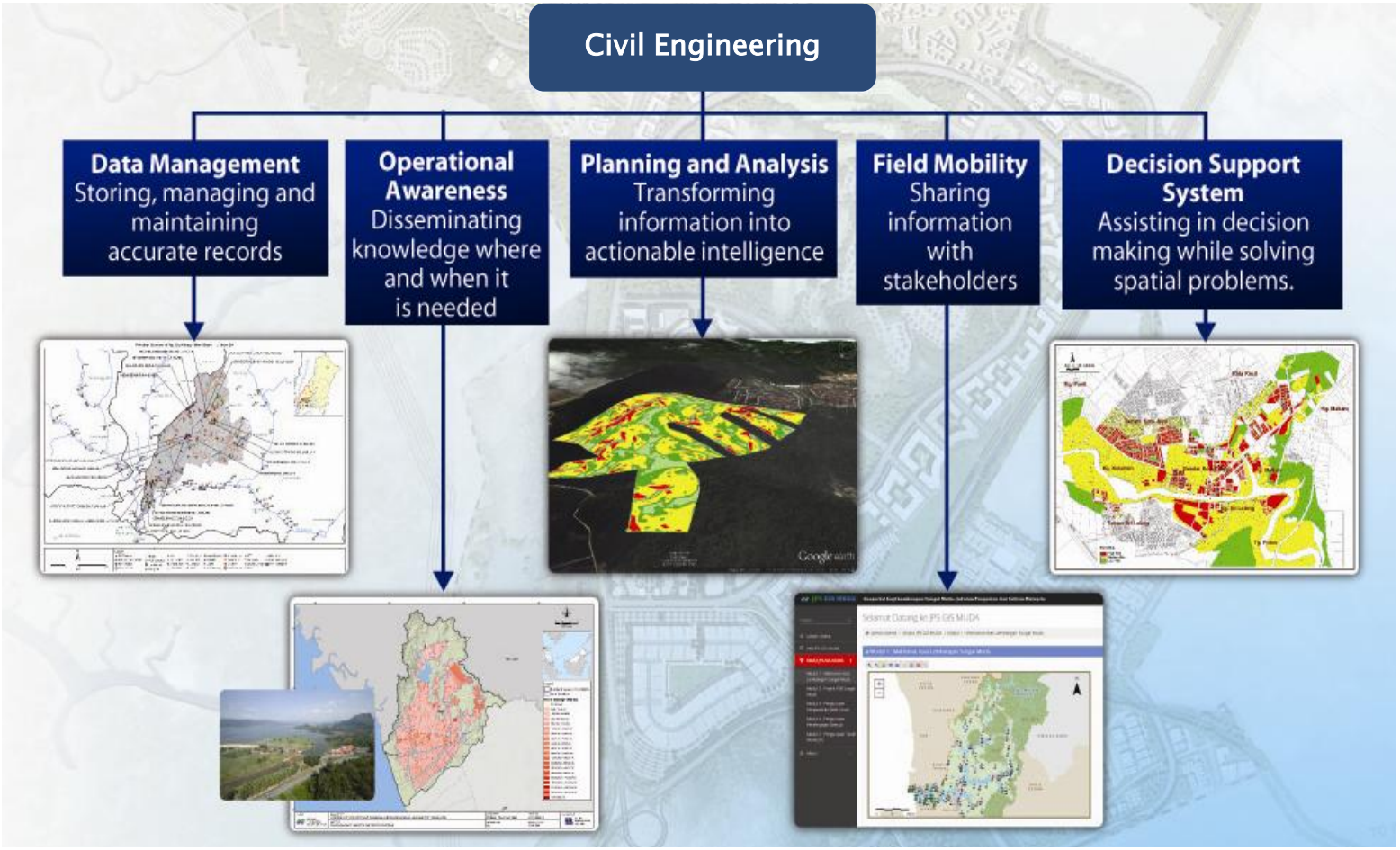
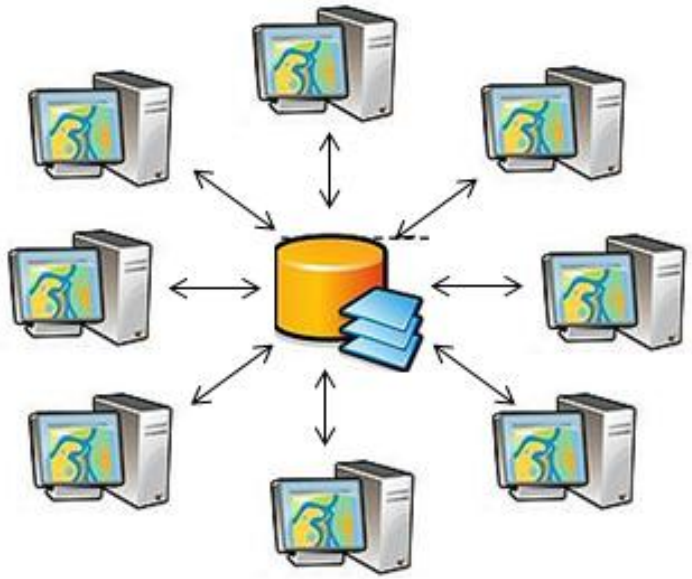
BETTER PROJECT MANAGEMENT WITH GEOSPATIAL TECHNOLOGIES

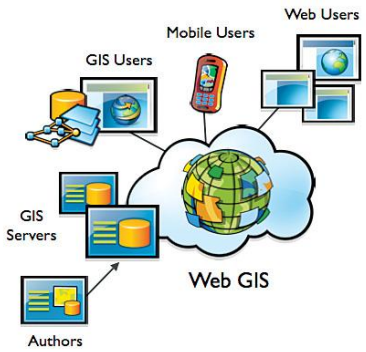


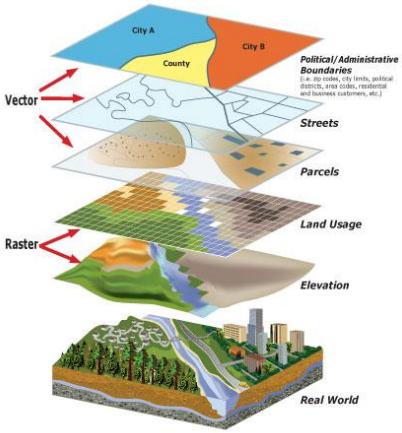
WEB-BASED GIS FOR CIVIL ENGINEERING

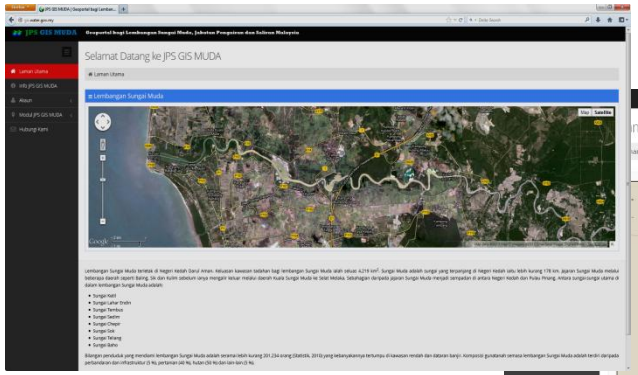
DISSEMINATE INFORMATION TO EDUCATE PUBLIC

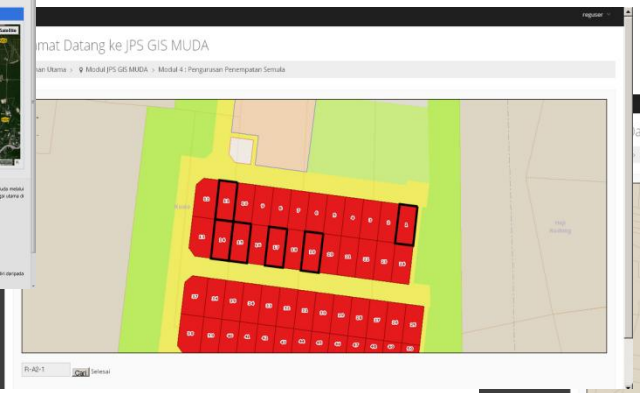


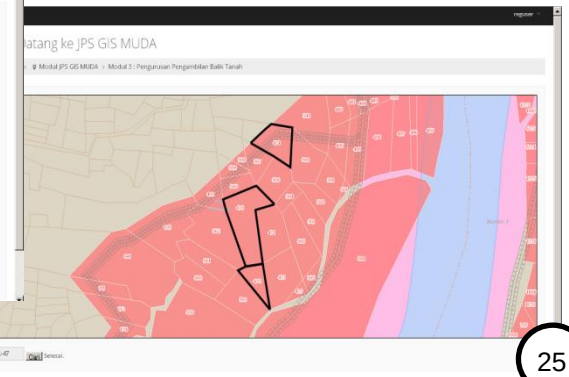
- Educating public by providing a web-based platform to sharing knowledge and geographic information





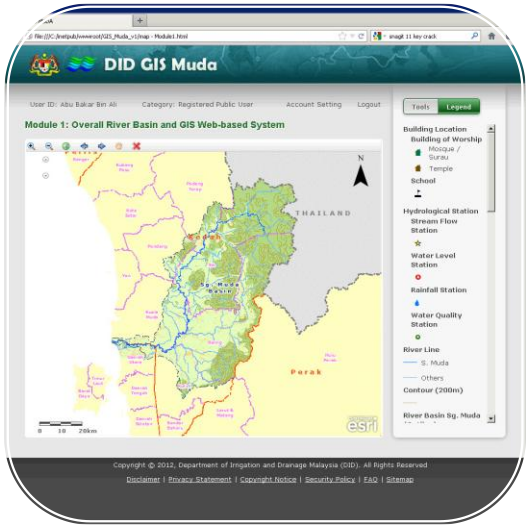






DISSEMINATE INFORMATION TO EDUCATE PUBLIC

ONLINE VIEWER ACCESSIBILITY



- Desktop

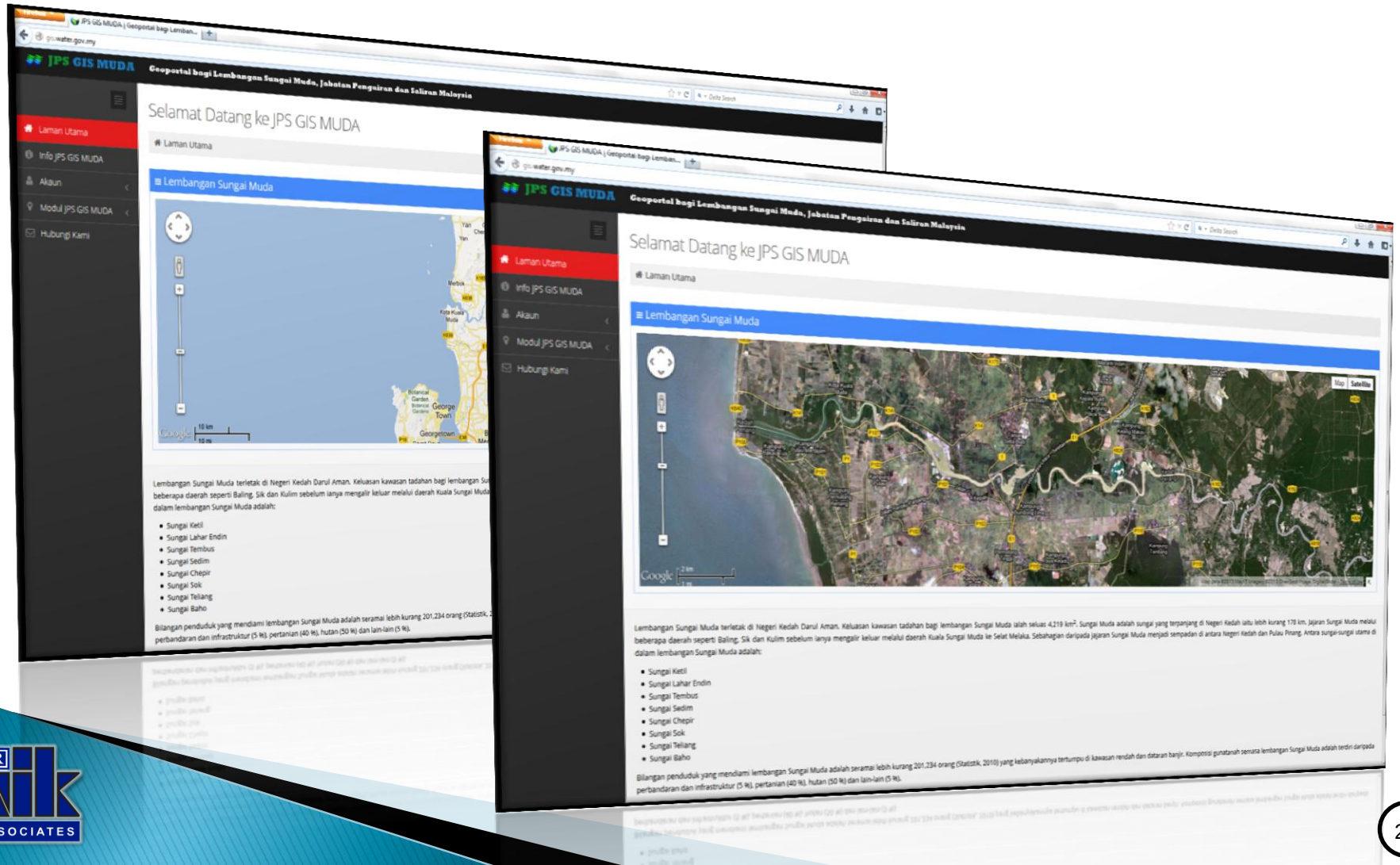
- Tablet

- Mobile

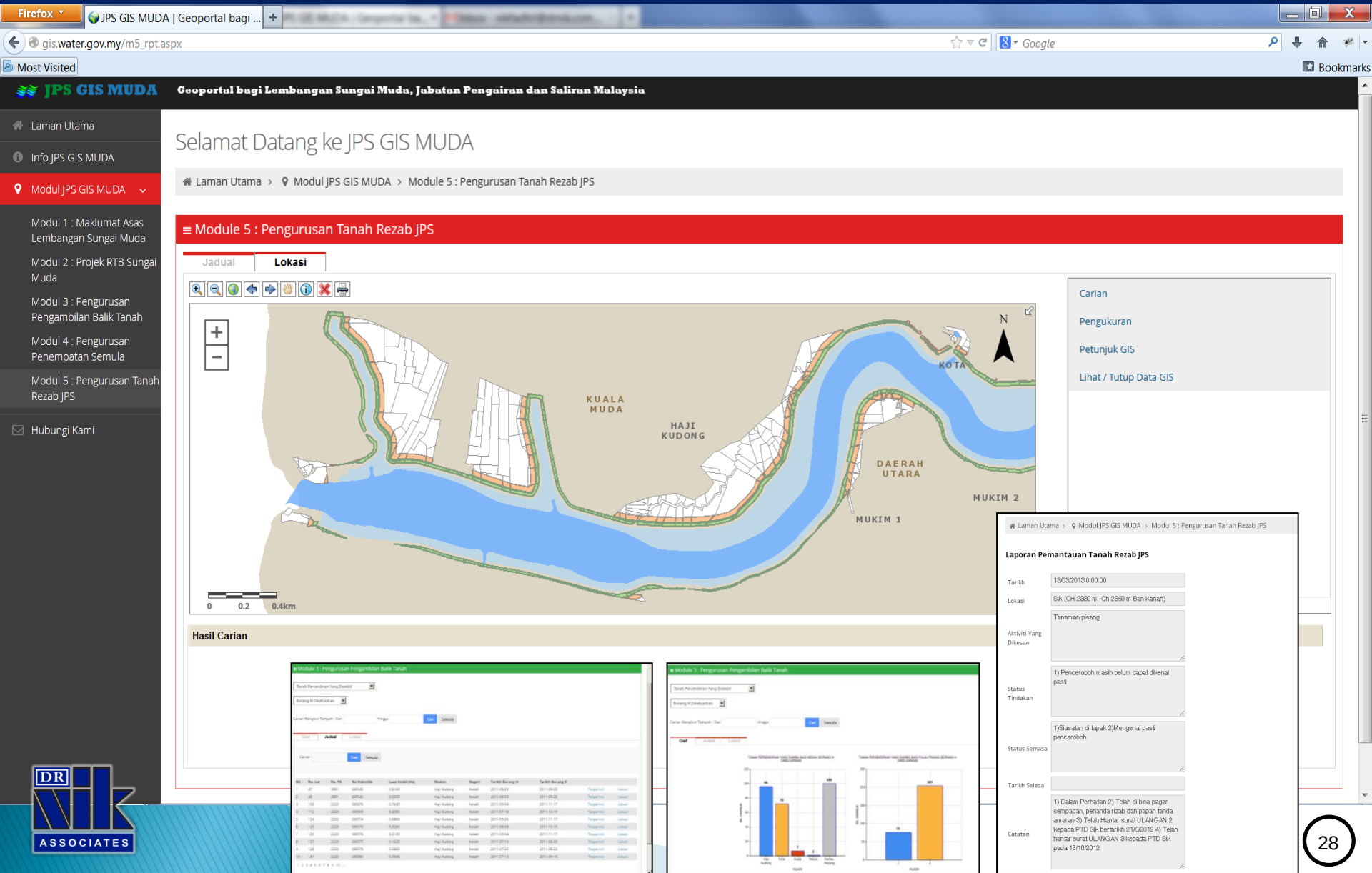
EXAMPLE OF GEOPORTAL
- RIVER BASIN MANAGEMENT -

Front Page of JPS GIS Muda

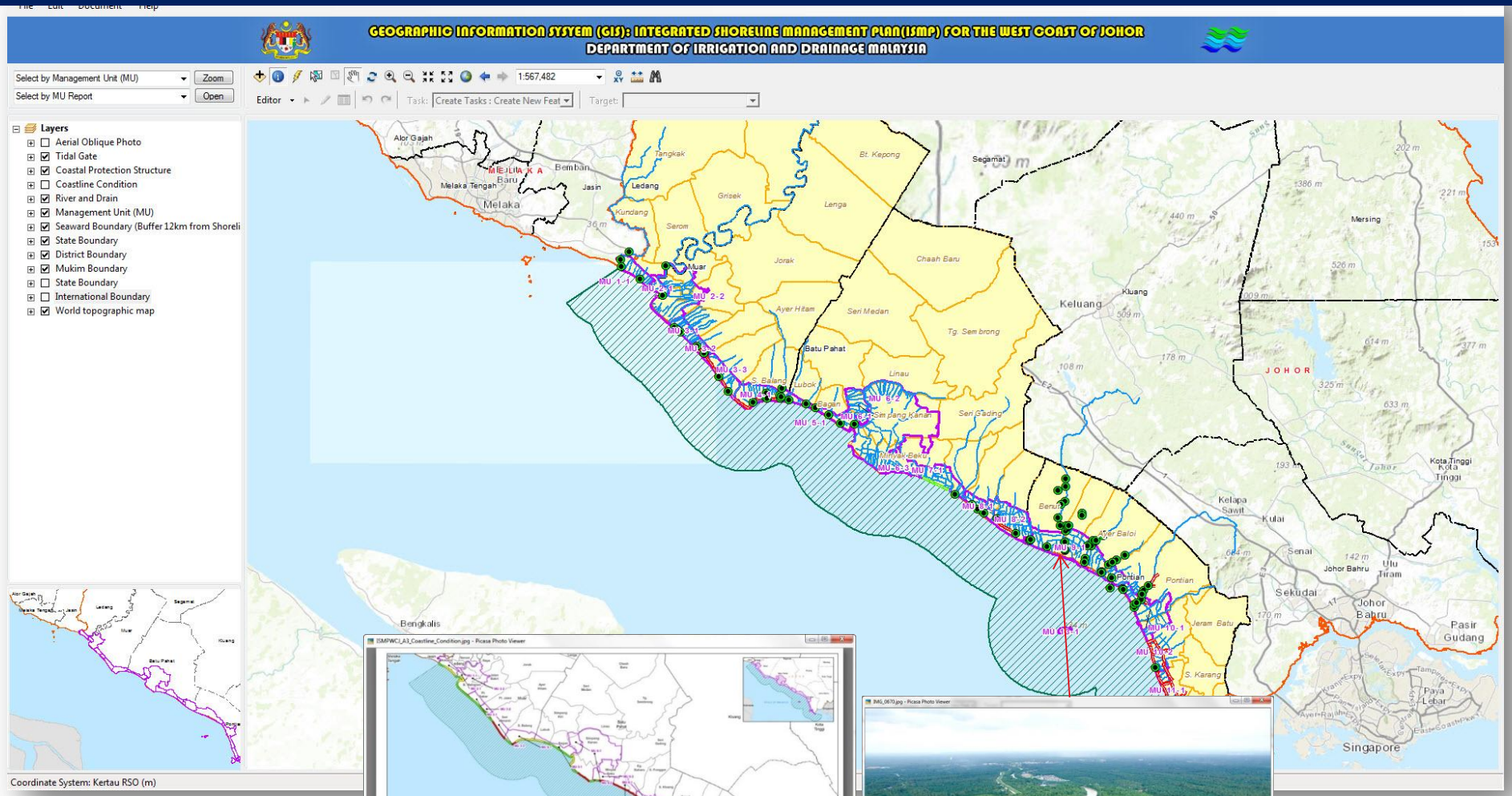
- *Web Home Page* – http://gis.water.gov.my/gismuda/



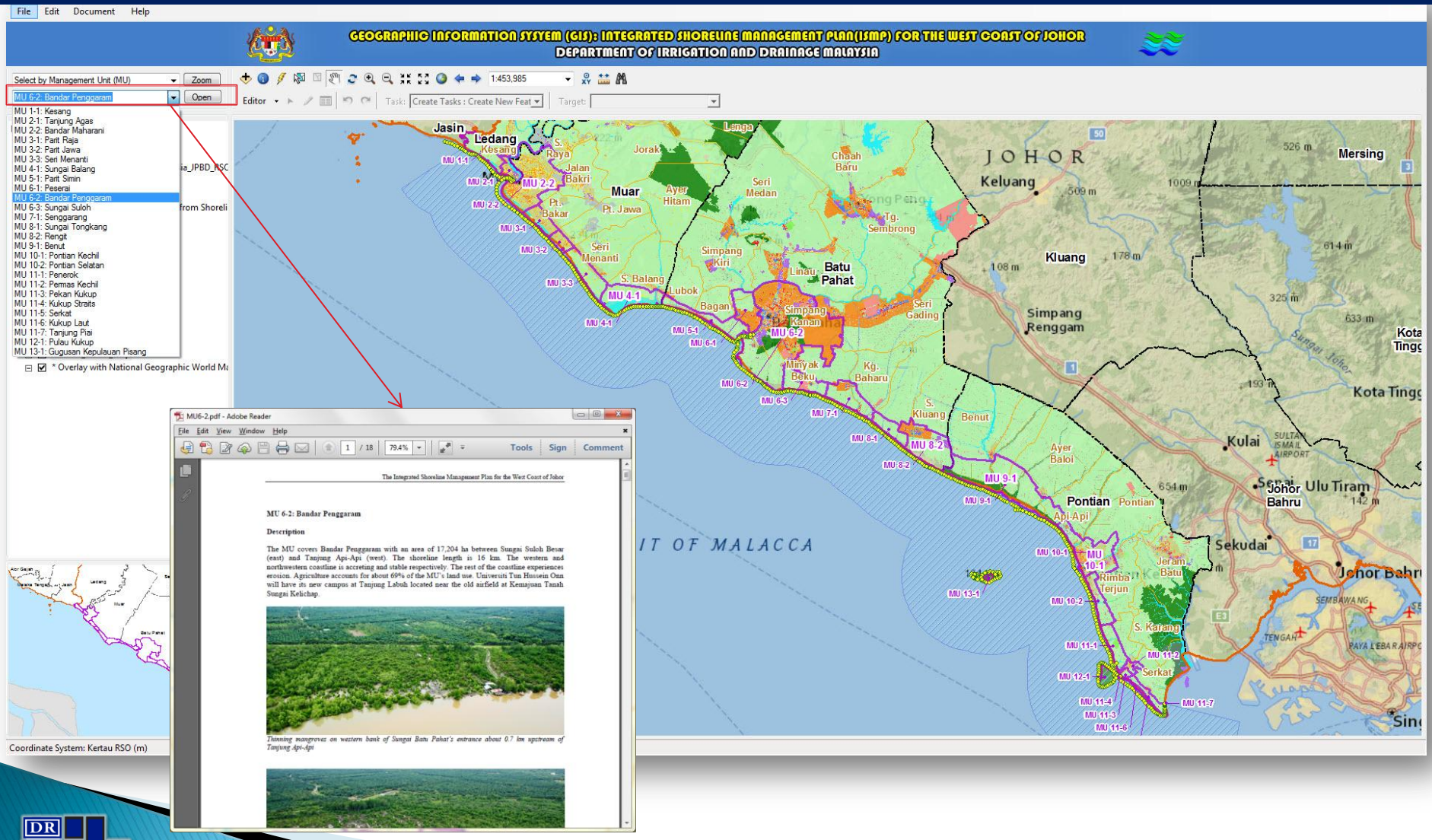
EXAMPLE OF GEOPORTAL
- RIVER BASIN MANAGEMENT -



EXAMPLE OF GEOPORTAL -SHORELINE MANAGEMENT-

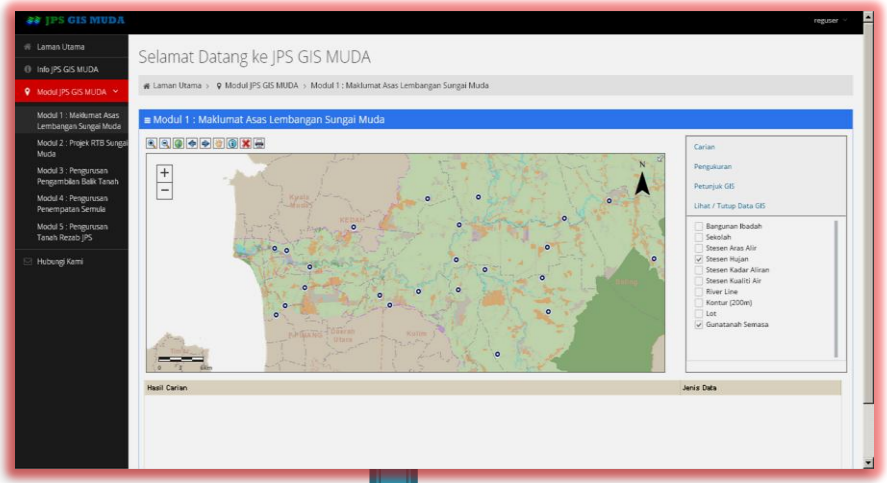


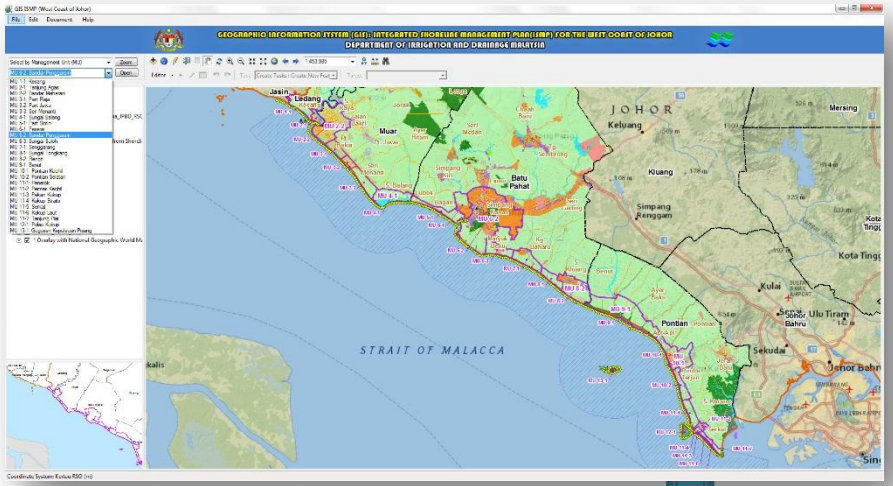
EXAMPLE OF GEOPORTAL -SHORELINE MANAGEMENT-



EXAMPLE OF GEOPORTAL
- DISASTER MANAGEMENT -

Interactive And Efficient Engineering-based Geospatial Platform For Engineers and Decision Makers





http://portalbencana.mkn.gov.my/

GEOINFORMATION TECHNOLOGIES TO SUPPORT DECISION MAKERS

1. GIS potential has not been fully exploited for Civil Engineering in Malaysia.
2. A decision support system with direct and easy access to geoinformation data and analysis tool is a platform for combination of Engineering and GIS that support
   a. planning, development and management.
   b. group collaboration and allows synchronous and asynchronous collaboration between decision makers, support GIS users such as mobile GIS and provide open standards based web portal technologies.

DR Nik ASSOCIATES

ACKNOWLEDGEMENTS

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- ***Jabatan Pengairan dan Saliran Malaysia (JPS)***
- ***Universiti Kebangsaan Malaysia (UKM)***
- ***Iskandar Regional Development Authority (IRDA)***
- ***DNASB's staff***
- ***Majlis Keselamatan Negara***

for their support

THANK YOU

DR Nik ASSOCIATES