

VOLUME 4 – SECTOR IX

ENVIRONMENTAL EVALUATION

**THE STUDY ON INTEGRATED URBAN DRAINAGE IMPROVEMENT
FOR MELAKA AND SUNGAI PETANI
IN MALAYSIA**

FINAL REPORT

VOLUME 4: SUPPORTING REPORT ON FEASIBILITY STUDY

SECTOR IX: ENVIRONMENTAL EVALUATION

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SECTOR IX

ENVIRONMENTAL EVALUATION

1. EXISTING ENVIRONMENT

1.1 Physical Setting

1.1.1 Sg. Air Mendidih

The Sungai Air Mendidih runs in a north-south direction passing through areas such as Kampung Benggali and Jalan Market before it joins the Sungai Petani. The total area of this basin is 362 ha. out of which about 66% are built up. The area is also very close to the old CBD of Sungai Petani town. The basin is bounded in the west by the KTM railway, and extends northwards to the Swiss Garden Inn, eastward up to the North South Highway and southwards to the market area near Kuala Ketil Road.

Residential uses (31%), institutional uses (11.7%), and commercial use (5.1%) characterize the existing land use in the area. Roads and railway constitutes 16.3% of the area while in-situ vacant land including cemeteries 32.8%. Residential uses (112ha) included both formal housing schemes and informal kampong houses such as those found in Kg. Benggali. Formal housing schemes in this area included Taman Peruda, Taman Nun, Taman Tiong and Taman Mesra. Commercial uses are mainly found along the major roads at Jalan Badli Shah and Jalan Sekerat and at Taman Bandar Baru along Jalan Peruda. Institutional uses include Sekolah Menengah Mohamad Jiwa, Institut Kemahiran Mara, SRJK Tamil Saraswathy, Sekolah Kebangsaan Sungai Petani, the existing District Hospital and the jailhouse. Extensive vacant land are found on either side of the road that leads to the Swiss Garden Inn, while vacant land are also found behind Jalan Market particularly along the river corridor. Cemeteries are also found along Jalan Badli Shah near Taman Peruda. Vacant development lands including cemeteries account for 118 ha. while existing ponds including oxidation ponds account for 4.91 ha.

The drainage area tends to gently slope toward westward and southwestward as a whole except in the northeast and the alluvial plain. Most of this gently sloping area was previously covered with lateritic soil that is generally highly permeable. However, most of the lateritic soil has been removed, or compacted due to the recent land development and road construction. As the results, the variegated and/or pallid layer is exposed on the ground surface thus lowering the previous permeable capacity.

As for the northeast part of the area, its topography is rather undulating. This area occupies over 55ha or 15% of the entire drainage area and still remains as the natural land preserving lateritic soil on the surface with thickness of more than 3m.

1.1.2 Line G in Sungai Petani

The Line G drainage basin is located to the south east of the town of Sg. Petani. The total basin area is about 299 ha. The topography of the area is characterized by undulating hilly areas to the east and low lying flat areas to the north. This includes Bukit Tok Ache (60m above msl). The area was previously a rubber plantation on the higher ground while paddy was planted in the lower grounds around the Kampong Pengkalan Lebai Man. Most of the paddy land have been reclaimed for housing development while some are left as idle land. The drainage basin is divided by the North South Highway. In contrast to the Sg. Air Mendidih Basin, the Line G drainage basin is relatively underdeveloped. About 60% of the area is either under agriculture or idle.

Only 19% or 57ha of the drainage basin is occupied by residential use. This includes mainly housing schemes such as Taman Keladi, Taman Angsana, Taman Sri Wang, Taman Keranji and Taman Harmoni. There are some informal housing including kampong houses along the main road opposite Taman Sri Wang. In view of the low residential population base, commercial uses are limited to local shops within the housing schemes. Some of the bigger commercial centers are located at Taman Keladi and Taman Sri Wang. Commercial uses account for 4.38ha of the area. In view of the proximity to the Bakar Arang Industrial estate, there is not much industrial use in the area. Existing industrial use include wood works, storage yards and light industrial activities along the road to Taman Berjaya. New light industrial premises have also been completed next to the North South Highway. Industrial uses account for 5.03 ha or 1.7% of the total area. Institutional uses only account for 1 ha or 0.5% of the area as most of the school sites identified have not been built. There is also a Telekom transmission tower and water reservoir facilities on the hill in the area. Recreational uses are mainly in the form of local open spaces and account for 5.3% or 15.9 ha. There is still substantial area under agriculture use especially rubber cultivation on the hilly areas, covering about 96ha or 32.2% of the area.

The topography in the drainage area is hilly and/or gently sloping. The hills as represented by Bukit Tok Acheh are located in the northeastern part of the drainage area where the original topography still remains without any intensive land development. On the contrary, the intensive land development has brought about a dynamic topographic change in the present gentle sloping areas which is spread out southwestern part of the drainage area.

The hilly areas are covered with the lateritic soil but the thickness is rather limited ranging about 1 to 2 in. A substantial part of these hilly area is subject to future land development, and the existing thin lateritic soil has to be removed through land development due to slope gradient of hills, and the subsurface weathered rock will be exposed. The weathered rock has a low permeability and therefore, infiltration measures for the storm water is hardly applied to the land development in this hilly area.

As for the gently slope area, the surface lateritic soil has been removed, and/or compacted due to the recent extensive land development and road construction in the same way as the aforesaid drainage area of Sungai Air Mendidih. The previous topographical map reveals that low land areas had been widely distributed and utilized as paddy field in lower reaches of the gently sloping area. However, most of them are filled up and only a few is remained as swamp area at present.

1.1.3 Parit Pokok Mangga

The topography of the Parit Pokok Mangga area shows a typical coastal plain feature, which is characterized by flat ground and the high ground water level (less than 25 mm below the ground level). A paddy field is extensively spread out in this drainage area. However, its greater part has been reclaimed for land development. Due to the high ground water level, the entire drainage area has low ground permeability. The superficial soil of the area except for the reclamation area is classified as alluvial soils, grey soil and acid sulphate soil, which generally show clayey and silty facies. Lateritic soils have generally been used as the fill material in the reclamation area.

1.1.4 Sg. Ayer Salak

The topography of the Ayer Salak area is moderately sloping in the northern part, and flat in the coastal plain in the south. The soil of the hilly area is mostly reworked laterite of the Malacca Series. The thickness of lateritic soil is about 50 mm in as a whole and hardly exceeds over 75 mm. A part of the hilly area is now being transformed to be flat terrain for land development. As a result, the layer of the lateritic soil has been removed and/or compacted due to the land leveling works, leading to low permeable ground.

An extensive land reclamation scheme was also recently carried out, through a large scale of land development, in the coastal plain, which was formerly utilized as a paddy field. A part of the former paddy field is now abandoned as swampy area. The topographical map published in 1974 revealed that there was also a large swamp area near the confluence of Sungai Ayer Salak and Sungai Ayer Hitam. It is inferred that this swamp area was formed due to

insufficient drainage capacity of both rivers. However, most of this swamp area has also now been reclaimed for land development.

1.2 Water Quality

1.2.1 Sg. Air Mendidih

Domestic wastewater comprising of sewage and sludge are a significant source of pollution in Sg. Air Mendidih and its tributaries. At present most of the study area in Sungai Petani are served by septic tanks that may not provide adequate treatment. Another sources of pollution are squatter houses along riverbanks.

The water quality noted here are typical of urban areas where surface runoff from these areas collect a wide range of pollutants especially organic matter originating from sewage. Most of the septic tanks utilized in these areas tend to overflow to the surrounding drain and thus flows into the river. The other associated water quality problems is the greatly enhanced nutrient levels especially inorganic forms of phosphorus and nitrogen that may cause eutrophication of water that eventually leads to massive algae blooms as evidenced in many of the rivers and flood detention ponds in the study area.

Water quality monitoring was carried at five locations within the Air Mendidih catchment and the results are shown in Table IX-1. Based on the results, the main pollutants appear to be suspended solids and organic wastes. The most polluted site is AM5 located in the middle reaches of Line N. At this site, the BOD is 25 mg/l and the COD is 139 mg/l indicating a high level of pollution. The water is also polluted at AM4 which is located along Line O. The elevated levels of iron and manganese reflect the earthwork activities on going at these sites.

1.2.2 Line G in Sungai Petani

As in Air Mendidih, domestic wastewater is a significant source of pollution in Line G and its tributaries. Most of the area in the Line G catchment are served by septic tanks that may not provide adequate treatment.

Water quality monitoring was carried at five locations within the Line G catchment and the results are shown in Table IX-2. Based on the results, the main pollutants appear to be organic wastes. The most polluted site is LG1 located in a retention pond. At this site, the BOD is 26 mg/l and the COD is 104 mg/l indicating a high level of pollution. The water is also polluted at LG4. The elevated levels of iron and manganese reflect the earthwork activities on going at these sites. LG5 is located near a swamp which is reflected by the low pH value.