



Australian Government

Geoscience Australia

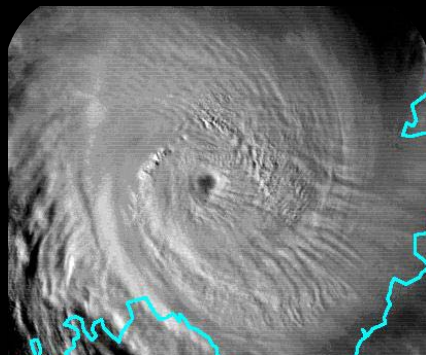
The Role of Spatial Data in Understanding Climate Change Risk

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Group Leader, Risk & Impact Analysis Group
Geoscience Australia

18th United Nations Regional Cartographic Conference – Asia Pacific
Bangkok, Thailand
26 October 2009

GEOSCIENCE AUSTRALIA

Measuring Risk



Hazard



Exposure



Vulnerability



Impact

Outline

- Spatial Data - Exposure
- Post-Disaster
 - Bushfire and Flood
- Climate Change Risk
 - Sea-Level Rise and Coastal Inundation

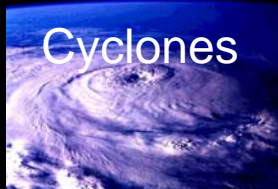
Outline

- **Spatial Data - Exposure**
- Post-Disaster
 - Bushfire and Flood
- Climate Change Risk
 - Sea-Level Rise and Coastal Inundation

HAZARDS



Climate Change



Cyclones



Bushfire



Floods



Tsunami



Earthquake

Hazard Models

Event



National EXposure Information System

Engineering Vulnerability Economic Vulnerability Demographic Casualty

Risk/Impact Assessment

Residential Exposure Requirements

SPATIAL

Latitude
Longitude
Address
Block Size
Floor Area

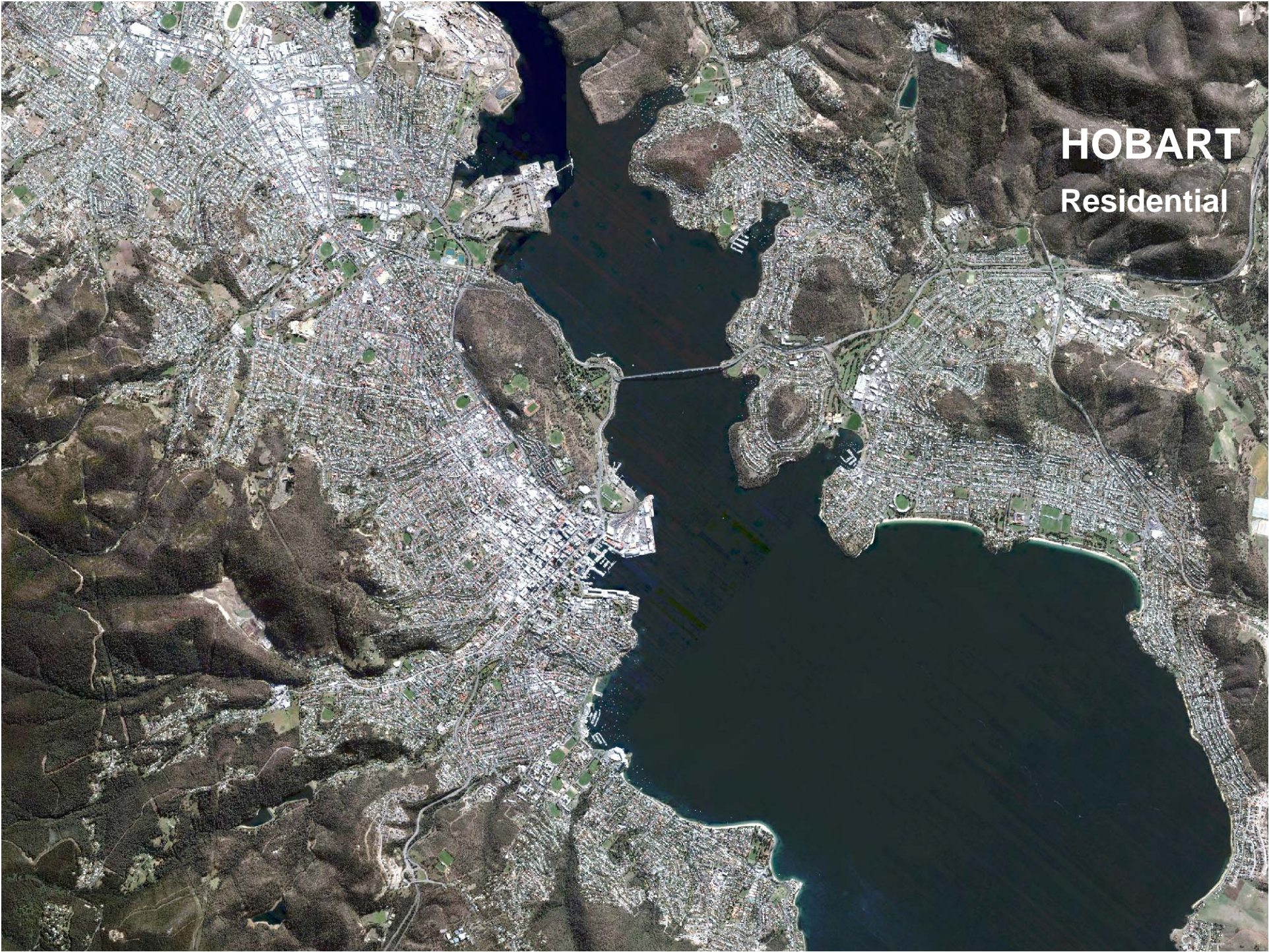
STRUCTURAL

Building Type
Roof Type
Wall Type
Floor Type
Age (Year)
Storeys/Height

OTHERS

People
Income Group
Replacement
Value
Contents Value





HOBART
Residential

HOBART

Residential

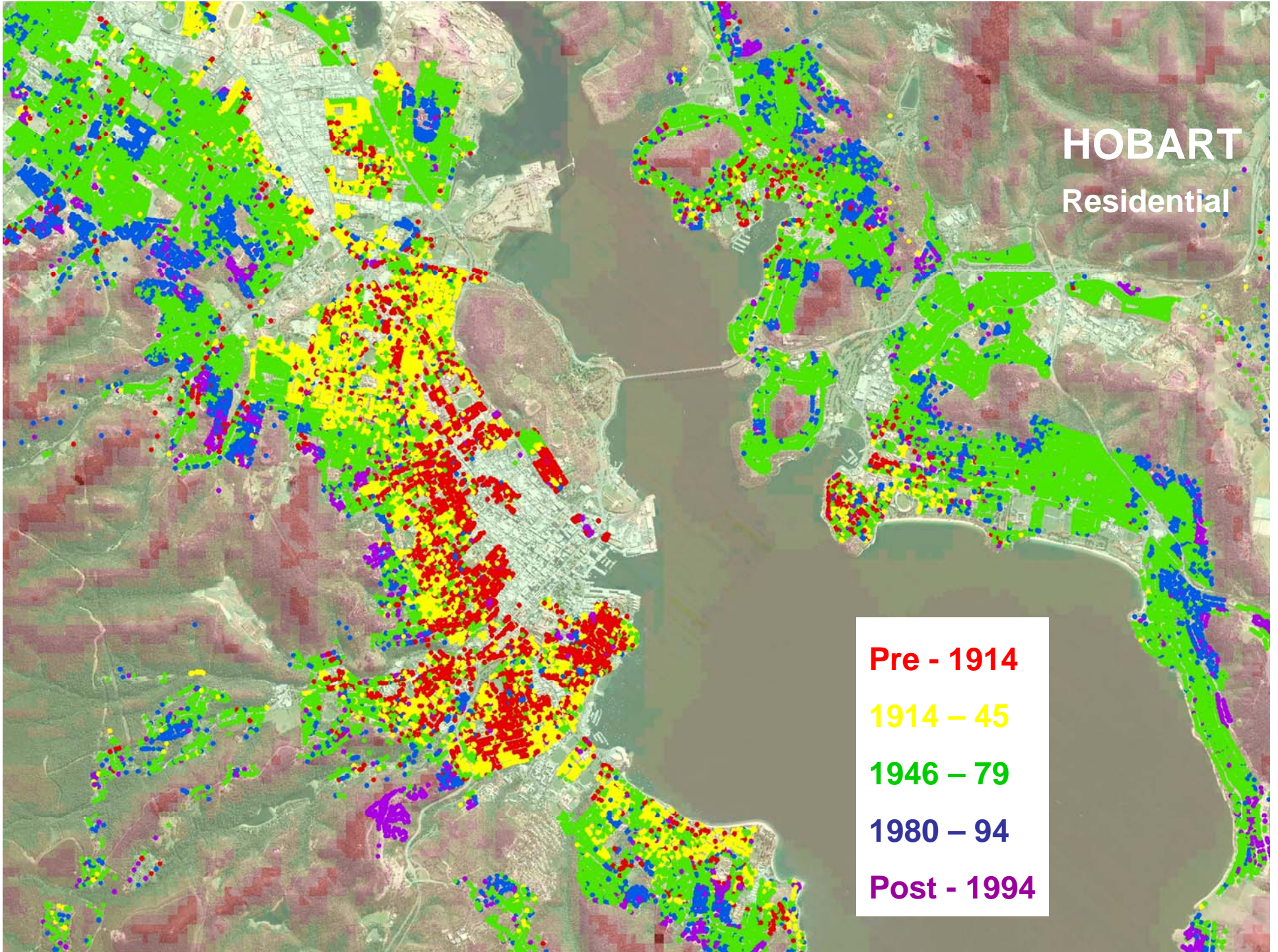
Pre - 1914

1914 - 45

1946 - 79

1980 - 94

Post - 1994



Building Contents



Cost Factors

Reconstruction
Value

Building Type
(SH, SD, F0, F3, F4)

Household Income

Floor Area

Contents
Value

Population
Demographics

08/07/2005

Business Exposure

Spatial Information

Latitude

Longitude

Address

Block Size

Floor Area

-Total

Floor Height

Structure Details

Roof Type

Wall Type

Structural System

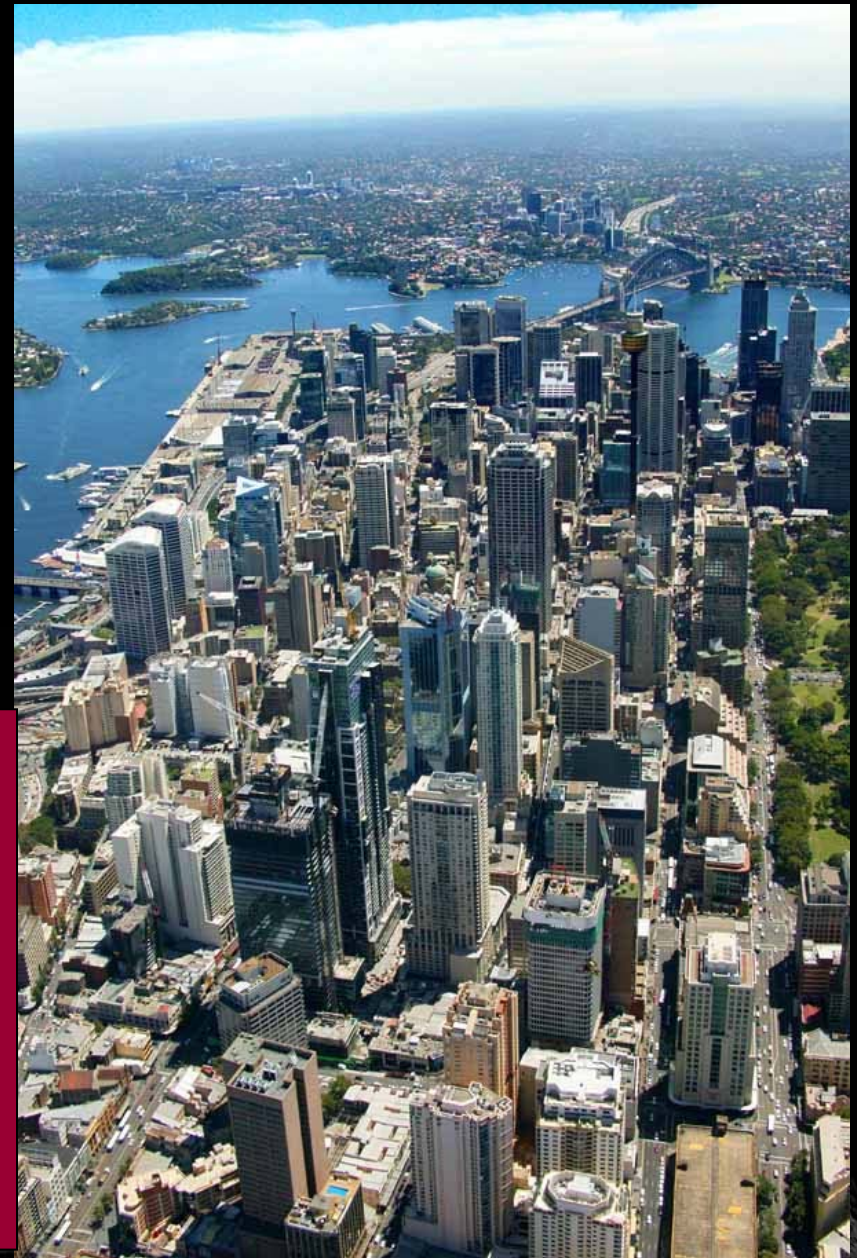
Façade

Progressive Failure (Yes/No)

Age

Height/Number of Storeys

Basement



Business Exposure

Business Information

Usage (Commercial/Industrial)
ANZSIC Category (Multiple Businesses)
-Proportion
Employees (Multiple Businesses)
Customer Numbers
Turn over
Public Access (Full/Limited/Restricted)
Tenancy

Value Estimations

Replacement Value
Contents Value
Insurance Status



Institutions

Emergency



Aged Care



Schools



Childcare



18th



Infrastructure Exposure

Transportation

- Road Network
- Rail Network
- Bridges
- Tunnels
- Airports
- Ports

Water

- Storage & Treatment
- Urban Water Supply Network
- Sewerage Treatment Facilities
- Stormwater Drainage Systems

Energy

- Transmission Towers
- Electricity supply substations
- Gas compressor stations

Communications

- Communication Towers
- Telephone exchanges



Residential

Industrial

Comm

Identify Results

Layers: <Top-most layer>

residential

- MARINE

Location: (153.412282 -27.961495)

Field	Value
OBJECTID	123995
Shape	Point
GNAF_PID	GAQLD160705964
FULL_ADDR	106 MARINE PARADE
UNIT_NUM	0
UNIT_SFX	
BUILDING_N	
STR_PFX	
STR_NUM	106
STR_SFX	
LAST_NUM	
STR_NAME	MARINE
STR_TYPE	PARADE
SUBURB	SOUTHPORT
STATE	QLD
LONGITUDE	153.412252
LATITUDE	-27.961522
GNAF_TYPE	<null>
PARCEL_ID	/BUP105703
BLOCKSIZE	3503.479361
SD	QLDR
MB_CODE	30399740000
USE	Residential
POSTCODE	4215
BLDG_AGE	<null>
FCB_TYPE	F4
FLR_AREA	11040
ROOF_TYPE	Tiles
WALL_TYPE	Double brick
STR_COST	854
STR_VALUE	9428160
NO_RESIDENCES	92
INC_GROUP	AVERAGE
CONT_VALUE	2828448
PEOPLE	152.387878
CD_CODE	3161807

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Disaster Damage Assessment



Sentinel Hotspots Online

Sentinel Hotspots - Microsoft Internet Explorer

Address: <http://fire3.ausliq.gov.au/Sentinel/inf.jsp>

SENTINEL Safeguarding Australia with geospatial sciences

Australian Government
Geoscience Australia

Layers Legend Find Find Results

Index Map Print Help

Layers

- Hotspots-MODIS
 - ModisLastPasses
 - Modis00to12Hours
 - Modis12to24Hours
 - Modis24to48Hours
 - Modis48to72Hours
- Hotspots-NOAA
- 250K Vector Maps
- Overlays
- Backgrounds
 - Non-printable Backgrounds [np]
 - MODIS Current Mosaic [np]
 - MODIS BlueMarble Mosaic Jan 20
 - Landsat Mosaic 2004 [np]
 - 250k Topographic [np]
 - 5m Reference [np]
 - BoM Satellite IR (**)[np]
 - Printable Backgrounds
- Bureau of Meteorology (**trial)[np]

Automatically Refresh Map
 Show Legends

Notes:
Please refer to the following for descriptions of the functions of the controls in the layer list above.

- Click to expand or hide group contents.
- Click to turn on all layers in the group.
- Click to turn off all layers in the group.
- Click the check box to turn layer on or off.

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Latest SHP Hotspot Data: 2009-02-08 02:46 AEDT / Updated: 2009-02-08 03:15 MODIS Mosaic: 2009-02-07 15:48 AEDT

Scale: 1:1,000,000 90 Map Tool: **Drill Down Identify**

Cursor Location: 145.50, -37.37 : 367352 E 5863104 N 553

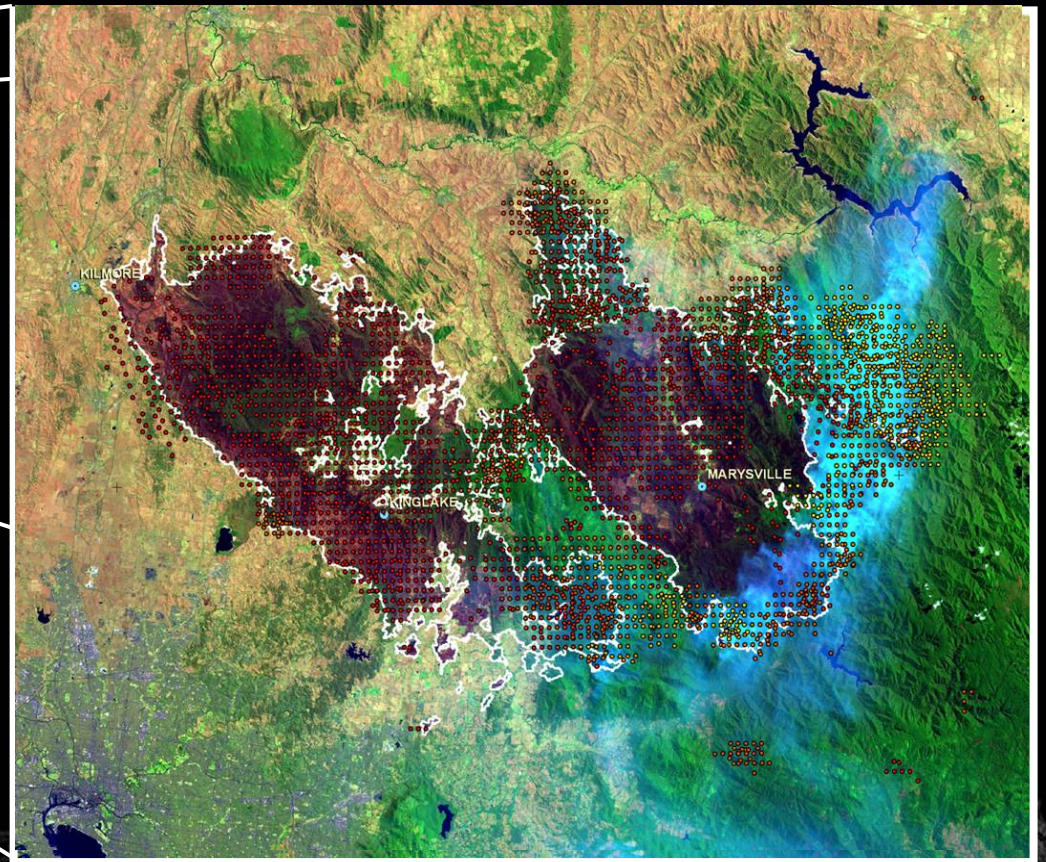
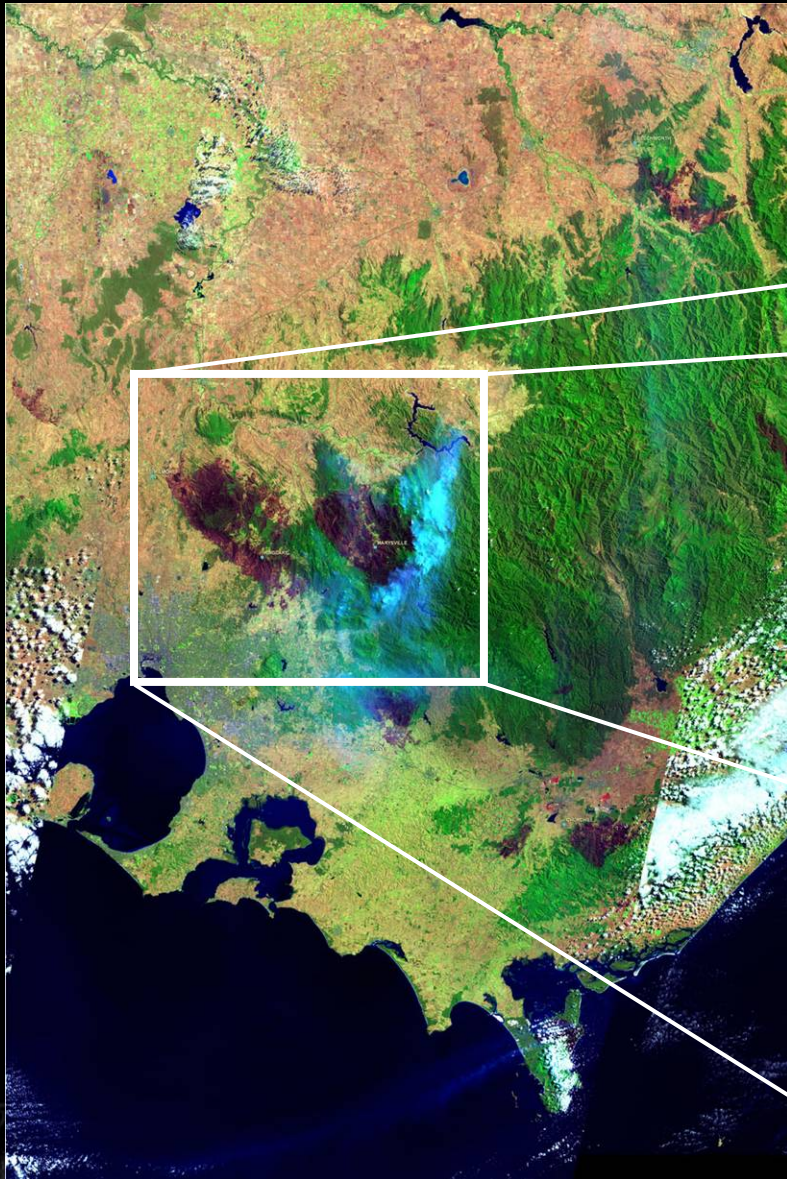
Refresh Map Sentinel Home | GA Home | Feedback disclaimer | © Commonwealth of Australia, 2005

Internet

Sentinel Hotspots

Victorian Fires 2009

- Twice daily update of fire position from MODIS thermal satellite data
- Hotspots show the fire position at the time of satellite overpass



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RAPID INVENTORY COLLECTION SYSTEM (RICS)

- Quick “first look” at damage impacts
- Complements detailed PDA field data collection



22/02/2009

RICS – vehicle cabin setup



18th UNRCC-AP, Bangkok, Thailand, 26 October 2009

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RICS – operational display

The screenshot displays the RICS (Rapid Inventory Collection System) interface. It is divided into several sections:

- Top Left:** A 2x2 grid of camera feeds showing various street scenes and buildings in Narrabundah.
- Bottom Left:** A panel for "Current GPS Data" showing:
 - Time: 12:35:24
 - Latitude: 35°18' 10" N
 - Longitude: 149°20' 10" E
 - Bearing: 124°15' 07"
 - Satellites: 8
 - Fix Quality: 2A speedometer shows a speed of 30.0 km/h.
- Bottom Left (Note Pad):** A text area containing the note: "Damage Level 1, limited to back section of house, 11:35:30, 34°27' 03", 149°55' 12"
- Right Side:** A detailed map of Narrabundah, Australia, with a red line indicating the vehicle's path. Key locations include Narrabundah College, Narrabundah Velodrome, and the Australian Geological Survey Organisation.
- Bottom Status Bar:** Shows "Number of cameras attached: 4" and "Frame rates: 4.00 4.00".

2009 Victorian Bushfires



18th UNRCC-AP, Bangkok, Thailand, 26 October

Tracklog_images - ArcMap - ArcInfo

File Edit View Bookmarks Insert Selection Tools Window Help

1:1,131

Editor Task: Create New Feature Target:

- Victorian Bushfire
 - FIRE SCAR BOUNDARY
 - Master_tracklog04032009
 - Bunyip_Select
 - NEXIS_photos
 - RICS Tracklog
 - nexis_t1
 - Bunyip
 - in_building_point
 - nexis_bld_photo
 - nexis_t1_SpatialJoin
 - KL_3_West
 - Kinglake_complex_3_West
 - Narre_Warren_2_East
 - Kinglake_complex_3_East
 - RICS TRACKLOG
 - Kinglake_complex_3_South
 - Kinglake_complex_2_East
 - Kinglake_complex_2_South
 - Kinglake_complex_2_West
 - Kinglake_complex_1_East
 - Kinglake_complex_1_South
 - Kinglake_complex_1_West
 - firearea_20090227_1130
 - NEXIS_Residential

0009160.jpg - IrfanView (Zoom: 345 x ...)

File Edit Image Options View Help

2448 x 2048 x 24 BPP 9161/26569 14 % 910.21 KB / 14.34 M

Drawing Arial 10 B I U A

16179675.25 -4177739.55 Meters

start Tracklog_images - A... ArcCatalog - ArcInf... Pine Ridge Road, Ki... elm grove kinglake - ... movies Clipboard03 - IrfanV... 0009160.jpg - IrfanV... EN 04:28

elm grove kinglake - Google Maps - Microsoft Internet Explorer provided by Geoscience Australia

http://maps.google.com.au/maps/?eventid=wtl

File Edit View Favorites Tools Help

elm grove kinglake - Google Maps

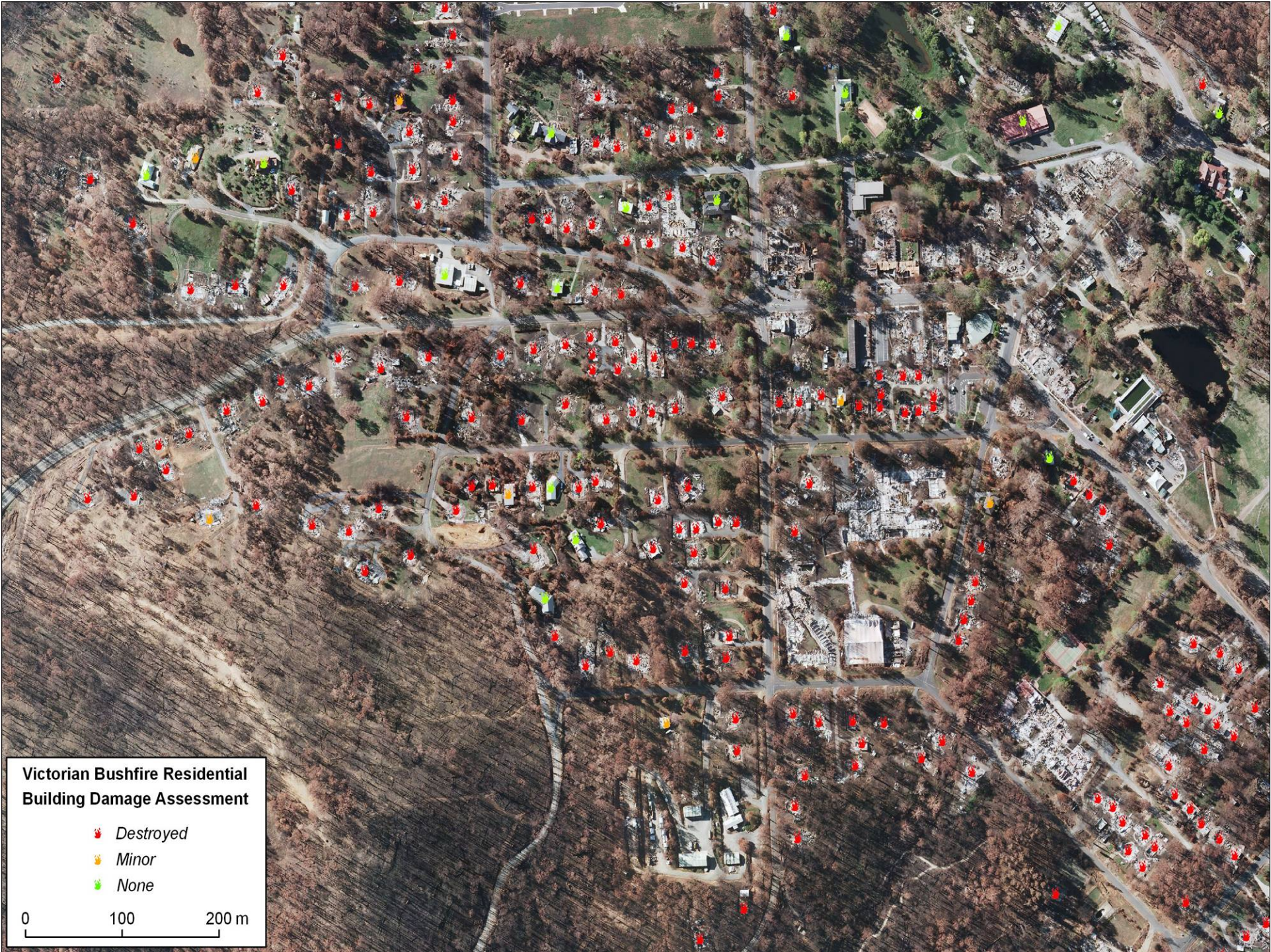
Web Images Maps News Video Gmail more

Google Maps Australia

Search Maps show search options

Find businesses, addresses and places of interest. Learn more

Print Send Link

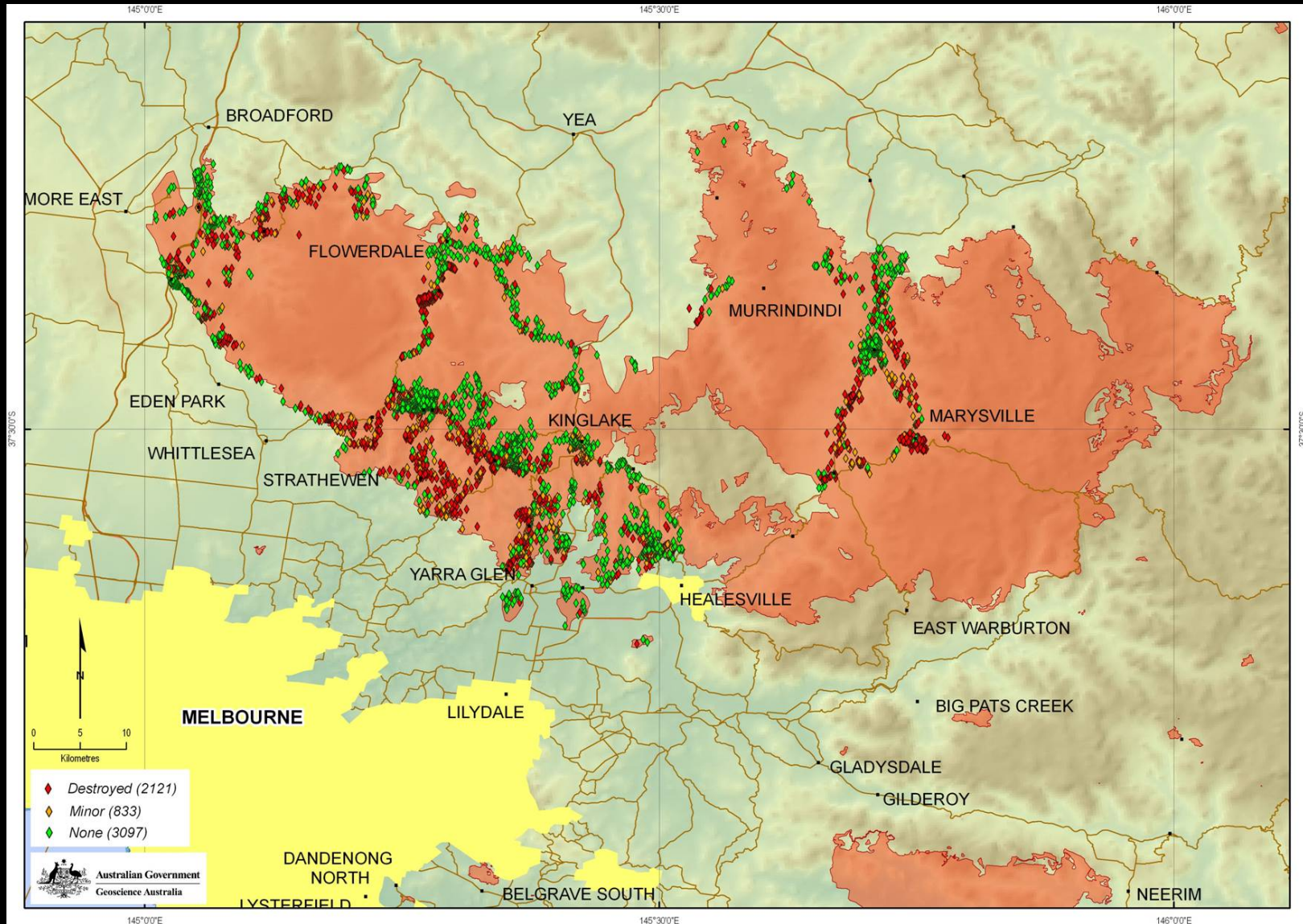


Victorian Bushfire Residential Building Damage Assessment

-  *Destroyed*
-  *Minor*
-  *None*

0 100 200 m

2009 Victorian Bushfire Damage Map

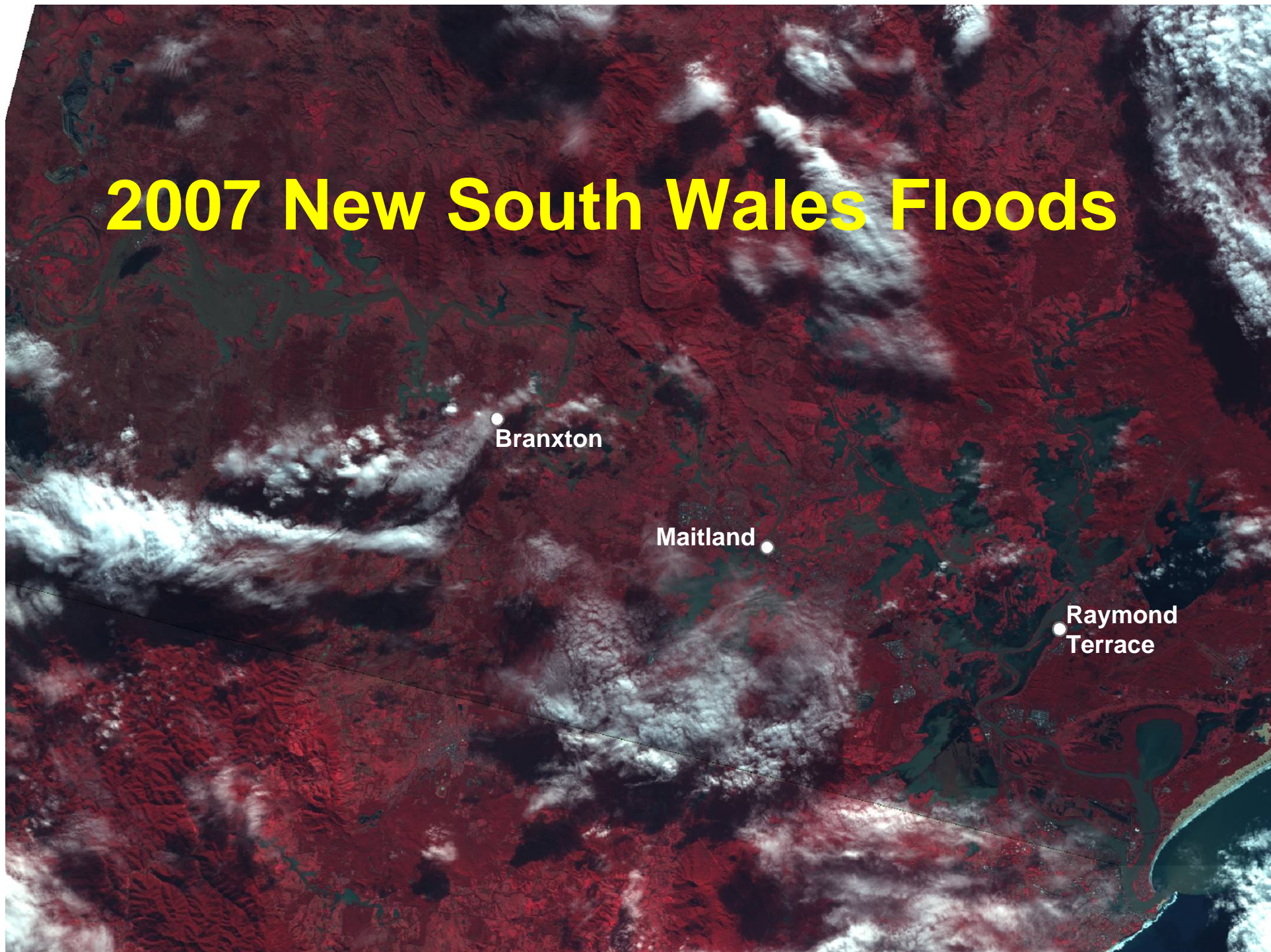


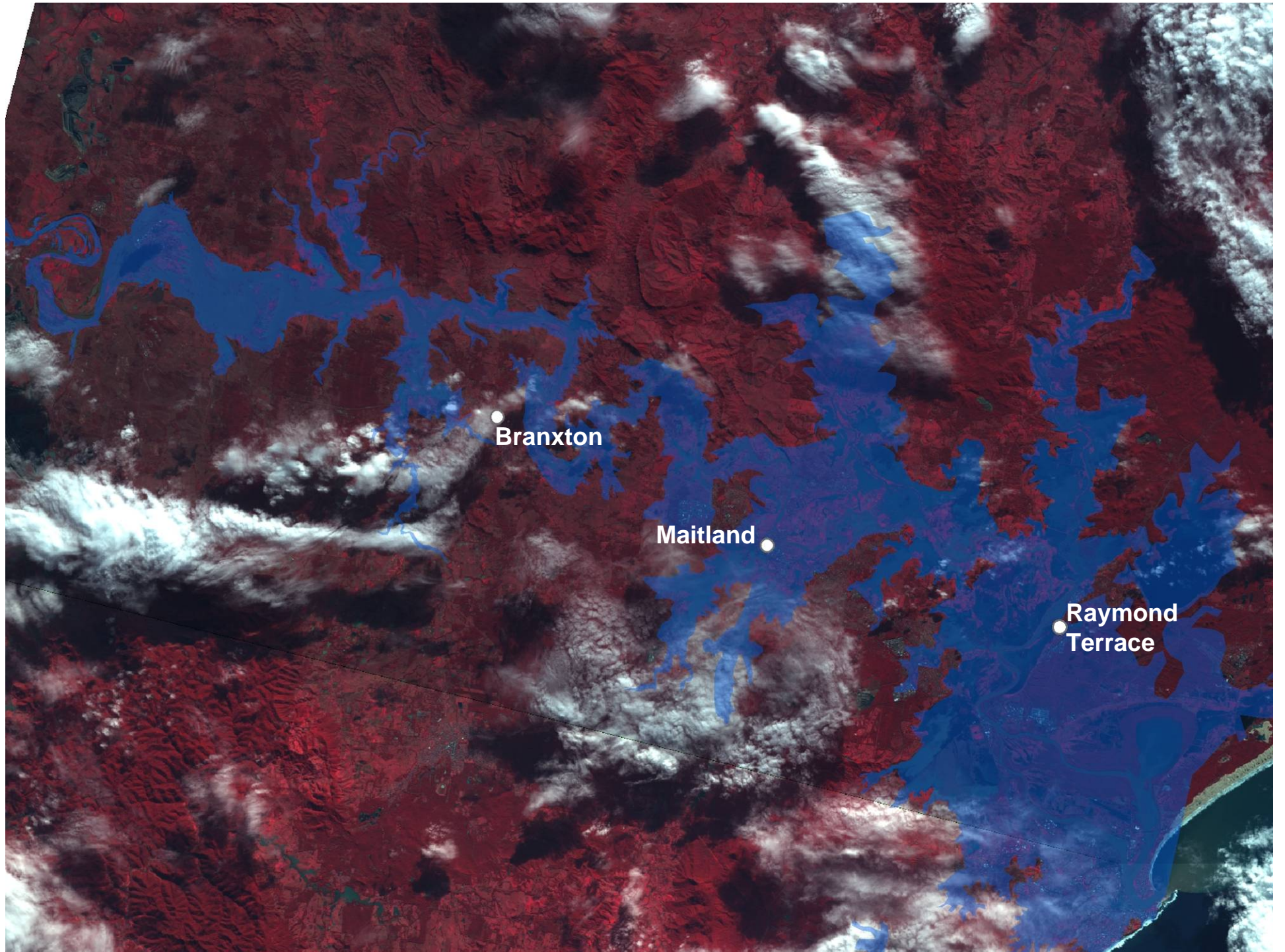
2007 New South Wales Floods

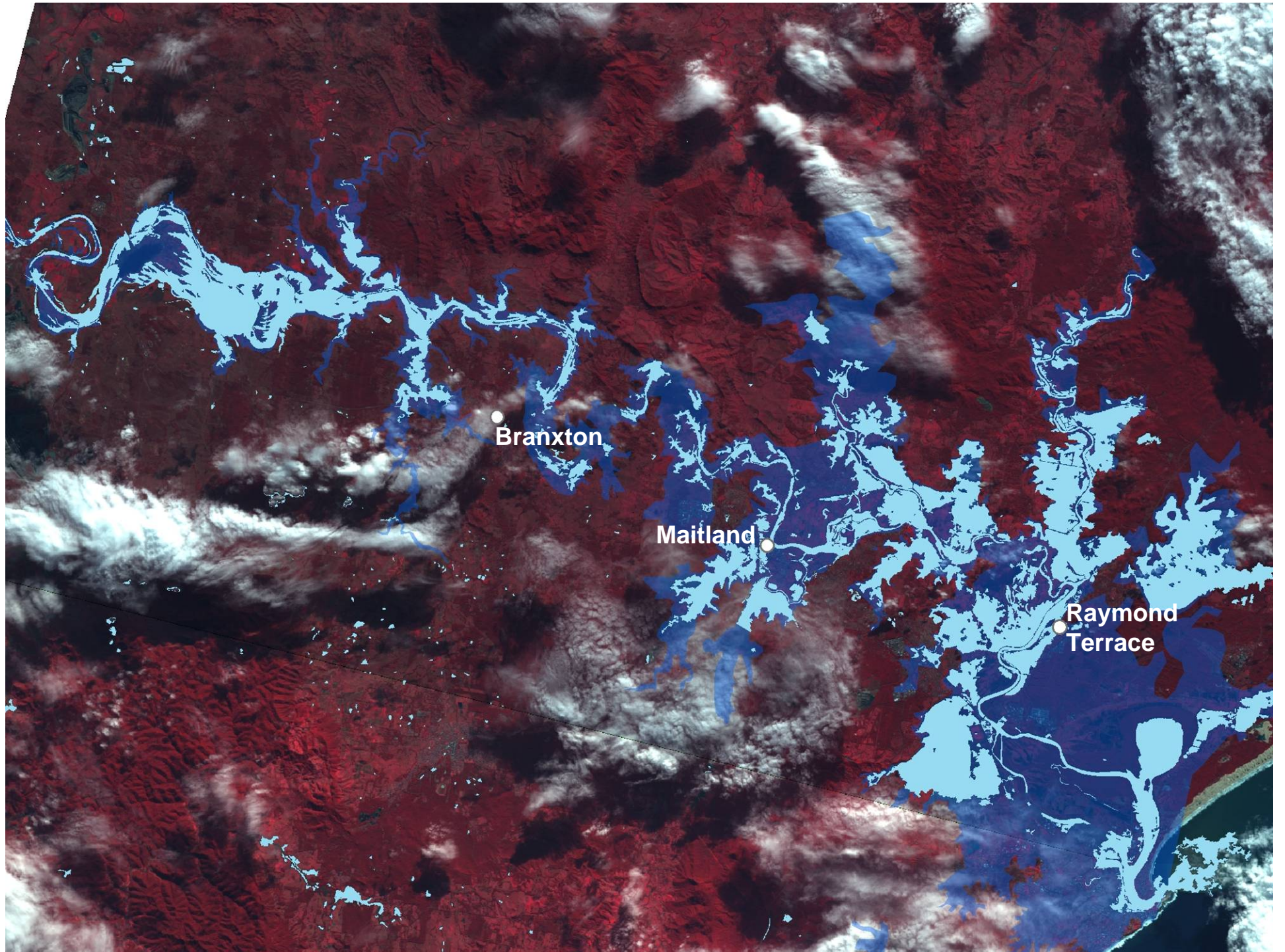
Branxton

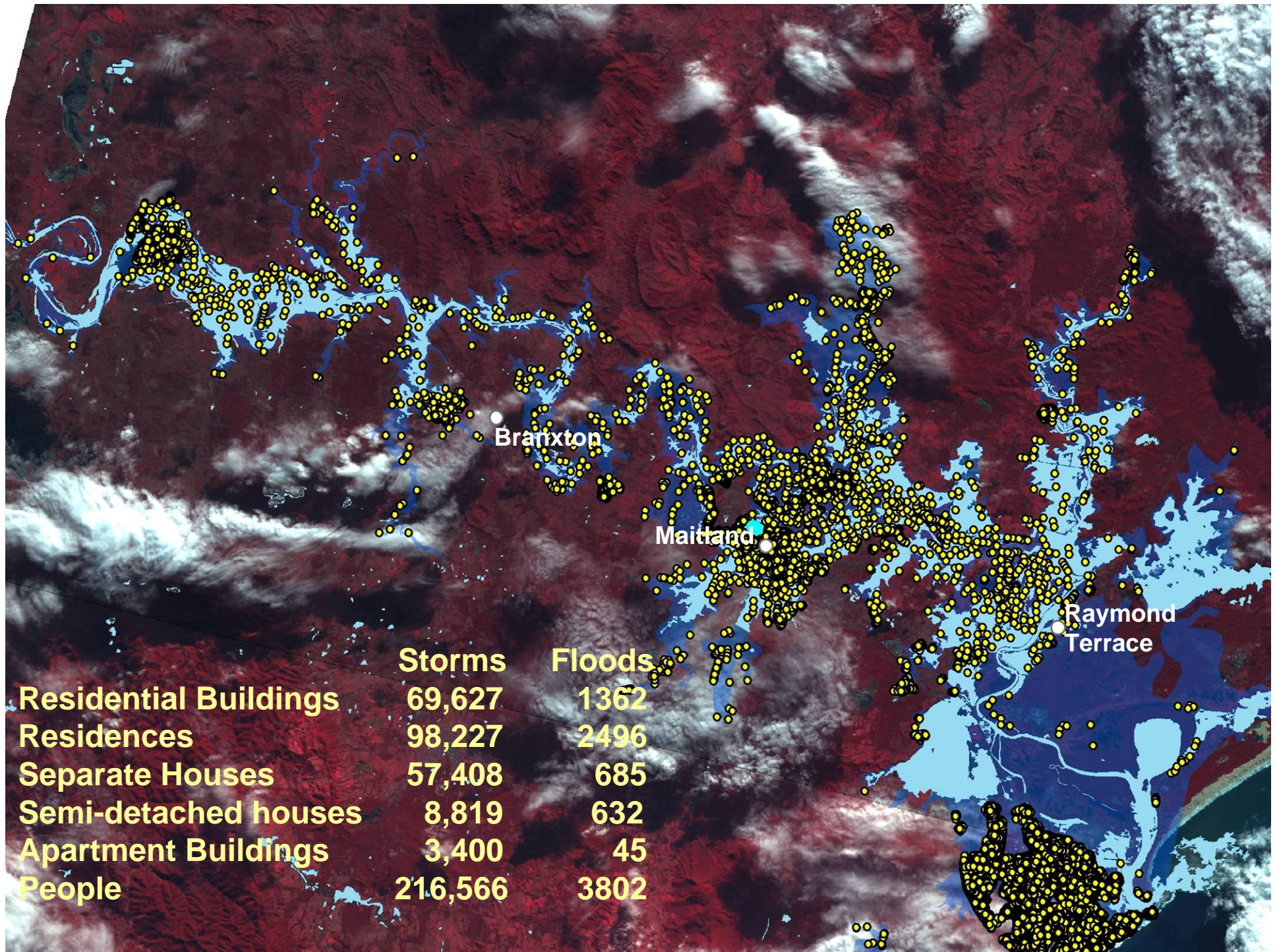
Maitland

Raymond
Terrace









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 - Sea-Level Rise and Coastal Inundation

Coastal Climate Change Risk

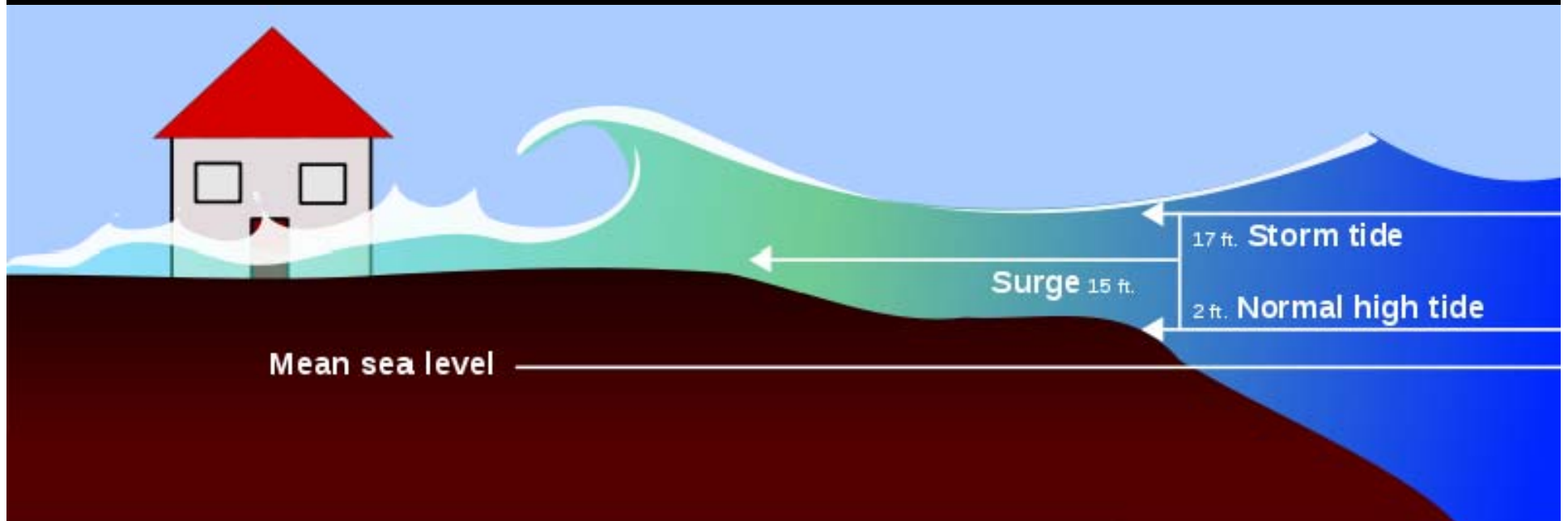


18th UNRCC-AP, Bangkok, Thailand, 26 October 2009

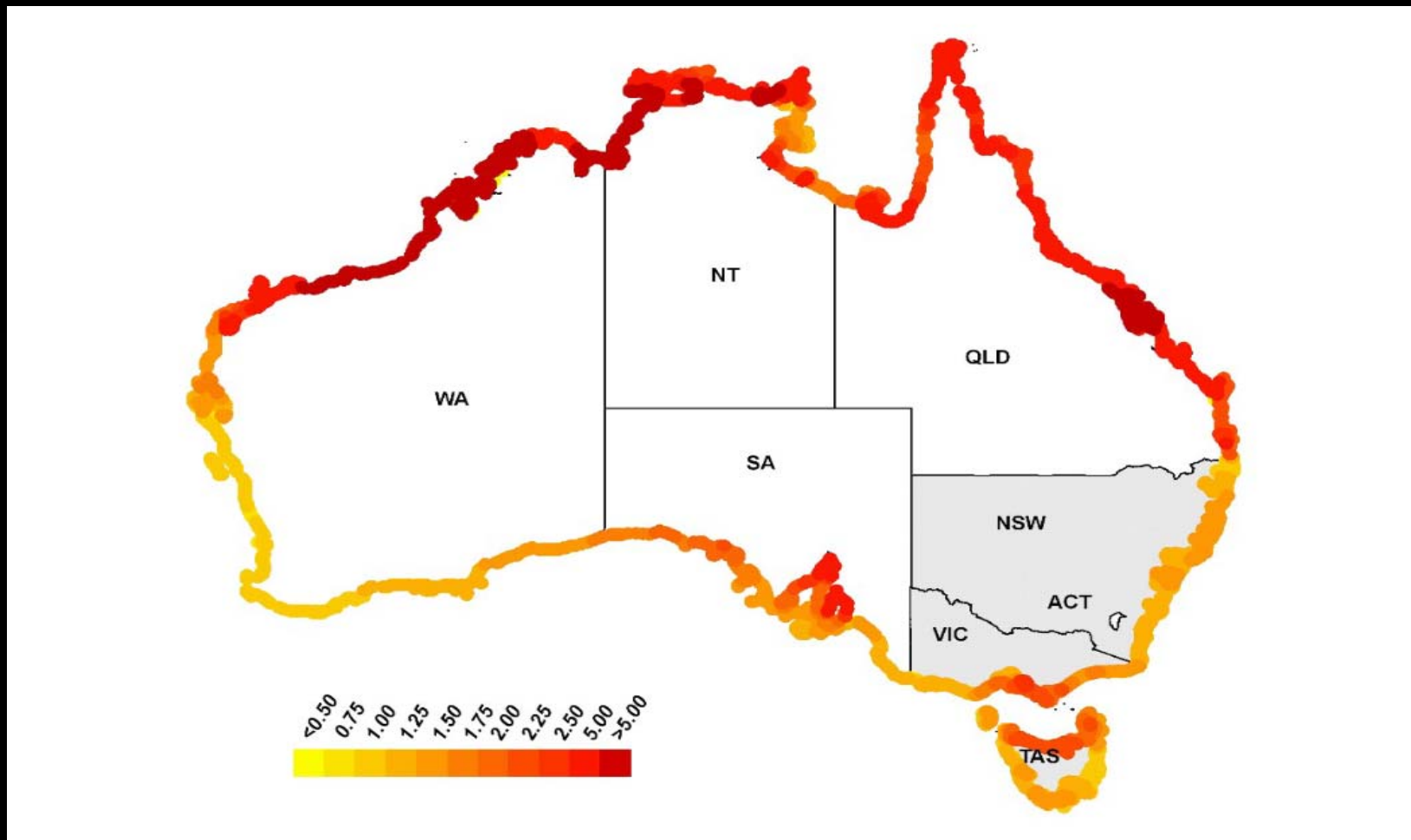
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Coastal Inundation

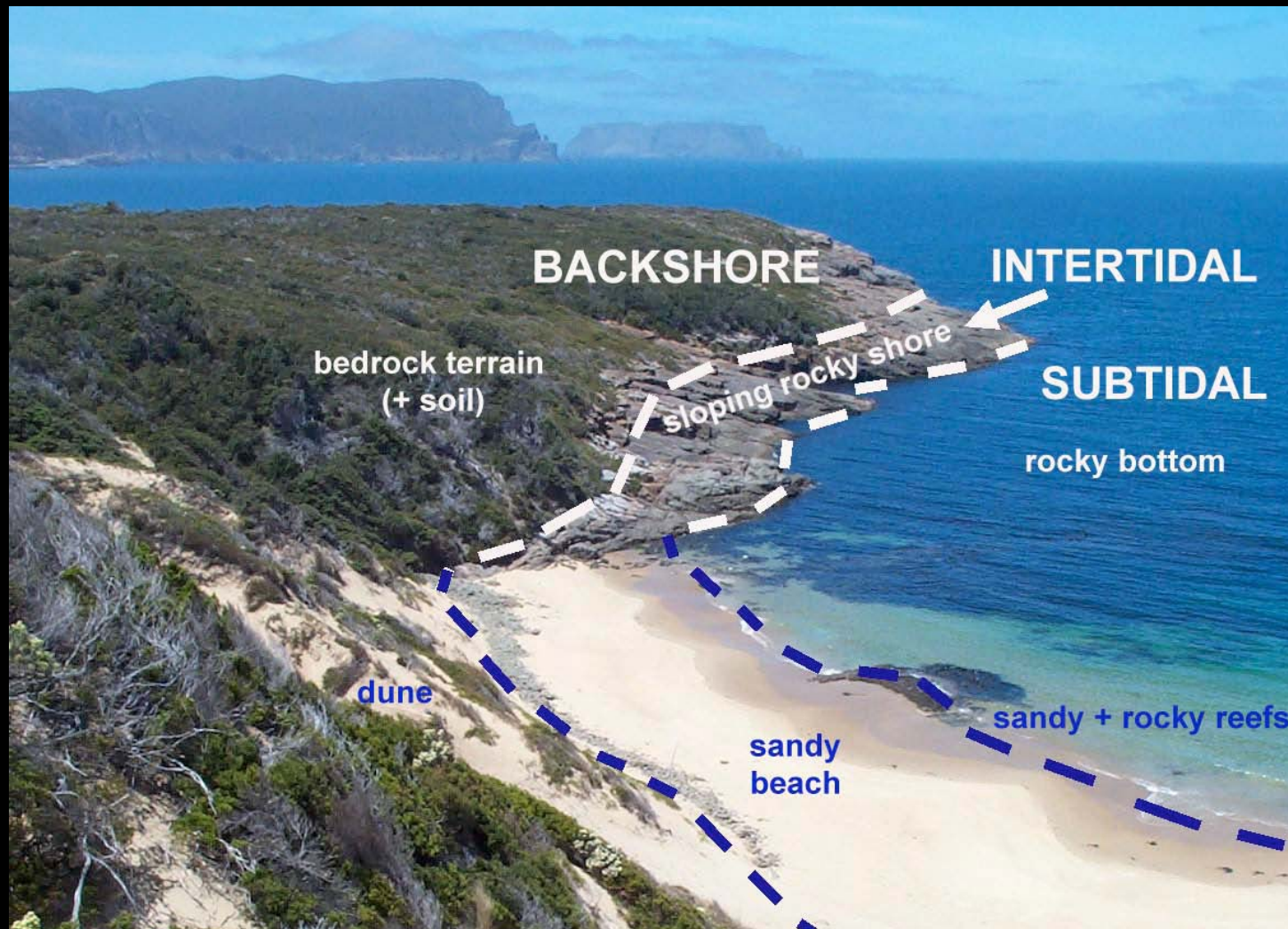
- Sea-level rise
- Tides
- 1 in 100 year storm surge



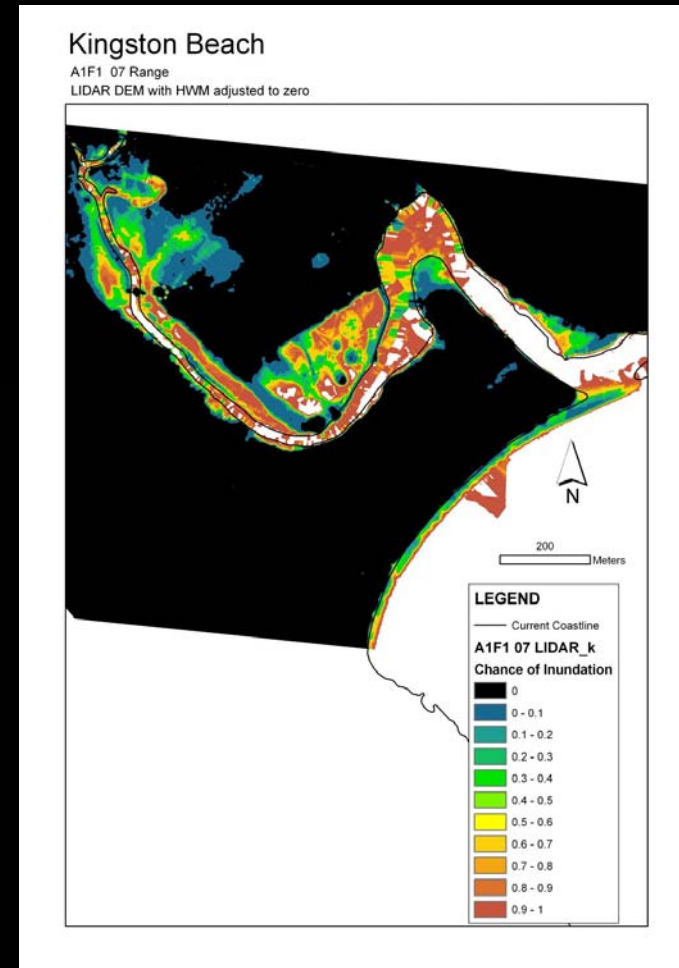
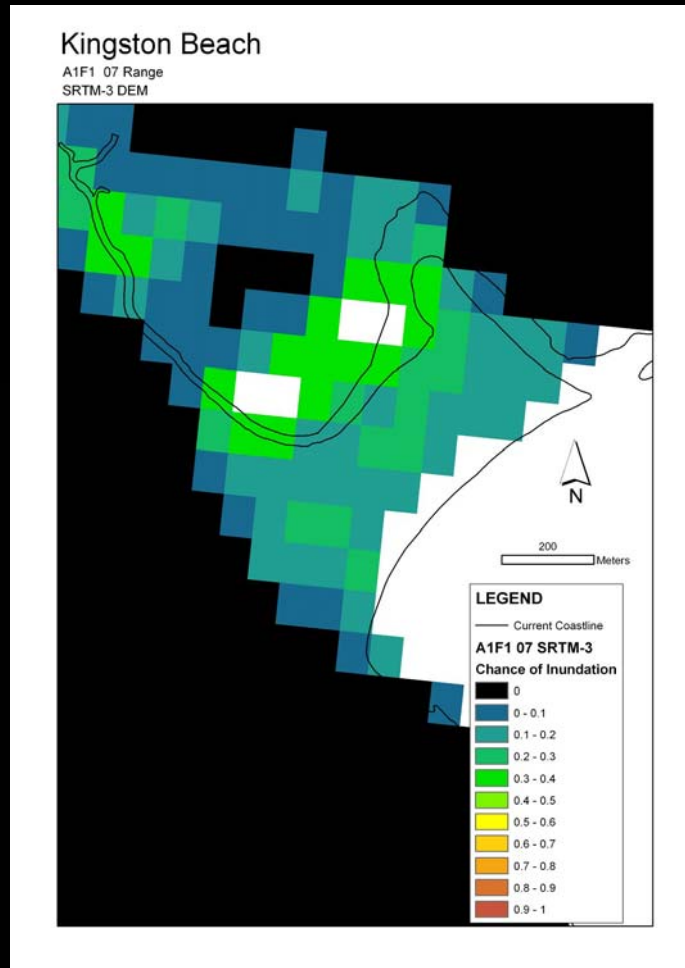
High Water Surface + Storm Surge



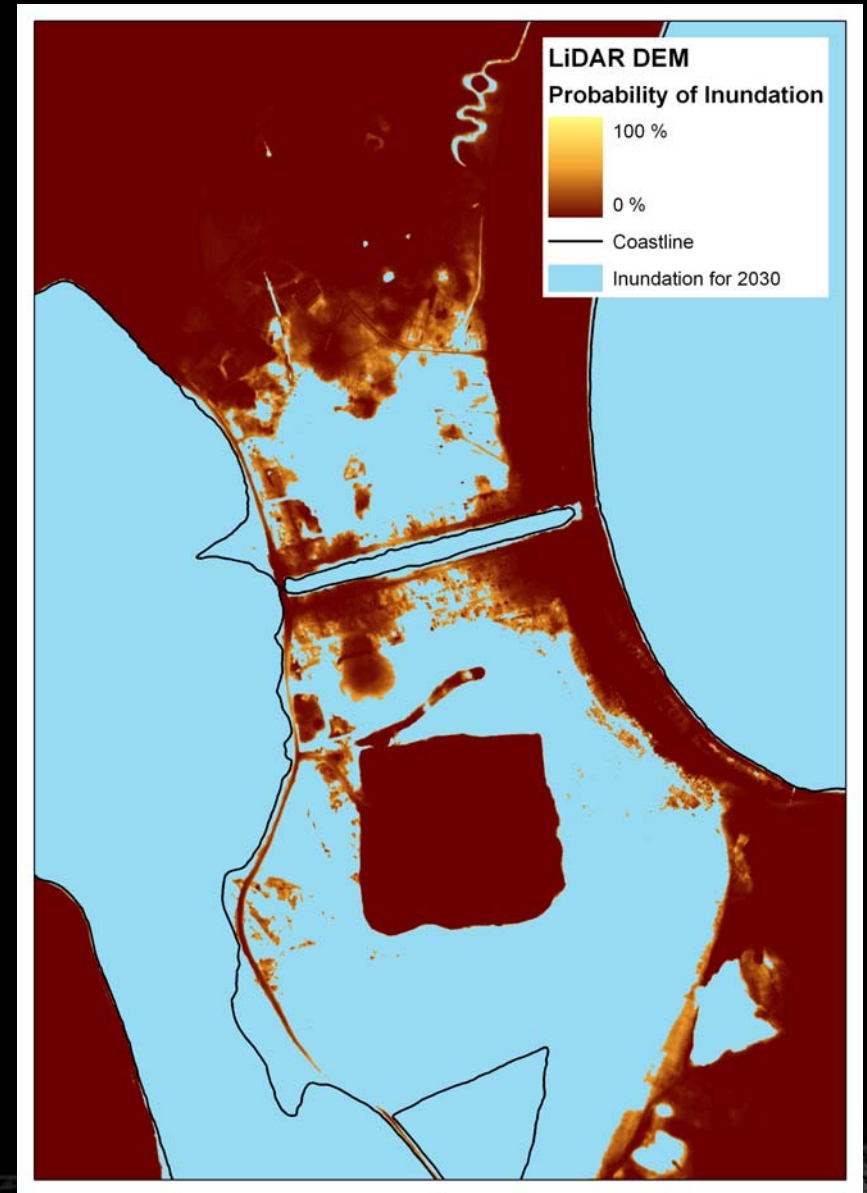
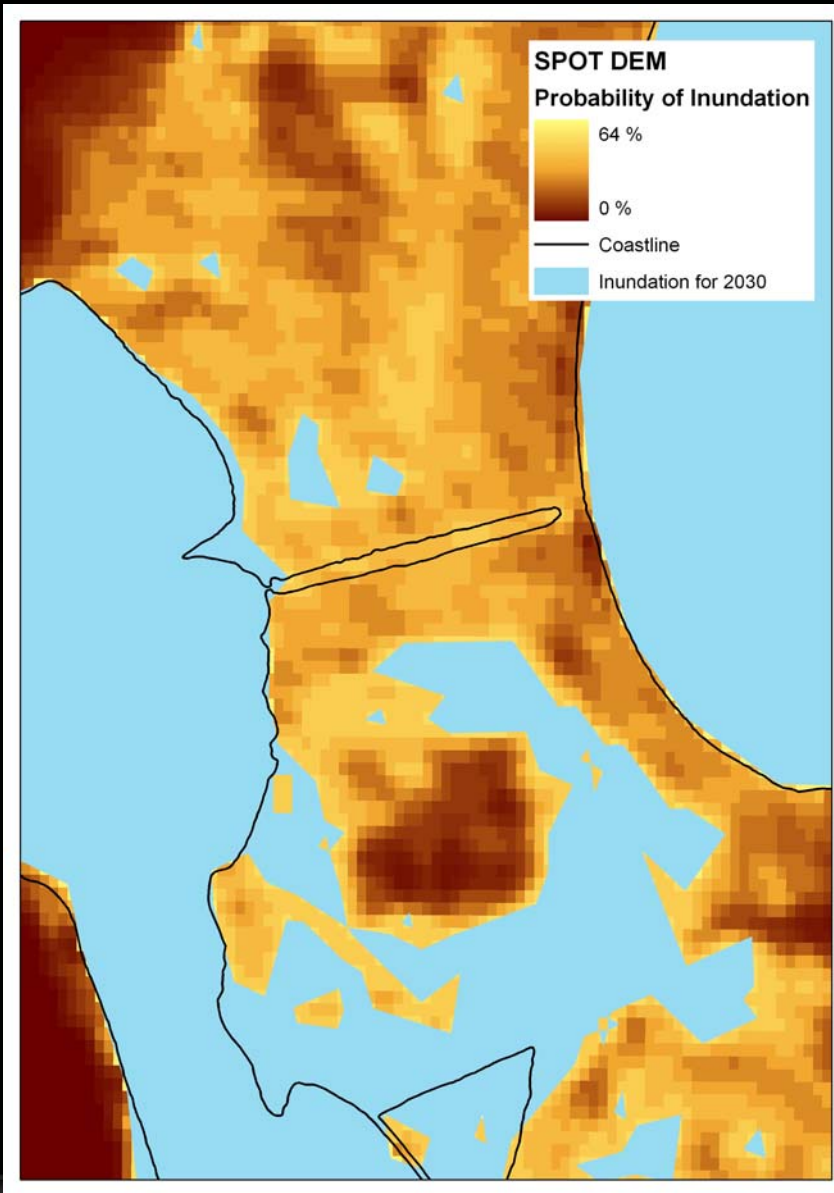
SmartLine: Geomorphic and Stability Mapping of Shoreline



Comparison of Inundation Levels Lidar vs SRTM 3-sec



Comparison between corrected SPOT and LiDAR DEMs



Future Coastlines Modelled



Combined Climate Change Impact



In Closing

- Spatial data is essential to understanding climate change risk.
- Risk = hazard x vulnerability x EXPOSURE
- Other vital data includes:
 - Digital Elevation Models
 - Coastal geomorphology
 - Post-disaster casualties, damage and loss
- Provides basis for informed decision making to reduce risk and adapt to climate change
- Spatial/mapping agencies have a vital role

Thank You

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