APPENDIX E - High risk catchments

HIGH RISK CATCHMENTS

PPROACH TO DEFINING HIGH RISK CATCHMENTS

As part of the development of Kirklees Local Flood Risk Management Strategy (LFRMS), a flood risk appraisal was undertaken in order to identify and prioritise the areas of Kirklees most at risk of surface water flooding and flooding from main rivers to help inform where actions should be focused. A catchment-based approach has been taken using the Water Framework Directive (WFD) watercourse catchments.

DATA

Data used within the analysis has been divided into two groups, primary and secondary, depending on the perceived level of significance within the catchment prioritisation process.

PRIMARY DATASETS

This data was used in the initial cluster analysis and formed the basis of the catchment prioritisation.

- Water Framework Directive (WFD) watercourse catchments (19 catchments in study area)
- National Receptor Dataset 2021 (NRD)
- Ordnance Survey (OS) MasterMap buildings
- Risk of Flooding from Surface Water (RoFSW) dataset
- RoFSW 1% AEP event + climate change

CLUSTER ANALYSIS

The Risk of Flooding from Surface Water (RoFSW) was used as the primary dataset to assess flood risk. It shows the flooding that takes place from the 'surface runoff' generated by rainwater (including snow and other precipitation) for the 1 in 30-year (3.3% AEP), 1 in 100-year (1% AEP) and 1 in 1000-year (0.1% AEP) rainfall events. This dataset has been chosen because, unlike the Environment Agency Flood Zones, it includes watercourses with catchments smaller than (3km^2), and as surface water flooding is the responsibility of the Lead Local Flood Authority, as opposed to Main River fluvial flooding, the responsibility for which predominantly lies with the Environment Agency. Additionally, climate change uplifts have been applied to the 1% AEP event, based on the allowances set out in the main report.

These datasets were used to identify clusters of properties at risk of surface water flooding. The approach used to identify these clusters is set out below:

1. National Receptor Dataset 2021 (NRD) was used to identify all properties. The Multi-Coloured Manual (MCM) codes within the NRD were used to identify residential and non-residential properties. Non-residential properties were further classified into types of property (emergency services, education, utility services, transport, offices, commercial and retail). A sensibility check of the NRD data was done compared to OS mapping.
2. Building footprints were extracted from OS MasterMap data for each NRD point identified within step 1.
3. Building footprints were screened against the RoFSW datasets and all NRD points where the flood risk intersects the building footprint were extracted. This was undertaken for each of the three RoFSW return periods (3.3%, 1% and 0.1%) plus two climate change uplifts (1% AEP +30% and 1% AEP + 45%) individually, creating five sets of data.
4. The NRD point for each property at risk of flooding within each dataset were buffered by 50m (to create a 100m diameter circle around each point).

5. The NRD buffers within each dataset were merged together where they intersected to generate clusters of properties at risk. Clusters with fewer than three properties were then discounted to avoid skewing the prioritisation towards individual properties in rural catchments, where there will be less opportunity schemes to be undertaken due to lower cost-benefit ratios.
6. To generate an individual 'risk score' for each WFD catchment and return period, the total number of properties within all the clusters (containing three or more properties) in a catchment was divided by the total number of clusters in each catchment (the average number of properties per cluster within a catchment).
7. To give greater weighting to locations susceptible to more frequent flooding, the individual 'risk scores' for each Annual Exceedance Probability (AEP) was combined to produce an overall prioritisation. This was achieved by multiplying the individual "risk scores" for each AEP by their AEP and then adding them together. i.e. the 3.3% AEP averages were multiplied by 3.3, the 1% AEP averages (an average of the 1% AEP, 1% AEP + 30% CC and 1% AEP + 45% CC) multiplied by 1 and the 0.1% AEP averages multiplied by 0.1.
8. Finally, the primary prioritisation scores were normalised by dividing the score for each WFD catchment by the maximum score – giving a score between one and zero for each WFD catchment.

WEIGHTING

Once the initial prioritisation of catchments was generated, the secondary datasets were used to adjust the weightings of the catchments to consider the impact other sources of flooding and historic flood records may have on the prioritisation of catchments. This allows catchment priorities to be influenced by existing (verified) flood risk information and potential for partnership working as a result of flood risk from multiple sources.

A weighting was applied to normalised flood risk score for each of these datasets within each WFD catchment based on the following information:

- Historic Flooding: derived from information provided by Kirklees Council as part of this study and the number of properties in the Environment Agency Historic Flood outlines **[0.5]**
- Number of properties in Flood Zone 2 (normalised) **[0.2]**
- Number of properties in Flood Zone 3 (normalised) **[0.2]**
- Number of properties in the highest risk (Zone 3 and 4) of the JBA groundwater map (normalised) **[0.1]**

For each secondary dataset, the score was normalised by dividing each WFD score by the maximum score – giving a score between one and zero for each WFD catchment. A weighting (shown in bold square brackets) was applied to each secondary dataset and then was added to the primary prioritisation score.