

# Johnson County flood warning/flood forecasting: Feasibility Study

## Executive Summary

Prepared for  
Johnson County Public Works  
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Prepared by  
Peridian Group, Inc.  
David Ford Consulting Engineers, Inc.  
OneRain Incorporated  
WeatherData  
The Larkin Group

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## Project Overview

In August 2002, the Johnson County Stormwater Management Program (SMP) retained a project team led by the Peridian Group to complete a study to determine the feasibility a floodwarning/flood forecasting system in Johnson County, Kansas – and if determined to be feasible, develop an implementation plan and to identify the potential costs to develop such a system. The basis for the study was the existing rain and stream gage network in the County. In 1999 the Johnson County Stormwater Management Program initiated a significant expansion to the existing rain and stream gage network that at the time was located primarily in Overland Park, Kansas and Jackson County, Missouri. The expansion covered a significant portion of Johnson County and was completed to provide a data collection system and the foundation for developing and implementing a floodwarning system, if desired or required.

Johnson County SMP staff managed and directed the overall effort. To ensure that the needs of the Johnson County communities were met, the Peridian Group project team worked with and reported to a steering committee comprised of Courtney Christensen (Mission Hills), Mike Moore (Fairway), Dan Miller (Overland Park), Scott Crain (Merriam) Nick Crossly (Johnson County Emergency Management) and Chet Belcher (Johnson County Stormwater Management Program). Each steering committee team member provided unique experience in the area of flood preparation and assisted in the development of this study.

## Key Findings

1. Based on the significant interest by Johnson County communities combined with the extent and capabilities of the existing rain and stream gage network in the County, a floodwarning/flood forecasting system is feasible for Johnson County.
2. Based on the interest by communities in the Kansas City Metropolitan area, combined with the extent and capabilities of the existing rain and stream gage network in the region, a regional floodwarning/flood forecasting system should be considered.
3. Numerous communities expressed interest in participating in a regional system that could decrease the number of multiple, redundant activities performed by individual communities.
4. Multiple local, regional, state and federal agencies expressed an interest in being involved in and supporting a regional floodwarning/flood forecasting system.
5. Multiple Johnson County communities recognize floodwarning/flood forecasting as a practical and cost-effective alternative to structural improvements.
6. An implementation plan can be developed for Johnson County to initiate development of a floodwarning/flood forecasting system without compromising the development of a regional floodwarning/flood forecasting system.

7. Johnson County should continue to enhance and fund the floodwarning system “backbone”. The backbone consists of the basic rain and stream gage data collection network, and the data transmission and management system necessary for the basic operation of the system. The total capital cost for the backbone system to support a full countywide floodwarning system is approximately \$800,000. The annual recurring costs (which include operation, maintenance, training, exercising the system, and outsourcing operation of threat recognition and water level forecasting) are estimated to be approximately \$160,000 in 2004 dollars. It is recognized that it may be many years, if ever, before a full countywide floodwarning system is required. However, the steering team felt it was important to identify this cost now.
8. Each city will be responsible for the desired floodwarning system/components needed – these systems/components include the locating, design, construction, maintenance and operation of specific floodwarning activities including flashing lights, automated gates and other features necessary to warn the public of flooding conditions.
9. Johnson County should evaluate the potential for watershed-based and/or countywide 24x7 flood forecasting services/support. At this time it appears that outsourcing is the most cost-effective method for providing this service/support.
10. The inventory of the existing rain and stream gage network showed that the system requires an additional eight rain and stream gages to function at a service level capable of supporting the countywide flood warning system based on the currently identified needs.
11. The critical floodwarning system requirements identified by the cities include location specific forecasting, basic transmission network infrastructure, and a system that provides opportunity for future automation.

## Recommended System Enhancements

The recommended system backbone, which includes elements that offer broad benefit throughout the county, provides fundamental goods and services required for an effective and efficient flood warning system. The existing backbone system consists of 78 rain and stream gages, an ALERT radio single frequency data transmission system, and a DIAD Visor™ data management system. Based on the backbone system evaluation, the following enhancements are recommended:

- Add gage-adjusted radar rainfall with alarms.
- Add stream gages at eight locations.
- Upgrade the ALERT radio transmission system to incorporate dual-frequency store-and-forward repeaters.
- Promote the use of NOAA weather radio by the cities and the residents. This system provides wide-spread public notification.
- Provide an automated threat recognition system tool. The County should select, and make available and cost effective for use by a city that desires to do so, a computer-aided threat recognition and notification software package.

- Provide a template emergency response and preparedness plan for use by the cities within Johnson County (and if applicable, the region).
- Provide site-specific water level forecasting services. The ability to forecast water levels at specific locations on streams was identified by many beneficiaries of flood warning as a critical need. However, streams within the County cross political boundaries, so developing the capabilities within one city and not the adjacent ones is inefficient. Accordingly, the backbone plan should include capability to provide such forecasts at multiple locations. However, the County should select and provide the service and tools with funding for application from individual cities..
- Continue funding for website sharing information with the public. The currently funded website ([www.stormwatch.com](http://www.stormwatch.com)) is used widely as a source of real-time flood information. This website is hosted by the City of Overland Park, financially supported by the County and is useful for all Johnson County cities and others in the Kansas City Region if applicable.

## Summary

The proposed menu of services is a comprehensive list of potential countywide flood warning system components. Over the next several years the cities and the County could begin to integrate recommended backbone components. The recommended system enhancements could be implemented as part of existing SMP projects or as stand-alone improvements pending available funding.

If a threat recognition system is developed such a system will require individual cities to identify potential flooding locations, and identify specific actions required to maximize early threat recognition. Development of this type of system would be aided by a 24x7 monitoring.

Improvements identified within this report assume continued coordination with local, state, and federal organizations within the region, which currently own, operate, or review flood warning information. As part of the implementation of this report the County should explore joint funding and grant opportunities from potential funding sources identified within the appendix of this report.