



# Development of Flood Hazard Map at TTDI Jaya, Shah Alam

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## About NAHRIM



- **National Hydraulic Research Institute of Malaysia (NAHRIM)**
- Under *Ministry Of Natural Resources and Environment*
- Engaged in research and specialist consultancy in all aspects of water hydraulics and water environment.



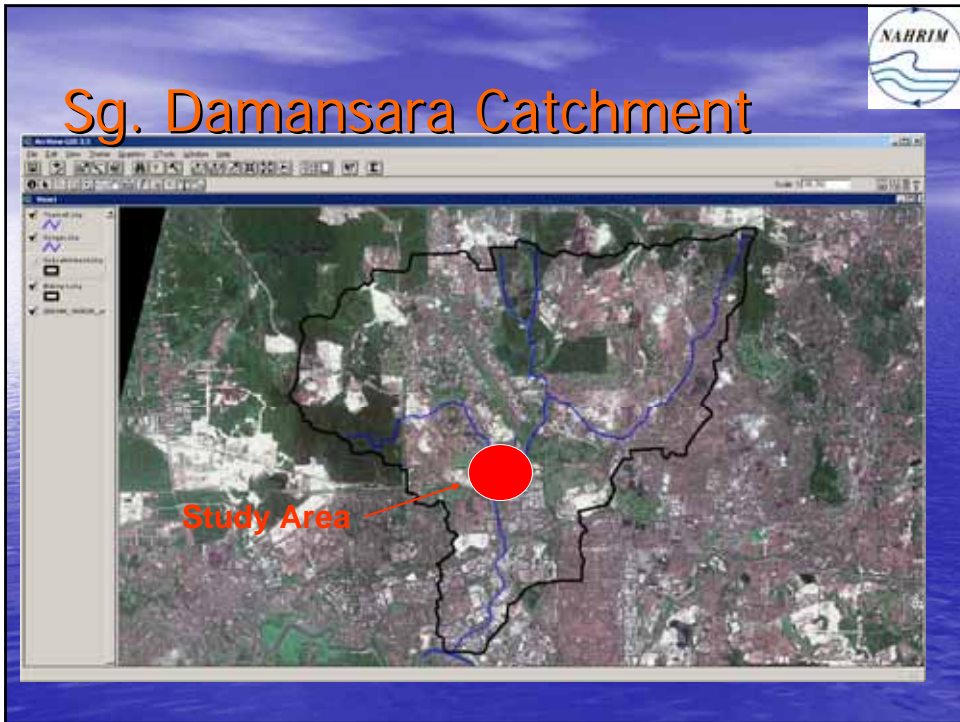
## Content

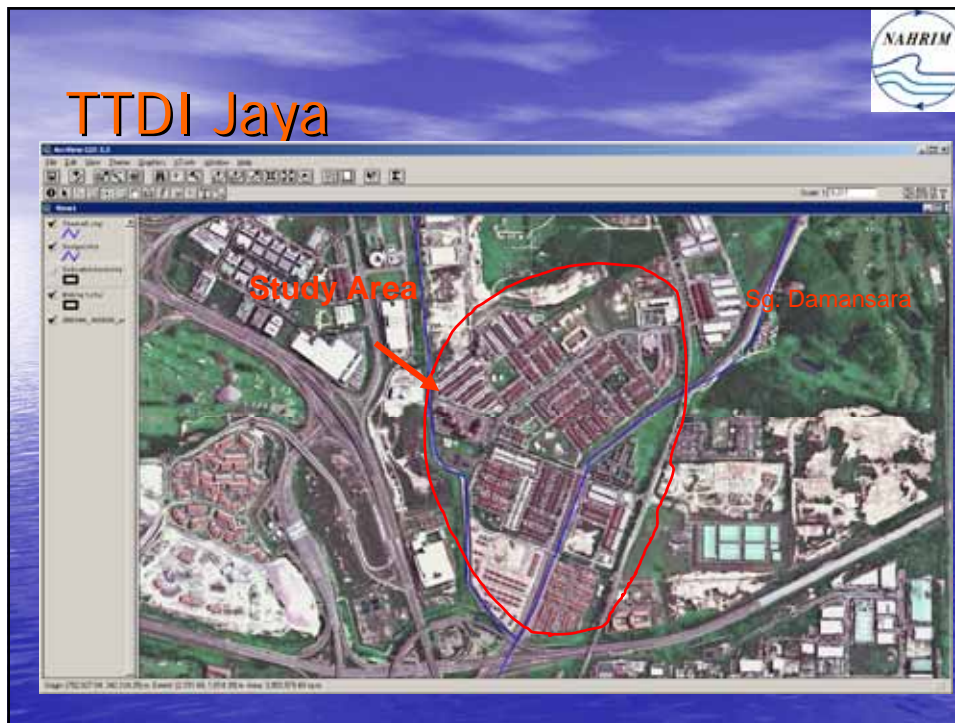
- Introduction
- Objective
- Methodology
- Analysis & Finding
- Conclusion
- Future Improvement Work



## Study area

- Taman Tun Dr. Ismail Jaya (TTDI Jaya)
- Total area – 265 acres (107 hectares)
- Estimated Population – 12,000 peoples.
- Located at the confluence of Sg. Damansara and Sg. Air Kuning
- Upper catchment = 116km<sup>2</sup>





## Flood history

- Experienced 12 flood events since 1994
- Big flood
  - December 1995
  - 6 December 1999
  - 5 January 2000
  - 26 February 2006 (The worst)

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## Flood on 26<sup>th</sup> Feb 2006



## Flood on 26<sup>th</sup> Feb 2006



## Flood on 26<sup>th</sup> Feb 2006



## Flood damage (26<sup>th</sup> Feb 2006)



- Estimate no of house flooded – 1842 units
  - Average damage / house = 15,000
  - Total damage = RM 27 Million
- Estimate no of car submerged – 2800 units
  - Average damage = RM 5000/car
  - Total damage = RM 14 Million



## Objectives

- To investigate the usefulness of Flood Hazard Map (FHM) in Taman Tun Dr Ismail Jaya (TTDI Jaya), Shah Alam
- To develop a discrete simulation model on traffic movement during flood
- To solve traffic congestion at TTDI Jaya, Shah Alam during flood



## Methodology

- Data collection
- Hydraulic Analysis and Simulation
- Traffic simulation
- Development of Flood Hazard Map



## Data Collection

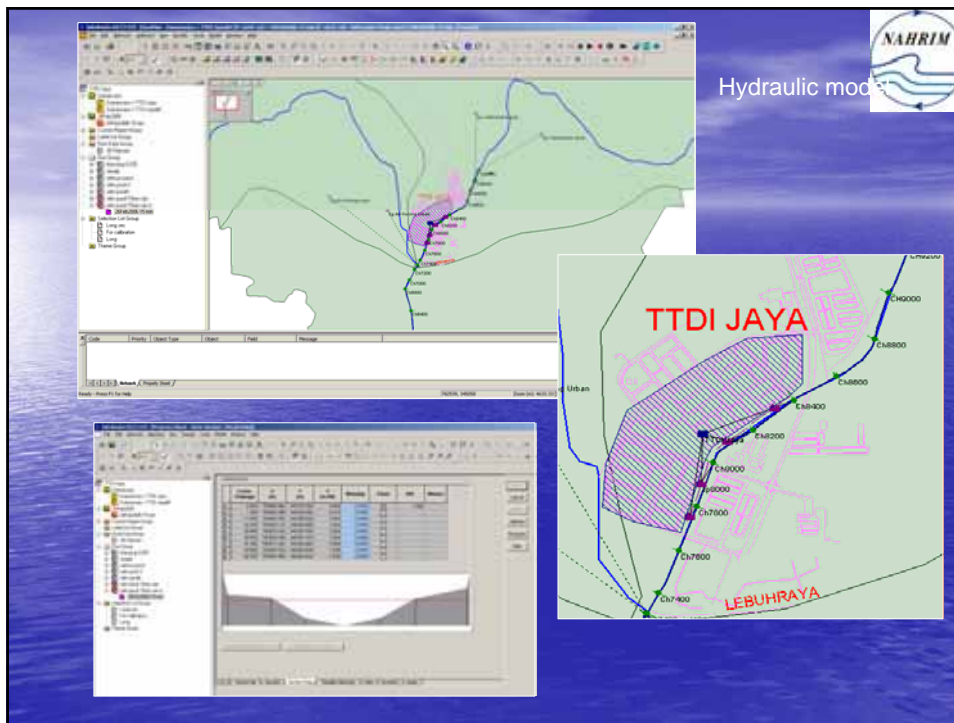
- Site Visit
- Survey
- Interview TTDI Jaya community committee
- TTDI Jaya map and physical properties i.e. road map, public facilities etc
- Media information



## Hydraulic Analysis and Simulation

- Use InfoWorks RS
- Inputs
  - rainfall
  - River cross section
  - Spill level
  - Flood plain Information
- Focus on rate of water filling flood plain to identify time required to evacuate





Hydraulic model

## Traffic simulation model

- Used Arena 10.0 by Rockwell Software Inc
- Develop calibration model for 26<sup>th</sup> Feb 2006
  - To test inputs assumption and comparing with available info obtained
- Develop model on evacuation plan
  - To evaluate evacuation plan of TTDI Jaya community committee by assuming all residents plan to save their cars

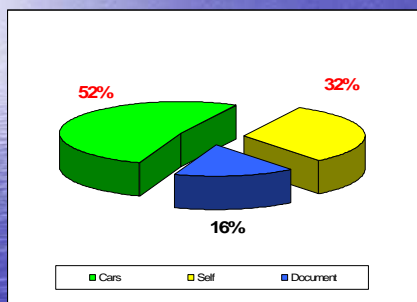


## Development of Flood Hazard Map

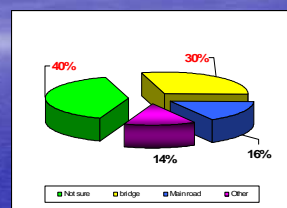
- To educate and prepared residents in managing flood situation



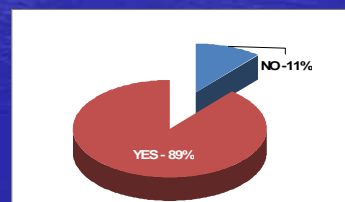
## Analysis from Survey



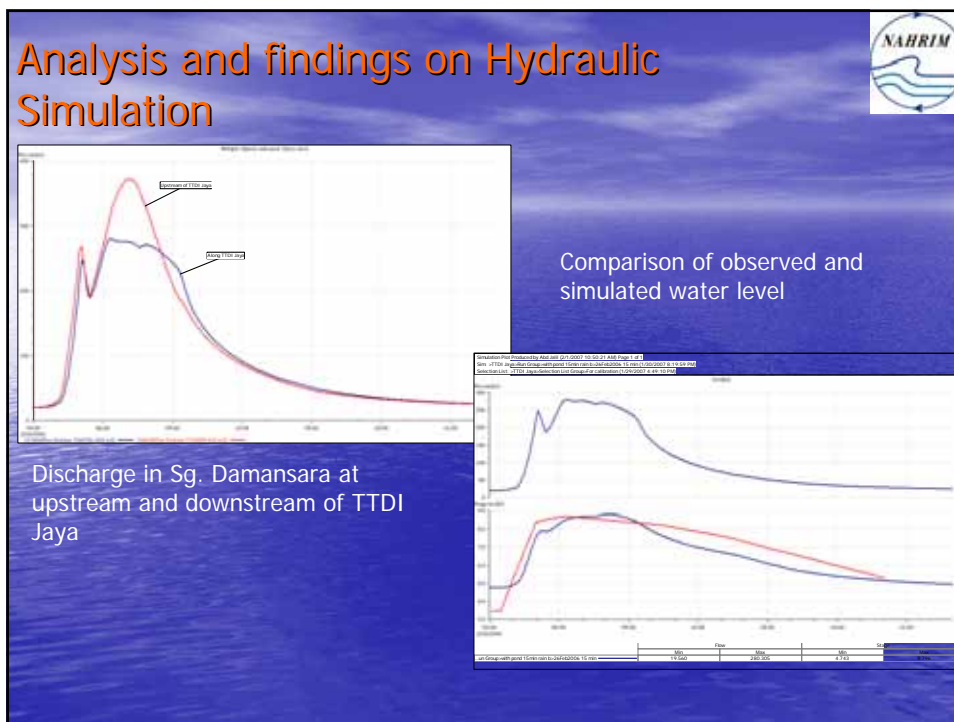
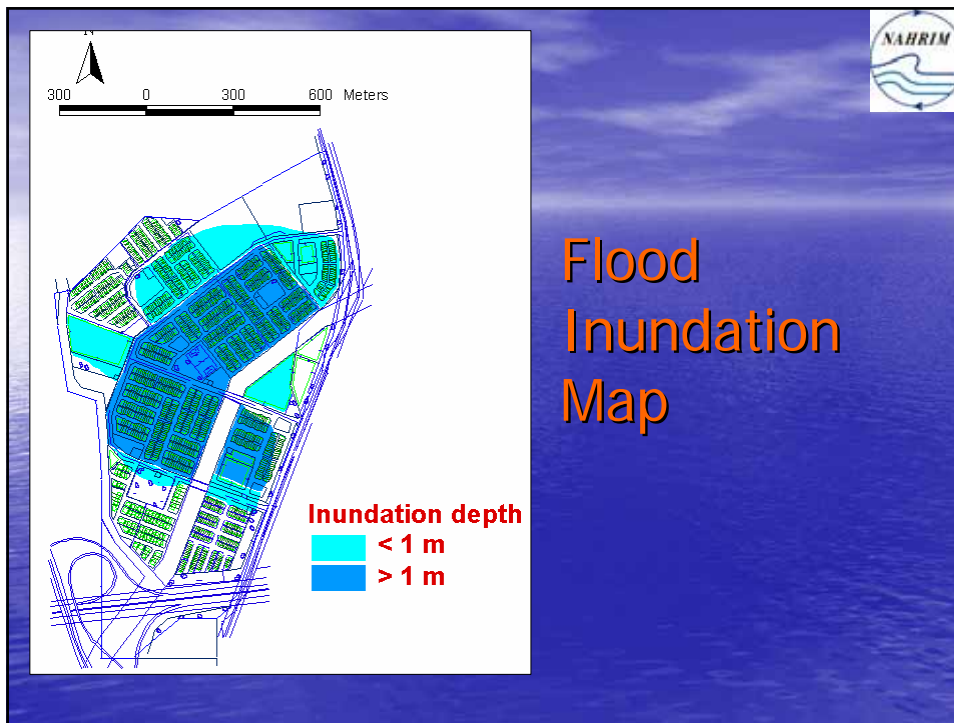
Priority item to be save during flood



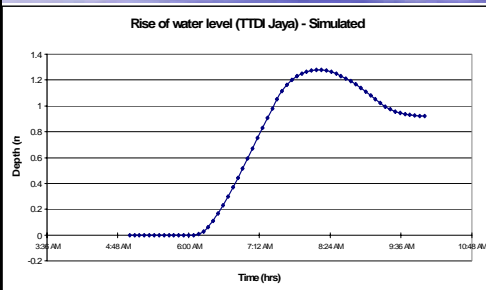
Safe location in event of flood



Acceptance of residents to idea of Flood Hazard Map

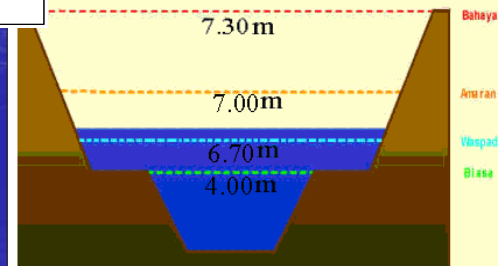


## Analysis and findings on Hydraulic Simulation



Flood warning system at TTDI Jaya

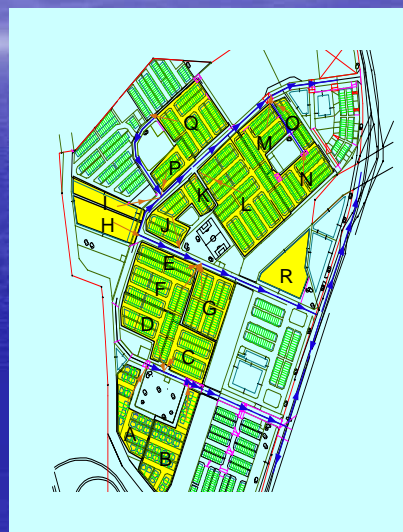
Rise of water level in TTDI Jaya - Simulated



## Traffic Simulation Model

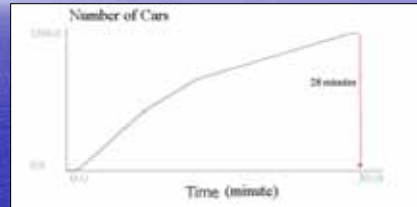


- Calibration model inputs (26 Feb 2006)
  - No of cars whose owner had intention to evacuate
  - Triangular distribution represent vehicle exiting behaviour from their respective residential area
  - Estimate 2 seconds delay at junction going out to safe area
  - Average speed of 20km/hr used throughout evacuation



## Traffic calibration model finding

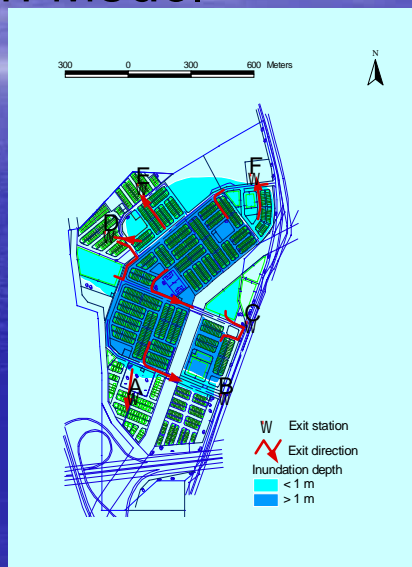
- It takes 28 minutes for all residents with intention to move out vehicles to three safe area – match with feedback received



Calibration simulation

## Traffic Simulation Model

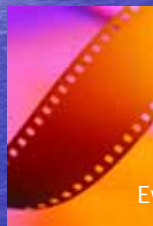
- Evaluation of evacuation plan inputs
  - 6 exits for different areas. Either mainroad or highland
  - All residents at home and have intention of evacuate vehicles
  - All vehicles go out at concurrent time



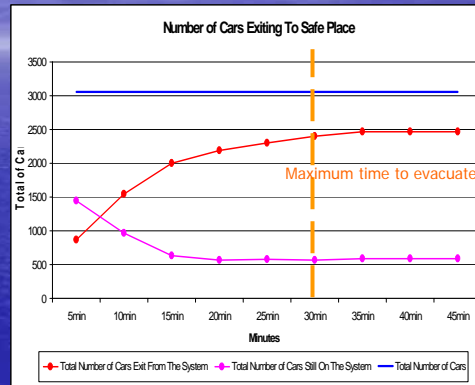
## Traffic evacuation evaluation findings



- At 30 minutes, only 2399 cars able to evacuate, 652 cars stranded



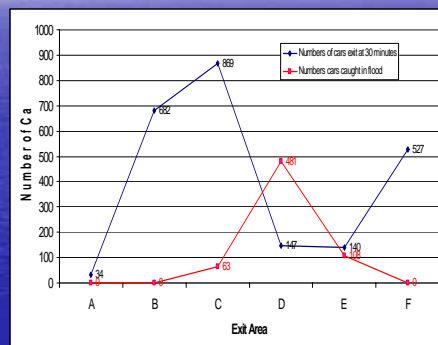
Evacuation Simulation



## Traffic evacuation evaluation findings



- Cars stranded at exit C due to it take more than 30 minutes for them to evacuate
- At Exit D and E is due to capacity at safe area is not enough to accommodate no. of cars routed to the area





## Conclusion

- Flood Hazard Map is required to increase awareness of TTDI Jaya residents
- FHP must have proper evacuation plan for vehicle movement since it is a priority item
- On 26<sup>th</sup> Feb 2006, most residents does not heard the warning siren and did not expect a big flood will occur
- Total time from danger level to flooding of 0.3m depth is 1 hour. However, need precise flood forecasting system to predict flood magnitude
- "Flood drill" model need to be improve to ensure all car evacuate within 30 mins



## Future Improvement Work

- Develop DEM and combine with Hydraulic Model to identify and improve flood inundation area
- Improve traffic model to provide better evacuation plan



## Special thanks to

- Undergraduate Trainee at NAHRIM
  - Amila Saliza Abd Wahab
  - Farhana Syed Ahmad
- JPS Petaling
- City Council of Shah Alam
- Community of TTDI Jaya



Thank You