City of Grand Island

Tuesday, June 03, 2008
Study Session

Item -2

Presentation of Groundwater Issues

Staff Contact: Steve Riehle

Council Agenda Memo

From: Steven P. Riehle, Public Works Director

Meeting: June 3, 3008

Subject: Presentation of Groundwater Issues

Item #'s: 2

Presenter(s): Steven P. Riehle, Public Works Director

Background

Civil Engineers and Hydrologists from Olsson Associates updated the city council on the 2000 Groundwater Report at the September 18, 2007 City Council Study Session. A number of questions came up at the study session that warranted further study. A staff committee was created and a survey was mailed to homes in the impacted areas to gauge the extent of the problem. The surveys were mailed out in 2007 and compiled in February 2008. At the March 18, 2008 City Council Study Session the results of the survey were presented. The council asked staff to bring the issue back at a future study session to review options in-depth. Today's council study session is to gain council direction for possible solutions.

There are a number of potential solutions for the groundwater intrusion issues:

Raise basements.
Prohibit construction of new homes with basements.
Set a minimum basement elevation for new home construction.
Utilize the de-commissioned municipal water wells as dewatering wells.
Build full project from 2000 Dewatering System ($23.2 million in 2 identified areas).
Build half Project from 2000 Dewatering System (south area that was identified).
Create neighborhood de-watering districts.
Change/Identify discharge options for individual de-watering systems.

Raise basements

- Raising basements is a quick fix.
- Raise the basement floor and create a crawl space.
- Raise the basement floor and the house to maintain a full depth basement.

Prohibit construction of new homes with basements

- Some communities prohibit the construction of basements.
- The 2007 survey reported that a large majority of homes with groundwater intrusion problems were built before 1995 (141 out of 149). In 1995 the city started requiring a subsurface drainage system.

Set a minimum basement elevation for new home construction.

- Prescribe a minimum elevation for new basement construction using information from studies of highest groundwater elevations.

Utilize de-commissioned municipal water wells as dewatering wells

- A number of the municipal supply water wells in the community have been taken out-of-service because of contamination.

Build full project from 2000 Dewatering Study

- $23.2 million construction cost (from September 2007)
- Covers 2 identified areas.
- Installation of de-watering wells.
- The construction of a discharge system is approximately 85% of the overall construction cost.
- Individual basement dewatering systems are no longer needed.
- Expenses reduced for individuals with groundwater intrusion problems.
- Frees up space in the public storm sewer and sanitary sewer that is being used by individual basement dewatering systems.

Build half Project from 2000 Dewatering Study

- A smaller project still needs a suitable outlet. The discharge pipe is the most expensive part of the overall project at over 85% of the total estimated cost. The dewatering wells are a small fraction of the overall cost.
- Covers only a portion of the 2 identified areas.
- Installation of dewatering wells.
- The construction of a discharge system.
- Individual basement dewatering systems are no longer needed.
- Expenses reduced for individuals with groundwater intrusion problems.
- Frees up space in the public storm sewer and sanitary sewer that is being used by individual basement dewatering systems

Creation of neighborhood dewatering districts

- There is a petition being circulated in the area south of the Bike Trail and east of Blaine Street to create a neighborhood dewatering district. There are currently 17 signatures on the petition.
- Smaller districts are easier to manage and implement.
- Residents in the district pay according to the benefit.
- The quantity of water discharged from a neighborhood dewatering system is significantly more then what is discharged from individual basement dewatering systems. A single basement dewatering system with one pump discharges 80

gallons per minute (GPM). The system designed in 2000 pumps 10,600 GPM (over 15 Million Gallons per Day) 24 hours per day for 265 days per year.

Discussion

Raise basements

- Groundwater intrusion eliminated.
- No on-going electric bill for pumping.
- Cost to the individual homeowner.
- May need a tornado shelter.
- Loss of living and storage space.
- Change in property value/valuation.

Prohibit construction of new homes with basements

- Groundwater intrusion eliminated on newly constructed homes.
- Storm shelters would need to be constructed.
- Basement space is cheaper per square foot for construction.
- Does not address homes with existing groundwater intrusion problems.

Set a minimum basement elevation for new home construction

- The finished floor for new construction may be unreasonably high when compared to neighboring properties.
- Cost for elevating the home.
- Calculating, administering and enforcing is difficult.

Utilize de-commissioned municipal water wells as dewatering wells

- Quick fix.
- Operating the Parkview wells could pull contamination into the city drinking water system and puts all customers at risk.
- The wells were designed as drinking water wells. Their effectiveness as de-watering wells has yet to be determined.
- The wells could be used for de-watering if the wells were disconnected from the drinking water supply.
- The water may need to be treated before discharging.
- The construction of a discharge system for the water is expensive.
- Replacing the wells would be expensive.
- Disconnecting wells from the municipal system reduces system capacity during catastrophic events.

Build full project from 2000 Dewatering Study

- Continue to work with the Central Platte Natural Resources District and the Platte River Recovery Implementation Program for possible funding sources. The Program is in the process of evaluating projects for future funding and the Grand Island dewatering project is one project being evaluated.
- No grants have been found to date.

- Grants are generally tied to household income and aimed at household that are 80% and below of median income ($43,750 for a family of 4).
- Home valuations are stabilized.
- A district would be subject to protest.
- Residents in the district pay according to the benefit.
- Assessments may be difficult to equalize at the Board of Equalization.
- Homeowners without groundwater intrusion may perceive little or no benefit.
- Is there a benefit to a home with no basement? Opens the property to future basement construction.
- Some homeowners have solved their groundwater intrusion problem on their own.
- High cost-to-benefit ratio with the survey indicating a relatively small number of residents are impacted (149 had groundwater intrusion problems at the time of the survey).
- If protested out, the only way to fund the project would be from the general fund, cost would be spread to the entire population of the City.
- The construction of a discharge system for the water is expensive.
- Discharge water may need to be treated.
- The city monitors the groundwater elevation, maintenance and operation of the system.
- Ongoing annual cost.
- Will not be a quick fix. Will be 2 to 5 years before operative.

Build half Project from 2000 Dewatering Study

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- Ongoing annual cost.
- Will not be a quick fix. Will be 2 to 4 years before operative.

Creation of neighborhood dewatering districts

- Neighborhood dewatering systems will overload the existing storm sewer system.
- Since they cannot discharge into the existing storm sewer system this still requires the construction of the expensive discharge system for the water.
- The district is subject to protest.
- Residents in the district pay according to the benefit.
- Homeowners without groundwater intrusion may perceive little or no benefit.
- Some homeowners have solved their groundwater intrusion problem on their own.
- Benefit is difficult to determine
- On going cost.
- Homeowners without a problem perceive little or no benefit.

Discharge options for individual dewatering systems

- Sanitary Sewer – Existing gravity sanitary sewer lines, lift stations and force mains do not have the capacity to handle the flows.
- Storm Sewer – If storm sewer is adjacent to the property, the cost for a plumber to connect a basement dewatering system to the storm sewer is approximately $1,000. Many neighborhoods do not have storm sewer available.
- Sanitary Sewer system
    - Could overload the system that wasn't designed to handle this.
    - Increased potential for backups.
- Storm Sewer
    - If a storm sewer pipe was close to their property, they could discharge their basement dewatering system directly into the storm sewer. A number of property owners have already done so. A storm sewer district could be built with storm sewer adjacent to each house.
    - Quick fix.
    - Minimal cost.
    - Storm sewer is not always available.
    - Uses existing storm sewer capacity.
    - We've allowed the connections because of the small numbers of individual systems.
- Ditch
    - If the homeowner has a ditch next to the street or in their back yard they sometimes discharge their basement dewatering systems there. Putting a constant source of water into an open ditch makes it hard to mow, kills grass, raises mosquito concerns, and adds to the problem down-gradient.
    - Many areas of the community, such as northwest Grand Island, Parkview and the Circle Drive area were developed before the city had jurisdiction over the area. These areas do not have storm sewer and the streets are substandard asphalt with no curb and gutter.

- Make Storm Sewer available
  - Create a paving and storm sewer district
  - Create a storm sewer only district.

Conclusion

This item is presented to the City Council in a Study Session to allow for any questions to be answered and to create a greater understanding of the issue at hand.