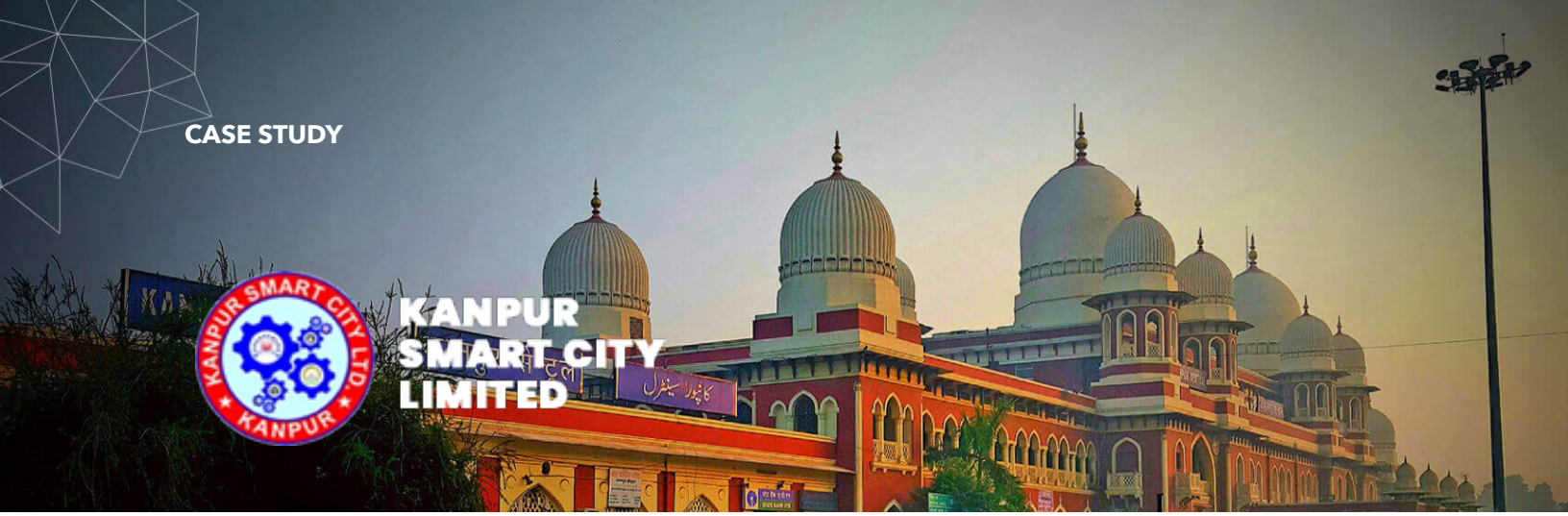
CASE STUDY



Kanpur transforms into an inclusive, vibrant city of opportunities with efficient urban services using Esri ArcGIS

Kanpur Smart City aspires to leverage its culture and heritage by investing in inclusive and transformative solutions that enhance the quality of life for its citizens. As per the Government of India's guidelines, Kanpur Municipal Corporation has formed a separate Special Purpose Vehicle (SPV) as Kanpur Smart City Limited for the implementation of projects under the smart city mission for the city of Kanpur. Since its establishment, KSCL has managed to bring all the verticals, assets and boundaries coming under Kanpur smart city jurisdiction under one GIS roof and made optimal use of Geospatial technology for managing and continuously improving their operations and infrastructure development and management.

Project Summary

Kanpur metropolitan sprawling over an area of 260 Sq. Kms. is the biggest city and main centre of commercial, industrial and educational activities in the State of Uttar Pradesh.

Kanpur's proposal envisions to retrofit 1475 Acres adjacent to the south bank of Ganga to a vibrant 24x7 destination. As a signature intervention reflecting the city's image, the area needs to be:

> "GIS Technology is of immense importance for smart city planning, development, operations and management.
>
> The GIS portal developed on Esri platform has provided us with the spatial data and tools essential for the smart decision making for smart cities."

Ashanvi Dubey
GIS Expert,
Kanpur Smart City Project

- 'Sampann': An economic engine providing a pro-business environment and supporting the region's knowledge industry.
- 'Sachal': A walkable, well-connected mixed-use area with public realm investments visible in its streets, public spaces and buildings.
- 'Sakriya': A model for achieving social equity by planning with 'citizen first' city governance.
- 'Satat': A model of sustainable infrastructure development for future proofing.

- 'Swasth': Creating a low-impact carbon neutral model for a healthy environment.

Challenges

Gathering authenticated data form Kanpur Municipal Corporation, designing a geodatabase for KSCL with the available spatial data has been a formidable challenge for the city. Another challenge was to provide the GIS solution access based on hierarchical roles. Given the rapid growth of Kanpur city in terms of population and economy and accompanying demand for infrastructure, use of technology for managing all aspects of smart city was imperative. Therefore, the need was to have a GIS Solution for smart city that showcases various aspects of the city including verticals with respect to citizen amenities, educational institutions, emergency facilities, travel and transportation, healthcare facilities, smart parking, various boundaries associated with city management, help citizen to find the optimal route. The visualization and analysis for timely decision making was the main challenge faced by the KSCL.

Solution

Esri India together with 6Simplex Software Solutions Pvt. Ltd. started their geospatial initiative and provided ArcGIS platform to meet above challenges by setting up KSCL's enterprise GIS portal. The new geodatabase helped capture spatial data related to mapping of various components in the smart city like different administrative boundaries, drains and water supply infrastructure, emergency services, building footprints and local points, civic, education & transportation facilities etc. During COVID-19 pandemic, the GIS solution was used to map the affected areas and residents which helped city administration to have a clear view of the situation and thus helped in taking timely action to manage the spread.

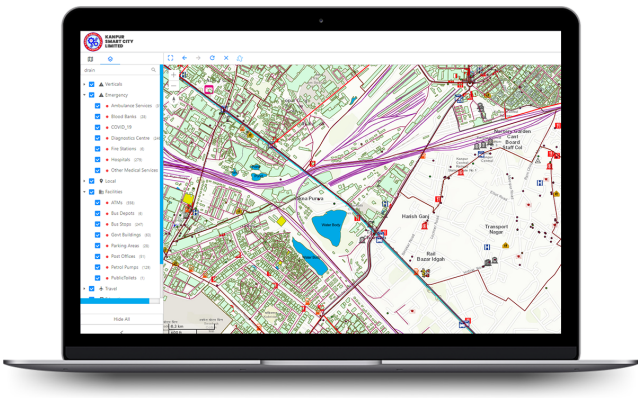
The enterprise GIS provides the following:

1. Enterprise Geodatabase
2. Identity management, authentication and authorization for KSCL
3. ArcGIS Server based service-oriented architecture to power the map, feature and non-spatial REST based services.
4. ArcGIS network analyst service for helping end user to find the optimal routing solution for commuting within the city.
5. Secure ArcGIS JavaScript API based web application for Data viewing and querying, advanced spatial data editing including split/merge of features, map printing, dynamic report generation, Providing a bird's eye view of all ongoing data collection activities and providing near real time view of the collected data.
6. Secure ArcGIS JavaScript API based web application for, field data collection in online mode only, advanced spatial data editing including split/merge, logging field activities, geofence based data viewing and collection for robust data management and better performance.

GIS tools and functionalities

The various GIS tools and functionalities included in KSCL GIS solution are:

1. Basemap selection - Users can select from the variety of available ArcGIS basemaps.
2. Layer selection module - Users can search and select from more than 60 layers, where the layers are grouped for better user experience and visualization. Users can view the data in the attribute table, zoom to layer extent or scale.
3. Admin users can customize layer visualization properties, export layer attribute tables.



4. Map module - Various standard functionalities such as zoom-in, zoom-out, map orientation, zoom to full extent, next and previous extents, reset and refresh maps, single select, multi-select, rubber banding, on feature click HTML pop-ups, etc. are enabled to facilitate better user experience.
5. Users can customize their map coordinates unit to specific standards such as DMS, LatLong, Meters.
6. Users can also change the map scale by typing the desired scale in the change map scale tool.
7. Tools module
   a. Information panel - Users can click on features to view the detailed information.
   b. Bookmarks - Users can create and save their favourite areas as bookmarks and later choose from available bookmarks.
   c. Search
      i. Attribute search - One can search various smart components by simply typing in the parameter or perform an advanced attribute query.
      ii. Spatial search – This tool facilitates the use of spatial relations and expressions such as crosses, intersects, within, etc. The data layers can be queried based on such spatial relations.
   d. Places search – It uses Esri's geocode service to find any place entered in the search box.
   e. Measurement tool - Users can measure area, distance and location of the object of interest using this tool.
   f. Go To XY tool - This tool allows the user to enter valid latitude and longitude and a map navigates to that location.
   g. Routing - An important tool to help Kanpur citizens to find the best suitable route between the locations of their interest. Routing tools use Esri's network analyst service at the back end.
   h. Redlining and Annotations - Users can mark or annotate the map areas of interest. Users can draw shapes, type comments, etc. using this tool.
   i. Map Print - Only admin users can export map prints in various ISO formats.
   j. Import shapefile - This functionality is exposed only to admin users. An admin user can choose a shapefile (.shp) to be shown on map.
7. The GIS editor application enables role-based feature editing for admin users. Such users can use add, edit or delete features. In addition to this advanced editing functionalities such as merge, split and move features are also available.

Benefits

As a result of deploying the initial Desktop GIS, KSCL can:

- Gather various smart city assets inclusive of citizen amenities, education, emergency facilities, travel and transport, healthcare facilities, smart parking and create a geodatabase which serves as the backbone of the KSCL GIS solution.
- In future KSCL may opt to add more data layers to the geodatabase to make it more scalable.
- Provide secure, Single Sign On (SSO) based web access to all its spatial and non-spatial data and services.
- View all their verticals such as visual sign boards, traffic cameras, number plate detectors, location of educational institutions, hospitals, etc.
- Help citizens to view locations of multimodal transport facilities within the city.
- The solution facilitates the use of routing services where users can find the optimized route to their favorite location.
- Edit spatial data with their data modification policies and data validation rules enforced.
- Export web maps in various available formats.
- Perform spatial and attribute search.