GROUND WATER POTENTIAL ZONATION MAPPING USING REMOTE SENSING AND GIS TECHNIQUES

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INTRODUCTION

Groundwater lies below earth's surface in the interstices and voids. In hard rock terrain it is mainly confined to weathered and fractured zones. In Tirunelvelli district it is being indiscriminately exploited to meet demands. Surface water storage in reservoirs and tanks are not sufficient.

MAIN OBJECTIVE

Delineating groundwater potential zones using remote sensing and GIS

Tamirabarani basin location

Latitude - 8°25' TO 9°13'N

Longitudes - 77°10' TO 78°10'

River origination – Agasthiyamalai (Western Ghats)

Altitude – 1869m Above mean sea level

Confluences with – Gulf of Mannar

TAMIRABARANI RIVER BASIN

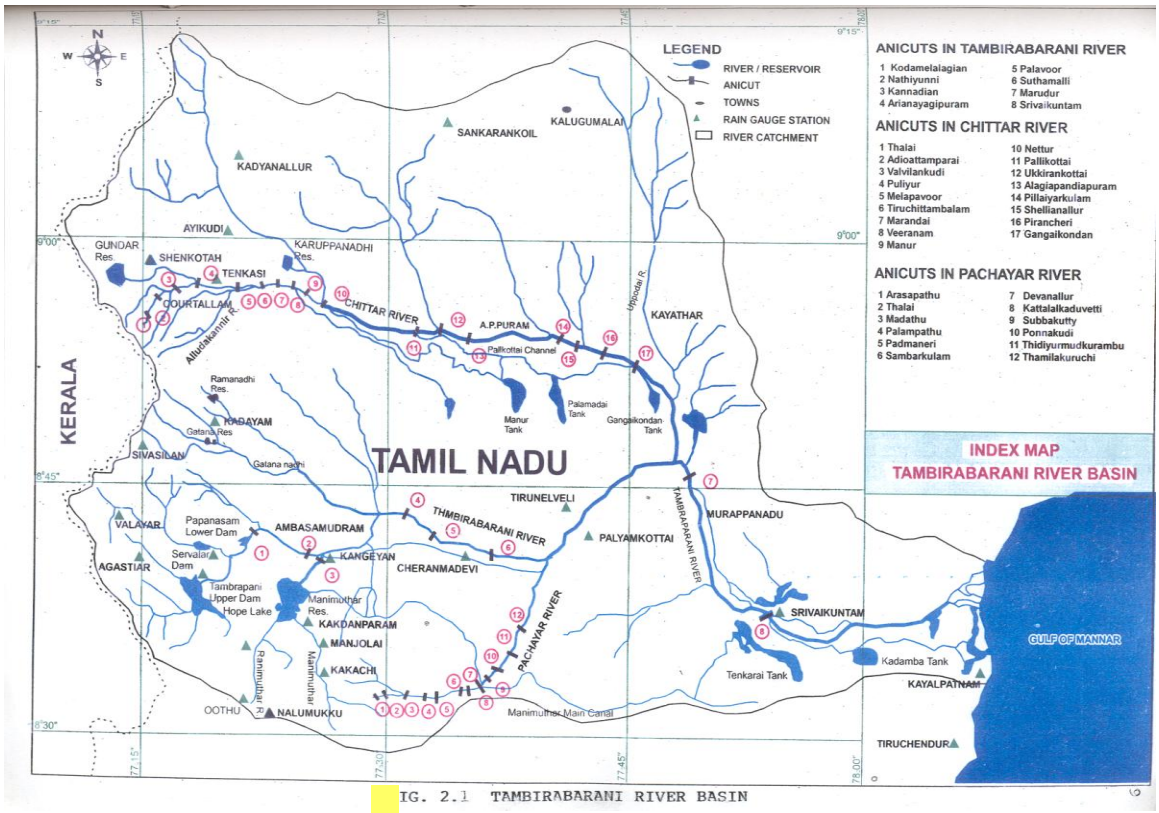
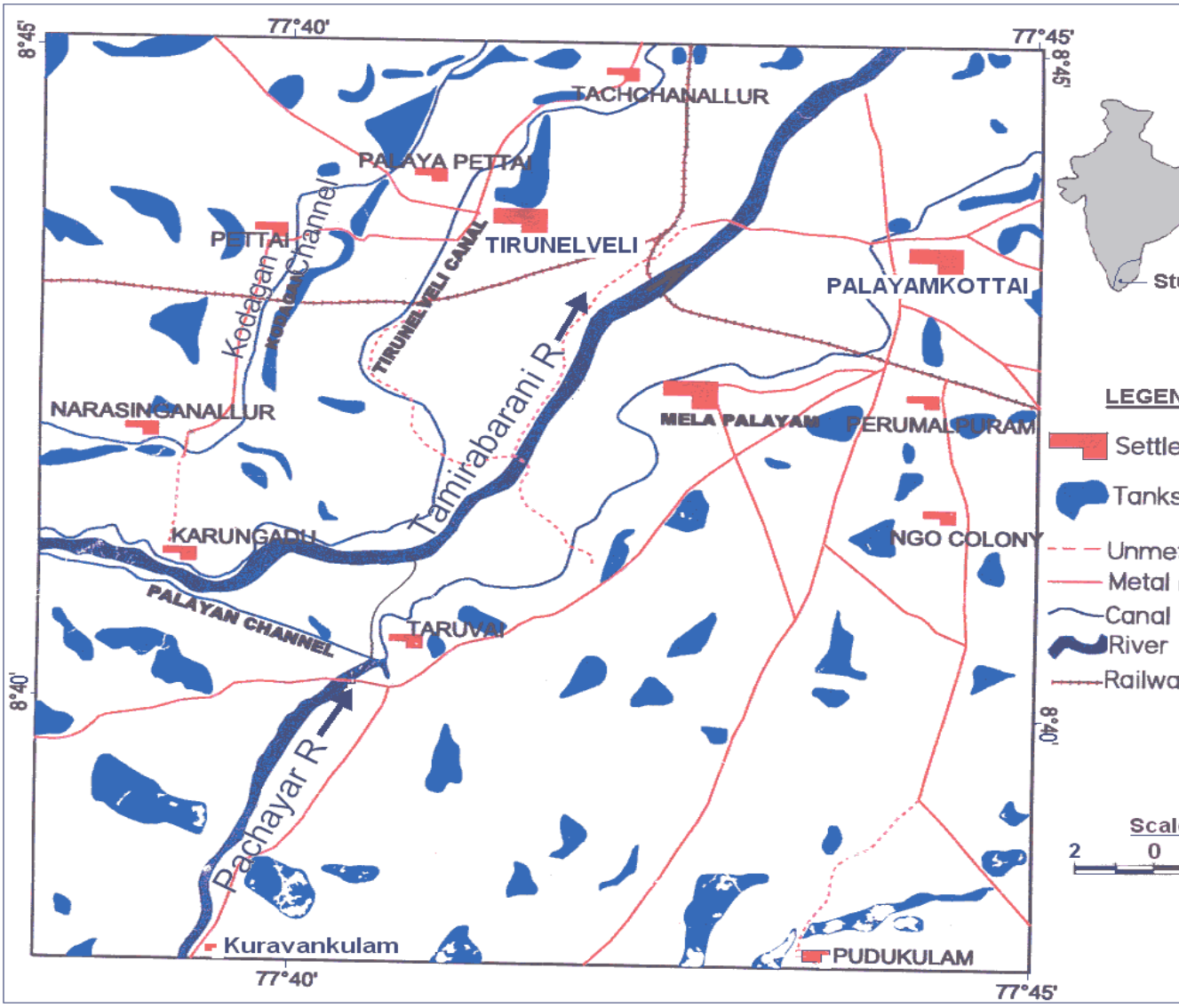


FIG. 2.1 TAMBIRABARANI RIVER BASIN

STUDY AREA LOCATION

LATITUDE - 8°37’5’’ TO 8°45’N
LONGITUDE - 77°37’48’’ TO 77°45’E
AREA -152 sq km
AVG ANNUAL
RAINFALL - 718mm

STUDY AREA MAP



MATERIALS AND METHODS

- For study area, ground elevation contour and drainage map - Survey of India toposheet (soi) 58h/10 on 1:50000 scale
- For thematic maps like geomorphology and lineament – IRS 1d LISS iii geocoded satellite image.
- For information about geological formations and structures - Geological survey of India (GSI, 1995) map
- Digital elevation model (DEM) - using surfer software

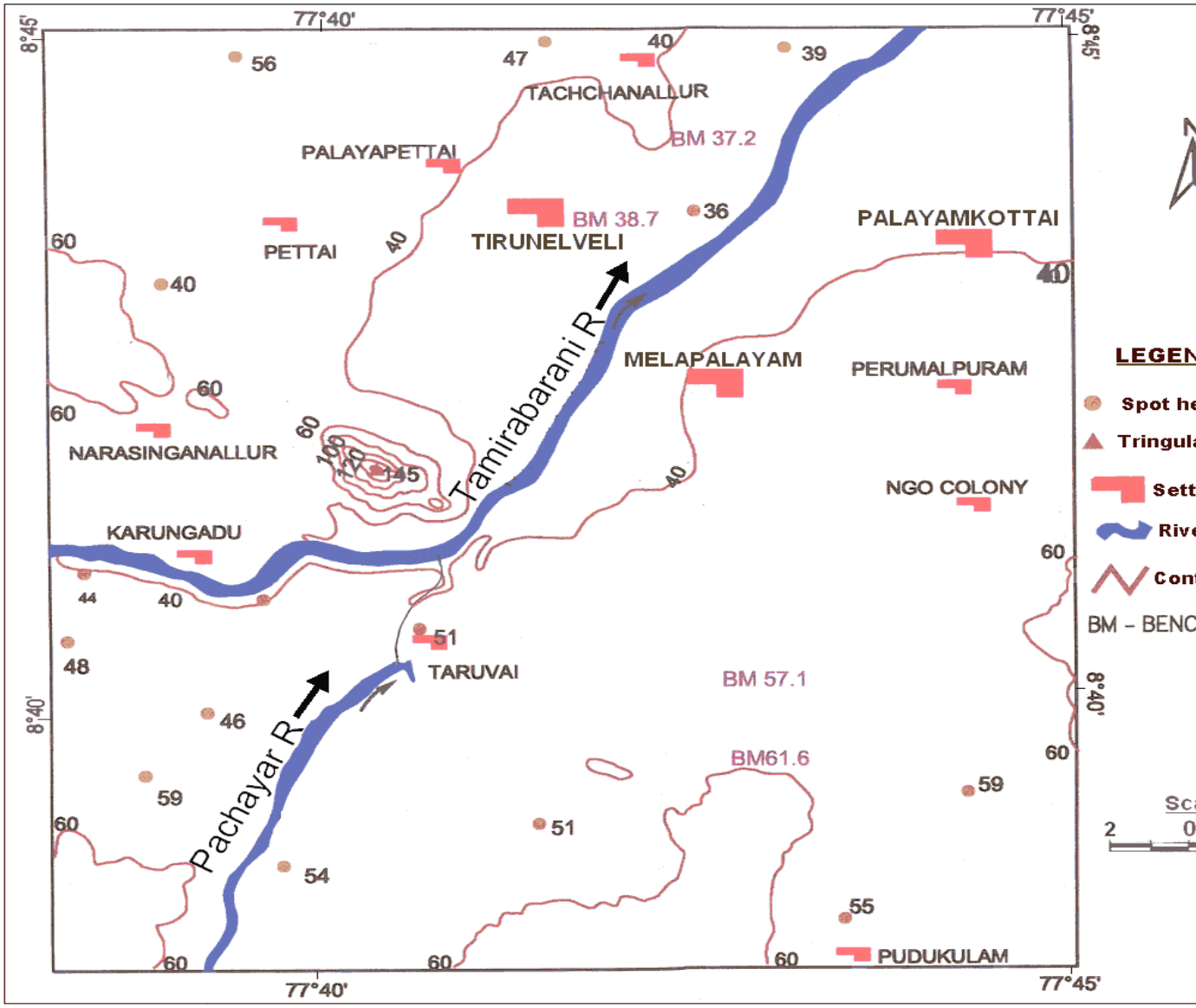
- Maps scanned and digitized - Arcgis software

- Groundwater potential zonation maps - integrating geomorphology, lineaments and well inventory details. For pump test details- materials from Tamil Nadu PWD

RESULTS AND DISCUSSIONS

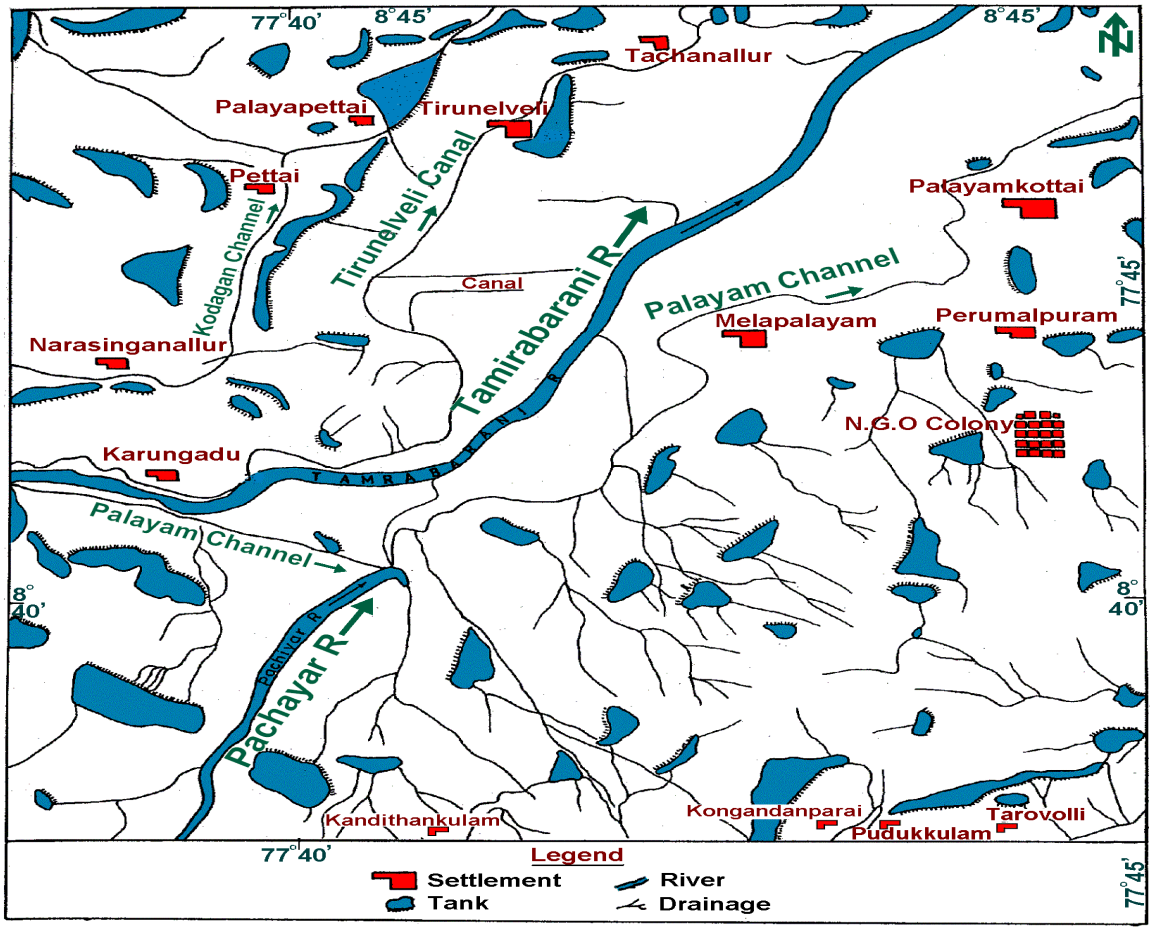
- Topography - slope of the terrain, surface run off and groundwater infiltration.
- Max elevation- 145m at top of structural hill in western part
- Min elevation- 36m in the n-e part
- Ground elevation contour map was prepared from SOI toposheet

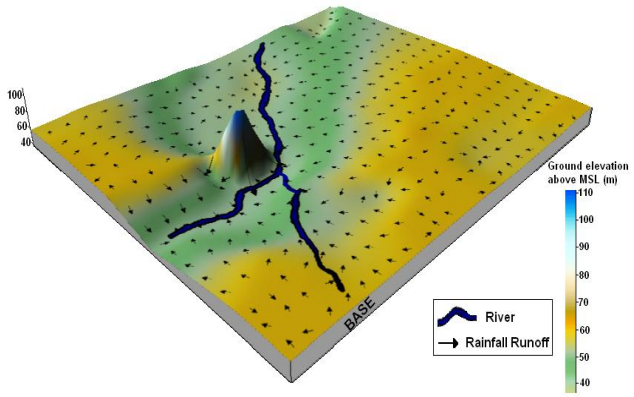
TOPOGRAPHY MAP



RAINFALL RUNOFF

- DEM – Ground elevation contour map
- Vector diagram (VD) - from topographical grid data.
- The VD was superimposed over DEM for understanding surface flow of water.
- Regional slope & surface flow are towards N-E in this region.


77°40'
8°45'
Tachanallur
Palayapettai
Tirunelveli
Pettai
Kodagan Channel
Tirunelveli Canal
Canal
Tamirabarani R
Palayamkottai
Palayam Channel
Melapalayam
Perumalpuram
77°45'
Narasinganallur
N.G.O Colony
Karungadu
TAMRAPARANI R
Palayam Channel
8°40'
Pachayar R
Kandithankulam
Kongandanparai
Tarovolli
Pudukkulam
Legend
Settlement
Tank
River
Drainage


100
80
60
40
Ground elevation above MSL (m)
110
100
90
80
70
60
50
40
River
Rainfall Runoff
BASE

GEOMORPHOLOGY

- To delineate hydrogeomorphic units for targeting groundwater from satellite imageries visual interpretation techniques are used.

- Geomorphologic map - satellite imagery based on specific tone, texture, size, shape.

- Major geomorphologic units are Structural hills (SH), pediment (P), shallow pediment (SP) and flood plains (FP).

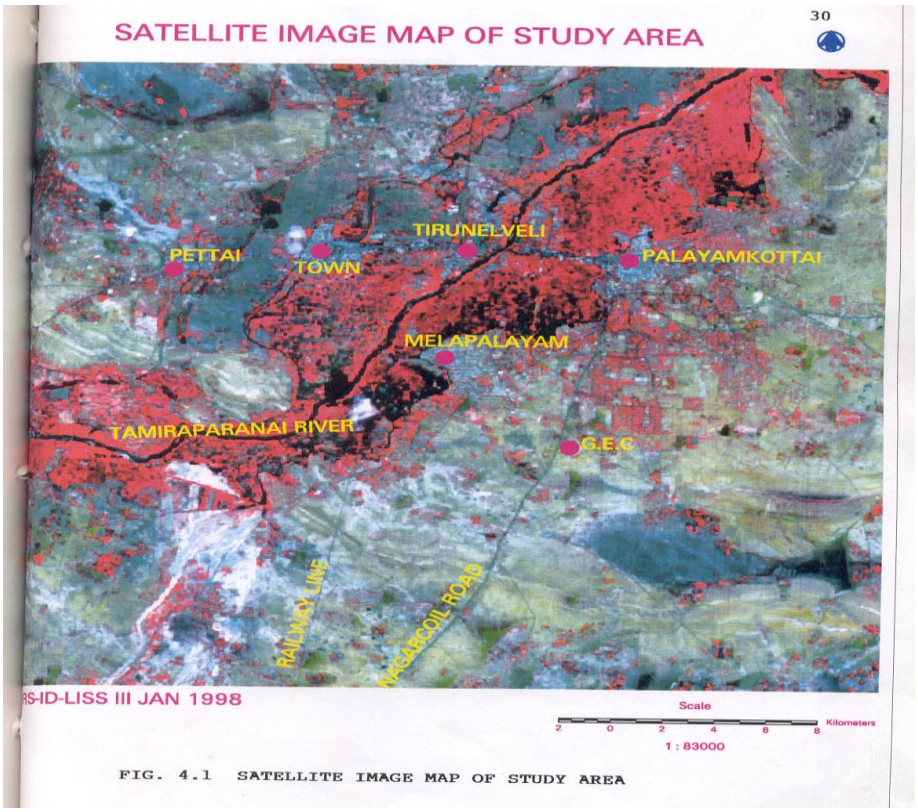
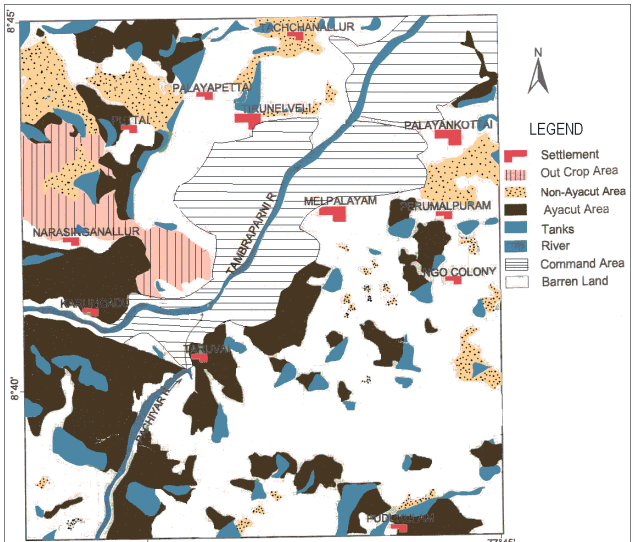
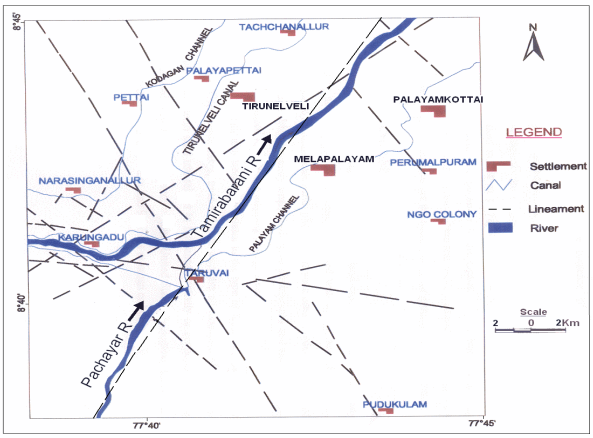


FIG. 4.1 SATELLITE IMAGE MAP OF STUDY AREA



LINEAMENTS

- Reflects orientation of joints and faults.
- Areas with different lineament intensities have differences in probability of groundwater development potential.
- Areas underlined by a relatively thick regolith possesses a high degree of water storage capacity.
- Most of the lineaments trend in the NW-SE direction.

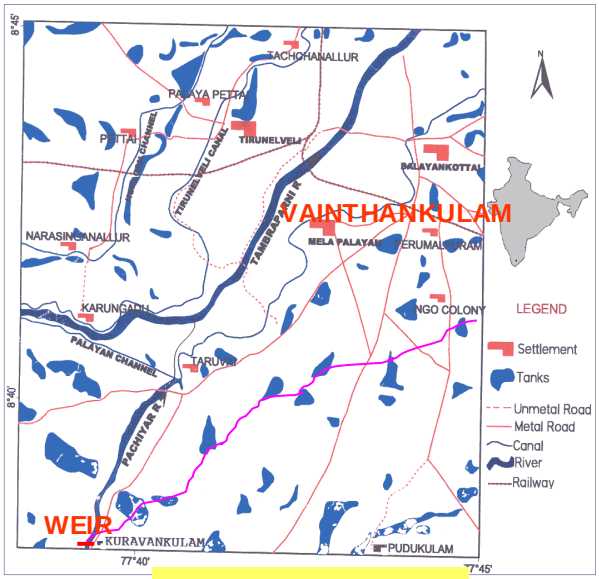


LINEAMENT

CONCLUSIONS

Suitable sites for the construction of artificial recharge structures.

Targeting of groundwater (to pin point the exact location, detailed electrical resistivity survey has to be conducted)



WEIR & CANAL ROUTE