

WATER RESOURCES BOARD

Ministry of Irrigation & Water Resources Management

REPORT OF THE HYDROGEOLOGICAL SURVEYS FOR GRAVEL EXCAVATION SITE AT POLIENA ESTATE, RATHNAHERUWA, HOROMBAWA

2016 November



WATER RESOURCES BOARD
2A, HECTOR KOBBEKADUWA AVENUE
COLOMBO 07

Head Office

Tel : 011-2669294, 2697050

Fax : 011-2669294

E-mail: wrhmiwm@slinet.lk

wrhcmh@slinet.lk

Provincial Office - Puttlam

Tel : 032-2265208

Fax : 032-2265208

1. INTRODUCTION

Consulting Engineering and Contractors (Pvt.) Ltd has expected to conduct a gravel extraction site at "Polhena Estate" situated at Rathnageruwa village in Kuliyaipitiya to supply required quantities of Gravel for the rehabilitation project of Mallawapitiya-Keppetipola road project and central expressway construction project.

Accordingly, it was suggested to carry out detail groundwater surveys at the respective site area in order to find the impact on groundwater in and around the site by the Geological Survey and Mines Bureau from the CEC (Pvt.) Ltd. As a result, request made by the CEC (Pvt.) Ltd from Water Resources Board to carry out the detail Hydrogeological surveys. The survey was carried out on 29th November 2016 with participation of Gramaniladari, officer from relevant company and few members from the village.

2. PHYSIOGRAPHY

The investigated area is situated 5km away from the Dangolla junction on Dangolla-Matiyagane road. It belongs to Dandagamuwa one-inch topographical sheet and lies within the geographical Coordinates longitude $80^{\circ} 11.311'$ and latitudes $7^{\circ} 25.587'$. The total extent area of the gravel excavation is reported about 2 Acres. Geomorphologically, this area is a hilly area with undulating topography and high-elevated grounds. The respective land situated in the side of the Quartzite rock ridges. Eastern part of the land boundary is in the top of the hill and slop towards to western side.

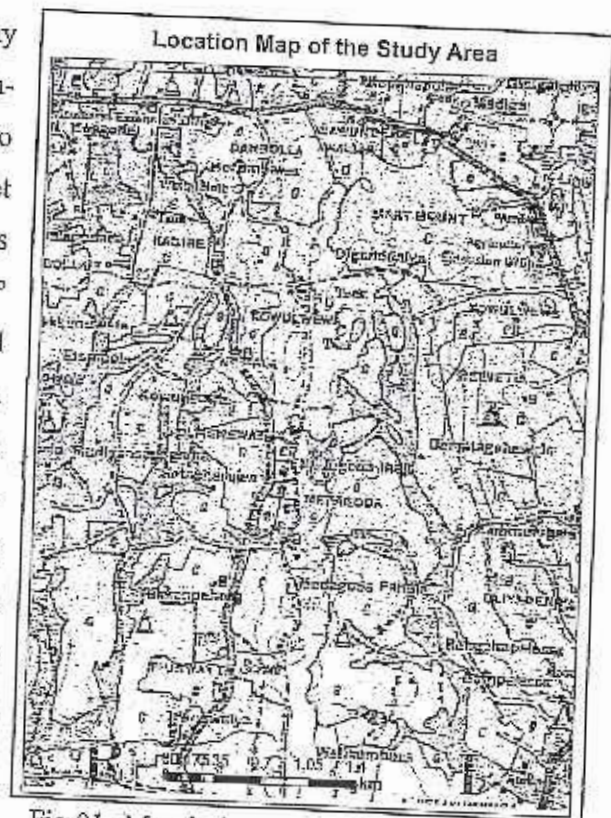
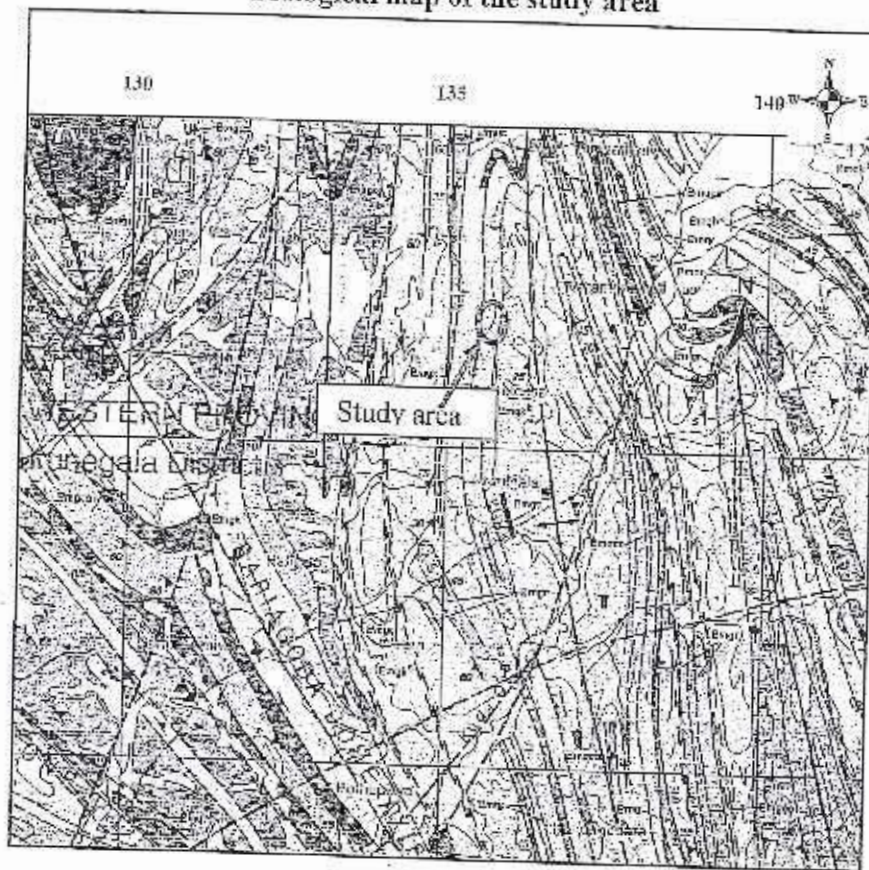


Fig 01- Morphology of the study area

Geologically, the area comprise with Precambrian Metamorphic hard rocks, which belong to Wannu complex, dominant in area. The Prominent rock types of the area are Quartzite,

Charnokitic gneiss and Biotite gneiss. And also the overburden mainly consists Gravelly soil.

Geological map of the study area



There are no any significant drainage systems in project area and dug wells were constructed in village for extraction of groundwater by villages at Western part of the proposed gravel mining site. According to the collected information from villagers, some natural springs are occurring in western part of the proposed excavation site and these are occurring only rainy period. Occurrences of the thick quartzite bands in the area make favorable condition to form natural springs.

Also these water sources in the area are seasonal depended and the water level of dug wells around the area become lower indicating that the poor recharge of the overburden during the dry period.

3. METHODOLOGY

Generally, a proper investigation and assessment on available hydrogeological information is an essential fact to be considered in any groundwater study. A complete reconnaissance

survey on all existing relevant data has been carried out to understand the regional and sites specific geological, geo-structural and hydro-geological set up of the area.

In order to identify above hydrogeological factors, it was deployed one of the most perfect geophysical technique of groundwater prospecting, Geo-electrical resistivity surveying method. Addition to the resistivity surveys, dug wells were observed around the gravel excavation site (shown in Table 01 & Fig. 04) to understand the groundwater level, the overburden conditions and seasonal water level fluctuations.

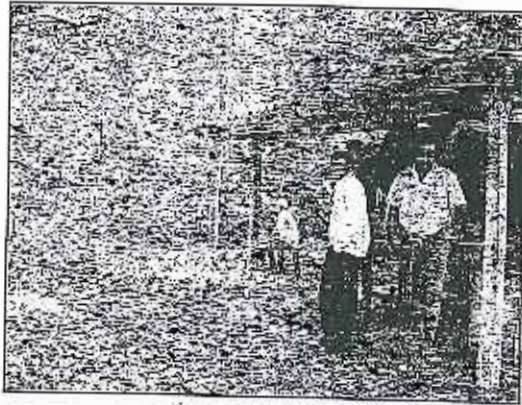


Fig 02: Details collecting from a resistivity survey

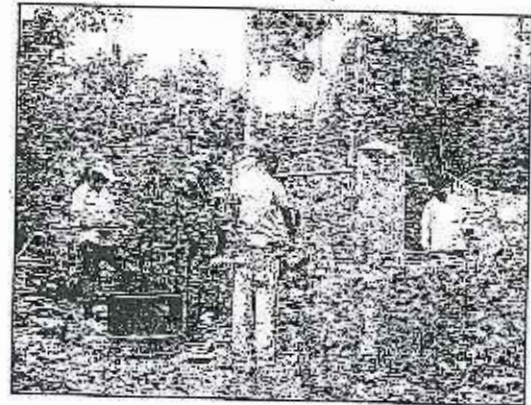


Fig 03: Details collecting from surrounding dug wells.

Finally, the all information collected through above investigations analyzed Hydrogeologically to understand the nature of existing groundwater system and the possible impacts on it due to the Gravel excavation at respective land.

4. RESULTS AND DISCUSSION

Details of the dug well surveys in the area around project site are given following table 01.

Table 01: The technical details of the existing Dug wells

	Location	Distance (m)	Coordinate	T.D. (m)	D (m)	W.L. (m) 29/11/2016	Remarks
DW 01	A.M.Sarath Nishantha, Madagoda Watta, Narammala	250	7° 25' 37.02" 80° 11' 26.22"	5.0	3.0	1.5	Use for drinking water Electrical conductivity 102µs/cm
DW 02	Polhena Estate, Dikirikewa, (K.Gunaseena)	370	7° 25' 44.64" 80° 11' 10.44"	4.85	1.50	1.95	Use for drinking water. Electrical conductivity 87µs/cm

DW 03	Polhena Estate, Dikirikewa, (Antoni Appuhami's land)	280	7° 25' 40.98" 80° 11' 11.28"	2.90	1.25	1.60	Use for drinking water. Electrical conductivity 198µs/cm
DW 04	P.D. Anula Kumari, Rathnageruwa, Dikirikewa	200	7° 25' 32.22" 80° 11' 13.32"	7.70	1.95	6.20	Use for drinking water. Electrical conductivity 58µs/cm
DW 05	Medagoda Watta Rathnageruwa, Dikirikewa	420	7° 25' 33.06" 80° 11' 5.34"	3.20	1.20	1.80	Use for drinking water. Electrical conductivity 49µs/cm

T.D:- Total Depth, D-Well Diameter, W.L.-Water Level, EC-Electrical conductivity

It seems extends up to the depths ranging from 2.90 – 7.70 meters. The overburden is mainly consists of sandy Gravel. The wells are located about 100-500 m away from the quarry site.

When consider the depths of those dug wells, the weathered rock formation and upper soil overburden can be identified as the shallow aquifer unit of the area. This aquifer unit is generally recharged by rainfall. The removing of surface vegetation cover will reduce the near surface water retention condition.

According to the analytical results of Geo-electrical resistivity soundings, it is indicated the gravel layer is extended to deep level and it also varies from one place to another similar to geo-morphological conditions.

RECOMMENDATIONS

Considering the above results following recommendations are made to maintain and enhance existing groundwater condition of the area while operating the proposed gravel excavation site.

1. *Gravel excavation should be carried out only shadow zone as shows in Figure 4.* This area should be marked on the respective land before start the gravel excavation with the participation of Officers from DS office, GSMB, Environmental authorities and other relevant institutes.

2. Benching system should be followed during the gravel excavation and general slope should be $10-15^{\circ}$ after excavated gravel as shown in Figure 5.

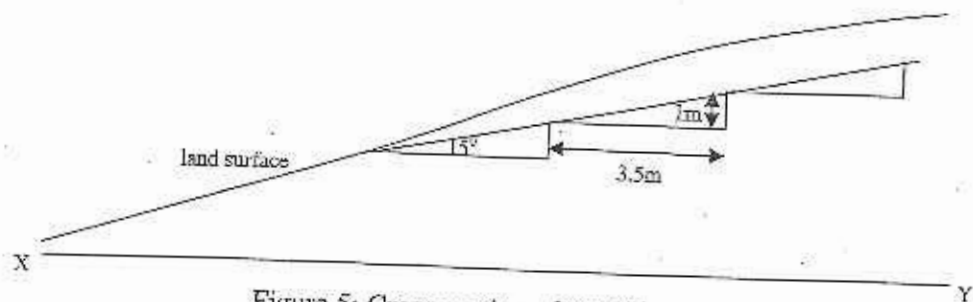




Figure 5: Cross section of X-Y line

3. 5m buffer zone should be remained from the boundary of the proposed excavation land area. The bottom of the quarry should have maintained proper channel system to collect the eroded soil during the rainy season without flowing to the low land areas. After completion of excavation, it is recommended to make vegetation cover with proper surface drainage system in order to avoid rapid soil erosion and surface runoff.
4. Water levels of surrounding wells must be measured during the Gravel excavation in every 3 months interval. This would help to understand the water level fluctuation of the area and to find the effect due to quarry operation. If the quarry operation would be influenced to the water level of the area, exaction has to be stopped.
5. Gravel excavation activities should be done under the supervision and recommendation of Environmental Authorities, GSMB, DS office and other relevant institutions. And also their recommendation reports should be submitted to WRB before initiating the quarry operation.


A.S.M.N.B. Samarakoon,
S. Hydrogeologist,
Water Resources Board
Puttalam.
18.01.2017


A.M.L.R. Amarakoon,
Hydrogeologist
Water Resources Board
Puttalam.

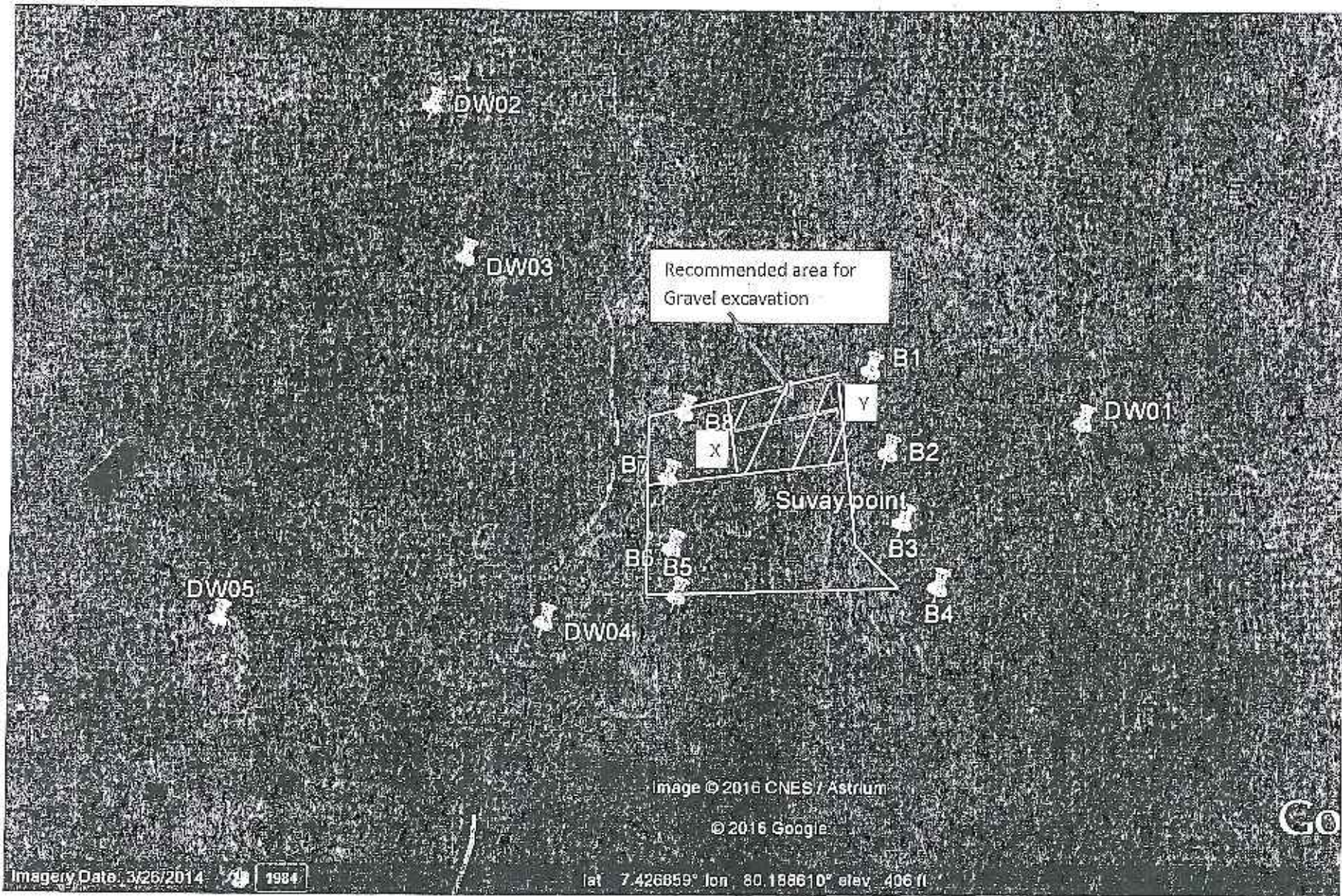


Fig 04