The Kota Damansara water retention pond area is located in Jalan Teknologi, Taman Sains Selangor 1, Seksyen 3, Kota Damansara, Mukim Damansara, Daerah Petaling, Selangor Darul Ehsan. This retention pond reserve is part of a comprehensive river and drainage network for Kota Damansara and the greater upstream PJ Utara areas. It is also used for storm water management. This water retention pond of 45.89 acres and its surrounding strips of land were actually zoned for water retention and recreational purposes. The whole catchments for Rumput River and 30% of Tambul River directly contribute to the water retention pond area (Fig.1). PKNS had initially reserved 45.89 acres for the retention pond (Fig.2). However, due to high maintenance, they decided to develop 17.66 acres of the area for residential and commercial development. Through their research they found out that only 33 acres are required for the water retention pond area (Fig.3). Thus, according to their estimations, the 45.89 acres reserved area is more than required.Moreover, a detailed study for the adequacy of area of the existing detention pond and studies on 100 years floods had been carried out. The maintenance cost is estimated at RM400,000 a year. Some aquatic species that function as pollutant removal will be planted. In the future, the pond will provide multifunctional services in terms of recreational opportunities and storm water management.

The normal water level for the area is 11.80m, while from the analysis the water level for 100 years flood is 17.80 m. The water level for new development is 18.00m.

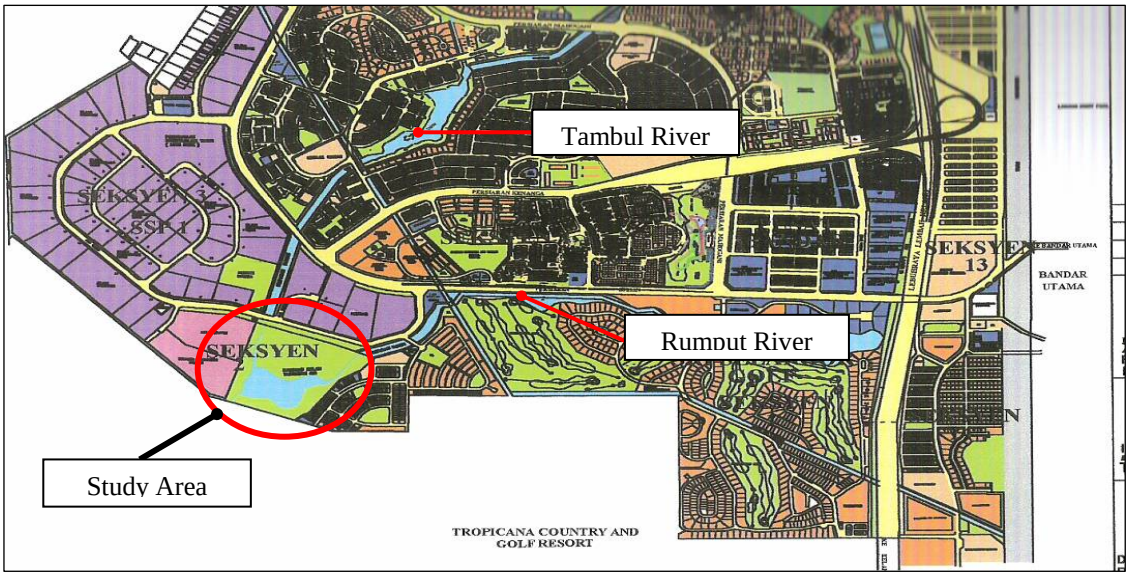

Fig.1: Location of Study Area in Kota Damansara
Source: PKNS (Town Planners Department)

B. Methodology

The methodology for this study comprises several stages that are observation and data collection, photograph analysis, interviews and data analysis.

C. Observations

Observational research techniques solely involve making observations. There are many positive aspects of the observational research approach. Namely, observations are flexible and do not necessarily need to be structured around a hypothesis.

D. Photograph Analysis

In order to aid the researcher, a digital camera was used to take photographs of the surrounding environment during the site visit. The photographs are used for data analysis

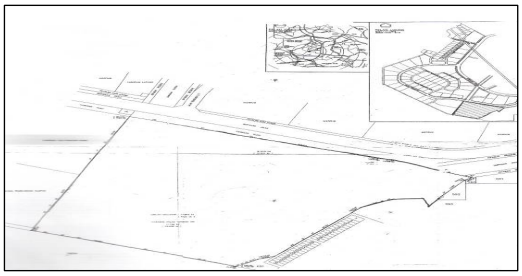

Fig.2: The water retention pond before development

E. Interviews

An interview is a series of questions a researcher addresses personally to respondents [2]. An interview may be structured (where clearly defined questions are asked) or unstructured, where some of the questioning is led by the responses of the interviewee. The unstructured interview was carried out to people who were deemed to be able to answer the critical questions that cannot be obtained by observations.

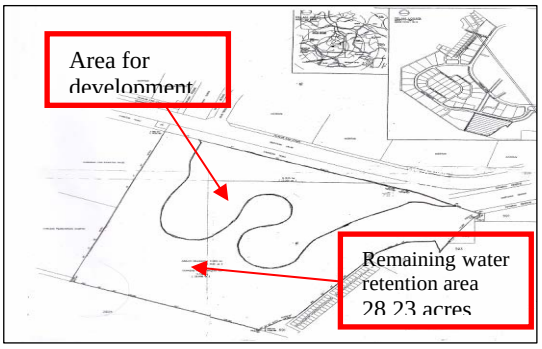

Fig.3: The water retention pond proposed for development

III. RESULT AND DISCUSSION

A. Total Area of Retention Pond

Based on the master plan, the researchers had calculated the area and it was found that the area reserved for the development on the current water retention pond is 17.66 acres (Fig.4). The actual leftover area for the water retention pond after development is 16.23 acres (Fig.5) and total green area left after development is 12 acres (Fig.6).

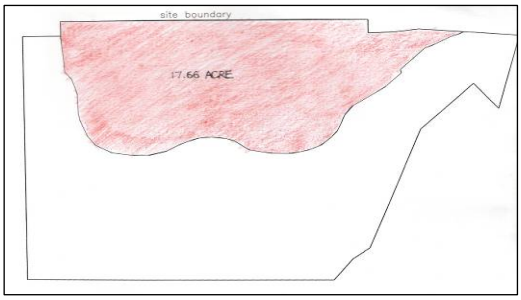

Fig.4: The area reserved for development is 17.66 acres

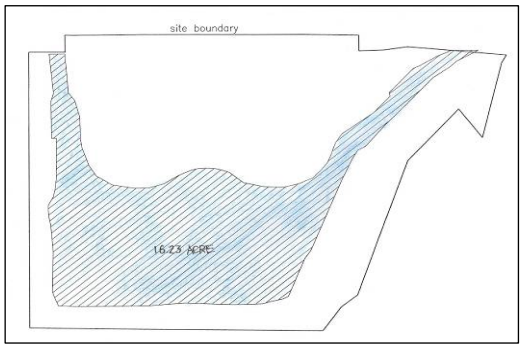

Fig 5: The actual area left over for the water retention pond is 16.23 acres

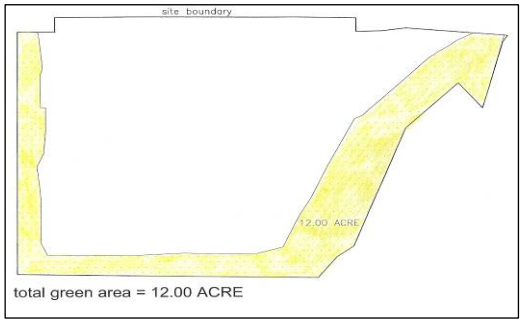

Fig. 6: Total left over for green area

From this, it is apparent that the total water retention pond area is actually less than 28.23 acres. Only 16.23 acres of this total is reserved for the water retention pond while the remaining 12 acres is reserved for landscape features in achieving the proposed plan of making it a multi-purpose recreational area. Thus, there is a reduction of up to 17 acres of land from the water retention pond thus this will have great impacts on the total water retention pond capacity.

The reduction of more than 17 acres out of the total water body of this pond will inevitably affect the efficiency of its ability to retain surface and storm water run-off and the overall flood mitigation master plan would be affected. Detailed studies need to be conducted not only for the said development site, but the entire water catchments area network, both upstream and downstream to ascertain the impact of such reduction.

B. Discharge Point

The pond discharge point is from Rumput River towards Damansara River (Fig.7).

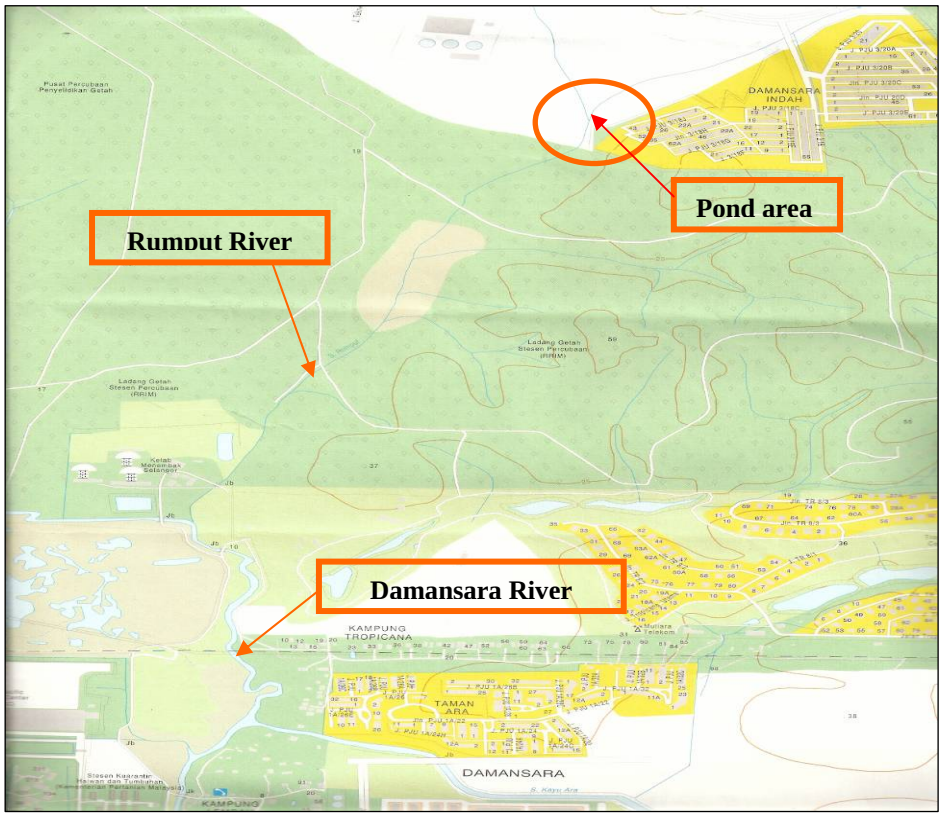

Fig.7: The pond discharges to Rumput River and into Damansara River

On 26 February 2006, the bund structure of the water retention pond collapsed. It is believed that the collapse – a 45.89 acres water retention pond at Section 3, Kota Damansara – resulted in water volumes of 10 to 15 feet of water depth multiplied by 45.89 acres water body to gush out from the broken bank of the water retention pond through the Damansara River to low-lying areas in Subang and Shah Alam area, thus compounding the flood situation (Fig. 8-9). The massive flood had invaded 3,000 houses and forced 9,015 people to evacuate their homes in Shah Alam (Figs.10). In many places, flood water hovered around 1 metre high. It rose to about 2.3 metres in a few areas, almost reaching the roof of single storey house. Thus, this shows how important the water retention pond area is.

Fig. 8. Broken bund on the site

Fig.9. Shah Alam Stadium

Fig. 10. Evacuation in Shah Alam

D. Impacts on Birds

Most bird species rely on wetland habitats during some portion of their life cycle. The development has degraded the existing habitats used for breeding, nesting or feeding and changed competitive interactions among and between species and will modify the population. [3] reported a correlation between watershed urbanization and declines in bird species richness as well as a higher number of non-native bird species. They also found that most of the bird species that were less tolerant to urbanization were found in forested areas within 1,640 to 3,280 feet of existing wetlands. [1] investigated that forested wetlands in New York that were surrounded by urban land were dominated by urban residents and human attracted bird species. If restoration techniques for the water retention pond area are not applied appropriately, this bird species may not return

.

E. Increased Storm Water Runoff

The new development may increase the storm water runoff to the wetland area. There will be more water runoff from upland development. For example, [4] reported that the total runoff volume from a one-acre parking lot is about 16 times greater than that produced by an undeveloped meadow. Storm water runoff to a down gradient area can increase dramatically especially if storm water is directly discharged into the pond area through a ditch, channel or storm drain pipe. These human alterations to land surfaces change the physical and biological features that affect the hydrologic processes. Increased storm water runoff from the impervious cover may lead to increased pond depth within the pond area and this may lead to changes in the wetland type, function and quality and also nutrient enrichment in the urban wetlands may increase the overall productivity of wetland but favours the spread of invasive wetland plants.

Corrido

F. Reduction of Wetland as Public Open Space and Wildlife Corridor

Retention ponds are considered as part of the open space network in a development. Therefore, in any planning submission, retention ponds are deemed to contribute to 30% of the overall open space required by the Local Planning Authority guidelines for open space which is 10% of the total land area. Through the elimination of 17.66 acres of retention pond area, this essentially reduces the open space network for the entire development. Moreover, the development totally changes the existing land use of the area where it is actually designated as a recreational area. In the Town and Country Planning Act guidelines, it is stated that the local authorities should not encourage or approve applications for development outside designated areas for recreation.

On 11 September 2005, hundreds of Damansara Indah residents gathered in front of the lake to protest over the proposed development (Fig. 11). Reclaiming 17.66 acres of the water retention lake to build 6 blocks of apartment and commercial units is just not right, as this area was zoned for water retention/recreational purposes.

Fig.11: The residents protest against the development

IV. CONCLUSION

This research has proven the importance of wetlands in an urban area. Although planning guidelines and estimates may prove a certain total area of wetland is sufficient to function as a retention area, planners and decision-makers cannot assume such procedures can fully guarantee this. As what has occurred with the broken bund of the water retention pond in Kota Damansara, the flow of water from the pond into the Sungai Damansara had compounded to the massive floods in Shah Alam. Such development also affects the fauna attracted to the wetland, as well as increased storm water run off that will in turn affect the hydrological processes of the wetland.

As a conclusion, Table 1 shows eight tools for the protection of wetlands recommended by [5].

REFERENCES

[1] Dowd, C., Effect of development on bird species composition of two urban forested wetlands and Staten Island, New York, *J. Field Ornithol*, Vol. 63, No. 4, 1992, 455-461.

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[5] Wright, T., Tomlinson, J., Schueler, T., Cappiela, K., & Hirshman, D., *Direct and indirect impacts of urbanization on wetland quality*, 2006

Table 1: Eight tools for protection of wetlands

Watershed Protection Tool	**Strategies Applied In or Near Wetlands**
1. Land Use Planning	• Incorporate wetland management into local watershed plans • Adopt a local wetland protection ordinance • Adopt floodplain, stream buffer, or hydric soil ordinance to indirectly protect wetlands
2. Land Conservation	• Identify priority wetlands to be conserved • Select techniques for conserving wetlands
3. Aquatic Buffers	• Require vegetated buffers around all wetlands • Expand wetland buffers to connect wetlands with critical habitats
4. Better Site Design	• Encourage designs that minimize the number of wetland crossings
5. Erosion and Sediment Control	• Require perimeter control practices along wetland buffer boundaries • Encourage more rapid stabilization near wetlands
6. Storm Water Treatment	• Prohibit use of natural wetlands for storm water treatment • Discourage constrictions at wetland outlets •Restrict discharges of untreated storm water to natural wetlands
7. Non-Storm Water Discharges	• Actively enforce restrictions on dumping in wetlands and their buffers • Promote alternative mosquito control methods to reduce insecticide inputs to wetlands
8. Watershed Stewardship	• Incorporate wetlands into watershed education programs • Post signs to identify wetlands, buffers, and wetland CDA boundaries • Manage invasive wetland plants • Establish volunteer wetland monitoring and adoption programs • Encourage wetland landowner stewardship • Establish partnerships for funding and implementing wetland projects

Source: [5]