



June 10, 2015

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Reference: Rainbow Lakes West Third Addition – Lake Assessment

Rainbow Lakes is located approximately 1/4 mile north of Maple Street and 1/4 mile east of 135th Street West. The lake was originally designed with the Rainbow Lakes West Third Addition in 1978. The Preliminary Plat for Rainbow Lakes West Third Addition states that the Water Surface Elevation for the lake is 1320. The plat also indicates that the lake has a drainage area of 1116 acres. The drainage area calculated from basins developed from recent City of Wichita LiDAR data is 1152 acres. The attached exhibit shows the drainage area to the lake. The water surface elevation of the lake was noted to be low early in the 2015 spring season. The Rainbow Lakes Home Owners Association (HOA) was concerned that the lake may be leaking and hired MKEC Engineering Inc. (MKEC) to investigate possible causes.

Common items that can contribute to low water levels in lake include:

- Excessive water bodies within a basin competing for the limited volume of rainwater runoff
- Pervious (sandy) soils
- Holes located within the pond liner commonly found by:
 - Pipe penetrations
 - Animal burrows

On May 7, 2015, MKEC made a site visit to Rainbow Lakes to investigate possible causes of the low water level experienced within the lake at that time. Photos were taken around the entire lake to document the existing conditions of the banks, as well as all inlets and outlet. Survey information of the water surface elevation was not collected at the time of the site visit.

A second site visit was completed on May 27 to monitor how the Lake reacted to the approximate 11.8 inches of rain that fell in May. The water level on May 27 was well above the normal pool elevation. The normal pool elevation is set by the 2 small PVC pipes at the eastern end of the Lake. MKEC recommends that the Home Owners Association note the date that the lake returns to its normal pool. The rate that the water surface drops could then be monitored. MKEC has not performed a long term study of the lake's water surface elevation to determine the rate of water loss below the pond's outlet structure. MKEC is also not familiar with the history of the lake.

While investigating the 1152 acre basin, MKEC discovered that approximately 55 acres of water surface exist. Typically 30 acres of watershed is required for every 1 acre of water surface to maintain a healthy pond. This basin has approximately 1 acre of pond surface area per 21 acres of watershed. The ponds in this watershed exceed the typical ratio; therefore the ponds compete with each other for the limited volume of runoff. During times of drought the water surface elevations of all of the ponds in the watershed will drop due to evaporation. Upstream ponds will fill up prior to downstream ponds when rains return. Until upstream ponds reach normal water surface elevation, water is not released to downstream ponds. Small storms within the basin may not be able to supply surface water to the lake.



MKEC noted that the lake's banks appeared to be in good shape. Steep banks are protected with stone rip-rap. Banks that are more gradual are not protected with rock. The unprotected banks appear to consist of a sandy soil. Sandy soil can allow more water to percolate into the ground than clay soils. However, even sandy soils tend to become impervious overtime as they become clogged with silt. No geotechnical investigations have been completed to determine the permeability of the lake bottom. MKEC would recommend monitoring the water level of the pond over time to determine how fast the water level drops after rain events. It is likely that the low water level is due to the watersheds inability to supply water to all of the ponds within the basin.

MKEC did not note any animal burrows around the edge of the lake. Burrowing animals can puncture clay liners and drain the lake. These holes are typically found near the water's edge or just below the water level. Burrows below the water level can be difficult to locate.

MKEC suspects that the excessive number and size of water bodies within the drainage area may be the largest contributing factor to the lake's low water level. Pond leaks would be suspected if water levels drop to the May 7 levels within a couple of weeks after the pond reaches its normal pool elevation. If it is determined that evaporation and not leaks are the primary cause of the low water levels, the HOA should investigate its water rights and request DWR to enforce those rights by requiring upstream pond owners to pump out their pond to fill the lake.

Sincerely,

MKEC ENGINEERING, INC.

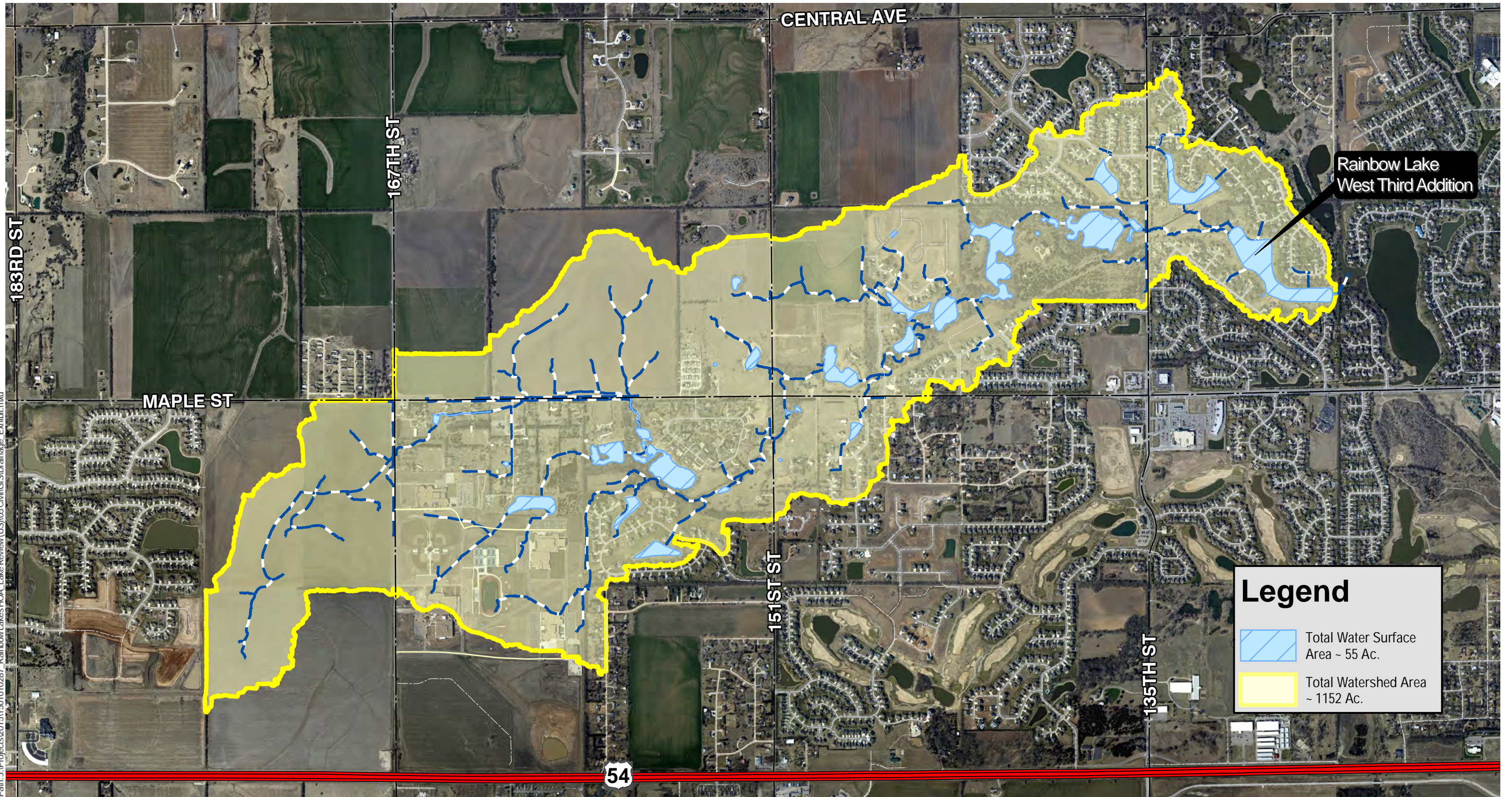


Adam J. Koster, P.E.

Attachments


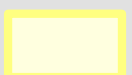
DRAINAGE BASIN EXHIBIT

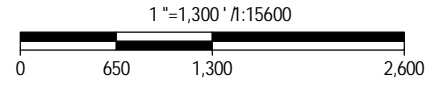
Path: J:\Projects\2015\1501010287_Rainbow Lakes HOA_Lake Review (US)\05 Civil\GIS\Drainage_ Exhibit.mxd



Rainbow Lake West Third Addition

Legend

-  Total Water Surface Area ~ 55 Ac.
-  Total Watershed Area ~ 1152 Ac.



05.26.2015



DRAINAGE BASIN EXHIBIT

RAINBOW LAKES HOA

The information presented hereon is best available data gathered by MKEC from various outside sources. MKEC does not guarantee the positional accuracy the data shown. In no event shall MKEC become liable to users of the data presented hereon, for any loss or damages, consequential or otherwise, including but not limited to time, money, or goodwill, arising from the use of the presented data. In using the data presented hereon, users further agrees to indemnify, defend, and hold harmless MKEC for any and all liability of any nature arising out of or resulting from the lack of accuracy or correctness of the data, or the use of the data.

SITE PHOTOS – MAY 7, 2015







































































SITE PHOTOS – MAY 27, 2015













