

APPLICATION OF GIS ON BUILDING THE GEOGRAPHIC DATABASE FOR NINH KIEU AND CAI RANG DISTRICTS OF CAN THO CITY

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INTRODUCTION

Ninh Kieu and Cai Rang are two important urban districts of Can Tho City. These two districts are geographically located on the right bank of the Hau River, established in 2004 under the Government's Decree No. 05/2004/ND-CP (Vietnam Government, 2004). Ninh Kieu and Cai Rang districts have a natural feature of relatively low terrain following the general trend of the Mekong Delta (Can Tho City Department of Construction, 2016). Due to the characteristics of the districts located along the river, Ninh Kieu and Cai Rang districts are greatly influenced by the Hau river tidal regime (Can Tho City Department of Construction, 2016). According to statistics in 2019, Ninh Kieu District has an area of 29.23 km² and an average population of 280,792 people (133,911 men/146,881 women), while Cai Rang District has an area of 66.81 km² and an average population of 105,547 people (52,241 men/53,306 women) (Can Tho City Statistics Office, 2020). In recent years, the process of urbanization in these two areas has taken place at a rapid pace and in a complex direction. This process has created great pressures and challenges for drainage management in Ninh Kieu and Cai Rang because the drainage system is no longer able to meet the needs of communities in these two urban districts. To solve these difficulties and challenges, the managers in these areas need to have appropriate solutions and policies for urban drainage.

One of the appropriate technological solutions to solve the above problem is the application of GIS for drainage management in the two districts of Ninh Kieu and Cai Rang. This technology has been used to support drainage management in many parts of the world and has brought practical and positive results (Muthanna et al., 2018; Wang et al., 2018; Abbas et al., 2019; Aguiar et al., 2020; Martin et al., 2020; Wang et al., 2020; Guptha et al., 2021). In recent years, the application of GIS to support drainage management in Vietnam has also been implemented by many domestic scientists (Trung et al., 2014; Dang and Kumar, 2017; Nguyen and Dao, 2018; Dung et al., 2021). To successfully apply this technology, one of the indispensable components is the geographic database. This work is carried out to build a geographic database for Ninh Kieu and Cai Rang districts, creating the initial basis for the gradual application of GIS to drainage management in these two areas.

RESEARCH METHODS

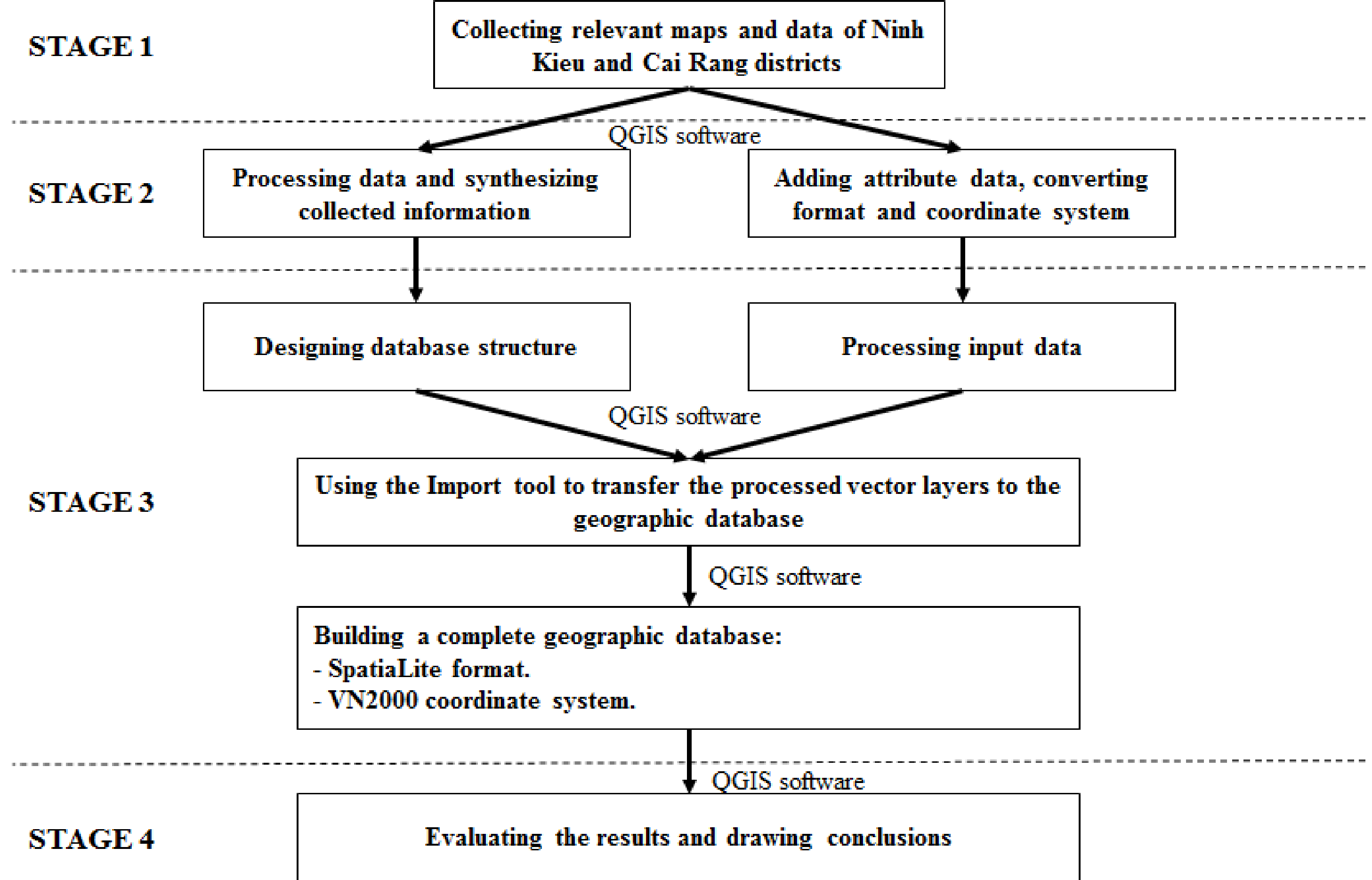


Figure 1. The detailed research flowchart to build geographic database.

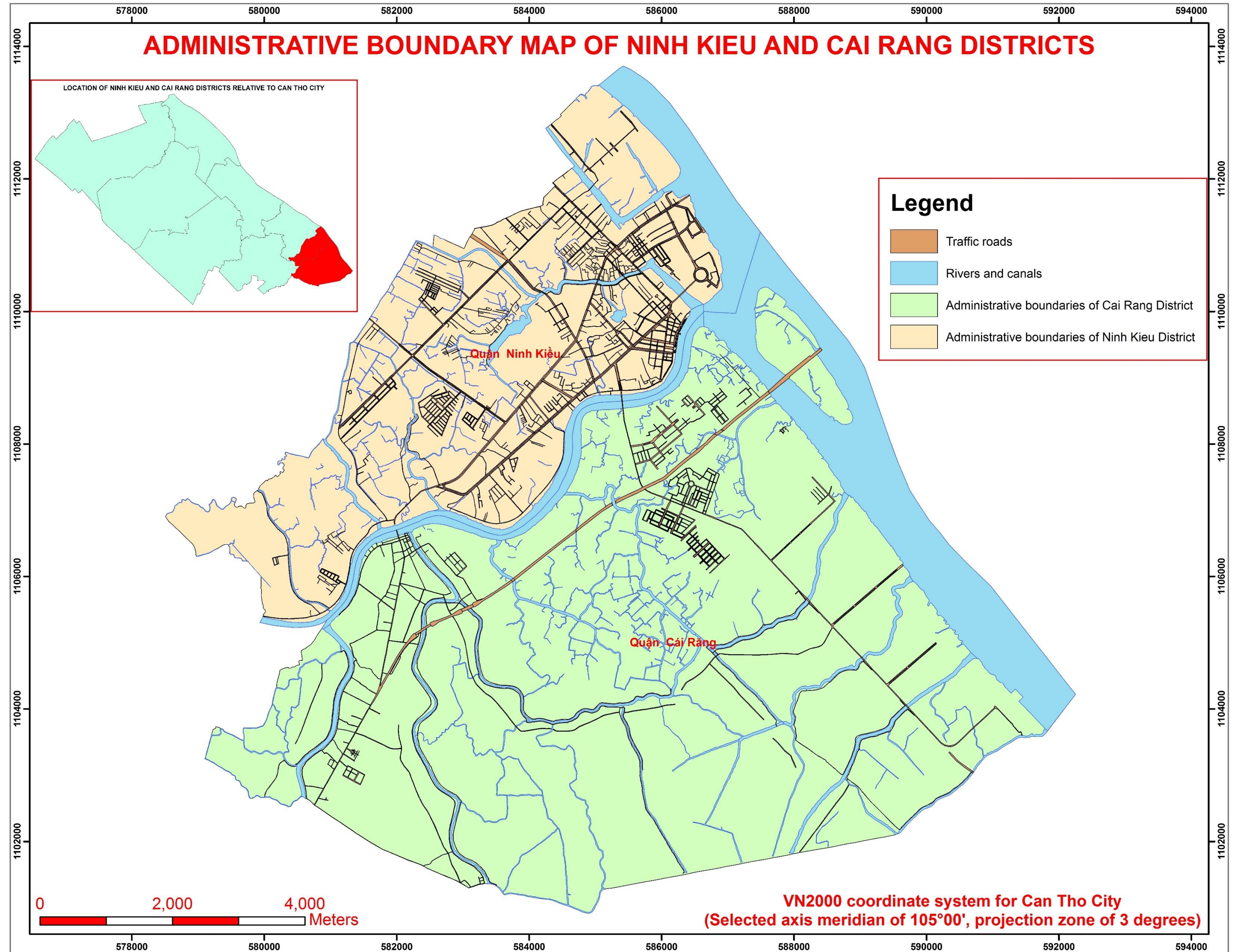


Figure 2. The location and scope of the study area - Ninh Kieu and Cai Rang districts.

RESEARCH DATA

The two main types of data were collected to build a geographic database for Ninh Kieu and Cai Rang districts including: (1) reports and statistics, (2) digital map data. The digital map data of the study area is assembled from many sources with following main formats: CAD file (*.dgn and *.dwg), Shapefile (*.shp), TAB file (*.tab). These digital maps include six main categories: (1) administrative map, (2) traffic map, (3) topographic map, (4) housing map, (5) land use map, (6) soil map. The boundaries of the study area cover the whole area of Ninh Kieu and Cai Rang districts (Figure 2).

RESULTS AND DISCUSSION

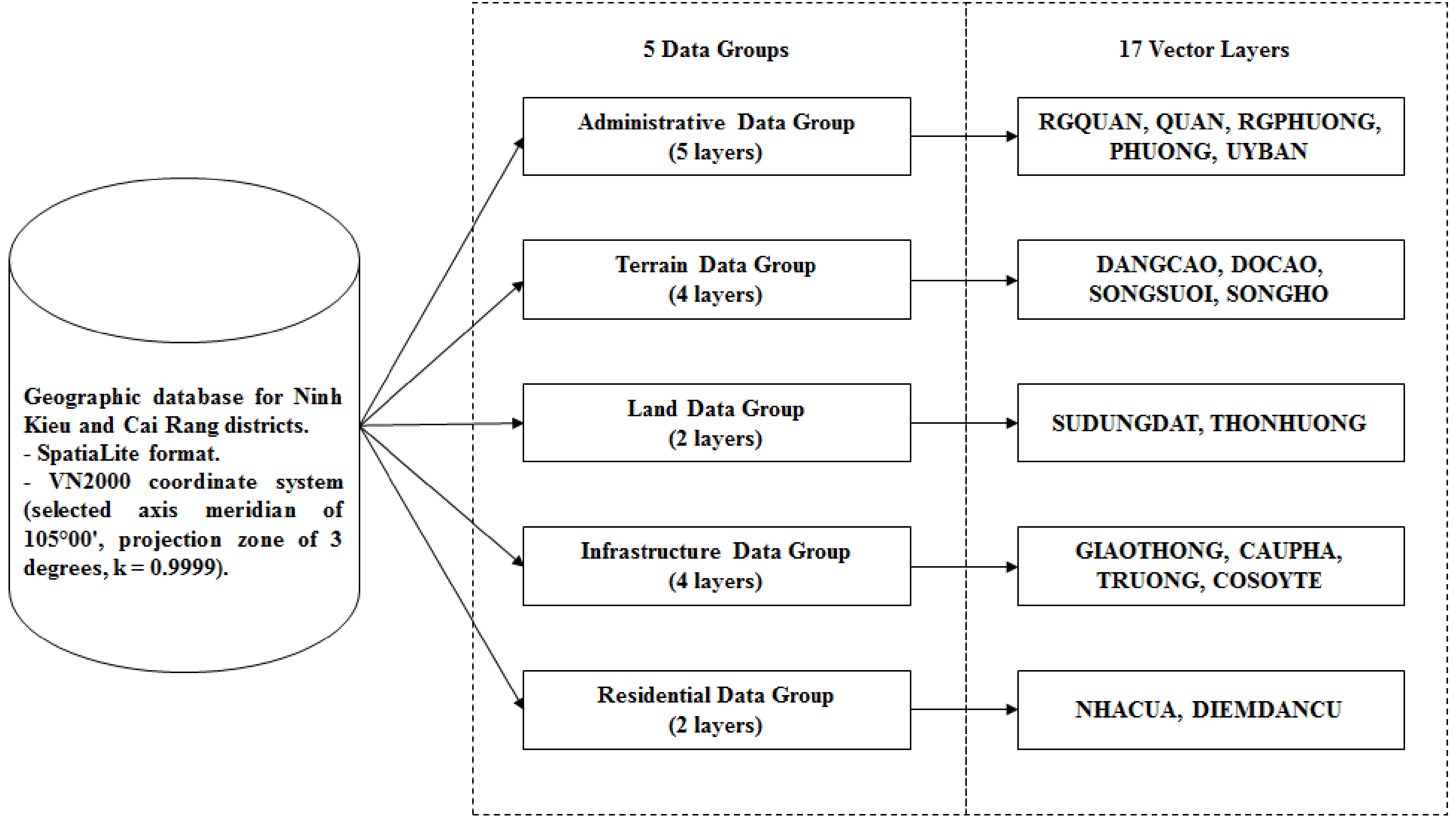


Figure 3. The general structure diagram of the geographic database for Ninh Kieu and Cai Rang districts.

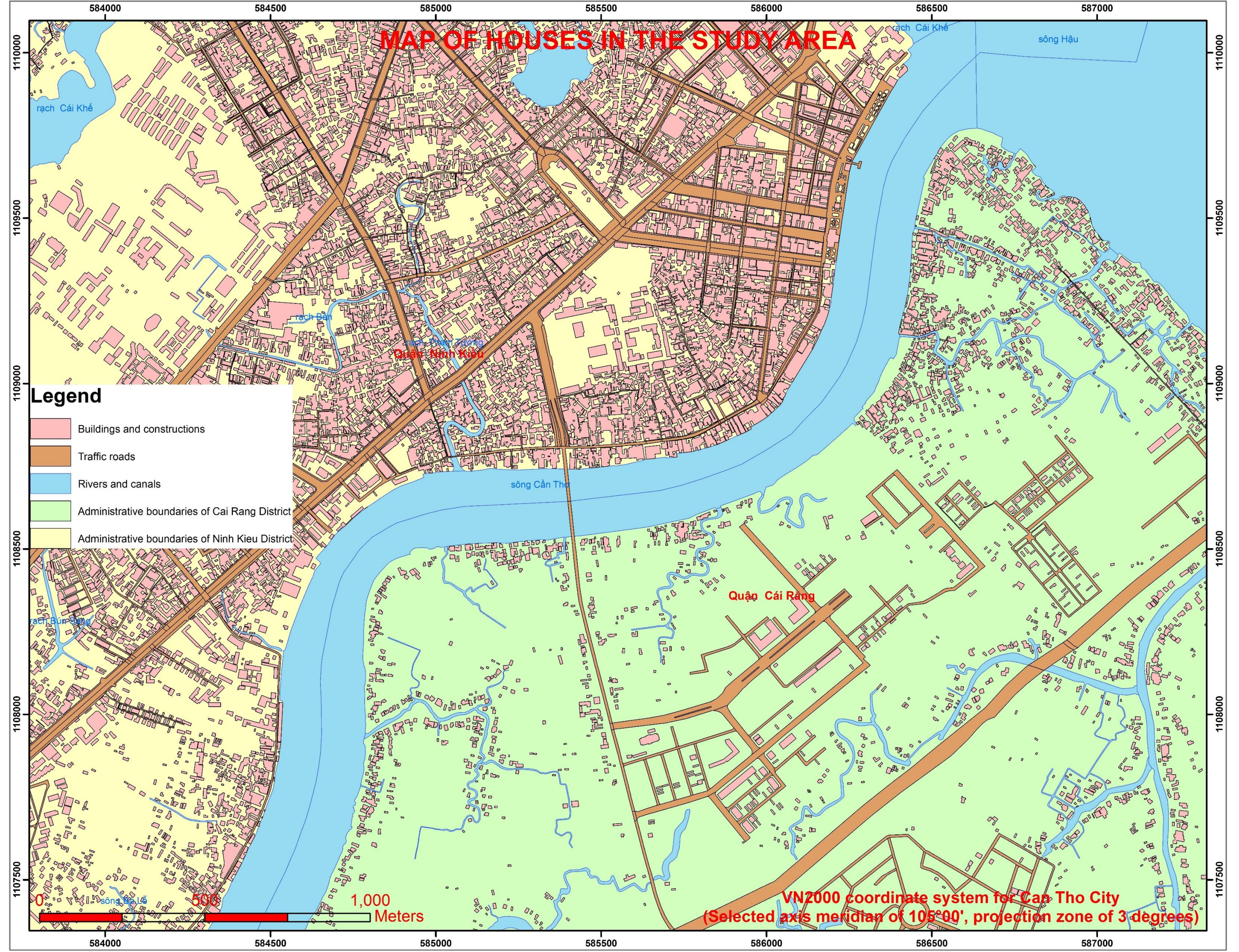


Figure 4. Map of houses in the study area - one of the objects of urban drainage management.

CONCLUSIONS AND RECOMMENDATIONS

The obtained results show that the research has achieved the set goal which is to build a geographic database for Ninh Kieu and Cai Rang districts with the structure in accordance with the regulations of the Ministry of Natural Resources and Environment. This geographic database is built on the VN2000 coordinate system, with five data groups, including 17 vector layers, meeting the requirements of the drainage management. With the SpatiaLite format, this geographic database can be used on many different types of GIS software. This geographic database is an important scientific basis for the application of GIS at different levels to drainage management in Ninh Kieu and Cai Rang districts. This database development process is a valuable reference for future research in the same field. The future development direction of the research is to add more layers and fields so that this database better reflects the current state of the study area, meeting the needs of managers in practice.

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