Existing Conditions
General location of existing project, Tuttle Creek Lake, and unprotected areas of the City of Manhattan examined in this study.

Enclosure 1
Manhattan Local Protection Project
Draft Feasibility Report
Manhattan, Kansas Levee Unit Raise for Plan 3

Enclosure 3
Manhattan Local Protection Project
Draft Feasibility Report
Manhattan, Kansas Levee Unit Raise for Plan 4

Not to Scale

CITY OF MANHATTAN

Manhattan Levee

Enclosure 4
Manhattan Local Protection Project
Draft Feasibility Report
<table>
<thead>
<tr>
<th>Final Alternatives Array</th>
<th>Short Description of Each Plan</th>
<th>First Cost (Oct 2013) and sponsor affordability</th>
<th>Annual Net Benefits</th>
<th>BCR (efficiency)</th>
<th>Flood Risk Management Effectiveness Rank</th>
<th>Environmental &amp; Cultural and Real Estate Effects (Acceptability)</th>
<th>Completeness, Effectiveness, Efficiency, Acceptability Summary</th>
<th>Annual Induced Damages</th>
<th>Ability to Meet Planning Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan 1</td>
<td>No Federal Action</td>
<td>None</td>
<td>None</td>
<td>--</td>
<td>no reduction in risk</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>No cost and no disruption. Future without project condition similar to existing condition. Essentially no contribution to Flood Risk Management. Planning objectives are not met.</td>
</tr>
<tr>
<td>Plan 2</td>
<td>Average 0.7 ft. levee rise with accompanying geotechnical and structural reliability improvements.</td>
<td>$21.4M (sponsor-affordable)</td>
<td>$2.08M</td>
<td>2.9</td>
<td>Low</td>
<td>Minor/Insignificant</td>
<td>Marginal -- minimal flood risk reduction; could be unacceptable to sponsor; inefficient given the cost as compared to Plan 3.</td>
<td>Minimal</td>
<td>Minimal overtopping improvements versus existing conditions. Implementation would leave a higher overtopping flood risk than is prudent given the investment. Planning objectives only partially met.</td>
</tr>
<tr>
<td>Plan 3</td>
<td>Average 1.5 ft. levee raise with accompanying geotechnical and structural reliability improvements.</td>
<td>$22.0M (sponsor-affordable)</td>
<td>$2.85M</td>
<td>3.5</td>
<td>Medium</td>
<td>Minor/Insignificant</td>
<td>Yes. Plan is considered Complete, Effective, Efficient, and Acceptable.</td>
<td>$2,040</td>
<td>Supports long-term City flood risk management and somewhat equalizes Big Blue &amp; existing Kansas River levee segments performance for the more common floods. Planning objectives are met.</td>
</tr>
<tr>
<td>Plan 4</td>
<td>Average 2.1 ft. levee raise with accompanying geotechnical and structural reliability improvements.</td>
<td>$46.3M (marginal affordability)</td>
<td>$2.76M</td>
<td>2.2</td>
<td>High</td>
<td>Structural Relocations and/or condemnations are likely</td>
<td>Mixed -- plan is considered Complete, Effective, Efficient. Public acceptability is questionable due to real estate impacts and overall cost of project to the community.</td>
<td>&gt; Plan 3 Damages</td>
<td>Supports long-term City flood risk management and provides substantial additional protection against future uncertainty in major Big Blue and Kansas River flood conditions. Best meets the Planning objectives.</td>
</tr>
<tr>
<td>Plan 5</td>
<td>Average 1.3 ft. levee raise with widening of the Big Blue River channel and bridge modifications for increased flood conveyance with accompanying geotechnical and structural reliability improvements.</td>
<td>$53.0M (marginal affordability)</td>
<td>$1.89M</td>
<td>1.5</td>
<td>Medium</td>
<td>Would likely require environmental mitigation</td>
<td>Mixed -- not efficient as this Plan provides essentially the same level of risk reduction as the much less costly Plan 3. Acceptability is marginal due to adverse habitat effects.</td>
<td>Minimal</td>
<td>Supports long-term City flood risk management. Provides more flow under bridges &amp; reduces possibility of debris jams; Channel Widening reduces any induced damages from levee raise. Planning objectives are met.</td>
</tr>
</tbody>
</table>

**NOTE:** Cost and Economic data presented in this table reflect early screening level analysis and do not include refinements made in the scope or estimate of the Recommended Plan following alternative comparison and evaluation.