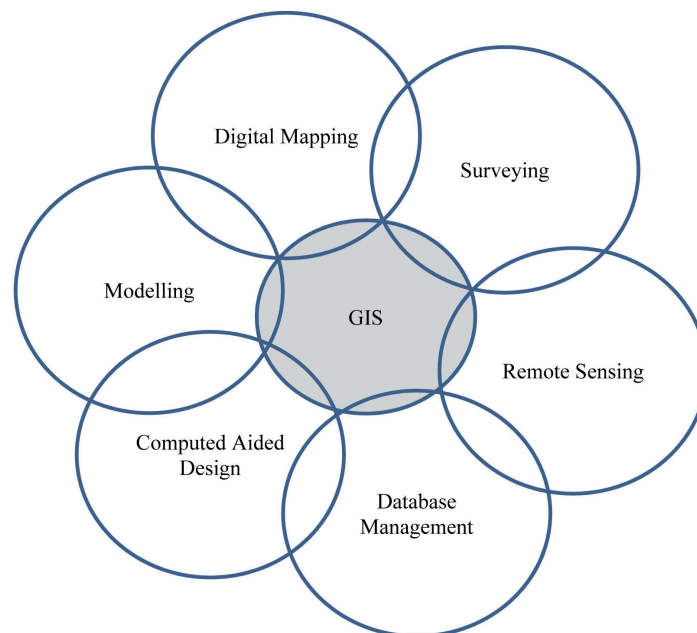


# Geographical Information Systems (GIS)

Reference: CS-42

**Geographical Information Systems (GIS) are a powerful tool for capturing, managing, analysing and understanding spatial distribution, connectivity and interaction of features. Computer-based GIS are used to digitally represent and analyse the geographic features present on the Earth's surface and the events taking place on it.**

**GWP Consultants LLP offers a range of GIS solutions, using ArcGIS, for environmental, geotechnical and engineering, hydrogeological, hydrological and surveying tasks. The multi-disciplinary nature of GIS enables GWP to integrate and analyse complex spatial information across multiple disciplines.**



## **In house expertise and services include:**

- A range of remote sensing products, e.g., Landsat, SRTM, ASTER, aerial imagery/photogrammetry, and LiDAR datasets.
- GIS-based geomorphological modelling. This includes computation of digital elevation, slope, aspect, and application to soil erosion potential, landslide risks, and models to characterise topography, fluvial and coastal geomorphological environments.
- GIS-based hydrological modelling. This includes the computation of surface water flow direction, flow accumulation, storm runoff routing networks, stream orders, catchment boundary delineation, fluvial and pluvial flooding and coastal storm surge and tsunami inundation modelling.
- GIS-based image processing techniques for land-use classification.
- Development of data inputs and visualisation of output results from, hydrological and hydrogeological modelling software packages (e.g. HEC-RAS, HEC-HMS, and Groundwater Vistas).
- Preparation of datasets for Computer Aided Design programs, including CAD and LSS.
- Optimisation of development location selection using spatial relationship proximity analysis, including buffer zones, access and transport routes, and hazard zone avoidance.
- Spatial planning and awareness of the interaction between natural and processes, populations and infrastructure – including disaster risk reduction planning.
- GIS database management and administration.
- Cartography and map production.

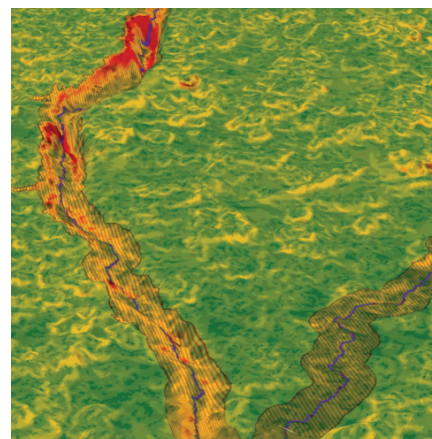
## Selected projects

### Case Study: Geomorphological GIS Analysis for Flood Hazard Maps in Samoa

GWP was appointed by the United Nations Development Project (UNDP) Samoa to provide geomorphological GIS modelling expertise for the production of fluvial and coastal (storm surge and tsunami) flood hazard zones for 25 No. districts in Samoa, covering an area of 1,600km<sup>2</sup>, as part of an Adaptation Fund, UNDP-executed project to update the Community Integrated Management Plans.

Samoa consists of four volcanic islands, of which 56% was covered by this project.

Geomorphological GIS (e.g. slope) and hydrological GIS (e.g. water flow direction, flow accumulation, runoff routing networks, stream orders, catchment boundary delineation and coastal and fluvial inundation) analyses were undertaken, using Digital Elevation Models produced from LiDAR datasets, to produce appropriate hazard zones.

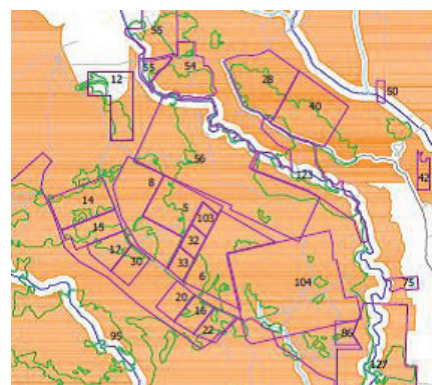


### Case Study: Establishment of Mining Zones in Trinidad and Tobago

On behalf of the Government of the Republic of Trinidad and Tobago, the Ministry of Energy and Energy Affairs (MEEA), commissioned a nine month project to define favourable mining zones with minimal environmental impact in Trinidad.

A GIS was used to aid in the development of a national Strategic Environmental Impact Assessment (SEIA), where the spatial relationships between mineral resources, infrastructure, population and environmental features were analysed.

A LiDAR survey and additional GIS datasets were used to map the remaining resources and identify areas to be included in the mining zone assessment. The analysis used a GIS to optimise zone locations based upon minimising interaction with social and environmental receptors and maximise proximity to transport routes and markets.

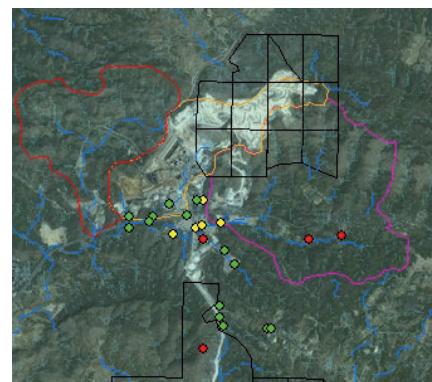


### Case Study: Administration and Hydrological Modelling in Thailand

GWP were engaged to develop a quarry design for a cement quarry, and to complete a preliminary hydrological assessment in Thailand.

A GIS was used to manage all associated geographical spatial information, including geological, hydrological, hydrogeological and infrastructure, and transform/project datasets in different geographical and projected co-ordinate systems.

The GIS was also used to complete a preliminary hydrological assessment, where 30m resolution satellite derived Digital Elevation Model (i.e. SRTM) was used to delineate watershed boundaries and possible locations to capture surface water runoff.

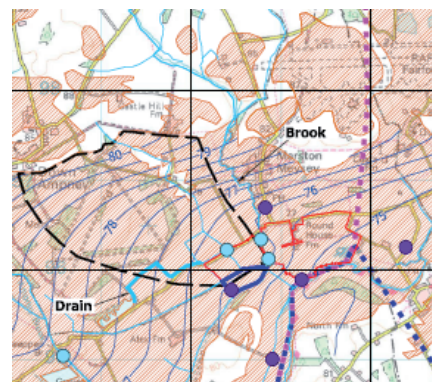


### Case Study: Spatial planning and awareness in the UK

GWP uses GIS to investigate spatial relationships and interaction between hydrological, hydrogeological, infrastructure assets and environmental receptors on both broad and local scales.

The use of GIS helps to create a site setting for proposed developments within the UK from which interpretations can be made as to the significance these developments could potentially have on the surrounding environment.

Multiple sources of information are required at different stages of development planning and design and GIS aids in providing a visual representation of proximity and impact to other parties. GWP uses this approach routinely as part of our project data management, analysis and reporting.



### Key contact:

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