

Hazard Impact Model factsheet (March 2017)

HIM features (HIF references)		Natural Hazards Partnership Surface Water Flooding (SWF) - Phase 2	Vehicle Overturning (Wind)	Scottish Surface Water Flooding (Glasgow Commonwealth Pilot)	
Primary operational user		Flood Forecasting Centre	Met Office	Scottish Environmental Protection Agency	
MODELLING	Develop or acquire hazard model	Hazard model input data (Section 5.1.1)	24 member ensembles using MOGREPS-UK data. Provided as 2km resolution 15 minute accumulations from four forecast references times per 24 hour period.	12 member ensembles using MOGREPS-UK data. Provided as 2km resolution hourly average of 15 minute wind gusts and wind direction from four forecast references times per 24 hour period.	24 member ensembles using MOGREPS-UK data. Provided as 2km resolution 15 minute accumulations from four forecast references times per 24 hour period.
	Review available receptor data	Vulnerability (Section 5.1.2)	Thresholds for depth and hazard rating based on receptor characteristics. Use of sensitive populations.	Altitude of road, road orientation, attributes of road and number of lanes.	Not explicitly considered. Implemented via a single depth threshold delineating the flood outline.
	Formalise hazard / receptor relationship	Impact modelling (Section 5.1.3)	Receptors in a given grid cell are impacted if the Grid-to-Grid SWF estimate exceeds Updated Flood Map for Surface Water thresholds.	Impact is not explicitly measured in VOT. Instead, this is communicated via risk through the probability of thresholds on a given section of road being exceeded by wind speeds.	Receptors in a given grid cell are impacted if the Grid-to-Grid SWF estimate exceeds Regional Pluvial Flood Hazard thresholds.
		Risk modelling (Section 5.1.3)	Risk = Severity of Impact * likelihood	Risk = probability of hazard exceeding wind thresholds * vulnerability * exposure	Risk = number of MOGREPS ensembles exceeding a given severity threshold.
		Risk modelling (Section 5.1.3)	Flood Forecasting Centre flood risk matrix.	Uses National Severe Weather Warning Service categories.	Scottish Environmental Protection Agency flood risk matrix.
	Model inputs	Geography - contact hazard data (Section 5.3.2)	Grid-to-Grid: 1km rasters of flood scenarios	2km rasters of wind gust and wind direction	Grid-to-Grid: 1km rasters of flood scenarios
		Geography - contact receptor data (Section 5.3.2)	Impact Library of 1km grids created off-line using Updated Flood Maps for Surface Water (9 potential design storms; 3 max scenarios for 1 in 30, 1 in 100 and 1 in 1000) and receptor point/polyline data	Centre points of road sections	Impact Library of 1km grids created off-line using Regional Pluvial Flood Hazard (RPFH) maps (14 potential design storms; 1 in 10,30,50,100,200, for 3hr durations and 2 climate change scenarios - 30yr + 20% and 200yr +20%) and receptor point/polyline data
PROOF OF CONCEPT / PROTOTYPING	Model outputs	Geography - hazard data (Section 6.3/6.4)	1km grids displaying probability of 3-hr maximum rainfall, 3-hr Grid-to-Grid Surface Runoff totals exceeding static thresholds and 3-hr rainfall exceeding 30 or 40 mm.	N/A	1km grids displaying probability of 3-hr maximum rainfall and Grid-to-Grid Surface Runoff totals exceeding static thresholds.
	Model dimensions	Geography - impact data (Section 6.3/6.4)	1km grids classified by impact category and severity	< 2 km road sections of trunk road network in UK. Also has exposure field, which is traffic counts on road network	N/A
		Impact types (Section 6.3.5)	Danger to life, Damage to property, Denial of access to infrastructure, and Denial of access to Transport.	N/A/ - model converts hazard, exposure and vulnerability directly into risk: Low, low-medium, medium-high, high risk of disruption	People and Property [Population (measured by properties), Community Services, Utilities, Commercial Properties], Transport [Railway, Road, Railways and roads combined]
		Impact intensity (Section 6.3.5)	Minimal, Minor, Significant, Severe	N/A	Minor, Significant, Severe
		Geography - risk data (Section 6.3/6.4)	County-level summary of risk	< 2 km road sections of trunk road network in UK. Also has exposure field, which is traffic counts on road network	1km grids displaying probability of 3-hr G2G surface runoffs exceeding 4 "minimum effective rainfall" grids using the Impact Library
		Time (Section 6.5)	Potentially every hour during hazard event out to 36 hours	Potentially every hour during hazard event out to 36 hours	Potentially every hour during hazard event out to 36 hours
		Probability (Section 6.5)	Use of 24 rainfall ensembles	Use of 12 wind gust and wind direction ensembles	Use of 24 rainfall ensembles
		Reporting geography (Section 6.5)	Local Authority/County	Road network	1km grid (10x10km research area)
Visualisation (Section 6.6)	1 km rasters for Grid-to-Grid, 1 km rasters of impacts, county-level polygons of risk	Road network on basemap visualised on Web Mapping Service	1km rasters for Grid-to-Grid, 1km probability rasters for each impact type and each severity coloured up by matrix.		
EVALUATION	Verification (Section 7.2)	Verification of input datasets and Grid-to-Grid / impact modelling approach	Verification using impact reports	Based on case study events	
	Validation (Section 7.3)	Validation of impact severities are conducted against King's College London Nexis Lexis printed media records and Flood Forecasting Centre post-event reporting.	Verification using impact reports, including news, Twitter and Highways England	Based on case study events	
Author		OG (HSE)	RH (Met Office)	OG (HSE)	