

ASSOCIATION OF IRISH RISK MANAGEMENT

FLOOD RISK MANAGEMENT IN IRELAND



Association of Irish Risk Management
a forum for inter-change of information and ideas
in the field of Risk Management

Mark Adamson
Office of Public Works

17th November 2010



ATHLONE



CARRICK-ON-SHANNON





CORK

CORK



FLOOD RISK IN IRELAND

- **NOVEMBER 2009 EVENT**
 - Very Severe Event and Consequences:
 - Widespread (South-West, West, Shannon, North)
 - €'00s million Euro Damage
 - Homes
 - Businesses
 - Infrastructure

ANNUAL MAXIMUM WATER LEVELS

SHANNON - ATHLONE

m OD
39.5

SUCK - Near BALLINASLOE

FERGUS - Near ENNIS

m OD

10.00
9.80

BANDON - BANDON TOWN

ERNE - BELTURBET

m OD

50.00

49.50

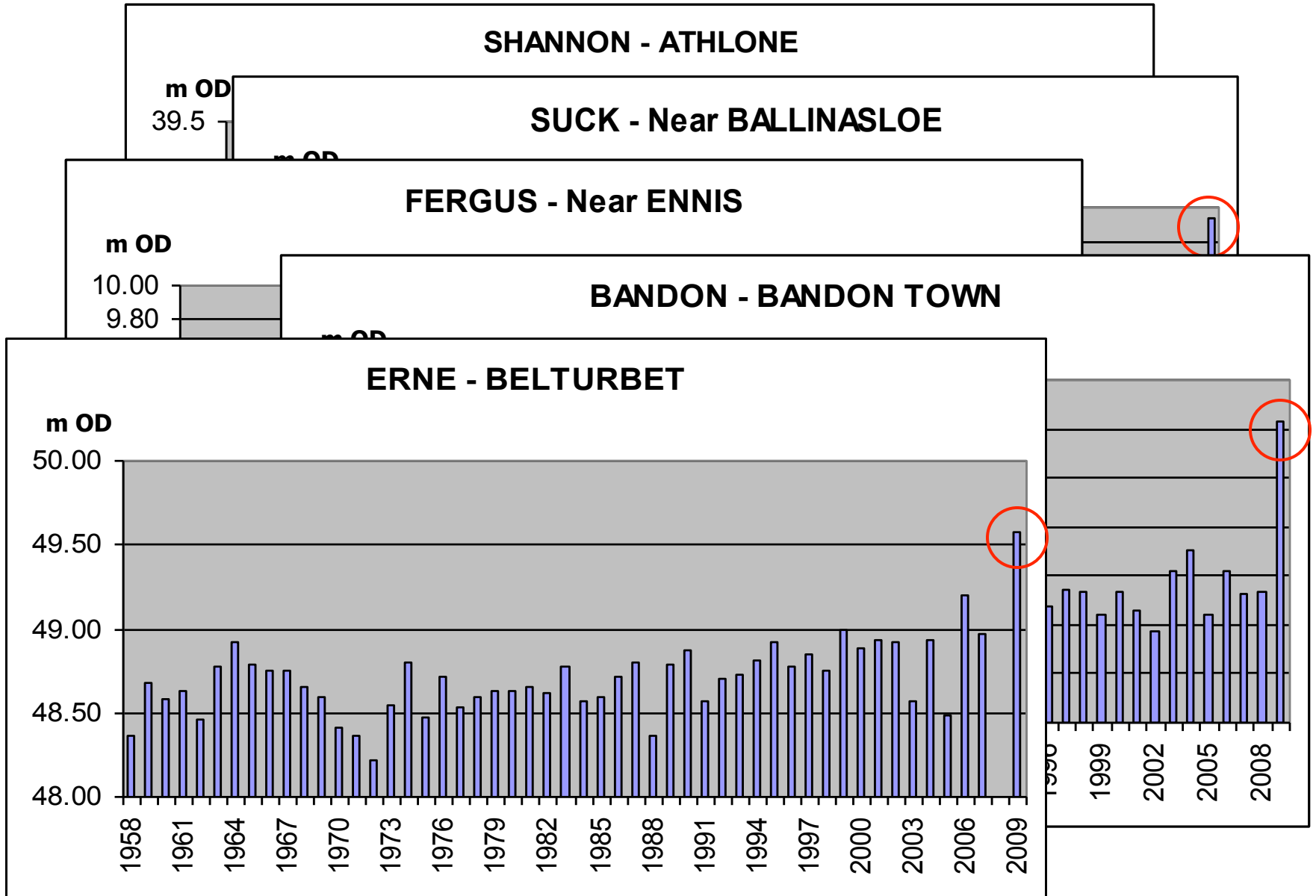
49.00

48.50

48.00

1958 1961 1964 1967 1970 1973 1976 1979 1982 1985 1988 1991 1994 1997 2000 2003 2006 2009

1990 1999 2002 2005 2008



FLOOD RISK IN IRELAND

- NOVEMBER 2009 EVENT
 - Very Severe Event and Consequences:
 - Widespread (South-West, West, Shannon, North)
 - €'00s million Euro Damage
 - Rare:
 - Most Areas: Worst on Record (50+ years)
 - Wettest Month in almost 150 yrs - Valentia
- RISK
 - Function of Probability and Consequence

FLOOD RISK IN IRELAND

- **PAST MAJOR EVENTS**

- 1954: Shannon
- 1986: 'Hurricane Charlie'
- Mid-1990's: Events in South / South-East
- 1995: Groundwater Flooding – South Galway
- 2000: Dublin, South-East
- 2002: Coastal Flood – Dublin, Tolka
- 2004 – 2009: Various Floods

FLOOD RISK IN IRELAND

- **WHAT IS THE RISK?**
 - Historic Event & Insurance Records
 - Predictive Risk Assessments
- **IS IT GETTING WORSE?**
 - Climate Change
 - Sea Level Rise
 - Increased Rain Storm Depths / Intensities
 - Development in Flood-Prone Areas
 - Increased Wealth

MANAGING THE PROBLEM

- ARTERIAL DRAINAGE ACT, 1945
 - Arterial Drainage Schemes, with Ongoing Maintenance
 - Intended for Agricultural Benefit
 - Provide Significant Benefits to Communities
 - Future:
 - Implementation of New Arterial Drainage Schemes Unlikely
 - Maintenance of Existing Schemes is of Very Clear Benefit

MANAGING THE PROBLEM

- FLOOD RELIEF SCHEMES
 - A.D. (Amendment) Act, 1995
 - Local, Urban Flood Protection Schemes
 - Appx. 20 Schemes Built to Date
 - Appx. 20 Schemes in Design / Construction
- Kilkenny, Tolka, Dodder, Mallow, Fermoy, Clonmel, Waterford, Ennis, Carlow, ...
- Details:
 - Contact OPW



MALLOW



MALLOW



“The Flood Relief Scheme in Mallow has proven a success for the second time in three months”

Irish Times, 13/01/10

MALLOW

MANAGING THE PROBLEM

- MINOR SCHEMES PROGRAMME
 - Launched in 2009
 - Local Solutions for Local Problems
 - Scheme Cost: <€500k
 - Faster Implementation
 - 2010: Appx. €10m Schemes Approved for Funding
 - Ongoing

MANAGING THE PROBLEM

- THE FUTURE FOR FRM IN IRELAND
 - Flood Relief Schemes
 - Will Continue to be a Cornerstone of Reduction of Existing Flood Risk into the Future
 - Arterial Drainage Maintenance
 - OPW Minor Schemes Programme
 - Ongoing Programme

MANAGING THE PROBLEM

- THE FUTURE FOR FRM IN IRELAND
 - Flood Policy Review, 2004
 - Proactive, Catchment-based Approach
 - Flood Mapping
 - Catchment Flood Risk Management Plans
 - Greater emphasis on non-structural measures
 - Establishment of Range of New Programmes
 - EU 'Floods' Directive, 2007

WORK PROGRAMMES

- FLOOD STUDIES UPDATE / R&D
- HYDRO-METEOROLOGICAL MONITORING REVIEW
- RESEARCH & DEVELOPMENT PROGRAMME
- FLOOD HAZARD MAPPING
- CATCHMENT FLOOD RISK MANAGEMENT PLANNING
- FLOOD FORECASTING AND WARNING
- EMERGENCY RESPONSE DEVELOPMENT
- PUBLIC AWARENESS AND PREPAREDNESS
- PLANNING AND DEVELOPMENT CONTROL
- HIGH-RISK CHANNEL DESIGNATION
- PRIORITISATION
- DEFENCE ASSET MANAGEMENT
- REVIEW OF LEGISLATION
- COMMUNICATIONS
- OPW FLOOD RESPONSE

PROGRAMMES 1, 2 & 3

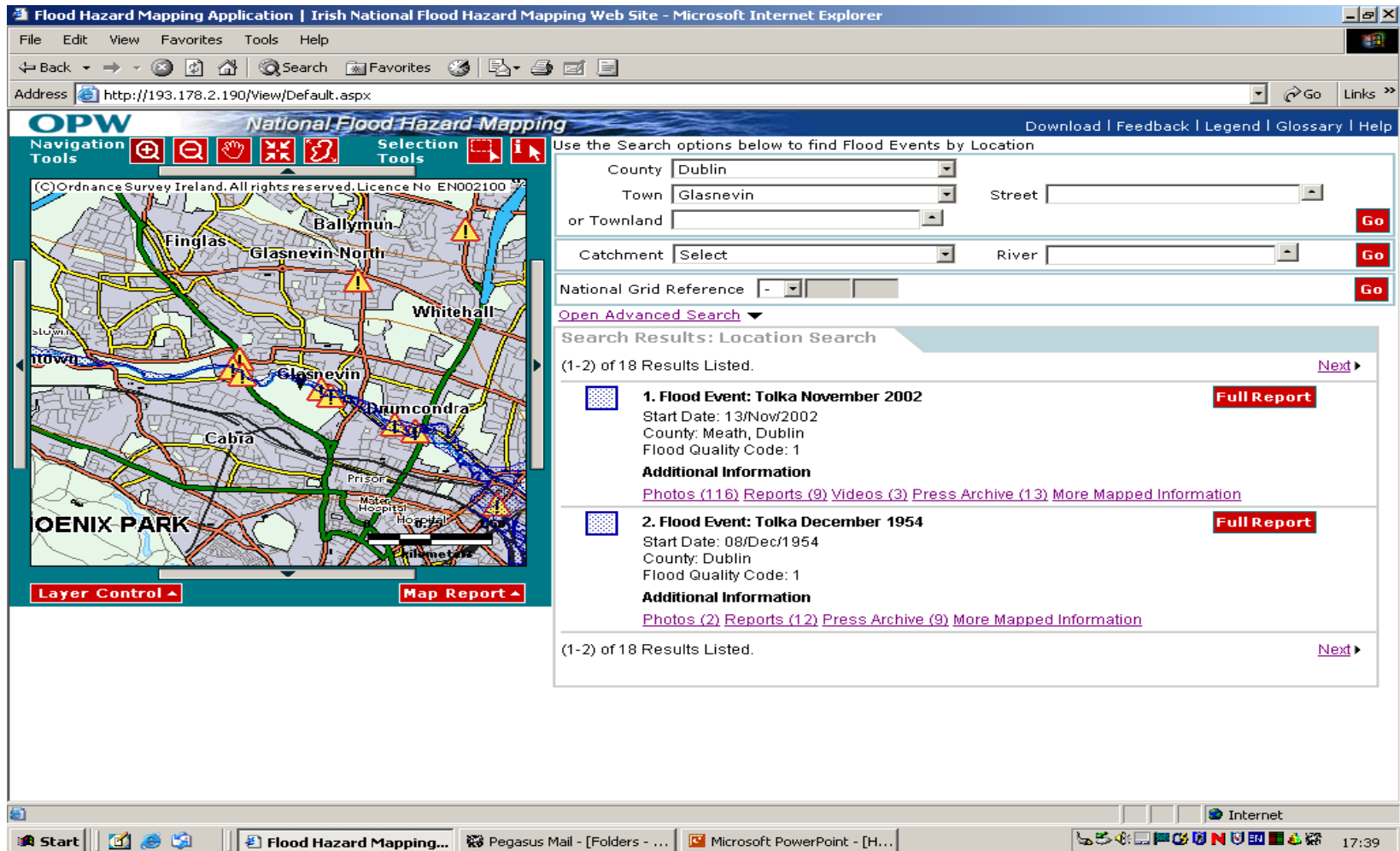
- **1: FLOOD STUDIES UPDATE**
 - Update of Flood Studies Report
 - Well underway: Completion 2011
- **2: STRATEGIC HYDRO-METEOROLOGICAL MONITORING REVIEW**
 - Strategic plan for monitoring networks
 - Completed – Moving to implementation
- **3: R&D PROGRAMME**
 - Structured flood risk management R&D programme

4: FLOOD MAPPING WEBSITE

- **PHASE I PROJECT**

- Website / Data management system development
- Historic data collection / verification
- Launched: October 2006

WWW.FLOODMAPS.IE



WWW.FLOODMAPS.IE

Flood Hazard Mapping Application | Irish National Flood Hazard Mapping Web Site

File Edit View Favorites Tools Help

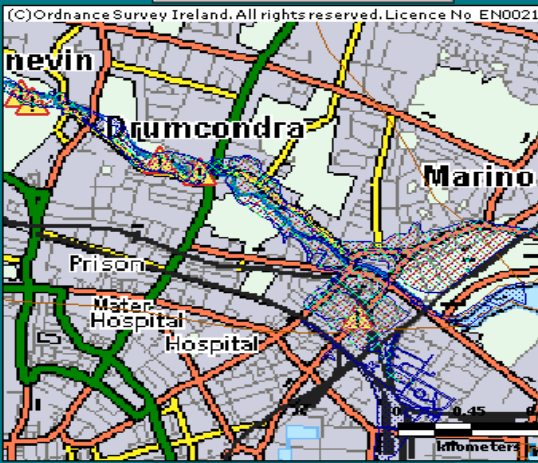
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Address http://193.178.2.190/View/Default.aspx

OPW National Flood Hazard Mapping

Navigation Tools Selection Tools

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Layer Control Map Report

Flood Photos Or Videos | Irish National Flood Hazard Mapping Web Site - Microsoft Internet Explorer



Back Forward Stop Home Search Favorites

OPW National Flood Hazard Mapping

Photos

Flood Event: Tolka December 1954

Start Date: 08/Dec/1954
County: Dublin
Flood Quality Code: 1
National Grid Reference: O 167 364

Photograph Name	File Type & Size	Date	Quality Code	Description	Source of Information	Click On Thumbnails below to view larger Photo
Tolka Dec 1954 - Fairview	Jpg (220Kb)	Dec/1954	2	- (Photo Includes: Flood Extent, Flood Level)	Dublin City Council	
Tolka Dec 1954 - Fairview (aerial photo)	Jpg (301Kb)	Dec/1954	2	- (Photo Includes: Flood Extent, Flood Level)	Dublin City Council	

[Photos \(2\)](#) [Reports \(12\)](#) [Press Archive \(9\)](#) [More Mapped Information](#)

(1-2) of 18 Results Listed. [Next >](#)

Start

Microsoft PowerPoint - [H...]

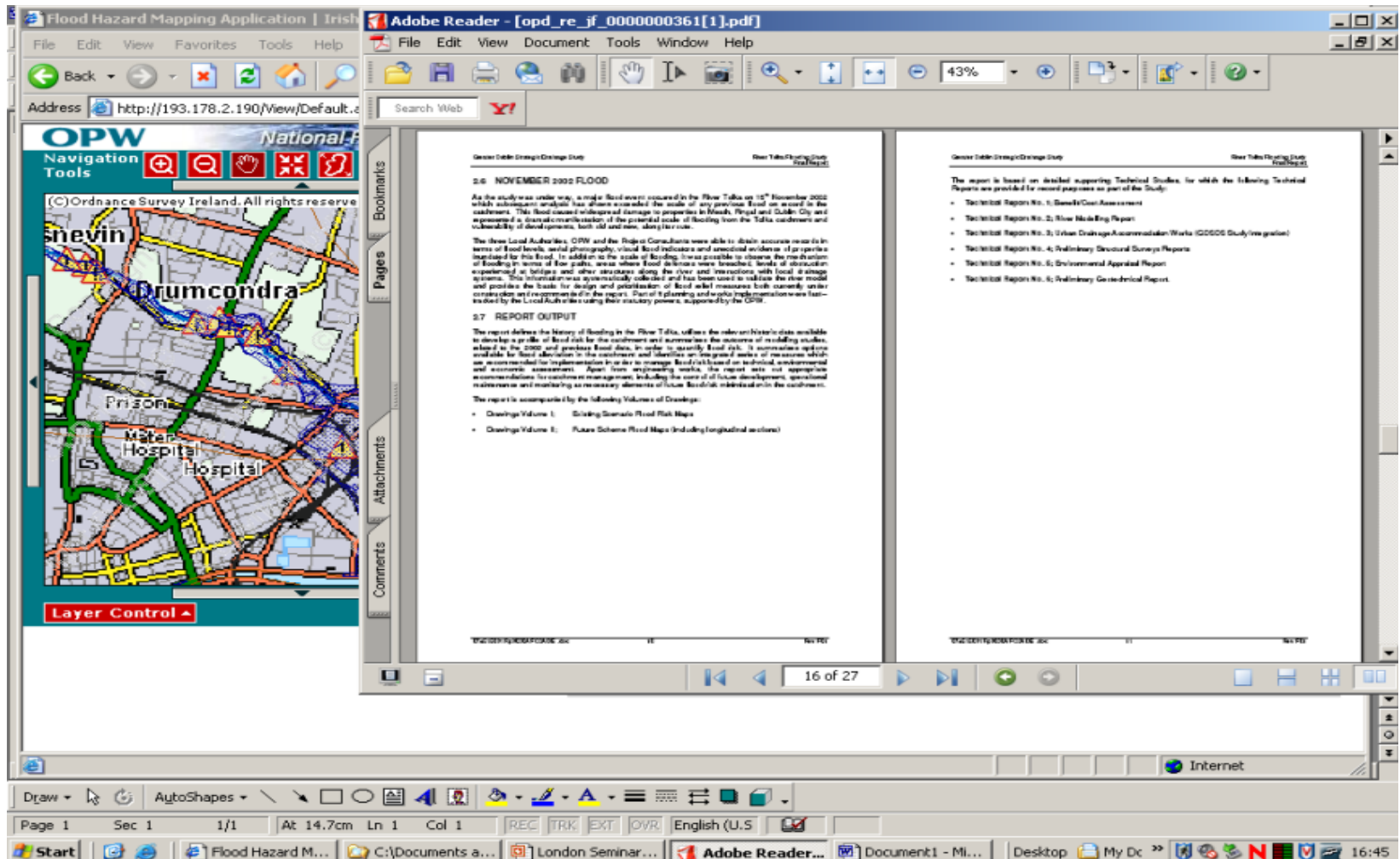
Flood Hazard Mapping Ap...

Flood Photos Or Video...

Internet

11:00

WWW.FLOODMAPS.IE



WWW.FLOODMAPS.IE

Flood Hazard Mapping Application | Irish National Flood Hazard Mapping Web Site - Microsoft Internet Explorer

File Edit View Favorites Tools Help

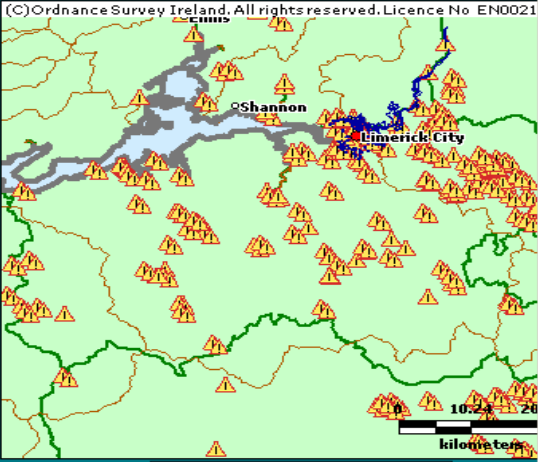
Back Forward Stop Home Search Favorites

Address http://193.178.2.190/View/Default.aspx

OPW National Flood Hazard Mapping

Navigation Tools Selection Tools

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Layer Control Map Report

More Mapped Information Summary | Irish National Flood Hazard Mapping Web Site - Microsoft Internet Explorer

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OPW National Flood Hazard Mapping

More Mapped Information

Flood Event: Shannon December 1954

Start Date: 01/Dec/1954
County: Clare, Galway, Leitrim, Limerick, Longford, Offaly, Roscommon, Tipperary, Westmeath
Flood Quality Code: 1
National Grid Reference: N 008 326

More Mapped Information

	Hydrometric Stations in Catchment
	Hydrometric Stations in area
	Rivers
	Lakes
	Catchments
	Land Commission
	Drainage Districts
	Benefiting Lands

Done

Start

Hodson Bay 120905 Ba...

Flood Hazard Mapping ...

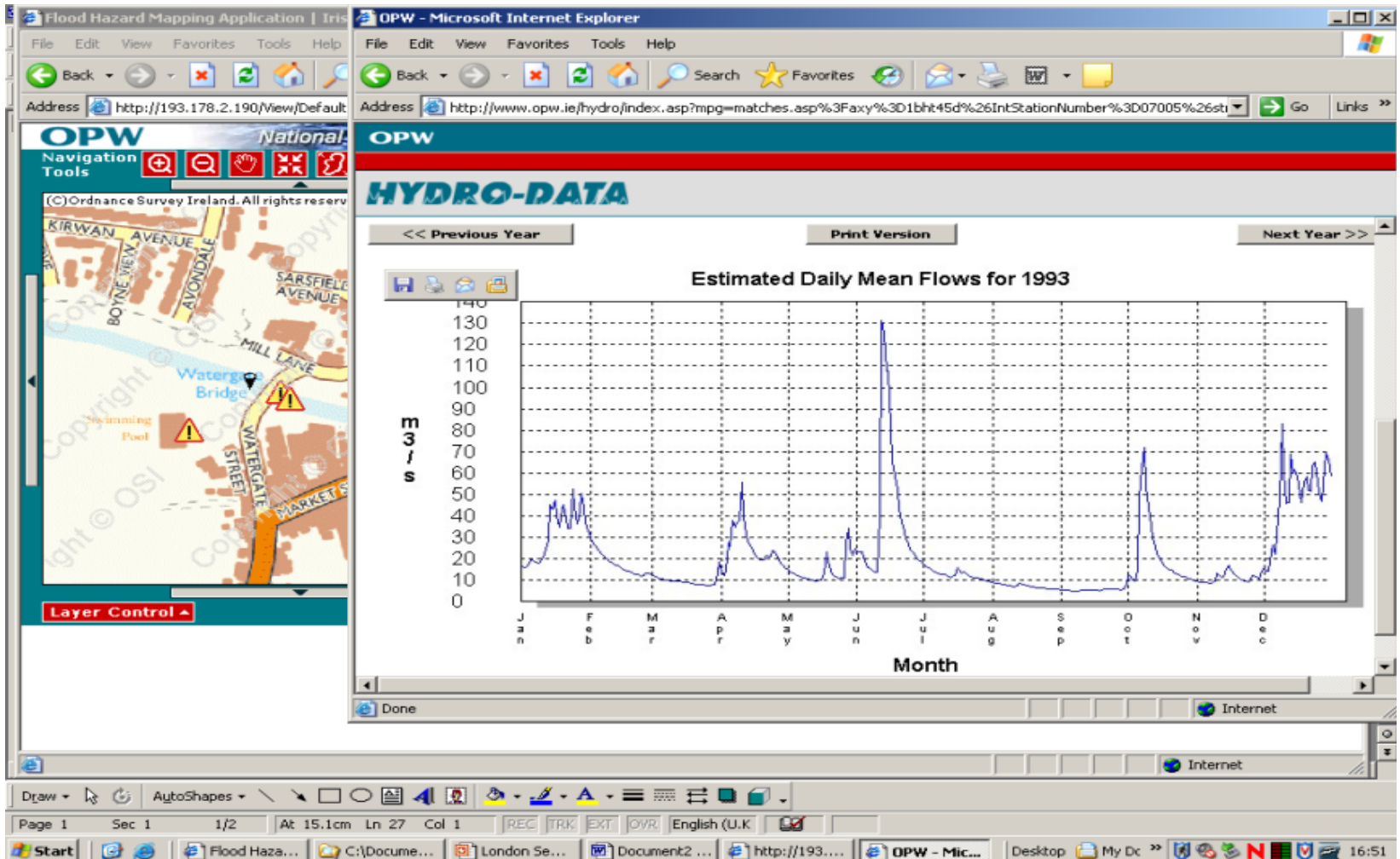
Pegasus Mail - [Folders...

More Mapped Infor...

Internet

12:23

WWW.FLOODMAPS.IE



4: FLOOD MAPPING WEBSITE

- **PHASE I PROJECT**
 - Website / Data management system development
 - Historic data collection / verification
 - Launched: October 2006
- **ONGOING MAINTENANCE / UPDATE**

Shannon – Athlone
30th November 2009



4: FLOOD MAPPING WEBSITE

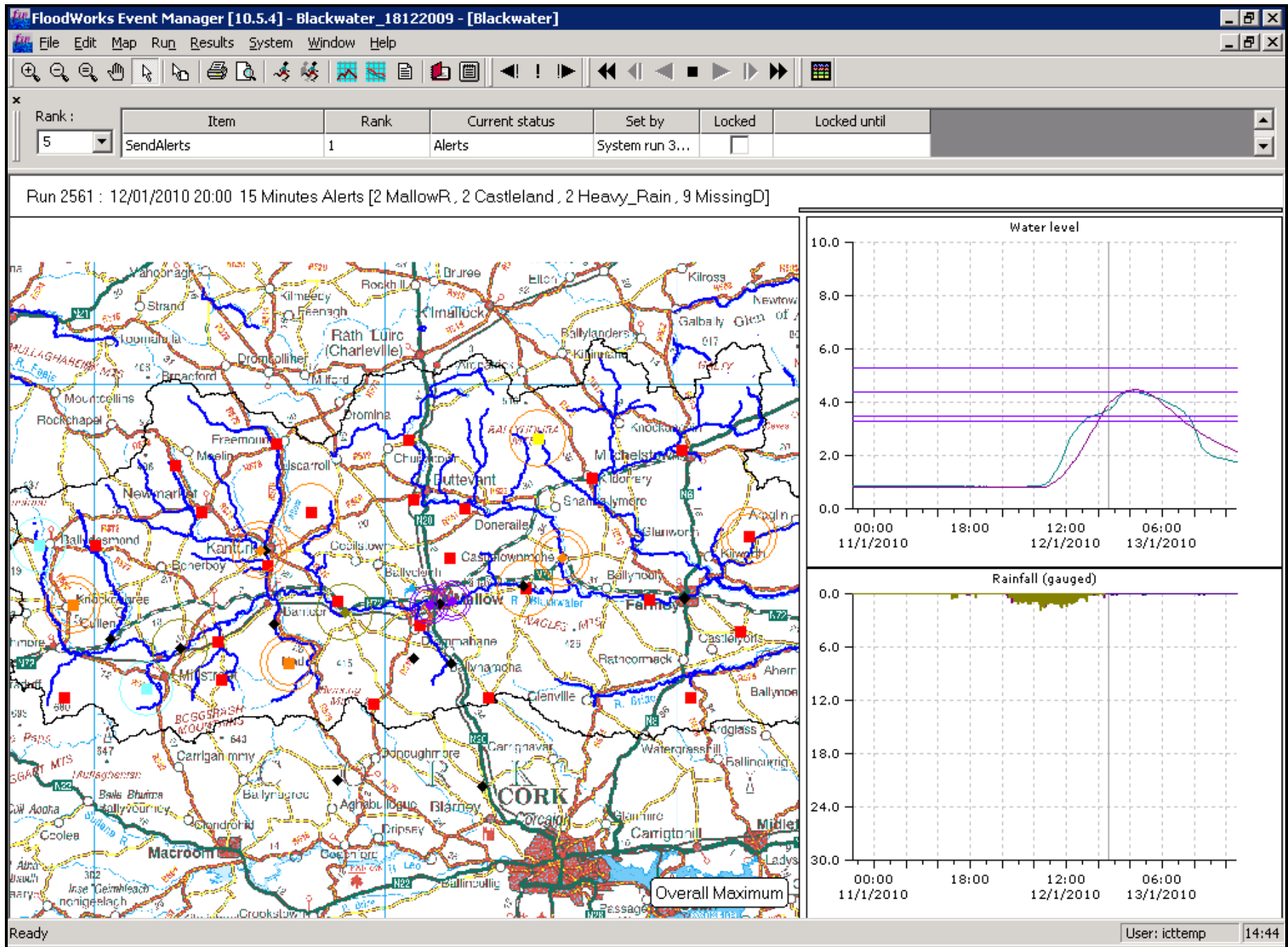
- **PHASE I PROJECT**
 - Website / Data management system development
 - Historic data collection / verification
 - Launched: October 2006
- **ONGOING MAINTENANCE / UPDATE**
- **PRESENTATION OF PREDICTIVE MAPS**
- **2011-12: MOVE TO 'ENTERPRISE GIS' & WEB-SERVICES**

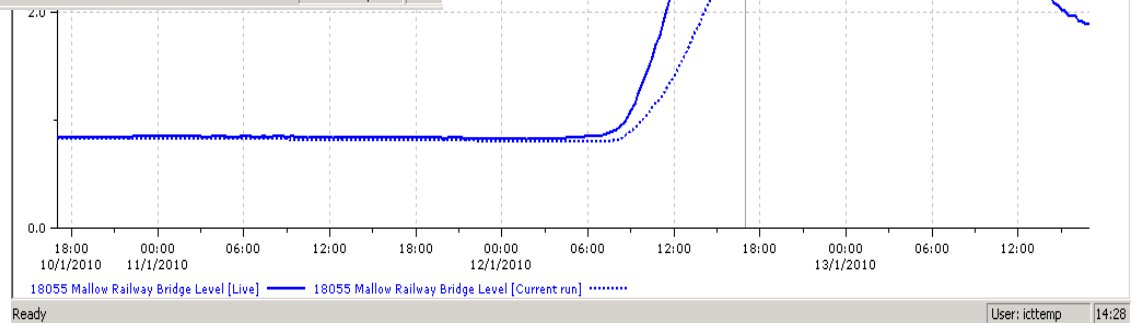
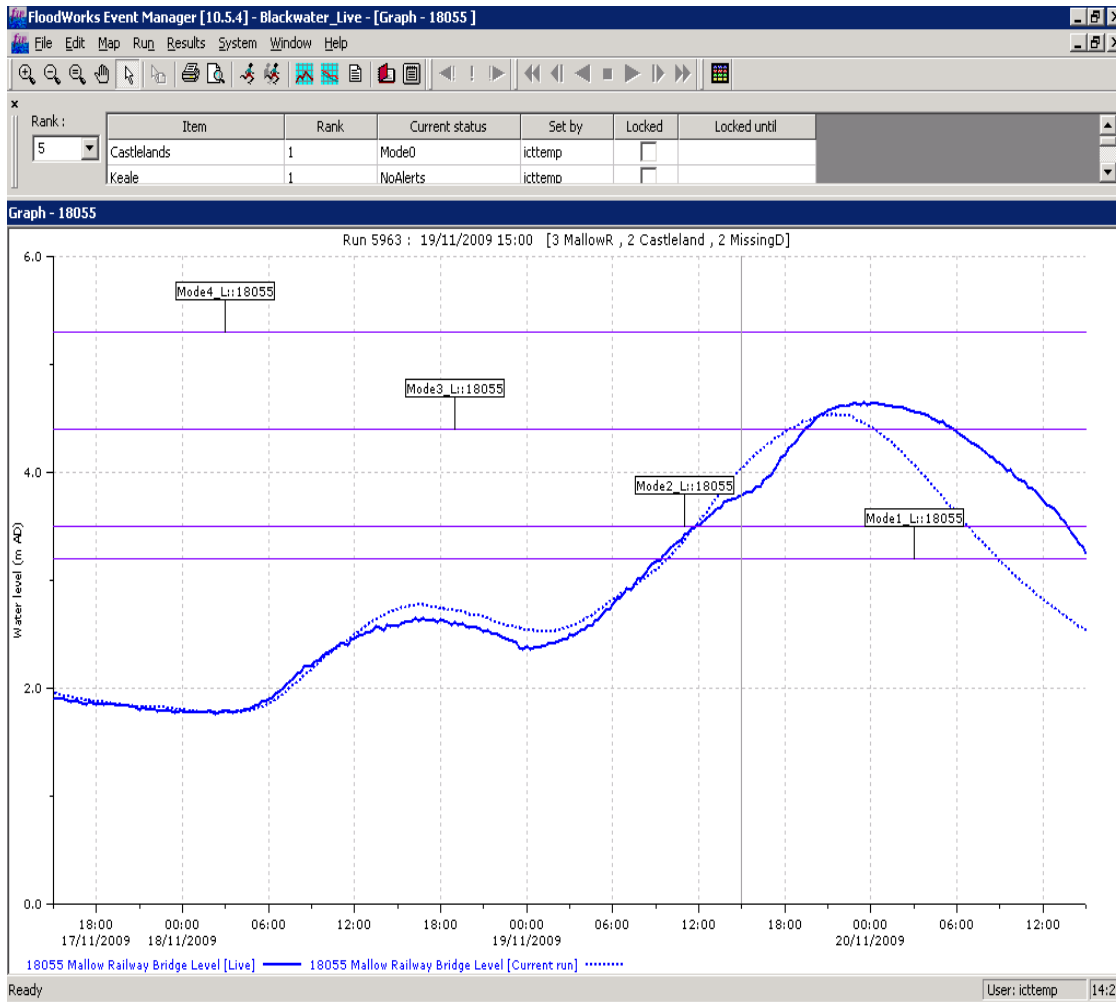
5: CFRAM STUDIES

- FLOOD RISK MGT. PLANNING PROG.
 - Comprehensive, Catchment-Based Flood Risk Assessment and Management (CFRAM) Studies
- EU FLOODS DIRECTIVE
- AFTER THE BREAK!

6: FLOOD FORECASTING

- FLOOD FORECASTING
 - Fluvial Flood Forecasting
 - Detailed: Mallow, Fermoy, Clonmel





6: FLOOD FORECASTING

- FLOOD FORECASTING
 - Fluvial Flood Forecasting
 - Detailed: Mallow, Fermoy, Clonmel
 - EFAS: Broad-Scale EU System
 - Coastal Surge Forecasting
 - National: Under Trial

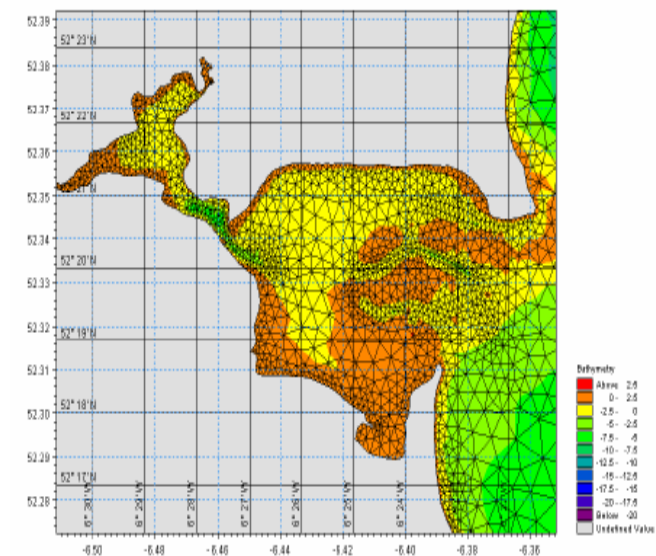
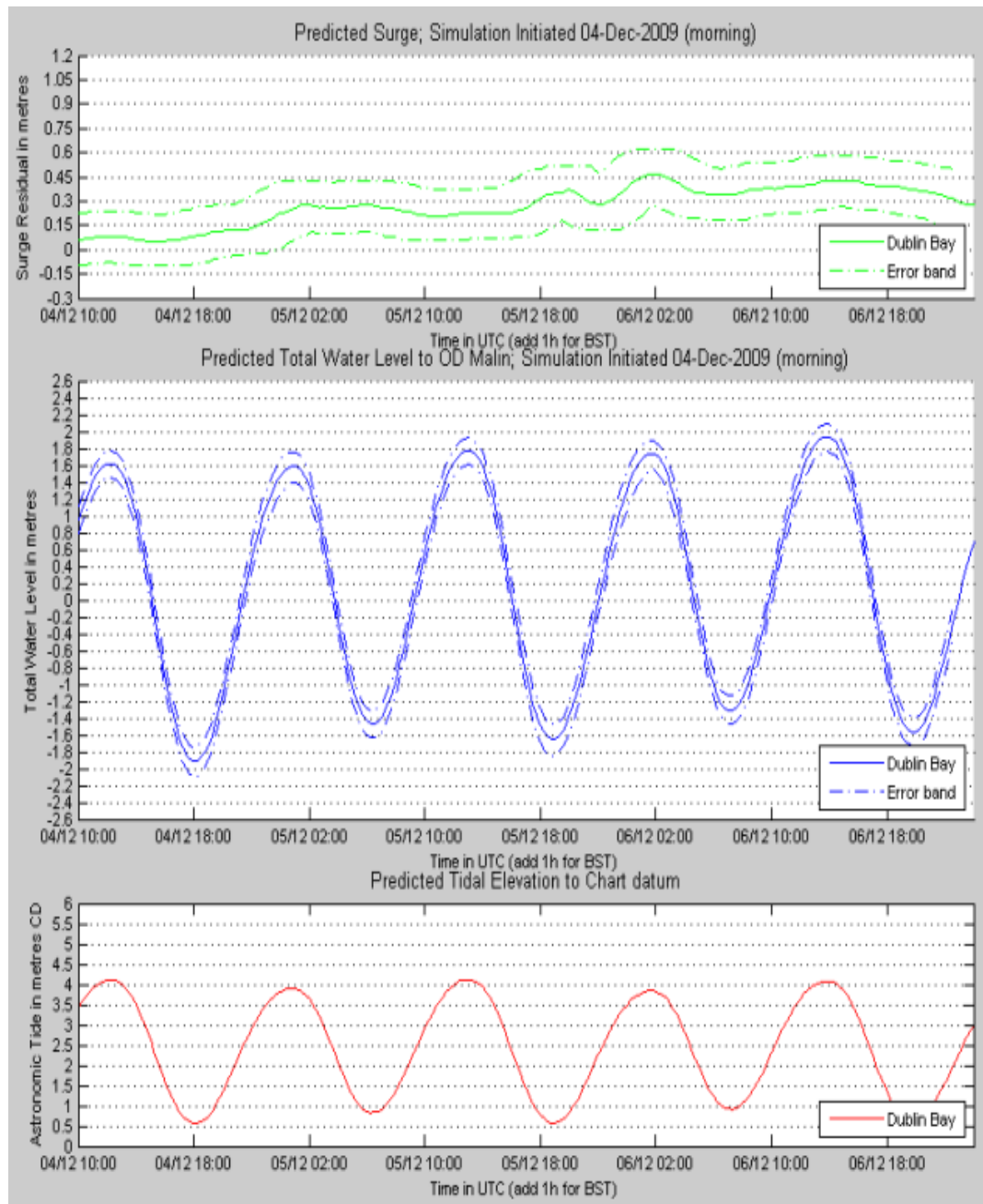
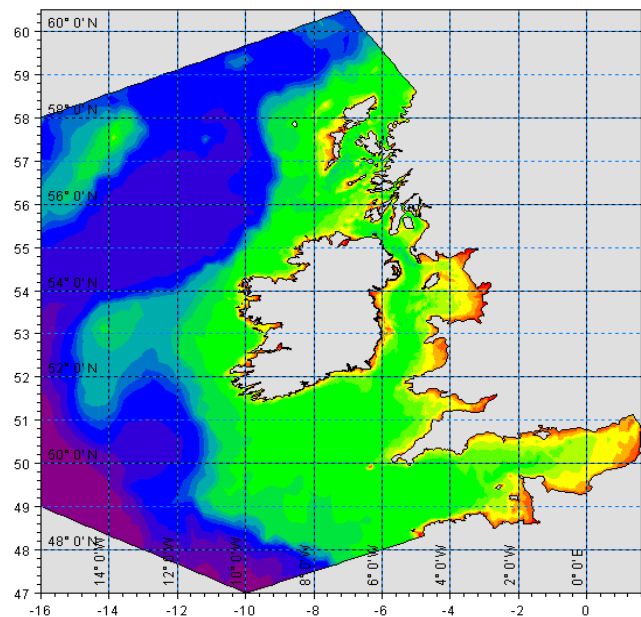


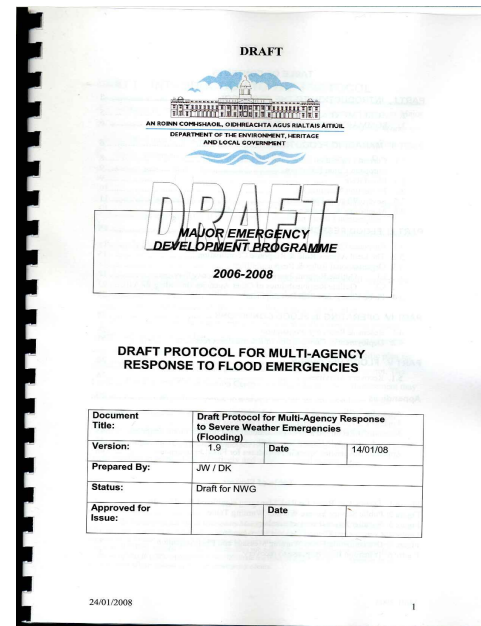
Figure 3: Detailed section of Wexford Harbour and Slaney river with mesh and bathymetry

6: FLOOD FORECASTING

- FLOOD FORECASTING
 - Fluvial Flood Forecasting
 - Detailed: Mallow, Fermoy, Clonmel
 - EFAS: Broad-Scale EU System
 - Coastal Surge Forecasting
 - National: Under Trial
 - Dublin: Operational
 - National Service?
 - Strategic FFWS Review
 - Completion Early 2011

7: EMERGENCY RESPONSE

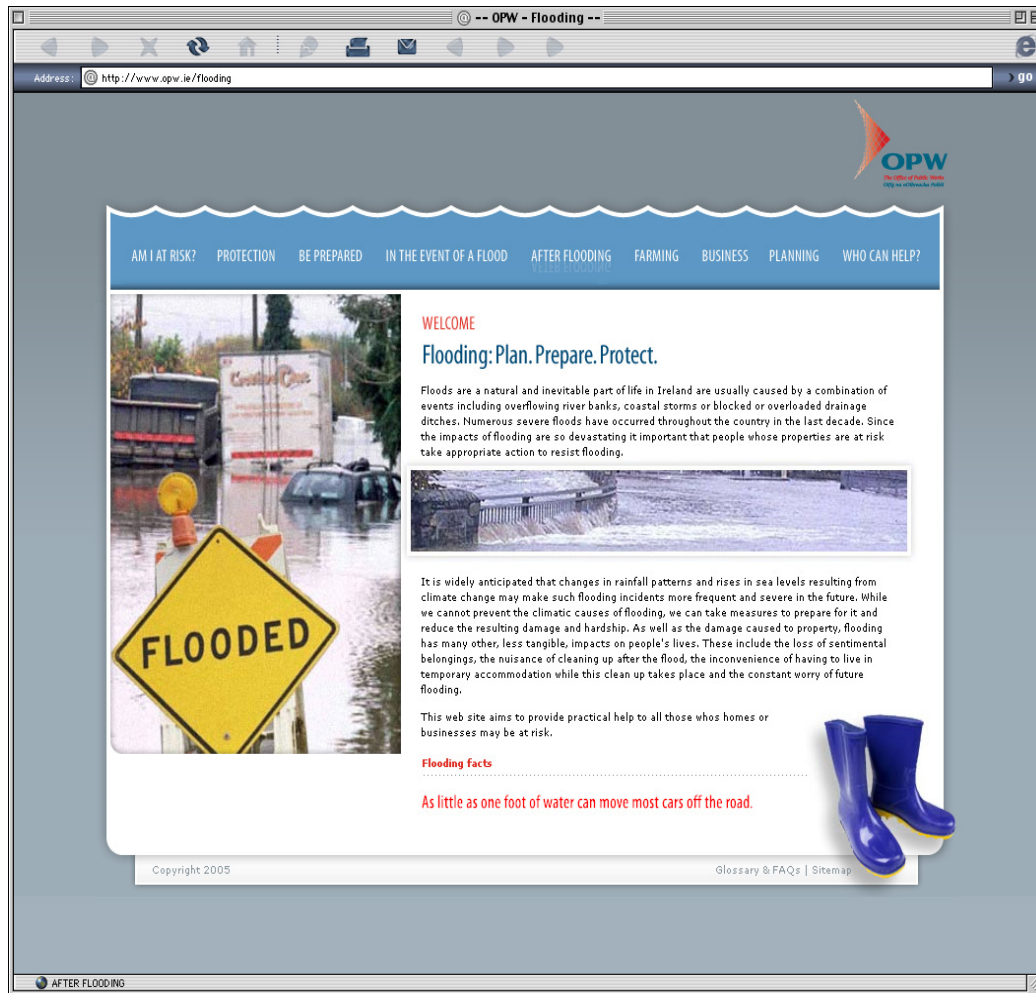
- EMERGENCY RESPONSE DEVELOPMENT
 - Flood Event Response Plans: Guidelines and Template Plan
 - DoEHLG (Protocol)



8: AWARENESS & PREPAREDNESS

- AWARENESS AND PREPAREDNESS
 - General campaign launched (www.flooding.ie)

8: WWW.FLOODING.IE



8: AWARENESS & PREPAREDNESS

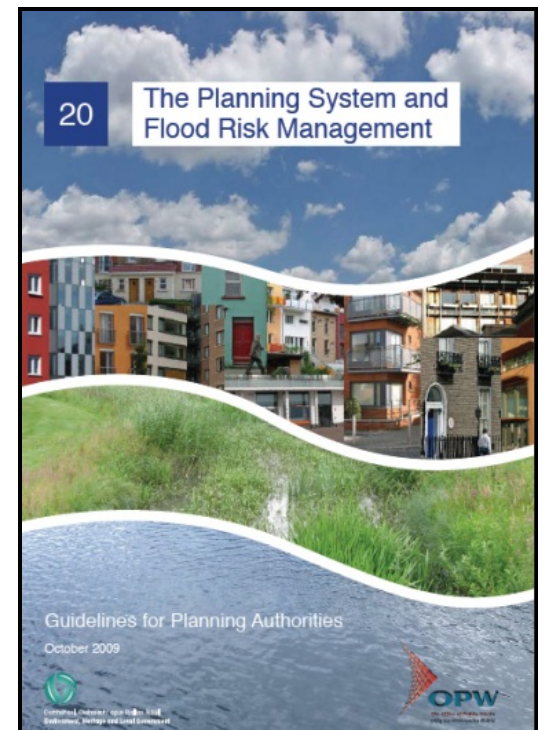
- AWARENESS AND PREPAREDNESS
 - General campaign launched (www.flooding.ie)
 - Local campaigns
 - Dependent on flood map availability
 - CFRAM Studies

9: PLANNING & DEVELOPMENT MGT

- MANAGING POTENTIAL FUTURE RISK
 - Flood risk impacts of development
 - Development being at risk itself
 - Increasing flood flows downstream
 - Increasing flood levels upstream
 - Increased runoff volumes / rates
 - Critical to effective management of future risk
 - Review Report Recommendation: Guidelines

9: PLANNING & DEVELOPMENT MGT

- GUIDELINES: NOVEMBER 2009
- OVERVIEW OF GUIDELINES
 - Sequential Approach
 - 'Appropriate Devt'



9: PLANNING & DEVELOPMENT MGT

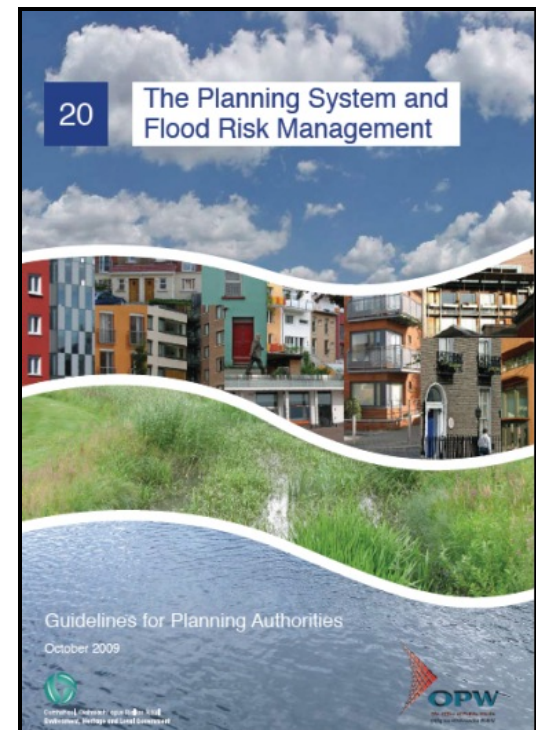
- APPROPRIATE DEVELOPMENT
 - Flood Zones (Undefined – Fluvial / Tidal)
 - A: High Probability ($>1\%$ / 0.5% AEP)
 - B: Moderate Probability ($>0.1\%$ AEP)
 - C: Low Probability ($<0.1\%$ AEP – All areas not in Zones A or B)
 - Land Use Vulnerability
 - High: Hospitals, Housing, Critical Infrastructure, etc.
 - Less: Shops, Offices, General Industry, etc.
 - Water-Compatible: Navigation, FRS, Amenity, etc.

9: PLANNING & DEVELOPMENT MGT

- APPROPRIATE DEVELOPMENT
 - Flood Zone A: Appropriate Development
 - Water Compatible Development
 - Flood Zone B: Appropriate Development
 - Water Compatible Development
 - Less Vulnerable Development
 - Flood Zone C: Appropriate Development
 - All (BUT – see below)
 - ALL of Above Subject to FRA of Other Sources, e.g., Groundwater

9: PLANNING & DEVELOPMENT MGT

- GUIDELINES: NOVEMBER 2009
- OVERVIEW OF GUIDELINES
 - Sequential Approach
 - 'Appropriate Devt'
 - Justification Test:
 - Town Centres / Urban Core
 - Flood Risk Assessments



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EU 'FLOODS' DIRECTIVE

- **KEY REQUIREMENTS**

- Transposition (SI No. 122 of 2010)
- Preliminary flood risk assessment (Dec 2011)
- Flood maps (Dec 2013)
- Flood risk management plans (Dec 2015)

- **OTHER PROVISIONS**

- Co-ordination with WFD implementation
- Trans-boundary co-operation
- Public dissemination / engagement

EU 'FLOODS' DIRECTIVE

- ARTICLES 4 & 5 – PRELIMINARY FLOOD RISK ASSESSMENT (PFRA)
 - Define 'APSRs'
 - Based on Available / Readily-Derivable Information
 - For which:
 - Flood Maps are to be prepared
 - Flood Risk Management Plans are to include measures to address flood risk

OVERVIEW OF PFRA

- OBJECTIVE

- Identify Areas of Potentially Significant flood Risk (APSRs)
 - Focus of CFRAM Studies
 - Detailed Flood Maps
 - Measures in Flood Risk Management Plan (FRMP)
- Based on 'Available & Readily-Derivable' Information
 - High-Level Screening of Flood Risk

OVERVIEW OF PFRA

- OVERALL APPROACH

- Risk Assessment

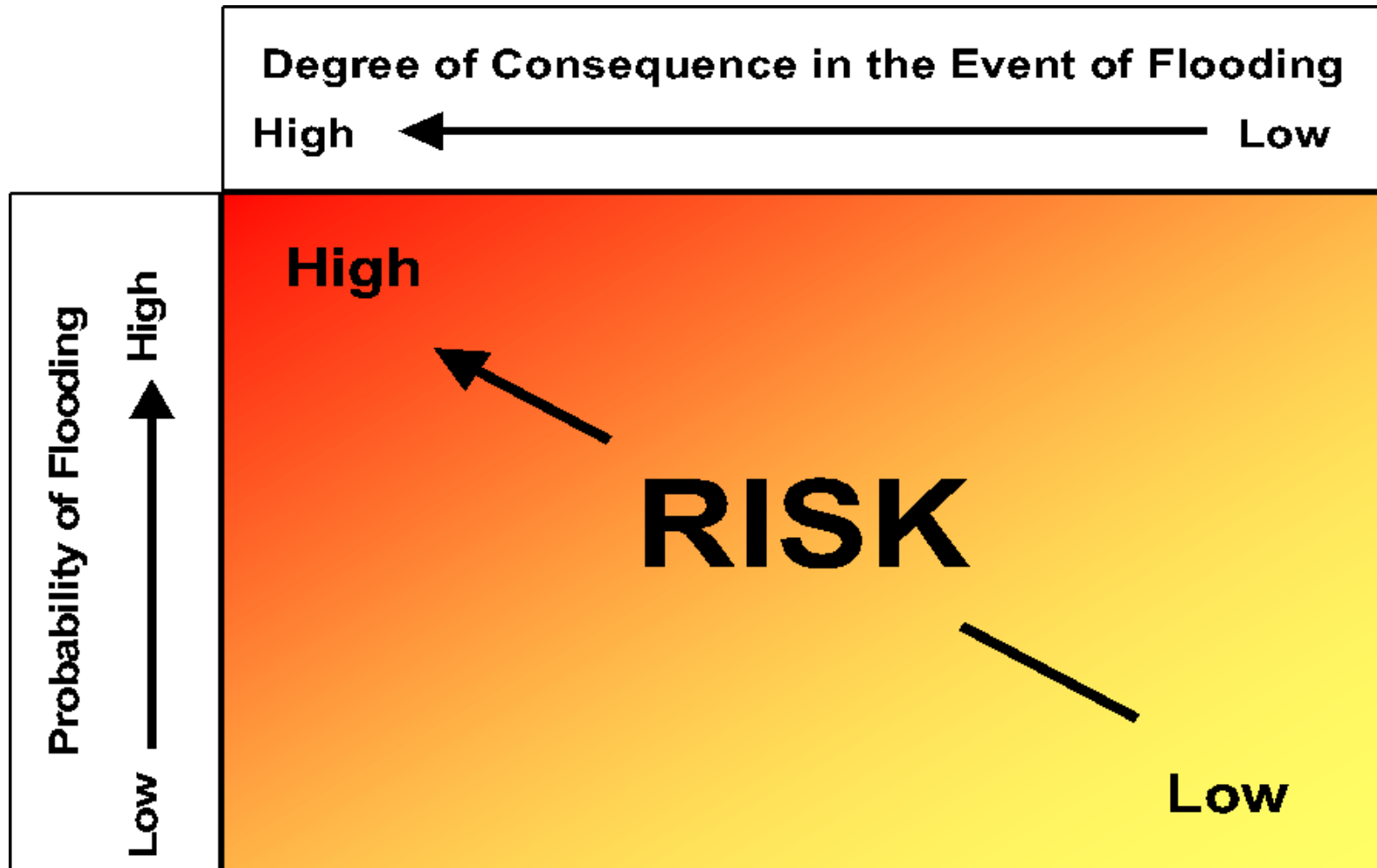
- 'Historic' FRA (What has happened)
 - 'Predictive' FRA (What could happen)
 - Consultation

- Define 'Significant' Risk

- Identification of APSRs

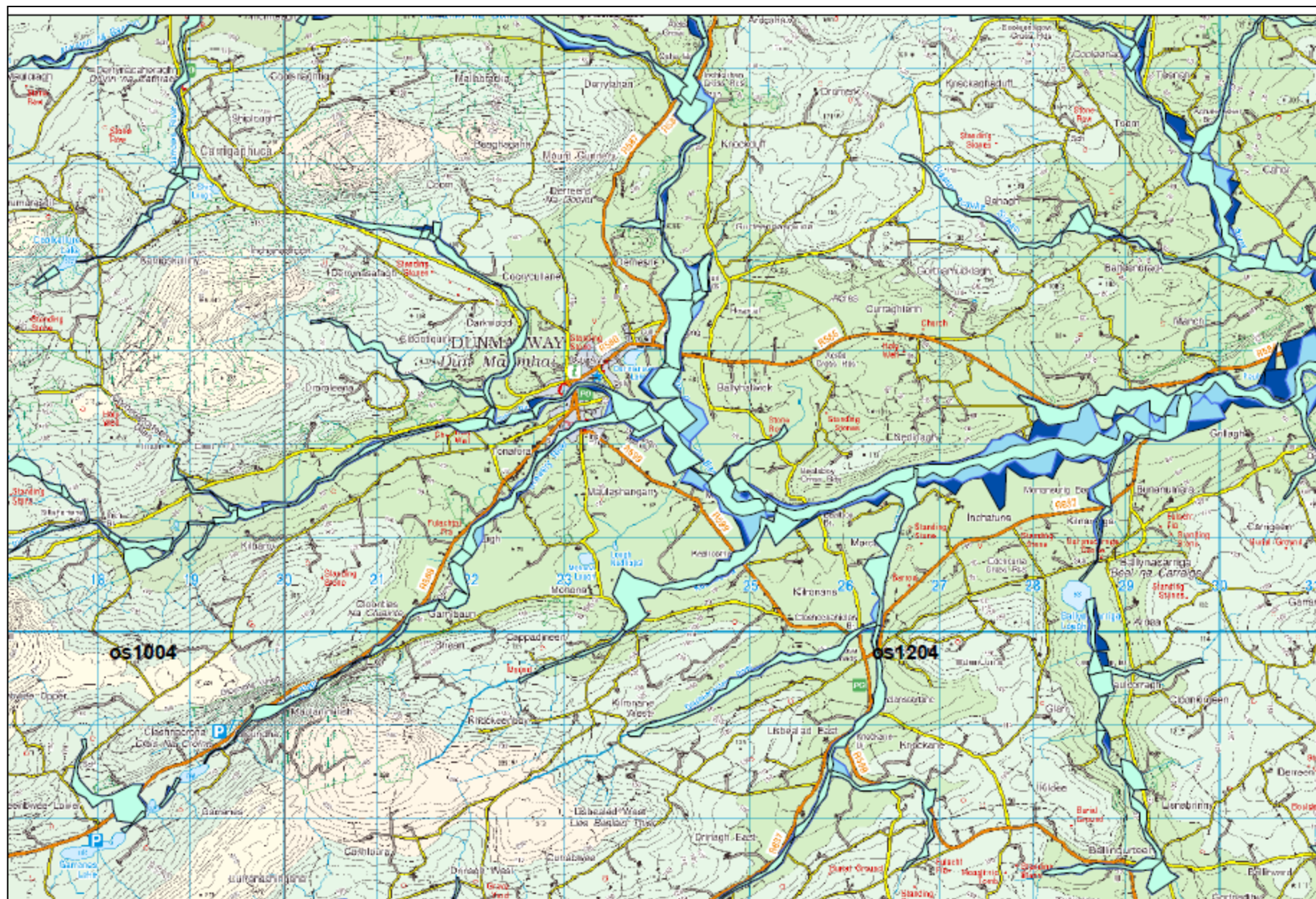
- Identify APSRs (Can be based on justification under any one of the approaches + FRS)
 - Validate, Consult & Finalise

'PREDICTIVE' PFRA



'PREDICTIVE' PFRA

- FLOOD RISK – FUNCTION OF:
 - Probability of a Flood Event (Hazard)
 - Consequences (Degree of Damage in Event of a Flood)



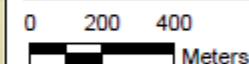
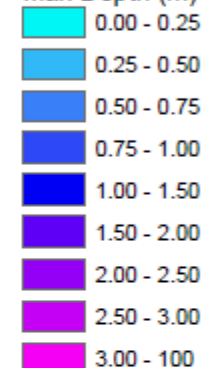
Ireland Pluvial Flood Mapping

Dublin Test Catchments

Swords - 100y 3h event

Legend

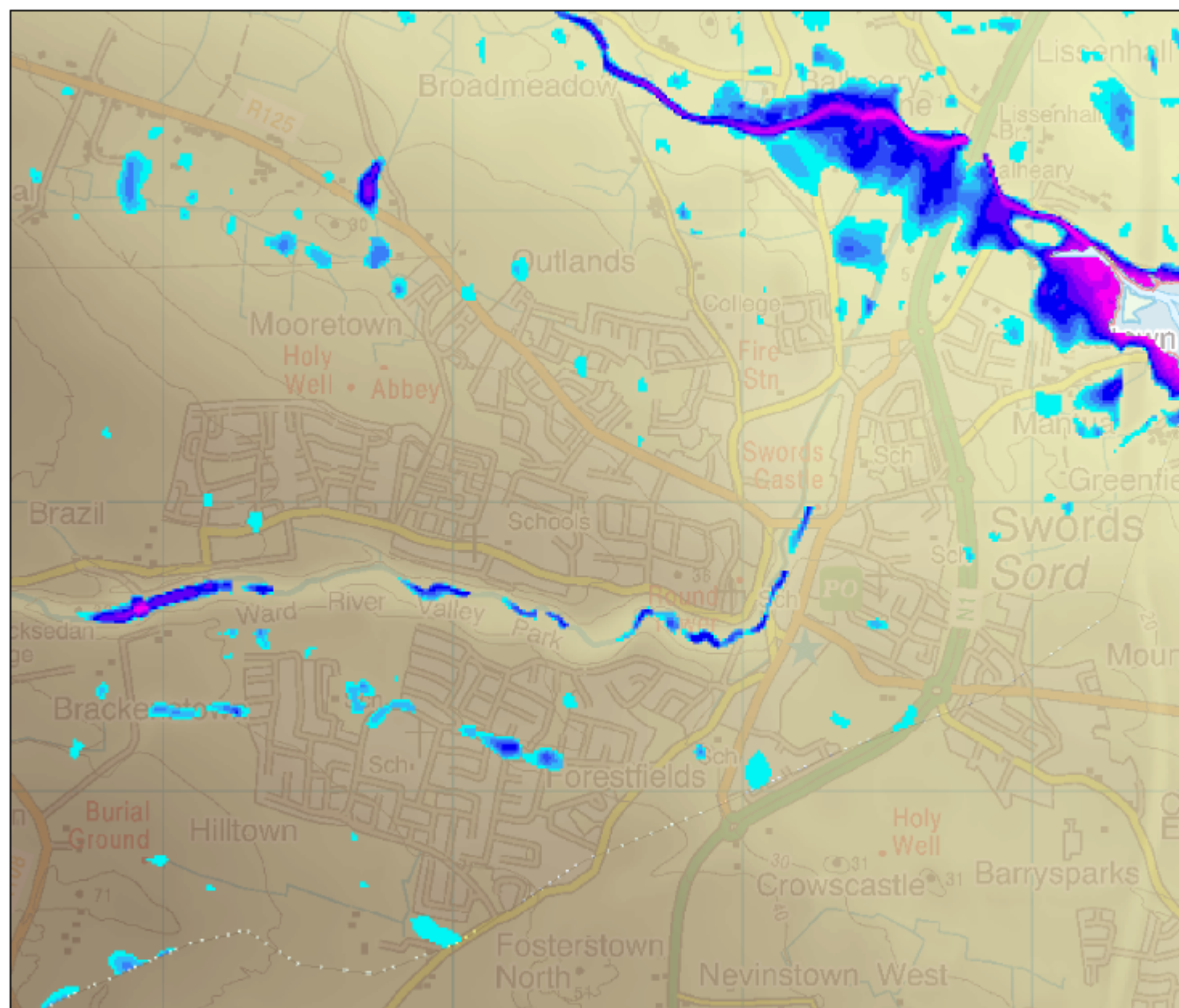
Max Depth (m)



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Working with water

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Wallingford, Oxon, OX10 9BA, UK.
Tel: +44 (0) 1491 835381
www.hrwallingford.co.uk

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`PREDICTIVE' PFRA

- PROBABILITY OF A FLOOD (HAZARD)
- CONSEQUENCES
 - Different 'Receptors'
 - *People, objects, areas and activities that could suffer harm or damage in the event of a flood*
 - Vulnerability Assessment for Receptors

RECEPTORS

- CRITERIA
 - Social
 - Economic
 - Environmental
 - Cultural Heritage

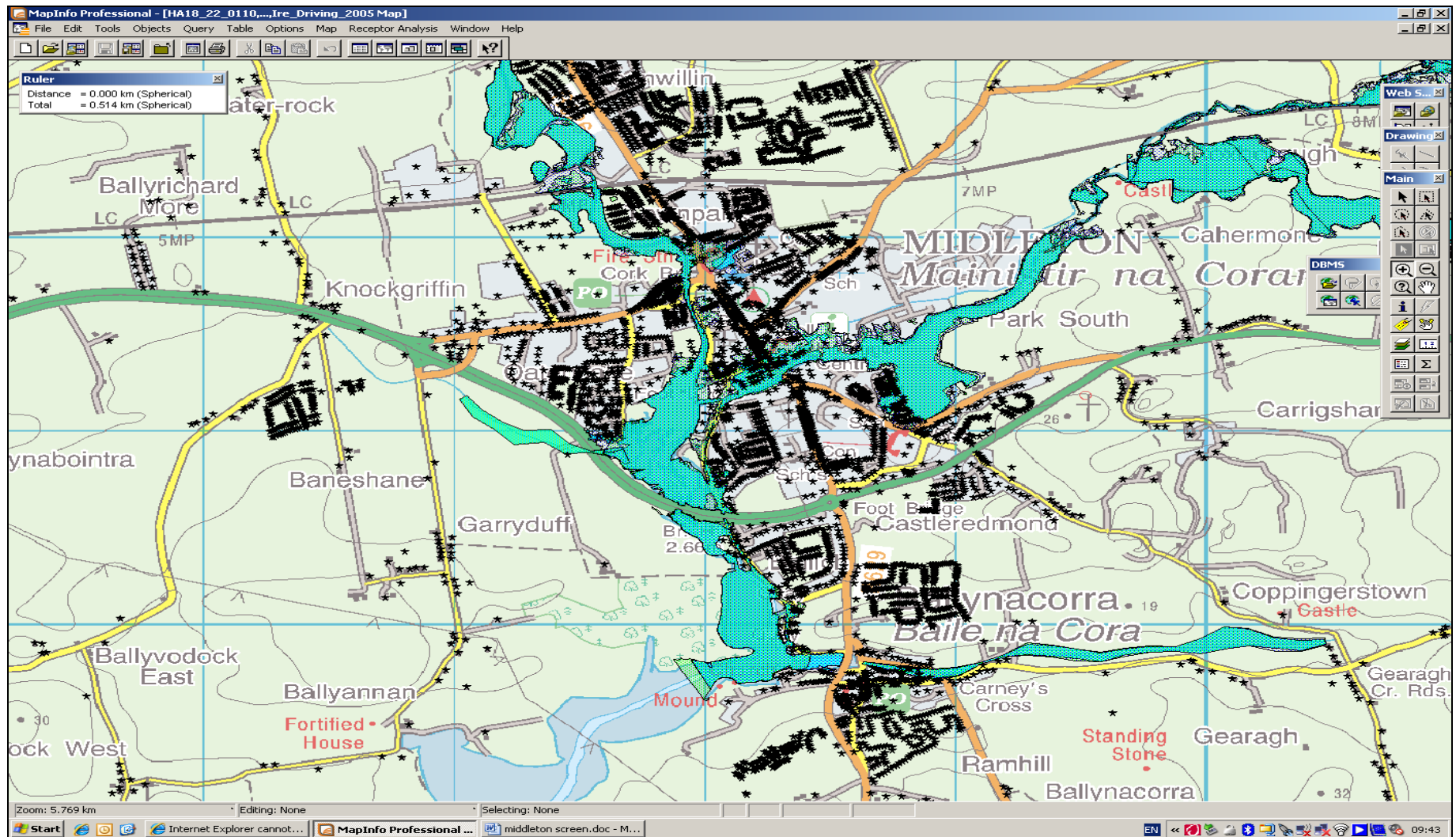
RISK ASSESSMENT

- RISK – (HAZARD, CONSEQUENCES)
 - Hazard
 - Indicative Mapping for range of sources of flooding
 - 3 Probabilities for each source
 - Consequences
 - Standardised Vulnerability Classifications
- FLOOD RISK INDEX (FRI)
 - Consistent Metric
 - Standard Threshold for 'Significance'

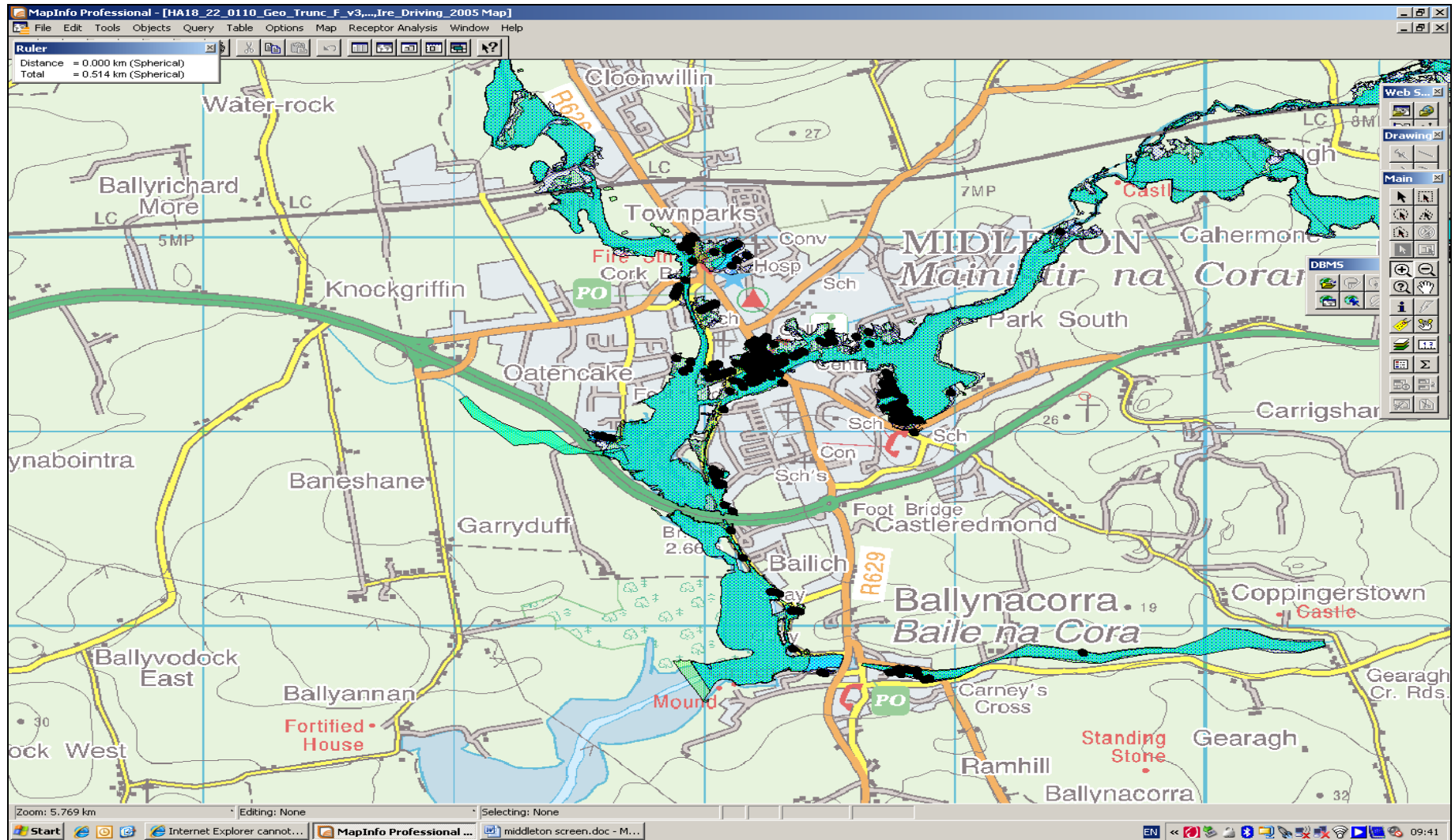
RISK ASSESSMENT

- **INDIVIDUAL POINT RECEPTORS**
 - Each Receptor represents a certain level of risk
 - Properties, Power stations, airports, hospitals, etc.
 - Calculate FRI for each Receptor
 - Vulnerability Classification
 - Probability of Flooding
- **AREAS OF RISK**
 - Cumulative risk within an area
 - Collection of houses, businesses, other receptors
 - Sum FRI within a given area

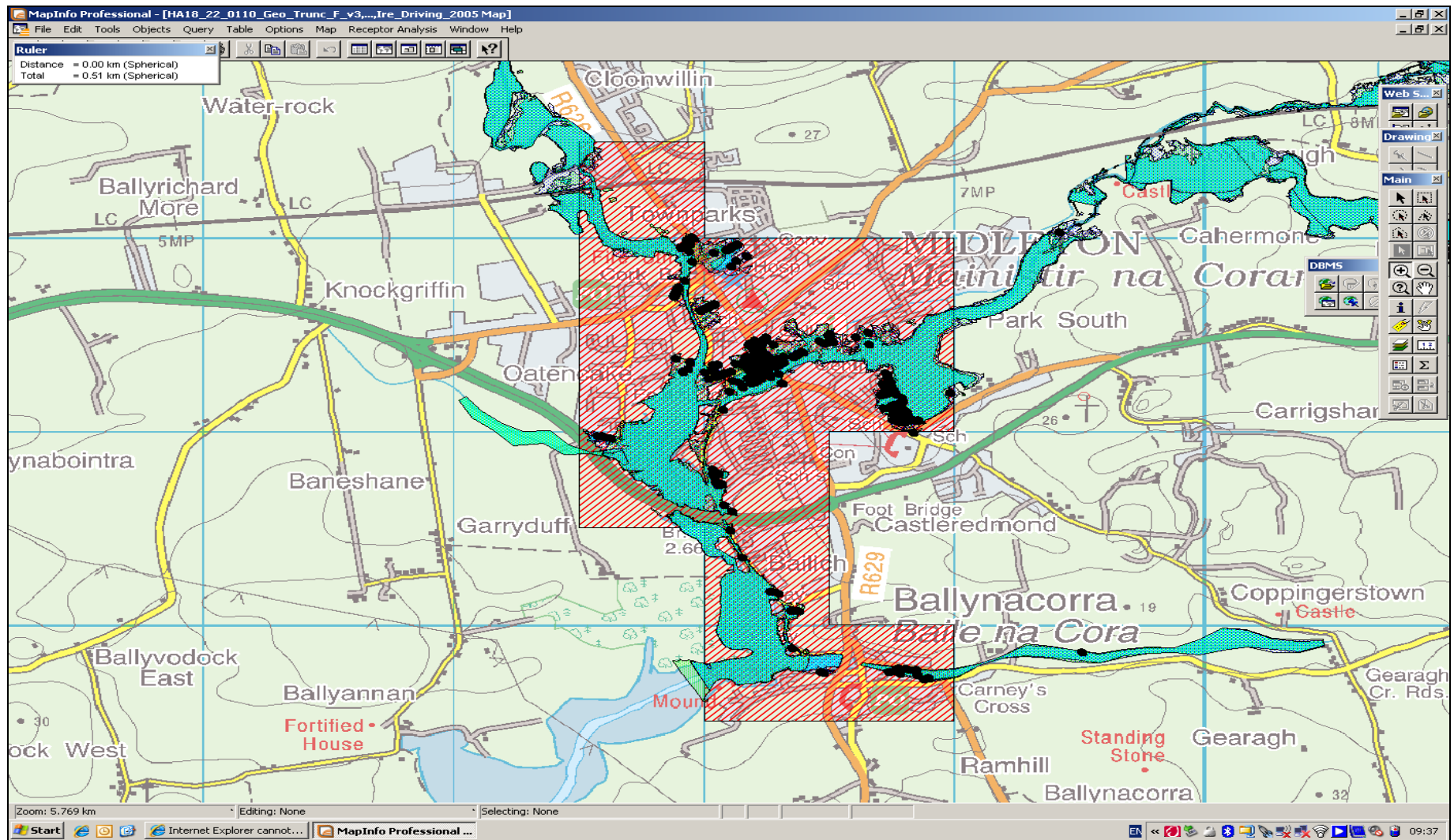
RISK ASSESSMENT



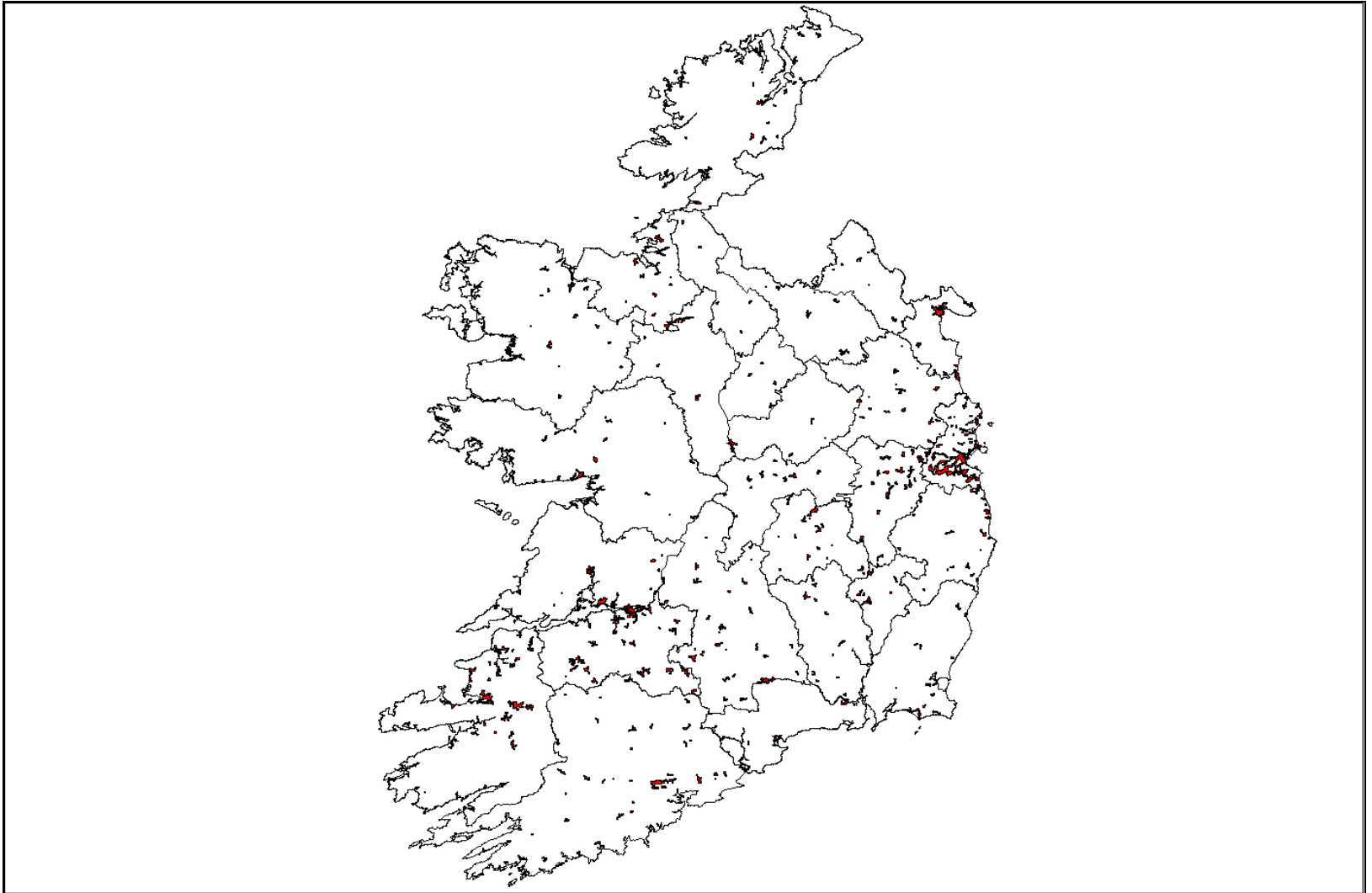
RISK ASSESSMENT



RISK ASSESSMENT



INITIAL RESULTS



OVERVIEW OF PFRA

- COMPLETION OF PFRA
 - Initial Draft: Mid-Late 2010
 - Identification of APSRs for CFRAM Studies
 - Consultation with:
 - Key Stakeholders / Experts (DoEHLG, EPA, etc.)
 - Local Authorities (Local Knowledge / Perceptions)
 - Final Draft: Mid 2011
 - Formal, Public Consultation Period (SI 122, 2010)
 - Final: December 2011
 - Deadline in 'Floods' Directive

EU 'FLOODS' DIRECTIVE

- ARTICLE 6 – FLOOD MAPS
 - Only Required for APSRs
 - Flood Hazard Maps
 - Low, medium and (option) high probability events
 - Flood extent
 - Depth or water level
 - (option) velocity or flow
 - Flood Risk Maps

EU 'FLOODS' DIRECTIVE

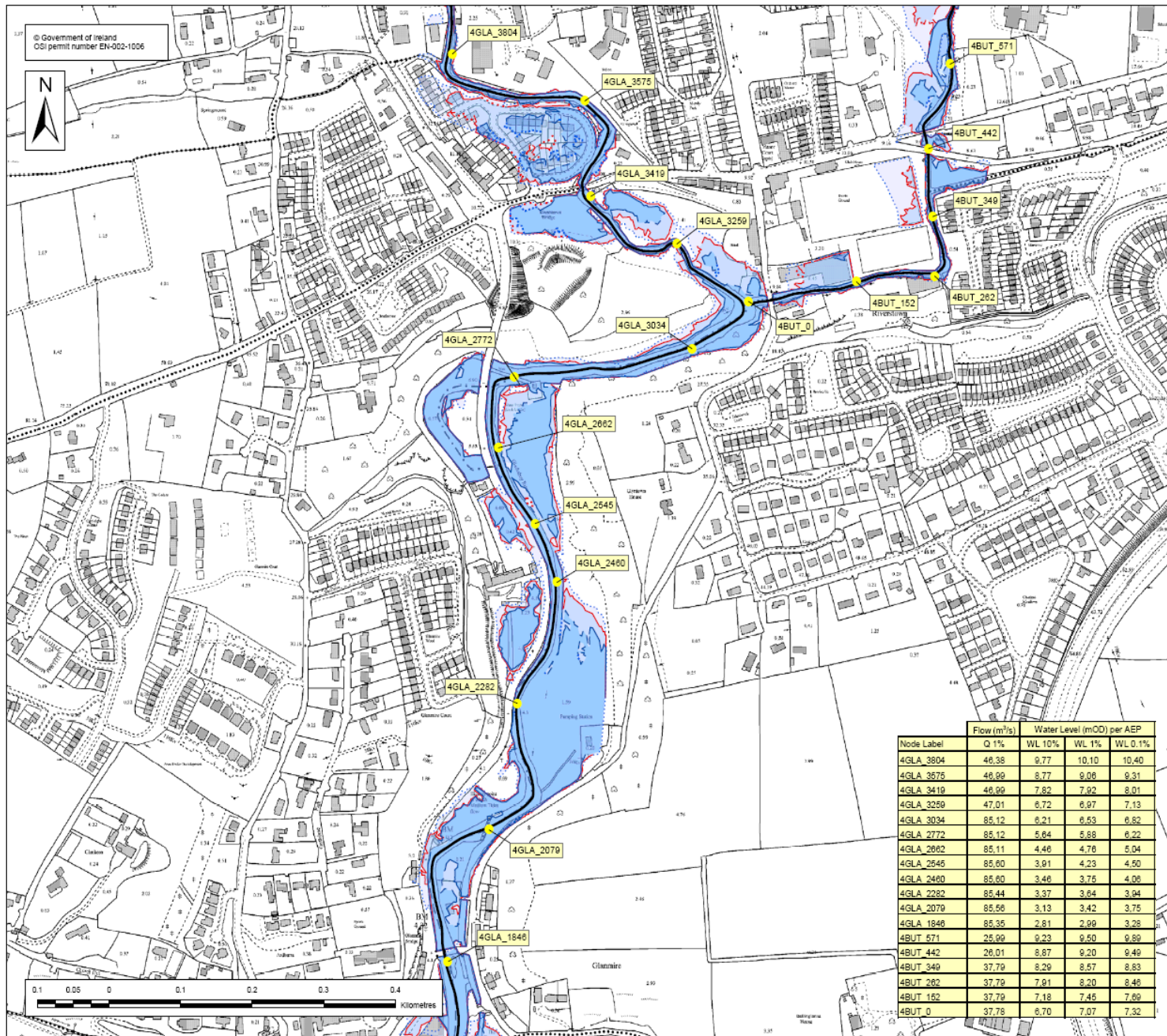
- ARTICLE 7 – FLOOD RISK MANAGEMENT PLANS (FRMPs)
 - At Catchment-Scale, but focused on addressing risk in APSRs
 - Set out flood risk management Objectives
 - Set out prioritised set of Measures for achieving specified Objectives

5: CFRAM STUDIES

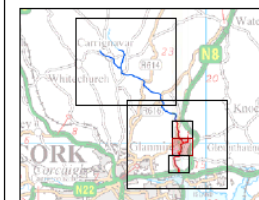
- FLOOD RISK MGT. PLANNING PROG.
 - Comprehensive, Catchment-Based Flood Risk Assessment and Management (CFRAM) Studies
- OUTPUTS
 - Flood Maps
 - Catchment Flood Risk Management Plan
 - Long-term plan for cost-effective and sustainable management of flood risk
 - Prioritised set of actions and measures to address flood risk in Areas of Potentially Significant Risk (APSRs)

5: CFRAM STUDIES

- SCOPE OF WORK
 - Survey
 - Data Collection
 - Hydrology
 - Hydraulics / Flood Mapping



Location Plan:



EXTENT MAP

Legend:

- 10 % AEP Flood Extent (1 in 10 chance in any given year)
- 1 % AEP Flood Extent (1 in 100 chance in any given year)
- 0.1 % AEP Flood Extent (1 in 1000 chance in any given year)
- High Confidence (0-20m) (10% AEP)
- Medium Confidence (20-40m) (10% AEP)
- Low Confidence (> 40m) (10, 0.1% AEP)
- High Confidence (0-20m) (1% AEP)
- Medium Confidence (20-40m) (1% AEP)
- Low Confidence (> 40m) (1% AEP)
- River Centreline
- Node Point
- Node Label (refer to table)

USER NOTE:

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS SOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

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OPW
Office of Public Works
17-19 Lower Hatch Street
Dublin 2
Ireland

Project:
LEE CATCHMENT FLOOD RISK
ASSESSMENT AND MANAGEMENT STUDY

Map:
GLASHABOY MODEL FLOOD EXTENT MAP

Map Type: FLOOD EXTENT

Source: FLUVIAL FLOODING

Map area: URBAN AREA

Scenario: CURRENT

Figure By: Valeria Medina Date: 7 August 2008

Checked By: Juan Fernandez Date: 7 August 2008

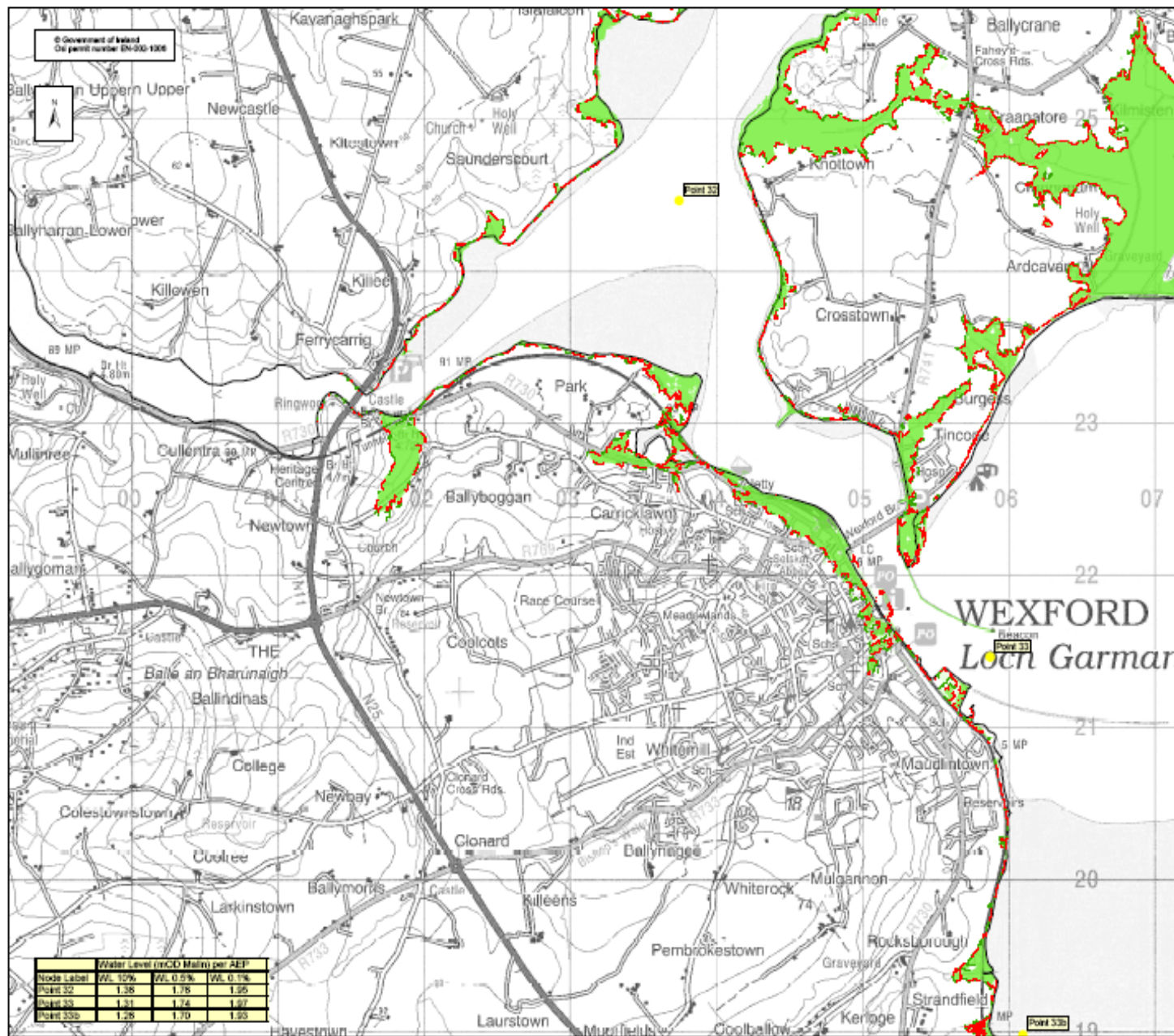
Approved By: Clare Dewar Date: 7 August 2008

Figure No.: M4/UA/EXT/CURS/002

Revision: 1

Drawing Scale: 1:5,000 Plot Scale: 1:1 @ A3

Node Label	Flow (m ³ /s)	Water Level (mOD) per AEP			
		Q 1%	WL 10%	WL 1%	WL 0.1%
4GLA_3804	46.36	9.77	10.10	10.40	
4GLA_3575	46.09	8.77	9.06	9.31	
4GLA_3419	46.09	7.82	7.92	8.01	
4GLA_3259	47.01	6.72	6.97	7.13	
4GLA_3034	85.12	6.21	6.53	6.82	
4GLA_2772	85.12	5.64	5.88	6.22	
4GLA_2662	85.11	4.46	4.76	5.04	
4GLA_2545	85.60	3.91	4.23	4.50	
4GLA_2460	85.60	3.46	3.75	4.06	
4GLA_2282	85.44	3.37	3.64	3.94	
4GLA_2079	85.56	3.13	3.42	3.75	
4GLA_1846	85.35	2.81	2.99	3.28	
4BUT_571	25.99	9.23	9.50	9.89	
4BUT_442	26.01	8.87	9.20	9.49	
4BUT_349	37.79	8.29	8.57	8.83	
4BUT_262	37.79	7.91	8.20	8.46	
4BUT_152	37.79	7.18	7.45	7.69	
4BUT_0	37.76	6.70	7.07	7.32	



Location Plan:



EXTENT MAP

Legend:

- 0.5% AEP FLOOD EXTENT
(1 in 200 chance in any given year)
- 0.1% AEP FLOOD EXTENT
(1 in 1000 chance in any given year)
- Very High Confidence (0.1% AEP)
- High Confidence (0.1% AEP)
- Medium Confidence (0.1% AEP)
- Low Confidence (0.1% AEP)
- Very Low Confidence (0.1% AEP)
- Very High Confidence (0.5% AEP)
- High Confidence (0.5% AEP)
- Medium Confidence (0.5% AEP)
- Low Confidence (0.5% AEP)
- Very Low Confidence (0.5% AEP)
- High Water Mark (HWM)
- Node Point
- Point Label (refer to table)

USER NOTE:

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF USAGE, INFORMATION, LIMITATIONS, IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.



Blomwood House
74 Boulder Road
Belfast
BT 12 6E2
Northern Ireland



Office of Public Works
17-19 Lower Hatch Street
Dublin 2
Ireland

Project:
IRISH COASTAL PROTECTION STRATEGY
STUDY - PHASE II

Map:
SOUTH EAST COAST FLOOD EXTENT MAP

Map Type: FLOOD EXTENT

Source: TIDAL FLOODING

Map Area: IRELAND

Scenario: CURRENT

Figure By: JMC Date: May 2009

Checked By: JMC Date: May 2009

Figure No.:

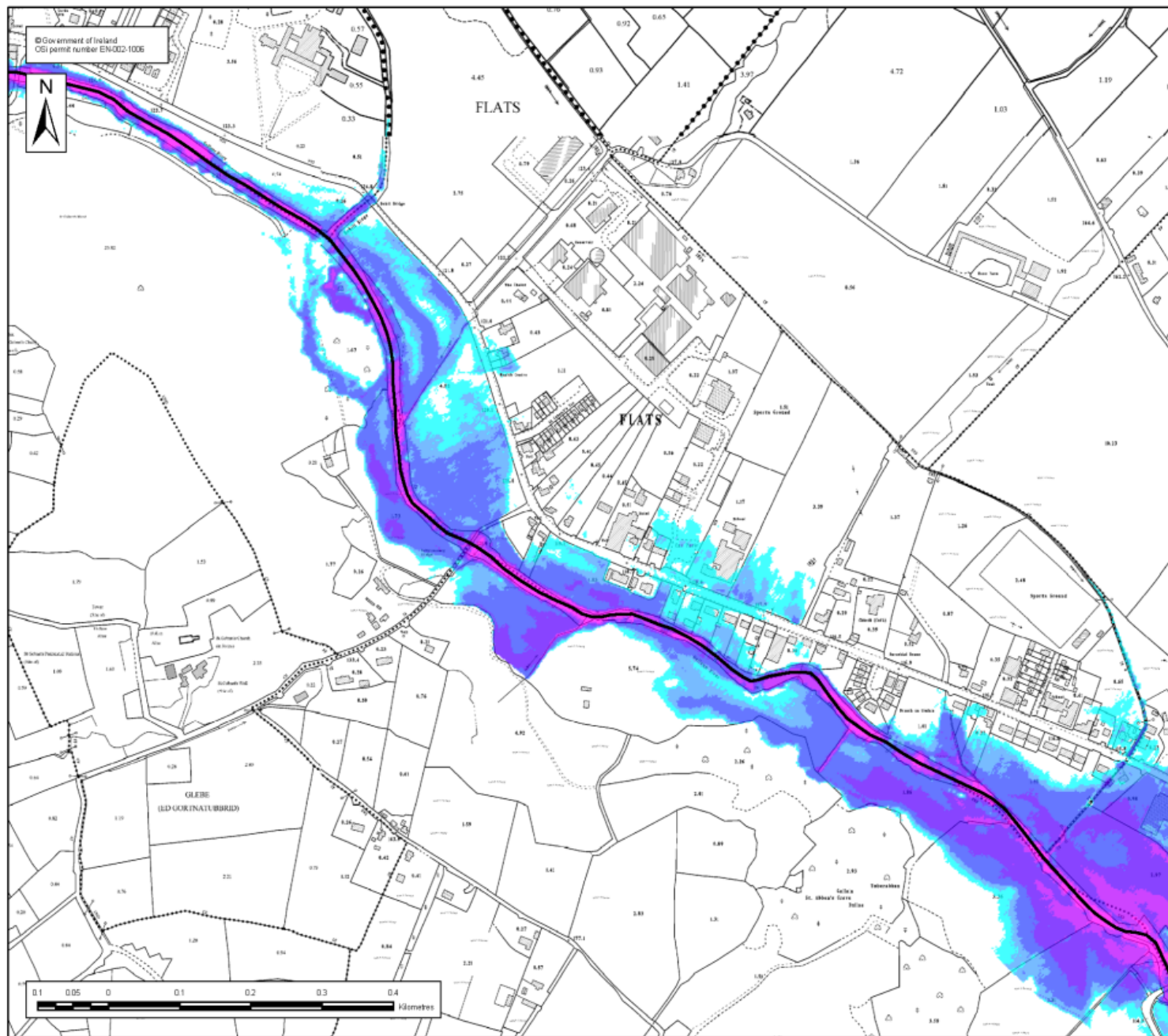
SE / RA / EXT / 19

Revision

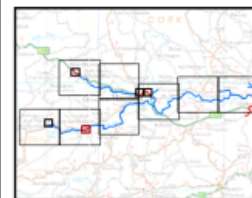
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Drawing Scale: 1:25,000

Plot Scale: 1:1 @ A3

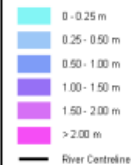


Location Plan



DEPTH MAP 10% AEP

Legend Depth Grid



USER NOTE:

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.



Project:
LEE CATCHMENT FLOOD RISK
ASSESSMENT AND MANAGEMENT STUDY

Map:
UPPER LEE MODEL FLOOD EXTENT MAP

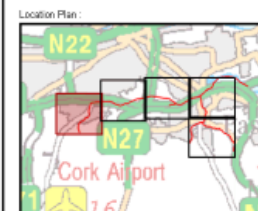
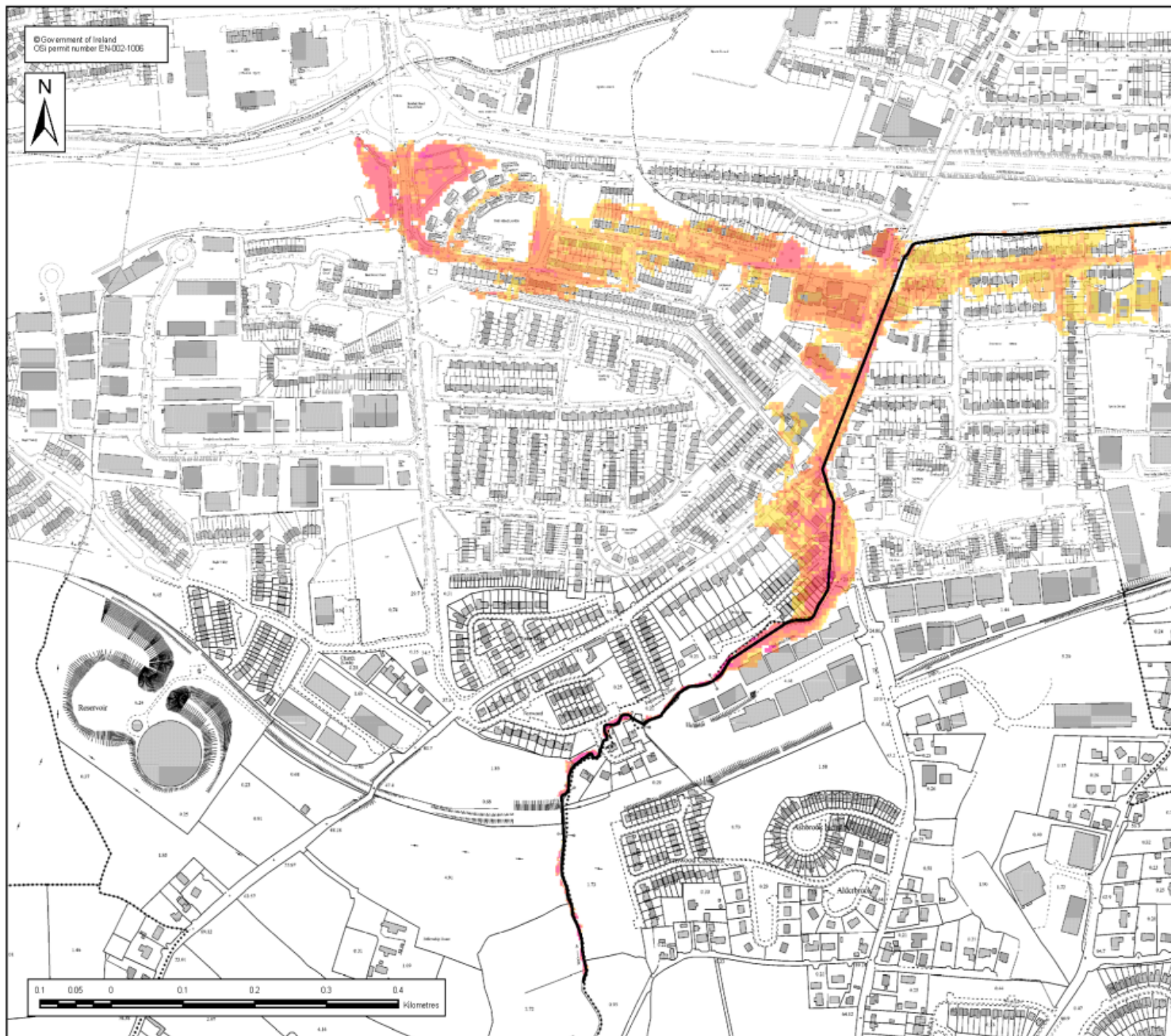
Map Type: DEPTH
Return Period: 10% AEP EVENT
Source: FLUVIAL FLOODING
Map area: URBAN AREA
Scenario: CURRENT

Figure By: Valeria Medina Date: 22 April 2009
Checked By: Juan Fernandez Date: 22 April 2009
Approved By: Jenny Pickles Date: 22 April 2009

Figure No:
M5/JA/DEP/10/003

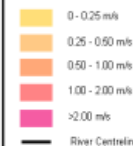
Revision
0

Drawing Scale: 1:5,000 Plot Scale: 1:1 @ A3



VELOCITY MAP 1% AEP

Legend Velocity Grid:



USER NOTE:

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND SOURCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.



Project:
LEE CATCHMENT FLOOD RISK
ASSESSMENT AND MANAGEMENT STUDY

Map:
TRAMORE MODEL FLOOD EXTENT MAP

Map Type: VELOCITY
Return Period: 1% AEP EVENT
Source: FLUVIAL FLOODING
Map area: RURAL AREA
Scenario: CURRENT

Figure By: Valeria Medina Date: 16 April 2009
Checked By: Juan Fernandez Date: 16 April 2009
Approved By: Jenny Pickles Date: 16 April 2009

Figure No:
M6/JA/VEL/100/001

Drawing Scale: 1:5,000 Plot Scale: 1:1 @ A3

5: CFRAM STUDIES

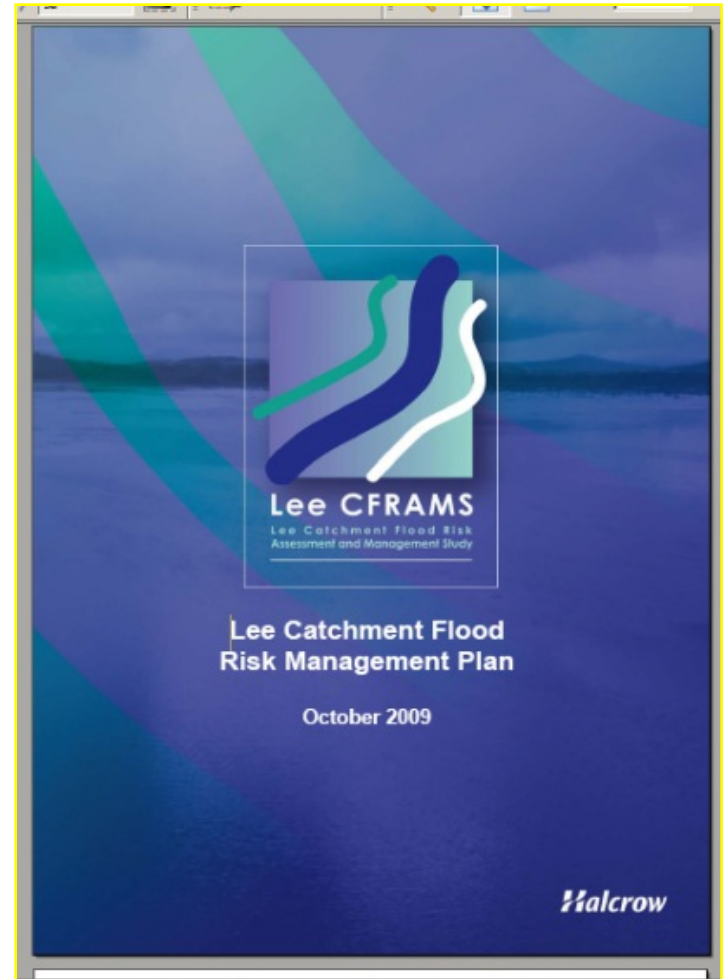
- SCOPE OF WORK
 - Survey
 - Data Collection
 - Hydrology
 - Hydraulics / Flood Mapping
 - Risk Analysis

5: CFRAM STUDIES

- SCOPE OF WORK
 - Survey
 - Data Collection
 - Hydrology
 - Hydraulics / Flood Mapping
 - Risk Analysis
 - Flood Risk Management Options
 - SEA / Habitats Directive Assessment
 - Flood Risk Management Plan

LEE 'CFRAM' STUDY

- WWW.LEECFRAMS.IE
- FLOOD MAPS
- FLOOD RISK
MANAGEMENT PLAN



LEE FRMP OUTPUTS - MEASURES

Phase I A (2010-11)	Phase I B (2012-13)	Phase I C (2014-15)	Phase II (2016-21)	Phase III (2022 onwards)	Who
NON-STRUCTURAL MEASURES – WHOLE CATCHMENT					
Develop Local Awareness and Preparedness Campaign, and Review Flood Event Emergency Response Plans	Implement Local Awareness and Preparedness Campaign Maintain, Review, Update and Practice Flood Event Emergency Response Plans				L o c a l Authoriti es
Implement the Guidelines on Spatial Planning and Flood Risk Management (2009)					L o c a l Authoriti es
CITY X					
Assess Opportunities to Optimise Formal Function of Existing Hydropower Reservoirs for Flood Risk Management	Implement Formal Function of Existing Hydropower Dams for Flood Risk Management, in conjunction with Further Local Works for Fluvial and / or Tidal Protection		Operate Formal Function of Existing Hydropower Dams for Flood Risk Management <u>AND / OR</u> Maintain Local Works to Provide Fluvial and / or Tidal Protection for City X <u>OR</u> Implement Full Joint Fluvial – Tidal Defence Scheme for City Y	OPW	
Detailed Assessment and Implementation of Local Works to Provide Fluvial and / or Tidal Protection for City X	<u>OR</u> Detailed Full Scheme Development for Joint Fluvial – Tidal Defences for City X				OPW
CITY Y					
Detailed Flood Relief Scheme Development for City Y	Planning and Procurement for Scheme for City Y	Implement Scheme for City Y	Maintain Scheme for City Y		OPW

5: CFRAM STUDIES

- PROVIDING FOR FUTURE CHANGES
 - Factors in Change
 - Climate Change
 - Land Use Change
 - Future Scenarios (MRFS, HEFS)
 - Hazard and Risk Assessment
 - Influence on Measures
 - Design (Adaptive, Assumptive)
 - Selection (Adaptability Criteria for Appraisal)

5: CFRAM STUDIES

- ENGAGEMENT AND CONSULTATION
 - Partnering
 - Local Authorities, Environmental Authorities, WFD Team, Other Responsible Bodies (ESB, WI)
 - Stakeholder Engagement
 - IFA, Fisheries, An Taisce, Chambers, Coillte, Ports, NRA, RPA, Marine Inst., ...
 - Public Consultation
 - Public Consultation Days, Website, Newsletters, Formal Consultation Processes
 - Coordinated Mgt. of Flood Risk

EU 'FLOODS' DIRECTIVE

- **NATIONAL IMPLEMENTATION**
 - PFRA: Underway
 - Flood Maps and Plans: CFRAM Studies
- **PROGRAMME**
 - Complete Initial PFRA (2010)
 - Commission CFRAM Contracts (2010 – 2011)
 - Flood Maps (2012 – 2013)
 - Flood Risk Management Plans (2014 – 2015)

SUMMARY

- THE PROBLEM

- 2009 Floods were Extreme
- Climate Change likely to Increase Flood Risk

- THE SOLUTION

- Ongoing Maintenance of Arterial Drainage Schemes
- Ongoing Implementation of Flood Relief Schemes
- Non-Structural Solutions
- Sustainable Planning and Development
- CFRAM Studies
 - PFRA, Flood Maps, Flood Risk Mgt. Plans
 - Coordinated Management by all Relevant Parties

ASSOCIATION OF IRISH RISK MANAGEMENT

FLOOD RISK MANAGEMENT IN IRELAND



Association of Irish Risk Management
a forum for inter-change of information and ideas
in the field of Risk Management

Mark Adamson
Office of Public Works

17th November 2010

