ASSET DETERIORATION – ASSESSMENT AND MEASUREMENT

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Ability for an asset to fulfil its function

- Protection against flood and coastal erosion
- But also access, health and safety, and environmental functions
ASSESSMENT OF AN ASSET

Deterioration:
- has a negative effect on the overall performance of the structure
- is a time dependent process
Assessing performance

Life time (years)

Condition/performance

Threshold for performance level

Threshold for decommissioning

Intervention

DETERIORATION CURVE
Assessing performance

Condition/performance vs. Life time (years)

- Threshold for performance level
- Threshold for decommissioning

Interventions

DETERIORATION CURVE
ASSESSMENT AND MEASUREMENT OF ASSET DETERIORATION INCLUDING WHOLE LIFE COSTING

• Phase 1 (2007-2009)
  – Building on past experience, initial user guidance

• Phase 2 (2009 – 2012)
  – Detailed monitoring of actual deterioration under different maintenance regimes
  – Developing and testing practical methods/tools for predicting future deterioration and WLC
  – Improved practical guidance for different maintenance regimes
Project Governance

- **EA Project Executive:** Lindsay Hensman
- **EA Project Manager:** Stefan Laeger
- **R&D Theme Manager:** Dr Geoff Baxter
- **Contractor:**
  - Phase 1: HR Wallingford, Royal Haskoning, Peter Lawton
  - Phase 2: Halcrow
Outcomes and benefits

• **Improved understanding** of asset deterioration and how it links to performance
• Improving **the way we manage** our flood defence assets
• Intervening at the **best time** within an asset’s life cycle
• **Optimising whole life costs**
Phase 1: final outputs

1. Background information
2. Conceptual framework
3. Collation of available knowledge
4. Practical guidance on deterioration curves
5. Approach to Phase 2
Conceptual framework for deterioration curves

Statistical models

- Identify DETERIORATION PROCESSES
- Identify KEY VARIABLES
- DETERIORATION EQUATIONS

Empirical data

- Expected DESIGN LIFE
- Changes in CONDITION GRADE
- CONDITION FEATURE monitoring

Description of time-dependency

DETERIORATION CURVES
Conceptual framework

Integrated WLC model

Input
- Asset
  - Type
  - Expected life duration ($n$)
- Deterioration rates
  - Condition ($k$)
  - Maintenance regime

Costs
- Capital costs ($C_c$)
- Operating costs ($C_o$)
  - Maintenance ($C_m$)
  - Refurbishment ($C_r$)
- Decommission costs ($C_d$)

Model

Output
Whole life costs for flood defence assets

Relation between deterioration rates and whole life costing
Collation of available knowledge

Asset managers from EA and maritime Local Authorities
1. Significant **variations in the life of assets** around the country (initial quality, aggressiveness of loadings, degree and quality of maintenance)

2. Three main factors:
   - deterioration of material,
   - instabilities of asset foundations,
   - loadings

3. Deterioration and maintenance of **culverts and channels** is as important as defences.
CONSULTATION FINDINGS

4. Hard defence maintenance is restricted to minor repairs (e.g. repointing of brickwork, resealing of joints)

5. Significant expenditure on assets for **non flood risk management** requirements, such as health and safety (e.g. maintaining handrailing)

6. Importance to carry out the characterization of asset performance at a **system** level
Deterioration curves and guidance on how to use them

- Covers vertical walls, embankments, culverts, dunes, shingle beaches
- Allows to quantify **residual life** of different types of assets
• Allows for assessment of composite assets

• Maintenance or no maintenance

• Best, fastest and slowest estimate

Vertical wall - Fluvial Environment - Brick&Masonry/Concrete
- Includes step by step guide and worked examples

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**But beware**

- Values are for guidance **only**
- Essential to use **engineering judgement** and practical experience
Operational use

• **Additional resource** for local asset managers

• Supports the preparation of **SAMPs**

• Can also support **national and regional assessments** of investment needs

• Does **not** make decisions but provide asset managers with the **ability to assess different options**

• Available from **EA publications catalogue** (search for ‘asset deterioration’)


Phase 2

3 years research project to be completed by summer 2012

• Series of pilot studies being monitored for deterioration and maintenance as well as historic back analysis of other sites

• New deterioration curves being developed for 3 levels of maintenance and 3 levels of exposure

• Whole life cost model being developed based on costs of maintenance, refurbishment and renewal
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THANKS!