



US Army Corps of Engineers®

CHICAGO DISTRICT

Lansing and Calumet City Levees, IL

Appendix K: Risk Register

June 2021

Risk associated with decision to approve the TSP and draft DPR for public and agency review and comment																			
#	Risk Category	Risk Description	Consequences Description - Undesirable Results	Unmitigated ratings and associated data and facts effecting the assigned ratings for likelihood and consequences and the respective certainty ratings associated with each				Risk Rating (consequences x probability)	Mitigation Measure Ratings						Risk Rating Buy down Delta				
				Consequence Certainty	Likelihood	Likelihood Certainty	Risk Rating Certainty		Consequence	Certainty	Likelihood	Certainty	Risk Rating	Certainty					
TSP - 1	Viable non-federal sponsor to cost share project implementation	Sponsors are unwilling or unable to enter a PPA to implement the Recommended Plan.	If the project does not have a viable non-federal sponsor, the project will not be able to proceed to proceed to the PED and Construction phases.	High	High	There is a demonstrated interest to proceed with a flood risk management project by the Village of Lansing and Calumet City. Both municipalities have signed a FCSA for the feasibility phase.	Low	High	The Village of Lansing and Calumet City have engaged in previous studies with the District regarding the levee systems, and the Lansing and Calumet City have signed a FCSA for the feasibility phase.	Medium	High	The PM and study team will continue to communicate with the non-federal sponsors during the study to ensure that they understand the recommendations and commitments that come from the feasibility phase study.	Medium	High	Low	High	Low	High	Communication with the non-federal sponsors will provide the opportunity to work through questions or issues that arise from the sponsors.
TSP - 2	Federal Interest	Problem resolution does not fit within a CAP authority, (i.e. problem resolution is not of regional or national significance).	If the benefits and costs of any of the alternative plans do not have a BCR greater than or equal to 1.0, the project would not meet CAP Federal participation requirements.	High	High	The economic analysis assumptions which could affect the final analysis include: levee fragility, level of protection provided by the proposed alternatives, estimated construction costs for each alternative, and the presumed federal discount rate at time of project justification.	Low	High	Level of detail for the economic analysis was appropriate for the feasibility phase analysis. The levee fragility, H&H modeling, and HEC-FDA model, and cost estimate were further refined between the FAAM milestone and the TSP milestone.	Medium	High	A review of economic model assumptions will be conducted to ensure adequacy and consistency of the analyses during DQC, ATR, and policy and legal reviews during the feasibility phase.	Medium	High	Low	High	Low	High	Identification of any changes to the damages/ benefits will provide an opportunity to reformulate plans to meet CAP authority requirements, if necessary.
TSP - 3	CAP Federal participation limits	Magnitude and complexity of water resource problem may be greater than can be successfully resolved by a CAP project.	If the costs exceed the CAP project limit, a complete project may not be constructible or a waiver may need to be sought.	High	High	The cost estimate was prepared to reflect additional design data gathered during the feasibility phase and performed according to USACE policies.	Medium	High	Level of detail for the civil design and cost estimate was appropriate for the feasibility phase analysis. The designs and cost estimate were further refined between the FAAM milestone and the TSP milestone.	High	High	A review of the civil design and cost estimate assumptions will be conducted to ensure adequacy and consistency of the analyses during DQC, ATR, and policy and legal reviews during the feasibility phase.	Medium	High	Low	High	Low	High	Identification of any changes to the cost estimate will provide an opportunity to reformulate plans to meet CAP Federal participation limits, if necessary.
TSP - 4	Life Loss/Population at Risk Estimate	Consequence analysis may over- or under-estimate life loss.	If life loss is higher than estimated, the risk assessment results may be impacted.	Medium	High	The life loss and PAR estimates were developed using LifeSim and best available data.	Low	High	Level of detail for the consequences analysis was appropriate for the feasibility phase analysis.	Low	High	A review of LifeSim model assumptions will be conducted to ensure adequacy and consistency of the analyses during DQC, ATR, and policy and legal reviews during the feasibility phase.	Medium	High	Low	High	Low	High	Life loss is virtually zero for events up to the 500-year storm. Additional refinements to the LifeSim model are unlikely to change the result.
TSP - 5	Economics	Damages and benefits are over- or underestimated.	If damages and benefits are determined to be significantly different from the FID estimate based on feasibility-level analyses, the benefit cost ratio of the proposed plans may fall below 1.0.	Medium	High	The economic analysis assumptions which could affect the final analysis include: levee fragility, level of protection provided by the proposed alternatives, estimated construction costs for each alternative, and the presumed federal discount rate at time of project justification.	Low	High	Level of detail for the economic analysis was appropriate for the feasibility phase analysis. The levee fragility, H&H modeling, and HEC-FDA model, and cost estimate were further refined between the FAAM milestone and the TSP milestone. Best available data for the structure elevation/values and vehicle count were used.	Low	High	A review of economic model assumptions will be conducted to ensure adequacy and consistency of the analyses during DQC, ATR, and policy and legal reviews during the feasibility phase.	Medium	High	Low	High	Low	High	Identification of any changes to the damages/ benefits will provide an opportunity to reformulate plans to meet CAP authority requirements, if necessary.
TSP - 6	Climate Change	Projected rainfall may increase in intensity in the future.	If flow frequencies increase from the data used in the Feasibility analysis, the level of protection of the project will be reduced.	Low	Medium	Projected rainfall is anticipated to increase. Best available data was used in the H&H model.	Medium	Medium	The levee crest is limited to the original design elevation due to real estate constraints at this time, which limits the adaptability of the project for changes to future conditions flows. The recommended flood warning plan will help to manage residual risks.	Low	Medium	The recommended flood warning plan will help to manage residual risks. Climate change considerations will be documented in the H&H analysis.	Medium	High	Low	High	Low	High	Little can be done to further mitigate risk from climate change at this time.
TSP - 7	H&H Model	Under a levee breach scenario, the model shows increases that make require a taking.	Increases downstream as a result of the project are not permitted.	Medium	Medium	Increases are shown only in very rare scenarios such as the 100-year event, or more frequent events if the levee breaches. A breach is extremely unlikely during more frequent events due to lower loading of the levee, so the likelihood of this occurring is very low.	Low	Medium	A takings analysis was completed by OC and a determination was made that no downstream takings are required.	Low	Medium	Project team has been in regular communication with Office of Counsel and IDNR regarding this issue.	Medium	Medium	Low	Medium	Low	Medium	Little can be done to mitigate this risk as it is a direct result of the project. However, conversations with Office of Counsel and IDNR are helping advance the study.
TSP - 8	H&H Model	The existing hydraulic model was not re-calibrated or verified after modifying the hydrologic model to include the new precipitation data (Bulletin 75)	Without calibration after new data is introduced, there is a higher level of uncertainty in the results.	Low	High	The updated precipitation amounts were inserted into the HEC-1 model and the results from that were input into the HEC-RAS model as hydrographs. Since both models were calibrated in previous studies, calibration was not done for the new precipitation data.	Low	High	Calibration was not necessary for this study since we are comparing a without-project condition to a with-project condition, so any uncertainty is the same for both scenarios.	Low	High	The H&H model will undergo DQC to ensure that the assumptions made are appropriate.	Low	High	Low	High	Low	High	Calibration with the new precipitation data will increase the certainty of model results.
TSP - 9	H&H Model/Geotechnical	The H&H model identifies the lowest elevation in the Lansing levee at 597.08-ft. The 2018 I&R Report identifies it at 596.7-ft. Both low points are in the same spot, but the elevation measurement is different.	If the H&H model low point is higher than actual, then project damages may be underestimated.	Low	Medium	A geotechnical field survey was completed on 23-MAR-2022 to verify the Lansing low point elevation in the H&H model (597.08-ft). The elevation captured in the field is within approx. 0.1 in of the elevation contained within the model (596.966-ft), so the H&H model elevation was not changed.	Low	Medium	The existing project conditions H&H model were not re-run because the difference in elevations between the model and field observations was determined to be negligible.	Low	Medium	The H&H model will undergo DQC to ensure that the assumptions made are appropriate.	Low	High	Low	High			Identification of any changes to the H&H model will provide an opportunity to updated the HEC-FDA model and econ results.

Risk associated with decision to approve the TSP and draft DPR for public and agency review and comment																			
#	Risk Category	What is the problem or issue?	Description of consequence. What could go wrong and how could it happen?	Unmitigated ratings and associated data and facts effecting the assigned ratings for likelihood and consequences and the respective certainty ratings associated with each						Mitigation Measure Ratings						Risk Rating Buy down Delta			
				Consequence	Certainty	Likelihood	Certainty	Risk Rating	Certainty	Consequence	Certainty	Likelihood	Certainty	Risk Rating	Certainty				
TSP - 10	Geotechnical	The levee fragility analysis may over- or underestimate levee performance.	The economic analysis of alternatives incorporates the levee fragility analysis. If the levee fragility analysis over- or underestimates performance, the HEC-FDA model/economic analysis will be impacted.	Medium	High	The levee fragility analysis was conducted with the Levee Screening Tool 2.0 and incorporated H&H and geotechnical data to assess levee performance.	Low	High	The levee systems both have existing performance and inventory results available to inform the fragility analysis. Soil data was available for both Lansing and Calumet City levee systems. The PDT conducted an SQRA and the geotechnical performance issues are well understood at this time.	Low	High	The LST 2.0 results will undergo DQC to ensure that the formulas used in the spreadsheet and geotechnical assumptions are appropriate.	Medium	High	Low	High	Low	High	Identification of any changes to the levee fragility curve will provide an opportunity to update the HEC-FDA model and econ results.
TSP - 11	Geotechnical	Former channel alignment may have soft or permeable zones that were not encountered during the subsurface investigation.	If poor quality soils are present, the cost estimate may increase as the levee/floodwall would have to be strengthened.	Low	Medium	Existing borings encountered competent materials; although did not include boring in possible old channel area. Old channel based on 1890's topo projection, which may not be accurate.	Low	Medium	Subsurface investigation was able to cover areas accessible and provide good initial cover. More data will be required in specific locations with real estate and vegetation clearing possible during PED.	Low	Medium	Additional soil data will be collected to inform measure design as necessary during the Design phase	Low	Medium	Low	Medium	Low	Medium	Areas identified in the feasibility phase that may have poor soils will be checked during design.
TSP - 12	Wetlands	Wetland delineation from November 4, 2019 indicates wetlands within the study area.	If wetlands are impacted, there will be mitigation requirements.	Medium	High	A wetland delineation was completed in the field on November 4, 2019 during the Feasibility phase.	Medium	High	Wetlands impacts are narrowly avoided by the levee improvement activities within Alternative 2 and Alternative 3 by a matter of feet. Changes to the plan designs during PED could trigger mitigation requirements.	Medium	High	Feasibility-level design of alternatives avoids wetland impacts. The presence of wetlands should be carried through as a design consideration during the PED phase. Instructions for contractors to use best management practices to reduce temporary impacts to wetlands, such as fencing, should be included in contract documents.	Medium	High	Medium	High	Medium	High	Instructions for contractors to use best management practices to reduce temporary impacts to wetlands, such as fencing, should be included in contract documents.
TSP - 13	Endangered or Protected Status Species	Endangered or protected species may be found within the project area.	If species are impacted, there will be mitigation requirements.	Medium	High	No endangered or protected species are known to exist within the project area. Consulted with USFWS	Low	High	No comments noting significant concerns were received during the initial scoping period.	Low	High	Project features will be coordinated with the local regulatory agencies during the public review period for concurrence on "no effect" determination.	Medium	High	Medium	High	Medium	High	Instructions for contractors to use best management practices to reduce temporary impacts to species, such as tree clearing in winter, should be included in contract documents.
TSP - 14	HTRW Concerns	HTRW concerns may be uncovered.	If HTRW concerns are identified, the cost estimate may increase and/or the project may not be viable.	High	High	Based on the HTRW investigation, there do not appear to be high risk environmental issues within the project area that preclude a conclusion that there is Federal interest in a flood risk management solution in the general project area. However, data gaps in the feasibility-level analysis to be resolved in PED include 1) no personal interviews were conducted with the individual property owners, and 2) detailed visual site inspections were not conducted on individual parcels.	Low	High	If HTRW issues are identified, modifications may be required to the design or, in the case of significant issues, a decision not to implement the project at that location.	Medium	High	It is likely that any issues identified during later stages of the planning process or during implementation could be addressed through modifications to the project designs.	Medium	High	Low	High	Low	High	Conduct coordination with study sponsors to identify known HTRW concerns. During PED, complete any necessary interviews with property owners and conduct detailed visual site inspections on individual parcels.
TSP - 15	Construction Schedule	The construction schedule may not be realistic.	If the construction schedule is inaccurate, the cost escalation will be impacted. Increases to the schedule duration can increase project costs.	Medium	High	The construction duration for similar projects served as the basis for this estimate.	Low	High	The uncertainties associated with the construction schedule were accounted for in the cost contingency.	Low	High	A review of the civil design and cost estimate assumptions will be conducted to ensure adequacy and consistency of the analyses during DQC, ATR, and policy and legal reviews during the feasibility phase.	Medium	High	Low	High	Low	High	Identification of any changes to the cost estimate will provide an opportunity to reformulate plans to meet CAP Federal participation limits, if necessary.
TSP - 16	Materials Disposal	Materials may need to be transported for offsite disposal.	If the quantities or distance are higher than the Feasibility estimate, project costs will increase.	Medium	High	Quantities used and costs developed assumed materials would be moved somewhere within a 20 mile radius. The site will be determined during the PED phase. The cost estimate assumed 3000CY for both levee systems.	Low	High	Level of detail for the civil design and cost estimate was appropriate for the feasibility phase analysis. The uncertainties associated with the cost inputs were accounted for in the cost contingency.	Low	High	A review of the civil design and cost estimate assumptions will be conducted to ensure adequacy and consistency of the analyses during DQC, ATR, and policy and legal reviews during the feasibility phase.	Medium	High	Low	High	Low	High	The cost for disposal is driven by the trucking cost. A site within the 20 mile radius will be prioritized to keep costs close to the estimate.
TSP - 17	Cost Estimate	The cost estimate over- or underestimates costs.	If the cost estimate during Feasibility is over- or underestimated, the wrong plan may be selected to maximize NED benefits, i.e., Tentatively Selected Plan.	High	High	The project cost is a function of the labor, equipment, and material required for each alternative. The cost estimate was prepared to reflect additional design data gathered during the feasibility phase and performed according to USACE policies. Estimates for these inputs are uncertain and can change based on market demands.	Low	High	Level of detail for the civil design and cost estimate was appropriate for the feasibility phase analysis. The designs and cost estimate were further refined between the FAAM milestone and the TSP milestone. The current rates for current labor, equipment, and material were used, with estimates for escalation over time. The uncertainties associated with these inputs accounted for in the cost contingency.	Medium	Medium	A review of the civil design and cost estimate assumptions will be conducted to ensure adequacy and consistency of the analyses during DQC, ATR, and policy and legal reviews during the feasibility phase.	Medium	High	Low	High	Low	High	Identification of any changes to the cost estimate will provide an opportunity to reformulate plans to meet CAP Federal participation limits, if necessary.

Risk associated with decision to approve the TSP and draft DPR for public and agency review and comment																							
#	Risk Category	Risk Description	Consequences Description - Undesirable Results	Unmitigated ratings and associated data and facts effecting the assigned ratings for likelihood and consequences and the respective certainty ratings associated with each		Likelihood	Likelihood Certainty	Risk Rating (consequences x probability)	Mitigation Technique and associated data and facts effecting the assigned ratings for likelihood and consequences and the respective certainty ratings associated with each		Mitigation Measure Ratings						Risk Rating Buy down Delta						
				Consequence	Certainty				Consequence	Certainty	Consequence	Certainty	Likelihood	Certainty	Risk Rating	Certainty							
TSP - 18	Levee Fill/Building materials	Assumed Lansing Levee embankment material is reusable, but about 50% of Cal City is reusable.	If larger pocket of unsuitable material found over the entire reach of the levee, excavation and removal off site might be required. Large vegetation (root) composition may also render fill unuseable.	High	Moderate	Moderate	Moderate	Based on soil borings, Cal City is already identified as having unusable fill accounted for. Lansing has limited vegetation in levee, but Cal City does.	Medium	High	The level of uncertainty is high since poor soil condition might cause failure.	Medium	High	Perform additional boreholes to further quantify amount of material suitable for reuse.	Medium	High	Medium	High	Medium	High	Medium	High	Level of rating buy down from mitigation recommendation Boring data will inform the PED specifications.
TSP - 19	Sheet Pile	Civil modeling indicated few areas where the levee gets very close to structures. Floodwalls would reduce impacts to structures.	Since the current levee was not built to national standards, the levee width needs to be increased per USACE regulations. In two locations at the tie in for the Calumet City west levee segment, demolishing single family house may be required.	High	High	Medium	High	Based on the site visit, a few areas are very tight, even with floodwalls.	Medium	High	Detailed survey will be conducted in area where the levee is close to structures.	Medium	High	Detailed analysis will be completed in PED to determine the optimal tie in alignment to avoid conflicts with the two houses. A VE Study could be completed.	High	High	Medium	High	Medium	High	Medium	High	Conducting a great level of design in PED will buy down risk.
TSP - 20	LERRDS	There are two different sponsors with differing levels of acquisition capacity (and possibly capability).	Potential impact to schedule and acquisition costs.	Medium	Medium	Medium	High	Communications with sponsors, sponsors response times, and information provided during Capability Assessment interview resulted in this assessment.	Medium	High	LERRDS information has been shared with the sponsors so they are aware of the acquisition schedule and costs.	Medium	High	Continue high level of coordination with both sponsors to share information and minimize delays.	Medium	Medium	Medium	High	Medium	High	Medium	High	It is unlikely that risk will be bought down.
TSP - 21	LERRDS	There are a large number (177) of private/residential parcels requiring acquisition.	Substantially increased possibility for multiple "quick-take" actions and/or condemnations.	High	High	Medium	High	Data from LERRD cost estimate provided by appraiser informed this risk.	Medium	High	LERRDS information has been shared with the sponsors so they are aware of the acquisition schedule and costs.	Medium	High	Continue high level of coordination with both sponsors to share information and minimize delays.	High	High	Medium	High	Medium	High	Medium	High	It is unlikely that risk will be bought down.
TSP - 22	LERRDS	There are a large number (177) of private/residential parcels requiring acquisition.	Substantially increased possibility of "quick-take" actions and/or condemnations result in the possibility of substantially increased acquisition costs.	High	High	Medium	High	Data from LERRD cost estimate provided by appraiser informed this risk.	Medium	High	LERRDS information has been shared with the sponsors so they are aware of the acquisition schedule and costs.	Medium	High	Continue high level of coordination with both sponsors to share information and minimize delays.	High	High	Medium	High	Medium	High	Medium	High	It is unlikely that risk will be bought down.
TSP - 23	LERRDS	There are a large number (177) of private/residential parcels requiring acquisition.	Substantially increased possibility of "quick-take" actions and/or condemnations result in the increased amount of time to complete acquisition (impact to schedule).	High	High	Medium	High	Data from LERRD cost estimate provided by appraiser informed this risk.	Medium	High	LERRDS information has been shared with the sponsors so they are aware of the acquisition schedule and costs.	Medium	High	Continue high level of coordination with both sponsors to share information and minimize delays.	High	High	Medium	High	Medium	High	Medium	High	It is unlikely that risk will be bought down.
TSP - 24	LERRDS	The number of parcels requiring acquisition by one sponsor is almost twice the amount requiring acquisition by the other sponsor.	Likelihood that one sponsor will complete acquisition several months and/or year(s) sooner than the other sponsor.	Medium	High	Medium	High	Data from LERRD cost estimate provided by appraiser informed this risk.	Medium	High	LERRDS information has been shared with the sponsors so they are aware of the acquisition schedule and costs.	Medium	High	Continue high level of coordination with both sponsors to share information and minimize delays.	Medium	High	Medium	High	Medium	High	Medium	High	It is unlikely that risk will be bought down.
TSP - 25	LERRDS	There is a strong possibility that condemnation will be required for one or more parcels.	Substantially increased acquisition costs and time (impact to schedule).	High	High	Medium	High	Based on the fact that most parcels within the project foot print a private residences, there is great likelihood that there will at least one, but more likely several homeowners unwilling to sell the real estate interest required.	Medium	High	LERRDS information has been shared with the sponsors so they are aware of the acquisition schedule and costs.	Medium	High	Continue high level of coordination with both sponsors to share information and minimize delays.	High	High	Medium	High	Medium	High	Medium	High	It is unlikely that risk will be bought down.
TSP - 26	LERRDS	One sponsor has indicated that state legislative action is required to exercise quick-take.	Substantially increased acquisition costs and time (impact to schedule).	High	Medium	High	High	Based on information provided by the sponsor's attorney.	High	High	LERRDS information has been shared with the sponsors so they are aware of the acquisition schedule and costs.	High	High	Continue high level of coordination with both sponsors to share information and minimize delays.	High	Medium	High	Medium	High	High	High	High	It is unlikely that risk will be bought down.
TSP - 27	LERRDS	Project may impact utilities within the project footprint	May require OC opinion of compensability increasing real estate feasibility schedule.	Medium	Medium	Medium	High	Based on project analysis	Medium	High	The feasibility design accounted for known utilities located within the project footprint with available data.	Medium	High	Continue coordination with OC during PED.	Medium	Medium	Medium	High	Medium	High	Medium	High	It is unlikely that risk will be bought down.
TSP - 28	LERRDS	Possibility that public meetings will not be conducted in-person.	Significant public opposition to real estate acquisition not realized until acquisition begins.	High	Medium	High	High	Meetings may be virtual due to COVID-19 with lower than normal attendance.	High	High	Meetings may be virtual due to COVID-19	High	High	Implement best practices for virtual meetings to ensure that public has a chance to provide comments. Coordinate with the sponsors to conduct the meeting(s).	High	Medium	High	High	High	High	High	High	It is unlikely that risk will be bought down.