Development of Groundwater Database for Parts of Areas Encompassed by the Lakeside Irrigation District

December 31, 2001
(Revised on January 31, 2002)

Report for Texas Water Development Board
Submitted by Lower Colorado River Authority
Prepared with assistance from University of Texas at Austin

Table of Contents

Executive Summary

Lakeside Irrigation District is located in the southern part of the Lower Colorado River Basin within Colorado and Wharton Counties. The primary source of water for the district is surface water, which is delivered from the Colorado River to the fields through irrigation canal systems. However, there are many groundwater wells located in this district, which meet about 20 percent of the region.

The objective of the project was to develop a database to include the information of the groundwater wells located in Colorado and Wharton Counties, and within the Lakeside Irrigation District. For better representation of the well data, a digital map was also prepared using Geographic Information System (GIS).

Three different data sources were used to accumulate all possible available data:

- Texas Water Development Board (TWDB) Database – for existing groundwater data
- Texas Natural Resource Conservation Commission (TNRCC) Groundwater Well Records - for records of all drilled water wells to up to date.
- Lower Colorado River Authority (LCRA) Field Offices – for the missing information and verification.

Wells near the irrigation canals are of special importance because those will be evaluated for groundwater development in future. The database attached in the appendix includes the wells inside the Lakeside Irrigation District.

Introduction

Lakeside Irrigation District is one of the four major irrigation districts located in the Lower Colorado River Basin within Colorado and Wharton Counties[1]. The primary source of water for the district is surface water, which is delivered from the Colorado River to the fields through irrigation canal systems. However, there are many groundwater wells located in this district, which meet about 20 percent of the agricultural demand of the region. An inventory of the existing groundwater wells is required to account for any future development of potential groundwater resources.

Scope of Work

In this project, the groundwater database for parts of areas encompassed by the Lakeside Irrigation District was developed. Water wells specifically located close to the irrigation canals in parts of Lakeside Irrigation Districts were evaluated.

Development of the Database for the Wells

The purpose of this project is to prepare a groundwater well database for Lakeside Irrigation District. Such a database will be useful in future development of groundwater wells within the irrigation district. The Lakeside Irrigation District is located in Wharton and Colorado counties. Groundwater wells in these two counties are included in the database.

Following three data sources were used in developing the database:

- TWDB database for existing groundwater data;
- TNRCC groundwater well records for all additional wells drilled to date; and
- LCRA field offices for the missing information and verification.

TWDB Groundwater Database[2]

The groundwater data in the TWDB database consists of six tables, listing the data for each well in various categories. These tables and their contents are listed and discussed below.

a) **Casing Table:** Information about casing and screen setting, diameter of the casing, screen material depths to the bottom of the cased and screened interval. Diameter was recorded in inches elevations are recorded in feet.

b) **Infrequent Constituent Water Quality Table:** Information for Infrequent Constituent screen with " Storet code". Each Storet code represents one frequent unit. The units are described in TWDB data dictionary. In this table, the constituent value, the date that it was measured and the "Flag-<,>" for each well were listed.

c) **Well Site Remarks Table:** Lists the information about the status of each well. This information explains the "casing or screening status of the well" or lists the type of well like if it is "observation well" or still in use.

---

[1] Appendix A: MAPS

[2] http://www.twdb.state.tx.us/data/waterwells/well_info.html

d) **Well Data Table:** Information for the geographic and physical features the wells with their owners, utilization and operational types. Zone codes, Basin codes, Aquifer codes and coordinates of the wells are used to identify the geographic features of the wells. For Physical features, Screen and Casing Material, Well Depth and Well Type were listed. Owners of the wells, the purposes of their usages; primary usage, secondary usage, type of lift and type of power are some of the descriptive information listed in the table.

e) **Water Level Table:** Information for the water level, depth of water from surface. The measurement day, measuring agency and method of measurement were also included in this table. Measuring agency and method of the measurement were represented with numbers each referring to a single agency and method. "Water-Level Data" section of the TWDB Data Dictionary[3] lists the numbers for the agencies and methods referred in the data.

f) **Water Quality Table:** This table stores the information for the metals dissolved in the water, which are taken to monitor for quality purposes. There are 12 metals listed in this table in MGL, such as Silica, Calcium, Magnesium, Sodium etc. The time and temperature of the sample that was taken, collecting agency, and collection and reliability remarks are some of the other data for the wells. "Water Quality Data" section of the TWDB Data Dictionary gives the brief descriptions about the data type used in this table.

The wells from the TWDB database are plotted in the map according to their coordinates provided in the database. The information for those wells are available in the table of the GIS digital map developed for the project.

TNRCC Groundwater Well Records

After acquiring the data from TWDB Database, next step in the project was to collect the data from TNRCC to develop a new database for the additional wells. TNRCC central records collect the groundwater data and classify them by counties. For each county, the groundwater well data were cataloged according to the state well codes and their locations. The counties were divided into grids of 1 degree, and 7½ and 2½ minutes. Within the 2½ minute grids, wells were located but no well number was assigned. This makes the TNRCC groundwater data classification different from TWDB classification. Moreover, the data in TNRCC were classified in 15 categories, which are different and less specific than those of TWDB.

In TNRCC groundwater well records, for some of the wells, maps were attached showing the locations of the wells. However, for most of the wells, either the hand drawn maps were provided in the records or their locations were specified by referring to a village, town, or important landmarks by indicating their distances and by directions such as 8 miles west of Nada, or 4.5 miles south west of St. Mary's church.

---

[3] http://www.twdb.state.tx.us/publications/manuals/UM50%20Data%20Dictionary/um50.pdf

The classification of groundwater data in TNRCC central records division includes owner, address, location of well, type of work, proposed use, drilling method, well log, diameter of hole, borehole completion, casing-well screening, cementing data, surface completion, water level, packers, type pump, well test, water quality. The same classification is used to develop this database. Some of these categories are self-explanatory. A brief description of the categories need explanations is provided below.

a) **Well Log:** Information of date of drilling, diameter and depth.
b) **Borehole completion:** Formation of the well wall such as open hole, straight wall, slotted and plug, etc.
c) **Casing and Screening data:** The material used for casing such as PVC, plastic, or steel slotted, its condition: old or new, and its diameter and setting depth.
d) **Cementing data:** Cementing depth and the method used for cementing such as manually poured, slurry, concrete pouring, poured from top etc. with their depth of pouring.
e) **Surface Completion:** Procedure used to complete the surface.
f) **Packers:** Type and size of material used for the coupling of the pipes.

The TNRCC data does not include coordinates identifying locations of wells.

LCRA Field Data

Data for the wells from TNRCC sources were organized in the database for the two counties. LCRA Lakeside Irrigation District field office staff was consulted to fill in missing information and for verification of the well location. Since TNRCC records did not provide any coordinates to locate the wells in the map, LCRA field staffs assisted identifying the approximate locations of some of the wells.

Locating Wells on a Map

GIS were used to locate the wells on a map of the counties by using their coordinates and from the descriptions of their approximate locations and directions. The wells from TWDB database were plotted in the map. TNRCC wells were added as new wells in the map. The area is divided into smaller 2-1/2 minute size grid. Each grid contains these two sets of wells with uniform well numbering system. The new well numbers were assigned to follow the state well numbers used in the TWDB well database. Approximate irrigation district boundary is shown in the map. The canal systems surrounded by the district boundary are also shown in the map to locate the wells close to the canals. This GIS representation will help to see the information in digital format for any desired well for any specific location for further evaluation, and also it will make it easier to add additional data for each well.

Evaluation of the Database

The project area encompasses Wharton and Colorado counties, and LCRA Lakeside Irrigation District is within these two counties. The database was separated for the two counties. In each county, the wells plotted in the map and the wells not plotted due to lack of proper information to plot them in the map were also organized in two separate tables. Wells located within the lakeside irrigation district are also separated for the counties.

Within each table, wells were organized according to the corresponding 2½ minute grid. To maintain the continuity, the new well numbers were assigned to follow the state well numbers used in the TWDB well database. However, the new well numbers are uniquely presented as 3-digit numbers and those are distinguishable in the map. The first 5 digits of the 7-digit TWDB well numbers represent the corresponding 1-minute, 7½-minute and 2½-minute grids and the last 3 digits are the actual well numbers. For example, for the TWDB well numbers 66-55-101 and 66-55-102, the respective grids are 66-55-1. Whereas, the new wells are 103, 104 .. and so forth within the same grid. The digital map was created to include the wells from TWDB database and also from the newly developed database.

Total number of wells in the database is 8,902 of which Colorado County has 4,111 and Wharton County has 4,791. There are 1,335 wells within the Lakeside Irrigation District of which 259 wells were plotted in the map. Also, 2,848 wells outside the district were plotted in the map.

For future groundwater development, it is necessary to know the current water level in the wells of the region. Water levels were measured and documented in the TNRCC records at the time of inception of the wells. Since then, water levels were not measured. Field verification of well locations and water level measurement is recommended as future work.

APPENDIX – A

WELL LOCATION MAP

APPENDIX - B

WELL DATABASE

Development of Groundwater Database for Parts of Areas Encompassed by the Lakeside Irrigation District

Contract No. 2001-483-399

The following maps are not attached to this report. They are located in the official file and may be copied upon request.

Map 1 (NW Corner) – Groundwater Database for Areas encompassing the Lakeside Irrigation District

Map 2 (NE Corner)

Map 3 (SW Corner)

Map 4 (SE Corner)

Please contact Research and Planning Fund Grants Management Division at (512) 463-7926 for copies.