



DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS  
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WASHINGTON DC 20314-1000

MAR 8 2012

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DIRECTOR OF CIVIL WORKS' POLICY MEMORANDUM CWPM 12-001

SUBJECT: Methodology for Updating Benefit-to-Cost Ratios (BCR) for Budget Development

1. References.

- a. Memorandum For Commanders, dated 22 November 2011, Subject: Economic Certification of Project Benefit Cost Ratios (BCR) for Inclusion in the FY2013 Budget Development Process
- b. Engineer Inspector General Report, Inspection of Updating Benefit Cost Ratios for Civil Works Projects, dated 2 August 2011
- c. Civil Works Program Development, EC 11-2-199
- d. Planning Guidance Notebook, ER 1105-2-100
- e. Civil Works Review Policy, EC 1165-2-209
- f. Civil Works Cost Engineering, ER 1110-2-1302

2. Purpose. This memorandum provides guidance on the methodology for updating benefit-to-cost ratios (BCR's) in support of the budget development process and establishes responsibilities for ensuring accurate reporting of updated BCR's to the Office of Management and Budget (OMB).

3. Background. During recent budget development cycles, it became obvious that the Corps of Engineers was not providing the most up-to-date BCR data to OMB for budget development. The Chief of Engineers ordered the Engineer Inspector General (EIG) to conduct an investigation into the policy and implementation being used by the Corps to update BCR's. That report, titled "Engineer Inspector General Report, Inspection of Updating Benefit Cost Ratios for Civil Works Projects", identified inconsistencies in both policy and implementation responsibility pertaining to the execution of BCR updates. It is of the utmost importance to provide OMB with the accurate and up-to-date BCR's for the budget development process.

4. Discussion. It has been and remains the policy of the Corps of Engineers to provide up-to-date BCR's to OMB for the development of the Civil Works Budget. Updated Benefit to Cost Ratios (BCR's) are required in support of funding requests for all projects in the Preconstruction Engineering and Design (Investigations account) or Construction (Construction account) phases.

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a. Updating Requirements. The BCR will be calculated based on the benefits in the latest approved official document, such as a Feasibility Report, Chief of Engineers Report, Limited or General Reevaluation Report (LRR or GRR), Engineering Documentation Report (EDR), or other reports where economics are updated in accordance with ER 1105-2-100. In accordance with this guidance, the updating of economic benefit estimates should be made in coordination with the annual update of project cost estimates. To support the annual Program Development process, an update of economic benefits and costs should be undertaken in those situations where the Project Delivery Team (PDT) determines changes in project scope and cost warrant a reassessment (ER 1105-2-100 Appendix G). The time frame for economic updates is described below for new start and continuing construction projects.

(1) New Construction Projects. For any project or element proposed as new construction, the fiscal year date of approval of the latest economic analysis, as outlined in this document, must not precede the fiscal year of the Major Subordinate Command (MSC) program submission by more than 3 fiscal years. For example, for any continuing construction project recommended in your program year (PY) submission, the price level of the economic analysis can be no earlier than 1 October current calendar year (CCY)-4 - the first day of PY-5.

(2) Continuing Construction Projects. Continuing construction data from the P2 data base will be used in developing the President's PY Budget. For continuing construction projects, the fiscal year date of approval of the latest economic analysis, as outlined in this document, must not precede the fiscal year of the MSC program submission by more than 5 fiscal years. For example, for any continuing construction project recommended in your PY submission, the price level of the economic analysis can be no earlier than 1 October CCY-6 - the first day of PY-7. This point in time precedes the start of the fiscal year in which you are making your submission by 5 fiscal years. If the fiscal year of the price level is more than 5 fiscal years old, you must perform an economic update to show that the calculated BCR and the remaining benefits remaining costs ratio (RBRCR) are current and consistent with this guidance.

b. Roles and Responsibilities. It is the responsibility of the entire Corps vertical team to ensure proper and accurate reporting of BCR's. Command responsibilities are as follows:

(1) District Responsibilities. It is the responsibility of the District to provide up-to-date BCR's to their MSC (as defined in Paragraph 4 above) during the budget development process. This includes: 1) identifying the appropriate level of update required in Table 1 of the attachment to this memorandum, 2) ensuring that the Programs and Project Management organization provide the appropriate time and funding to the Planning organization allowing the economist and other required disciplines to support the required update, and 3) ensuring adequate review and approval as defined in Table 2 of the attachment to this memorandum. More detailed roles for the District are outlined in Paragraph 4 of the attachment of this memorandum.

(2) MSC Responsibility. It is the responsibility of the MSC to: 1) verify that all BCR's submitted for budget development are accurate and appropriately scoped as required in Table 1 of the attachment to this memorandum, 2) ensure the appropriate time and funding support, and

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3) ensure adequate review and approval as defined in Table 2 of the attachment to this memorandum. More detailed roles for the MSC are outlined in Paragraph 4 of the attachment of this memorandum.

(3) HQUSACE Responsibilities. It is the responsibility of HQUSACE to: 1) ensure existing policy is in place to prepare BCR Updates, 2) communicate the policy to MSC's and Districts, 3) provide guidance to MSC's and Districts in understanding the policy requirements and 4) oversee MSC implementation of policy and guidance.

c. Implementation. Implementation of the BCR Updating Requirements (defined in Paragraph 3), Roles and Responsibilities (defined in Paragraph 4), and the use of the Updating Methodology (defined in the attachment and supplements to this memorandum) is required as of the date of this memorandum.

5. Contact. Comments or concerns regarding this memorandum should be brought to the attention of Mr. Theodore A. Brown, P.E., Chief Planning and Policy, or his action officer Thomas E. Hughes at 202-761-5534.

FOR THE COMMANDER:



STEVEN L. STOCKTON, P.E.  
Director of Civil Work

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## ATTACHMENT – METHODOLOGY FOR UPDATING BENEFIT-TO-COST RATIOS

### 1. References:

EC 11-2-199 FY2012 CIVIL WORKS PROGRAM DEVELOPMENT  
ER 1105-2-100 PLANNING GUIDANCE NOTEBOOK  
EC 1165-2-209 CIVIL WORKS REVIEW POLICY  
ER 1110-2-1302 CIVIL WORKS COST ENGINEERING

2. Program Development Criteria. Updated Benefit to Cost Ratios (BCR's) are required in support of funding requests for all projects in the Preconstruction Engineering and Design (Investigations Account) or Construction phases. The BCR will be calculated based on the benefits in the latest approved official document, such as Feasibility Report, Chief of Engineers Report, Limited or General Reevaluation Report (LRR or GRR), Engineering Documentation Report (EDR), or other reports where economics are updated in accordance with ER 1105-2-100. In accordance with the current guidance, the updating of economic benefit estimates should be made in coordination with the annual update of project cost estimates. To support the annual Program Development process, an update of economic benefits and costs must be undertaken in those situations where the Project Delivery Team (PDT) determines that changes in project scope and cost warrant a reassessment (ER 1105-2-100 Appendix G). The time frame for economic updates is described below for new start and continuing construction projects.

a. New Construction Projects. For any project or element proposed as new construction, the fiscal year date of approval of the latest economic analysis must not precede the fiscal year of the MSC program submission by more than 3 years. For example, for any new construction project or element in your FY2013 (PY) initial submission, the approval date of the document containing the most recent economic analysis can be no earlier than 1 October 2007 (CCY-4) - the first day of FY2008 (PY-5).

b. Continuing Construction Projects. Continuing construction data from the P2 data base will be used in developing the President's PY Budget. For continuing construction projects, the fiscal year date of approval of the latest economic analysis must not precede the fiscal year of the MSC program submission by more than 5 years. For example, for any continuing construction project recommended in your June submission in support of the FY2013 budget, the price level of the economic analysis can be no earlier than 1 October 2005 (CCY-6) - the first day of FY 2006 (PY-7). This point in time precedes the start of the fiscal year in which you are making your submission by 5 years. If the fiscal year of the price level is more than 5 years ago, you must perform an economic update to show that the calculated BCR and the remaining benefits remaining costs ratio (RBRCR) are current and consistent with this guidance.

3. Economic Update Process. In accordance with the annual Budget Development Process, the economic update will involve no major new analysis. The purpose of the economic update (Levels 1-3 in Table 1 below) is to support the budget development process and not to reevaluate authorization. It will be limited to reviewing and updating previous assumptions and limited

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surveying, sampling, and application of other techniques to affirm or develop a reasonable revised estimate of project benefits. Economic updates should be performed in accordance with the update plan in the feasibility or post authorization change report and/or the Project Management Plan. MSCs will approve all economic updates except Level 4. Table 1 describes the four Levels in more detail.

All economic analysis will be conducted using the 7% discount rate and the current year discount rate. BCR's will be calculated using total project cost and total benefits. Costs that have accrued will be discounted back to the price level of the benefits last approved report and this cost will be added to the remaining cost, also in the price year of the last approved report, provided by Engineering as per their guidance. Interest during construction will only be calculated based on remaining construction costs and a schedule to complete that assumes adequate funding.

Table 1  
Description of Economic Update Levels

Update Level	Scope*	Anticipated Cost and Time**
Level 1 – Reaffirmation (Qualitative analysis affirms that all previous benefits are still valid)	<ul style="list-style-type: none"> <li>- Qualitative re-verification of key benefit assumptions</li> <li>- Current Cost Estimates</li> <li>- Minimal effort to verify no new Engineering is needed (e.g. H&amp;H)</li> <li>- Discount Costs back to price level of the last approved report</li> <li>- Show BCR and RBRCR</li> <li>- No new plan formulation</li> <li>- No new NEPA</li> </ul>	\$15K - \$50K and One Month Plus
Level 2 – Benefit Update (Some quantitative analysis is needed for benefits, but no major changes)	<ul style="list-style-type: none"> <li>- Use sampling to update key data and assumptions</li> <li>- Re-run economic benefit model</li> <li>- Minimal effort to verify no new Engineering is needed (e.g. H&amp;H)</li> <li>- Current cost estimates</li> <li>- Show BCR and RBRCR at current price levels</li> <li>- No new plan formulation</li> <li>- No New NEPA</li> </ul>	\$50K-\$100K and Two Months Plus
Level 3 –Economic Reevaluation (Conditions, Economics, and Engineering have	<ul style="list-style-type: none"> <li>- Collect all new Economic and Engineering Data</li> <li>- Fully Update Benefits</li> </ul>	\$100K - \$200K and 6 Months Plus

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changed so significantly that full reanalysis is warranted)	- Obtain Current Cost Estimates - Show BCR and RBRCR at current price levels -No new Plan Formulation - No new NEPA	
Level 4 – General Reevaluation (Scope is beyond an economic update.)	- Full reanalysis with new Plan Formulation - Follow ER 1105-2-100	Over \$200K and 1-year Plus
*Generic scope. Actual process will vary by business line (see supplements 3-6).		
**These costs are simply estimates for economics and necessary support. These costs do not include funds for updating Cost Estimates. Cost ranges may be exceeded depending on the level of Engineering detail required to support the economic analysis.		

4. Roles and Responsibilities. The economic update process will require careful coordination between multiple disciplines. The key project delivery team members in the process are project management, economics, and engineering, although this may expand depending on the complexity of the analysis. Each member has specific roles and responsibilities that critical for success.

District Programs and Project Management:

- Responsible for identifying the need to accomplish economic update within established timeframes.
- Responsible for tasking Planning and Engineering and Construction Divisions to determine appropriate level of detail needed and time/cost estimates.
- Responsible for securing funding and providing to Planning and Engineering and Construction.
- Responsibility for ensuring accurate completion of work, transmitting to the MSC and securing signatures for Supplement 2.

District Planning and Economics

- Responsible for complying with all policy and NEPA requirements.
- Responsible for ensuring appropriate level of economic update is conducted.
- Responsible for providing scope and cost of economic update in collaboration with Engineering and Construction Division.
- Responsible for all economic documentation to support effort.
- Responsible for Technical Certification of update by the district’s Chief of Planning prior to submittal to District Quality Control (DQC)

District Engineering and Construction:

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- Responsible for providing current project cost estimates per ER 1110-2-1302.
- Responsible for providing the appropriate level of engineering support including scope and cost estimate in collaboration with Planning.

MSC Planning and Policy

- Responsible for review and approval (see Table 2 below).
- Oversee District implementation of policy and guidance.

HQ Planning and Policy

- Provide guidance and assistance to MSC Planning and Policy for execution of this BCR Update Methodology.
- Oversee MSC implementation of policy and guidance.

5. Model Certification. There may be cases where economic models used in the last approved report pre-date the current model review and approval requirements. If the benefits in the last approved report were based on an unapproved/uncertified model and the economic update is a Level 1 -3, then no new model review and certification requirements will be necessary. If the benefits in the last approved report were based on an unapproved/uncertified model and the economic update would warrant Level 4 analyses, then current guidance does apply and all review and certification requirements must be followed.

6. Review and Approval Requirements. Review of the economic updates will vary by level of complexity. Each of the levels requires District Quality Control (DQC) and MSC review. Level 4 is subject to all of the review requirements currently in force. Table 2 outlines the review requirements for each level. A district approval sheet (see supplement 2) must be signed by responsible PDT members.

**Table 2  
Review and Approval Requirements**

<b>Update Level</b>	<b>DQC</b>	<b>ATR</b>	<b>MSC</b>	<b>HQ</b>
<b>Level 1 - Reaffirmation</b>	YES	MSC	Review & Approves	Policy Oversight
<b>Level 2 – Benefit Update</b>	YES	Done by Another District in MSC	Review & Approves	Policy Oversight
<b>Level 3 – Economic Reevaluation</b>	YES	Done by Another District in MSC	Review & Approves	Policy Oversight
<b>Level 4 - GRR</b>	YES	EC 1165-2-209	Review	Approves

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## SUPPLEMENT 1 – REPORT REQUIREMENTS

### 1. LEVEL 1 – Reaffirmation Report

- Clearly document authority;
- Clearly document scope has not changed since last approved report (i.e. still within Chief's discretionary authority);
- Clearly document all of key economic (benefit) assumptions;
- Clearly document, through qualitative analysis, that key assumptions have not change since last approved report;
- Clearly document that engineering does not need updating (e.g. H&H) – *if there is a need, go to at least Level 3*;
- Display benefits at price level of last approved report;
- Display updated costs;
- Discount costs back to price level of last approved report;
- Display BCR and RBRCR for both current discount rate and 7-percent discount rate;
- Recalculate 902 Limit and display all of the required tables and fact sheets in Appendix G of ER 1105-2-100;
- Signed District Approval Sheet (see supplement 2).

### 2. LEVEL 2 – Benefit Update Report

- Clearly document authority;
- Clearly document scope has not changed since last approved report (i.e. still within Chief's discretionary authority);
- Clearly document all of key economic (benefit) assumptions;
- Clearly document changes in economic assumptions
  - Use sampling to update economic data
  - Re-run economic model to update benefits to current price level;
- Clearly document that Engineering does not need updating (e.g. H&H) – *if there is a need, go to at least Level 3*;
- Display benefits at current price levels;
- Display updated costs;
- Display BCR and RBRCR for both current discount rate and 7-percent discount rate;
- Recalculate 902 Limit and display all of the required tables and fact sheets in Appendix G of ER 1105-2-100;
- Signed District Approval Sheet (see supplement 2).



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3. LEVEL 3 – Economic Reevaluation Report (ERR)

- Clearly document authority;
- Clearly document scope has not changed since last approved report (i.e. still within Chief's discretionary authority);
- Clearly document all of key economic (benefit) assumptions;
- Collect all necessary economic and engineering data for full reassessment of benefits;
- Re-run economic model using updated economic and engineering data;
- Display benefits at current price levels;
- Display updated costs;
- Display BCR and RBRCR for both current discount rate and 7-percent discount rate;
- Recalculate 902 Limit and display all of the required tables and fact sheets in Appendix G of ER 1105-2-100;
- Signed District (see supplement 2).

4. LEVEL 4 – General Reevaluation Report (GRR)

- Follow ER 1105-2-100

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SUPPLEMENT 2 – EXAMPLE OF DISTRICT APPROVAL SHEET

We submit and certify that all of the requirements for this (insert Level) analysis have been fulfilled and the report is in compliance to support budgetary development. The benefits have been calculated and documented as warranted for this analysis, all of the costs are current per ER 1110-2-1302 and the remaining work is in compliance with Section 902 of the Water Resources Development Act of 1986, if applicable, and all of the review requirements required for this (insert Level) analysis have been met and documented.

\_\_\_\_\_  
Project Manager

\_\_\_\_\_  
Date

\_\_\_\_\_  
District Economist

\_\_\_\_\_  
Date

\_\_\_\_\_  
District Planning Chief

\_\_\_\_\_  
Date

\_\_\_\_\_  
District Engineering Chief

\_\_\_\_\_  
Date

\_\_\_\_\_  
Deputy District Engineer for Project Management

\_\_\_\_\_  
Date

### SUPPLEMENT 3 - FLOOD RISK MANAGEMENT REQUIREMENTS

This section describes in further detail the process, requirements and factors used to determine update level, defined generically for all business lines in the update methodology and supplements 1 and 2, specifically to Flood Risk Management. Each level should be considered a progression based on required data needs to fill gaps in the basic analysis. If an initial reaffirmation shows that with little effort that the previous benefits are still valid, a Level 1 analysis should be sufficient. But if significant changes have occurred, a higher level should be completed. The following factors should be considered when determining the level of update required:

- Number of years since last official document, lack of available data, approved modeling or current methodology (risk-based for example)
- Changes in land use within the study area (Flood consequences may have/will shortly change)
- Urban: Changes in structure inventory: new growth, decline, demolition, conversion
- Agriculture: quick comparisons of potential changes in crop acreages or yields
- Project cost and /or project scope greater than 20%
- Lack of available data
- New development requirements, zoning, prohibitions
- Changes in existing conditions due to experienced storm events and /or unmet nourishment needs
- Unrepaired damage to existing protective structures, public and private
- Have assumptions significantly changed based on experienced flooding events or modeling for the damage mechanisms of inundation
- Have any of the hydrologic, hydraulic or geo-technical assumptions significantly changed
- Is current economic modeling or methodology risk based
- BCR Factor – projects with high BCR's have much lower risk in terms of sensitivity to time changes. Low BCR's should focus on greater detail analysis to major benefit categories
- Risk of exceeding 902 limit
- Percent of project complete
- Significant changes in project features, project deviation, performance, residual risk.
- Effects of Relative Sea Level Rise

Level 1 - If there are no significant changes in these factors, a Level 1 Reaffirmation Report, consistent with the descriptions in Table 1, should be performed. No modeling updates required, simple comparison of major benefit category values should be used to update benefits. Use standard spreadsheets to compute new BCR metrics.

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Level 2 – If changes in economic parameters, value of damageable property and other factors that could change the benefits have occurred, a Level 2 updated is required. Limited model adjustments to account for these changes may be required.

- Urban – structural inventory revisions – use of sampled field inspections, mapping such as Google Earth, and spot checks could be made to determine that land uses are consistent with the last official document. The basic procedure to revise damages could include revaluation for a stratified sample of existing residential and non-residential structures by basic uses, adopting revised representative depth-damage functions (such as found in EGM# 04-01) and current findings that may show a change in benefits.
- Agricultural – crop pattern, costs of production and yield revisions – sources of information: county annual agricultural crop reports and crop enterprise budget reports.
- If a certified or approved model was used to derive benefits, the most recent approved version of the model should be used with limited additional adjustments such as valuations to current levels.

Valuation adjustments: If HEC-FDA was used for the last approved benefit analysis, revising by reach/impact area and by damage category can be done simply by either modifying the exported/imported inventory or by adjusting price levels by category and reach. Use a valuation service such as Marshall and Swift, RS Means or discussions with county tax assessor or appraisers to determine changes in your sample set. Re-compute stage-damage functions with the revised values/inventory. Evaluate EAD for with and without project conditions to determine flood damage reduction benefits. Concentrate the effort on the major categories. The analysis should not require anything more than price adjustments for minor categories such as roads and autos that provide less than ten percent of expected annual damages. The goal is to reaffirm that the initial investment decision was sound not to complete new plan formulation.

Level 3 - If a Level 1 determines that there have been significant changes in without project conditions or difficulty in reproducing base data (such as inventory or floodplains), then a more detailed reevaluation may be required. One reason may be due to the length of time since original analysis. While the Level 3 Economic Reevaluation Report is not a reformulation, it may require more time and effort than the first two Levels. The detail of analysis of the Level 3 is not intended to be equivalent to a new feasibility study or decision document. The goal is still to focus on those categories and changes that may possibly have significant impact on the current benefit analysis. Possible re-analysis steps that may require additional effort:

- New floodplains – either changes in hydrology or hydraulics may require development of new water surface profiles, inundation layers and/or flood depths. Consideration should be made to level of detail needed to confirm benefits making reasonable assumptions. If changes can be identified as a relative shift in exceedance probability, consideration of simple adjustments to exceedance probability-discharge or stage may reduce the time and effort. The district's Engineering Division Chief should approve adequacy of detail with District Quality Control (DQC) determining level required in coordination with PDT.

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- Economic Structural Inventory – several issues may require new economic inventory. The original data may not be spatial or in electronic form. The new flood plains may create a greater areal extent than covered in the original analysis. Or there could be significant changes in structures or development in specific areas. The development of the revised inventory should use sampling for valuation as much as is reasonable given the level of investment. Use GIS and available populated databases as much as possible, parcel data, existing reports. Be wary of new growth, making sure to be consistent with WRDA 1990 Section 308 (Flood Plain Management). Concentrate on categories that were predominant in the original study and indentify any changes in land use or strategic infrastructure within the flood plain.
- Agricultural damages – if acreages have big changes due to either urbanization or larger areal extent, additional analysis beyond the Level I may be warranted. Important consideration should be what percentage of total damages is from crop loss to determine level of detail. In addition to sources of data described in Level I analysis, spatial acreage can be found from USDA : <http://www.nass.usda.gov/research/Cropland/>

#### Flood Risk Management Reporting

In addition to the Reporting Requirements found in Supplement 1, the following Flood Risk Management metrics should be included in Level 2 and 3 reports to define effectiveness and residual risk:

- Display of Residual Risk as require in ER 1105-2-101
- Population at risk within the mean 1% flood plain under with and without project conditions
- Mean single event damages for various events (example 10%, 2%, 1%, and 0.2%) under both with and without project conditions
- Average Annual Damages under both with and without project conditions
- Significant changes to structures, either in value or use and changes in critical infrastructure

**Level 4** - If there is an indication that the scope of the project has significantly changed, costs are approaching the 902 limit or reformulation may be required, then a General evaluation report (GRR) should be conducted following (See ER 1105-2-100 Appendix G).

#### SUPPLEMENT 4 – DEEP DRAFT NAVIGATION REQUIREMENTS

This section will describe in further detail the process, requirements and factors used to determine update level, defined generically for all business lines in the update methodology and supplements 1 & 2, specifically to Deep Draft Navigation. Each level should be considered a progression based on required data needs to fill gaps in the basic analysis. If an initial reaffirmation shows that with little effort that the previous benefits are still valid, a level 1 analysis should be sufficient. But if significant changes have occurred, a higher level should be completed.

The following factors should be considered when determining the level of update required:

- Number of years since last official document, lack of available data, approved modeling or current methodology (risk-based for example)
- Changes in industries and vessels using the federal channels within the study area
- Changes in commodity movements: changes in type or volume of commodities being handled through the port, imports or exports,
- Have any of the hydrologic, hydraulic or geo-technical assumptions significantly changed
- Risk of exceeding 902 limit
- Percent of project complete
- Changes to disposal areas or laws and policies that that might impact areas planned to be used for construction, long term Operations and Maintenance
- Changes in project features, project deviation, performance, residual risk, or number of shippers using the port facilities.
- Effects of Relative Sea Level Rise

Level 1 - If there are no significant changes in these factors, a Level 1 Reaffirmation Report consistent with the descriptions in Table 1 and Supplement 1, should be performed. No modeling updates required, simple comparison of major benefit category values should be used to update benefits. Use standard spreadsheets to compute new BCR metrics.

Level 2 - Unlike Level 1, this effort will present updated benefits at current price levels. Level 2 is triggered when there are moderate changes to the factors above, but the majority of the assumptions for benefits are still applicable. For example, there is a new commodity movement but the vast majority of the movements in the last approved report are still viable.

Level 3 - Major effort triggered by significant differences in projected and actual traffic. This economic update is limited to re-evaluation of the recommended plan, no reformulation will be conducted.

Possible events that may require Level 3 effort:

- New trade routes have been developed since the last report was accomplished
- New Port Users or loss of historic port users

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- Changes in hydrology or hydraulics may require reassessment of hydrodynamic modeling. Consideration should be made to level of detail needed to confirm benefits making reasonable assumptions
- Types and Tonnages of Commodities being moved through port - several issues may require new economic inventory. The data may not be in electronic form. The new port hinterland may create a greater areal extent than covered in the original analysis. Or there could be significant changes in industry or development in specific areas.
- The development of the revised Commodity forecast should use sampling as much as is reasonable given the level of investment. Concentrate on categories that were predominant in the original study and identify any changes in major benefitting commodities.

Level 4 - If there is an indication that the scope of the project has significantly changed, costs are approaching the 902 limit or reformulation may be required, then a General evaluation report (GRR) should be conducted following (See ER 1105-2-100 Appendix G).

#### SUPPLEMENT 5 – COASTAL STORM RISK MANAGEMENT REQUIREMENTS

The degree of changes, since the last approved report, in any of the following list of factors will determine the appropriate level of economic updating to be employed. The degree of change, if any, will be determined by the project economist and when necessary in consultation with the PM and PDT. Levels of change are characterized as:

The following factors should be considered when determining the level of update required:

- Number of years since last official document, lack of available data, approved modeling or current methodology (risk-based for example)
- Changes in land use within the study area (flood and erosion consequences may have/will shortly change)
- Changes in structure inventory: new growth, decline, demolition, conversion
- Project cost and /or project scope greater than 20%
- Lack of available data
- New development requirements, zoning, prohibitions
- Changes in existing conditions due to experienced storm events and /or unmet nourishment needs
- Unrepaired damage to existing protective structures, public and private
- Have assumptions significantly changed based on experienced storm events or modeling for the damage mechanisms of inundation, waves and erosion
- Have any hydrologic, hydraulic, coastal engineering, geo-technical, environmental, or cost assumptions significantly changed
- Is current economic modeling or methodology risk based
- Recreation: Changes in dry beach area, visitation, access, projections, environmental factors, prohibitions, unit day values

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- BCR Factor – projects with high BCR's have much lower risk in terms of sensitivity to time changes. Low BCR's should focus on greater detail analysis to major benefit categories
- Risk of exceeding 902 limit
- Percent of project complete
- Significant changes in project features, project deviation, performance, residual risk.
- Effects of Relative Sea Level Rise

Level 1 - If there are no significant changes in these factors, a Level 1 Reaffirmation Report consistent with the descriptions in Table 1 and Supplement 1, should be performed. No modeling updates required, simple comparison of major benefit category values should be used to update benefits. Use standard spreadsheets to compute new BCR metrics.

Level 2 - Unlike Level 1, this effort will present updated benefits at current price levels. Level 2 is triggered when there are moderate changes to the factors above, but the majority of the assumptions for benefits are still applicable. For example, there have been significant changes, since the last approved report, to the economic inventory or a storm or hurricane has hit the area.

Level 3 - Major effort triggered by significant differences in the above factors. This economic update is limited to re-evaluation of the recommended plan, no reformulation will be conducted.

Level 4 - If there is some indication that the scope of the project has significantly changed, costs are approaching the 902 limit or reformulation may be required, then a General evaluation report (GRR) should be conducted (See ER 1105-2-100 Appendix G).

#### SUPPLEMENT 6 – INLAND NAVIGATION REQUIREMENTS

The Planning Center of Expertise for Inland Navigation (PCXIN) and its virtual resources will be responsible for production and agency technical review for all inland navigation economic updates to ensure consistency and accuracy in the computations. The level of detail for economic updates may fall within three tiers depending on comparison of changes in conditions between the time of the last approved document and current conditions (Tier 4 is beyond the scope of an economic update). The PCXIN will determine the appropriate level of detail and update methodology. Factors that will be considered in determining level of detail include but are not limited to the following:

- Number of years since last official document, lack of available data, approved modeling or current methodology (risk-based for example)
- Methodology and level of detail of previous report
- Changes in traffic at the project under consideration
- Commodity movements: changes in type or composition of commodities moved through the project
- Changes in the project performance or reliability



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- Risk of exceeding 902 limit
- Percent of project complete

Level 1 - Minimum effort if there is no evidence to suggest significant changes in the benefits of the project. For navigation projects, the most significant and obvious change would be an increase or decrease in traffic. If there is no marked change in traffic, then the level 1 effort is warranted. For example, if current annual traffic does not significantly deviate from the projected annual taking into account normal variations due to business cycles and weather, then a level 1 update is suggested. The economics will be evaluated based on the benefits in the latest approved document and current cost estimates prepared in compliance with ER 1110-2-1302. The economic update will be restricted to a cursory re-evaluation of the approved project and of the categories of benefits used in the approved report. Once the benefits have been validated, they will be compared to the current cost estimate deflated to the benefits' price level.

Level 2 - Unlike Level 1, this effort will present updated benefits at current price levels. Level 2 is triggered when there are moderate changes to the factors above, but the majority of the assumptions for benefits are still applicable. For example, there is a new commodity movement but the vast majority of the movements in the last approved report are still viable. Level 2 effort would update the benefits by evaluating the assumptions and using current levels of traffic and transportation costs. It is not a recalculation of benefits but an updating of benefits based on available data.

Level 3 - Major effort triggered by significant differences in projected and actual traffic. This economic update is limited to re-evaluation of the recommended plan, no reformulation will be conducted.

- Traffic. The most recent five year traffic volumes at the project and/or system will be averaged and substituted for the forecasted volume of traffic in the current year. The forecasted growth rate from the current year from the approved report will be applied to the current traffic to yield new traffic forecasts.

- Capacity. The updated traffic forecasts will be compared to the estimated capacity of the project to determine if waterway transit times would differ from those in the authorized report. If current traffic is plus or minus 10% of the current year's forecasted traffic, then delay reduction benefits will have to be recomputed for updating purposes. The delay reduction benefits is the WOPC to WPC difference in an average tow delay multiplied by the hourly tow cost for each tow transiting the project. The last approved report WOPC and WPC streams of equilibrium tonnage, average tow delays, number of tows, and hourly tow cost. The tonnages and delays would be adjusted to current levels, along with an updated hourly tow cost. The adjusted cash flows will be amortized to compute average annual benefits.

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- Transportation rate savings. Transportation costs are developed for the existing and least cost all overland transportation mode during the study with the difference represent the transportation benefit of the recommended project (aka barge transportation surplus willingness-to-pay) benefits of the waterway system. Transportation rates at current price levels and IWR hourly operating costs will be used to update the benefits price level.

- Other project benefits. Other project benefits vary with the project and the time of the study and could include flood damage reduction, recreation, and ecosystem enhancement, maintenance of the system, water supply benefits and possibly other items. Other project benefits will be updated with the method depending on the importance of the category to total project benefits. For example, for relatively small recreation benefits the update could consist of the application of current day values to recreational usage. Moderate effort that would include a re-computation of benefits based on current traffic and related data.

Level 4 - If there is some indication that the scope of the project has significantly changed, costs are approaching the 902 limit or reformulation may be required, then a General Revaluation Report (GRR) should be conducted following (See appendix G of ER 1105-2-100).