Using newspapers as a source of data to assess flood impacts: methodology note

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1 Context and background

Effective warnings have long been recognised as crucial tools to protect the public from natural hazards (Sorensen 2000; Parker 2004; Parker et al. 2007). Although there is no consensus about which aspects of warnings (e.g. source, information, language, media, time and frequency of distribution, etc.) are more strongly correlated with optimal public response, the greater salience of flooding as a public policy issue (Escobar & Demeritt 2014) and the incidence of recent flood events in the UK has lead to increased demands for more accurate and meaningful flood alerts (Cole et al. 2013). These demands not only come from the general public but also from emergency responders responsible for making decisions about what information to convey, when, how and to who.

There is ongoing work to improve the accuracy and resolution of *rainfall*-based flood risk models (Hurford, Parker, et al. 2012; Hurford, Priest, et al. 2012; Parker et al. 2011) but an additional stream of work is seeking to develop *impact*-based models that not only estimate the probability of flooding but also its potential impact, for instance in terms of transport disruption or property damage[1]. The Natural Hazards Partnership's Hazard Impact Model (HIM) initiative is tasked with developing such models for three hazards: surface water flooding (SWF), land instability and high wind so as to support Civil Contingency Act Category 1 and 2 responders in their decision-making when dealing with impending natural hazard events. The Centre for Ecology and Hydrology leads the work on the surface water flooding model in close collaboration with the Health and Safety Laboratory (HSL), which is leading on modelling flood receptors and damage functions.

Past studies on the challenges and feasibility of flood warnings have identified a lack of data on the incidence and impact of flood events (Hurford, Priest, et al. 2012; Priest et al. 2011) and this is particularly problematic when validating the models developed in the HIM initiative. There is a strong record of using non-scientific accounts to reconstruct natural hazard events

[1] Although (Priest et al. 2011) understand *impact* in terms of geographical extent and magnitude and use *consequences* to denote what we understand by impact in this paper, our use of the word impact is consistent with that of the Flood Forecasting Centre and thus we prefer it to consequences.

and of the use of newspapers as historical data in particular (Trimble 2008). The digitalisation and indexing of multiple newspaper archives has made this method more accessible and efficient for building, expanding and verifying large inventory and impact datasets. A recent study of UK landslide occurrence, for example, used newspaper coverage to identify 111 events to complement the National Landslide Database, and enhanced the breadth and detail of information for existing entries in the Database (Taylor et al. 2015). The specific case of floods is no exception: for example, Tarhule used newspapers to explore the nature of flood events in Niger's Sahel (Tarhule 2005); Hall traced a turning point in the expectations about state responsibilities for natural disasters in the UK (Hall 2011) and Escobar & Demeritt used newspapers to document shifts in the public perception of flood risk in Britain (Escobar & Demeritt 2014).

There are recent experiments to use crowd-sourced data (Kutija et al. 2014) and post-event surveys (Borga et al. 2011) to gather evidence on flood impacts but this method is less useful for model validation, which requires more systematic methods of reporting less prone to incompleteness and discontinuity biases of novel social media. The Environment Agency, local authorities, insurers and emergency responders may receive reports of flood impacts but they do not archive it in a consistent and easy to search way and their archives are selective of only those impacts on which they are expected to act: properties in the case of local authorities and insurers or properties and roads in the case of the Fire and Rescue Services. This means that other impact categories identified by the Flood Forecasting Centre (FFC), such as disruption to communities or service/business disruption are out of scope in these archives. Furthermore, these databases do not always hold the information that is more useful for model validation.

While the media's criteria for deciding which events are newsworthy imply that newspapers cannot be taken as a comprehensive source (Moeller 2006; Pennington & Harrison 2013; Guzzetti & Tonelli 2004), their potential to contribute data about flood impacts is still significant. Based on our previous experience of using a newspaper database to gather and analyse flood event coverage (Escobar & Demeritt 2014), and on our current work building and understanding an inventory of surface water flooding impacts within the SINATRA project funded by NERC under its Flooding from Intense Rainfall Programme, King's College London was asked to collaborate in the SFW HIM project by taking on the task of identifying the impacts of a series of flood event case studies being used to test and validate the Hazard Impact Model. This note describes the methodology we used to collect, analyse and score impacts from the 11 event case studies.

2 SFW HIM Case studies and remit of the impact data task

Work Package 4 of Phase 2 of the SFW HIM project aims at testing and refining the model through a series of case studies. The case studies were selected on the basis of several criteria, paraphrased below from their Case Study Selection Protocol, which determined that the case studies would:

a. Reflect the FFC's impact categories of minimal, minor, significant and severe impacts.
b. Include urban and rural cases
c. Include winter and summer cases
d. Allow for different geologies to be analised
e. Include a 'false positive' case
f. Include cases where a range of impact categories occur within a single county

The final list of selected case studies is presented in Table 1.

Table 1. Selected Event Case Studies

Event	Counties	Impact category
28 June 2012	Northumberland	Significant
	Tyne & Wear	Severe
6 July 2012	Norfolk	Significant
	Suffolk	Minor
	Northumberland	Significant
5 July 2012	Durham	Significant
	Northumberland	Minor
	Stockton-on-Tees	Minor
20 July 2014	Essex	Significant
	Norfolk	Significant
	Kent	Significant
	Greater London	Minor
28 June 2014	Norfolk	Minor
	Suffolk	Significant
	Greater London	Minor
21 May 2014	Cambridgeshire	Minimal
	Essex	Minimal
	Norfolk	Minimal
	Southend-on-Sea	Minimal

	Suffolk	Minimal
	Thurrock	Minimal
	Kent	Minimal
	Medway	Minimal
	Greater London	Minimal
14 August 2014	Essex	Minor
	Suffolk	Minor
	Greater London	Significant
28 July 2014	Cambridgeshire	Minor
	Essex	Significant
	Greater London	Significant
8 July 2014	Tyne & Wear	Significant
7 February 2014	Cambridgeshire	Minor
	Essex	Significant
	Suffolk	Significant
23 November 2014	Cambridgeshire	Minor
	Essex	Minimal
	Norfolk	Minor
	Suffolk	Minor
	Thurrock	Minor
	Greater London	Minor

The impact data task involved systematically searching a newspaper database to build a complete corpus of coverage about these events (see section 3) and then a series of further analytical steps to screen individual stories for relevance (section 4), extract and categorize reports of impact by location and type (section 5), and score those impacts according to the FFC flood risk matrix (section 6), before, finally, producing a final output dataset per event to be used by the HSL to validate their model.

3 Data Collection

Nexis is a digital database of over 36,000 news sources worldwide. It stores more than 1,000 UK titles that can be searched by date, region, key words and type of publication. Search results can be further filtered and downloaded as a Word document for analysis. The researchers had previous experience of using the Nexis[2] database to build a 25 year archive of

[2] Available via registration at https://www.lexisnexis.com/uk/nexis/

UK flood events coverage; KCL is subscribed to this service and the database has proved useful in similar projects, e.g. (Taylor et al. 2015). Thus it was decided to use it again for this task.

3.1 Search Terms

Pilot trials were carried out with two of the case study events (28 June 2012 and 6 July 2012) and one further event not included in the final selection (4-6 August 2012). After several trial Boolean search trials, (Escobar & Demeritt 2014) settled on "flood!" AND "rain" OR "risk" within the same paragraph in order to capture both event and policy discussion articles. Nexis allows for the search to be carried out in the headline, headline or lead as well as other options not relevant for this case, such as Byline. However, Escobar & Demeritt had already established that using the headline missed substantial data and preferred searching "Anywhere in the text"; an initial search was carried out with these terms for each of the pilot dates. As the emphasis here was on capturing event coverage articles as comprehensively as possible, a further trial using "flood!" AND "rain" OR "storm" within the same paragraph was carried out. This yielded less results than the first search but a comparative analysis revealed that the second search filtered out articles about planning projects and policy discussions that were irrelevant for this task whilst still capturing all of the event-related articles. Trials to exclude terms such as "tears" (as in "floods of tears") or the combination "flood in" (as in "responses flood in") excluded relevant articles and so the search terms were agreed as "flood!" AND "rain" OR "storm" within the same paragraph with no exclusion terms as shown in Figure 1.

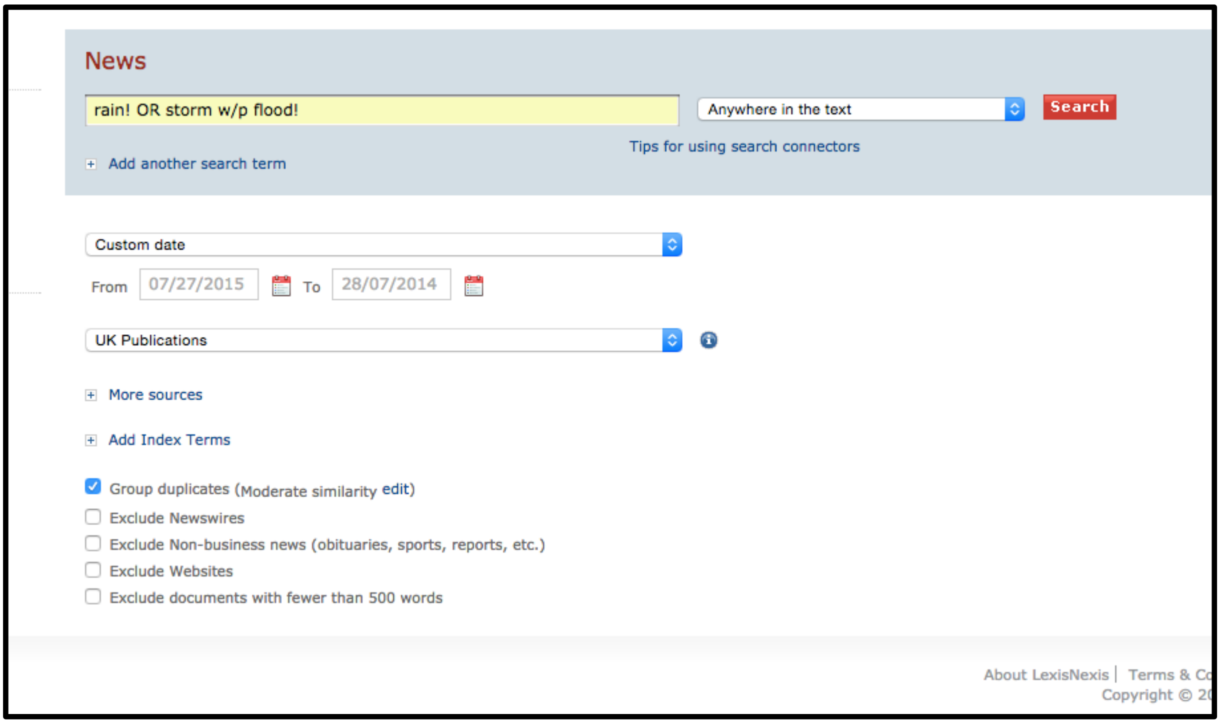

Figure 1. Customised Search Terms in Nexis Database

3.2 Search Period

To allow a comparison of the three pilot dates we selected a two-month period between the 28th June 2012 and 31st August. Trial analyses identified that impact reporting reduced significantly on the fourth day after each event, and stopped completely within a fortnight, especially if another event occurred in the interim. Moreover, relevant results on and after day 9 of each event were found not to reveal anything new that had not already been reported in the first week of coverage. The trial analysis also revealed that regional newspapers tended to provide more detailed impact information than the national press and wire services, and so it is important for any search method to capture them. Given that a significant number of regional publications are weekly it was decided to set the search period as the event date plus the following 7 days. In other words, eight searches were for each of the case study dates: one with the event date and then 7 more for the subsequent 7 days.

3.3 Sources

Nexis' Multiple-source files include options such as UK Broadsheets, UK Nationals, UK Regionals and UK Publications, which is the most comprehensive one. It also includes an option to search in UK Newspaper stories but in this case only selected online coverage is included. A trial search was performed on the regional newspaper database, which returned results from relevant regional publications but also included national publications, such as The Times, The Independent and The Telegraph. The data reported in the national publications was found to complement and consolidate the regional data rather than repeat it. Thus the sources were set as UK Publications to ensure both regional and national sources were fully captured.

3.4 Filters

3.4.1 Geography

The Nexis database classifies results by the geography of publication, categorised by country and regions, as well as an "unclassified" headline. Trial analysis showed that a large number of results fell into the latter category including relevant UK flood event articles. Further, relevant results were dispersed between several non mutually exclusive categories, such as Europe, European Member States, England, and London (England), therefore it was decided not to automate the search by using this filter as it posed a risk of excluding relevant data. Instead we relied on manually filtering to screen out stories about flooding outside the UK.

3.4.2 Duplicates

Nexis groups duplicates using either High or Moderate Similarity criteria. The system chooses a lead document within a group of duplicates and then excludes the rest. The aim of using this option was to filter out duplicating articles e.g. from morning and evening editions of the publication, or duplicated within the online version that increased the volume of articles for analysis without contributing to the quality of the data. During trials, using the High Similarity option was not found helpful and even the Moderate Similarity option results still contained a number of duplicates, which had to be filtered out manually, so the decision was to apply the Moderate Similarity option to reduce duplicates as much as possible.

3.5 Raw Data Curation

In sum, 8 searches were carried out for each case study date (Days 1 to 8 of the event). The search results were downloaded as a Word document with the search terms in bold and a "list of included documents" at the front. The resulting 8 Word documents (e.g. 28 June 2012 DAY1.doc) were filed in a discrete case study folder of raw data (e.g. 28 June 2012 Raw Data). Each "list of included documents" was transposed as text into an Excel Daily Database (DD) (e.g. 28 June 2012 DAY1.xlsx) ready for three analysis steps: marking for relevance, extracting and categorizing impacts by type and location, and scoring impacts.

4 Article Analysis Step 1: Screening for Relevance

Apart from the article number, source and headline information already supplied by the "list of included documents" transposed in to the DD, the spreadsheet includes the following additional fields on the article's ID (see Figure 2):

Paper Title, Type and Frequency: Types of papers were National, Regional or Online and Frequency was Daily, Weekly or Online. This information was only recorded for articles marked with relevance 1 (see below). Filling in the Frequency category during analysis proved time-consuming as it often implied further Internet searches and as it was not considered key information it was not always filled in.

Duplicate: Duplicates would be noted in this column, specifying the article number of the original or article; this field was completed only for articles with relevance 1.

Relevance: Four numerical relevance categories were established. 0 for articles that were not about floods or outside the UK; 1 for floods in the case study regions (which varied for each case study is shown in Table 1); 2 for flood impacts but outside the case study regions and 3 for flood stories but not about impacts, such as warnings or forecasts.

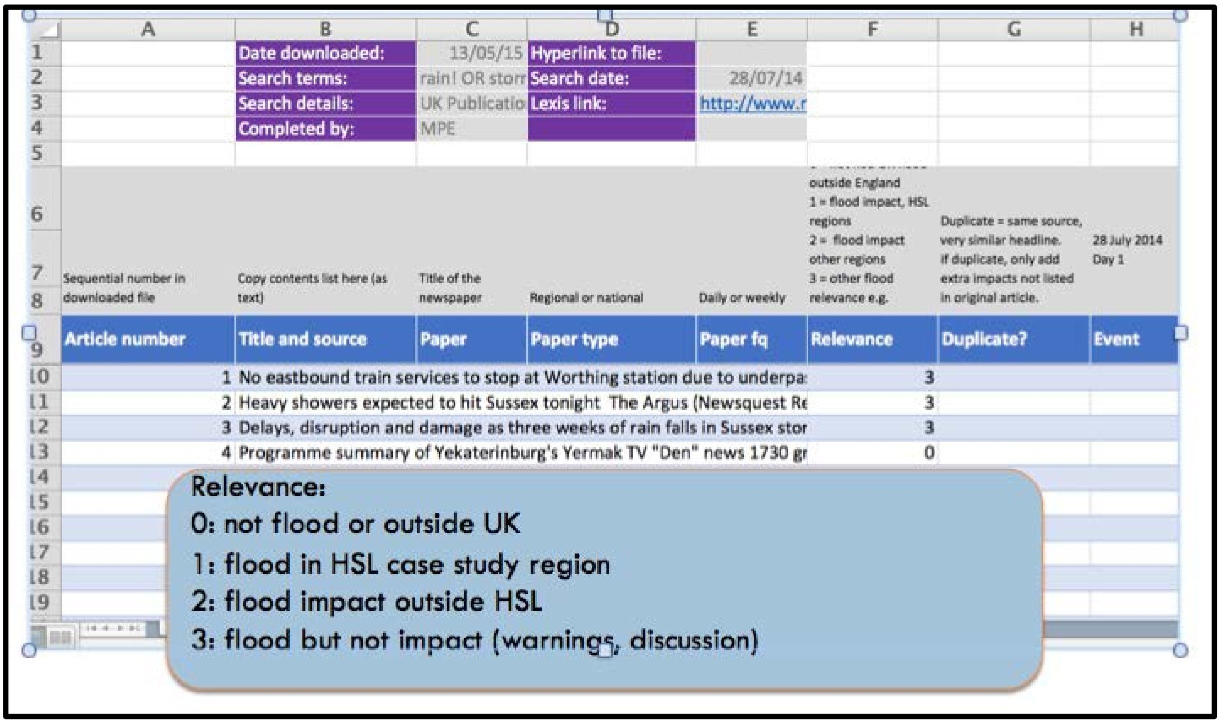

Figure 2 Article ID Data in Raw Data Daily Database

Each article was skim-read to determine and record its relevance but only articles with relevance 1 were mined for impacts.

5 Article Analysis Step 2: Extracting Impact Data

5.1 Defining the Impact Categories

Possible impacts were divided into 6 main categories based on the FFC's Flood Impacts Table to which we will return: danger to life, damage to buildings, damage to key sites, disruption of transport, disruption of communities and other. The trials showed that the information reported in the news allowed for finer granularity so these main categories were further broken down as follows for a total of 9 impact types.

Danger to life (3 subcategories):

- **Death**: reported fatalities, direct or indirect. Fatalities due to lightning strikes were not considered as a flood impact.
- **Injury**: these had to be reported as such rather than as possibilities to be recorded as impacts.
- **Evacuation/Rescue**: these could be preventative or refer to people trapped in properties or stranded in vehicles.

Damage to buildings (2 subcategories, matching fields in HSL datasets):

- **Residential damage**: properties flooded or affected by the flood.
- **Non-residential damage**: public and commercial buildings flooded.

Damage to key sites:

- Flooding in hospitals, or damage to power stations or transport infrastructure such as railway lines or bridges.

Disruption of transport:

- Flooded and closed roads, flooding in train or tube stations and cancelled or delayed rail and underground services.

Disruption of communities:

- School closures and cancelled or postponed community events.

Other:

- This included other reported facts such as Fire and Rescue Services' reports of received phone calls or call outs regarding floods or vague impact descriptions such as "The Castle and its surrounding villages were hardest hit by flooding"

5.2 Identifying and recording impact data

Each article with Relevance 1 was carefully read in order to identify and classify impacts into the DD where each impact category had the following fields, see Figure 3:

Relevance: A binary code column (1 or 0) to denote if the impact was reported in the article (this allows filtering the data by impact type)

Description: A narrative description of the impact e.g. "flooding affecting three neighbouring houses". As much detail as possible would be recorded.

Location: as each case study event focused on more than one county as shown in Table 1, the county would also be noted together with the specific locations reported in the article (e.g. B184, Weaverhead Close or Thaxted)

Hazard: several drop-down menu options were specified under Hazard (surface water, fluvial, coastal, hale, wind, snow and landslide) but only the first three were recorded as relevant. Not all articles were as specific when describing the hazard and unless specified or easy to deduct surface water was used as default

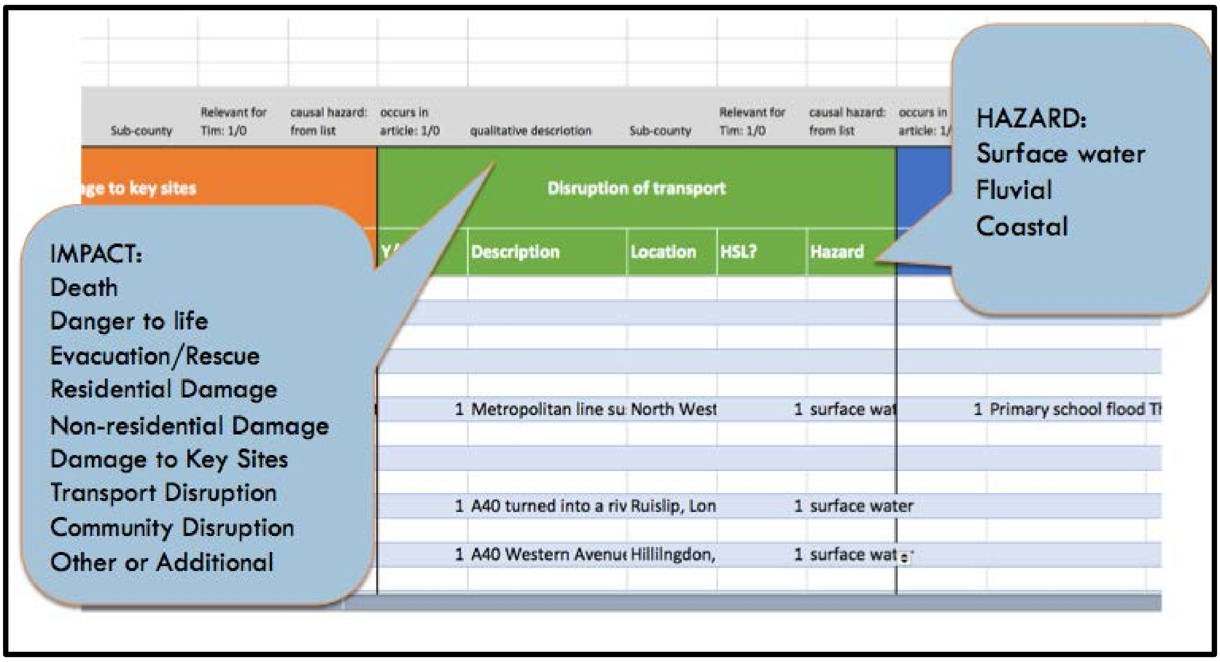

Figure 3. Impact information recorded in Daily Database

To illustrate the process, 9 impacts have been underlined in the article reproduced as an example in Figure 4. "*Flooding has affected the B184*" would be recorded as Disruption to Transport and the B184, Thaxted and Essex would be listed in the impact's Location column. The "*flooding in three neighbouring houses*", the "*four flooded cellars*" and the "*two flooded cottages' basements*" would all be recorded separately as Residential Damage with their respective locations. The "*flooded boiler house at a primary school*" and the "*flooding in the Catholic Church*" were recorded separately with their respective locations as Disruption to Communities. The information about time of day was recorded as much as possible in the impact's description as it might be useful for the model validation.

properties since 3am today.

The flooding has affected the B184 and numerous properties. A road has also collapsed from the heavy rainfall, according to Essex Fire and Rescue.

Firefighters were called to flooding affecting three neighbouring houses on Weaverhead Close.

One family remained on the first floor of their property while crews pumped water from their property.

The flood water was affecting the electrics and the electricity board was called to the incident to isolate the power.

Firefighters led a total of five people to safety and dealt with the incident by 09:14hrs.

Crews from Thaxted, Saffron Walden and Dunmow were sent out to deal with flooding in Thaxted.

Firefighters also reported cars were stranded in floodwater on the B184.

At 7.30am, two fire appliances remain in Thaxted and are continuing to pump water out of the affected areas.

At 8.24am firefighters were called to a flooded boiler house at a primary school on Bardfield Road. Crews used a light portable pump and dealt with the incident by 9.18am.

Soon afterwards firefighters attended four flooded cellars on Watling Street and successfully pumped water from the cellars by 9.56am.

Two cottages on Park Street have also had their basements flooded. Crews are currently using a light portable pump to remove the water.

Meanwhile, the Catholic Church in Thaxted has also been flooded and it unknown when it will be cleared of water.

A Met Office yellow "be aware" warning of rain for parts of East Anglia and the South East, which was issued yesterday, remains in place until 11.45pm tonight.

Figure 4 Article with impacts underlined

However, the process was not always smooth. For example, the article above reports "*one family remained on the first floor of their property while crews pumped the water out of their property*". Two lines later, the article reports that "*firefighters led a total of five people to safety*". Although it would be possible to infer that the family was part of the five people led to safety, the researchers avoided having to make assumptions as much as possible in order to limit the distortions that interpretation and subjectivity can bring about (Devoli et al. 2007), and so the family and the five people were recorded as separate impacts under Evacuation/Rescue. While it might be argued that operating with this criteria risked might inflate the impact footprint, this risk was considered less compromising than the risk of under-representing the impacts.

In summary, the DD was organised by article (each article= one row) with the impact information across the spreadsheet. While the Daily Database was used to filter the Nexis results by Relevance and extract the relevant impacts from the newspaper coverage, presenting the data in this format was unhelpful for the model validation task, therefore each impact was also recorded in a Final Output Excel Database (FOD) for each case study. The FOD was organised by impact (each report of an impact one row). The FOD is where the third analytical step of scoring the impacts took place.

6 Article Analysis Step 3: Scoring the Impacts

6.1 The Final Output Database design

One FOD was created for each case study. The Database was designed to group all the impacts identified over the 8 days of the event, list them by category and score them. In order to identify the article within the 8 days of coverage, each article was given a serial number (additional to its article number in the Daily Database) made up of the event day in which it was published (1 to 8) and its article number divided by 1000. So for example, article 37 in Day 2 of the coverage would have a serial number 2.037 in the FOD. The other article ID fields (headline and source, paper, paper type, paper frequency and duplicate) were also included in the FOD.

In the FOD, the Location information of the DD was disaggregated into separate columns: region, county, city or town, area or street and post-code. The latter was almost never reported in the coverage. The impacts were listed by impact type in the order in which they are described in section 5.1. Each impact was scored according to the FFC Impacts Table and to the Met Office's Weather Observations Website WOW Impact Types -more on this to follow. Each of these impact-scoring frameworks had a separate column in the FOD. Finally, a Comments column was added to the database, as shown in Figure 5.

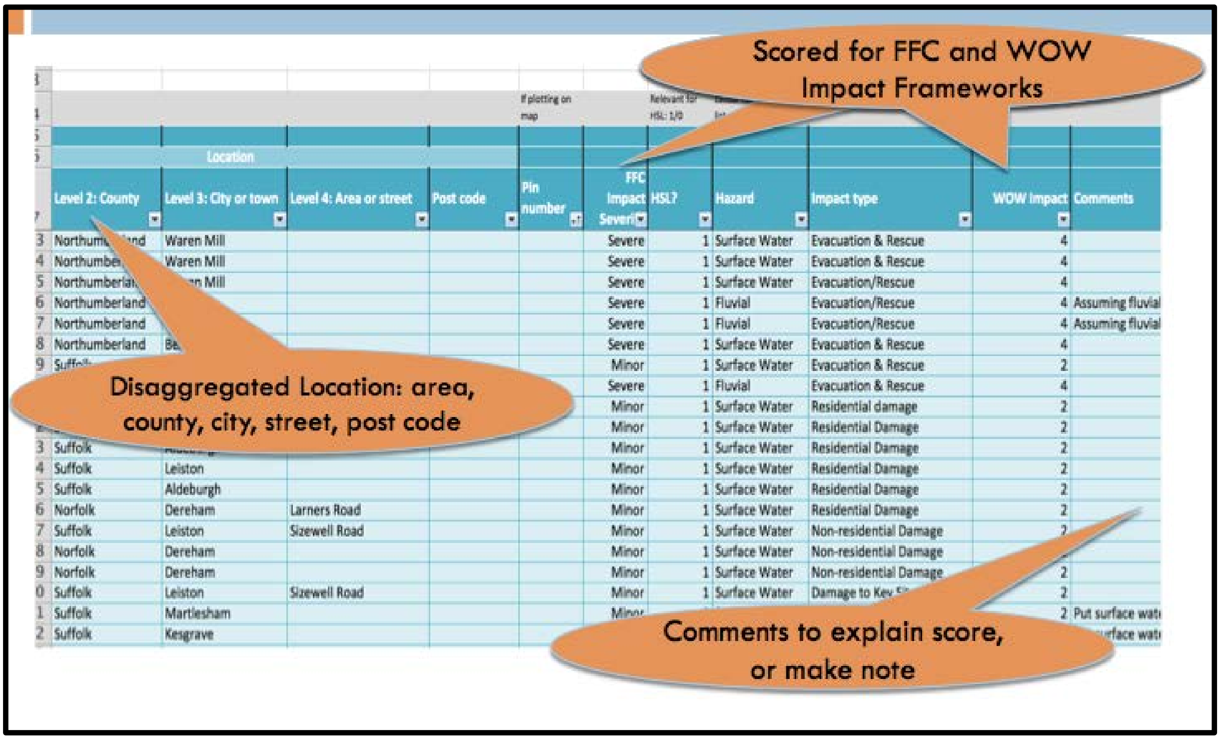

Figure 5 Final Output Database Location and Scoring detailed design

6.2 Scoring frameworks and criteria

The FFC Flood Impacts Table and the Met Office's WOW Impacts Framework share a colour code to denote the impact's severity with Green for Minimal, Yellow for Minor, Amber for Significant and Red for Severe. However, in comparison to the FFC's, WOW's descriptions are more detailed. During trials, the WOW narratives were found easier to relate to how impacts are described in the press, perhaps because WOW narratives were designed for point source reporting, which is more akin to our news reports than the more synoptic perspective of the FFC framework.

In order to facilitate and ensure consistent scoring, the two frameworks were compared in an effort to harmonise them using the WOW descriptions as base line. We then placed the relevant text from the FFC impact descriptors into the relevant WOW category to which it corresponded, using colour coding to indicate the FFC impact level ascribed by FFC to that qualitative impact description. The comparative table is shown in Figure 6. The comparison revealed tensions between different rationales for defining impact levels. For example, while the FFC focuses on the degree of certainty and the geographical scale of an impact to define its level (i.e. less certain and smaller geographical footprint impacts are scored lower), impacts are scored depending on their level of damage.

These and other challenges emerged during the scoring task, which inevitably involved a degree of subjective expert judgment in the scores assigned to individual impacts in the FOD. To ensure consistency, we used an iterative approach. Initial group discussion of randomly sampled impacts helping to calibrate initial scoring, which was then performed by MPE. After she completed her own internal quality controls, double checking several case study days, when suspicions arose about 'drift' in her marking, the entire corpus was subject to sample re-marking by MV and DD.

The Comments column was used to explain scoring decisions and voice uncertainties. The following features of either the coverage or the impact frameworks posed a challenge or in some cases contributed to the scoring task.

The impact-event tension: the information in the media stories tries to convey at once an impression about the severity of the *event* and the level of the *impact* and it was not always easy to navigate that tension and ensure that one scored the impact.

Newsworthiness bias: as identified by Guzzetti and Tonelli (2004), minimal impacts were harder to find and were described with a lot less detail. The decision was to score minimal detail as minimal severity.

Language: Sometimes, the WOW framework uses vague terms to differentiate between impact levels. The difference between a minimal and minor impact on utility disruption is described as the contrast between "short term loss of supply" and "local supply outages". It was not always easy to relate these descriptions to the more factual reporting in the press.

Detail: Differences in the level of detail provided across articles affected the scoring of the same impact. For example, reports of 28 flooded houses in the same village in the first one or two days of coverage received a lower score than the more detailed descriptions later in the coverage reporting the 28 houses were all on the same street. The decision was to score each reporting in its own right.

Differences in detail also enhanced the scoring frameworks. Stranded motorists are classified as Severe in the FFC but the coverage often detailed whether people had been able to evacuate themselves or if the rescue had involved the FRS. This was considered as telling of the impact's level and so the decision was to score those requiring the FRS as Severe in line with the frameworks and those where people had rescued themselves as Minor.

Duration: in some cases, the WOW framework also uses a duration criteria to differentiate impact levels. For example, the early closure of a school or business is scored as minimal but if they are closed the whole day the impact is classified as minor. Most of the impacts identified were related to Disruptions of Transport and the richness of the press reports did not seem to be reflected in the impact frameworks. The duration criteria seemed to add granularity to impact levels and thus, in the case of transport disruption impacts the decision was to use this criterion to enhance the scoring by giving a lower score to roads that were only temporarily closed.

WOW impact types	WOW impact levels			
	WOW impact Level 1	**WOW impact Level 1**	**WOW impact Level 1**	**WOW impact Level 1**
TRAVEL DISRUPTION	Level 1 - Difficult travelling conditions resulting in slow moving traffic, minor delays to commuting and public transport. **FFC** Little or no disruption to travel although wet road surfaces could lead to difficult driving conditions	Level 2 - Longer journey times, local disruption to travel and service delays to public transport, fords impassable. **FFC** Localised flooding of land and roads – risk of aquaplaning **FFC** Local disruption to travel – longer journey times	Level 3 - Roads closed, widespread disruption to public transport and/or Police advice not to travel. **FFC** Disruption to travel is expected. A number of roads are likely to be closed	Level 4 - Entire public transport networks suspended, prolonged road closures and/or motorists stranded in vehicles. **FFC** Severe disruption to travel. Risk of motorists becoming stranded
UTILITY DISRUPTION	Level 1 - Short term loss of supply experienced during the poor weather period. **FFC** Localised disruption to key sites identified in flood plans (e.g. railways, utilities)	Level 2 - Local supply outages experienced. **FFC** Disruption to key sites identified in flood plans (e.g. railways, utilities, hospitals)	Level 3 - Multiple utility outages experienced e.g. loss of electricity and water. **FFC** Widespread disruption or loss of infrastructure identified in flood plans (e.g. railways, utilities, hospitals)	Level 4 - Widespread disruption to most utilities for many days. **FFC** Widespread disruption or loss of infrastructure identified in flood plans (e.g. railways, utilities, hospitals)

PROPERTY & INFRASTRUCTURE DAMAGE	Level 1 - Loose or broken fittings dislodged from property or infrastructure.	Level 2 - Minor internal property damage and/or minor external damage to property or infrastructure. **FFC** Localised flooding could affect individual properties **FFC** Individual properties in coastal locations affected by spray and/or waveovertopping **FFC** Flooding affecting properties and parts of communities	Level 3 - Significant internal property damage and/or structural damage to property or infrastructure. **FFC** Damage to buildings/structures is possible **FFC** Widespread flooding affecting significant numbers of properties and whole communities	Level 4 - Entire building or infrastructure destroyed. **FFC** Collapse of buildings/structures is possible
PERSONAL HEALTH & SAFETY	Level 1 - Potential for minor injuries due to slips or trips. **FFC** Isolated instances of spray/wave overtopping on coastal promenades Isolated and minor flooding of low-lying land and roads	Level 2 - Evidence of minor injuries/observed.	Level 3 - Ambulance attending to treat injured.	Level 4 - Evacuations being considered or carried out. **FFC** Possible danger to life due to fast flowing/deep water/ wave overtopping/ wave inundation **FFC** Danger to life due to fast flowing/ deep water/ wave overtopping/ wave inundation **FFC** Large scale evacuation of properties may be required

SERVICE / BUSINESS DISRUPTION	Level 1 - Business/school closed early.	Level 2 - Business/school closed whole day.	Level 3 - Multiple businesses/schools closed and some disruption to other public services.	Level 4 - Multiple businesses/schools closed and widespread disruption to other public services.
LEISURE EVENT DISRUPTION	Level 1 - Minor effects on tents or recreational activities. **FFC** Isolated and minor flooding of low-lying land and roads	Level 2 - Tents severely affected / small scale event e.g. village fair or recreational activities affected. **FFC** Localised flooding of land and roads – risk of aquaplaning	Level 3 - Tents destroyed, caravans slightly affected / small scale event or recreational activities abandoned or cancelled / major event (>10,000 attendees) affected.	Level 4 - Caravans severely affected or destroyed / major events severely affected e.g. cancellation or abandonment of major music festival (>10,000 attendees).
AGRICULTURAL / HABITAT DAMAGE	Level 1 - Minor damage to woodland and/or farmland e.g. branches broken off trees, minor crop damage. **FFC** Isolated and minor flooding of low-lying land and roads **FFC** Localised flooding of land and roads – risk of aquaplaning	Level 2 - More significant damage to an area of farmland/woodland e.g. trees felled, large area of crops damaged.	Level 3 - Extensive area of farmland/woodland damaged. Livestock injured/lost.	Level 4 - Extensive area of SSSI (Site of Special Scientific Interest) damaged.

Figure 6 FFC and WOW Impact Frameworks Comparison

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