APPENDIX A. DATA SOURCES AND RESOLUTION OF THE ASSOCIATED ANALYSIS

Contents

A.1 Overview

The analysis considers present-day and future flood risk for three epochs (2020s, 2050s and 2080s) across the UK (England, Wales, Scotland and Northern Ireland). The spatial resolution of the analysis combines:

- **Flood hazard data at the resolution of underlying national flood maps** – this varies across the UK and ranges from 2m-50m (depending upon flood source and location).
- **Exposure: Property data** – Residential property data is based upon national point datasets.
- **Vulnerability: Socio-economic data at the resolution of a 'neighbourhood'** – vulnerability can be extremely localised, to a specific street, household or individual. Analysis at such a localised scale is not practical in the context of this study (although possible in principle). The concept of the 'neighbourhood' is therefore used as a small, but aggregated, spatial unit for assessing socio-economic factors. A neighbourhood is defined by census geographies (i.e. Lower Super Outputs Areas (LSOAs) in England and Wales, Data Zones (DZs) in Scotland and Super Output Areas (SOAs) in Northern Ireland).

Data sets used here, and their resolution, are further discussed below with a full description of the data sources used by the Future Flood Explorer provided in Sayers *et al.* (2015).

A.2 Hazard: Probability of flooding

Two aspects of the flood hazard, probability and spatial extent, are considered as follows:

- **Probability** is defined here as the annual exceedance probability of a flood to any depth. The lead authorities in England, Wales, Scotland and Northern Ireland all assess the flood probability using slightly different bandings and make varying assumptions regarding the performance of flood defences. The Future Flood Explorer interprets this information to provide a coherent

assessment of probability that reflects the performance of defences where they are known to exist (as described in detail in Sayers *et al*., 2015).

- **Spatial** resolution of the probability reflects the native resolution of the national flood hazard data used in the development of the Future Flood Explorer. This data varies in resolution as follows:
    - *Fluvial flooding* – the resolution used is 50m in England and Wales, 5-20m for Scotland, and 10-40m in Northern Ireland.
    - *Coastal flooding* – the resolution used is 50m in England and Wales, 5m for Scotland, and 5m in Northern Ireland.
    - *Surface water flooding* – the resolution used is 2m in England and Wales, 5m for Scotland, and 5m in Northern Ireland.

A.3 Exposure: Residential property data sources

The location of a single residential property is taken from national receptor datasets, namely:

- England and Wales: National Receptor Dataset (NRD) – Dated 29/10/14.
- Scotland: Scottish Property Dataset (SPD) – Dated 29/01/2015.
- Northern Ireland: Ordnance Survey Northern Ireland, Buildings – Dated 12/2014.

These supporting datasets identify individual residential property footprints and provide information on the likely number of households at ground floor within a given footprint (Figure A-1). Information on the percentage of properties with a basement within a given neighbourhood is taken from the 2001 Census.

Note: There are known errors associated with these datasets but they are assumed here to be fit for purpose in the context of residential property locations.

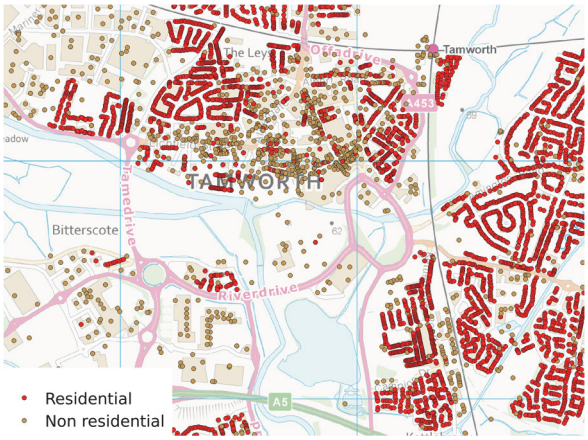


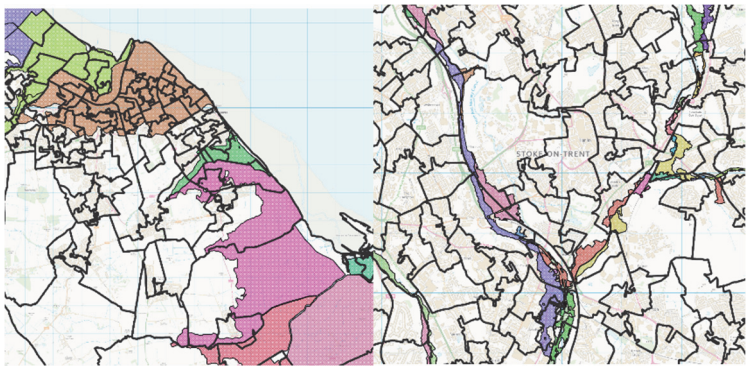
Figure A-1 National receptor datasets are used to identify the location of residential properties. Contains OS data © Crown copyright and database right (2016)

A.4 Vulnerability: Analysis resolution

Social vulnerability can be extremely localised, to a specific street, household or individual. Analysis at such a localised scale is not practical in the context of this study (although possible in principle). The concept of the 'neighbourhood' is therefore used as a small, but aggregated, spatial unit for assessing socio-economic factors. A neighbourhood is defined by census geographies (i.e. Lower Super Outputs Areas (LSOAs) in England and Wales, Data Zones (DZs) in Scotland and Super Output Areas (SOAs) in Northern Ireland).

Using these as the basis for the analysis of neighborhoods, provides several advantages over previous studies:

- ***Improved homogeneity of socio-economic indicators*****:** Using a smaller scale improves our ability to identify areas of disadvantage.
- ***Improved resolution of the risk analysis that provides a balance between resolution and practicality***: The FFE has been reconfigured based on so-called Census Calculation Areas (CCAs); created using census geographies but attributed with the flood defence characteristics of the Calculation Areas (the spatial resolution of the FFE used in support of the CCRA, Sayers *et al*., 2015). This enables the FFE to operate at CCA level, and produce information on flood risk at a more refined spatial scale that is directly linked to census data. There are approximately 500,000 CAs in the UK (covering coastal, fluvial and surface water floodplains); introducing the neighbourhood scale increases this to approximately 800,000 CCAs. This is a feasible number for use in the FFE. Using any smaller units (e.g. census output areas) may lead to too great a computational burden and may convey a false sense of precision.



Left: Coastal Calculation Areas (coloured) overlain with LSOA boundaries (bold black lines)

Right: Fluvial Calculation Areas (coloured) overlain with LSOA boundaries (bold black lines)

Figure A-2 Census Calculation Areas (used here) and Calculation Areas (used in CCRA, Sayers et al., 2015b)

- ***Normalising neighbourhood size:*** The scale of a 'neighbourhood', based on the census area definitions, provides a balance between resolution and practicality. The three census-based definitions of 'neighbourhood' however vary in size and population count across the UK, with DZs in Scotland covering, in general, a smaller area and population than either LSOAs or SOAs (see below). To overcome the bias this introduces, metrics are either aggregated to larger areas

that represent geographic lenses of interest, or normalised to be risks 'per person on the floodplain'.

Table A-1 Comparison of Census areas used to describe 'neighbourhoods'

Area (ha)	10%ile	50%ile	90%ile	Average
England and Wales – LSOA	18	47	1,000	430
Scotland – DZ	9.7	23	1,900	1,200
Northern Ireland - SOA	32	150	5,700	1,600
Population	10%ile	50%ile	90%ile	Average
England and Wales – LSOA	1,300	1,600	2,000	1,600
Scotland – DZ	540	750	980	760
Northern Ireland - SOA	1,400	1,925	2,770	2,000

Note: A more detailed breakdown of the census datasets and sources used to support the Neighbourhood Flood Vulnerability Index (NFVI) is given in Appendix B.

A.5 References

Sayers, P.B., Horritt, M. S., Penning-Rowsell, E. and Mckenzie, A. (2015). Climate Change Risk Assessment 2017: Projections of future flood risk in the UK. Main Report and Appendix B: Population growth projections. Sayers and Partners LLP report for the Committee on Climate Change.