

Flooding from a breach of a canal embankment is largely dictated by canal and ground levels, canal embankment construction, breach characteristics and the volume of water within the canal that can discharge into the lower lying areas behind any breach.

Possible breach locations were identified using a conservative approach. Areas in the vicinity of the canal that are more than approximately 0.3 m lower than the estimated canal water level were assumed to be at potential risk from a canal breach. Canal water levels and hinterland levels were determined using LIDAR data.

A breach hydrograph was fed into the two-dimensional JFLOW model to assess flood inundation extents along the length of the canal. Inflows were included in the JFLOW model at 100 m intervals along the canal at potential breach locations. The modelled extents from the individual inflows were combined, with a small buffer zone, to provide a canal breach hazard zone for the Bridgewater Canal.

The potential breach locations / areas were then sub-divided into two Canal Breach Zones (each shown on the SFRA Maps):

- Zone A - those areas that would be affected by a breach of an embankment. In this zone a detailed examination of canal breach flood risks is required.
- Zone B - less likely breach locations, such as at wide, low or very low embankments. At such locations it is more likely that this source of risk could be scoped out within any site-specific FRA.

Breach Zone A on the Bridgewater Canal covers several developed areas in Salford, namely; Alder Forest Westwood Park, Winton, Dumplington, Stretford, Sale, Timperley and Old Trafford.

Rochdale and Ashton canals

Overtopping zone

The Rochdale and Ashton Canal are controlled waterbodies and generally the overtopping risk was considered to be low. However, historic canal bank

overtopping has been recorded on the Rochdale Canal at Holland Street and it was considered that this area warranted a more detailed assessment.

British Waterways were able to advise that the overtopping in the area was caused by lowered freeboards from mining subsidence along the pound stretching, approximately, from Butler Street to Great Ancoats Street.

The modelled flow hydrograph output was distributed for spill locations at Holland Street in a two-dimensional JFLOW model where ground levels are lower than the canal water level. The resultant flood extents were combined with a 5 metre buffer zone to produce an Overtopping Hazard Zone for the Rochdale Canal at Holland Street, as shown on the SFRA Maps.

Breach zone

Compared to the Bridgewater Canal, the pound lengths for the Rochdale and Ashton canals are much shorter and therefore the available flood volume is much smaller. In breach conditions it was considered likely that only a single pound length would be likely to drain.

The actual volume of water leaving a canal after a breach has occurred would in practice be dependent on the local pound length, which varies throughout the canal network.

As part of the MST SFRA, a breach hydrograph was developed using a one-dimensional HECRAS model with an average pound length of 1.3 km applied to the model. Breach hydrographs were fed into a two-dimensional JFLOW model to assess potential flood inundation extents as per the Bridgewater Canal method.

The Oldham Level 2 SFRA modelled breach locations on the Rochdale Canal within the Oldham authority area and produced a Canal Hazard Zone (shown on the SFRA Maps).

It was found that the locations where canal breaches are most likely to occur are:

- The lower lying areas of Chadderton and Failsworth;
- The aqueduct across the River Irk (breaches have occurred in 1923 and 2003;
- Surrounding farmland.

As with the Bridgewater Canal, Hazard Zones A and B have also been produced for the Rochdale and Ashton canals. Zone A covers a large part of Ancoats in Manchester City Centre.

Huddersfield Narrow Canal

A Canal Hazard Zone was also produced for the Huddersfield Narrow Canal in Oldham (see SFRA Maps). It was found that:

- A breach of raised embankments would result in canal flood water flowing towards the River Tame and southwards along the Tame Valley;
- Immediately downstream of the Standedge Tunnel, at Diggle Works, the canal passes approximately 9 metres above Diggle Brook. A breach in this location would result in large volumes of water entering Diggle Brook;
- A breach in Uppermill could cause flooding to areas between the canal and the River Tame, Churchill fields, parts of Frenches Wharf and the sewage works at Greenfield.

6.6.2 Reservoirs

A reservoir can usually be described as an artificial lake where water is stored for use. Some reservoirs supply water for household and industrial use, others serve other purposes, for example, as fishing lakes or leisure facilities.

Like canals, the risk of flooding associated with reservoirs is residual and is associated with failure of reservoir outfalls or breaching. This risk is reduced through regular maintenance by the operating authority.

Reservoirs in the UK have an extremely good safety record with no incidents resulting in the loss of life since 1925.

The EA is the enforcement authority for the Reservoirs Act 1975 in England and Wales. All large reservoirs must be regularly inspected and supervised by reservoir panel engineers. LAs are responsible for coordinating emergency plans for reservoir flooding and ensuring communities are well prepared.

GMCA should work with other members of the Greater Manchester Resilience Forum (GMRF) to develop these plans. See Section 8.1.1 for more information on the GMRF.

Figure 6-7: GM LLFA historic flood incidents

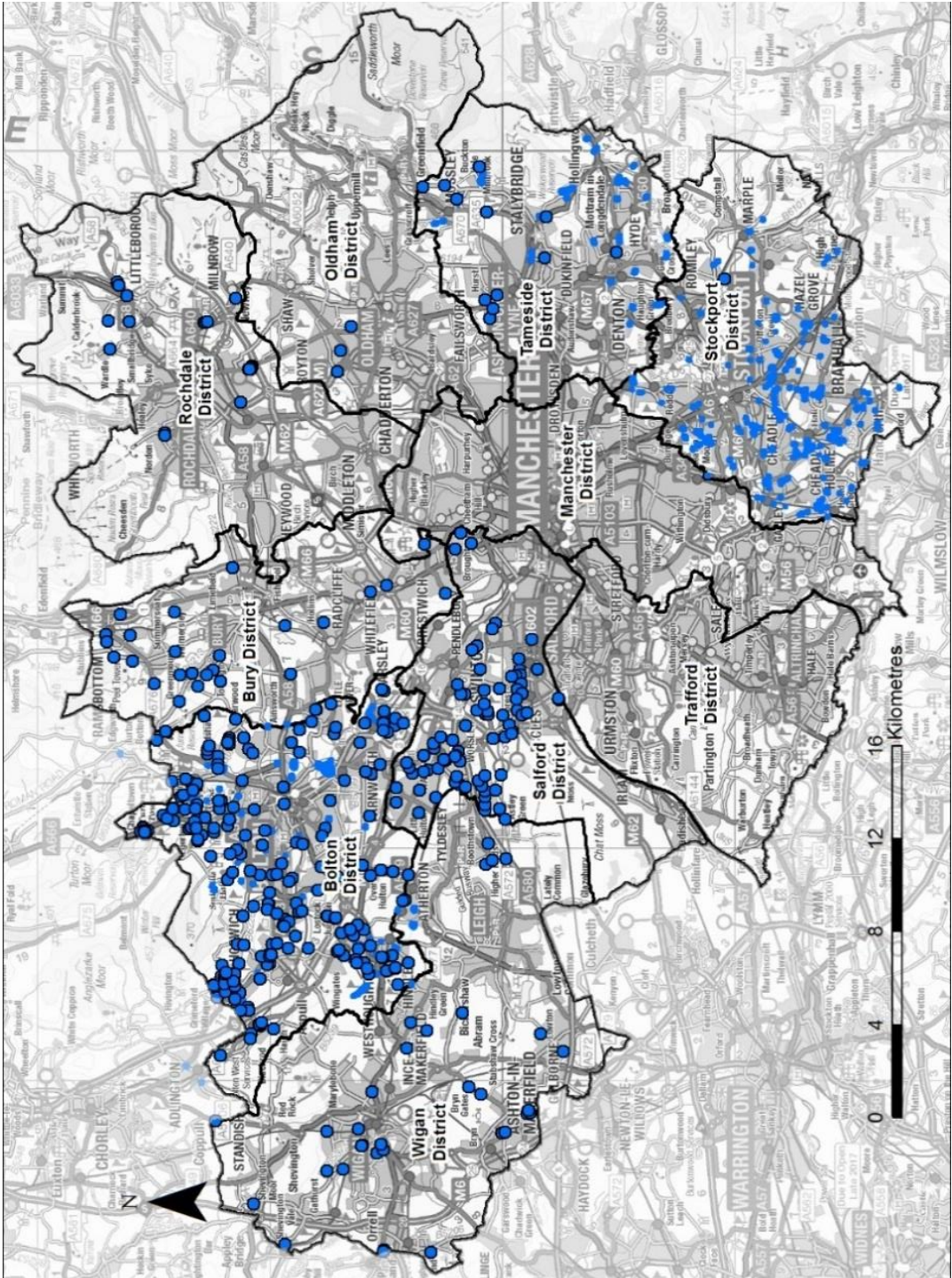
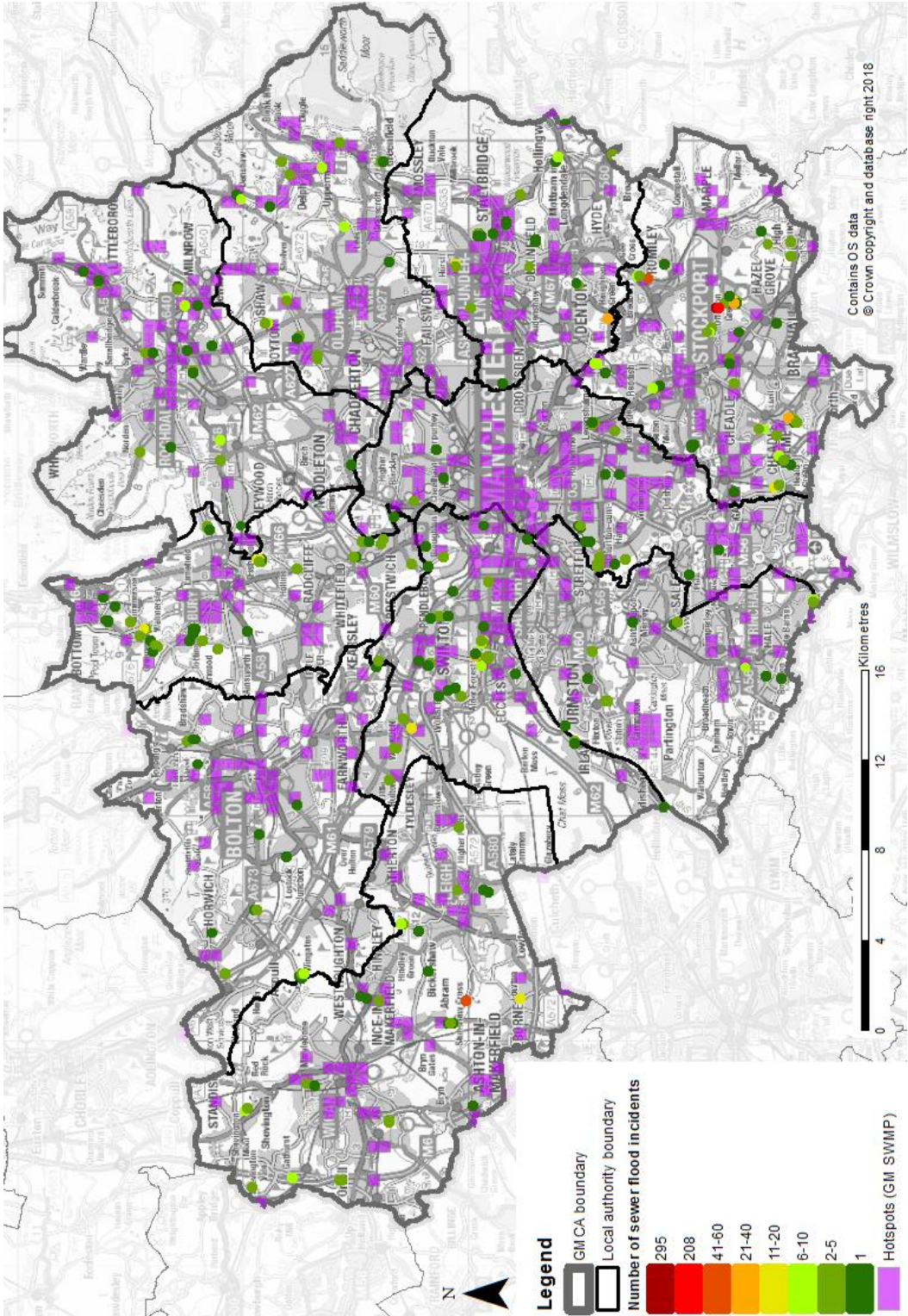


Figure 6-8: UU historic sewer flooding incidents and GM SWMP Hotspots



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APPENDIX J: NOTES OF LIMITATIONS

The data essentially comprised a study of available documented information from various sources together with discussions with relevant authorities and other interested parties. There may also be circumstances at the site that are not documented. The information reviewed is not exhaustive and has been accepted in good faith as providing representative and true data pertaining to site conditions. If additional information becomes available which might impact our conclusions, we request the opportunity to review the information, reassess the potential concerns and modify our opinion if warranted.

It should be noted that any risks identified in this report are perceived risks based on the available information.

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