

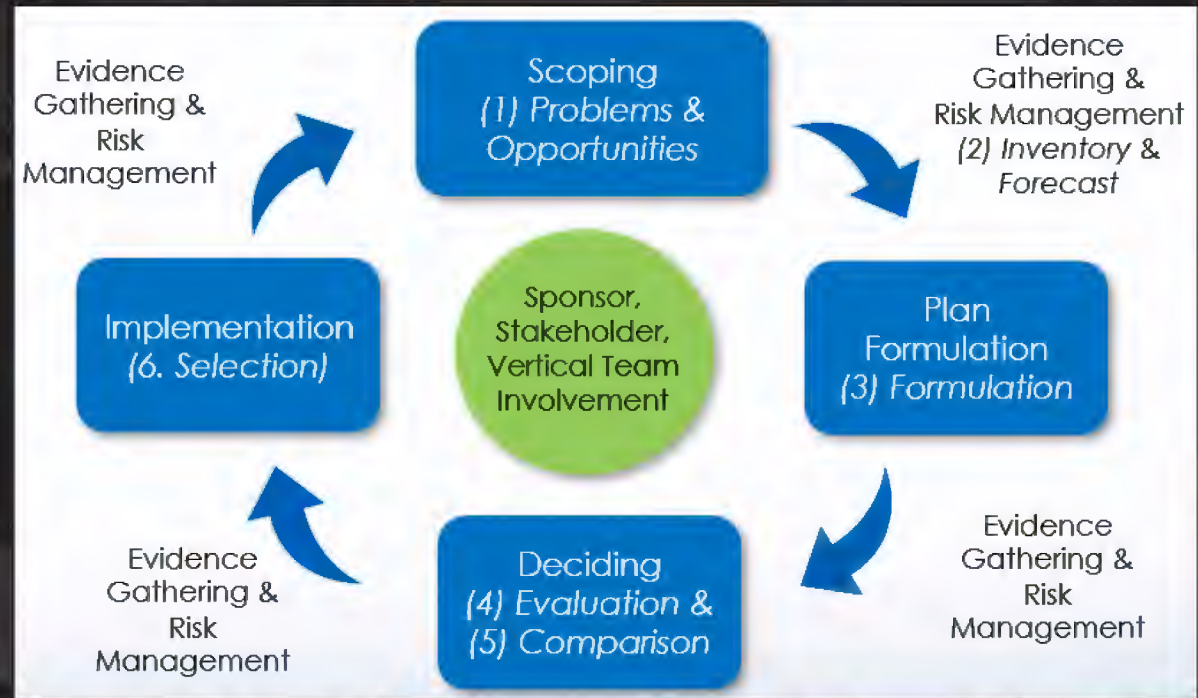
PLAN FORMULATION STRATEGY FUNDAMENTALS

Presented by:

Nate Richards
HQUSACE - NAD RIT Planner

Nick Applegate
HQUSACE – OWPR

14 Sept 2023



U.S. ARMY



US Army Corps
of Engineers®



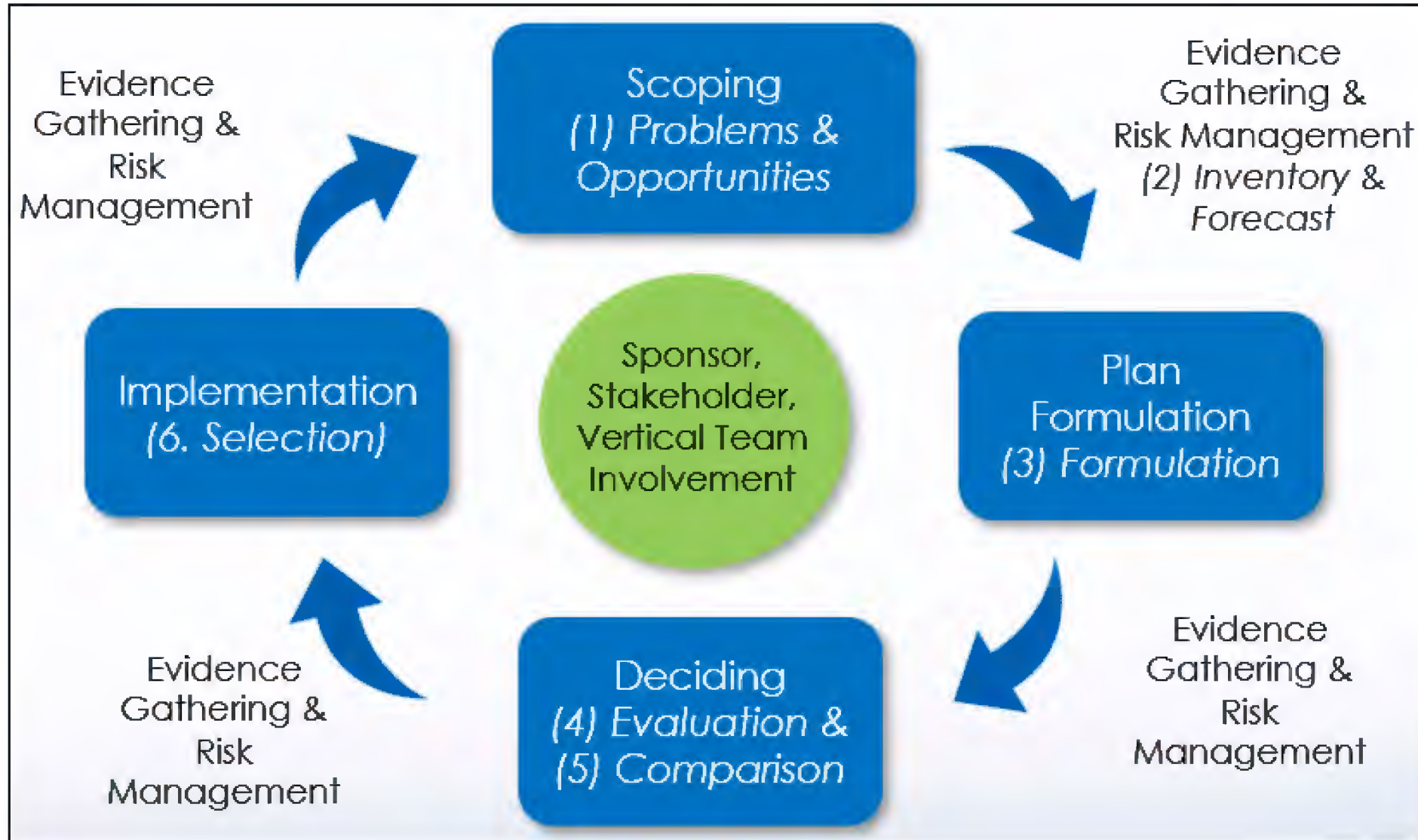
LEARNING OBJECTIVES

- Understand the value of plan formulation strategies
- Understand measures and how they are used to create alternatives
- Be able to define and provide examples of plan formulation strategies
- Understand which alternatives are “required” to be formulated for different mission areas





RISK INFORMED PLANNING PROCESS





KNOWLEDGE CHECK -- PLACE A CHECK AS APPROPRIATE

I haven't taken any of the PCC courses

I've taken PCC1 – Civil Works Orientation

I've taken PCC2 – Planning Essentials

I've taken PCC3 – Plan Formulation and Evaluation Capstone



KNOWLEDGE CHECK -- PLACE A CHECK AS APPROPRIATE

Help, I don't know what a formulation strategy is!

I've developed plans, but don't remember using a formulation strategy

I've used one or two formulation strategies that I remember

I've used various formulation strategies and have a good understanding

WHY DO WE FORMULATE ALTERNATIVE PLANS?

Very simply: To address planning objectives while avoiding constraints.





MANAGEMENT MEASURES

- A management measure is a means to solve a problem or realize an opportunity
- Either a **feature** or **activity** that can be implemented at a specific geographic site to address one or more planning objectives
- A feature is a **physical element** that generally requires site construction
- An activity is an **action** which may be a one-time occurrence or ongoing



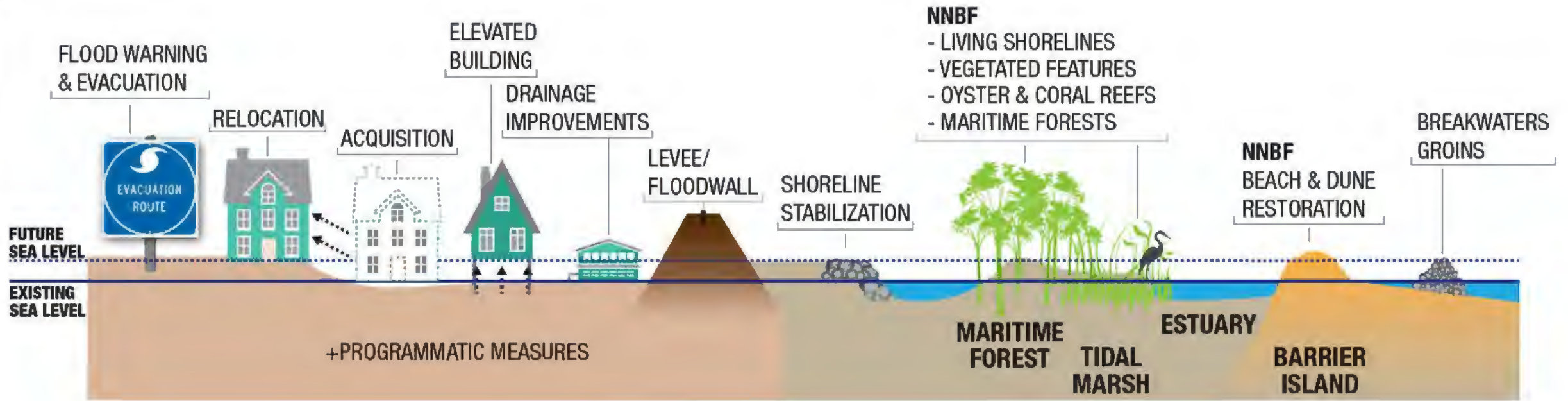
MEASURES VS. SCALES OF MEASURES

- Management measures may be scaled by several different properties or dimensions:
 - Physical characteristics (e.g., sizes, heights, depths, amounts, counts)
 - Composition (e.g., different materials and methods that would accomplish the same purpose)
 - Locations
 - Timing and duration (e.g., flow release schedules)
 - Levels of intensity (e.g., density of plantings)
 - Scale can be optimized after the TSP Milestone





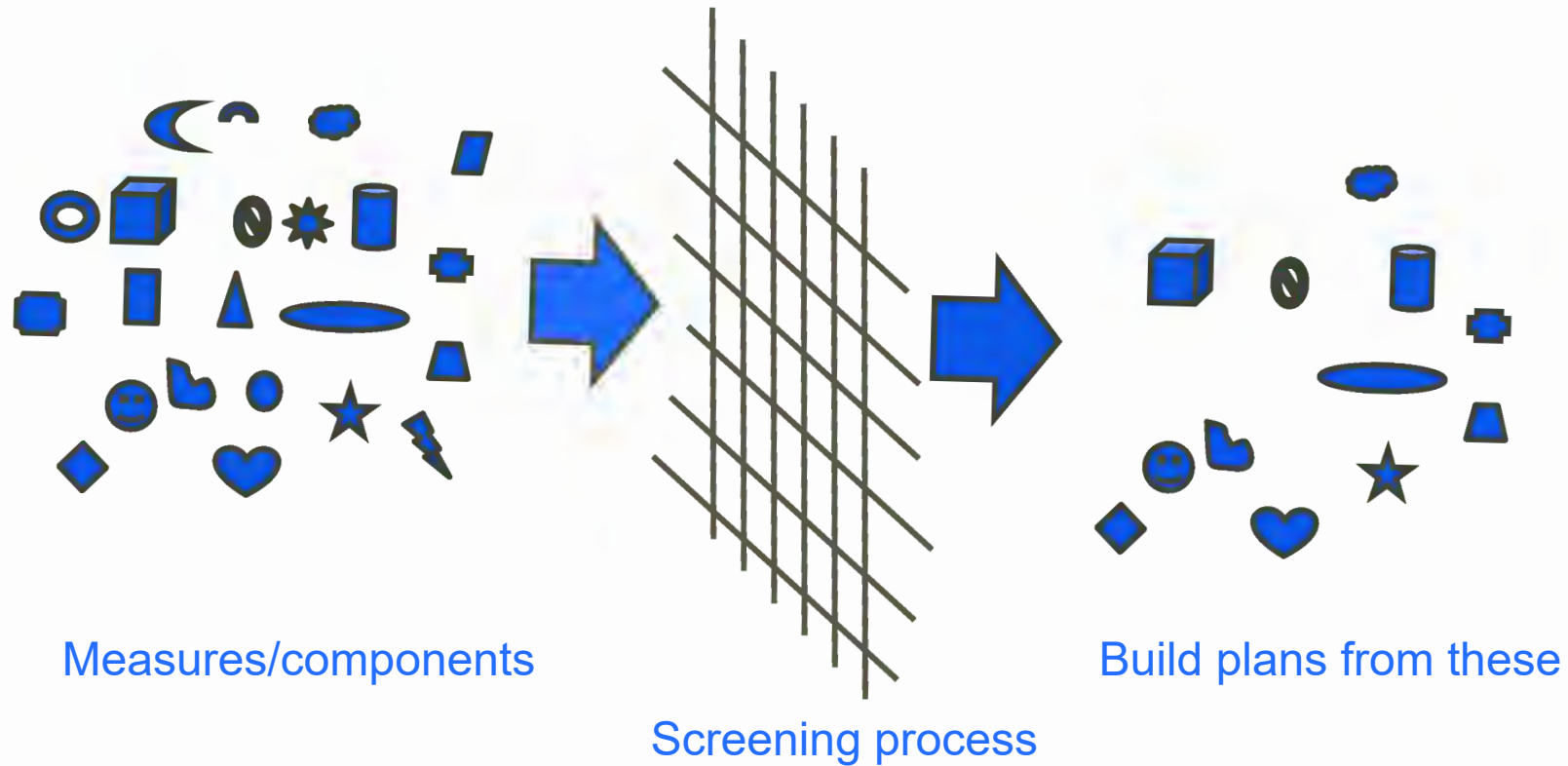
COASTAL STORM RISK MEASURES EXAMPLE





MEASURE SCREENING

- We often start with a long list of measures that are screened down based various criteria focused primarily on efficiency and effectiveness.





BUT HOW DO I TURN THESE MEASURES INTO DISTINCT ALTERNATIVE PLANS?!?

- By developing and implementing Plan Formulation strategies!





WHAT ARE FORMULATION STRATEGIES AND WHY ARE THEY IMPORTANT?

- **“Order from Chaos”**
 - A method to narrow down the universe of possible solutions into a concise group of initial and focused arrays of alternatives
- A systematic way of combining measures into plans based upon specific planning objectives. Not a “mechanized/automated” process
 - Make basic links between planning objectives and alternatives
 - Identify innovative ways to solve the problem
- A means of obtaining input/preferences from the public and non-Federal sponsors
- **Document it in the report**





PLAN FORMULATION STRATEGIES

GUIDANCE: Not much “formal” guidance on formulation strategies

IWR Planning Manual Part II: Risk Informed Planning (2017-R-03) Section 8.5:

“A formulation strategy is a disciplined way to produce one or more specific plans... A strategy usually consists of a set of tactics or conditional decisions that shape and guide the development of plans; thus, strategies structure the *how to* of plan formulation.”

https://planning.erdcdren.mil/toolbox/library/Guidance/PlanningManualPartII_IWR2017R03.pdf



WHERE DO PLAN FORM STRATEGIES FIT IN THE PLAN FORMULATION PROCESS?

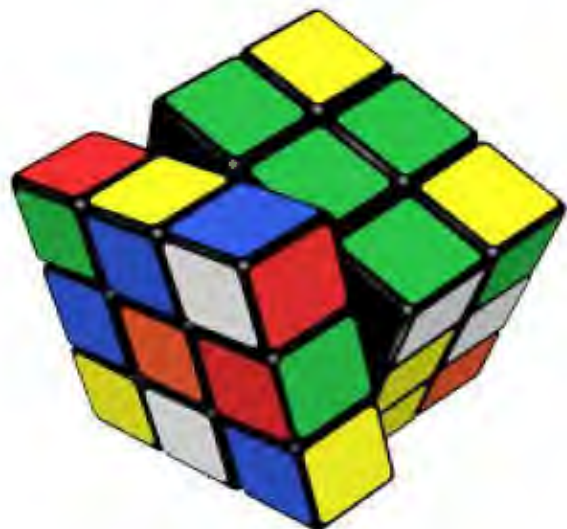
A little context...

- Initial plan form strategies are just the first step in development of alternative plans
- To be followed by development of actual alternatives – placing management measures “on the ground” - with maps - to address objectives
- Which in turn will be screened using objective evaluation criteria to arrive at a focused array



PART ART – PART SCIENCE

- It is doubtful that any two formulators will do it the exact same way, or even come up with the same answer
- No single approach is sure to “work” every time



Nevertheless, formulation:

- Is based on facts
- Allows different values to impact the final array of plans
- Focuses on rational process/systematic approach
- *Builds from problems, opportunities, objectives and constraints*



FORMULATION CONSIDERATIONS

Things to think about to help ensure significantly different alternatives

- Review the problems, opportunities, objectives and constraints
 - Think of different methods to solve the problems and take advantage of opportunities
 - Strategies should reflect the evaluation criteria that will measure success in achieving objectives
- Use the 4 P&G criteria: Completeness, Acceptability, Effectiveness, and Efficiency
 - *Effectiveness is usually measured in many different ways. Come up with comprehensive and appropriate evaluation criteria for effectiveness in YOUR STUDY.*
- Use the 4 accounts: NED, EQ, RED, and OSE
 - *OSE to include criteria like life risk, disadvantaged communities, social justice, community cohesion, etc.*



PLAN FORMULATION STRATEGIES

Examples From the Planning Manual Part II:

Example Methods to Develop/Collect Ideas:

- Do Your Homework (read other reports)
- Ask People (experts, other disciplines, vertical team)
- Checklists
- Brainstorming
- Pair off PDT Members
- Use Data / Models
- Targeted Meeting

Example Plan Form Strategies:

- All Possible Combinations of Measures (be careful!)
- Plans from Outside Sources
- Additive / Cornerstone Approach
- Ideal future
- Themes
- Outcome based to satisfy stakeholders
- Directive (external or internal)
- Mutate (subtract, add, transfer, change, hybridize, etc.)



PLAN FORMULATION STRATEGIES (CONT.)

Start small and add increments OR Start large and subtract



If you have a key feature, may begin with that and continue to add logical increments to it

OR

If you have a complete proposed plan, break off logical pieces into separate functional components and arrange into different plans






NEITHER OF THESE STRATEGIES NEGATE THE NEED FOR INCREMENTAL ANALYSIS

PLAN FORMULATION STRATEGIES (CONT.)

THEMES (similar to Outcome Based):

Identify focal areas to guide the development of distinct alternatives

Examples:

-  • Environmentally Focused (measures that would be most beneficial / least detrimental to the environment)
-  • Life Safety Focused (measures that most reduce life safety risk)
-  • Recreation Focused (measures that provide the most ancillary rec benefits)
-  • Sponsor Preferred (measures from the sponsor; potential to become an LPP)
-  • Economics Focused / NED (measures with the most outputs / net benefits)

REQUIRED ALTERNATIVES

Name Some Alternatives Required For A Flood Risk Management Study?





REQUIRED ALTERNATIVES / MEASURES

REQUIRED

- **No Action** (ER 1105-2-100): No new federal action / continue ongoing actions
- **NED / NER Plan** (ER 1105-2-100): **Reasonably maximizes** net NED/NER benefits
- **Nonstructural** (PB 2016-01, WRDA 74 S.73): A **minimum** of one **primarily non-structural** alternative considered for FRM and CSRM projects. Nonstructural measures should be given equal consideration for all studies (ER 1105-2-100).
- **Life Safety / TRG Plan** (PB 2019-04): At a minimum, one alternative that addresses **TRG 1 and TRG 4** must be identified for studies that involve existing or proposed dams and levees
- **Max Total Net Benefits all Categories** (2021 Policy Directive – Comprehensive Benefits in Decision Documents): Plan that maximizes net total benefits **across all benefit categories**.

CONSIDERED / IDENTIFIED

- **Natural and Nature-Based Features** (IG for WRDA 2016 S.1184): Must be **considered** alone and in combination with other measures for FRM, CSRM, and ER studies
- **Least Environmentally Damaging Practicable Alternative** (2023 Pre-Publication Planning EC), consistent with Section 404 of the Clean Water Act
- **Locally Preferred Plan** (2021 Policy Directive – Comprehensive Benefits in Decision Documents): **If requested by non-federal partner**, and not in one of other listed plans in the guidance.



HOW DO WE INCORPORATE THE REQUIRED ALTERNATIVES INTO PLAN FORMULATION?

- By using plan formulation strategies!
 - Develop more focused sub-strategies around achieving these required alternative themes.
- Develop thoughtful evaluation criteria and define how effectiveness will be measured across all benefit areas.
 - Get outside the traditional NED box, but still focused on the authorized study purpose and achieving the study objectives.





EXAMPLE PLAN FORM STRATEGIES FOR FLOOD RISK MANAGEMENT (CONT.)

- Focus on economic damage centers (e.g., where the greatest consequences are)
- Focus on minimization of life loss (e.g., ALSO where the greatest consequences are)
- Focus on critical infrastructure (almost by definition “high consequence” – often associated human health & safety)
- Focus on existing FRM infrastructure (e.g., fragile levees)
- Focus on giving equal/better performance to disadvantaged communities.
- Focus on “*regional*” solutions initially (e.g., dams, upstream detention, land use ordinances), followed by more “*local*” *performance measures* (e.g., floodwalls/levees, channelization, bypass structures, bridge modifications, interior drainage)
- Pick 1 or more levels of performance for initial formulation of alternatives (e.g., 10% AEP, 4% AEP). *Optimization comes later!*
- Non-structural (alternatives, not just measures, e.g., relocations, evacuation planning, etc.)
- Combination of structural and non-structural measures
- Avoiding risk transfer; consider residual risk



CASE STUDY - PORTLAND METRO LEVEE SYSTEM FRM

Outcome focused / thematic:

1-No Action

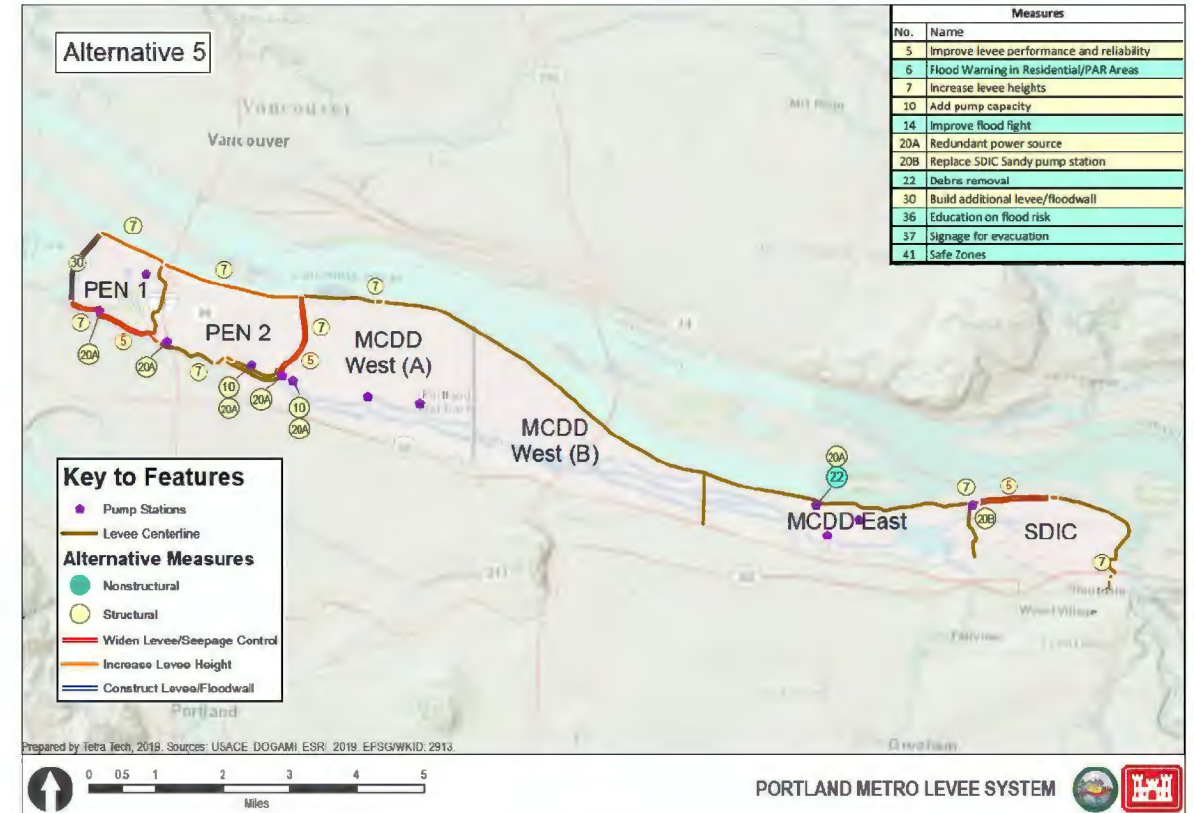
2-Nonstructural and NNBF Focus

3-Prioritize Public Health and Safety

4-Maximize Resilience / Reliability

5-More Uniform AEP (sponsor desire)

- Measure address inconsistencies within the existing PMLS related to AEP and provide a more uniform AEP across the system. This alternative focuses more on the external sources of flooding rather than cross levees and resilience / redundancy measures.



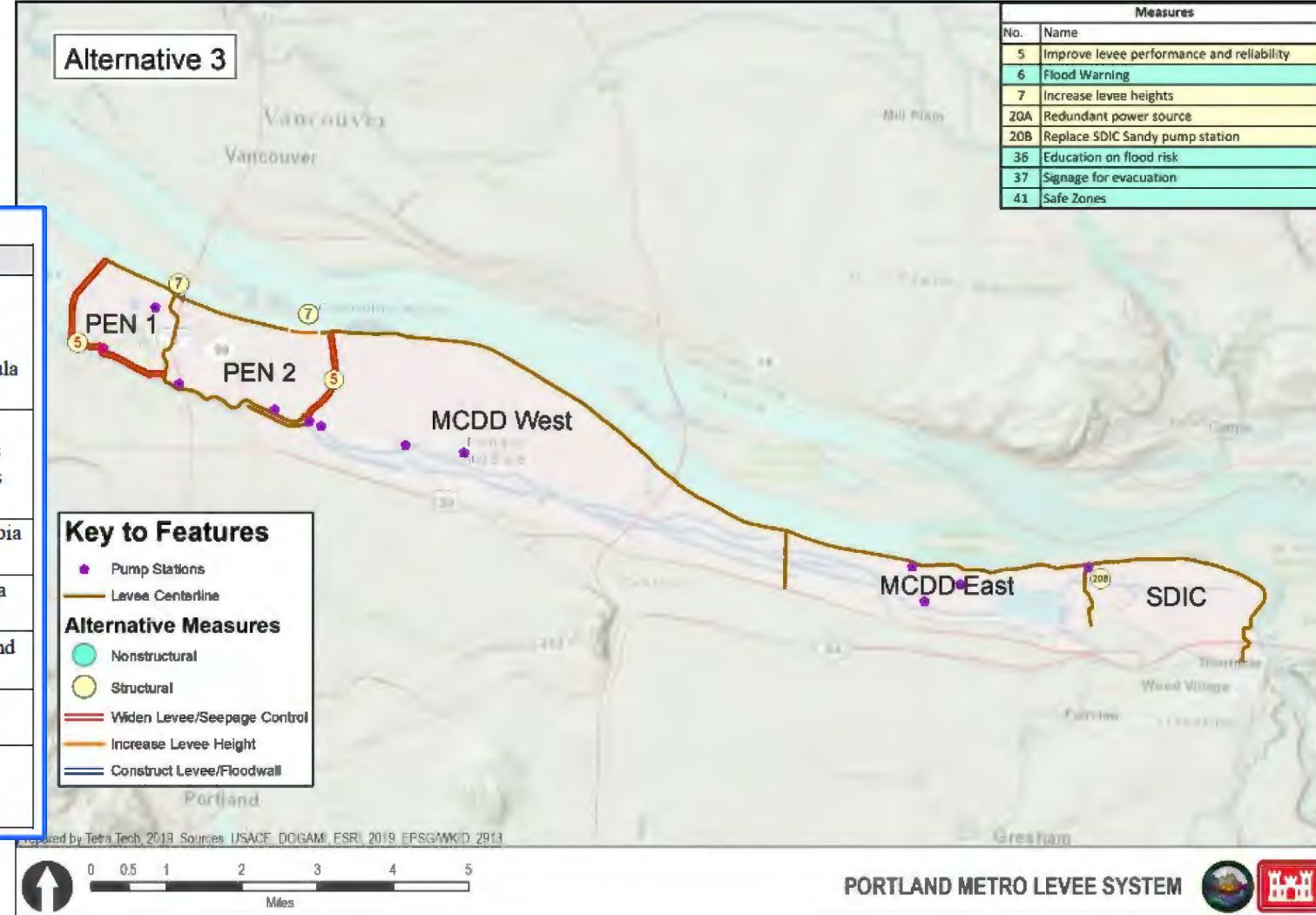


CASE STUDY - PORTLAND METRO LEVEE SYSTEM FRM (CONT.)

Public Health and Safety Strategy:

Table 3-22 Alternative 3 Measures and Description

No.	Measures	Description
5	Improve Levee Performance and Reliability	Modifications in PEN 1 Columbia Slough areas include widening PEN 1 levee along the slough and installing toe drain for seepage control. Upgrade railroad embankment seepage berm. In MCDD West, includes widening and stability improvements at the Peninsula Slough cross levee.
6	Flood Warning in Residential/PAR areas	Prepare information content that can be incorporated into existing local planning framework to boost effectiveness of flood warnings and evacuation. Includes flood risk information resulting from this feasibility study.
7	Increase Levee Heights	Extend the floodwall under I-5, raise levee elevation at the Columbia River homes along Marine Drive.
20	Add Redundancy for Pump System	Elevation and replacement of the SDIC Sandy Pump Station with a new pump station.
36	Education	Develop flood risk education materials for the population at risk and visitors within the study area.
37	Signage for Evacuation	Design and install flood hazard and evacuation route signage throughout the study area.
41	Safe Zones	Develop designated safe zones at high points within the PMLS for those that cannot evacuate from the floodplain. Would be implemented in conjunction with Measure 6.



Prepared by Tetra Tech, 2019. Sources: USACE, DOGAMI, ESRI, 2019, EPSG:WKID 2913





EXAMPLE PLAN FORM STRATEGIES FOR ECOSYSTEM RESTORATION

Considerations:

- Conceptual models are useful
 - Drivers and stressors?
 - What effects do we care about?
 - Most effective management measures?
- Thresholds in terms of habitat parameters/variables?
- Limiting habitat structure and function, quantity and quality?

Examples:

- Least cost
- Minimum (no regrets) or Maximum Plan (kitchen sink)
- Outputs based:
 - Maximize habitat units
 - Maximize habitat diversity
 - Minimally acceptable solution
- Stakeholder preference
- Something for everyone
- Minimize impacts to community cohesion or existing infrastructure.



CASE STUDY – MERAMEC RIVER BASIN ER

1. No Action
2. Maximize Ecosystem Benefits in the Meramec River
3. Minimize Impacts to Other Social Effects
4. Maximize Bank Stabilization in the Study Area
5. Maximize Sediment Capture in the Big River
6. Sponsor Preferred





SUMMARY

- Formulation Strategies are an organized method of combining management measures into a distinctly different set of alternatives
- There are numerous different approaches – pick strategies that makes sense for your study **AND DOCUMENT THEM IN THE REPORT!**
- Ensure the approach used and the rationale behind it are documented in the feasibility report