

## **Combined Sewer Overflow Action Plan** *City of Rock Island*

As part of the settlement of the pending lawsuit, the City of Rock Island proposes to significantly advance its combined sewer overflow program over the next few years through the execution of this *Combined Sewer Overflow Action Plan*. Plan initiatives will achieve improved monitoring, wet weather treatment, and facility operations through the execution of a number of projects. The projects, when taken as a whole, will achieve the following objectives:

- **Consolidate untreated combined sewer overflows** to two locations to facilitate monitoring and treatment, if needed.
- **Accurately quantify and characterize impacts of combined sewer overflows** by installing effective metering at the two remaining active CSO outfalls and conducting a water quality monitoring program
- **Maximize storage and treatment of combined sewage** at the Main WWTP prior to experiencing overflows by installing/raising weirs at the diversion structures in the Mill St. headworks.
- **Address known or suspected operational issues** by reviewing the capacity of sewers feeding the Blackhawk Lift Station and searching for cross-connections in the northeast side of the City.
- **Relieve the South Interceptor** with the proposed Blackhawk Wet Weather Treatment Facility
- **Optimize joint operations of treatment facilities** through development of optimal control logic for existing and proposed facilities
- **Create a comprehensive strategy for addressing combined sewer overflows** through the development of a Long Term Control Plan (LTCP).

Assuming approval of this *Combined Sewer Overflow Action Plan* prior to the end of the 2001, the City intends to complete four of the projects by April 1, 2002. The other projects will take between 8 to 24 months from approval of this action plan because they are more complex or rely on the results of monitoring program.

The attached exhibit indicates the location of the projects this plan proposes. Details of each project follow below.

Each project includes a budget level cost estimate. In addition to the project costs, the program management will cost between \$25,000 to \$35,000 per year for coordination, meetings, etc.

## CSO Control Projects

### *City of Rock Island*

<b>Project:</b>	Project "A" Close Provisionally Outfalls 003, 004, and 006												
<b>Cost:</b>	<table border="0"> <tr> <td>Design:</td> <td>\$1,500</td> <td></td> </tr> <tr> <td>Construction:</td> <td>\$3,500</td> <td></td> </tr> <tr> <td>O&amp;M:</td> <td>\$7,000 (per year)</td> <td></td> </tr> <tr> <td><b>Total:</b></td> <td></td> <td><b>\$12,000</b></td> </tr> </table>	Design:	\$1,500		Construction:	\$3,500		O&M:	\$7,000 (per year)		<b>Total:</b>		<b>\$12,000</b>
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Construction:	\$3,500												
O&M:	\$7,000 (per year)												
<b>Total:</b>		<b>\$12,000</b>											
<b>Completion Date:</b>	April 1, 2002												
<b>Purpose:</b>	Consolidate CSOs by reducing their number from 6 to 3.												
<b>Description:</b>	Close the flood gates at the three outfalls and install bottle racks in upstream manholes to measure maximum surcharging in combined sewer.												
<b>Discussion:</b>	<p>During recent flooding on the Mississippi River, the City maintained these flood gates closed for an extended period and experienced no surcharging. Because of this experience, the City believes it can abandon these outfalls without any negative consequences.</p> <p>The City will test the effects of closing the outfalls by maintaining the flood gates closed while monitoring maximum surcharging in the combined sewers upstream of the flood gates. If no excessive surging occurs during a one year trial period, provisions will be made for the permanent abandonment of the outfalls.</p> <p>The City will abandon the test if, at any time, excessive surcharging occurs.</p>												

## CSO Control Projects

### City of Rock Island

<b>Project:</b>	Project "B" Install Area-Velocity Meter to Measure CSO Discharge at Outfall 005												
<b>Cost:</b>	<table border="0"> <tr> <td>Design:</td> <td>\$2,500</td> <td></td> </tr> <tr> <td>Construction:</td> <td>\$7,500</td> <td></td> </tr> <tr> <td>O&amp;M:</td> <td>\$2,000 (per year)</td> <td></td> </tr> <tr> <td><b>Total:</b></td> <td></td> <td><b>\$12,000</b></td> </tr> </table>	Design:	\$2,500		Construction:	\$7,500		O&M:	\$2,000 (per year)		<b>Total:</b>		<b>\$12,000</b>
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Construction:	\$7,500												
O&M:	\$2,000 (per year)												
<b>Total:</b>		<b>\$12,000</b>											
<b>Completion Date:</b>	April 1, 2002												
<b>Purpose:</b>	Quantify frequency, volume, and duration of overflows to Sylvan Slough (Outfall 005)												
<b>Description:</b>	Install a portable area-velocity meter (ISCO or Sigma) between the flap gate and the flood gates with a separate input for the position (open or closed) of the flap gate.												
<b>Discussion:</b>	<p>With the closure of Outfalls 003, 004, and 006, only Outfall 005 will continue discharging to Sylvan Slough. Therefore, quantifying CSO volumes and rates at this outfall will achieve complete characterization of any CSOs to the Sylvan Slough.</p> <p>Accurate metering requires using an area-velocity meter because backwater during high river stage impedes free flow of sewage through the outfall.</p> <p>The metering information will provide crucial information for design of any CSO abatement project. It will also verify data provided by the existing limit switch on the flap gate. Now, the City records short duration gate openings that it reports as CSO events. The City suspects these "events" may actually consist of sudden releases of excess air pressure in the combined sewer through the flap gate. (This can only occur when there is no back pressure on the flap gate.)</p> <p>The City believes water quality monitoring of the CSO is unnecessary because past studies have established CSO quality for typical parameters.</p>												

# CSO Control Projects

## City of Rock Island

<b>Project:</b>	Project "C" Install Area-Velocity Meters to Measure Combined Sewage Inflow to Treatment Plant Headworks												
<b>Cost:</b>	<table> <tr> <td>Design:</td> <td>\$6,000</td> <td></td> </tr> <tr> <td>Construction:</td> <td>\$62,000</td> <td></td> </tr> <tr> <td>O&amp;M:</td> <td>negligible</td> <td></td> </tr> <tr> <td><b>Total:</b></td> <td></td> <td><b>\$68,000</b></td> </tr> </table>	Design:	\$6,000		Construction:	\$62,000		O&M:	negligible		<b>Total:</b>		<b>\$68,000</b>
Design:	\$6,000												
Construction:	\$62,000												
O&M:	negligible												
<b>Total:</b>		<b>\$68,000</b>											
<b>Completion Date:</b>	April 1, 2002												
<b>Purpose:</b>	Provide sufficient metering to fully quantify CSO discharge at the Main WWTP (Outfall 001)												
<b>Description:</b>	Install permanent area-velocity meters in the two interceptors that feed the Main WWTP. These will be installed upstream of the diversion structures in a suitable location.												
<b>Discussion:</b>	At present, the City computes CSO discharge by converting measured water level in the North Side Diversion Structure and converting to flow rate using the weir equation. There are several problems with this system:												
<div data-bbox="289 1058 711 1774"> <p>Installing flow meters on combined sewer interceptors allows complete quantification of CSO volumes</p> <p>The diagram shows a central circle labeled 'MILL ST. HEADWORKS'. Three arrows point into it from the top-left, top-right, and bottom-right. The top-left arrow is green and labeled 'STORM SEWERS (2)'. The top-right arrow is pink and labeled 'COMBINED INTERCEPTORS (2)'. The bottom-right arrow is pink and labeled 'WWTP INFLUENT'. Two callouts point to the interceptors: one says '2 Proposed Flow Meters' and the other says 'Existing Influent Flow Meter'. Two arrows point out from the bottom-left and bottom-right. The bottom-left arrow is red and labeled 'MIXED CSO AND STORM TO RIVER'. The bottom-right arrow is pink and labeled 'WWTP INFLUENT'. Below the diagram is the formula: CSO Volume = Combined Interceptor Volume - WWTP Influent Volume.</p> </div>	<ol style="list-style-type: none"> <li>1. It measures stormwater discharge as well as CSOs</li> <li>2. It reports false CSOs during low flow conditions.</li> <li>3. It does not account for submerged weir conditions during high flows</li> <li>4. It can miss metering small CSO discharge through a 12-inch diameter drain pipe.</li> </ol> <p>This project will achieve metering all combined sewage inflow into the Mill St. headworks through the two interceptors. By subtracting the WWTP influent volume from the combined sewage inflow, the City can accurately quantify <u>all</u> CSO volume through Outfall 001.</p>												

## CSO Control Projects

### City of Rock Island

<b>Project:</b>	Project "D" Install Weir on False Floor of North Side Diversion Structure and Raise Weir on South Side Diversion Structure												
<b>Cost:</b>	<table border="0"> <tr> <td>Design:</td> <td>\$16,000</td> <td></td> </tr> <tr> <td>Construction:</td> <td>\$15,000</td> <td></td> </tr> <tr> <td>O&amp;M:</td> <td>negligible</td> <td></td> </tr> <tr> <td><b>Total:</b></td> <td></td> <td><b>\$31,000</b></td> </tr> </table>	Design:	\$16,000		Construction:	\$15,000		O&M:	negligible		<b>Total:</b>		<b>\$31,000</b>
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Construction:	\$15,000												
O&M:	negligible												
<b>Total:</b>		<b>\$31,000</b>											
<b>Completion Date:</b>	April 1, 2002												
<b>Purpose:</b>	Maximize storage of combined sewage and influent flow to the Main St. WWTP before experiencing overflows.												
<b>Description:</b>	In the North Side Diversion Structure, install a weir on the false floor at the mouth of the 96-inch diameter combined interceptor. In the South Side Diversion Structure, raise the existing weir by inserting stop planks. The height of the weirs depends upon critical elevations for flooding. If fixed weirs cause too much hydraulic restriction, inflatable weirs or flash boards may be used instead.												
<b>Discussion:</b>	<p>Installing or raising the weirs achieves the following benefits:</p> <ol style="list-style-type: none"> <li>1. Storage in the combined interceptors prior to overflowing is maximized</li> <li>2. Discharge to the WWTP prior to overflowing is maximized</li> </ol> <p>Detailed hydraulic modeling will be required to determine the maximum elevation to which the weirs may be raised without causing basement flooding or surcharging to the surface. The same modeling will allow quantification of expected benefits.</p>												

## CSO Control Projects

### City of Rock Island

<b>Project:</b>	Project "E" Review Capacity of Sewers Feeding the Blackhawk Lift Station and Characterize First Flush
<b>Cost:</b>	Design: \$34,000 Construction: none O&M: none Total: <b>\$34,000</b>
<b>Completion Date:</b>	8 months from action plan approval
<b>Purpose:</b>	Assure tributary sewers have sufficient capacity to exploit the full capacity of the Blackhawk Lift Station and establish the time and/or volume required for the first flush.
<b>Description:</b>	Investigate the hydraulic capacity of the pipes supplying sewage to the Blackhawk Lift Station. Identify bottlenecks and required projects to achieve full utilization of the Blackhawk Lift Station capacity. Determine the level of protection against overflows that the delivery system provides. Determine, through water quality sampling, the time and/or volume required to flush the sewer system.
<b>Discussion:</b>	<p>When the City reconstructed the Blackhawk Lift Station in 2000, the pumping capacity approximately doubled to 13,500 gpm. Because of downstream capacity limitations, the City does not use the full capacity of the lift station at present. Instead, excess inflow overflows at Outfall 007.</p> <p>When the downstream capacity issue is resolved, the City wants assurance that it can exploit the full capacity of the lift station. This requires analysis and modeling of the complex combination of siphons and gravity sewers that feed the lift station.</p> <p>Design of the Blackhawk Wet Weather Treatment Facility requires characterizing the first flush because there are different treatment requirements for these flows. The Black Hawk Lift Station provides a convenient place to perform the required sewage quality and quantity monitoring to carry-out this task.</p>

## CSO Control Projects

### City of Rock Island

<b>Project:</b>	Project "F" Construct the Blackhawk Wet Weather Treatment Facility near 49 <sup>th</sup> Avenue and Highway 67
<b>Cost:</b>	Design: \$200,000-\$340,000 Construction: \$1,150,000-1,910,000 O&M: \$50,000 (per year) Total: <b>\$1,400,000-\$2,300,000</b>
<b>Completion Date:</b>	18 to 24 months from action plan approval
<b>Purpose:</b>	Relieve the South Interceptor and reduce or eliminate overflows at OF007
<b>Description:</b>	Construct a swirl concentrator to treat discharges in excess of the capacity of the South Interceptor. The swirl concentrator would provide the equivalent of primary treatment and disinfection prior to discharging to a new outfall located on the Rock River downstream of the Highway 67 bridge. The facility would return approximately 10% of the treated flow volume to the South Interceptor as underflow.
<b>Discussion:</b>	<p>The recently constructed Blackhawk Lift Station can deliver more flow than the South Interceptor can handle without surcharging to the surface. To remedy the surcharging situation, the City investigated various options and concluded constructing a wet weather treatment facility best satisfies CSO abatement objectives.</p> <p>Preliminary analysis indicates the wet weather treatment facility should have the capacity to treat most or all the flow delivered from upstream. This will create space in the South Interceptor to receive inflow at downstream locations and provide more capacity at the Main WWTP to treat flow from the North Interceptor. With this facility in operation, the City anticipates a great reduction or elimination in overflows at Outfall 007.</p>

## CSO Control Projects

### *City of Rock Island*

<b>Project:</b>	Project "G" Develop Optimal Control Logic to Coordinate Use of Existing Franciscan and Saukie Treatment Tanks and Proposed Blackhawk Wet Weather Treatment Facility												
<b>Cost:</b>	<table border="0"> <tr> <td>Design:</td> <td>\$21,000</td> <td></td> </tr> <tr> <td>Construction:</td> <td>none</td> <td></td> </tr> <tr> <td>O&amp;M:</td> <td>none</td> <td></td> </tr> <tr> <td><b>Total:</b></td> <td></td> <td><b>\$21,000</b></td> </tr> </table>	Design:	\$21,000		Construction:	none		O&M:	none		<b>Total:</b>		<b>\$21,000</b>
Design:	\$21,000												
Construction:	none												
O&M:	none												
<b>Total:</b>		<b>\$21,000</b>											
<b>Completion Date:</b>	12 months from action plan approval												
<b>Purpose:</b>	Maximize flow to Main WWTP while minimizing discharge of untreated CSOs												
<b>Description:</b>	Develop, through hydrologic, hydraulic, and control logic modeling, the control logic needed for optimal joint operation of treatment facilities.												
<b>Discussion:</b>	<p>Optimal control logic maximizes flow of combined sewage to the Main WWTP at all times. After the Main WWTP has achieved maximum flow, the control logic must maximize use of CSO abatement facilities—both storage and treatment. Only after utilizing the full storage and treatment capacity should the control logic allow overflows.</p> <p>The existing Saukie and Franciscan treatment tanks will operate in series with the proposed Blackhawk Wet Weather Treatment Facility, and the Main WWTP. This mode of operation requires careful analysis to develop the control logic required for optimal operation.</p>												

## CSO Control Projects

### *City of Rock Island*

<b>Project:</b>	Project "H" Develop A City-Wide Long Term Control Plan For Combined Sewer Overflows												
<b>Cost:</b>	<table border="0"> <tr> <td>Design:</td> <td>\$150,000</td> <td></td> </tr> <tr> <td>Construction:</td> <td>none</td> <td></td> </tr> <tr> <td>O&amp;M:</td> <td>none</td> <td></td> </tr> <tr> <td><b>Total:</b></td> <td></td> <td><b>\$150,000</b></td> </tr> </table>	Design:	\$150,000		Construction:	none		O&M:	none		<b>Total:</b>		<b>\$150,000</b>
Design:	\$150,000												
Construction:	none												
O&M:	none												
<b>Total:</b>		<b>\$150,000</b>											
<b>Completion Date:</b>	24 months from action plan approval												
<b>Purpose:</b>	Create a comprehensive strategy for addressing CSOs throughout the city.												
<b>Description:</b>	<p>Draft a long term control plan for CSOs consisting of the following nine elements:</p> <ol style="list-style-type: none"> <li>1. Characterization of the combined sewer system</li> <li>2. Consideration of environmentally sensitive areas</li> <li>3. Evaluation of alternatives for CSO control</li> <li>4. Consideration of costs and performance</li> <li>5. Revisions to operational plans</li> <li>6. Maximization of treatment</li> <li>7. Implementation schedule for new facilities and management programs</li> <li>8. Post-construction monitoring for performance</li> <li>9. Participation of the public</li> </ol>												
<b>Discussion:</b>	<p>If the characterization of receiving water impacts identifies water quality violations caused by CSOs, the City will need to develop a long term control plan to eliminate the violations. Federal policy mandates the plan include the nine elements listed above. If the characterization shows no CSO-related water quality violations, the City will not have to prepare the long term control plan.</p> <p>The projects proposed in this CSO Action Plan will support several portions of the long term control plan.</p>												

## CSO Control Projects

### City of Rock Island

<b>Project:</b>	Project "I" Conduct Receiving Water and Combined Sewer Overflow Quality Monitoring
<b>Cost:</b>	Design: \$100,000 to \$175,000 Construction: none O&M: none Total: <b>\$100,000 to \$175,000</b>
<b>Completion Date:</b>	12 months from action plan approval
<b>Purpose:</b>	Characterize the impacts of CSO to the Mississippi River, determine if the overflows cause any water quality violations, and develop background water quality at the location of the proposed Blackhawk Wet Weather Treatment Facility.
<b>Description:</b>	Conduct two dye tests during dry weather to evaluate dispersion of effluent from OF001 into the Mississippi River. Collect and analyze water quality samples throughout the dispersion plume for small, medium, and larger rainfall events (4 events total). Analyze for pH, temperature, dissolved oxygen, bacteria (e.coli and fecal coli.), total suspended solids, volatile suspended solids, and oil sheen. Determine if CSOs cause any water quality violations and health risks to potential receptors. Document observations of floatables at sampling locations.
<b>Discussion:</b>	<p>This project commences with drafting a sampling plan and submitting it to the IEPA for their concurrence. Only after regulatory comment and approval will sampling begin.</p> <p>Use the dye testing results to focus the sampling program. Dye testing should be performed during conditions of cold effluent/warm river and vice versa to ascertain if temperature affects the dispersal of the plume.</p> <p>Sampling locations should include the Rock River at the proposed Blackhawk Wet Weather Treatment Facility outfall, Sylvan Slough near OF005, the closest downstream location where full-body contact recreational activities may occur, and within the CSO outfall pipe. We propose no sampling within the established zone-of-initial-dilution. Use the existing City program to assess floatables, and published studies and data to assess regional impacts.</p>

## CSO Control Projects

### *City of Rock Island*

<b>Project:</b>	Project "J" Conduct a Cross-Connection and Capacity Investigation of the Northeast Corner of the City.												
<b>Cost:</b>	<table border="0"> <tr> <td>Design:</td> <td>\$55,000</td> <td></td> </tr> <tr> <td>Construction:</td> <td>none</td> <td></td> </tr> <tr> <td>O&amp;M:</td> <td>none</td> <td></td> </tr> <tr> <td><b>Total:</b></td> <td></td> <td><b>\$55,000</b></td> </tr> </table>	Design:	\$55,000		Construction:	none		O&M:	none		<b>Total:</b>		<b>\$55,000</b>
Design:	\$55,000												
Construction:	none												
O&M:	none												
<b>Total:</b>		<b>\$55,000</b>											
<b>Completion Date:</b>	8 months from action plan approval												
<b>Purpose:</b>	Determine causes and solutions to manhole surcharging at the intersection of 5 <sup>th</sup> Avenue and 40 <sup>th</sup> St. (Farmall Viaduct)												
<b>Description:</b>	Conduct smoke testing of the combined and sanitary sewers in the partially separated 4 <sup>th</sup> Av. Sewer Sub-Basin (Service Areas 8A, 9, 10, 11, 14 and 15) to identify direct sources of inflow. Identify required projects to direct sources of clearwater to the storm sewer system.												
<b>Discussion:</b>	<p>In response to the 30-inch diameter interceptor experiencing surcharging to the surface at the Farmall viaduct, the City undertook a two-year program to clean the interceptor. The City had suspected that sedimentation had reduced the capacity of the interceptor to the point of causing surcharging. After completing the cleaning, Rock Island experienced a 3-inch rainfall over the period of a few hours and the surcharging occurred again.</p> <p>Because of the complex network of piping in the partially separated service areas, there may yet exist significant sources of clearwater inflow to the combined sewer system. The smoke testing should identify any these cross-connections and allow the City to determine the additional projects needed to remedy the surcharging situation.</p>												