നവംബർ &
ഡിസംബർ 2025

അമൃത് വാർത്താ പത്രിക

ലക്കം 9

18th Urban Mobility india

Conference & Expo

2025

Special Mention Award

City with Best non-Motorized Transport System

for Skywalk Project, Thrissur

18-ാമത് ദേശീയ അർബൻ മൊബിലിറ്റി അവാർഡിൽ നോൺ മോട്ടോറൈസ്ഡ് സംവിധാനമുള്ള മികച്ച നഗരം എന്ന വിഭാഗത്തിൽ പ്രത്യേക പരാമർശത്തിനുള്ള അവാർഡ് നേടിയ അമൃത് ടീം ബഹു. തദ്ദേശ സ്വയംഭരണ വകുപ്പ് മന്ത്രിയെയും, പ്രിൻസിപ്പൽ സെക്രട്ടറിയെയും സന്ദർശിച്ചപ്പോൾ

18-ാമത് ദേശീയ അർബൻ മൊബിലിറ്റി അവാർഡിൽ നോൺ മോട്ടോറൈസ്ഡ് സംവിധാനമുള്ള മികച്ച നഗരം എന്ന വിഭാഗത്തിൽ പ്രത്യേക പരാമർശത്തിനുള്ള അവാർഡ് നേടിയ അമൃത് ടീം ചീഫ് സെക്രട്ടറിയെ സന്ദർശിച്ചപ്പോൾ

അമൃത് വാർത്താ പത്രിക

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എഡിറ്റോറിയൽ

അമൃത് 1.0 യുടെ ഭാഗമായി തൃശ്ശൂർ കോർപ്പറേഷനിൽ അർബൻ ട്രാൻസ്പോർട്ട് സെക്ടറിൽ പൂർത്തീകരിച്ച ആകാശപ്പാതയ്ക്ക് 18-ാമത് ദേശീയ അർബൻ മൊബിലിറ്റി അവാർഡിൽ നോൺ മോട്ടോറൈസ്ഡ് സംവിധാനമുള്ള മികച്ച നഗരം എന്ന വിഭാഗത്തിൽ പ്രത്യേക പരാമർശത്തിനുള്ള അവാർഡ് നേടുകയുണ്ടായി. കേന്ദ്ര മന്ത്രി ശ്രീ. മനോഹർ ലാൽ ഖട്ടറിൽ നിന്ന് അവാർഡ് സ്വീകരിച്ചു. കേരള അമൃത് മിഷന് ഏറ്റവും അഭിമാനാർഹമായ ഒരു നേട്ടമാണിത്. ഈ പ്രവർത്തി പൂർത്തീകരിക്കാനായി പരിശ്രമിച്ച എല്ലാവർക്കും പ്രത്യേകിച്ച് തൃശ്ശൂർ കോർപ്പറേഷനും അഭിനന്ദനങ്ങൾ അറിയിക്കുന്നു. അമൃത് മിഷൻ പ്രവർത്തനങ്ങൾ ദേശീയതലത്തിൽ ശ്രദ്ധേയമാകുന്നതിൽ നമുക്ക് അഭിമാനിക്കാം. അമൃത് 1.0 പദ്ധതി പൂർണ്ണമായും 2025 ഡിസംബർ 31 ന് അവസാനിക്കുകയാണ്. ഇത് സംബന്ധിച്ചുള്ള എല്ലാ പ്രവർത്തനങ്ങളും ഈ സമയ പരിധിക്കുള്ളിൽ പൂർത്തീകരിക്കണമെന്ന് ഓർമിപ്പിക്കുന്നു.

അമൃത് 2.0 പദ്ധതികളുടെ പ്രവർത്തനങ്ങൾ സമയബന്ധിതമായി പൂർത്തിയാക്കേണ്ടതുണ്ട്. അംഗീകാരം ലഭിച്ച പദ്ധതികൾ വർക്ക് അവാർഡ് ചെയ്ത് പൂർത്തീകരിച്ചാൽ മാത്രമെ പദ്ധതിയുടെ ഫണ്ട് വിഹിതം പൂർണ്ണമായും കേന്ദ്രത്തിൽ നിന്ന് ലഭിക്കുകയുള്ളു. ആയതിനാൽ പദ്ധതി പ്രവർത്തനങ്ങൾ സംബന്ധിച്ച വിശദാംശങ്ങൾ പോർട്ടലിൽ അപ് ലോഡ് ചെയ്യുന്ന കാര്യത്തിൽ സവിശേഷമായ ശ്രദ്ധ ആവശ്യമാണ്. പോർട്ടലിലൂടെയാണ് കേന്ദ്ര സർക്കാർ പദ്ധതി പ്രവർത്തനങ്ങൾ വിലയിരുത്തുന്നത്.

അമൃത് 2.0 പദ്ധതിയുടെ ഭാഗമായി നടപ്പിലാക്കുന്നു അമൃത് മിത്ര പദ്ധതി പ്രവർത്തനങ്ങൾ എല്ലാ നഗരസഭകളിലും കാര്യക്ഷമമായി നടന്നുവരികയാണ്. മുകളിൽ സൂചിപ്പിച്ചതുപോലെ പദ്ധതി പ്രവർത്തനങ്ങൾ അതാത് ഘട്ടങ്ങളിൽ പോർട്ടലിൽ രേഖപ്പെടുത്തേണ്ടതാണ്. തദ്ദേശ സ്വയംഭരണ സ്ഥാപനങ്ങളിലേയ്ക്കുള്ള തിരഞ്ഞെടുപ്പ് സംസ്ഥാനത്ത് പൂർത്തിയായി നഗരസഭകളിലൊക്കെ പുതിയ ഭരണ സമിതി നിലവിൽ വരികയാണല്ലോ. മുൻകാലങ്ങളിൽ അമൃത് പദ്ധതി പ്രവർത്തനങ്ങളിൽ കാണിച്ച ശ്രദ്ധയും പരിഗണനയും തുടർന്നും നൽകണമെന്ന് അഭ്യർത്ഥിക്കുന്നു. പുതിയതായി തിരഞ്ഞെടുക്കപ്പെട്ട എല്ലാ ജനപ്രതിനിധികൾക്കും ആശംസകൾ നേരുന്നു. ഏവർക്കും ക്രിസ്തുമസ് പുതുവത്സരാംശസകൾ.

മിഷൻ ഡയറക്ടർ

തദ്ദേശസ്വയംഭരണ വകുപ്പ്
കേരള സർക്കാർ

ചീഫ് എഡിറ്റർ
സൂരജ് ഷാജി ഐ.എ.എസ്സ്
മിഷൻ ഡയറക്ടർ

എഡിറ്റർ
മുരളി കൊച്ചുകൃഷ്ണൻ
എൻവിയോൺമെന്റ് എക്സപർട്ട് കം
ഹൈഡ്രോ ജിയോളജിസ്റ്റ്

അസിസ്റ്റന്റ് എഡിറ്റർ
സാവിയോ സജി ഇ.ആർ.

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(സൗജന്യ വിതരണത്തിന് മാത്രം)

സംയുക്ത പാർലമെന്ററി സ്റ്റാൻഡിംഗ് കമ്മിറ്റി യോഗം കൊച്ചിയിൽ വച്ച് നടന്നു

ഇരിട്ടി നഗരസഭയിൽ അമൃത് 2.0 പദ്ധതിയിൽ ഉൾപ്പെടുത്തി പുനരുജ്ജീവന പ്രവർത്തനങ്ങൾ പൂർത്തിയായി വരുന്ന കുളോത്ത് ക്ഷേത്ര കുളം

അമൃത് വാർത്താ പത്രിക

നവംബർ & ഡിസംബർ 2025

ഉള്ളടക്കം

കണ്ണൂർ നഗരസഭയിൽ അമൃത് പദ്ധതിയിലുൾപ്പെടുത്തി പൂർത്തീകരിച്ച മൾട്ടി ലെവർ കാർ പാർക്കിംഗ് സംവിധാനത്തിന്റെ ഉദ്ഘാടനം ബഹു. എം.പി. ശ്രീ. കെ. സുധാകരൻ നിർവ്വഹിക്കുന്നു.

കണ്ണൂർ മുനിസിപ്പാലിറ്റിയിൽ അമൃത് പദ്ധതിയിലുൾപ്പെടുത്തി പൂർത്തീകരിച്ച മൾട്ടി ലെവർ കാർ പാർക്കിംഗ് സംവിധാനം

Kerala's AMRUT Mission Honoured with Special Recognition at 18th National Urban Mobility India Awards 2025

The AMRUT Kerala team, led by Shri Suraj Shaji IAS, Mission Director, has been honoured with the Special Mention Award in the category of Best City with the Non-Motorized Transport system at 18th National Urban Mobility India Award ceremony held in Gurugram, Haryana for the Thrissur "Sky walk project". The award was presented by the Hon'ble Minister of Housing and Urban Affairs & Power, Shri Manohar Lal Khattar, in the presence of other senior officials from the Central and Haryana State Governments.This prestigious recognition highlights Kerala's steadfast commitment towards fostering sustainable, inclusive, and environment-friendly urban mobility across the state. Under the AMRUT Mission, Kerala has implemented pioneering initiatives that promote non-motorized transport system, improves walkability, and enhances public spaces, giving priority to people over vehicles.The Ministry's appreciation serves as a strong endorsement of Kerala's progressive and citizen-centric approach to urban mobility. Through continuous innovation and strategic planning, the AMRUT Kerala Mission continues to set benchmarks in advancing India's national sustainability and urban development goals.

അമൃത് 2.0 പദ്ധതിയിൽ ഉൾപ്പെടുത്തി പരവൂർ നഗരസഭയിൽ പൂർത്തീകരിച്ച ജലവിതരണ പദ്ധതിയുടെ ഉദ്ഘാടനം ബഹു. ജലവിഭവ വകുപ്പ് മന്ത്രി ശ്രീ. റോഷി അഗസ്റ്റിൻ നിർവ്വഹിക്കുന്നു.

പരവൂർ നഗരസഭയിൽ പൂർത്തീകരിച്ച ജലവിതരണ പദ്ധതിയുടെ ഉദ്ഘാടനം ബഹു. ജലവിഭവ വകുപ്പ് മന്ത്രി ശ്രീ. റോഷി അഗസ്റ്റിൻ നിർവ്വഹിച്ചു.

നഗരങ്ങളുടെ ജലഭദ്രത ലക്ഷ്യമിട്ട് സംസ്ഥാനത്തെ എല്ലാ നഗരസഭകളിലും നടപ്പിലാക്കി വരുന്ന അമൃത് 2.0 പദ്ധതിയിൽ ഉൾപ്പെടുത്തി പരവൂർ നഗരസഭയിൽ പൂർത്തീകരിച്ച ജലവിതരണ പദ്ധതിയുടെ ഉദ്ഘാടനം ബഹു. ജലവിഭവ വകുപ്പ് മന്ത്രി ശ്രീ. റോഷി അഗസ്റ്റിൻ നിർവ്വഹിച്ചു. ശ്രീ. എൻ.കെ. പ്രേമചന്ദ്രൻ എം.പി., ശ്രീ. ജി.എസ്. ജയലാൽ എം.എൽ.എ., മുനിസിപ്പൽ ചെയർഴ്സേൺ ശ്രീമതി പി. ശ്രീജ എന്നിവർ ചടങ്ങിൽ സംബന്ധിച്ചു.

പരവൂർ നഗരസഭയിൽ നിലവിലുണ്ടായിരുന്ന 13.9 കി.മീ. ദൈർഘ്യമുള്ള ജലവിതരണ ശൃംഖല പൂർണ്ണമായും മാറ്റിയതുൾപ്പടെ 29.5 കി.മീ. ദൈർഘ്യത്തിൽ ജലവിതരണ ശൃംഖല സ്ഥാപിച്ച്, പുതിയതായി 3344 ഗാർഹിക കണക്ഷനുകൾ നൽകി. നിലവിലെ 6130 ടാപ്പ് കണക്ഷനുകൾ പരിഷ്ക്കരിച്ചു. 16.1692 കോടി രൂപയാണ് പദ്ധതിയുടെ ഭരണാനുമതി തുക. പദ്ധതി പൂർത്തീകരിച്ചതിലൂടെ 9474 വീടുകളിലായി 37,900 പേർക്ക് പദ്ധതിയുടെ ഗുണം ലഭിക്കും. 13.38 കോടി രൂപയ്ക്കാണ് പദ്ധതി പൂർത്തീകരിച്ചത്.

'നാഷണൽ അർബൻ കോൺക്ലേവ് 2025'

നാഷണൽ അർബൻ കോൺക്ലേവ് 2025

'നാഷണൽ അർബൻ കോൺക്ലേവ് 2025' കേന്ദ്ര ഭവന നഗരകാര്യ വകുപ്പ് മന്ത്രി ശ്രീ. മനോഹർ ലാൽ ഖട്ടർ ഉദ്ഘാടനം ചെയ്തു. സുസ്ഥിരവും ഭാവിയിലെ ആവശ്യങ്ങൾക്ക് അനുയോജ്യമാകുന്ന രീതിയിൽ നഗരങ്ങളെ രൂപപ്പെടുത്തിയെടുക്കുന്നതിനുമായുള്ള ചർച്ചകൾക്കും നയ രൂപീകരണത്തിനുമായി നഗര നയരൂപീകരണ രംഗത്തെ വിദഗ്ദ്ധർ, സംസ്ഥാനങ്ങളിലെ നഗര വികസന ചുമതലയുള്ള മന്ത്രിമാർ, നൂതന ആശയങ്ങൾ പങ്കുവെയ്ക്കുന്നവർ, വിവിധ മേഖലകളിലെ വിദഗ്ദ്ധർ എന്നിവരാണ് കോൺക്ലേവിൽ പങ്കെടുത്തത്. 2047 ലെ വികസിത ഇന്ത്യ എന്ന ലക്ഷ്യം മുൻ നിർത്തിയുള്ള ചർച്ചകളാണ് കോൺക്ലേവിൽ നടന്നത്. പൗരന്മാരുടെ ജീവിത നിലവാരം മെച്ചപ്പെടുത്തുന്ന നിലയിലുള്ള സാങ്കേതിക വിദ്യയിലധിഷ്ഠിതമായ പൊതുജന കേന്ദ്രീകൃതമായ നഗര സംവിധാനമാണ് '2047 ലെ വികസിത ഇന്ത്യ ലക്ഷ്യം വയ്ക്കുന്നത്. കോൺക്ലേവിനോട് അനുബന്ധിച്ച് 'വികസിത ഇന്ത്യ നഗര പ്രദർശനം' എന്ന പേരിൽ പ്രദർശനവും സംഘടിപ്പിച്ചിരുന്നു.

നാഷണൽ അർബൻ കോൺക്ലേവ് 2025' ൽ കേരളത്തെ പ്രതിനിധീകരിച്ച് പങ്കെടുത്തവർ

100 കെ.എൽ.ഡി. എഫ്.എസ്.ടി.പി. ബഹു. കേന്ദ്ര സഹമന്ത്രി അഡ്വ. ജോർജ്ജ് കുര്യൻ ഉദ്ഘാടനം ചെയ്തു.

പാലക്കാട് നഗരസഭയിലെ യാക്കരയിൽ അമൃത് 1.0 പദ്ധതിയിൽ ഉൾപ്പെടുത്തി പൂർത്തീകരിച്ച 100 കെ.എൽ.ഡി. ശേഷിയുള്ള കക്കൂസ് മാലിന്യ സംസ്കരണ പ്ലാന്റ് ബഹു. കേന്ദ്ര സഹമന്ത്രി അഡ്വ. ജോർജ്ജ് കുര്യൻ ഉദ്ഘാടനം ചെയ്തു. പാലക്കാട് നഗരസഭയിലെ കക്കൂസ് മാലിന്യം ശാസ്ത്രീയമായി സംസ്കരിക്കുന്നതിന് പ്ലാന്റ് സഹായകമാകും. 3.86 കോടി രൂപയാണ് പദ്ധതിയുടെ ഭരണാനുമതി തുക. ചടങ്ങിൽ പാലക്കാട് നഗരസഭാ ചെയർപേഴ്സൺ ശ്രീമതി പ്രമീള ശശിധരൻ അദ്ധ്യക്ഷത വഹിച്ചു.

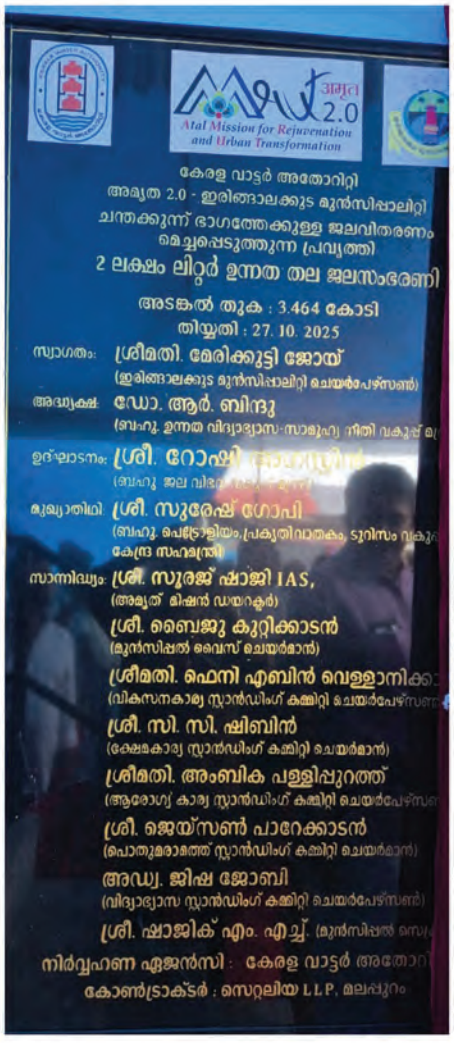
നവീകരിച്ച ഉത്രമേൽ ക്ഷേത്രക്കുളം ബഹു. കേന്ദ്ര സഹമന്ത്രി അഡ്വ. ജോർജ്ജ് കുര്യൻ ഉദ്ഘാടനം ചെയ്തു

തിരുവല്ല നഗരസഭയിൽ അമൃത് 2.0 പദ്ധതിയിൽ ഉൾപ്പെടുത്തി നവീകരിച്ച ഉത്രമേൽ ക്ഷേത്രക്കുളം ബഹു. കേന്ദ്ര സഹമന്ത്രി അഡ്വ. ജോർജ്ജ് കുര്യൻ ഉദ്ഘാടനം ചെയ്തു. ബഹു. എം.എൽ.എ. അഡ്വ. മാത്യു ടി തോമസ് ചടങ്ങിൽ അദ്ധ്യക്ഷത വഹിച്ചു. തിരുവല്ല നഗരസഭാ ചെയർപേഴ്സൺ ശ്രീമതി അനുജോർജ്ജ് മുഖ്യാതിഥിയായി പങ്കെടുത്തു. 43.80 ലക്ഷം രൂപ അടങ്കൽ തുകയിലാണ് കുളം നവീകരിച്ചത്.

അമൃത് മിഷൻ ഡയറക്ടർ ശ്രീ സൂരജ് ഷാജി ഐ.എ.എസ്. പാലക്കാട് അമൃത് മിഷൻ പ്രവർത്തനങ്ങൾ വിലയിരുത്തുന്നു.

ഇരിങ്ങാലക്കുട മുനിസിപ്പാലിറ്റിയിൽ ഓവർ ഹെഡ് ടാങ്കിന്റെ ഉദ്ഘാടനം ബഹു. മന്ത്രി ഡോ. ആർ. ബിന്ദു നിർവ്വഹിച്ചു

ഇരിങ്ങാലക്കുട മുനിസിപ്പാലിറ്റിയിൽ അമൃത് 2.0 പദ്ധതിയിൽ ഉൾപ്പെടുത്തി നിർമാണം പൂർത്തീകരിച്ച ഓവർ ഹെഡ് ടാങ്കിന്റെ ഉദ്ഘാടനം ബഹു. ഉന്നത വിദ്യാഭ്യാസ വകുപ്പ് മന്ത്രി ഡോ. ആർ. ബിന്ദു നിർവ്വഹിച്ചു. മുനിസിപ്പാലിറ്റിയിലെ ചന്തക്കുന്ന് ഭാഗത്തേയ്ക്കുള്ള ജലവിതരണം കാര്യക്ഷമമാക്കുന്നതിനായാണ് 2 ലക്ഷം ലിറ്റർ ശേഷിയുള്ള ടാങ്ക് നിർമ്മിച്ചിരിക്കുന്നത്. 3.464 കോടി രൂപയാണ് ടാങ്കിന്റെ നിർമാണ ചെലവ്. നഗരസഭാ ചെയർപേഴ്സൺ ശ്രീമതി മേരിക്കുട്ടി ജോയ് ചടങ്ങിൽ അദ്ധ്യക്ഷത വഹിച്ചു.



മലിന ജല സംസ്കരണം സംബന്ധിച്ച് എഞ്ചിനീയർമാർക്കായി ദേശീയ തല പരിശീലന പരിപാടി സംഘടിപ്പിച്ചു.

MD, AMRUT Kerala Showcases Kerala's Urban Growth Strategies at NITI Aayog's State Workshop Series, Madhya Pradesh

The Mission Director, AMRUT (Atal Mission for Rejuvenation and Urban Transformation) Kerala, Cum Director Urban, Government of Kerala has delivered an insightful and engaging presentation at the NITI Aayog State Workshop Series held in Bhopal, Madhya Pradesh, on November 20, 2025. The session, titled "Planning, Implementation, Management and Monitoring Towards the Growth of Cities in Kerala," highlighted Kerala's innovative approaches to sustainable urban development and integrated governance.Serving as both presenter and moderator, the Mission Director led an invigorating discussion on Kerala's urban transformation strategies, focusing on people-centric planning, efficient project management systems, and the use of technology-driven monitoring tools. The session drew participation from senior civil service officers representing various states and Union Territories, members of NITI Aayog, and representatives from multiple national and institutional organizations.

Participants widely appreciated the comprehensive and outcome-oriented presentation, commending the clarity of vision, depth of analysis, and replicable models showcased from Kerala's urban growth initiatives. The session was recognized for its practical insights into strengthening institutional frameworks, fostering interdepartmental coordination, and ensuring transparency in urban development programs.This engagement reflects Kerala's continued commitment under both AMRUT Mission and Urban affairs Department, LSGD Government of Kerala in promoting sustainable urban infrastructure, citizen engagement, and performance-based reforms, aligning with the nation's broader vision of resilient and inclusive city based development under Vikist bharat 2047.

"Urban Infrastructure Finance Festival 2025 Inclusive, Resilient, Sustainable Cities"

Inaugural Session details- Welcome address: Shri Srinivas Katikithala, IAS, Secretary, MoHUA, Govt of India and Opening Remarks: His excellency: Mr Herve Delphin, Ambassador, Delegation of the European Union to India and Bhutan

The Urban Infrastructure Finance Festival 2025, a flagship initiative under Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Germany's federal agency for international cooperation, in association with European Union (EU), conducted Urban Infrastructure Finance Festival (UIFF) 2025,, at New Delhi on 28 & 29 October 2025. The UIFF 2025 is a joint action "Support to Sustainable Urbanisation in India", is a programme designed to empower Indian cities to access diverse financing avenues for climate-resilient and gender-inclusive urban infrastructure. As a convening platform, the festival brings together policymakers, municipal officials, financial institutions, multilateral agencies, and private sector leaders to foster long-term partnerships and co-develop actionable strategies to bridge India's urban infrastructure funding gap. Against the backdrop of rapid urbanization and growing infrastructure needs, the festival plays a pivotal role in attracting investment by offering stakeholders the opportunity to explore viable projects, mobilize financing, and catalyse collaborative urban development.

The Inaugural Session and Welcome address of the conference have been carried out by Shri Srinivas Katikithala, IAS, Secretary, MoHUA, Govt of India and the Session initiation /Opening Remarks were given by His Excellency Mr. Herve Delphin, Ambassador, Delegation of the European Union to India and Bhutan.

This is followed by a keynote address and Main Panel discussion towards "**Accelerating Urban Infrastructure Investments for Climate-Resilient and Gender Inclusive Cities by Smt.D. Thara IAS, MoHUA, Additional Secretary, Government of India.**

The prime Objective of the Urban Finance Festival is to:

1. Enhancing municipal capacities to unlock innovative financing for climate-resilient, gender-inclusive cities to build the technical, regulatory, and operational capabilities of municipal bodies to design, finance, and manage climate-resilient, gender-inclusive urban infrastructure projects by enhancing their understanding of capital markets, climate finance, PPPs, and grant utilization.

2. Strengthening the urban infrastructure finance ecosystem by streamlining policies, regulations, & institutions.

3. To strengthen the urban infrastructure finance ecosystem by facilitating structured dialogues that uncover and address policy, regulatory, and institutional barriers, while discussing on strategies & actionable pathways to overcome them. 3. for cities, and financial institutions

4. To provide a dedicated Matchmaking platform **for cities to showcase investment-ready infrastructure projects and directly engage with financial institutions, enabling dialogue, refinement in project structuring, demystification of the requirements of financing channels and the formation of financing partnerships**.

Based on the advice and Direction by the Mission Director, AMRUT Kerala, The Team comprises of **Rahul.N, Madhavan.K.N and Murali Kochukrishnan** have presented the case study on WET (WATER EFFICIENT THRISSUR) as a potential Bankable infrastructure Project which can be replicated in other districts of Kerala.

The team has presented the case on **29th in the Shark Tank (ST) Cities and have showcased the** WET **infrastructure project to the wide array of investors and funders who have participated in the short pitch session.**

Outcome of the Presentation: *The WET project presentation has been appreciated by many a participant.* ***Mr. Alvaro Berill, the head of Urban and Mobility team, Kfw development Bank of Germany*** *has extended his cooperation to further collaborate with Government of Kerala to finds ways to pitch in to replicate such projects in other regions of Kerala.*

Acknowledging the support of GIZ Team. Dr. S. Esakki Raj, State Project Coordinator, SUDSC II, GIZ and GIZ Team

Presentation of WET (WATER EFFICIENT Thrissur) as a Bankable Entity model to replicate in other Districts of Kerala by Rahul.N. / Session Headed by Smt. T.K. Sridevi; IAS Principal Secretary, Government of Telengana.

MoHUA Additional Secretary, GoI Sharing the Session on "Accelerating Urban Infrastructure Investments for Climate-Resilient and Gender Inclusive Cities".

AMRUT, Kerala team members Participation in UIFF on 28th to 29th at New Delhi

കൈരളി തൃശ്ശൂർ നഗരസഭയിൽ 105 പൂന്തോട്ടങ്ങളുടെ ഉദ്ഘാടനം ബഹു. എം.എൽ.എ. ശ്രീ. പി. ബാലചന്ദ്രൻ നിർവ്വഹിച്ചു

തൃശ്ശൂർ നഗരസഭയിൽ അമൃത് മിത്ര പദ്ധതിയിൽ ഉൾപ്പെടുത്തി നഗരസഭയിലെ 55 ഡിവിഷനുകളിലായി നിർമ്മിച്ച 105 പൂന്തോട്ടങ്ങളുടെ ഉദ്ഘാടനം ബഹു. എം.എൽ.എ. ശ്രീ. പി. ബാലചന്ദ്രൻ നിർവ്വഹിച്ചു. ചടങ്ങിൽ തൃശ്ശൂർ മേയർ ശ്രീ. എം.കെ. വർഗ്ഗീസ് അദ്ധ്യക്ഷനായിരുന്നു. നഗരത്തെ മാലിന്യ മുക്തമാക്കുന്നതിലേയ്ക്കുള്ള സുപ്രധാനമായ ഒരു ചുവടുവെയ്പായി പൂന്തോട്ട നിർമാണം വിലയിരുത്തപ്പെടുന്നു. 55 ഡിവിഷനുകളിലെയും പൂന്തോട്ട പരിചരണത്തിനായി ഓരോ ഡിവി ഷനുകൾക്കും 4 പേർ വീതം ആകെ 220 പേരെ നിയമിച്ചിട്ടുണ്ട്. ഓരോ ഡിവി ഷനിലെയും പൂന്തോട്ട പരിചണത്തിനായി 10 ലക്ഷം രൂപ വകയിരുത്തിയിട്ടുണ്ട്. ആകെ 5.5 കോടി രൂപ യാണ് പൂന്തോട്ട പരിചരണത്തിനായി അമൃത് മിത്ര പദ്ധതിയിൽ അനുവദിച്ചിട്ടുള്ളത്.

പൊന്നാനി - തീരദേശ കുടിവെള്ള പദ്ധതിയുടെ ഉദ്ഘാടനം ബഹു. ജലവിഭവ വകുപ്പ് മന്ത്രി നിർവ്വഹിച്ചു

എല്ലാവർക്കും കുടിവെള്ള ലഭ്യത ഉറപ്പാക്കിക്കൊണ്ട് നഗരങ്ങളെ ജല ഭദ്രതയുള്ളതാക്കി മാറ്റുവാൻ ലക്ഷ്യമിട്ട് സംസ്ഥാനത്തെ മുഴുവൻ നഗരസഭകളിലും നടപ്പിലാക്കി വരുന്ന അമൃത് 2.0 പദ്ധതിയിലുൾപ്പെടുത്തി പൊന്നാനി നഗരസഭയിൽ തീരദേശ കുടിവെള്ള വിതരണ പദ്ധതി നടപ്പിലാക്കി. പദ്ധതി പ്രകാരം പൊന്നാനി നഗരസഭയിലെ എല്ലാ തീരദേശ വാർഡുകളിലെ എല്ലാവർക്കും സൗജന്യമായി കുടിവെള്ളം ലഭ്യമാകും. ഇതിനായി ഗാർഹിക കണക്ഷനുകൾ നൽകുന്ന പ്രവർത്തിയുടെ ഉദ്ഘാടനം ബഹു. ജല വിഭവ വകുപ്പ് മന്ത്രി ശ്രീ. റോഷി അഗസ്റ്റിൻ നിർവ്വഹിച്ചു. ശ്രീ. പി. നന്ദകുമാർ എം.എൽ.എ. ചടങ്ങിൽ അദ്ധ്യക്ഷത വഹിച്ചു. 21.16 കോടി രൂപയാണ് പദ്ധതി ചെലവ്.

ശുദ്ധമായ കുടിവെള്ളം ഇടതടവില്ലാതെ പൊതുജനങ്ങൾക്ക് ലഭ്യമാക്കുക എന്ന ലക്ഷ്യത്തോടെ നടപ്പിലാക്കിയ വാട്ടർ എഫിഷ്യന്റ് തൃശ്ശൂർ പദ്ധതിയുടെ തുടർച്ചയായി വാട്ടർ എഫിഷ്യന്റ് തൃശ്ശൂർ 2.0 പദ്ധതിയ്ക്ക് തൃശ്ശൂർ കോർപ്പറേഷനിൽ തുടക്കം കുറിച്ചു. ശ്രീ. പി. ബാലചന്ദ്രൻ എം.എൽ.എ. പദ്ധതി ഉദ്ഘാടനം ചെയ്തു. മേയർ ശ്രീ. എം.കെ. വർഗ്ഗീസ് ചടങ്ങിൽ അദ്ധ്യക്ഷനായിരുന്നു. സ്മാർട്ട് മീറ്ററുകൾ സ്ഥാപിച്ച് ജല വിതരണം കാര്യക്ഷമമാക്കുന്നതിനാണ് പദ്ധതി ലക്ഷ്യമിടുന്നത്. ജല ഉപയോഗത്തിന്റെ അളവും കൃത്യമായ ബില്ലും ഉപഭോക്താവിന്റെ മൊബൈൽ ഫോണിൽ ലഭ്യമാകും. ജലത്തിന്റെ ഗുണനിലവാരവും ഇതിലൂടെ അറിയാൻ സാധിക്കും. അമൃത് 2.0 പദ്ധതിയിൽ ഉൾപ്പെടുത്തി 17 കോടി രൂപ ചെലവിലാണ് പദ്ധതി നടപ്പിലാക്കുന്നത്.

The Jal Hi Amrit (JHA) is an initiative introduced by the Ministry of Housing and Urban Affairs (MoHUA) under AMRUT-2.0 to incentivize States /UTs to improve the quality of treated effluent discharge and promote the recycling of treated water. Under the Jal Hi Amrit initiative, 19 STPs were submitted in the JHA portal and these STPs were assessed twice by an independent third-party agency appointed by the MoHUA, Quality Council of India (QCI). The 1st phase of field verification was held from 18.11.2024 to 28.11.2024 and the 2nd phase of the field verification was held from 22.01.2025 to 03.02.2025. The MoHUA released the 1st installment of Rs.5.25 Cr. (70% of the total incentive amount of Rs.7.50 Cr.) for 15 STPs based on the marks obtained in the 2nd phase of inspection. The 3rd phase (final phase) of inspection was held from 10.10.2025 to 15.10.2025 and from 05.11.2025 to 08.11.2025. The balance 30% of the total incentive amount will be released by MoHUA based on the marks obtained in the 3rd phase of inspection.

3rd Phase Inspection of the 240 KLD STP at the General Hospital, Alappuzha


3rd Phase Inspection of the 150 KLD STP at the Taluk Hospital, North Paravur

IRMA Field Visit Plan Launched to Strengthen Monitoring and evaluation of AMRUT 2.0 Projects in Kerala

The Independent Review and Monitoring Assessment (IRMA) for AMRUT 2.0 projects has been officially initiated across Urban Local Bodies (ULBs) in Kerala with the aim of enhancing project oversight, ensuring quality implementation, and accelerating progress in urban infrastructure development.

As part of this initiative, dedicated field visits were carried out to assess the physical and financial progress of ongoing projects under AMRUT 2.0. The review framework focusses on evaluating technical compliance, monitoring practices, financial documentation, and quality assurance measures adopted by the respective ULBs.

The visit schedule covers all participating ULBs in the state from **8th October to 17th of November 2025**, based on a detailed ULB-wise work plan already circulated to authorities. The assessment teams undertook a comprehensive review of project execution supported by field verification and documentation analysis.

ULBs have kept the essential project documents ready for inspection, including DPR, tender documents, work orders, RA bills, measurement books, muster rolls, and quality testing reports. The IRMA process also underscores the role of effective coordination, for which each ULB has been asked to nominate a Point of Contact (POC) to facilitate site access, data sharing, and follow-up actions in close coordination with the experts of concerned AMRUT city Management Unit.

Officials affirmed that the outcomes of the assessments have identified best practices, project-level challenges, and necessary corrective interventions to expedite project completion. The efforts have significantly supported the evidence-based decision-making, strengthening the state's performance under AMRUT 2.0.

The detailed evaluation report and the proposed ATR are communicated to all municipalities across districts to comply and carry forward.

IRMA visit at Kunnamkulam

IRMA visit at Arattupuzha

Report

CERC Meeting Progresses GIS-Based Master Plan Development for AMRUT 2.0 Towns

The Consultancy Evaluation and Review Committee (CERC) convened under the chairpersonship of the **Principal Secretary, LSGD** to review the progress of the **GIS-based Master Plan preparation for 49 tier two AMRUT 2.0 towns in Kerala**. Senior officials from **AMRUT Mission, LSGD Planning, Town & Country Planning Department, PMU and SLTC** participated in the meeting.

The committee noted significant advancement in the **Drone Survey component**, with survey work **completed in 15 towns**, **progressing in 12 towns**, and **one town cleared by the Survey of India**. To accelerate pending activities, the committee recommended migration of GIS datasets to the **SPARSH platform**, replacing current dependencies that have slowed the release of survey outputs.

A major outcome of the meeting was the **finalisation of the Request for Proposal (RFP) framework** for selecting consultants to prepare Master Plans through a **cluster approach**, grouping 4–5 towns per package. The committee approved executing the tender through the **e-tendering portal** and adopting the **Combined Quality and Cost Evaluation (CQCE)** methodology to ensure high technical quality and cost efficiency.

To ensure transparency in project administration, the committee constituted a **Bid Evaluation Committee** and approved the formation of an **Empowered Dispute Resolution Committee** to resolve contractual issues within a defined timeline without arbitration.

The CERC emphasised timely completion of Master Plan preparation and reinforced the need for **strengthened technical support to District Town and Country Planning Offices** for data validation, stakeholder consultation, and monitoring of consultant performance.

The meeting concluded with a shared commitment ensuring that **Kerala becomes one of the first States in India to complete scientifically-prepared GIS-based Master Plans under AMRUT 2.0**, strengthening urban resilience, infrastructure planning and evidence-based city development.

National Review – Credit Enhancement Initiative for smaller cities

Two online National Review meeting have taken place on Credit Enhancement Initiative during 19 November 2025 (11:00 AM) and 05 December 2025 (11:00 AM – 12:00 Noon) under the chairpersonship of Smt. Isha Kalia, Joint Secretary (AMRUT Mission). State Mission Directors from all States and Union Territories participated.

Discussions focused on the status of project identification and uploading on the AMRUT 2.0 portal, along with the need for States/UTs to utilise the Credit Enhancement framework to structure financially viable infrastructure projects in water supply, sanitation, energy efficiency, urban mobility and smart urban services. A focused review was also conducted with seven States—Kerala, J&K, Telangana, Uttarakhand, Andhra Pradesh, Himachal Pradesh and Jharkhand to assess preparedness of project pipelines and address bottlenecks in project structuring, credit rating and financial closure.

Key Outcomes

- States/UTs instructed to finalize and submit shortlisted projects on the AMRUT 2.0 portal without delay.
- HUDCO to provide technical handholding support to improve bankability and investor readiness of selected projects.
- States encouraged to utilise pooled financing, PPP models and debt-linked funding mechanisms.

Periodic monitoring structure to be introduced to address challenges and track progress.

The meetings reiterated MoHUA's commitment to fast-track the Credit Enhancement Initiative nationwide, strengthening municipal creditworthiness and financial sustainability while enabling future-ready urban infrastructure development.

The 14th meeting of the State Level Technical Committee (SLTC)

The 14th meeting of the State Level Technical Committee (SLTC) under AMRUT 2.0 was held on 08 October 2025 at 4:30 PM in the Navakerala Hall, Secretariat, chaired by Smt. Tinku Biswal IAS, Principal Secretary, LSGD. The session reviewed the implementation status of AMRUT 2.0 projects across the State and key policy decisions to accelerate execution.

The Committee confirmed the minutes of the previous SLTC and examined the Action Taken Report on major decisions including sanctioning of water supply projects under SWAP-3, distribution of reform incentives to ULBs, appointment of Project Development Management Consultancy, and progress of STP O&M strategy formulation.

A comprehensive progress update revealed that 737 projects amounting to ₹3744.49 Cr have been approved under AMRUT 2.0 for 93 Urban Local Bodies, including CAPEX ₹3515.47 Cr and OPEX ₹229.01 Cr. Central Assistance stands at ₹1400.39 Cr, State Share ₹1279.42 Cr, and ULB Share ₹1061.13 Cr.

The Committee noted major project delivery milestones:

- 707 projects with Administrative Sanction, 751 with NIT issued, 640 awarded, and 219 completed, with expenditure touching ₹561.39 Cr (18.04%).
- National Institute of Urban Affairs (NIUA) has completed the first-round of independent monitoring covering 208 projects, and NIT Calicut has initiated the 2nd round.

Multiple capacity-building initiatives were undertaken including exposure visits and workshops on GIS -based master planning for 49 AMRUT cities.

One of the most important outcomes of the meeting was the approval and recommendation for Administrative Sanction of two major water supply projects under SWAP-3:

- Nilambur Municipality – Augmentation of UWSS (₹11.47 Cr)
- Parappanangadi Municipality – Construction of 15 LL OHSR & household connections (₹15.50 Cr)

The Committee also recommended Administrative Sanction revisions for 12 Water Supply Projects across 9 municipalities due to design modifications, additional scope of work, and tender excess — ensuring uninterrupted project execution while clearly defining State and ULB cost-sharing norms.

The SLTC directed KWA and ULBs to initiate all pending works on the ground before the end of the month and to expedite tendering and Technical Sanction for sanctioned projects to prevent time overruns.

AMRUT 1.0 and AMRUT 2.0 State Level High Power Steering Committees Review Progress and Approved Key Decisions

The Government of Kerala convened two high-level meetings of the **State High Powered Steering Committee (SHPSC)** on **AMRUT 1.0 and AMRUT 2.0**, chaired by **Dr. A. Jayathilak IAS, Chief Secretary**, to review implementation progress and clear priority interventions for accelerated completion of urban water and sanitation projects across the State.

AMRUT 1.0 – 38th SHPSC

The committee reviewed status ahead of the **final mission deadline of 31 December 2025**. A total of **1108 projects worth ₹2386.78 Cr** have been sanctioned; **1055 works completed**, with **₹2228.73 Cr expenditure (93.38%)**.

Major Decisions

- **Ratified efforts to fully utilise remaining Central Allocation of ₹46.37 Cr** by taking up additional works that can be completed within the deadline.
- **Cancellation of Rain Water Harvesting Phase-2 (Kollam)** due to insufficient beneficiary participation.
- **Revised AS and additional works approved in Palakkad Municipality**, including upgrades to the **Yakkara Septage Treatment Plant** and **water supply pipeline restoration**.
- **Approval of modified scope and O&M restructuring for Kureepuzha STP (Kollam)** to fast-track commissioning.
- **Additional works cleared in Kollam Corporation**, including deployment of **amphibian vehicle & mobile septage units** for canal and waterbody cleaning.

Committee Directive: All implementing agencies must **complete ongoing works before 31 December 2025**, with **no further extension** beyond the MoHUA mandate. Any **financial liability due to delays will be borne by ULBs**.

AMRUT 2.0 – 11th SHPSC

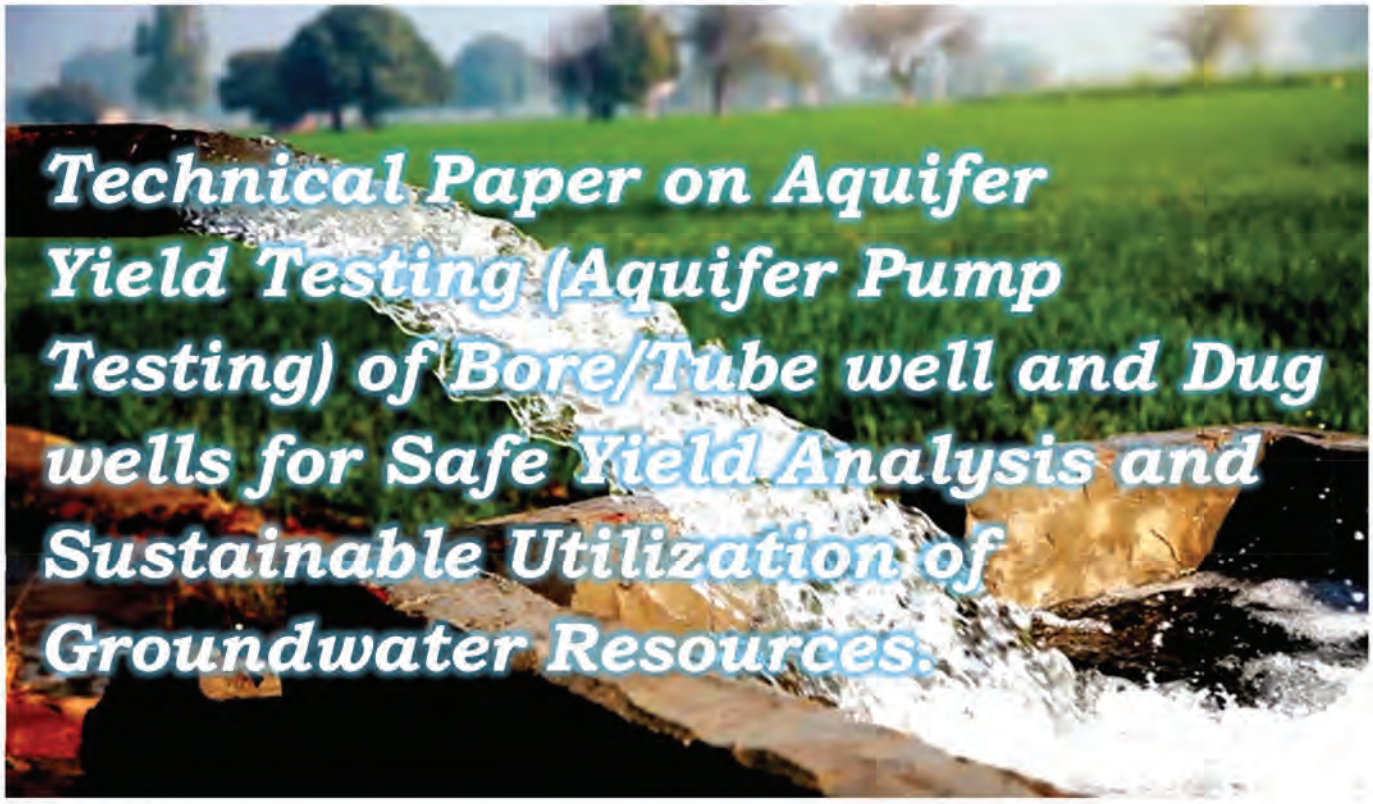
The committee noted Kerala's strong momentum in implementing **737 projects worth ₹3744.49 Cr** across **Water Supply, Sewerage, Waterbody Rejuvenation and Parks sectors**. So far, **707 Administrative Sanctions**, **751 Technical Sanctions**, and **640 tenders** have been issued. Expenditure has reached **₹561.39 Cr**, while **₹792.47 Cr** has been released including Central, State and ULB share.

Major Decisions

- **Administrative Sanctions** granted for water supply projects in **Nilambur (₹11.47 Cr)** and **Parappanangadi (₹15.50 Cr)** under **SWAP-3**.
- **Revision of AS** for projects in Kochi, Kalamassery, Mannarkkad, Shornur, Thrikkakara, Angamaly, Erattupetta and Alappuzha to address tender excess and scope changes.
- **Mobilisation advance of ₹125 Cr** and **₹75 Cr tranche release** approved for uninterrupted implementation.

208 projects monitored in the 1st IRMA cycle; second round underway.

Direction from the Chair: Kerala Water Authority and ULBs must ensure **immediate commencement of works** where sanctions are issued and avoid delays in **tendering, documentation, and site readiness**. Central Assistance must **not** be used toward **land cost, O&M or supervision charges**.



Technical Paper on Aquifer Yield Testing (Aquifer Pump Testing) of Bore/Tube well and Dug wells for Safe Yield Analysis and Sustainable Utilization of Groundwater Resources.

Introduction:

Considering the pivotal role of groundwater in the Country's water supply and its gradual depletion coupled with growing contamination, there is an urgent need to investigate the reaction of aquifers to various human activities in terms of both quantity and quality of groundwater so as to avoid severe and often irreversible damages to the mankind and ecosystem. To achieve this broad goal, a prior knowledge of the hydraulic properties of different aquifer systems is a basically a necessity for almost all groundwater-related studies. Further, groundwater processes being hidden and highly complex in nature, Groundwater modelling plays an important role in the planning, design and management of groundwater systems. Adequate knowledge of aquifer parameters is also indispensable for successful and reliable modelling results, and thereby ensuring proper management of vital groundwater resources. The bore/tube wells can be studied for the perfect yield assessment and understanding the overall aquifer properties. Pumping test/yield Testing is the most reliable and standard method for determining hydraulic parameters of different aquifer systems. Proper knowledge of the **lithology and types of aquifers present in an area or basin are pre-requisite for designing and conducting efficient pumping tests**, which in turn can ensure good-quality pumping-test data. Good-quality pumping-test data are vital for the determination of accurate or dependable aquifer parameters, which are the key to the accurate Hydraulic characterization of an aquifer system. The methods of analyzing different types of pumping-test data for determining hydraulic parameters of aquifer systems. Pumping test (sometimes also called as yield test) can be defined as a field investigation in which a well is pumped in a specific fashion and the resulting drawdowns are measured in the pumping well itself and/or observation wells installed at different locations over the groundwater basin under investigation. Many modern books on groundwater/hydrogeology mostly use the terminology **'Aquifer test'** instead of the widely-used terminology **'Pumping test'.** Although the use of both the terms is recommended, the **'Aquifer test'** is a broader term which encompasses non-conventional tests also.

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Most commonly an Aquifer yield test of bore wells is conducted by pumping water from one well at a steady rate in a stipulated time period and carefully measuring the water levels in the monitoring wells. When water is pumped from the pumping well the pressure in the aquifer that feeds that particular pumping well declines. This decline in pressure will show up as **"Draw down"** (change in hydraulic head) in pumping and as well as in observation well. Draw down decreases with radial distance from the pumping well and drawdown stabilizes at a point of time where in the aquifer yields consistently to the amount of water with drawn for a given length of time as the pumping continues.

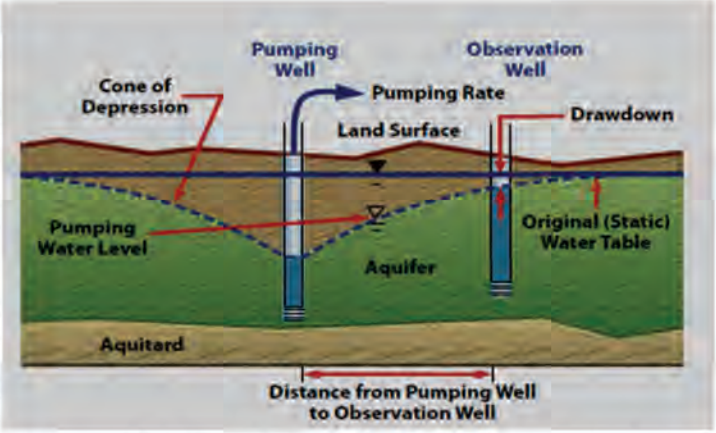


Figure: 1 Schematic Understanding of Yield Testing of Bore/Tube wells

Why Yield/Pumping Test of Bore/Tube Well?

- To delineate the **Aquifer boundary**.
- entify the aquifer parameters like, **coefficient of Transmissivity, storage coefficient, recuperation rate and Hydraulic Conductivity.**
- To establish **localized groundwater flow direction for aquifer**.
- Pumping test will provide us with the **safe yield, assessing safe drawdown, calculating transmissivity and storage coefficient**, suitable pump and duration of pumping and its installation depth.
- It enables **spacing decision for wells such that the interface/ interference** between the bore wells is avoided.
- To select the appropriate **submersible pump based on the calculated safe yield** of the bore well/ tube well.
- it helps to determine the safe discharge of the wells so that over exploitation of the ground water reserves is avoided.
- It provides information towards research and development related study, e.g., **plume concentration, contaminant movement and pollution studies** etc...

Types and Purpose of Pumping/Yield Test:

1. Step Draw Down Test:

Step-drawdown tests can provide important information about the hydraulic characteristics of production wells **(i.e., aquifer loss coefficient, well loss coefficient, well efficiency, well specific capacity, and safe well yield) and the condition of production wells.**

2. Continuous/Constant Discharge Test (CDT)

When aquifer tests are conducted until an equilibrium (steady-state) or quasi-equilibrium (quasi steady-state) condition is reached, they are called **steady-state tests.** On the other hand, when these tests are conducted for a relatively short period and are completed before the steady-state or quasi steady-state condition is reached, they are called **unsteady-state tests or transient tests.**

The pumping test, yield testing or aquifer test is the only standard method available to date for determining the hydraulic characteristics of various aquifer systems [e.g., T, K, S or S_y, leakage factor (B) and hydraulic resistance (C)] and those of production wells (e.g., well parameters, safe well yield, etc.). Long-term time-drawdown pumping tests can also provide information about the presence of subsurface hydraulic barriers, if any, as well as the existence of a boundary and its type (recharge, impermeable or leaky boundary). Properly placed observation wells at different locations and in different directions can provide information about the degree of heterogeneity and anisotropy of aquifer systems. The major goal of a constant discharge-rate pumping/yield testing of bore well is to estimate hydraulic properties of an aquifer system such as **TRANSMISSIVITY, STORATIVITY, and HYDRAULIC CONDUCTIVITY.** The aquifer characteristics which are evaluated by conducting the constant discharge aquifer tests are:

- **Hydraulic conductivity**: The rate of flow of water through a unit cross sectional area of an aquifer, at a unit hydraulic gradient (In metric units the rate of flow is in m/ per day of cross-sectional area.
- **Specific storage or Storativity**: a measure of the amount of water a confined/semi confined aquifer will give up for a certain change in head;
- **Transmissivity**: The rate at which water is transmitted through a unit thickness of an aquifer under a unit hydraulic gradient. It is equal to the hydraulic conductivity times the thickness of an aquifer.

Figure: 2: Yield Testing of Bore well/Tube wells

Water level Indicator to measure the static water levels during pumping of wells	*Water flow meter to measure the flow and yield of bore/ tube wells during pumping.*	*Timer/Stop watch to Calculate the yield of bore/Tube well in Litre/minute. (LPM)*

Figure:3: Necessary Equipment's Utilized for Yield Testing of Bore/Tube well & Dug wells/Open wells:

As a rule, the more observation wells available for measurement during a time-drawdown test, the more reliable the information obtained on aquifer characteristics.

Recovery Test:

Recovery test is conducted at the end of **a time-drawdown aquifer test**. It is an unsteady-state aquifer test in which groundwater rise is measured with time in a pumping/production well or in an observation well after pumping has been stopped. The details taken are measured as **"Residual Draw down".** In general, the data obtained during the recovery period are more reliable than during the pumping period due to the lack of water-level fluctuations caused by discharge variations and the absence of turbulence. Like the time-drawdown data from single well tests, the time-recovery data measured in pumping wells can yield only T or K. However, if the time-recovery data are measured in observation wells, both T and S can be determined. The recovery test provides an independent and additional estimate of aquifer parameters, which can be compared with the aquifer parameters obtained from time-drawdown data to gain confidence in the analysis.

Procedure of the Test:

Water is pumped from the designated **Bore/tube well** to about **06 or 10 or 24 or 72 hours until the stabilization phase is in progress**. One or more bore/tube well in the nearest and farthest from the pumping well should be taken as observation well.

Drawdown during pumping and recuperation rate/ recovery rate for both the pumping and observation wells have been recorded during pumping and also the recuperation rate after cessation of pumping.

The Drawdown and recovery can be analyzed using software termed Pumping Test Software **"Star Line Infinite Extent - Version 3.1"** for evaluation of the yield /aquifer characteristics in bore well or any other software detailed below and available in the market.

The discharge is to be measured by installed water meter and the drawdown has to be measured by water level indicator. (**solinst or any other make**) Two water level indicator (one for pumping well and one for Observation well is a Mandatory requirement)

As pumping continues, *inflow water* from the aquifer is also pumped out along with water stored in the pumping well. More and more water is now derived from the aquifer dewatering the volume of the aquifer surrounding the pumping well. Dewatering of aquifer volume (due to discharge from aquifer storage) results in lowering the water level (i.e. Head) in pumping well as well as over aquifer surface area where dewatering of openings under the hydraulic gradient has taken place.

The difference between the static water level and the pumping water levels in different wells is known as **"drawdown"**. A shape of an inverse cone results if we join the drawdown in the pumping head distribution within the aquifer. This inverted cone is called as **Cone of Depression**. The cone of depression expands with continued pumping.

Yield Test for Dug Wells:

The yield test for bore wells and dug wells both aim to determine the rate at which water can be sustainably withdrawn, but the methods differ due to well construction and depth characteristics.

Measuring the "Drawdown" and "Discharge" of a larger Diameter Open well as part of Yield Assessment Study

- Dug well yield tests are typically simpler because these wells are shallow, open, and access water from unconfined aquifers.
- The test often involves pumping (or bailing) water out using a surface pump, and then measuring the rate at which the well fills up (recovery test), or conducting step-drawdown/pumping tests at various rates to see water level stabilization.
- The discharge can be collected in a container (such as a drum) and measured over intervals, as dug wells usually yield smaller, variable flows.
- Well users sometimes rely on natural recharge rate **by observing the time required to recover to a given water level after pumping.**

Key Differences of Borewell yield Testing Vs. Dug well Yield Testing:

Aspect	Bore Well Yield Test	Dug Well Yield Test
Method	Submersible pump, flow meter, constant/step-drawdown test	Surface pump/bailing, recovery observation, step-drawdown at low rates
Depth	Usually deep (tens to hundreds of meters)	Shallow (often <20 m)
Measurement	Requires flow meters, electrical water level indicators	Container measurement, visual water level observation
Yield	Typically higher and more stable	Lower and variable, subject to rapid drawdown
Risk of Contamination	Lower, water from deep aquifer	Higher, open and close to surface

Conceptualization of the Yield Test:

The expansion of cone of depression depends upon, the rate of pumping - Q. The aquifer contribution - q from the aquifer to the well (as inflows into the well). Drawdown depends upon Quantity of inflow, for instance, if pump discharge Q > aquifer contribution q more and more portion of aquifer volume is dewatered, indicated by continuous drawdown in the pumping wells.

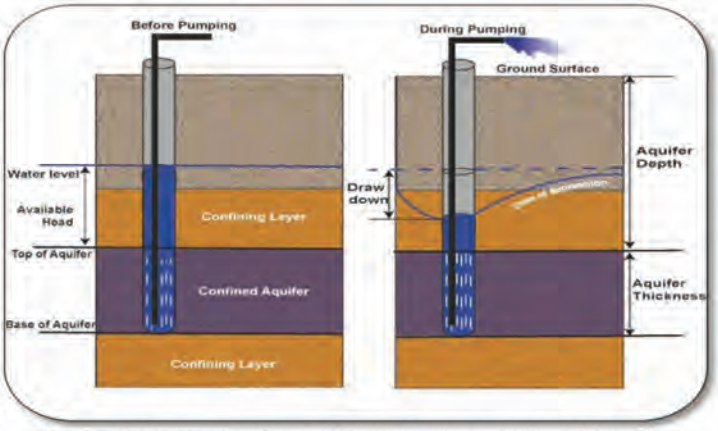


Figure 5: Understanding of Yield Testing of Bore/Tube well

If Q nearly matches with q i.e. Q = q, drawdown in the pumping well and in the observations, wells remain nearly constant (as the inflow from aquifer "q" is in excess or equal to the pump discharge Q) indicated by no further deepening of cone of depression in the pumping well. The distance from center of pumping well to periphery of the cone of depression is known as **"radius of influence".**

After the pumping is stopped, the level of water in pumped well is known as "pumped water level". The difference in "static water level" and the "pumped water level" is known as **"Total Drawdown".**

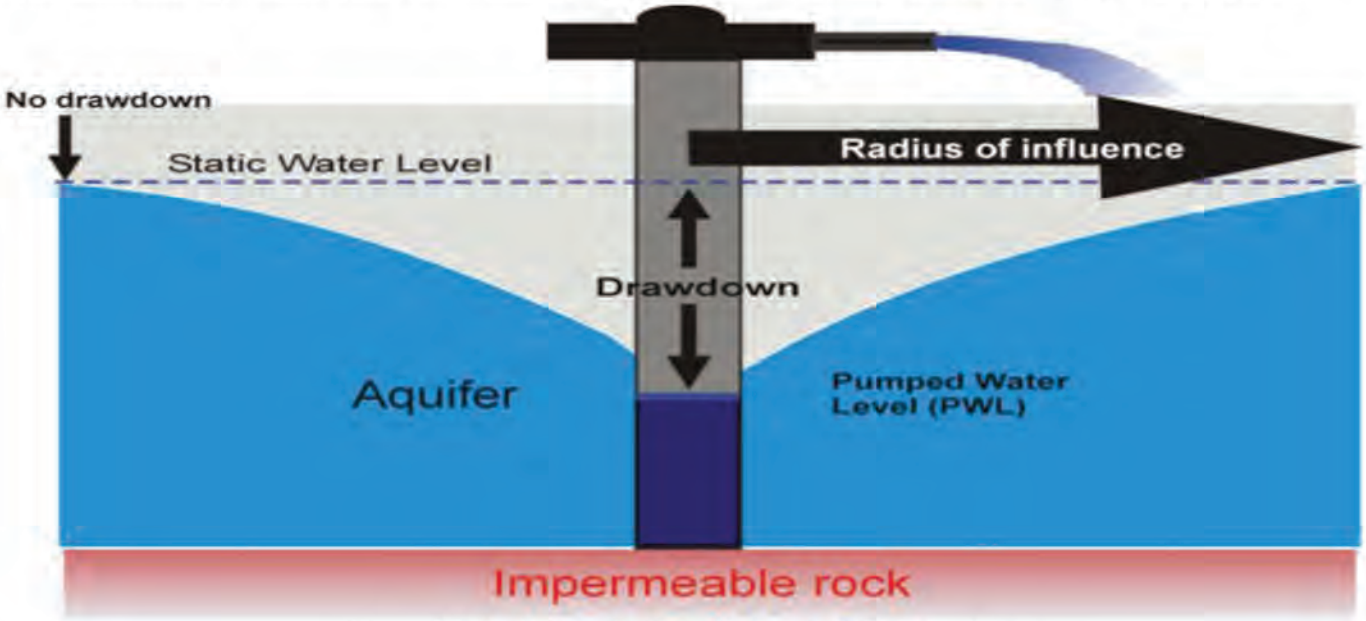


Figure: 6 depicting the Radius of Influence during drawdown

In this condition the water from the surrounding aquifer continues to flow towards the pumping well under the influence of the (artificial) hydraulic radiant towards the pumping well. After pumping is stopped, due to continued aquifer contribution q water level in the pumping well as well as in the aquifer surrounding the pumping well rises. This is because the portion of the aquifer which was earlier dewatered during pumping starts re-saturating due the water inflowing towards the pumping well (indicated by rise in water level in pumping well). This process is known as **"recovery or recuperation".**

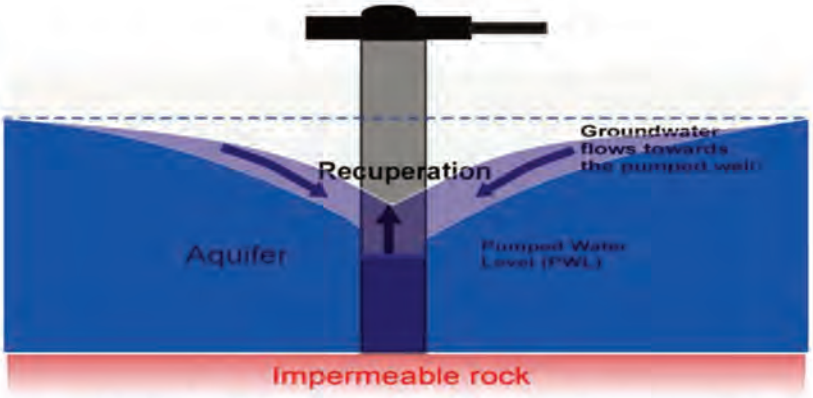


Figure: 7 depicting the Process of Recuperation/Recovery

During the process of recuperation or recovery, more and more de-saturated portion of the aquifer gets re-saturated. This is indicated by a rise in water in areas away from pumping well also. Due to rise in water level the hydraulic gradient towards pumping well becomes gentler with time, thereby reducing the rate of the aquifer contribution q. Now, the water required for this re-saturation process is derived by dewatering the peripheral areas of cone of depression i.e. cone of depression continues to expand in peripheral areas even after the pump is switched off. Slowly, with time, the water level rises in the aquifer and finally gets stabilized at a new static water level (which may be fractionally lower as compared to the original S.W.L.)

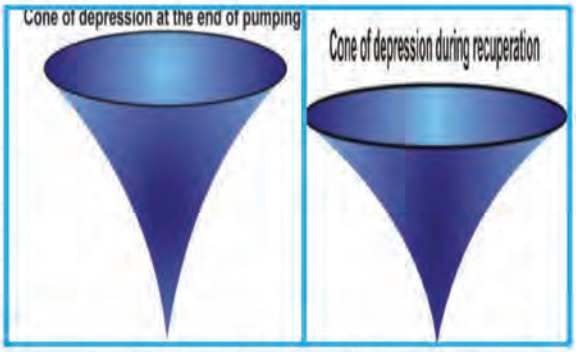


Figure:8 depicting the Cone of depression at the end of pumping and during recuperation.

Radius of Influence:

The Radius of Influence of a pumping well is determined from a distance-drawdown plot. Radius of Influence can be used as a guide for well spacing to avoid interference since radius of influence depends on the balance between aquifer recharge and well discharge, the radius of influence may vary from year to year. Moreover, beyond a certain distance from the well, there will be no drawdown induced by pumping. This distance is called the Radius of Influence of the well.

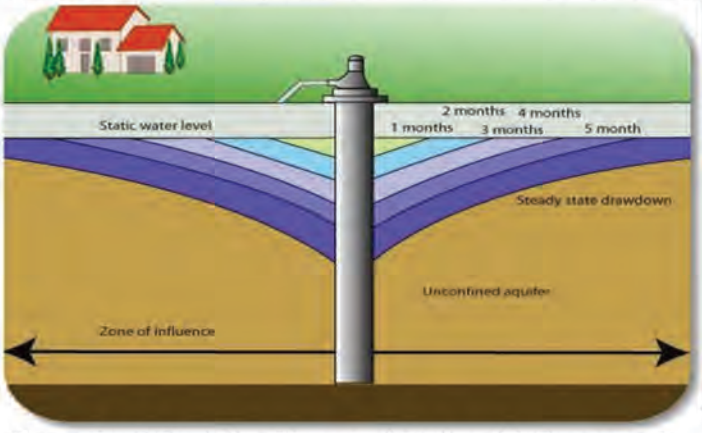


Figure No: 9-Depicting The zone / Radius of Influence and Cone of Depression in Unconfined aquifer

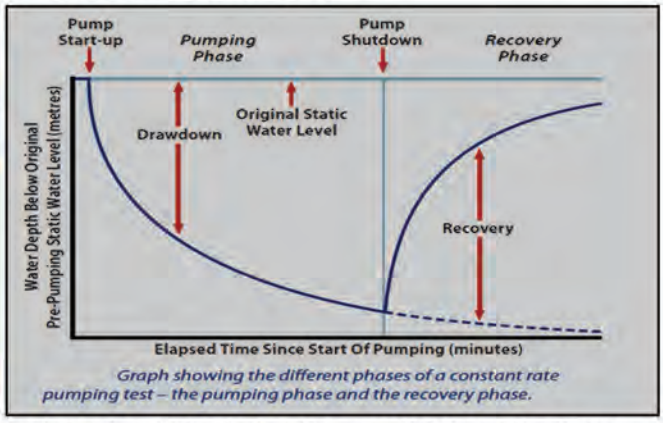
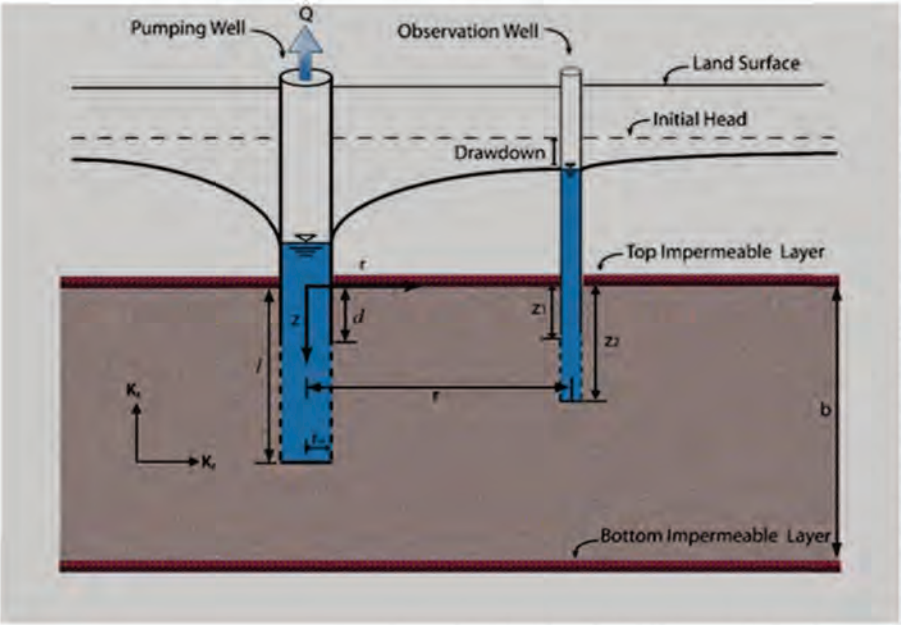


Figure No: 10 depicting the overall Schematic diagram towards Different Operational Phases of Aquifer Yield Testing

Determination of various Bore well/Tube well performance, Behaviour and Parameters as per the different aquifer condition:

1: Aquifer Behaviour in Confined Condition:

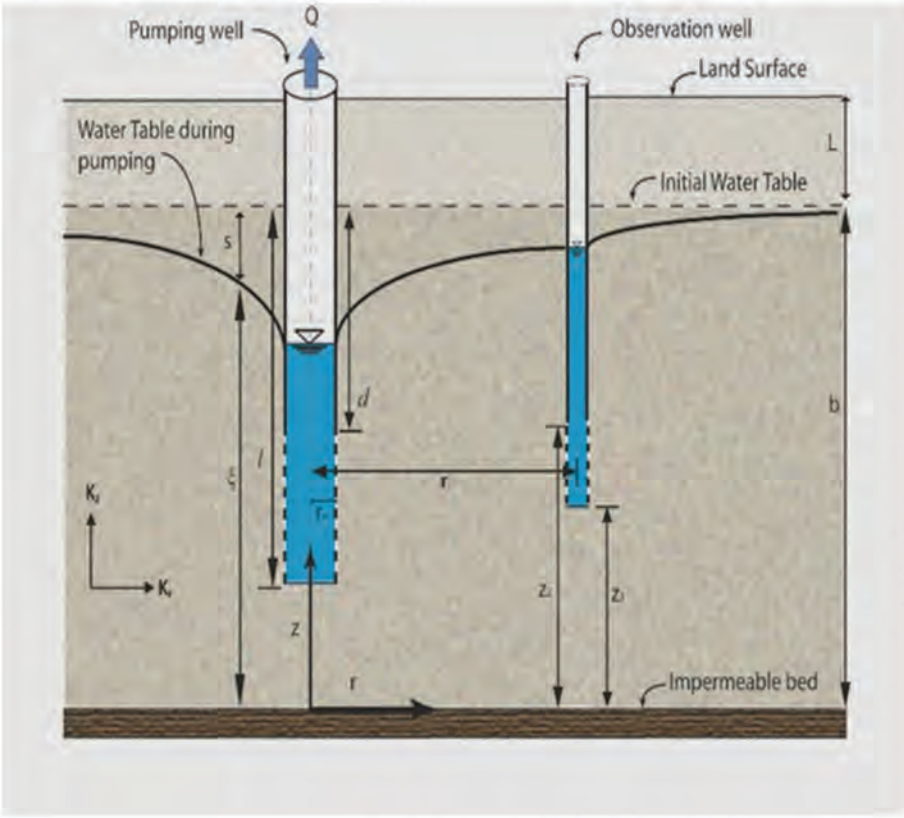


The schematic of system geometry for a confined aquifer (with an overlying and underlying aquitard) pumping test is shown in the above figure. The pumping well of finite radius $\mathbf{r_w}$ is partially penetrating the confined aquifer of thickness b between depths **l** and **d** below the top impermeable boundary.

The pumping well has wellbore storage coefficient $\mathbf{C_w}$ (volume of water released from well storage per unit drawdown in it). The observation well penetrating between depths $\mathbf{z_1}$ and $\mathbf{z_2}$ below the top impermeable boundary is located at distance **r** from the axis of the pumping well.

Figure No:11: Aquifer Behaviour in Confined Condition.

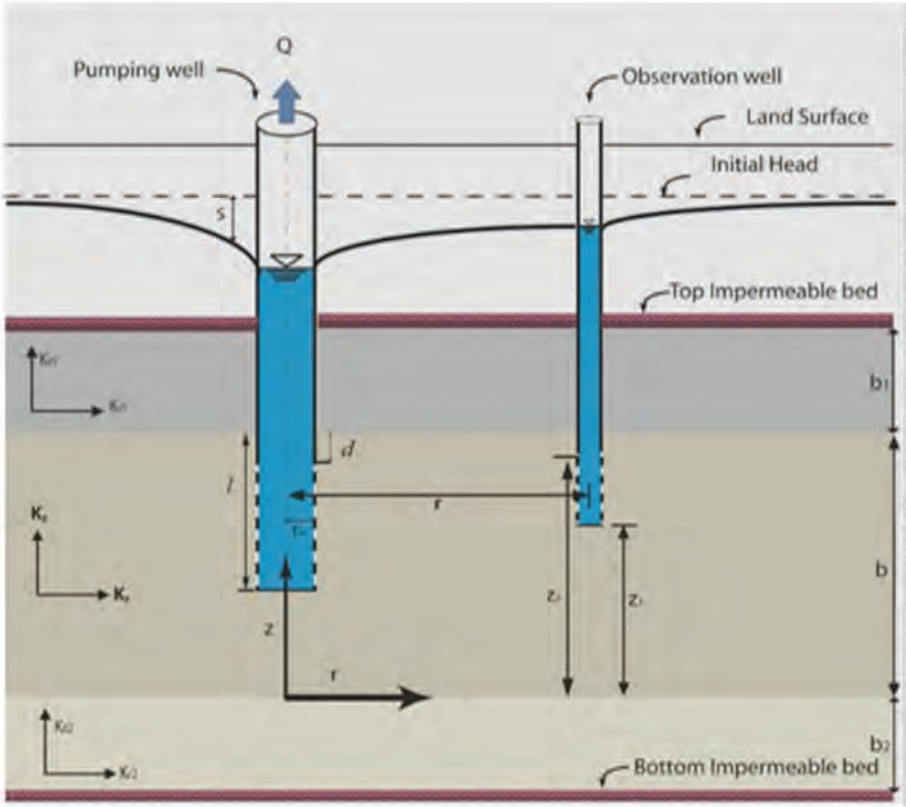
2. Un-confined Aquifer Condition:



The schematic of system geometry for unconfined aquifer pumping test is shown in adjacent figure no. The pumping well of finite radius $\mathbf{r_w}$ is partially penetrating the confined aquifer of initial saturated thickness **b** between depths **l** and **d** below the initial water table. The pumping well has wellbore storage coefficient $\mathbf{C_w}$ (volume of water released from well storage per unit drawdown in it). The observation well penetrating between depths $\mathbf{z_1}$ and $\mathbf{z_2}$ above the bottom impermeable boundary is located at distance **r** from the axis of the pumping well.

Figure No:12 Aquifer Behaviour in unconfined condition.

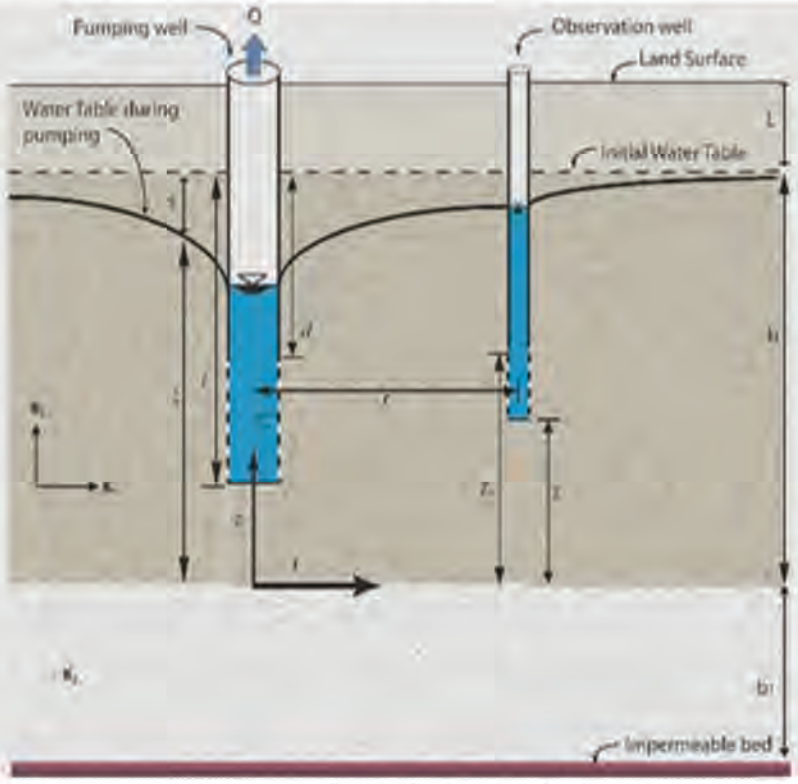
3. Leaky confined Aquifer Condition:



The schematic of system geometry for leaky confined aquifer pumping test is shown in adjacent figure.... The pumping well of finite radius rw is partially penetrating the leaky confined aquifer of thickness b between depths l and d below the top aquitard. The pumping well has wellbore storage coefficient Cw (volume of water released from well storage per unit drawdown in it). The observation well penetrating between depths z1 and z2 above the bottom aquitard and is located at distance r from the axis of the pumping well.

Figure No 13: Aquifer Behaviour in Leaky confined condition

4. Leaky Un-Confined Aquifer Condition



The schematic of system geometry for leaky unconfined aquifer pumping test is shown in adjacent figure.... The pumping well of finite radius r_w is partially penetrating the leaky unconfined aquifer having initial saturated thickness **b** between depths **l** and **d** below the initial water table. The pumping well has well bore storage coefficient C_w (volume of water released from well storage per unit drawdown in it). The observation well penetrating between depths **z1** and **z2** above the top boundary of underlying aquitard is located at distance **r** from the axis of the pumping well.

Figure No 14: Aquifer Behaviour in Leaky unconfined condition

Advantages and Disadvantages of Pumping/Yield Tests:

The advantages of the pumping test method are self-evident. A pumping test provides in situ parameter values and these values are, in effect, averaged over a large and representative volume (Freeze and Cherry, 1979). From a single pumping test, one can obtain both T and S values. Also, in aquifer-aquitard systems (i.e., leaky aquifer systems), it is possible to get very important leakage properties of the system (e.g., leakage factor, hydraulic conductivity and storage coefficient of aquitards, and leakance). Moreover, the step-drawdown test provides hydraulic characteristics of production wells, including safe well yield.

However, there are two disadvantages of the pumping test (Freeze and Cherry, 1979): one scientific and one practical. The scientific limitation is that the pumping test interpretation is not unique. For example, similarity in time - drawdown response could be found for leaky, unconfined and bounded systems. Thus, unless clear geologic evidence is available, a unique prediction of the effects of any pumping test would be difficult. The fact that a theoretical curve can be matched by the pumping test data in no way proves that the aquifer satisfies the assumptions on which the curve is based. The practical disadvantage of the method lies in its expense, including money, time and labour. Therefore, when **only K or T values are required** such as in the case of geotechnical and contamination studies or flow net analysis, simple and inexpensive methods like slug test should be used. These simple and cheaper methods are also useful when local conditions do not permit pumping tests or when preliminary and quick results are desired.

Data Analysis:

In the past, the analyses of pumping-test (aquifer-test) data for determining aquifer parameters or for determining hydraulic characteristics of production wells were done manually only, which is cumbersome and somewhat subjective. However, with a rapid advancement in the computer technology and numerical techniques, it is possible to perform such analyses using a PC (laptop or desktop). Commercial software packages such as Aquifer Test developed by the Waterloo Hydrogeologic, Inc., Canada http://www.swstechnology.com), **AQTESOLV http://www.aqtesolv.com/).Aquiferwin32 (http://www.aquifer-test.com/), & "Star line infinite extent version 3.1"** among some others, are available which enable us to analyse different types of pumping-test data easily and efficiently in considerably less time. These software packages are based on either graphical approaches or numerical approaches to aquifer-test data analysis. A detailed sample analysis and Graphs and its interpretation by using a software named **"Star line infinite extent version 3.1" is detailed below for better understanding:**

Table: 2: Commonly Used Test Methods for Pumping-Test Data analysis:

Sl. No.		Type of Pumping-Test Data	Name of Methods
1	Confined Aquifer	(i) Time-Drawdown data	• Theis Type Curve Method • Cooper-Jacob Straight-Line Method
		(ii) Unsteady Distance-Drawdown data	• Cooper-Jacob Straight-Line Method
		(iii) Quasi-Steady/Steady Distance-Drawdown data	• Thiem Method • Graphical Method
		(iv) Recovery data: - Time-Residual Drawdown data - Time-Recovery data	Residual Drawdown-Time Ratio Method Cooper-Jacob Straight-Line Method
2	Unconfined Aquifer without Delayed Yield	(i) Time-Drawdown data	• Theis Type Curve Method • Cooper-Jacob Straight-Line Method
		(ii) Unsteady Distance-Drawdown data	• Cooper-Jacob Straight-Line Method
		(iii) Quasi-Steady/Steady Distance-Drawdown data	• Thiem Method • Graphical Method
		(iv) Recovery data: - Time-Residual Drawdown data - Time-Recovery data	Residual Drawdown-Time Ratio Method Cooper-Jacob Straight-Line Method
3	Unconfined Aquifer with Delayed Yield	(i) Time-Drawdown data	• Type-Curve Method • Neuman Straight-Line Method
		(ii) Quasi-Steady/Steady Distance-Drawdown data	• Thiem Method • Graphical Method
4	Leaky Confined Aquifer without Storage in Aquitards	(i) Time-Drawdown data	• Walton Type-Curve Method • Hantush Inflection-Point Method
		(ii) Quasi-Steady/Steady Distance-Drawdown data	Type-Curve Method
5	Leaky Confined Aquifer with Storage in Aquitards	(i) Time-Drawdown data	• Hantush Type-Curve Method
		(ii) Quasi-Steady/Steady Distance-Drawdown data	Type-Curve Method

Analysis of Pump Test Data:

The data obtained from the pumping well and observation well can be further plotted and analyzed with pumping test software titled **"star line infinite extent version 3.1"** or any other software to bring forth various attributes of aquifer pumping tests/aquifer performance tests. Simultaneous data from a series of wells (pumping and observation well) (distance-drawdown) or a series of measurements from one well (time Vs drawdown) (pumping and observation well) were used to plot in a semi-log drawdown curve from which the values needed to solve the equations are taken as **(straight line methods)** or time Vs drawdown data is plotted on a log-log plot and then matched to a type curve or series of type curves to derive the various parameters of aquifer performance test **(type curve method)**. The distance-drawdown analyses were performed to obtain independent estimates of the aquifer properties in addition to the estimates obtained from the time-drawdown analyses of the observation well also. This allows the consistency of the resulting aquifer properties. **The various analyzed sample details of one of the yield tests carried out in West Bengal Industrial growth center, Siliguri by the Reporting person during his tenure with IL&FS Environment is detailed Below as a sample/ Case study for better understanding of the yield test analysis.**

Table No 3: Details of Pumping Well.

Constant Discharge Test Details of Pumping Well-1 (Pumping Data)	
Pumping (Test) well	WBIIDC borewell located Raninagar industrial Growth Centre (Pumping well)
Village, Taluk and District	Patkata village (Raninagar Industrial Growth Centre), Jalpaiguri Taluka, Jalpaiguri District
Date of Aquifer Yield Test	19/04/2017
Aquifer Type	Semi confined
Duration of Pumping (in Minutes)	330 minutes (5.5 hours)
Pump Setting/ installation Depth (m)	35.35 m
Type of Pump and Specification	Submersible pump of 25 HP capacity
Discharge (LPM)	**2390 LPM (Calculated during Yield Testing after taking an average of yield measurement of borewell for every ten minutes totaling for 6.5 hours of pumping)**
Static Water Level (SWL)	4.24 m bgl
Total Depth of the borewell	100 m bgl
Diameter of the borewell	203.2 mm
Discharge measured by	Flow Meter installed
Water level measured by	Electronic sounder / water level indicator.
Details of Observation Well	
Observation well	Piezometer
Location and Distance from pumping well	130 m away from the pumping well in the North-Western direction within the Plant.
Static Water Level (SWL)	4.6 m bgl

Locational Sketch of the Project Terrian:

Figure No:14. Location of Pumping well and Observation well used for Yield Test

Interval managed for Pumping and Observation Wells:

The details of the pumping/yield test and the time interval undertaken for conducting the yield test of the borewell at constant discharge rate for a given period of time is presented below in **table :4.**

Time Since Pumping Started (Minutes)	Time Interval (Minutes)
0-10	Every One Minute reading
10-20	Once in every 2 Minutes
20-60	Once in Every 5 Minutes
60-100	Once in every 10 Minutes
100-240	Once in Every 20 Minutes
240-330	Once in Every 30 Minutes

Time Interval Log for Yield Testing (Table:4)

Analysis of Pump Test Data:

The data obtained from the pumping well and observation well has been further plotted and analyzed with pumping test software titled "star line infinite extent version 3.1"to bring forth various attributes of aquifer pumping tests/aquifer performance tests. Simultaneous data from a series of wells (pumping and observation well) (distance-drawdown) or a series of measurements from one well (time Vs draw-down) for both pumping and observation well were used to plot in a semi-log drawdown curve from which the values needed to solve the equations are taken as (straight line methods) or time Vs draw-down data is plotted on a log-log plot and then matched to a type curve or series of type curves to derive the various parameters of aquifer performance test (type curve method). The distance-drawdown analyses were performed to obtain independent estimates of the aquifer properties in addition to the estimates obtained from the time-drawdown analyses of the observation well also. The groundwater flow is in semi-confined to confined condition were determined using the various types of curve matching techniques described in the earlier sub-sections.

The major aquifer properties like Transmissivity and Storativity can be determined from how the drawdown changes with respect to the pumping over a period of time. Semi-confined aquifer has many master curves and the curve matching procedure is done by selecting match point and reading well function parameters (e.g., u), drawdown and time. Using these matching values and borewell discharge rates, etc., the various data are worked out to bring forth the Transmissivity and Storativity of the aquifer. This allows the consistency of the resulting aquifer properties. The various analyzed details are as represented below:

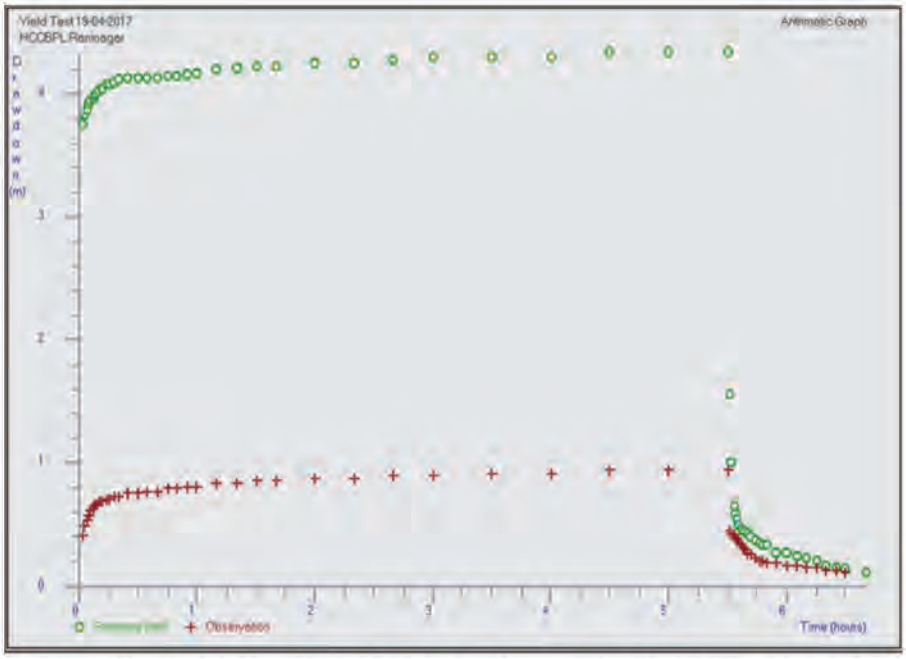


Figure No 16: Arithmetic Graph Analysis for pumping and observation well data and its Recovery

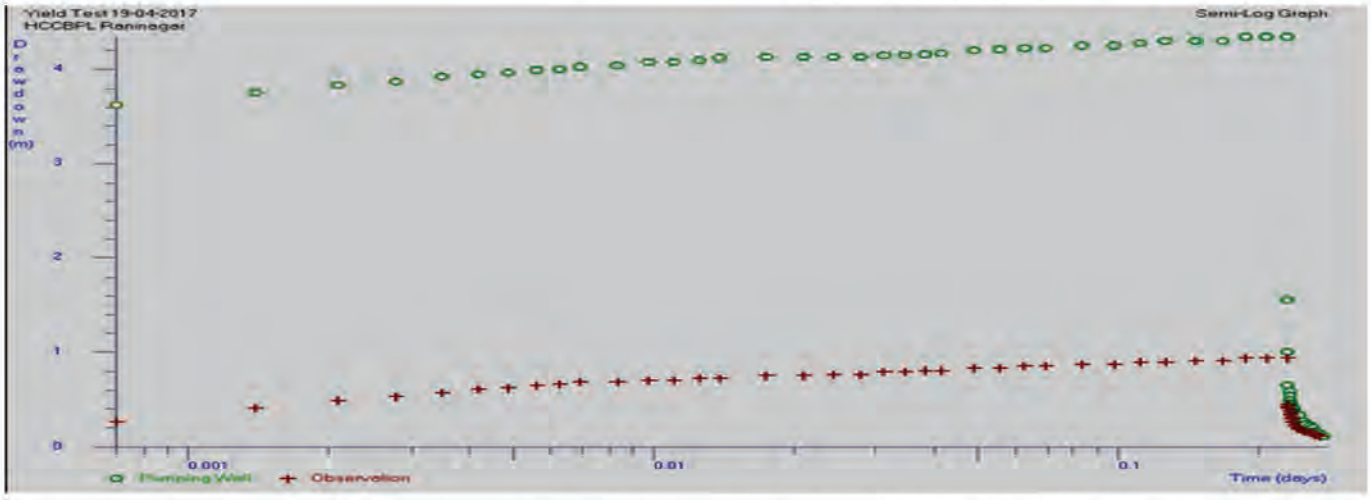


Figure no:17. Semi-Log data Plotting and Analysis for pumping well and Observation well and its recovery data

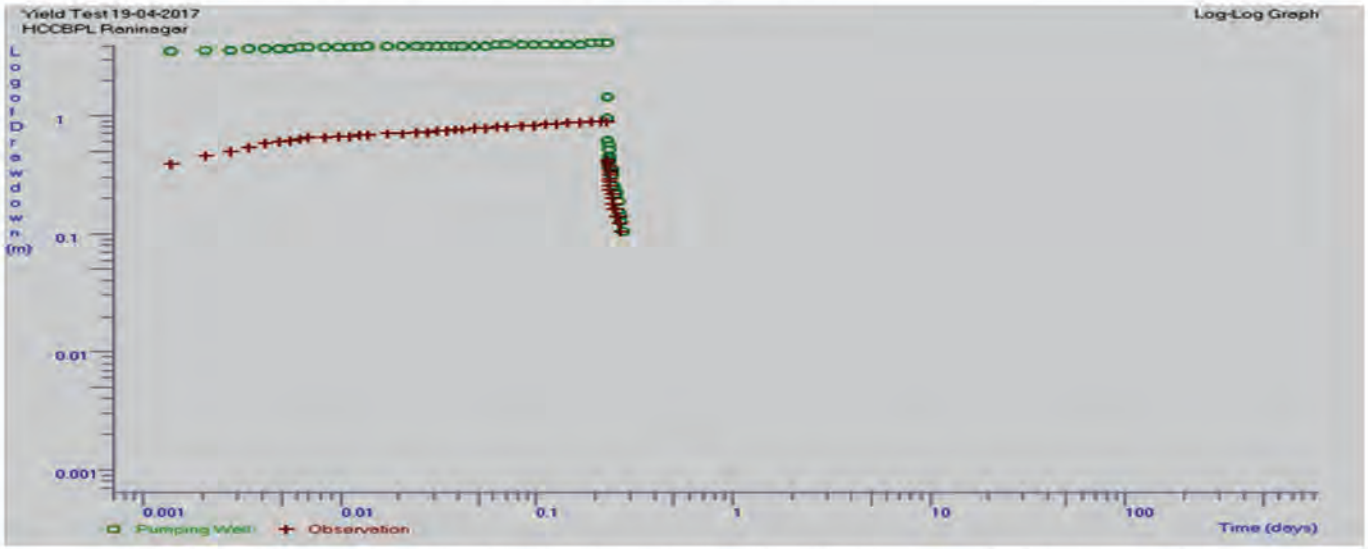


Fig:18 Log- Log data Plotting and Analysis for pumping well and Observation well and its recovery data

Distance Vs Drawdown Assessment:

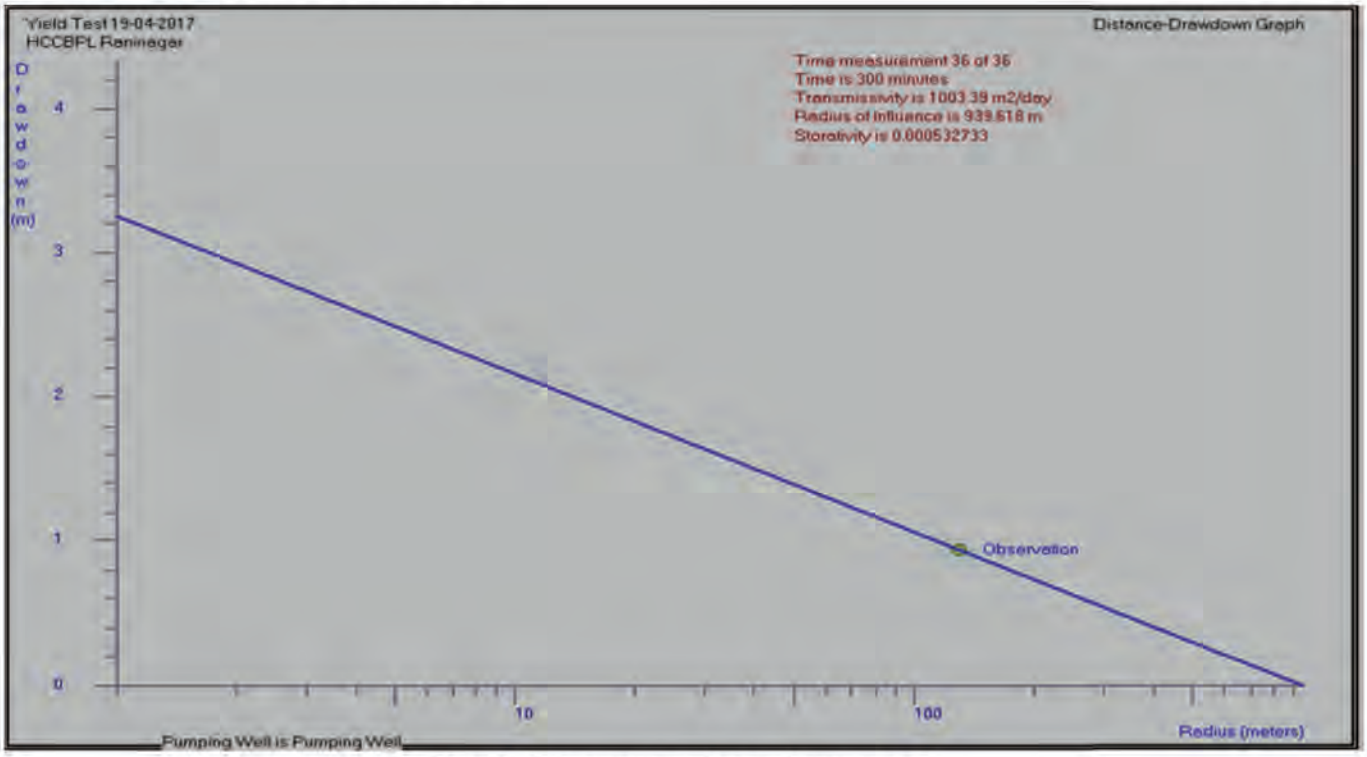


Fig: 19 *Distance vs Drawdown graph*

Distance Vs Drawdown and its Parameters (Table:5)

Transmissivity	1003.39 m^2/day
Radius of Influence	939.618 m
Storativity	0.000532733

Radius of Influence:

The radius of influence of a pumping well is determined from a Distance-Drawdown plot. Radius of influence can be used as a guide for well spacing to avoid interference since radius of influence depends on the balance between aquifer recharge and well discharge, the radius of influence may vary from year to year.

However, from the distance vs drawdown curves that within 5.5 hours of continuous pumping of the Plant borewell a radius of influence is **939.618 m** has been created wherein any borewell within the above said distance will get influenced during the pumping of this Plant Borewell. It is also understood that most of the borewells in the WBIIDC are tapping the same aquifer & are influencing each other on a long-time pumping hour.

As the aquifer is a semi confined/unconfined aquifer, **Walton Leaky type curve, Hantush Leaky type curve, Neumann curve analysis for unconfined aquifer** has been taken for a curve- matching aspect and analysis to derive the aquifer properties. Further **Theis method of curve matching** has also been done to bring forth the unconfined aquifer properties.

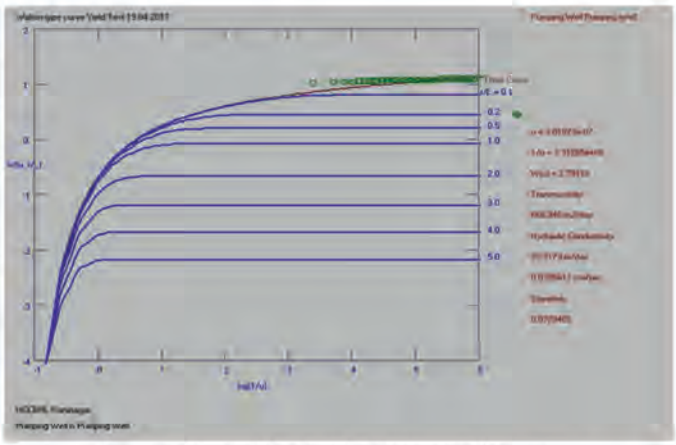


Figure 20: Walton leaky type aquifer curve

Walton Leaky type curve & Parameters: (Table:6)

Transmissivity	666.346 m^2/day
Hydraulic Conductivity	33.3173 m/day
Storativity	0.0779465

Hantush Leaky type curve

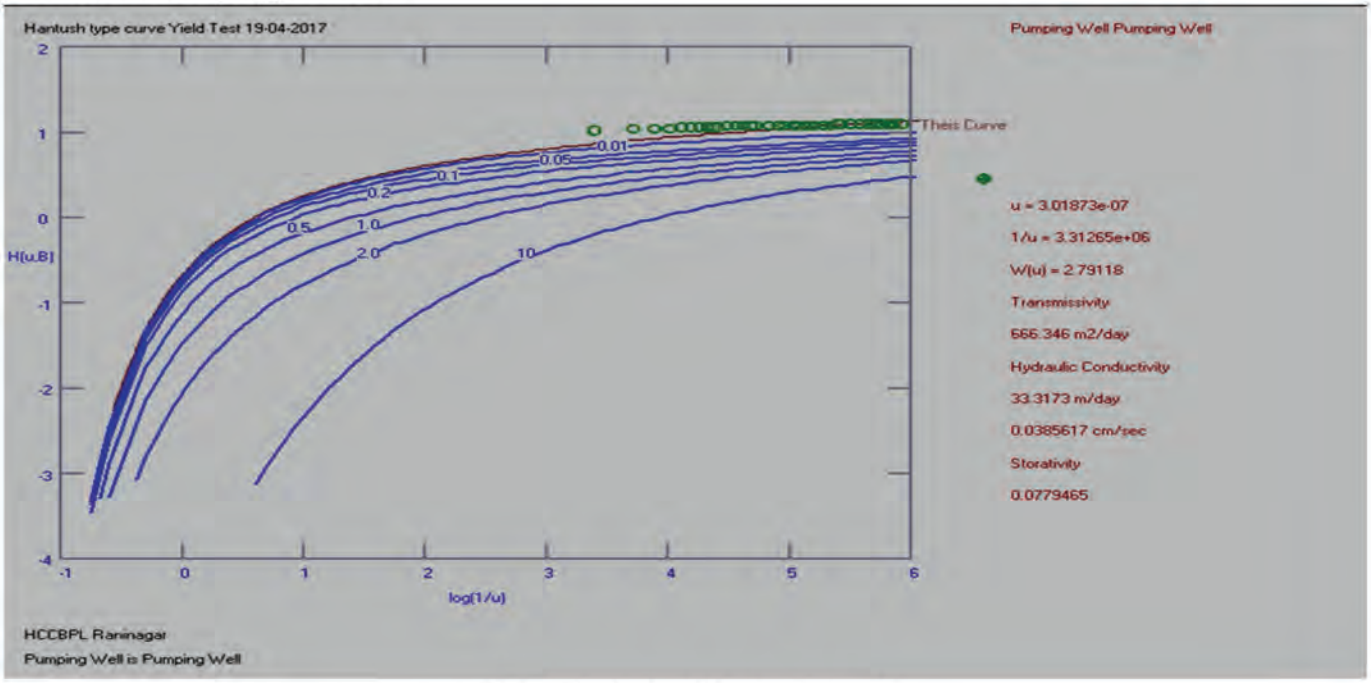


Figure 21: Hantush type curve graph

Hantush Leaky type curve & parameters (Table:7)

Transmissivity	666.346 m^2/day
Hydraulic Conductivity	33.3173 m/day
Storativity	0.0779465

Neumann type curve

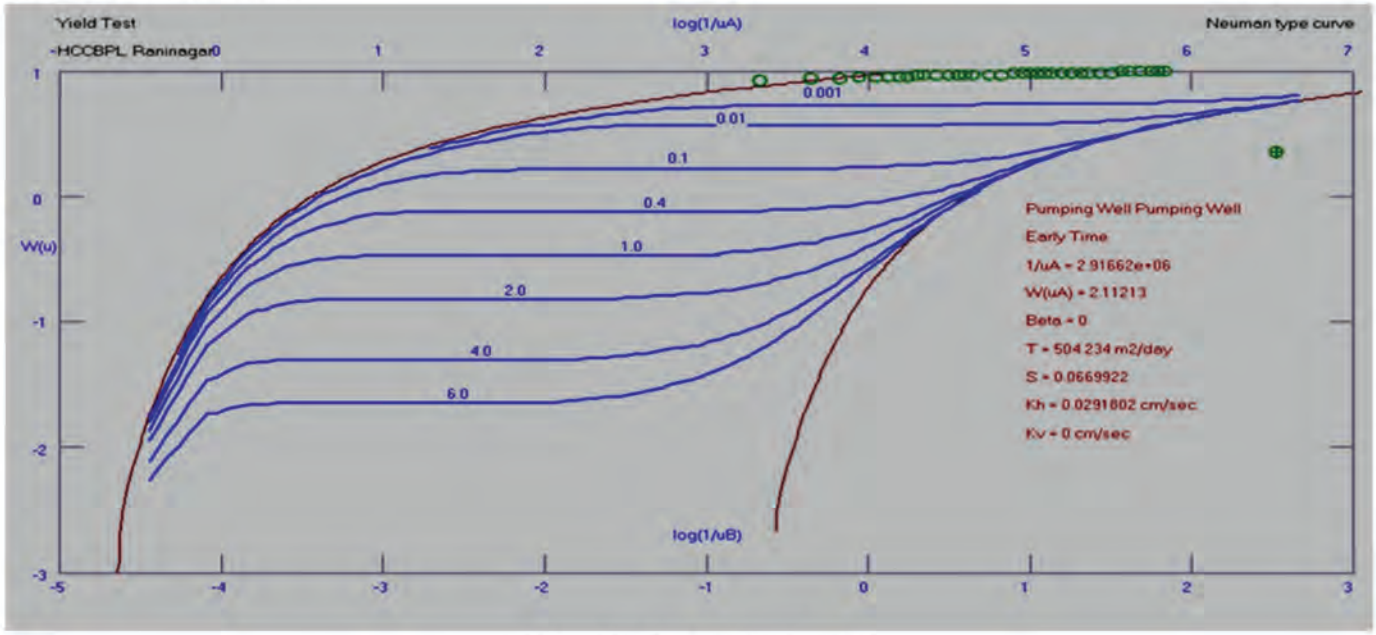


Figure22: Neumann type curve

Table: 8

Transmissivity	504.234 m^2/day
Storativity	0.0669922

Theis Curve Matching Technique

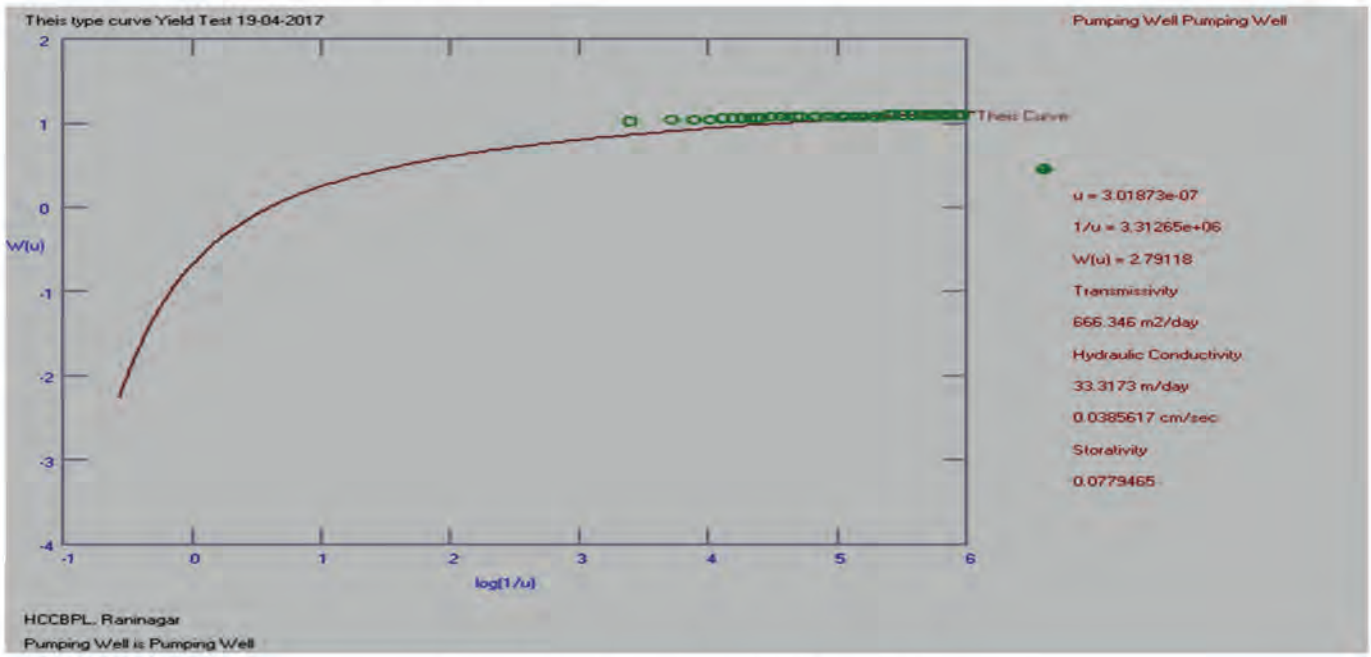


Figure 23: Theis Curve Matching Technique

Details of Theis curve matching interpretation: (Table:9)

Transmissivity	666.346 m^2/day
Hydraulic Conductivity	33.3173 m/day
Storativity	0.077945

Recovery/recuperation Analysis – Theis method:

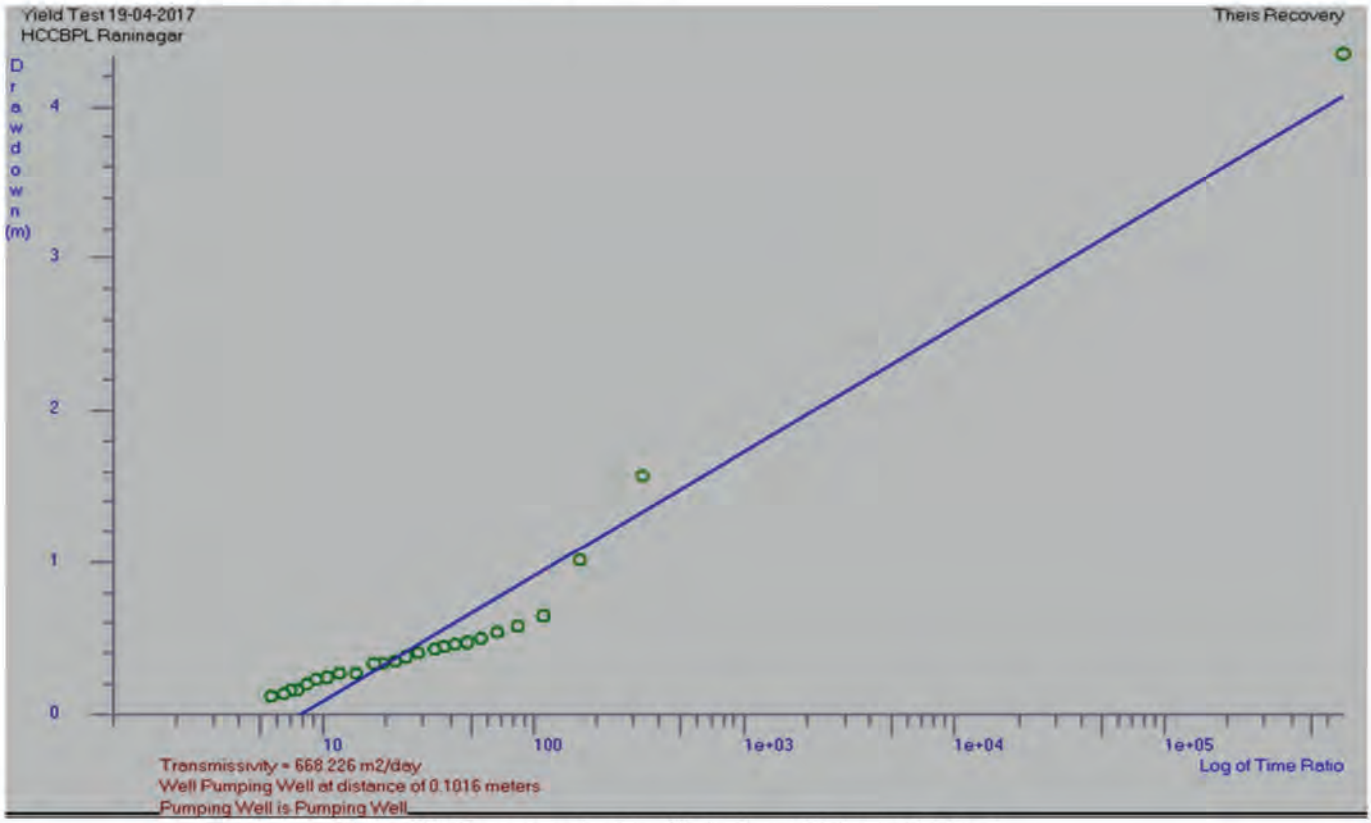


Figure 28: Recovery chart by Theis Curve Matching Method

Table 10: Average Values of Transmissivity and Storativity

Method of Analysis	Transmissivity (m^2/day)	Storativity
Walton Confined/ Semi confined aquifer analysis	666.346	0.0779465
Hantush Leaky type curve	666.346	0.0779465
Neumann type curve	504.234	0.0669922
Theis Curve Analysis Aquifer analysis	666.346	0.077945
Theis recovery analysis	668.226	-
Distance vs Drawdown	1003.39	0.000532733
Average Value	695.8147	0.06027259

The average of Transmissivity and storativity values obtained out of **distance vs. draw down, Walton Hantush and Neumann methods** have been calibrated to obtain the radius of the influence of the borewells in the Project area.

Data interpretation Methodologies and inferences:

Non-equilibrium Flows in semi-confined to unconfined condition were determined using the above types of curve matching techniques. The major aquifer properties like Transmissivity and Storativity can be determined from how the drawdown changes with respect to the pumping over a period of time. For analysis of semi-confined to unconfined aquifer many master curves and the curve matching procedure is used by selecting match point and read Well function, function parameters (e.g., u), drawdown and time. Using these matching values, plus pumping rate etc. are worked out to bring forth the Transmissivity and Storativity of the aquifer.

The initial fall of water level from the pumping well within first 10 minutes of pumping was to 8.27 m bgl from 4.24 m bgl and the drawdown was calculated as 4.03 m. This indicates that the inter-granular pore spaces / void where air/vacuum is being partially filled with water in the formation are dragged at a faster rate. This trend of increasing draw- down continuous to the initial one hour as well and the pumping water level had gone down drastically up to 8.42 m bgl with the drawdown of 0.15 m. Further to which, the partial stabilization phase occurred for the next one hour with the water level reaching 8.5 m bgl with the drawdown of 0.08 m. The third hour of pumping has ended up with 8.55 m bgl of the pumping water level and a draw-down of 0.05 m. At the end of fourth hour, pumping water level remind similar as the level third hour i.e. 8.55 m bgl with the drawdown of 0.05 m.

After the stoppage of pumping the residual drawdown/recuperation rate was quite good with more than 90% recovery within the initial 60 minutes indicates the moderate to good recuperation rates.

The average yield of the borewell has been worked out to be of 2390 Liters per Minute LPM after taking several discharges reading with the installed totalizer or water meter along the discharge pipe.

Specific Capacity of the Well determination:

The calculation of the specific capacity of the borewell will also provide the yielding capacity of the well. The specific capacity of the well is the discharge/unit draw down (Q/s) in the borewell. The larger the specific capacity the better the borewell yield.

Specific Capacity of the Borewell: (Table:11)

Static water level of the pumping well	4.24 m bgl
Pumping water level at the stoppage of the pump	8.58 m bgl
Measured Draw down	4.43 m
Yield of the well calculated on field	143.6 m^3/hr.
Specific capacity of the borewell is calculated by dividing the yield of borewell/draw down	**143.6/4.43=32.41 m^3/m of draw down**

Specific capacity "**C = Q / s**" where,

Q= discharge of the pump in Liters per minute (LPM)/ m^3/Hour.

s= drawdown in pumping well after certain time has lapsed. Therefore, specific capacity is worked out as **discharge per unit of drawdown**.

Here the well is pumped at rate Q= **143.6 m^3/hr** for four hours of pumping with a resultant drawdown s= 1.68 m, Hence, Specific capacity of the borewell is C = Q/s = 143.6/4.43=32.41 **m^3/ hour/ meter (kL/hr/m)** of Draw down.

Aquifer Hydraulic properties/parameters derived from various Curve Matching Technologies and other analytical assessments are as detailed below in Table:12

Table 12: Aquifer Hydraulic properties/parameters

Method of Analysis	Transmissivity (m^2/ day)	Storativity	Hydraulic Conductivity
Walton Confined/ Semi confined aquifer analysis	666.346	0.0779465	33.3173
Hantush Leaky type curve	666.346	0.0779465	33.3173
Neumann type curve	504.234	0.0669922	
Theis Curve Aquifer analysis	666.346	0.077945	33.3173
Theis recovery analysis	668.226	-	-
Distance vs Drawdown	1003.39	0.000532733	-
Average Value	695.8147	0.06027259	33.3173

Critical Assessment and Analysis of Well Yield Parameter

Well yield is the measure of how much water can be withdrawn from a borewell over a period of time and the same is measured in cubic-m/hour or cubic-m/day. After thorough analysis of the above study and data the final conclusion is derived in the following way:

The Transmissivity and Storability value from various graphical interpretation and recovery data has been taken and are averaged out with the following values in **Table: 13**

Transmissivity	695.8147 m^2/day
Storativity	0.06027259

By taking into consideration of the Transmissivity, Storativity and an assumption of Maximum Drawdown of value 5 to 10 m in the pumping well for an average of allocated 20 hours pumping, the maximum sustained yield (m^3/day) and the optimum Sustained yield (m^3/day) of the borewell is calculated using the infinite extent pumping test (version 3.1) software analysis is as detailed in Table:14

Table 14: Maximum and Optimum Sustained Yield

Draw down (m)	Maximum Sustained Yield (m^3/day)	Optimum Sustained Yield (m^3/day)
5	3320.15	2224.5
6	3984.18	2669.4
7	4648.21	3114.3
8	5312.25	3559.2
9	5976.28	4004.1
10	6640.31	4449.01

The above values are basically the computer-generated data base. The Maximum sustainable well yield is defined as the maximum sustainable volume of water that the pumping well will discharge over a given period of time i.e. calculated at various draw down level (5 to 10 m) where in, the simultaneous recharge to the bore is also withdrawn during the course of pumping.

Optimal sustainable yield is nothing but the Safe Yield limit to the quantity of water which can be withdrawn regularly and permanently without dangerously depleting the storage reserve/aquifer that includes natural recharge/replenishment to the aquifer simultaneously and such values are automatically by the software used. This is an inbuilt feature in the Aquifer Pumping Test Software (**Star Line Infinite Extent version 3.1**) to analyze both the maximum sustainable yield and optimum sustainable yield by changing the values of draw down and yield, Transmissivity and Storativity etc. Both the values of maximum and optimal yield can be defined for futuristic modeling also. **Hence, the optimal sustainable yield/safe yield needs to be considered for the constant discharge of the borewell with the present pumping rate using the 25HP submersible pumps.**

Critical Findings emerged out of the yield testing conducted on WBIIDC borewell Within the Plant premises is as follows:

The Productive aquifers dispositions are in a semi-confined to unconfined condition. The area is mostly composed of a Bhabar and Terai intersection zone which forms a very plain terrain. The local aquifer is in the intersection zone of this geological formation composed of Silt, Sand, pebbles, gravel and boulders sediments of varying texture with several granular zones, having considerable thickness. The aquifer has a thickness of 20-30 m bgl.

By interpreting the data of pump test yield of the borewell (present & design yield) have been calculated and are described below:

The design yield of the well-used as pumping well during the pump test was found to be **150 m^3/hr**.

However, our yield testing estimates show that the current yield of the borewell is **143.6 m^3/hr.** Calculating the yield as per actual design of the present pumping borewell is **150 m^3/hr**. Thus, with the statutory allocated pumping of 20 pumping hours, the estimated yield will be **150*20=3000 m^3/day**. As per the actual yield test conducted on field the estimated yield **is 143.6 m^3/hr**. Thus, if worked out for **20 hours pumping, the estimated yield for the day is 2872 m^3/day**. Hence, it can be seen that over the period of time the yield of the borewell has been slightly reduced.

The Plant borewell indicates that owing to the presence alluvium soil deposited by the fluvial process and presence of many rivers & rivulets, the study area shows very good groundwater potential and the Plant is unlikely to face any issues towards groundwater availability in the future. The zone of influences worked out through yield testing is **939.618 m.** Hence, any borewells within the above-mentioned preview will get influenced during the course of pumping.

The yield testing works carried out and the analysis of aquifer properties clearly indicates that there is a very good groundwater potential available in the region, due to the prevailing hydro-geological condition, topographical disposition, slope characteristics etc. of the area. Also, the underneath rock system at deeper depths is underlain by alluvium aquifer system with good faults, fractures and joints indicating higher groundwater potential.

The prevailing geomorphologic set-up and Slope distribution patterns enable more of a surface run-off of the precipitation. A part of it gets in to the pore spaces of the rock system and on reaching the lithomarge layer along presence of many rivers & rivulets help in increasing the groundwater potential of the area.

Analysis of the Borewells operated by WBIIDC:

The borewells owned by WBIIDC are the main source of raw water supply to the Plant. The Plant requires 1300 m^3/day. HCCBPL & IOCL are the only two water intensive industries of Raninagar Industrial Growth center.

As per the discussion of IEISL team with WBIIDC officials, the yield of the borewells owned by WBIIDC is **calculated to be 1627.4 m^3/day for each of the three borewells operated & mandated by WBIIDC outside the Plant borewell for** statutory allocated pumping of 20 pumping hours; the estimated yield will be **1627.4*3*= 4882.2 m^3/day.**

The results of the analysis of yield test the Plant borewell and the analysis of the data of borewells operated by WBIIDC, the total water extracted from the 3 borewells is **4882.2 m^3/day**.

As the Plant requires 1300 m^3/day for its production purpose, which can be met by the water supplied from WBIIDC borewells.

In case of emergency the Plant can also extract water from the borewell located within the Plant premises for production purpose.

Performance of the Submersible Pump of the Pumping well.

To fill up the required Hydraulic head of 45.35 m with the 25 HP pump should have a discharge of 2500 LPM. But the yield calculated during the test shows that the Pump discharge is 2390 LPM. Hence, it indicates that the performance of the submersible pump has slightly reduced over the period of time. The detailed calculation is shown in table: .

Table No: 15:-Performance of Submersible Pump Technical Data Vs Yield Test Data

Submersible pump	Motor specification HP	Outlet size in mm	Discharge in m^3/hr
Technical Specifications	25	203.2	150
Field Observations	25	203.2	143.6

Format for Yield Testing data collection:

DATA FOR YIELD TESTING OF BORE WELL:- CDT (Continous Discharge Test)

General Details: Table: 16

Date:

Name and Address of the client:

Observer/Technical Team:

Location of the yield testing well with GPS Co-ordinates:

Village:

Panchayat:

Taluk and District:

Well Details:

Depth of Well:..... in Mts.

Casing Depth and details of Blank and slotted casings provided:

Diameter:

Reported Yield of the wells: in.....LPM/LPH.

Static water level:.....

Water bearing formation at:

Purpose of well:

Measuring point details:

Test Details:

Pump Size:

Pump installation Depth:

Water level Measured by:

Discharge Measured by:

Observation well/wells Location, Distance from pumping well and its co-ordinates:

General Remarks/ Rough sketch of the area for Reporting purposes:-

-

Continuous Discharge Test (8 hours) (Table:17)

STATIC WATER LEVEL:

Time in Minutes	Time Since pump Started.	PWL	Draw Down (PWL-SWL)	Remarks. (Discharge Measurement, manometer reading)
0				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
12				
14				
16				
18				
20				
25				
30				
35				
40				
45				
50				
55				
60				
70				
80				
90				
100				
120				
140				
160				
180				
210				

240				
270				
300				
330				
360				
420				
480				
540				
600				
660				
720				

Recovery Test Data: (Table:18)
SWL:.....
Pump Shut down Time: .....

Time since Pumping started. (T)	Time since pumping stopped (T')	T/T'	Depth to water level	Residual Draw-down in mts. (DTWL-SWL)
720				
721	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	12			
	14			
	16			
	18			
	20			
	25			
	30			
	35			
	40			
	45			
	50			

	55			
	60			
	70			
	80			
	90			
	100			
	120			
	140			
	160			
	180			
	210			
	240			
	270			
	300			
	330			
	360			
	420			
	480			

Conclusion:

In conclusion, the borewell/open well yield testing (or aquifer yield testing) processes will provide comprehensive data on the water yield potential of the borewell/tube well/open well tapping concerned aquifers. This evaluation is critical for understanding the open well / borewell yield sustainability and reliability of the water source for intended uses, whether for agricultural, industrial, or domestic purposes. The results indicate that the borewell/open well aquifer has a specific yield detailed in **liters per minute (LPM),** which meets/exceeds the required demand of water in terms of LPM.

The test results confirm that the borewell/open well and concerned aquifer can sustainably support the anticipated water needs, ensuring long-term water availability and groundwater sustainability. It is recommended to regularly monitor the yield and water levels to detect any potential changes over time and manage the resource effectively. Proper maintenance and adherence to recommended pumping rates will further enhance the longevity and performance of the bore/tube well/open well infrastructure by exactly knowing the zone of influences and the distance required between two bore well/tube wells / open wells in place. This aquifer yield testing/pumping test of Bore/tube well /open well provides a solid foundation for informed decision-making and effective/ sustainable Groundwater Resource management.

("When the Well is Dry, We May know the Worth of WATER":-Benjamin Franklin)

Atal Mission for Rejuvenation and Urban Transformation

AMRUT 1 Progress

TOTAL PROJECTS

1107 PROJECTS WORTH
Rs. 2357 Cr.

AWARDED

1107 PROJECTS HAVE BEEN AWARDED

COMPLETED

1059 PROJECTS HAVE BEEN COMPLETED.
95% PHYSICAL COMPLETION.
48 PROJECTS ARE IN PROGRESS.

EXPENDITURE

SPENT Rs. 2229 Cr.
95% FINANCIAL COMPLETION

Atal Mission for Rejuvenation and Urban Transformation

AMRUT 2.0 Progress

TOTAL PROJECTS

734 PROJECTS WORTH
Rs. 3515 Cr.

AWARDED

515 PROJECTS HAVE BEEN AWARDED

COMPLETED

134 PROJECTS HAVE BEEN COMPLETED.
603PROJECTS ARE IN VARIOUS IMPLEMENTATION STAGES.

EXPENDITURE

SPENT Rs. 603 Cr.
17.15% FINANCIAL COMPLETION

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