# ENGINEERING BEST PRACTICE

## Where are we at?
## “Climate Change in Context”



MWH

BUILDING A BETTER WORLD

# Engineering Best Practice

**Intervention + Adaptation + Innovation ≥ Standard of Living & Existing Infrastructure "Security"**

- Cultural
- Environmental
  - Climate Change Policies
- Economic
- Social
- Combination of Actions or Activities
  - Safety net at top of cliff or Ambulance at bottom of cliff (Proactive or Reactive)
- Standards
  - Incorporating climate change
- Values
- Attitudes
  - To Climate Change

Planning Horizons Important

10, 20, 50 100, 500 years

# Engineering Best Practice

## Best Practice : Definition

“A best practice is a technique or methodology that, through experience and research, has been proven to reliably lead to a desired result.”

Source: whatis.com

# Engineering Best Practice

## Indicative Impacts on Design Parameters from Climate Predictions (Planning horizon 100 years)

| Design Parameter | Infrastructure Impact | Indicative Scale of Impact |
|---|---|---|
| Mean Sea Level | • Land Use • Stormwater<br>• River & Drainage Systems | • 0.8m sea level rise<br>• Significant loss of LOS |
| Storm Surge | • Landuse<br>• Coastal protection | • All land & infrastructure below RL 5m |
| Runoff Volume | • Hydroelectric storage<br>• Resource/Storage capacities<br>• Wastewater systems | • Effectiveness reduced by 100%<br>• Overflow doubled or trebled<br>• LOS reduced by 50% |
| Annual Excellence Probability | • Levels of service | • Typically halved |
| Rainfall Intensity | • Stormwater<br>• Drainage & flood protection | • Increased by 16% |

# Engineering Best Practice

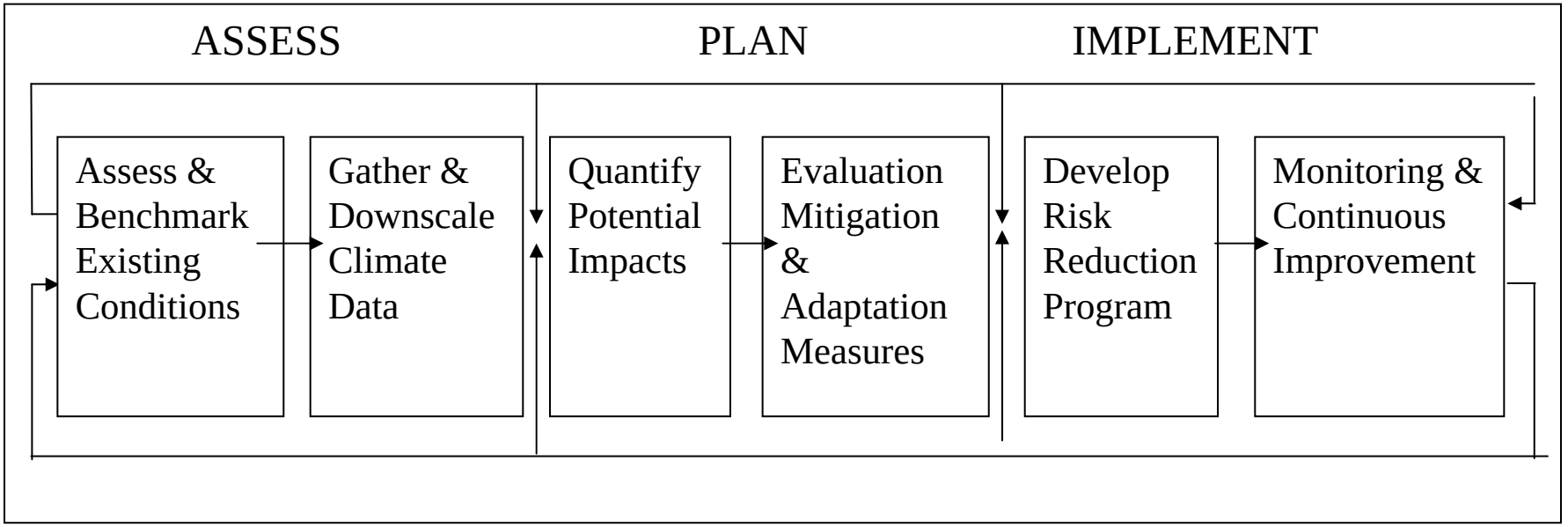
## Intervention

- IPCC
- Central government Policies
- Regional Council Strategies (RPSs)
- Regional Council Planning Documents
- TLA District Plans
- Insurance

# Engineering Best Practice

## Example City Planning:

## Climate Risk Reduction Program: (Part of outcome of the process from Chicago City Case Study)




*Intervention*

# Engineering Best Practice


Climate Change Proofed Housing
14 Jul 07, hits:168

*Intervention*

# Engineering Best Practice

## Adaptation

Implementation driven by:

- Policies and strategies (National, Regional & Local)
- By adoption of Standards (National & Local)
- Guidance Manuals
- By a risk based approach
- Combination of all four

# Engineering Best Practice

## Government Guidelines

- MfE Preparing for Climate Change (2nd Edition)
- MfE Climate Effects & Impacts Assessment – a guidance manual for LG in NZ (2nd Edition)
- MfE Coastal Hazards & Climate Change (Guidance Manual) (2nd Edition)
- MfE River Flooding & Climate Change : Guidance for Local Government (2008)

*Adaptation*

# Engineering Best Practice

## UK Standards Based Approach

- DEFRA - Planning Policy Statement 25
- Development & Flood Risk (2006)
- Annex B

Table B.1 Recommended contingency allowances for net sea level rise

| Administrative Region | Net Sea Level rise (mm/yr) Relative to 1990 | | | |
|---|---|---|---|---|
| | 1990 to 2025 | 2025 to 2055 | 2055 to 2085 | 2085 to 2115 |
| East of England | 4.0 | 8.5 | 12.0 | 15.0 |
| South West | 3.5 | 8.0 | 11.5 | 14.5 |
| NW England | 2.5 | 7.0 | 10.0 | 13.0 |

Table B.2 Recommended national precautionary sensitivity ranges for peak rainfall intensities, peak river flows, offshore wind speeds and wave heights

| Parameter | 1990 to 2025 | 2025 to 2055 | 2055 to 2085 | 2085 to 2115 |
|---|---|---|---|---|
| Peak rainfall intensity | +5% | +10% | +20% | +30% |
| Peak river flow | +10% | +20% | | |
| Offshore wind speed | +5% | | +10% | |
| Extreme wave height | +5% | | +10% | |

# Engineering Best Practice

**Innovative Actions to Integrate Climate Change Impacts**

***"Proceed with Caution"***

- Many options available
- Need to be integrated into overall planning process
- Need to be supported by good science and backstopped with robust national engineering standards, codes of practice and guidelines

# Engineering Best Practice

## Approaches

- Reduction in Levels of Service
- Innovative Planning Rules
- Indemnity Provisions
- Civil Defence and Emergency Planning

- Business as usual
- Shorten planning horizons
- Flexible design
- Essential services
- Location review

**Tests:** Are they sustainable?

Are they socially acceptable?

Economic & lifecycle analyses essential

# Engineering Best Practice

# Engineering Best Practice

## Summing Up

**Intervention + Adaptation + Innovation ≠ ? ≠ Standard of Living**
**Existing Infrastructure Security”**
**Social expectations**
**Social adaptation**

# Engineering Best Practice

## Conclusions

- Climate change is happening and needs positive action
- National leadership from Central Government is required
- The risk based approach is currently not yet standardised
- Traditional Engineering Standards and COP are no longer valid
- There is a demand for a standards base approach
- The traditional concepts of levels of service and KPI's are seriously under challenge
- Innovation provides some interesting non traditional solutions which have not yet had the sustainability test.

# Engineering Best Practice

## The "KEY" Challenge

Are we ready to:

- Be involved in the decision making process to prioritise and adapt to Climate Change?
- Include Climate Change adaptation in our planning and design processes?
- Include Climate Change mitigation & innovation in our design solutions?
- Establish Best "National" Practice?