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Applying Other Social Effects In Alternatives Analysis

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Other Social Effects (OSE) have appeared in Federal guidance in various forms and nomenclatures for many years, but the amount of attention OSE has received in the U.S. Army Corps of Engineers (USACE) planning process has been inconsistent, and the analysis methodology has varied. However, OSE as part of the planning process has been gaining in prominence. The 2005 publication of EC 1105-2-409, *Planning in a Collaborative Environment*, greatly increased the emphasis and potential application of OSE by stating that all USACE planning studies.

This paper is meant to assist planners at the District level by providing a practical framework and approach for the use of OSE in alternative development and evaluation. The framework and approach are general — planners are encouraged to adapt the process as appropriate based on the local conditions and experience.

APPLYING OTHER SOCIAL EFFECTS IN ALTERNATIVES ANALYSIS

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Table of Contents

SECTION 1: INTRODUCTION	1
1.1 OSE in the USACE Planning Process	1
1.2 Overview of the OSE Handbook	2
1.3 Application of OSE in the Major USACE Business Lines	5
SECTION 2: COMMUNITY BASELINE PROFILE	6
2.1 Baseline Profile.....	6
2.2 Identifying Problems, Opportunities, and Constraints.....	6
2.3 Inventorying and Forecasting Conditions.....	7
2.4 Formulating Alternative Plans	8
2.5 Issues and Challenges	8
SECTION 3: DEVELOPMENT OF AN APPLIED PLANNING METHOD	9
3.1 Planning Metrics	9
3.2 Scoring System and Planning Matrix	11
3.3 Issues and Challenges	13
SECTION 4: APPLYING OSE IN ALTERNATIVES ANALYSIS	14
4.1 Initial Screening of Alternatives	14
4.2 Evaluating Final Alternatives	15
4.3 Issues and Challenges	18
SECTION 5: OVERALL PERSPECTIVES IN OSE ANALYSIS	19
SECTION 6: REFERENCES	21

Tables

Table 1-1: OSE Analysis in the Planning Process	3
Table 1-2: Social Factors	5
Table 3-1: Description of Metrics.....	10
Table 3-2: Key to Scoring Metrics in Matrix.....	11
Table 3-3: Template Screening Matrix	12

Appendix

Appendix A	Template Outline for OSE Report
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List of Acronyms

EJ	Environmental Justice
EQ	Environmental Quality
FRM	flood risk management
GIS	Geographic Information System
IWR	Institute for Water Resources
NED	National Economic Development
OSE	Other Social Effects
PDT	project delivery team
PMP	Project Management Plan
RED	Regional Economic Development
SOVI	Social Vulnerability Index
TIGER	Topologically Integrated Geographic Encoding and Referencing
USACE	U.S. Army Corps of Engineers

Section 1: Introduction

Other Social Effects (OSE) have appeared in Federal guidance in various forms and nomenclatures for many years, but the amount of attention OSE has received in the U.S. Army Corps of Engineers (USACE) planning process has been inconsistent, and the analysis methodology has varied. However, OSE as part of the planning process has been gaining in prominence. The 2005 publication of EC 1105-2-409, *Planning in a Collaborative Environment*, greatly increased the emphasis and potential application of OSE by stating that all USACE planning studies:

... will evaluate, display and compare the full range of alternative plans' effects across all four Principles and Guidelines' accounts National Economic Development (NED), Environmental Quality (EQ), Regional Economic Development (RED) and Other Social Effects (OSE) (USACE, 2005, p. 4).

Objective and Audience

The following paper provides a practical framework for District level planners to use OSE in the development and evaluation of alternatives.

This paper is meant to assist planners at the District level by providing a practical framework and approach for the use of OSE in alternative development and evaluation. The framework and approach are general — planners are encouraged to adapt the process as appropriate based on the local conditions and experience.

During the development of the framework and approach, many lessons learned and insights were drawn from the methodology for the OSE analysis conducted for the *Fargo-Moorhead Metropolitan Area Flood Risk Management Feasibility Study* (USACE, 2010).¹ The lessons learned and insights are included in this paper. Although many relate to flood risk management, the approach can be applied to all of the USACE Civil Works business lines.

This paper is organized as follows:

- Section 1 – Brief overview of OSE in the USACE planning process and sources of information about OSE
- Section 2 – Development of the community baseline profile and how it can be used in plan formulation
- Section 3 – Development and application of planning tools
- Section 4 – Evaluation of alternatives from an OSE perspective
- Section 5 – Overall perspectives in OSE analysis

1.1 OSE in the USACE Planning Process

The USACE six-step planning process, which is described in the *Planning Primer* (Orth and Yoe, 1997), provides a rational, systematic, and flexible approach to planning. The *Planning Primer* provides a general overview of OSE but no specific guidance on incorporating OSE into

¹ The *Fargo-Moorhead Metropolitan Area Flood Risk Management Feasibility Study* (USACE, 2010), which is being conducted by the USACE St. Paul District, is referred to as the “Fargo-Moorhead study” in this paper. The feasibility study can be found at <http://www.internationalwaterinstitute.org/feasibility>. Planners are encouraged to review the report to gain a better understanding of how OSE was applied.

a planning study. To provide this guidance, the USACE Institute of Water Resources was directed to provide tools to planners to help integrate OSE analysis into the planning process. *The Handbook on Applying “Other Social Effects” Factors in Corps of Engineers Water Resources Planning* (OSE Handbook) was written to fulfill this directive (Dunning and Durden, 2009). The OSE Handbook provides guidance on developing a baseline profile (assessment) that describes the social fabric of a community (the human environment of the study area) and identifies issues and concerns that are important to the community.

Table 1-1 summarizes the framework presented in the OSE Handbook for integrating OSE into the six-step planning process along with issues to be identified for each planning step. Data collection methods and sources of information are also identified to help planners link the issues with information to make an informed decision. As presented in the table, the six steps are:

1. Identifying Problem and Opportunities;
2. Inventorying and Forecasting Conditions;
3. Formulating Alternative Plans;
4. Evaluating Alternative Plans;
5. Comparing Alternative Plans; and
6. Selecting a Plan.

1.2 Overview of the OSE Handbook

The OSE Handbook describes seven social factors that should be assessed in an OSE analysis for a USACE study (see Table 1-2). Assessing each social factor involves evaluating indicators² that are pertinent to that social factor. After the indicators have been evaluated for each social factor, a baseline profile can be developed. The baseline profile describes the social fabric of the community in the study area, helps planners and decision-makers understand the social issues in a community, and provides context for alternative formulation and analysis. The indicators in the OSE Handbook are a guide and should be addressed at a minimum—planners are not restricted to them.

² “The social well-being factors presented in this handbook are concepts which influence personal and group satisfaction, well-being, and happiness. These concepts have real meaning in our lives; however, we don’t actually see concepts like ‘social connectedness’ or ‘social vulnerability.’ We can’t weigh social connectedness or take the social vulnerability’s temperature or measure its height. Instead we see evidence of their reality through indicators that have some logical relationship to the concept. Indicators are real, observable things which give evidence of the presence or absence of a concept (Babbie 1979)” (Dunning and Durden, 2009, p. 53). Examples of indicators for the Economic Vitality social factor include average annual cost of living, unemployment rate, and percentage of businesses locally owned.

Table 1-1: OSE Analysis in the Planning Process

Planning Step	Key Issues to Understand, Identify, and Document	Data Collection Methods and Sources of Information
1. Identifying Problem and Opportunities	<ul style="list-style-type: none"> • Identify water- and/or land-related problem • Determine social landscape and history of the area • Identify civic groups, stakeholders and engage them to find out problems with affect them 	<ul style="list-style-type: none"> • Workshops • Interviews • Literature review • Community visits
2. Inventorying and Forecasting Conditions	<ul style="list-style-type: none"> • Determine how current social conditions are affected by the water resources situation • Compile a social profile that includes population growth, age (<14 years and >65 years), education, income, employment, and housing • Correlate social changes to gathered data • Predict how social conditions will change without water resource remediation 	<ul style="list-style-type: none"> • U.S. Census Bureau SF1 and SF3 data tables for population estimates and TIGER system files: <ul style="list-style-type: none"> – Population – Racial/ethnic composition – Hispanic origin – Household income – Per capita income – Percent in poverty
3. Formulating Alternative Plans	<ul style="list-style-type: none"> • Communicate information from the baseline study and stakeholder preferences to the project delivery team (PDT) • Use information from baseline study to formulate project options • Identify potential management measures to address social issues of concern 	<ul style="list-style-type: none"> • Visioning workshops • Focus groups • Charrettes • Interviews
4. Evaluating Alternative Plans	<ul style="list-style-type: none"> • Emphasize alternative plans’ social effects to illuminate choices • Consider stakeholder issues and identify preferences between plan alternatives • Modify alternative plans as necessary 	<ul style="list-style-type: none"> • Visioning workshops • Focus groups • Charrettes • Interviews

Planning Step	Key Issues to Understand, Identify, and Document	Data Collection Methods and Sources of Information
5. Comparing Alternative Plans	<ul style="list-style-type: none"> • Consider full array of effects on all four accounts (NED, EQ, RED, and OSE) for each plan alternative • Identify and recommend a plan 	Discussions with project staff and stakeholders
6. Selecting a Plan	<ul style="list-style-type: none"> • Considering all four accounts, select the plan with the most net beneficial effects 	Discussions with project staff and stakeholders

Source: Dunning and Durden (2009)

EQ = Environmental Quality

GIS = Geographic Information System

NED = National Economic Development

OSE = Other Social Effects

RED = Regional Economic Development

TIGER = Topologically Integrated Geographic Encoding and Referencing

Table 1-2: Social Factors

Social Factor	Description
1. Health and Safety	Perceptions of personal and group safety and freedom from risks
2. Economic Vitality	Personal and group definitions of quality of life, which is influenced by the local economy's ability to provide a good standard of living
3. Social Connectedness	Community's social networks within which individuals interact; these networks provide significant meaning and structure to life
4. Identity	Community members' sense of self as a member of a group, in that they have a sense of definition and grounding
5. Social Vulnerability and Resiliency	Probability of a community being damaged or negatively affected by hazards and its ability to recover from a traumatic event
6. Participation	Ability of community members to interact with others to influence social outcomes
7. Leisure and Recreation	Amount of personal leisure time available and whether community members are able to spend it in preferred recreational pursuits

Source: Dunning and Durden (2009)

1.3 Application of OSE in the Major USACE Business Lines

Although the Fargo-Moorhead flood risk management (FRM) study is used in this paper to illustrate the application of OSE, OSE principles are not limited to the FRM Business Line. Application of OSE in all the major USACE business lines can be found in Section 6 of the OSE Handbook. A brief summary is presented below.

- **FRM.** FRM projects have the potential to impact all seven of the social factors in Table 1-2. The nature of flooding events within urbanized areas directly impacts the lives of individuals within the floodplain.
- **Navigation (Inland and Deep Draft).** Navigation channels may affect Health and Safety (accidents, pollution), Economic Vitality from increased business opportunities, Social Connectedness, and Leisure and Recreation opportunities.
- **Ecosystem Restoration.** The improvement of ecosystem values can have direct and indirect social values, primarily associated with recreation or enjoyment of improved resources to the project.

Other Resources for Social Analyses

The OSE Handbook provides references to many other papers and resources, including the Social Vulnerability Index (SOVI), which is widely used for social analysis of projects (Cutter et al., 2003). As defined by the Hazards and Vulnerability Research Institute, "the index is a comparative metric that facilitates the examination of the differences in social vulnerability among U.S. counties." A valuable tool for policy makers and practitioners, SOVI helps to graphically illustrate the geographic variation in social vulnerability. The SOVI Handbook for use in USACE analyses can be found on the Institute of Water Resources (IWR) web site (www.usace.iwr.army.mil).

Additional resources are available at HD.gov, which features material on human dimensions from many Federal agencies.

Section 2: Community Baseline Profile

Developing a baseline profile of the communities in the study area is one of the most important components of the OSE process and corresponds to **Step 1 – Identifying Problems and Opportunities** and **Step 2 – Inventorying and Forecasting Conditions of the Planning Process**, presented in Table 1-1. By developing the baseline profile, planners gain an understanding of the problems, needs, and opportunities in a community and obtain information that can be used to guide the formulation of alternatives, which is **Step 3 – Formulating Alternative Plans of the Planning Process**. The baseline profile is also the foundation of the analysis of the potential impacts of the alternatives.

This section provides a brief overview of the development of a community baseline profile and its use in the first three steps of the planning process. Additional information is provided in the OSE Handbook.

2.1 Baseline Profile

A baseline profile is conducted to obtain a better understanding of the social fabric of the study area. As part of the baseline profile, existing and projected demographic profiles of areas and neighborhoods should be documented. To the extent designated by local jurisdictions, the demographics of distinct neighborhoods should also be evaluated. Additionally, community facilities in the study area should be identified.

Although it is easy to sit at a desk and gather information about communities through Internet searches and news articles, it is also important for planners to talk with a variety of local representatives and the general public. Discussions with local residents can provide insights into the community's thoughts and make-up that may not be readily evident through outside sources. It is also important to recognize that these voices may not be representative of the feelings of the local population. Therefore, efforts should be made to obtain information from a representative sample of the residents of the study area. The OSE Handbook describes a number of methods for gathering information about the community that can be used to develop the baseline profile. For example, planners may conduct a survey of residents and local representatives that captures the thoughts of the residents.

Results of the baseline profile should be organized by the social factors presented in the OSE Handbook. The baseline profile should provide enough detail so that reviewers who are not familiar with the study can gain an understanding of the residents and communities in the study area.

2.2 Identifying Problems, Opportunities, and Constraints

As discussed in the OSE Handbook, the knowledge gained during the initial development of the baseline profile can be used to identify problems, opportunities, and planning constraints in the study area (Step 1 – Identifying Problems and Opportunities of the Planning Process).

Through initial data collection and discussions with stakeholders, planners should work to identify problems and opportunities that can be addressed through the USACE business lines. The problems may not always be obvious at first and may result in identifying opportunities that include multiple business lines. For example, when conducting the initial data collection of a FRM study, community members note to the planners that the number of ducks in the areas has

declined in recent years. Further analysis may reveal that the increase in flooding and the decrease in the number of ducks corresponded to the draining of sloughs in the area. Recognizing this relationship may lead to identifying the opportunity to reduce flooding and conduct ecosystem restoration by rebuilding sloughs in the area.

The initial data collection should also lead to an understanding of planning constraints, which can be used in the formulation of the study objectives. Plans can then be formulated to meet the objectives subject to the planning constraints. As plans contribute to planning objectives, they solve problems and realize opportunities.

The following are examples of potential constraints that may be identified during the baseline profile and considered during the initial development of planning objectives:

- A community has a significant cultural/historical connection to the homes and businesses in one area of the community. Because of this connection, relocating or acquiring these structures may not be desirable to community members.
- Because of a lack of personal vehicles, a low income area of the community may rely on easy access to area stores and services. Reducing access or removing the stores and services may cause a significant burden on community members.
- Residents on one side of a river may rely on immediate access to the services of a hospital on the other side of the river. Reducing access, such as removing a bridge, may create a public safety concern.
- A local park may be very popular with residents. Removing the park, or reducing access to the park, may cause considerable disruption in the community.
- A community found to be lacking in civic participation may not be capable of generating the public involvement necessary to implement a complex plan.

“Identifying the problems and opportunities you face is the most important step in the planning process. Once the problems and opportunities are described, the next task is to define the objectives and constraints that will guide your efforts to solve those problems and achieve those opportunities.

The success of the entire planning process depends critically on the success of this first step. Every planning investigation, from a multimillion-dollar multiple-purpose comprehensive investigation to a several thousand-dollar preliminary study, and everything in between, should produce two sheets of paper early in the study. One of them lists problems and opportunities, the other the objectives and constraints. The first sheet says this is what is wrong here, the second says this is what you intend to do about it (Orth and Yoe, 1997, p. 6.).”

2.3 Inventorying and Forecasting Conditions

Collecting basic community information and coordination with stakeholders will have occurred during the first step of the planning process discussed above. Following this initial step, planners should continue to gather information and forecast conditions in the study area (Step 2 – Inventorying and Forecasting Conditions of the Planning Process). This additional information will be used further define the social fabric of the community and to complete the baseline profile. Planners should also use the information to refine and revise the problems and opportunities as appropriate.

2.4 Formulating Alternative Plans

The development of measures and alternatives corresponds to Step 3 – Formulating Alternative Plans of the Planning Process presented in Table 1-1. During this step, management measures are developed that address one or more of the planning objectives. Developing these measures, and subsequently alternatives, requires an understanding of the needs of the stakeholders and their vision of addressing the problem. The OSE analysis can help ensure that stakeholder preferences about social conditions are understood by the PDT.

OSE analysis can be used to identify planning constraints as discussed in Section 2.2 above, but it can also be a tool to identify management measures that produce positive approaches to meet the planning objectives. Some examples of these measures include:

- Degraded estuarine or riverine areas can be improved as part of a navigation project with the beneficial use of dredged material to create marsh or other environmental features to address public health issues.
- Shoreline protection or beach nourishment can improve the economic vitality of an area suffering from constant erosion and loss of businesses.
- Detention or retention areas associated with a FRM project can be used to address the lack of recreation or open space in a community.

2.5 Issues and Challenges

A well-documented baseline profile developed through collaboration with local stakeholders and residents is essential when identifying problems, opportunities, and constraints. Engaging the community can lead to better relations between the local stakeholders and the PDT throughout the course of the study, and it may avoid any misconceptions and difficulties later in the study.

Developing the baseline profile may be hindered because of a lack of available data, lack of interest among stakeholders in the study, animosity towards the USACE, or the agendas of interest groups. Even with a well-documented baseline profile, developing measures and alternatives that meet stakeholder visions can be challenging. Stakeholder preferences often conflict or the stakeholders are unable to clearly articulate the “why” of their preferences. Therefore, a combination of data collection and stakeholder involvement methods may be needed to present a balanced and comprehensive baseline profile.

Section 3: Development of an Applied Planning Method

The OSE Handbook provides information on the indicators that are used to help develop the baseline profile of the study area. Although the indicators that define the social factors are valuable when developing the baseline profile of a community, they are not always relevant when assessing the impacts of alternatives on a community. Therefore, developing a method that can be used in an applied setting to assess the potential impacts of the alternatives on a community in the context of the social factors identified in the OSE Handbook and developed in the baseline profile is important.

The following section presents a framework for assessing OSE as part of an alternatives analysis, including a description of key OSE planning metrics, application of a matrix incorporating the metrics, and additional considerations. This framework corresponds to **Step 4 – Evaluating Alternative Plans, Step 5 – Comparing Alternative Plans, and Step 6 – Selecting a Plan of the Planning Process**. Application of the framework for evaluating alternatives from an OSE perspective is presented in Section 4.

3.1 Planning Metrics

Metrics have been developed for each social factor. The metrics are meant to provide a method of evaluating potential impacts on a community as a result of implementing an alternative. The metrics are defined using key issues that are meant to capture how a community could react to an external factor, such as implementing an alternative. For example, issues such as threat of flooding, transportation concerns, and noise are generally known to affect the mental health of residents within a project area, therefore the Mental Health metric is meant to capture impacts to an individual’s mental well-being.

The metrics listed in Table 3-1 are intended to be an initial guide for planners. **It is anticipated that planners will refine the metrics and add other metrics as needed.** A row for “Special Issues” is included in the table under each social factor. This row can be defined as needed to address prominent issues that are not covered in the other metrics. Special issues are typically identified while the baseline profile is being developed. The importance of various metrics will vary between studies depending on the baseline profile.

Special Issues

Special issues associated with the uniqueness of the study area should be identified and considered during the evaluation of alternatives. As an example, while developing the baseline profile for the Fargo-Moorhead study, the area was identified as a regional healthcare center with numerous hospitals and specialized clinics at risk of flooding. Flooding of the community would have a major impact on the healthcare services that could be provided for the residents of the larger region—well outside the immediate study area. Therefore, a metric called “Healthcare Services” was added under the Health and Safety social factor to address the prominence of this feature of the community.

Table 3-1: Description of Metrics

Social Factor	Metric	Description
Health and Safety	Mental Health	Issues affecting the overall mental health of a person, such as anxiety and stress (e.g., threat of flooding, transportation concerns, noise)
	Physical Health	Issues affecting a person’s physical health (e.g., air quality, diseases)
	Physical Safety	Safety issues that could cause bodily harm to a person (e.g., flood waters, crime)
	Special Issues	Special concerns identified during baseline assessment
Economic Vitality	Business Climate	Issues affecting the ability of a community to retain and attract businesses
	Employment Opportunities	Issues affecting the availability to provide employment opportunities for residents
	Financial Impacts	Issues affecting a person or group’s standard of living (e.g., taxes, property values)
	Municipal Services	Issues affecting the local tax base and the ability to provide municipal services
	Special Issues	Special concerns identified during baseline assessment
Social Connectedness	Community Cohesion	Issue affecting local social networks, including personal networks
	Community Facilities	Issues affecting access to local community related facilities (e.g., libraries, community centers, religious establishments)
	Special Issues	Special concerns identified during baseline assessment
Identity	Cultural Identity	Issues affecting sense of cultural identify within a community (e.g., historical significance, cultural significance)
	Community Identify	Issues affecting sense of community identity (e.g., local sports, how others see the area)
	Special Issues	Special concerns identified during baseline assessment
Social Vulnerability and Resiliency	Residents of Study Area	Issues affecting the overall risk to the population within the study area
	Socially Vulnerable Groups	Issues affecting socially vulnerable groups (e.g., low income, minority, elderly, children, disabled)
	Special Issues	Special concerns identified during baseline assessment
Participation	Public Participation	Issues affecting overall public involvement in community matters (e.g., trust in local officials, public interest in community)
	Special Issues	Special concerns identified during baseline assessment
Leisure and Recreation	Recreational Activities	Issues affecting access to, or availability of, recreational activities (e.g., parks, trails, view sheds)
	Special Issues	Special concerns identified during baseline assessment
Environmental Justice		
Public Safety		

In addition to the social factors described in the OSE Handbook, impacts to the residents and communities of a study area should also include a consideration of Environmental Justice (EJ) and Public Safety. These topics are critical components of the impacts to the residents and communities of a study area and are intertwined with many components of the OSE analysis. The EJ and Public Safety assessments are shown in Table 3-1, but it is anticipated that readers will be directed to the sections of the report of the planning study with detailed information on these critical considerations. EJ is most commonly addressed in the Environmental Impact Statement. Public Safety is included in OSE. The consideration of public safety is evolving and more specific guidance will likely be developed in the future.

3.2 Scoring System and Planning Matrix

A scoring system and matrix have been developed to aid in evaluating the OSE impacts of the alternatives on a community. Because some social factors are not easily quantified, the evaluation relies on a scoring system with a scale of –3 to +3, with –3 indicating significant negative effects on a particular metric, and +3 indicating a significant beneficial effect (see Table 3-2). **The score is an assessment of the relative impact an alternative would have on a particular metric in relation to the Without Project Alternative (No Action Alternative). The assessment is made from an overall planning perspective (not necessarily reflecting impacts to individuals or small groups).** For example, a diversion channel alternative to reduce flooding may have a significant beneficial effect to the residents at risk of flooding and be given a score of +3 for the Residents of Study Area metric. On the other hand, a nonstructural alternative (relocation) may benefit the residents being relocated but leave a large majority of the residents susceptible to flooding, and, therefore, receive a score of 0 or +1 (i.e., most of the residents would be susceptible to the same flood damage with relocation as with the Without Project Alternative).

Table 3-2: Key to Scoring Metrics in Matrix

Score	In Relation to the Without Project Alternative, the With Project Alternative Has ...
-3	Significant negative effects (showstopper)
-2	Moderate negative effects
-1	Minor negative effects
0	Negligible effects (no impact)
1	Minor beneficial effects
2	Moderate beneficial effects
3	Significant beneficial effects

The matrix provides a platform for the evaluation of the alternatives and displays the information so it can be easily understood by decision makers (Table 3-3). The matrix should be used as a planning tool to identify the impact of alternatives on the communities.

Table 3-3: Template Screening Matrix

Social Factor	Metric	Alternative 1	Alternative 2	Alternative 3
Health and Safety	Mental Health	-3	3	
	Physical Health	-2	2	
	Physical Safety	-1	1	
	Special Issues	0	0	
Economic Vitality	Business Climate			
	Employment Opportunities			
	Financial Impacts			
	Tax Revenues			
	Special Issues			
Social Connectedness	Community Cohesion			
	Community Facilities			
	Special Issues			
Identity	Cultural Identity			
	Community Identify			
	Special Issues			
Social Vulnerability and Resiliency	Residents of Study Area			
	Socially Vulnerable Groups			
	Special Issues			
Participation	Public Participation			
	Special Issues			
Leisure and Recreation	Recreational Activities			
	Special Issues			

Score: See Table 3-2 for a definition of the score

The displayed in the matrix for each metric should not only reflect the relative impact of the alternative on the community but also the importance of the social factor or metric to the community. When developing the baseline profile, planners need to determine which social factors are the most important to the community in relation to the problem. For example, when developing the baseline profile for the Fargo-Moorhead study, the investigators discovered that the recurring flood threat caused significant anxiety and stress to the local residents. The anxiety and stress was negatively affecting their lives throughout the year, not just during a flood event. Therefore, the Health and Safety social factor was given extra consideration and more prominence when evaluating the impacts of each of the alternatives on the communities. **The scores given for the metrics should reflect both the issues that are important to the community and the impacts of the alternatives.**

As is done with the other USACE planning accounts, alternatives are evaluated in relation to the Without Project Alternative for the OSE analysis; therefore, the Without Project Alternative is typically considered to be the neutral point (no costs or benefits). As such, the Without Project Alternative is not included as one of the alternatives in the matrix. **The matrix is meant to focus on the impacts of the alternatives on the communities, not the impacts of the Without Project Alternative on the community.**

Because the scores assigned reflect a qualitative assessment of the impacts, the evaluation is based on the judgment of the planners as to the scale of the impacts relative to the priorities of

the community. This can lead to unintentional biases during the evaluation, especially if the analysis is conducted by one person. Therefore, **conducting the evaluation in a collaborative environment with the PDT and with input from stakeholders is critical.** Although it can take more effort, a collaborative approach can lead to in-depth discussions of the impacts and result in a more robust and defensible evaluation. At the same time, these discussions will bring to the attention of the PDT members the social impacts of the alternatives.

3.3 Issues and Challenges

The metrics and matrix presented in Tables 3-1 and 3-3 should be viewed as a starting point for an analysis—they may require modifications to best reflect the uniqueness of the communities in the study area and the impacts of the alternatives on the communities. Prior to developing the matrix, planners should consider:

- Location of the impacts (does one community in the study area benefit at the expense of another?)
- Timing of the impacts (does implementing Phase 3 of the project in year 35 change the impacts to the communities?)
- Duration of the impacts (do the negative impacts of one alternative last significantly longer than another alternative?)
- Variation of the impacts (do the impacts change over a year or during an event?)

Modifications can be made to the metrics and matrix following the development of the baseline profile and review of the impacts of the alternatives. For example, implementing a flood risk management (FRM) alternative could have different impacts on a community, depending on whether the evaluation considers impacts during a flood event or during everyday life of the residents in the community. Therefore, when evaluating an FRM alternative, planners may find it appropriate to assess the OSE impacts to a community both during a flood event and in daily (i.e., non-event) life.

The impacts of an alternative on a community during a flood event are often obvious (reduction in flood damages and associated disruption to lives); however, planners must also consider the impact on the everyday lives of the community members. For example, constructing a diversion channel may significantly reduce the mental stress during a flooding event (i.e., may receive a score of +3 for the Mental Health metric), but the diversion channel may also sever local roads and result in minor increases in the daily commute and aggravation for local residents (i.e., receive a score of –1 for the Mental Health metric). To address both scenarios, planners should assess a community separately during (1) an event and (2) during daily life by providing two scores for each metric. An example of how the matrix was revised for the Fargo-Moorhead study is provided in Section 4.2 of this paper.

Section 4: Applying OSE in Alternatives Analysis

As with the other USACE planning accounts, the With Project Alternatives are evaluated in relation to the Without Project Alternative for the OSE analysis. When developing the baseline profile, planners are presenting the community to the reader and explaining the social fabric of the community and identifying the problems, opportunities, and constraints. With an FRM study, for example, the baseline profile evaluates the impact of the risk of flooding on the community, which may include stress and anxiety from the fear of flooding and the loss of business opportunities. Much of the information in the baseline profile will form the Without Project Alternative. The framework and approach for evaluating the alternatives, comparing the alternatives, and recommending an alternative corresponds to **Step 4 – Evaluating Alternative Plans, Step 5 – Comparing Alternative Plans, and Step 6 – Selecting a Plan of the Planning Process** presented in Table 1-1.

During the alternative analysis portion of a study, planners need to evaluate the impacts of the With Project Alternatives on the community by using the information in the baseline profile as the basis for comparison and evaluation. Although an alternative may address certain problems in a community, implementing the alternative may also present new challenges in the community. The following section discusses evaluating the impacts of the With Project Alternatives and determining the OSE impacts. A template outline for an OSE report is presented in Appendix A.

4.1 Initial Screening of Alternatives

Because With Project Alternatives are evaluated in relation to the Without Project Alternative for the OSE analysis, each With Project Alternative needs to be developed in enough detail during the initial screening phase that a comparison can be made. The matrix presented in Section 3.2 can be used as one of the primary planning tools for the initial screening of alternatives.

Planners must perform the evaluation from a neutral perspective and not focus on individuals or small groups. For example, relocating 10 elderly residents to construct a levee may seem significant to the individuals being relocated, but it may be less significant when compared to the total number of residents relocated or the number of elderly residents who would be protected by the levee. In such cases, the Socially Vulnerable Groups metric might be scored as 0 or -1. In the Fargo-Moorhead study, the nonstructural (acquisition of structures) alternative was anticipated to move a small number of residents out of harm's way (compared to the total number of residents at risk). Because the nonstructural option had only a small impact on the reduction in flood risk in the community as a whole, the nonstructural option was not expected to produce positive or negative impacts. Therefore, this alternative was scored primarily as 0, +1, or -1 for all of the metrics.

A score of -3 or +3 should be given only when specific, significant impacts are anticipated. A score of -3 should be considered a "showstopper" for that particular alternative (pending any mitigation measures that may reduce the impacts), while a +3 should be considered a significant beneficial effect. Normally, no more than 25 percent of the scores for an alternative should be either -3 or +3. **If more than 25 percent of the scores are -3 or +3, planners should closely evaluate the scoring to determine whether it is appropriate.** In some cases, it may be necessary to reassess which items are most important to the community and adjust the scores for the other metrics accordingly. Basically, an alternative would not be expected to cause a

significant impact on every metric being evaluated. The score for any metric that receives a score of -3 or $+3$ should be explained in the associated evaluation section so that decision makers can understand why that score was selected.

Once the scores from the evaluation are entered into the matrix, planners should review the results to ensure that they are appropriate and reasonable. Metrics with a score of -3 (significant negative impacts) indicate that there could be serious issues with implementing the alternative. **These metrics should be reviewed to determine whether any mitigation measures can be implemented to reduce their negative effects.** For example, a diversion channel may separate a community from the local elementary school (i.e., score of -3 for Community Cohesion metric); however, a series of pedestrian bridges over the channel may reduce the effects. Identifying mitigation measures proactively may alleviate a community's concerns.

By reviewing the matrix, planners can readily see both the benefits and disadvantages of each alternative in comparison to the Without Project Alternative. As in Table 3-3, the scores are color-coded to assist with identifying the assigned scores. An OSE report should include the matrix and a section evaluating the results of the initial screening analysis.

The purpose of the initial screening of alternatives is to contribute to identifying which alternatives should be carried forward for further analysis. Because the scores in the matrix are meant for general evaluation purposes and the metrics are not weighted, it is not appropriate to simply add all of the scores and select the alternatives with the highest scores. **Planners should identify which alternatives would best meet the needs of the community from an overall planning perspective, considering their benefits, drawbacks, and the priorities of the community.**

The results of the OSE analysis should be used in conjunction with the results from analyses being conducted by the other PDT members to make an informed decision of which alternatives should be carried forward for further analysis.

4.2 Evaluating Final Alternatives

Although the initial screening of alternatives may clearly identify two or three alternatives that should be carried forward for further consideration, the selection of the alternatives should not be based solely of the results of the OSE analysis. **The selection of the alternatives to carry forward should be completed with other members of the PDT and take into consideration the other three planning accounts (NED, RED, and EQ).**

Accordingly, the specific impacts of an alternative would most likely affect more than one of the accounts. However, impacts may not be measured the same way across the accounts. For example:

- The projected construction of a new business resulting from a navigation improvement alternative would be quantified through the RED account and considered when evaluating the Economic Vitality social factor.
- Increased water clarity from an ecosystem restoration alternative would be analyzed in the EQ account and considered when evaluating the Leisure and Recreation social factor.

- A reduction in damage to homes resulting from a flood risk management alternative would be quantified through the NED account and considered when evaluating the Social Vulnerability and Resiliency social factor.

An alternative that clearly meets the objective of the community from an OSE standpoint may not be cost-effective or it may have significant environmental consequences, thus eliminating it from further consideration. Alternatively, an alternative that has negative OSE impacts may be acceptable if mitigation measures can be implemented to reduce or eliminate the concerns. For example:

- The loss of important open space from an FRM alternative may be mitigated by the use of the detention basins for recreation activities (i.e., soccer or baseball fields) during dry periods.
- Public safety concerns associated with an upland placement area from a navigation project may be mitigated by use of fencing and vegetative buffer zones around the site.
- Noise impacts associated with increased barge traffic from a navigation alternative may be reduced by implementing operating procedures that limit lock operation during the nighttime hours.

After the alternatives that will be carried forward have been selected, the impacts and consequences may change as the alternatives are developed in greater detail and the impacts become clearer. This new information may result in changes to the evaluation criteria and how the OSE analysis is conducted. For example, during the initial screening of alternatives in the Fargo-Moorhead study, the study area was identified as the Fargo-Moorhead metropolitan area. However, further analysis determined that the alternatives had the potential to induce flood damage outside the metro area. To account for induced impacts and better evaluate the impacts, the study area was expanded and divided into four subareas during the final screening of alternatives.

For consistency throughout the analysis, the metrics and scoring system for each social factor are the same as those used in the initial screening of alternatives, but because alternatives are refined, the scores may not be the same. In addition, the alternatives are evaluated with more knowledge of the potential impacts of the alternatives.

Although the basic premise of the matrix presented earlier is the same, the tables in the detailed analysis are presented by social factor. As can be seen in Table 4-1, during the Fargo-Moorhead study, a number of alterations were made to the evaluation of the Health and Safety social factor. Changes include accounting for the impacts to daily life and during an event (column heading “D” addresses impacts to daily life, while column “E” addresses impacts during an event), another metric (Regional Healthcare) was added to account for the large number of hospitals and clinics that are at risk, and the study area was divided into subareas to account for induced flooding in certain areas.

Table 4-1: Health and Safety Social Factor

Social Factor: Health and Safety	Metrics			
	Mental Health	Physical Health	Physical Safety	Regional Healthcare
Alternative 1: Diversion Channel with Downstream Impacts and No Mitigation				
	D / E	D / E	D / E	D / E
Area 1 (upstream of the metro area)	0 / 0	0 / 0	0 / 0	0 / 0
Area 2 (metro area)	3 / 2	2 / 2	0 / 2	0 / 3
Area 3 (immediately downstream of metro area)	-1 / -2	-1 / -1	0 / -1	0 / -1
Area 4 (downstream of Area 3)	0 / -1	0 / 0	0 / -1	0 / 0
Alternative 2: Diversion Channel with Upstream Impacts and Mitigation				
	D / E	D / E	D / E	D / E
Area 1 (upstream of the metro area)	-1 / -1	0 / -1	0 / -1	0 / -1
Area 2 (metro area)	3 / 2	2 / 2	0 / 2	0 / 3
Area 3 (immediately downstream of metro area)	0 / 0	0 / 0	0 / 0	0 / 0
Area 4 (downstream of Area 3)	0 / 0	0 / 0	0 / 0	0 / 0

Notes:

- Impacts are measured in comparison to the Without Project Alternative
- D = impacts to daily life (no flooding); E = impacts during a flood event
- Scores can range from -3 (significant negative impact) to +3 (significant beneficial impact)
- No more than 25 percent of the metric scores for an alternative should be either a -3 or +3

Although the baseline profile is used as the basis for evaluation, planners should gather input from other members of the PDT and local stakeholders. A collaborative process may yield valuable insights into the community and the potential impacts of alternatives. **Seeking input from others during the assessment is necessary to clarify, fine tune and, if necessary, revise the evaluation.** Techniques for engaging the PDT and stakeholders can be found in the OSE Handbook.

As mentioned in Section 3.2, planners should look at alternatives from an overall planning perspective rather than focusing on the impacts to individuals or small groups. Along those lines, looking at the impacts and the project from a watershed or systems approach it is sometimes appropriate. Even though a community in the study area may be negatively affected by an alternative, small benefits may result for a larger group of residents in a watershed. For example, one of the side benefits of an ecosystem restoration project may be the reduction in the downstream sediment load, which may improve downstream fisheries and extend the life of a municipal water supply reservoir many miles away.

During the final evaluation of the alternatives, it is important to remember that not all of the impacts need to be beneficial for an alternative to be acceptable to a community. **An alternative that has some negative effects may still be the most beneficial to a community overall.** Planners need to take into consideration what social factors and metrics are important to the community. How this determination is made should be reiterated in the report so that decision makers can make an informed decision on the overall impacts of the alternatives.

4.3 Issues and Challenges

Although the importance of the social factors to the community is based on the understanding gained while developing the baseline profile, the importance of the social factors may change as the study progresses, the alternatives are better defined, and the communities' understanding of the alternatives change. **Revisions to the importance of the social factors may need to be adjusted between the initial screening of alternatives and the evaluation of the alternatives that are carried forward.** For example, in the Fargo-Moorhead study, the Participation social factor became more important as residents in the study area became more aware of the alternatives and engaged in the process through public meetings and workshops. At the beginning of the study, residents in the study area were relieved that the flood risk would be reduced. However, as the alternatives were developed further and the residents understood the impacts of the alternatives in more depth, their perception of the alternatives changed. During public meetings, opposition to one of the alternatives by residents in Minnesota became apparent. The residents felt they were disproportionately bearing the burden of the impacts of the alignment of a diversion channel while receiving relatively few benefits. Because implementing this alternative could hurt residents' confidence in the ability of resource agencies and local officials to look out for their best interests, the opposition was taken into consideration when evaluating the Participation social factor.

When an alternative is evaluated, whether the benefits outweigh the costs is not always clear because fully assessing the impacts is often difficult. For example, in the Fargo-Moorhead study, one of the alternatives would induce additional flood damages to a community in the study area. A mitigation measure to acquire all the structures in a small town and require the residents to relocate was presented. Although residents would lose the social connections that define their sense of community, they would also reduce their stress and anxiety by moving out of a flood-prone area. The community's likely reaction may seem obvious, but the community may view the situation very differently. The contrary reaction by the community may be the result of planners not having a good understanding of the community or of limited or misleading information having been provided to the community. Sometimes the reactions of the community are unexpected.

Many large-scale development projects take many years from project inception to final completion. Therefore, social factors that may affect the communities surrounding the project area are likely to change from project scoping to the mid-point of the project cycle. For an OSE analysis to be robust and truly effective, the timing and duration of impacts should be built into the analysis framework. In most cases, PDT members and stakeholders are aware of possible long-term impacts and a discussion of these should be made during the alternatives analysis.

Although OSE is one of the four accounts evaluated by the USACE, the results of the analysis may be used by a broader audience. For example, the local sponsor may use the OSE report to build public support for implementing an alternative or to demonstrate that the impacts to portions of the population were taken into consideration. Therefore, planners should consider how the OSE report will be used outside the USACE and ensure that the report addresses those broader needs.

Section 5: Overall Perspectives in OSE Analysis

This paper presents a practical framework and approach for an OSE analysis, with emphasis on the use of OSE in alternative development and evaluation. As can be seen, a successful OSE analysis relies on many factors: preparing a comprehensive baseline profile of the study area, sincere and sustained efforts to involve local stakeholders and the public, a commitment from the PDT, flexibility, and innovation. This section provides a few additional thoughts and perspectives that a planner may want to consider at the beginning of the study and throughout the process:

- The project management plan (PMP) includes OSE. The PMP is the game plan for how the study will be conducted. It identifies the activities to be performed and provides the schedule, duration, and costs for the study activities. OSE efforts should be included in the PMP to ensure that adequate time is incorporated into the project schedule to perform the necessary tasks. Identifying OSE tasks at the outset of a study, via the PMP, will also help the PDT understand the role that OSE will play in the study and its relationship in the plan selection.
- Adequate funding is available. OSE study efforts should be funded commensurate with the scope of the effort. Including OSE efforts in the PMP will help ensure that the project manager programs funds for the required tasks.
- The project manager and stakeholders understand the value of completing an OSE analysis. It is critical that planners convey the importance and the role that OSE can have in the planning process and how it can contribute to alternative development and selection. For both the project manager and stakeholders, OSE will be a new concept from traditional benefits analysis, and may not be fully understood. Planners must ensure that the value of the OSE analysis and its contribution to better plan selection are explained and understood.
- The PDT is prepared to discuss OSE, both internally and with the public. The PDT may also be resistant to OSE analysis, because it is not traditionally used. Planners will need to convey how OSE will interact with other disciplines and address any uncertainties about its use. The public may have a greater acceptance of OSE analysis; however, the analysis must also be conveyed in clear, non-technical terms to increase understanding.
- OSE is included from the beginning of the planning process. The Planning Primer describes Step 1 – Identifying Problems and Opportunities as the critical first step to the success of the entire planning process. Incorporating OSE at the beginning of the process is equally critical to a successful OSE analysis. OSE analysis can help develop planning objectives and constraints, formulate measures and alternatives, evaluate plans, and aid in plan selection.
- OSE is considered in formulating alternatives and in evaluating plans. Because of the shared components across all four accounts, planners must ensure that the alternatives and their impacts are fully understood by the entire PDT and are presented consistently across the accounts. The role of OSE will vary among studies. In some, it may be a primary factor in formulation; in others, it will be primarily a consideration in evaluation.

OSE analysis continues to evolve within the USACE. As OSE gains prominence in the decision-making process as one of the four accounts, OSE will be incorporated into the overall planning process and reviewed more critically. Therefore, greater emphasis will be required by planners to prepare a comprehensive and defensible OSE analysis.

Section 6: References

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APPENDIX A
TEMPLATE OUTLINE FOR OSE REPORT

1.0 INTRODUCTION

- 1.1 Purpose
- 1.2 Study Area
- 1.3 Overview of Other Social Effects
- 1.4 Organization of Report

2.0 COMMUNITY CHARACTERISTICS AND OTHER SOCIAL EFFECTS FACTORS

- 2.1 Socioeconomic Characteristics of the Study Area
 - 2.1.1 Population Size and Composition
 - 2.1.2 Household Structure
 - 2.1.3 Race and Ethnic Diversity
 - 2.1.4 Education
 - 2.1.5 Housing
 - 2.1.6 Industrial and Occupational Structure
- 2.2 Baseline Profile of Communities
 - 2.2.1 Health and Safety
 - 2.2.2 Economic Vitality
 - 2.2.3 Social Connectedness
 - 2.2.4 Identity
 - 2.2.5 Social Vulnerability and Resiliency
 - 2.2.6 Participation
 - 2.2.7 Leisure and Recreation
 - 2.2.8 Summary of Baseline Profile

3.0 ANALYSIS OF OSE BASELINE

- 3.1 Key Findings
- 3.2 Input for Development of Management Measures and Alternatives

4.0 INITIAL SCREENING OF PROJECT ALTERNATIVES

- 4.1 Description of Alternatives
 - 4.1.1 Alternative 1
 - 4.1.2 Alternative 2
 - 4.1.3 Alternative 3

- 4.1.4 Alternative 4
- 4.2 Initial Screening Methodology
 - 4.2.1 Social Factor Metrics
 - 4.2.2 Scoring
- 4.3 Evaluation of Social Factors
 - 4.3.1 Alternative 1
 - 4.3.2 Alternative 2
 - 4.3.3 Alternative 3
 - 4.3.4 Alternative 4
- 4.4 Summary of Initial Screening of Project Alternatives

5.0 ALTERNATIVES ANALYSIS

- 5.1 Description of Alternatives Carried Forward
 - 5.1.1 Alternative 1
 - 5.1.2 Alternative 2
- 5.2 Other Social Effect Evaluation of Alternatives
 - 5.2.1 Health and Safety
 - 5.2.2 Economic Vitality
 - 5.2.3 Social Connectedness
 - 5.2.4 Identity
 - 5.2.5 Social Vulnerability and Resilience
 - 5.2.6 Participation
 - 5.2.7 Leisure and Recreation
- 5.3 Summary of Alternative Analysis

6.0 REFERENCES



Institute for Water Resources

The Institute for Water Resources (IWR) is a U.S. Army Corps of Engineers (USACE) Field Operating Activity located within the Washington DC National Capital Region (NCR), in Alexandria, Virginia and with satellite centers in New Orleans, LA; Davis, CA; Denver, CO; and Pittsburg, PA. IWR was created in 1969 to analyze and anticipate changing water resources management conditions, and to develop planning methods and analytical tools to address economic, social, institutional, and environmental needs in water resources planning and policy. Since its inception, IWR has been a leader in the development of strategies and tools for planning and executing the USACE water resources planning and water management programs.

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