



Clare County Council

# *Climate Change and the Environment*

## *A New Reality*

**Impact on our Infrastructure:**

**The Clare Experience.**

Seán Lenihan

Senior Engineer

Clare County Council

*ESTG Conference, Clonmel, April 25<sup>th</sup> 2018*



# Overview



Clare County Council

- Inland Flooding
  - Damage to properties, roads, land, treatment plants, etc
- Storm Damage/Coastal Storm Damage
- Severe Winters
  - Winter maintenance, Frost damage to roads, bursts and leaks to water mains, etc.
- Risk to Critical Infrastructure
  - Treatment Plants, Bridges, Embankments, Substations, Telecom Masts, etc.
- Lessons Learned & Areas to Consider



# Positive Impact of CC!



Clare County Council



*Ba mhór ag an Taoiseach,  
an tUasal Leo Varadkar, T.D.,*

*Mr. Seán Lenihan*

*a bheith i láthair ag Fáiltiú  
i gCaisleán Bhaile Átha Cliath,  
chun aitheantas a thabhairt don obair  
a rinne tú mar fhreagra ar  
Stoirmeacha Ophelia agus Emma  
Dé Máirt, 17 Aibreán, 2018  
ó 7.00 p.m. go 9.00 p.m.*

*The Taoiseach, Mr. Leo Varadkar, T.D.,  
requests the pleasure of the company of*

*at a Reception in  
the State Apartments, Dublin Castle  
to acknowledge your work  
in response to  
Storms Ophelia and Emma  
on Tuesday, 17 April, 2018  
from 7.00 pm to 9.00 pm*

*ck: Gnó  
T.P. faoi 10 Aibreán 2018*

*Dress: Business  
R.S.V.P by 10th April 2018*

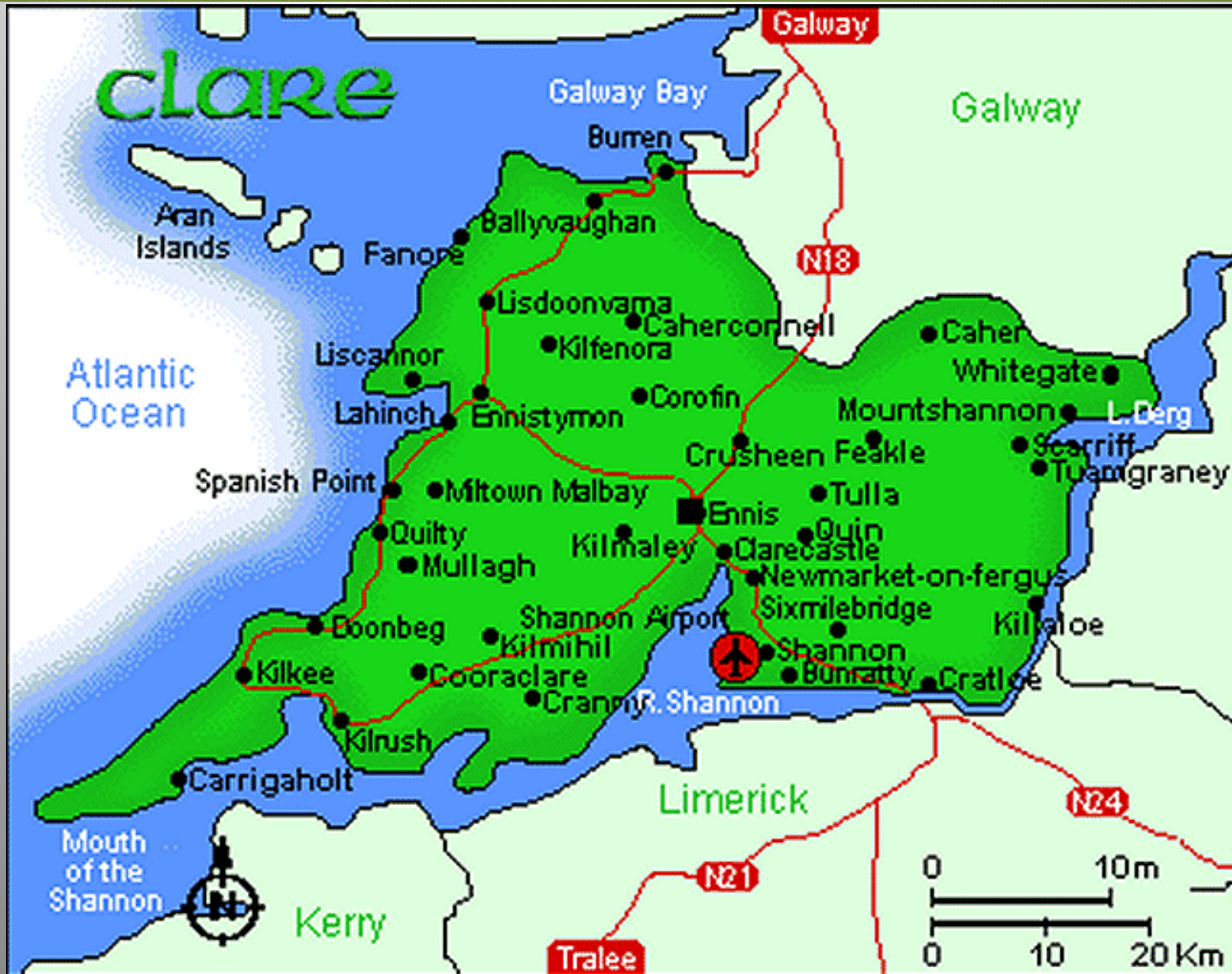




# Clare – an island nation!



Clare County Council



# Communities Flooded



Clare County Council



# Farms Flooded



Clare County Council



# Homes Flooded



Clare County Council



# Damage to Business



Clare County Council







# Inland Flooding



Clare County Council

- Ennis – town centre flooding and several locations in environs – 1995, 1999 and 2009
- Coincidence of elevated river levels, high tide and South West wind
- Approximately 80% resolved by relief schemes to date. Ennis South due to commence
- South East Clare – extreme inundation due to elevated levels in the Shannon forced to bypass Ardnacrusha
- Smaller scale flooding issues in North and East Clare / karst areas mainly







# Nov 2009 Flooding



Clare County Council





Clare County Council





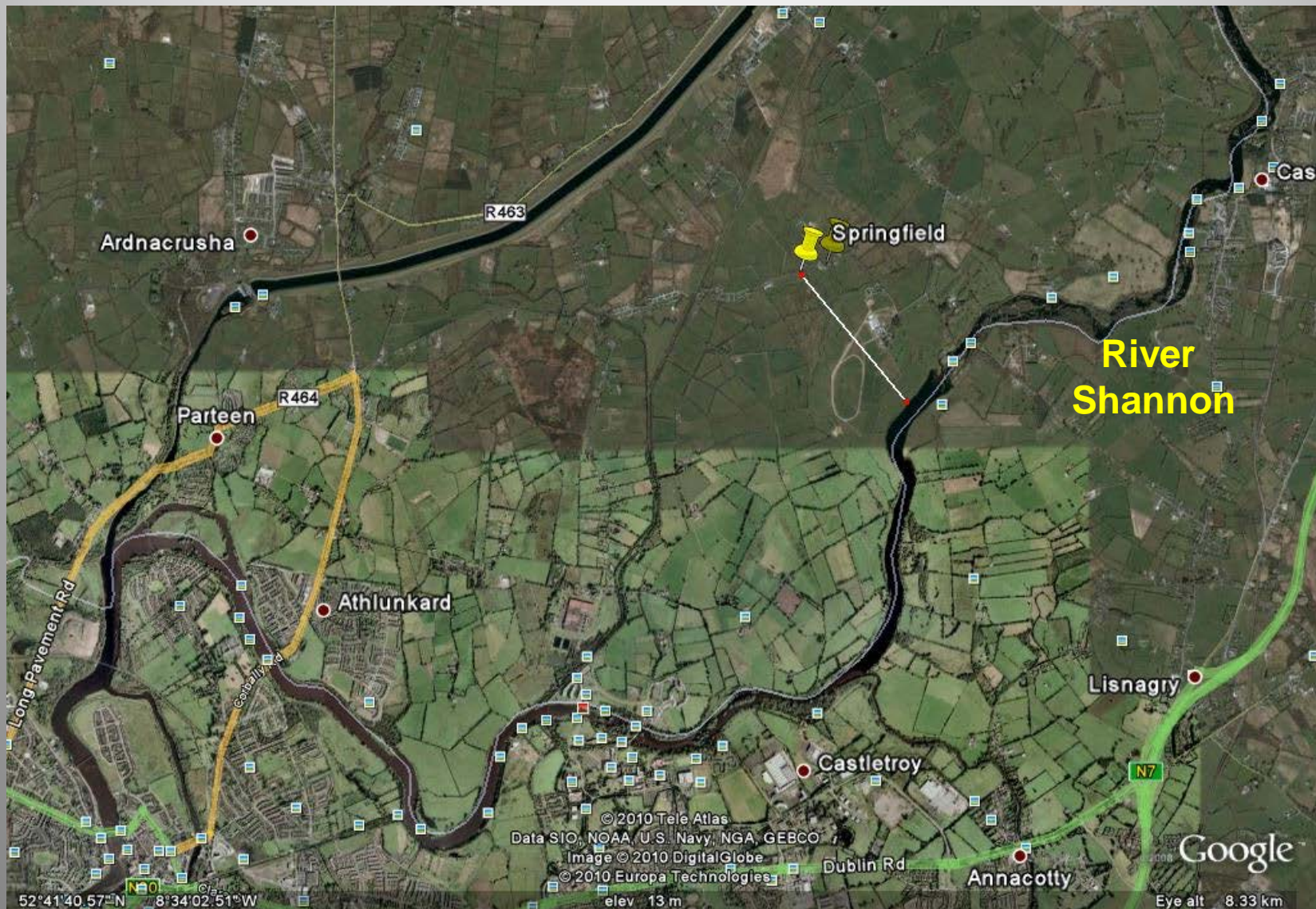




# Springfield, Clonlara



Clare County Council









# Springfield, Clonlara



Clare County Council





Clare County Council





# Flood Issues



Clare County Council

- Access issues due to roads impassable
- Emergency calls/People at risk
- Provide Sandbags & Pumps
- Media queries
- Work closely with the Guards, Army Civil Defence, GAA Clubs, Volunteers
- Clean up & Repair

# Sand bagging operation



Clare County Council



# Severe Winters





# Roads issues due to Frost



Clare County Council

- Winter Maintenance Plan
- Salting & Gritting at Local Level
- Local Grit deposits for Community
- Repair damaged Roads
- Pothole repairs following Thaw
- Clean up afterwards





# Winter Maintenance Plan

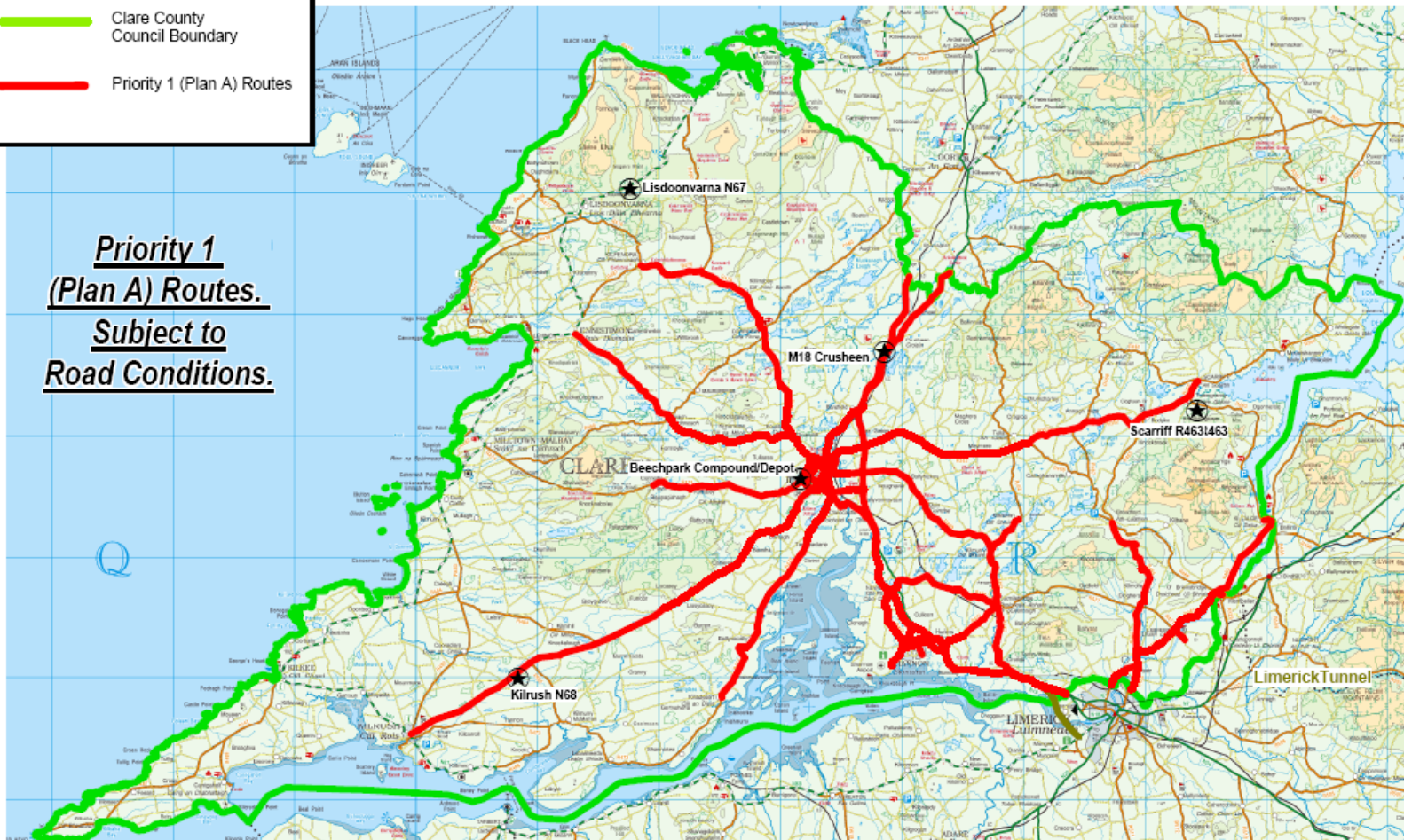


Clare County Council

**Legend :**

-  Clare County Council Boundary
-  Priority 1 (Plan A) Routes

**Priority 1**  
**(Plan A) Routes.**  
**Subject to**  
**Road Conditions.**




**CLARE COUNTY COUNCIL-Salting Routes Winter 2011/2012 Priority 1 (Plan A) Routes**





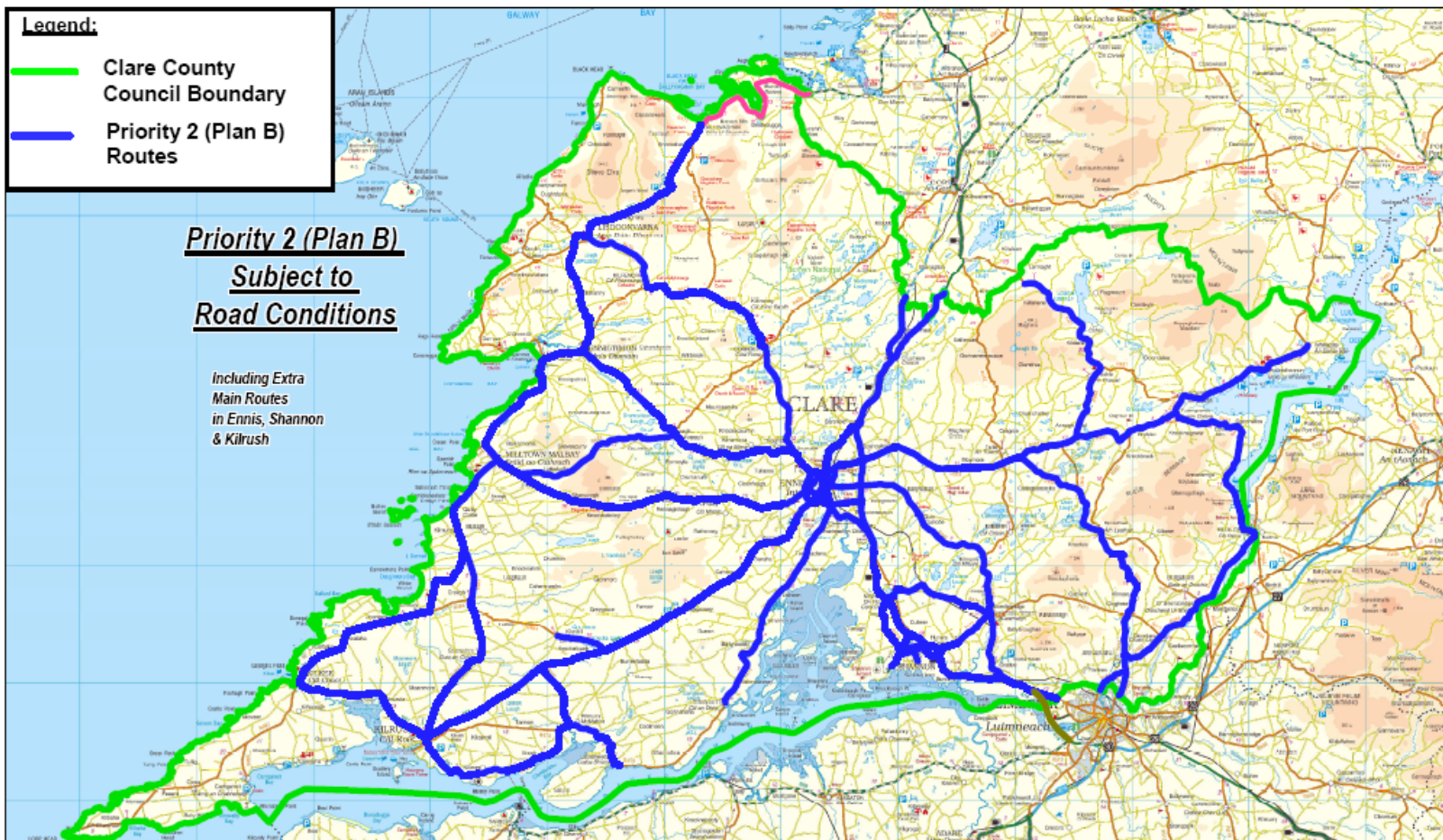
Clare County Council

**Legend:**

-  Clare County Council Boundary
-  Priority 2 (Plan B) Routes

**Priority 2 (Plan B)**  
**Subject to**  
**Road Conditions**

*Including Extra  
Main Routes  
in Ennis, Shannon  
& Killrush*



**CLARE COUNTY COUNCIL - Salting Routes Winter 2011 / 2012 - priority 2 (Plan B) Routes**

Last Amended: October 2011







# Water Services related Issues



Clare County Council

- Considerable Public breaks & bursts
- Considerable Private side Leaks
- Demand increases due to running taps
- Power outages at Plants
- Provision of Tankers, Standpipes
- Access issues for Plant Caretakers
- Shallow services in Estates



# Coastal Storms



Clare County Council

- Jan & Feb 2014 & again in 2016
- “Perfect Storm”
- High winds
- High tides
- Swells between 0.5 and 1m
- Variation in wind direction resulting in different damage locations



# Nature of Damage



Clare County Council

- Demolition/undermining of sea walls
- Seaside Resort facilities destroyed
- Dune systems compromised or washed away
- Roads compromised or destroyed
- 1000's of tons of sea rubble and shingle thrown long distances inland



Clare County Council

- Over 40 public infrastructure locations along the coastline in Jan 2014
- Public and private property including Doonbeg Golf Club.
- Highest recorded gust in country in Shannon
  - almost 160km/hr
  - 1,000 trees fallen



# Tree Damage



Clare County Council







# New Quay



Clare County Council



- Over 3km of coast road damaged
- Coastal defences found to be inadequate and needed to be reinstated/strengthened
- Total estimated cost of remediation:  
**€3.8million**



# Lahinch



Clare County Council





# Lahinch



Clare County Council

- Rock armour defences destroyed over a distance of more than 1.5km
- Promenade walls damaged/removed
- Promenade undermined and pulverised by wave power
- Damage to car parks, playground, surf school, Lifeguard station, etc.
- Total estimated cost of remediation:  
**€6.7 million**



# Clounahinchy, Quilty



Clare County Council

- Dune system obliterated or seriously eroded over a distance of 2.2km
- Up to 20 houses / Road network left exposed to wrath of next Spring tide
- A number of houses flooded and evacuated at night
- Estimated costs:  
***€5.2 million***

# Clounahinchy, Quilty



Clare County Council



# Clounahinchy, Quilty



Clare County Council





# Kilkee



Clare County Council

- Several significant breaches in historic sea walls
- Major wall destabilisation resulting in collapse of Strand Line
- Destruction of extensive paved spaces, walkways and various other structures.
- Estimated cost:  
**€3m**



# Kilkee



Clare County Council







# Kilkee



Clare County Council





# Kilbaha



Clare County Council

- Total destruction and undermining of significant sections of sea wall
- 150m of Regional road completely removed along with supporting sea wall
- Regional Road closed for 6 weeks
- Total estimated cost of remediation:  
**€3.5 million**



# Kilbaha



Clare County Council





# Kilbaha



Clare County Council





# Kilbaha



Clare County Council





# Learning Outcomes



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- Ability/Competency/Staff to lead and manage such crisis
- Not set up for long term 24/7
- Importance of good interagency relations - ESB, OPW, Met Eireann, Guards, HSE, Civil Defence, Coast Guards, Volunteers, etc.
- Media Relations
  - Helpline/Text Alerts/Website updates
  - Community Specific Messaging
- Benefit/necessity of ongoing training
  - MEM, CMT, Exercises, Preparedness



# Areas to consider



Clare County Council

- Funding issues. Repair or Replace?
- Who is responsible now/in future?
- Balance between Tech/Env/Econ
- Management of Data
  - Accurate recording of Information
  - Levels, Photographs, Extent maps, etc.
- Availability of Jeeps/Ploughs/Tankers
- Health, Safety and Welfare Issues
  - Public **and** Staff (Red Warning)



***Thank You.***