

## FLOOD RISK IN A LOW-COST TOWNSHIP

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The problem of flooding is increased in low cost townships because of disregard for flood plains and obstructing the flow. Drainage systems are blocked with litter and water flows overland. Emergency water ways are required.

Stormwater culverts in Alexandra township were originally designed to cope with a 10 year storm, and major floods were intended to flow along overland channels. Since the original design, there has been an influx of poor people building their dwellings on any available land, including over the culverts. Now there are 1800 dwellings in the path of potential floods. Not only are the lives and properties of people endangered, their shacks also obstruct flows.

The northern culvert was estimated to be the worst and was the subject of hydrological calculations and modelling. Engineering solutions investigated included enlarged culverts, surface concrete channels and new culverts along other roadways to intersect flows. Non engineering solutions included relocation of residents, construction of high rise buildings adjacent to the drains and establishing lanes down the drainage routes. Lanes would facilitate garbage collection, a major contributor to reducing capacity of the culverts.

Although the stormwater inlets can be improved in capacity, the limiting factor remains the culvert capacity. This cannot be increased easily without disrupting houses built in the waterways. Some access will have to be provided for cleaning inlets and servicing the culverts. The most practical solution appeared to be to construct additional drains on intermediate roads going eastwards towards the Jukskei river. These will catch surplus water before it reaches the gully down which the culverts traverse. The study went hand in hand with a study of sanitary drainage. Separate systems are envisaged for stormwater, sullage and sewage. This will minimize the pollution threat to the Jukskei river downstream.

Alexandra Township was constructed on the west bank of the Jukskei river north of Johannesburg. It was originally a middle class township with brick houses and gardens. Now practically every piece of bare land is covered by shanties. It is on sloping ground (1/25) and there are three major channels which used to drain stormwater from the catchment. Culverts were constructed underground to carry the stormwater to the Jukskei river. These culverts are up to 1.7m high by 3.9m wide. They were designed to take approximately the 10 year storm, and major storms was intended to flow over ground. There are no roads down the gullies, but the area above the culverts was intended to be parkland.

However, with the immigration of thousands of poor people to the Alexandra area which was 'declared black' during the apartheid era, land for building was at a premium and informal houses sprung up on the previously open land. Unfortunately, some houses were built along the watercourses which are normally dry. These houses are therefore sited in a dangerous position from the point of view of stormwater.

Not only would floods be dangerous to the houses because they obstruct the flow and would be endangered structurally and economically, but also they take up open space. The

latest Alexandra Renewal Project sought ways of providing open spaces for relaxation and recreation. In addition removal of garbage is difficult and the result is unaesthetic. The problem is exacerbated by the plight of the community, its inability to do anything, and its lack of understanding .

A risk index is proposed, being the product of Hazard factor and Probability. Hazard factor is related to water depth and flow velocity. This should be plotted on maps together with flood lines.