



bushfire&natural  
**HAZARDS**CRC

# IMPACT FORECASTING

Introducing a new project for 2017-2019

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Australian Government  
Department of Industry,  
Innovation and Science

**Business**  
Cooperative Research  
Centres Programme

## PROJECT TEAM

**Craig Arthur, Martin Wehner, Claire Krause, Mark Dunford, Mark Edwards, Jane Sexton, Russell Hay**  
*Geoscience Australia*

**Harald Richter (lead), Beth Ebert, Jeff Kepert, Russell Stringer,**  
*Bureau of Meteorology*

# PROJECT OBJECTIVE

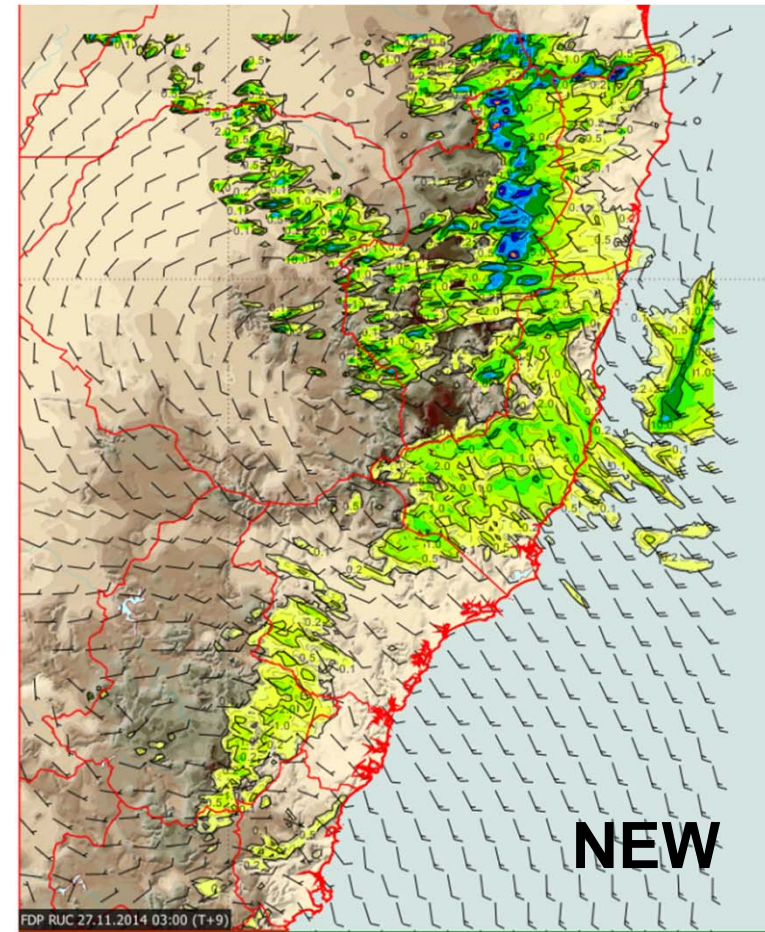
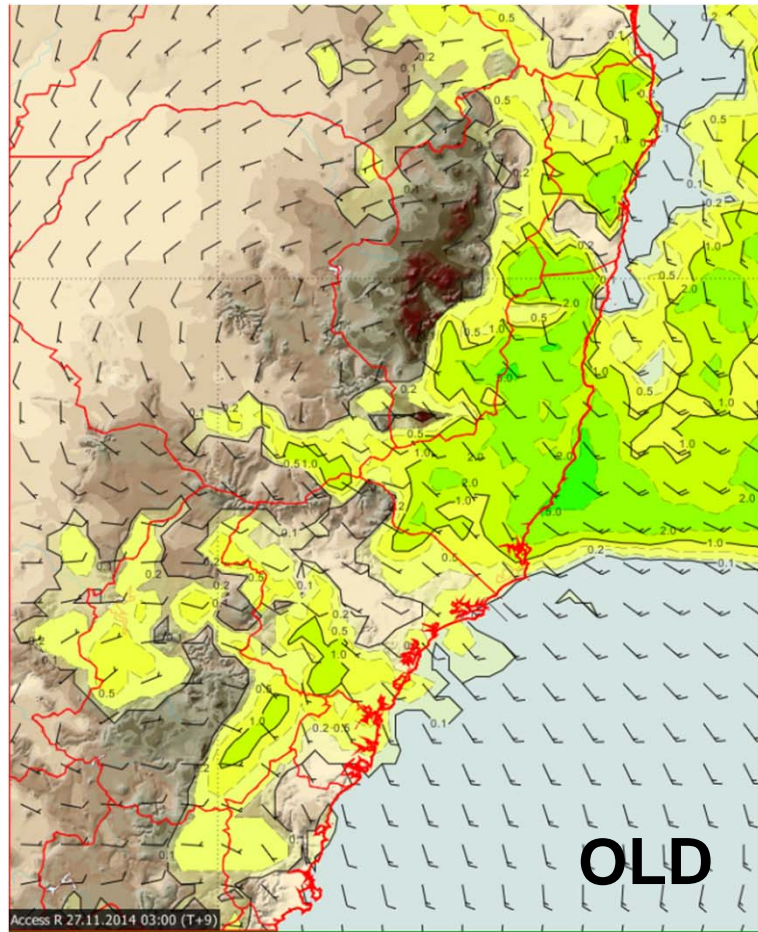
To develop a pilot capability that will make useful predictions of community impacts of extreme weather with the goal of improving timely mitigating actions by a range of stakeholders.



# PROPOSED METHODOLOGY

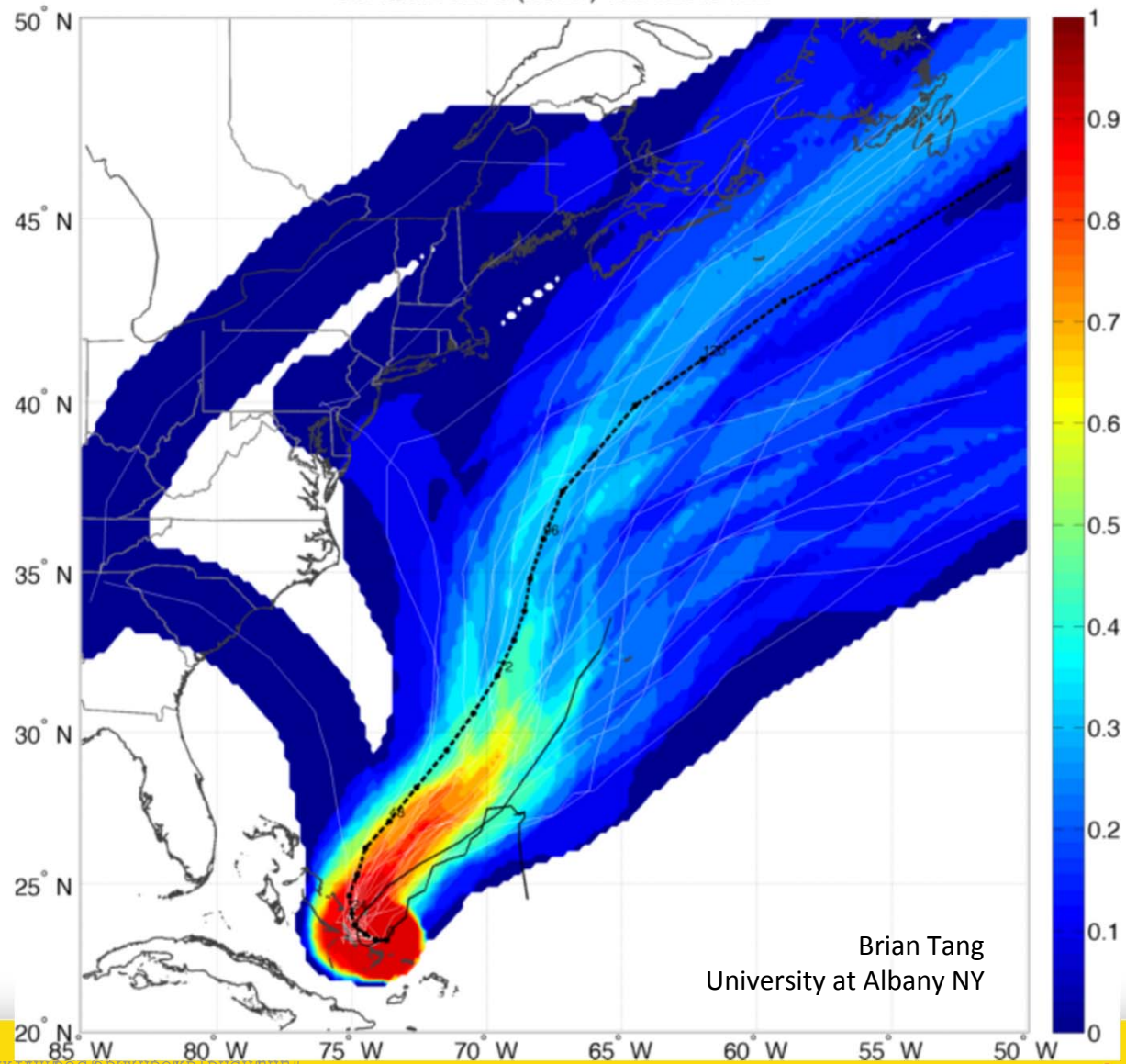
- 1) Project planning (including identification of use-cases, user requirements, available regional & national scale data, review of international approaches etc.)
- 2) Develop workflow to integrate high resolution meteorological prediction models with impact models and test results with historic data
- 3) Assess data issues relating to scale, uncertainty etc.
- 4) Develop impact statements that relate thresholds of hazard to impact
- 5) Trial workflow implementation and test with a range of users

# NEW BUREAU HIGH-RESOLUTION MODELS



# DEALING WITH UNCERTAINTY

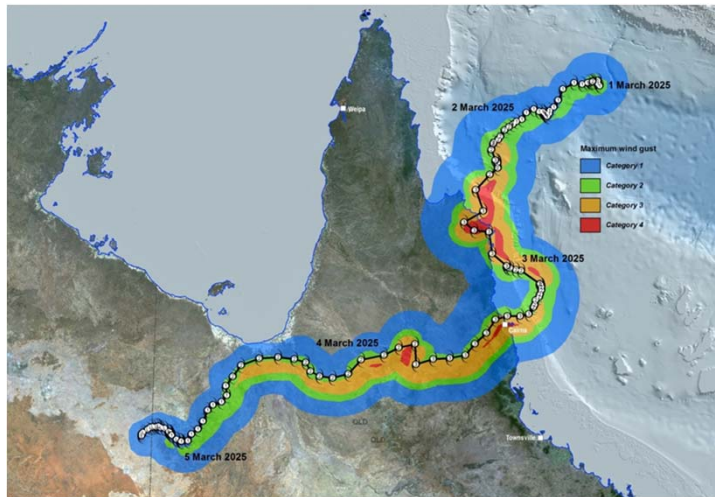
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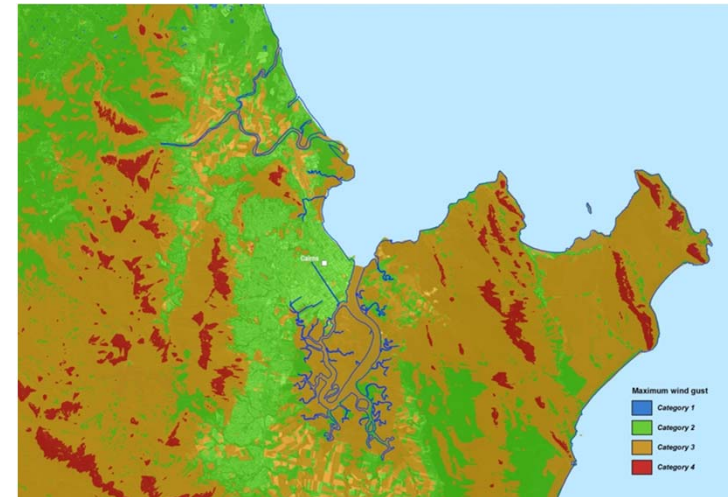
© 2015 NCEP/Climate Prediction Center  
534:

# EXPOSURE ASSESSMENT (hypothetical event)

Tropical Cyclone track and associated wind field



Wind Gust Strength (10m AGL)



People and assets exposed to the storm

155,000



52,000



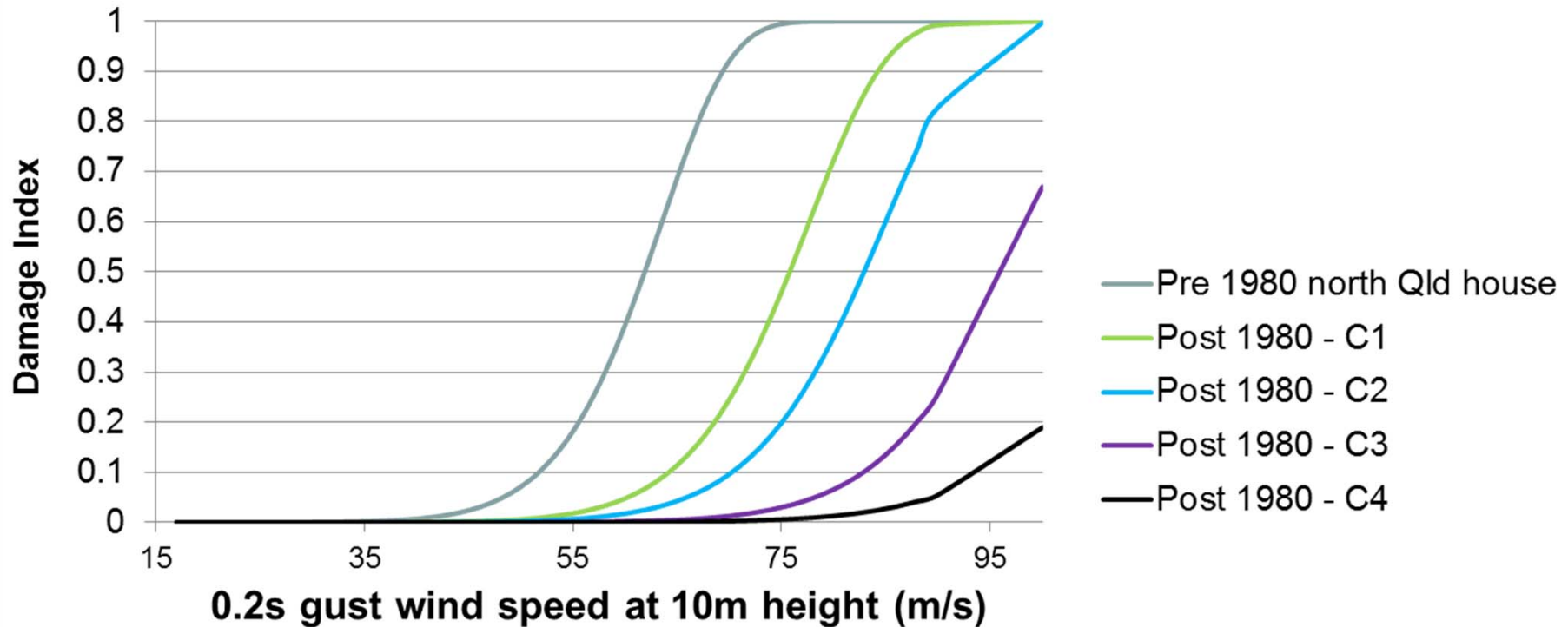
7



52



# VULNERABILITY ASSESSMENT



Quantification of how much more vulnerable older houses are compared to newer ones: A  $75 \text{ m s}^{-1}$  ( $270 \text{ km hr}^{-1}$ ) wind gust destroys a pre-1980 house, while a post-1980 C4 house suffers practically no damage.



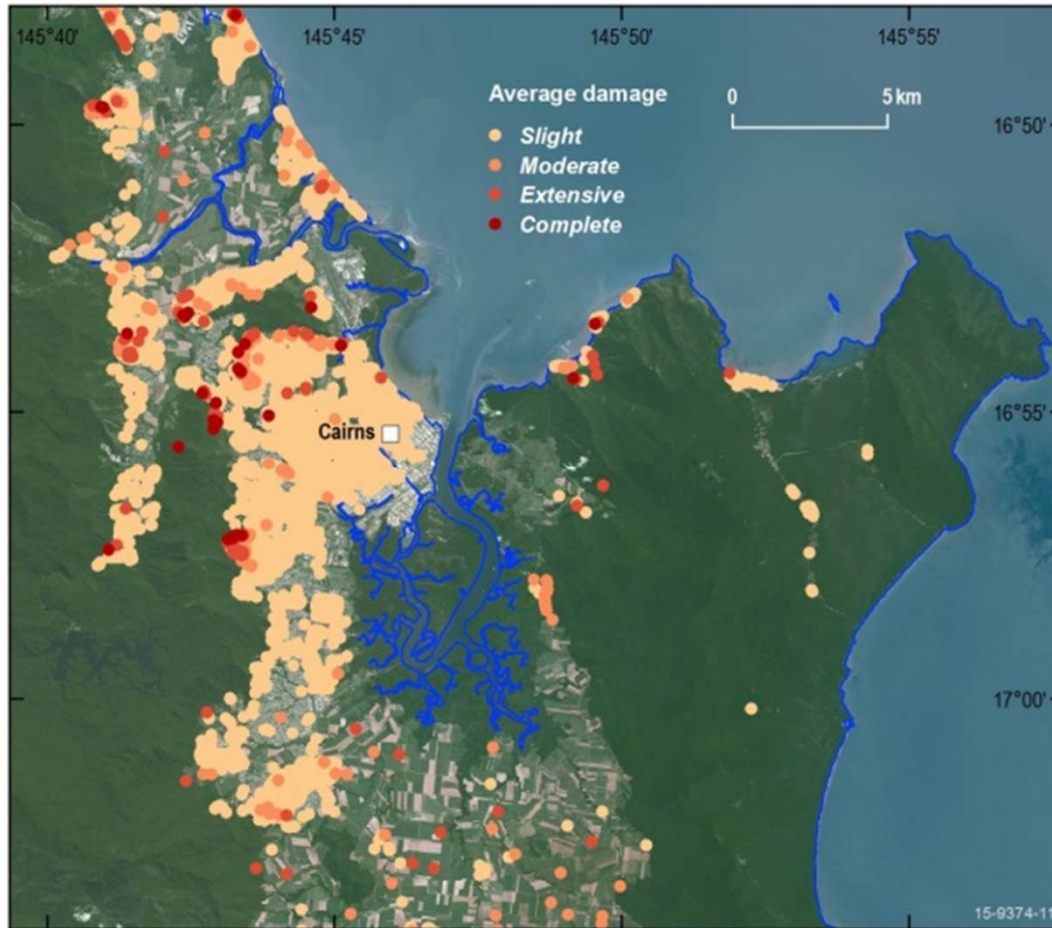
# IMPACT OUTPUTS



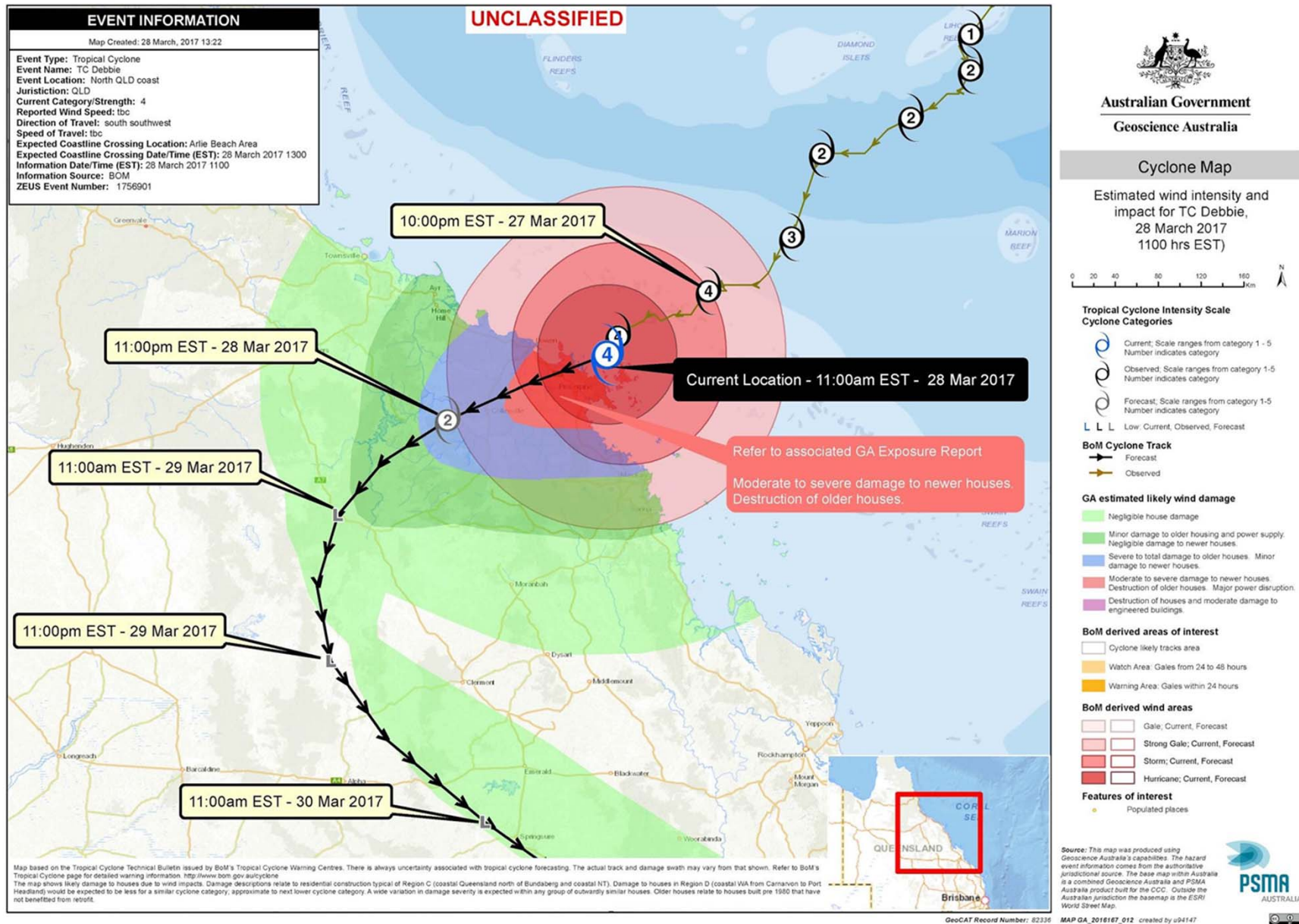
\$446mn



16,645



# TRIAL IMPACT PRODUCTS FOR THE CCC



# Geoscience Australia - Exposure Report

ZEUS Event#: 1756901

Event name: Tropical Cyclone - Debbie - Queensland - 28 March 2017

Event type: Cyclone

Report Date: 28-03-2017 13:32:32

LGAs within the event footprint: Whitsunday (R) (18.9%), Mackay (R) (3.8%)

Localities within the event footprint: Airlie Beach - Cannonvale, Bowen, Hamilton Island, Hideaway Bay - Dingo Beach (L), Midge Point (L), Mount Julian (L), Proserpine



Footprint data source: GA estimated Moderate to Severe wind damage based on BOM advice 43 28032017 1300

Building Exposure, V7 July 2016		Dwelling estimates where residents:		
Residential	Event	Demographic*	Event	QLD (Av)
Population count	16,017	Are all aged 65 or over	11.6%	13.2%
Dwelling count	7,773	Includes persons aged 14 years and under	25.8%	28.2%
Building count	6,774	Includes an indigenous person	3.4%	3.9%
Pre 1980 construction count	2,285	Are a single parent family	5.0%	4.8%
Pre 1990 probable asbestos containing products**	4,002	Are in need of assistance for self-care activities	7.6%	8.8%
Reconstruction value	\$3,599,700,000	Include persons not proficient in English	0.0%	0.5%
Contents value	\$428,990,000	Do not have access to a motor vehicle	4.9%	7.4%
Commercial		No one has completed Year 12 or higher	20.3%	19.0%
Building count	336	Moved to the region in the last 1 year	11.0%	12.3%
Reconstruction value	\$893,330,000	Moved to the region in the last 3 years	29.4%	36.1%
Industrial		Top 5 employing industry:		
Industrial Building count	55	Accommodation Food Services, Retail Trade, Construction, Transport		
Reconstruction value	\$67,640,000	Postal Warehousing, Mining		
2011 SEIFA IRSAD		Economic†	Event	QLD (Av)
Dwellings in area with a SEIFA decile 10 score (most advantaged)	-	Are low income (\$1-999/week)	31.8%	36.4%
Dwellings in area with a SEIFA decile 9 score	196	Are medium income (\$600-\$1,999/week)	60.4%	56.7%
Dwellings in area with a SEIFA decile 8 score	952	Are high income (\$2,000+/week)	6.2%	5.7%
Dwellings in area with a SEIFA decile 7 score	328	Are in public housing	3.0%	4.6%
Dwellings in area with a SEIFA decile 6 score	1,543	Are all unemployed	1.8%	0.9%
Dwellings in area with a SEIFA decile 5 score	615			
Dwellings in area with a SEIFA decile 4 score	989			
Dwellings in area with a SEIFA decile 3 score	1,757			
Dwellings in area with a SEIFA decile 2 score	1,175			
Dwellings in area with a SEIFA decile 1 score (most disadvantaged)	215			
Dwellings in area without a SEIFA score	3			

\*Residential demographic and economic information is not provided for dwelling counts less than 20

\*\*Buildings may contain asbestos cement materials, especially in the eaves, internal and external wall cladding, ceilings (particularly in wet areas such as bathrooms and laundries), corrugated products (roofing and cladding) and fences

Institution Exposure		Infrastructure Exposure	
Event	Event	Event	Event
Education		Transport	
School - Pre/Primary	5	Airport - Major Areas	2
School - Secondary	1	Airport - Major Terminals	2
School - Tertiary	-	Airport - Landing Grounds	12
School - Other (Combined, Special)	1	Road - Major (km)	97
Health and Welfare		Road - Arterial and Sub-arterial (km)	58
Hospital - Public	1	Railway - Station	14
Hospital - Private	-	Railway - Tracks (km)	229
Nursing Home	1	Maritime - Major Port	-
Retirement Home	1	Maritime - Ferry Terminal	1
Emergency Services		Utility/Energy	
Police Station	2	Power Station - Major Renewable	1
Fire Station	2	Power Station - Major Fossil Fuel	-
Ambulance Station	4	Transmission - Substation	1
SES Facility	4	Transmission - Electricity Lines (km)	197
Rural/Country Fire Facility	4	Liquid Fuel - Refineries	-
Government Facilities		Liquid Fuel - Terminals	-
Federal Court	-	Liquid Fuel - Depots	1
Medicare Office	-	Liquid Fuel - Petrol Stations	9
Centrelink Office	1	Gas Pipeline (km)	-
Diplomatic Facility	-	Oil Pipeline (km)	-
Consulate Facility	-	Off-shore Extraction Platform	-
Major Defence Facility	-	Waste Management Site	11
Correctional Facility	-	Waste Water Treatment Plant	4
Immigration Detention Facility	-	Major Dam Weirs	2
Local Government Offices	1	Telephone Exchange	5
		Broadcasting Studios (Radio and TV)	-

Business Exposure, ABR 2015			
Number of businesses	4,947	Number of Registered Charity Organisations:	17
Accommodation and Food Services	192	Number of Primary Producers	232
Administrative and Support Services	456	Agriculture and Fishing Support Services	35
Agriculture, Forestry and Fishing	232	Aquaculture	<5
Arts and Recreation Services	150	Dairy Cattle Farming	<5
Construction	957	Deer Farming	-
Education and Training	117	Fishing	20
Electricity, Gas, Water and Waste Services	12	Forestry and Logging	-
Financial and Insurance Services	159	Forestry Support Services	22
Health Care and Social Services	165	Fruit and Tree Nut Growing	12
Information Media and Telecommunications	22	Hunting and Trapping	<5
Manufacturing	195	Mushroom and Vegetable Growing	5
Mining	16	Nursery and Floriculture Production	7
Other Services	363	Other Crop Growing	68
Professional, Scientific and Technical Services	424	Other Livestock Farming	8
Public Administration and Safety	31	Poultry Farming	-
Rental, Hiring and Real Estate Services	414	Sheep, Beef Cattle and Grain Farming	49
Retail Trade	245	Transport, Postal and Warehousing	314
Transport, Postal and Warehousing	314	Wholesale Trade	58
Wholesale Trade	58	Unclassified businesses	425
Unclassified businesses	425		

Agricultural Exposure		
	Event	QLD (Prop)
Agriculture Commodity Estimated Value 2014-15:	\$135,872,000	1.4%
Estimated Agricultural Area (Ha):	150,400	0.1%
Commodities include: Beans french runner, Bees, Buffaloes, Capsicums, Chickens layers, Dairy cattle, Deer, Ducks, Eggs, Grapfruit, Horses other, Horses stud, Lemons, Lettuces, Limes, Lychees, Mandarins, Mangoes, Meat cattle, Melons, Nurseries, Oranges, Other cereals, Other citrus fruit, Other crops, Other crops for hay, Other livestock, Other nuts, Other orchard fruit, Other vegetables, Passionfruit, Pasture for hay, Pawpaws, Pigs, Pumpkins, Sheep lambs, Soybeans, Strawberries, Sugarcane crushing, Sugarcane newly planted, Sugarcane plants, Sugarcane standover, Sweet corn, Tomatoes, Vegetables seed		

The exposure report presents an overview of agricultural, building, business, demographic, institution and infrastructure exposure generated by GA's National Exposure Information System (NEXIS) for a specific event.

The National Exposure Information System exposure information includes:

**Agricultural Exposure:** The list of agricultural commodities and estimated value is based on the Australian Bureau of Statistics (ABS)

# NEXT USER ENGAGEMENT OPPORTUNITY

Meet in CSIRO Level 4 Meeting Room (= Room 4)  
tomorrow at 11:15 am