

SIMPLIFIED TOOLS FOR RISK ASSESSMENT

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FRMRC II - Practitioner workshop on asset management
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SIMPLIFIED TOOLS FOR RISK ASSESSMENT

The purpose

Quantify the change of risk due to a particular
management intervention



SIMPLIFIED TOOLS FOR RISK ASSESSMENT

The user

Easily applied - can be run from a PC with a few clicks
With limited data

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Microsoft Excel - RAFT_V001_RevA.xls [Read-Only]

Environment Agency

Launch RAFT Tool

Asset Risk Attribution - a Field-based Tool (RAFT)

Press 'F1' key within RAFT for help with any input. All files from the zip archive must be present to use the help facility.
The screen resolution must be set at 1024 x 768 or higher in order to use the tool.
The tool creates two folders in the directory in which it is being run - one for RAFT output and one for working files.

The following shows the different stages that must be followed in order to estimate the Risk that is attributable to an unserviceable asset:

```

    graph LR
      A[PROJECT INFORMATION] --> B[ASSET TYPE/CONDITION]
      B --> C[WATER LEVEL INFORMATION]
      C --> D[CONSEQUENCE INFORMATION]
      D --> E[RISK]
  
```

The RAFT Tool has been developed by HR Wallingford Ltd for the Environment Agency

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Dave Dennis (Project Manager)

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D	E	F	G	H	I	J	K	L	M	N	O
2.1	3.3	1.7	3.6	459.7	463.3	460.853	1.05	459.803	-0.1	-0.1	
2.2	3.4	1.7	3.8	459.6	463.4	460.853	1.05	459.803	-0.2	-0.2	
2.3	3.6	1.7	4	459.4	463.4	460.853	1.05	459.803	-0.4	-0.4	
0.8	1.9	1.7	1.3	637.1	638.4	637.45	1.66	637.79	1.3	1.3	
0.9	2.2	1.7	1.5	637	638.5	637.45	1.66	637.79	1.2	1.2	
1	2.5	1.7	1.7	637	638.7	637.45	1.66	637.79	1.2	1.2	
1.1	2.7	1.7	1.9	636.9	638.8	637.45	1.66	637.79	1.1	1.1	
1.2	2.8	1.7	2	636.8	638.8	637.45	1.66	637.79	1	1.0	
0.5	1.7	2	1	658.4	659.4	658.4	1.72	656.68	1.7	1.7	
0.6	2	2	1.2	658.4	659.6	658.4	1.72	656.68	1.8	1.7	
0.7	2.4	2	1.4	658.4	659.8	658.4	1.72	656.68	1.7	1.7	
0.8	2.6	2	1.5	658.4	659.9	658.4	1.72	656.68	1.7	1.7	
0.8	2.8	2	1.7	658.3	660	658.4	1.72	656.68	1.7	1.6	
0.5	1.3	2	1	623.9	624	624.12	1.6	622.52	1.4	1.4	
0.6	1.5	2	1.2	623.7	624.9	624.12	1.6	622.52	1.2	1.2	
0.7	1.6	2	1.3	623.7	625	624.12	1.6	622.52	1.2	1.2	
0.7	1.8	2	1.5	623.6	625.1	624.12	1.6	622.52	1.1	1.1	
0.8	1.9	2	1.6	623.5	625.1	624.12	1.6	622.52	1	1.0	
0.7	1.6	2.5	1.8	636.1	637.9	636.48	1.14	635.34	0.7	0.8	
0.8	1.7	2.5	2	636	638	636.48	1.14	635.34	0.6	0.7	
0.9	1.9	2.5	2.2	635.8	638.1	636.48	1.14	635.34	0.5	0.5	
0.9	2	2.5	2.4	635.8	638.2	636.48	1.14	635.34	0.5	0.5	
1	2.1	2.5	2.5	635.7	638.2	636.48	1.14	635.34	0.4	0.4	
0.7	2.2	2	1.4	680.9	682.3	681.06	1.97	679.09	1.8	1.8	
0.8	2.5	2	1.7	680.7	682.4	681.06	1.97	679.09	1.6	1.6	
1	2.9	2	1.9	680.6	682.5	681.06	1.97	679.09	1.5	1.5	
1.1	3.2	2	2.2	680.4	682.6	681.06	1.97	679.09	1.4	1.3	
1.2	3.5	2	2.4	680.3	682.7	681.06	1.97	679.09	1.2	1.2	

RAFT - Risk Attribution Field-based Tool

Project Information

Introduction:
RAFT estimates the additional flood risk that results from an individual asset (raised defence, floodgate, culvert or flap-valve) being unserviceable. RAFT utilises data provided by the user together with built-in fragility curves to estimate the risk attributable to a single unserviceable asset. This risk is expressed as the Expected number of additional flooded properties per year due to the asset being unserviceable.

NFCDD Asset Reference:
(0 Digits Entered)

Flood Risk Management System Reference:

Name of Person Carrying Out Assessment:

National Grid Reference (2 letters followed by 10 numbers, Optional):

Local Asset Name (optional):

Any Additional Notes or Comments:

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RAFT - Risk Attribution Field-based Tool

Project Information | Data Entry | Asset Data

Step 1: Identify exposure to waves
Is the asset directly exposed to sea-waves?

Step 2: Select Asset Type
Which of the following most closely describes the asset?

Step 3: Asset Width
Select whether the asset is 'Narrow' or 'Wide' (narrow means less than 7.5m wide at the base)

Step 4: Level of Asset Protection
Identify whether there is erosion protection or revetment on the front-face, crest and rear-face of the asset

Front-Face Protection?

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SIMPLIFIED TOOLS FOR RISK ASSESSMENT

It is based on sound science – but simplified

RISK

Probability of an event

X

Potential consequences of that event

- Extracted from existing knowledge (as fragility curves) or previous studies

- HOUSES
- User's knowledge + flood mapping + theoretical knowledge

RISK

Probability of an event

X

Potential consequences of that event

**RISK = EXPECTED ANNUAL HOUSEHOLDS
AT RISK OF FLOODING**

p = 0.1 c = 50 Risk = 5

p = 0.01 c = 500 Risk = 5

Risk Attribution Field Tool

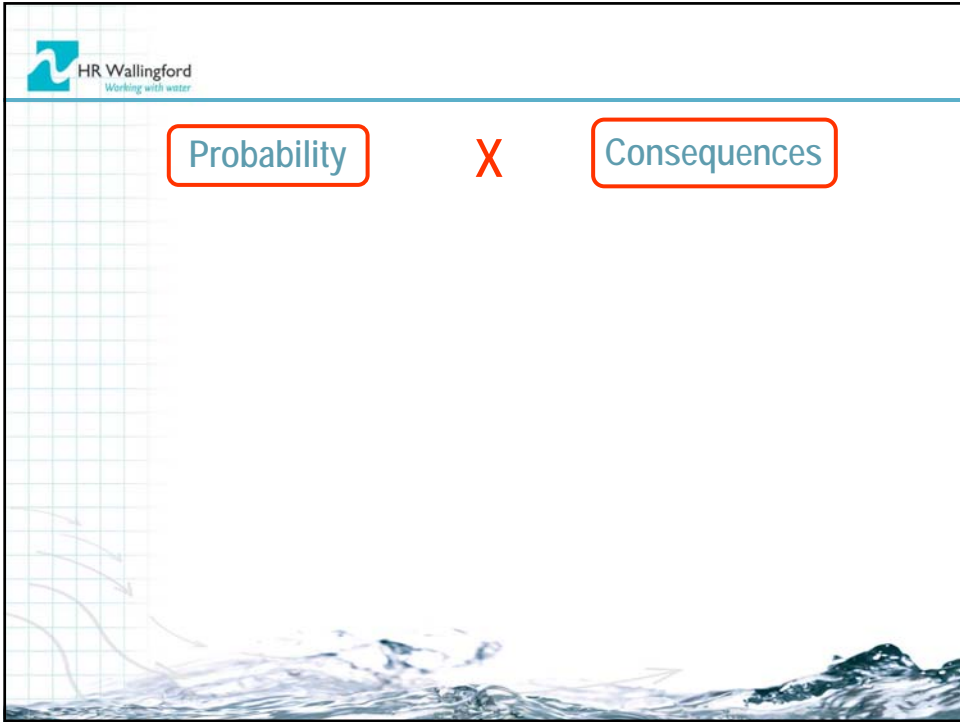
RAFT

It relates the **condition** of an asset
to its contribution to flood risk

Probability

X

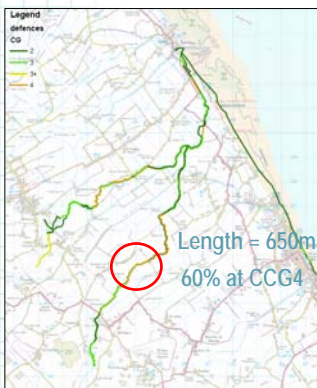
Consequences



Probability

X

Consequences

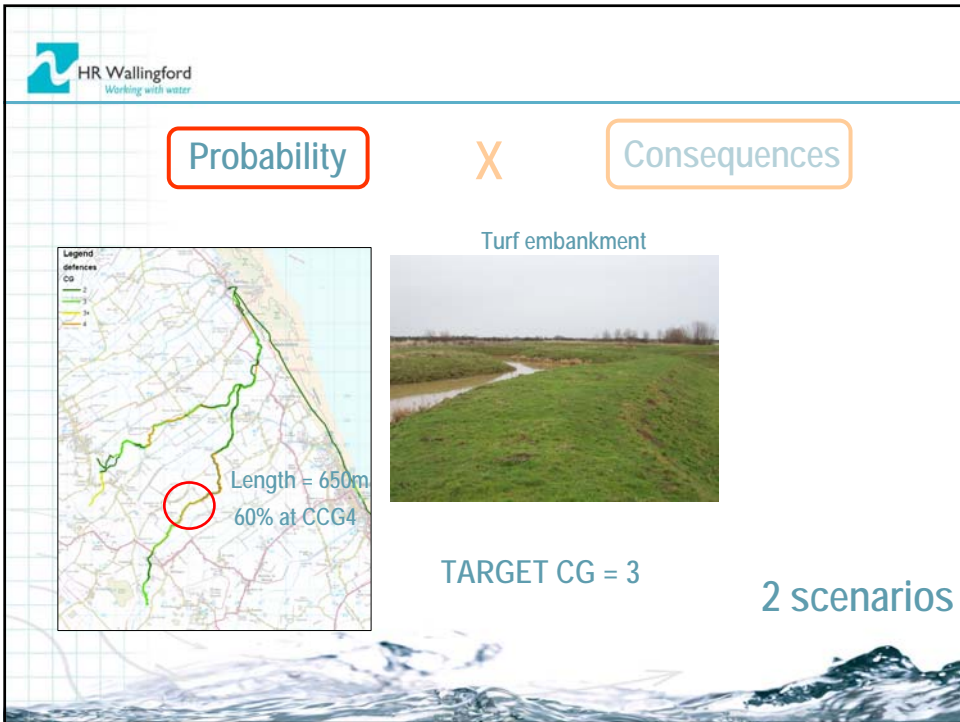


Turf embankment



TARGET CG = 3

2 scenarios



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Probability X Consequences

Asset Condition

— CCG
— TCG

Probability of Failure

Water Level - Crest Level

Show Asset Condition | HR Wallingford | Environment Agency | Return

RAT 7 - Risk Attribution Field Inward Tool

Project Information: Data Entry

Step 1: Specify type of Defence
Do you know the RASP type number for this asset?
(Dike, Flood, Tuff Slope or Embankment)

Step 2: Water level data
Is in-river water level/return period data available for the asset?

Step 3: Asset Information
Total length of the asset (in metres):
Crest Level of asset (mOD):

Current Condition Grade (CCG) Percentage at CCG: %
Target Condition Grade (TCG) Percentage at TCG: %

Asset Condition

Proportion of Asset in Different Condition Grades

- CC1 (8%)
- CC2 (8%)
- CC3 (40%)
- CC4 (50%)
- CC5 (8%)
- Unassigned (8%)

Show Fragility Curve | HR Wallingford | Environment Agency | Return

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Probability X Consequences

Area at Risk from Asset Failure

Step 1: Identify level of Hinterland
Enter the ground level behind the Asset at the likely failure location (mOD):

Step 2: Suggested dimensions of the area 'At Risk' behind breach

Radius of area 'At Risk' (m):

Any residential property within both Flood Zone 2 and the radius provided above should be considered 'At Risk'. Using a GIS package, estimate the number of properties at risk and enter in the box below. The tool can be 'paused' to allow this number to be calculated.

Residential Properties at risk:

Non Residential Properties at risk:

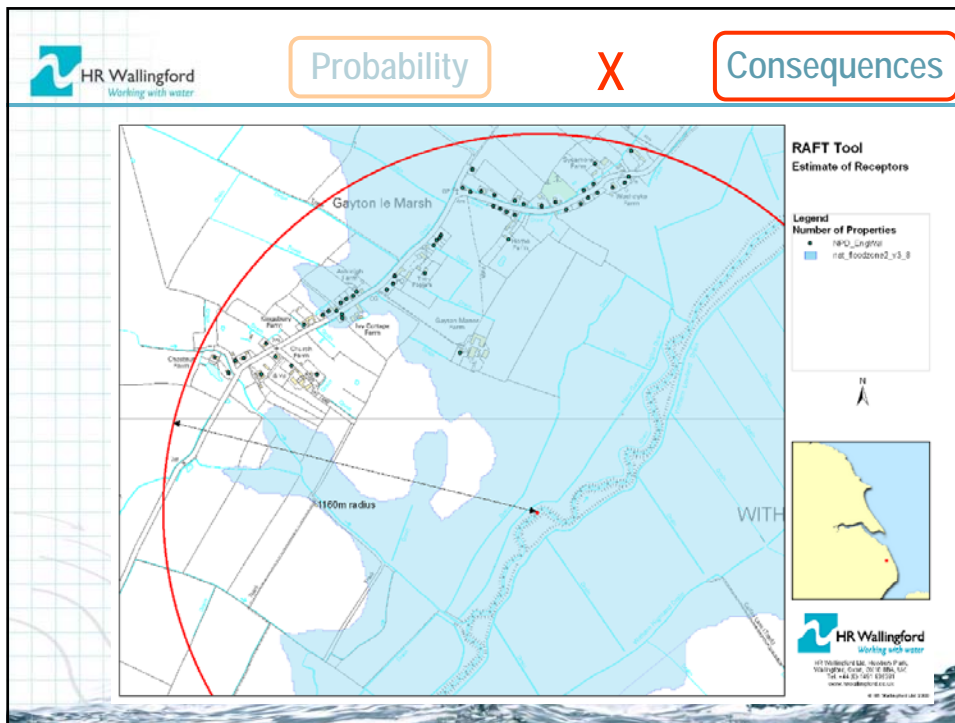
Pause Tool | HR Wallingford | Environment Agency

Vulnerable Receptors

Vulnerable Receptors
Ten different types of non-residential receptor have been classified as 'Vulnerable'. If these are present within both the Radius of Influence and Flood Zone 2, they should be counted and recorded below:

Shops	<input type="text" value="0"/>
Offices	<input type="text" value="0"/>
Factories and Warehouses	<input type="text" value="0"/>
Police / Ambulance / Fire Stations	<input type="text" value="0"/>
Schools/Day Nursery	<input type="text" value="0"/>
Caravans/Campsites (Number of static caravans)	<input type="text" value="0"/>
Main Roads	<input type="text" value="0"/>
Railways	<input type="text" value="0"/>
Agricultural Land: Arable (Hectares)	<input type="text" value="0"/>
Agricultural Land: Grass (Hectares)	<input type="text" value="0"/>

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RISK

RAFT - Risk Attribution Field-based Tool

Project Information | Data Entry

Step 1: Specify type of Defence
 Do you know the RASP type number for this asset?
 (Wide, Fluvial, Tuff Slope or Embankment)

Step 2: Water-level data
 Is in-river water level/return period data available for this asset?

Step 3: Asset Information
 Total length of the asset (in metres):
 Crest Level of asset (mCD):
 Current Condition Grade (CCG) Percentage at CCG %
 Target Condition Grade (TCG) Percentage at TCG %

Step 4: Count Receptors
 Number of Residential Properties:
 Number of Non-Residential Properties (in House Equivalents):

RESULTS: Expected Additional Properties at Risk (Annual) (PPA)

	Residential	Non-Residential	ALL PROPERTIES	
CURRENT CONDITION	17.6%	6.2	2.2	8.4
TARGET CONDITION	14.81%	5.2	1.9	7.1
INCREASED RISK	N/A	1.0	0.3	1.3

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CONveyance Risk Tool – Frequent Maintenance CONVRT - FM

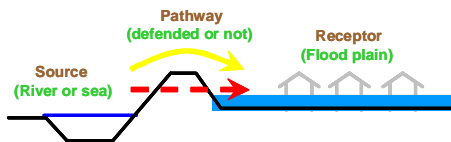
It estimates the benefits of conveyance-related
maintenance works at a Flood Risk
Management System level

Probability

X

Consequences

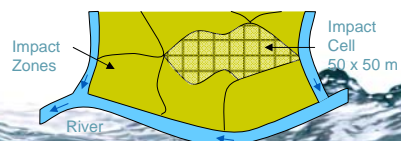
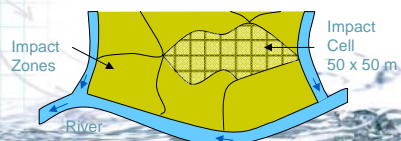
NAFRA (National Flood Risk Assessment)



'Business As Usual'
run



'Do Nothing'

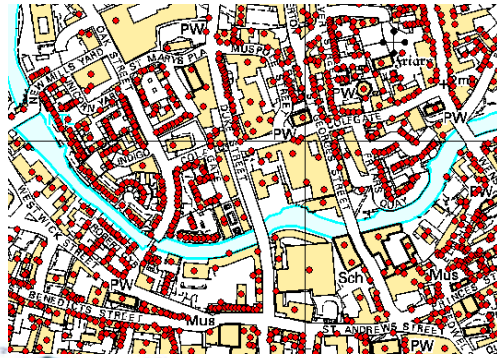


Probability

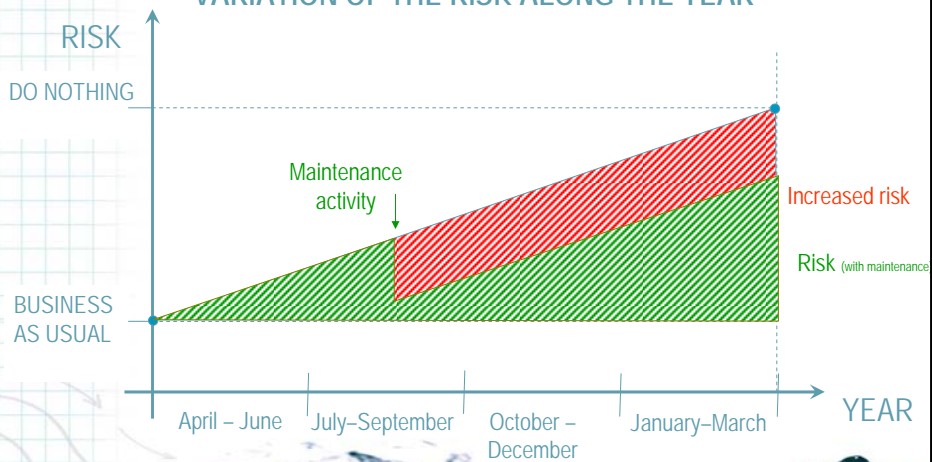
X

Consequences

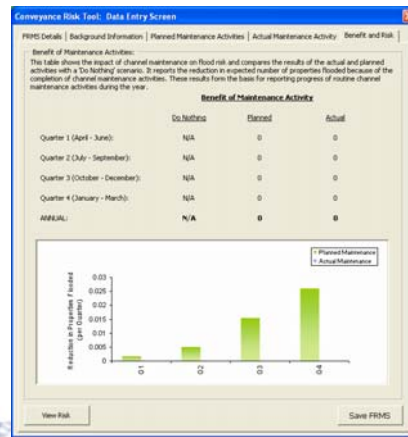
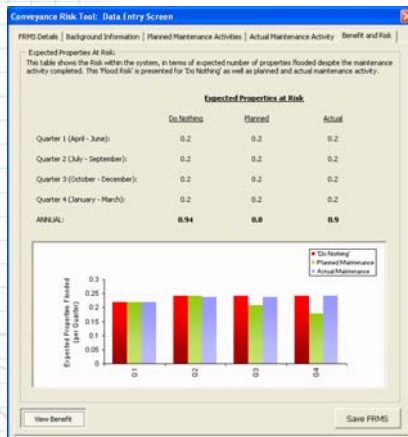
NPD (National Properties Dataset)



From user-provided information, CONVRT-FM calculates:
VARIATION OF THE RISK ALONG THE YEAR



Risk and Benefit calculated for 'Do Nothing', 'Planned' and 'Actual' data...



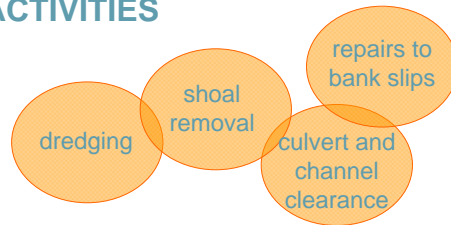
Intermittent tool Conveyance ESTimation – Risk Attribution

CES - RA

It estimates the benefits of a particular channel
maintenance activity

In development

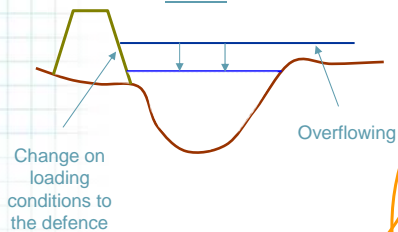
INTERMITTENT ACTIVITIES



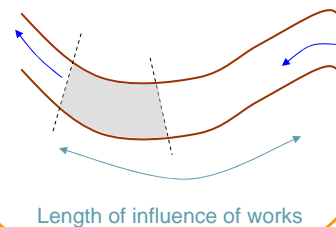
- Every 5-10 years
- 40% related to asset condition
- 30% related to clearance activities
- Around 160 activities within High Consequence Systems

Basics

We assume that the activity reduces water levels



And it influences a particular length of the river



Add Receptors

Receptor Information:
In this window, identify the number of properties that are at risk of flooding and the defences these properties will flood by. This information should be obtained from models, if it is available, or from local knowledge if it is not. So that only those events large enough to flood the properties are considered when estimating the risk, enter a representative distance of the properties from the defence for which they flood.

User ID (optional): House Group 2

Number of Residential Properties: 0 25

Representative Distance from Defence Line: 0 400 (m)

Sources of Flooding:

- Embankment 1
- Embankment 2
- Wall 1
- Wall 2

Influence of the Works

Water Level Data Available:
Success as local modelled water levels are available

Water Level (m) vs. Return Period

Return Period (Years)	Water Level (m)	Effect of Works on Water Level (m)
1	3.5	0.1
2	4.2	0.225
5	4.8	0.38
10		

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Many thanks!

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