

# Urban Flood Management Strategy Framework

## Introduction

Floods are intrinsic in the climate of Johannesburg, and are projected to become frequent and intense in the future. Absolute protection from flooding is utopian. This suggests that Johannesburg will live with the reality of occasional flooding. Urban flood management attempts to coordinate activities from various players with the view to mitigate deleterious impacts that may be caused by flooding to property and livelihoods.

Integrated urban flood management strategy takes into account structural and non-structural measures. Structural measures, for example, hard-engineered structures such as flood defenses and drainage channels to more natural and sustainable complementary or alternative measures such as wetlands and natural buffers, aim to reduce flood risk by controlling the flow of water both outside and within urban settlements. They can be highly effective when used appropriately, but these measures can be overtopped by events outside their design capacity or transfer flood risk by reducing flood risk in one location only to increase it in another. Non-structural measures intend to keep people safe from flooding through better planning and management of urban development. Non-structural measures include emergency planning and management including warning and evacuation; increased preparedness through awareness campaigns; flood avoidance through land use planning; speeding up recovery and using recovery to increase resilience by improving building design and construction. (Abhas et al., 2011).

Legislative Framework

## Risk Assessment

Urban Flood Management (UFM) must start with risk assessment, where risk is defined thus: Risk = Hazard x Exposure x Vulnerability. The City of Johannesburg (CoJ) generally experiences afternoon thunderstorms, although some occur in early morning, that sometimes result in flash flooding. Whereas climate change

projections are clear on future temperature trends, it is not so for rainfall. However, a general consensus is that storm events are likely to become frequent and intense.

## **Understanding Risk**

### *History of flooding in the CoJ*

CoJ experiences summer rainfall that sometimes manifests itself in the form of thunderstorms. Major rain-bearing systems like, cut-off lows, and tropical-temperate-troughs are known to affect the CoJ. It has been established that 1 in 5 cut-off low events results in flooding. Whereas there is no discernible trend in the past CoJ flood events, for there are no clear reports, it appears the Caelum publication (SAWS) indicates only a marked increase in reports. This does not necessarily imply an increase in flood events. It is worth mentioning that the 2009 and 2010 flooding events in Soweto were associated with a cut-off low weather event.

### *Current Studies about flooding*

CoJ completed a Flood-Prone study (2009), which aimed to indicate flood-prone areas and identify strategies that may be used to reduce risk in susceptible areas to and provide recommendations as to methods that may be used to protect the City. The study prioritized 8 catchment areas as being at risk of flooding for the 1:100 year flood event and therefore requiring concentrated attention in dealing with flooding. JRA completed a Flood Management Plan (2011) that emphasizes structural measures.

## **Asset Management**

A list of all flood mitigation assets, ie., drainage, waterways, dams within the CoJ must be up to date. Drainage and flood mitigation assets are to be maintained regularly to ensure they work as designed during a flood. CoJ drainage assets are to be managed in accordance with clearly defined guidelines (Flood Management Plan of Melbourne, 2011).

## **Planning Controls**

Land use planning and the regulation of new development is a key aspect of integrated urban flood risk management. In addition, integrated urban flood risk management strategies are naturally designed to fit in with water-related planning issues and can be part of a wider agenda such as urban regeneration or climate change adaptation (Abhas et al., 2011)

## **Community Education & Awareness**

CoJ ought to work together with the community before, in the lead up to and during periods of flooding, to create awareness within the community of preparedness measures that have been and should be taken. This includes working to ensure that community members:

- Are aware of the flood threat in their area and the level at which their property might be inundated;
- Understand that works within an overland flow path or on a floodplain will have some impact on flood behaviours and the need to ensure that such works do not create additional flood problems elsewhere;
- Have access to material about how to protect themselves and their property against flood (egg. personal flood planning);
- Know the location of or how to find out the location of evacuation centres;
- Are aware of the importance of advising EMS when they make their own decisions to evacuate;

CoJ must recognize the need to ensure that residents, business owners / operators and visitors are aware of the flood risk and of appropriate flood response actions. The incorporation of flooding zones and overlays into the planning scheme raises community awareness of flooding issues.

## **Roles and Responsibilities**

It is not possible for one stakeholder to deliver on all these measures, therefore an integrated approach is required. A clear understanding and common agreement on roles and responsibilities is necessary for effective collaboration. The following are expectations that must be carried through by various stakeholders implicated in the integrated Urban Flood Management Plan.

- JRA will provide with technical assistance relating to all structural measures;
- EISD and EMS will provide financial assistance in the preparation and maintenance of a Urban Flood Management Plan that identifies, existing flood risks, intolerable risks and prioritizes works and activities aimed at reducing risks and improving regional flood management;
- *All implicated departments* will assist with funding and management of prioritized works and activities identified in the Flood Management Plan and in their implementation as required;
- **EISD** and **EMS** will provide financial and technical support to CoJ and to deliver community flood education, awareness and preparedness across the Municipality;
- **Development Planning** will provide support CoJ in land use management and other activities aimed at reducing existing and future flood risk and damages;
- **EISD** and **EMS** will provide CoJ with the results of studies and analysis as well as data gathered during and after flood events for inclusion in the improvement of Urban Flood Management Plan.