INVEST Memorandum - Interstate 11

Use of INVEST Sustainable Project Development and System Planning for States Modules to Explore Sustainability in the Tier 1 I-11 Build Corridor Alternatives

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ADOT

INVEST
ECONOMIC • SOCIAL • ENVIRONMENTAL

U.S. Department of Transportation
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Acronyms and Abbreviations

ADOT	Arizona Department of Transportation
ASR	Alternatives Selection Report
BCA	Benefit-Cost Analysis
BMP	Best Management Practice
CSS	Context-Sensitive Solutions
CWMP	Construction and Demolition Waste Management Plan EIA
	Economic Impact Analysis
EIS	Environmental Impact Statement
FHWA	Federal Highway Administration
GIS	Geographic Information Systems
HOAR	High Quality Aquatic Resources I
	Interstate
ITS	Intelligent Transportation Systems
INVEST	Infrastructure Voluntary Evaluation Sustainability Tool
LCCA	Lifecycle Cost Analysis
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NMP	Noise Mitigation Plan
NRHP	National Register of Historic Places NRMCA
	National Ready Mixed Concrete Association OM
	Operations and Maintenance
PD	Project Development
RAP	Reclaimed Asphalt Pavement
RCA	Recycled Concrete Aggregate
SPS/SPR	System Planning for States/System Planning for Regions

INTRODUCTION AND OVERVIEW

Overview of INVEST

INVEST (Infrastructure Voluntary Evaluation Sustainability Tool) was developed by the Federal Highway Administration (FHWA) as a practical, web-based, collection of voluntary best practices, called criteria, designed to help transportation agencies integrate sustainability into their programs (policies, processes, procedures, and practices) and projects. The INVEST web-based tool allows users to self-evaluate programs or projects using these criteria to obtain a snapshot of the sustainability of the program or project in time. The tool also allows the user to include notes on scoring and implementation actions that can assist the user in integrating criteria and making progress over time. Although many agency efforts could already be considered sustainable, INVEST is focused on "above and beyond" efforts. Efforts that are typically required, such as National Environmental Policy Act (NEPA) resource analysis areas, are not included within the INVEST criteria.

INVEST considers the full lifecycle of projects and has four modules to self-evaluate the entire lifecycle of transportation services, including System Planning for States or Regions (SPS or SPR), Project Development (PD), and Operations and Maintenance (OM). Each of these modules is based on a separate collection of criteria and can be evaluated separately.

Purpose of Memorandum

The Arizona Department of Transportation (ADOT), in partnership with the FHWA has utilized the latest version of INVEST (1.3) on numerous agency projects and programs in varying stages of development to document, explore, and identify sustainability elements of projects for incorporation, as well as provide feedback on the current INVEST 1.3 version of the tool. The goal of this I-11 INVEST memorandum is to document the use of INVEST on the three Build Corridor Alternatives currently under study as part of the FHWA and the ADOT Interstate 11 (I-11) Tier 1 Environmental Impact Statement (EIS); and to explore and identify potential ways the INVEST tool can link sustainability and the NEPA process, inform future Tier 2 design efforts, and influence overall ADOT sustainable transportation program implementation processes.

I-11 Tier 1 EIS

The ADOT and FHWA are conducting the environmental review process for the I-11 Corridor from Nogales to Wickenburg, Arizona. An Alternatives Selection Report (ASR) and Tier 1 Environmental Impact Statement (EIS) have been prepared as part of this process in accordance with NEPA and other regulatory requirements.

The study is atypical in that it is a tiered EIS process assessing a corridor of approximately 280-miles. Initially, the ASR assessed a comprehensive range of corridor alternatives through a robust high level evaluation process that used extensive public and agency input, innovative public outreach methods, previous studies, and various topographical, environmental, and other planning information to help identify opportunities and constraints. The study also used Quantm, a specialized program used to

design roadway and railway alignments. The software uses topographic information, engineering design criteria, and environmental constrains to generate a list of optimized alignments. These were reduced to a reasonable range and carried forward into the Draft Tier 1 EIS for more detailed environmental review – see Figure 1.

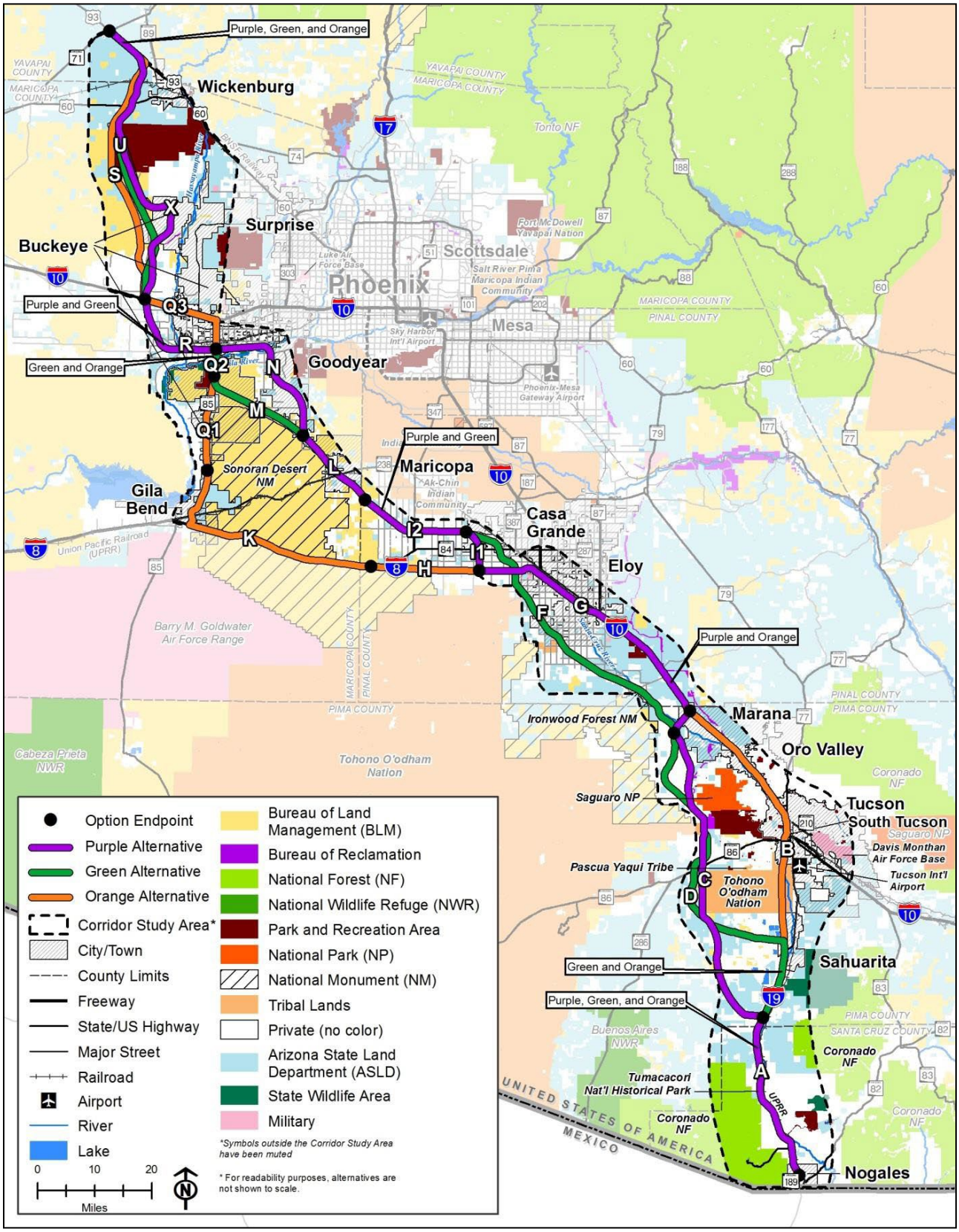


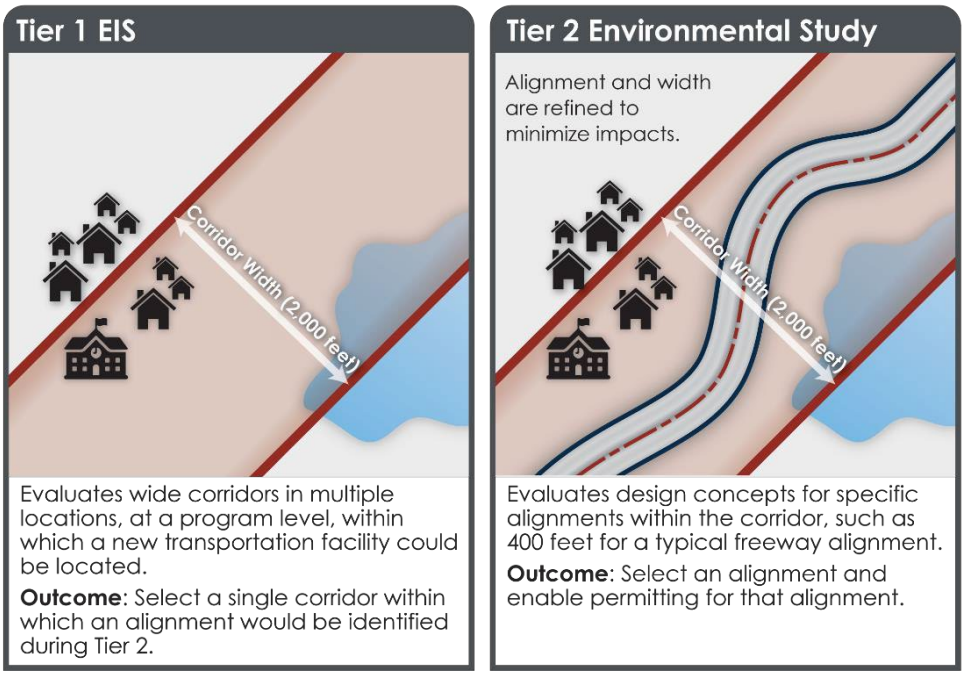
Figure 1. I-11 Build Corridor Alternatives

The Tier 1 EIS continues to assess the potential social, economic, and natural environmental impacts of the No Build Alternative and remaining corridor alternatives (i.e., Build Alternatives). In addition to the Tier 1 EIS, a project specific Tier 1 Section 106 Programmatic Agreement has been created to identify a Tier 2 Section 106 process and ensure coordination and compliance for all stages of the EIS. The I-11 Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS) was completed and made available for public review and comment on April 5, 2019. Based on the comments received and any additional technical analysis, the study team will prepare a Final Tier 1 EIS, outlining a Preferred Alternative for I-11. A Preferred Corridor Alternative will be identified in the Final Tier 1 EIS in late 2020, that will provide an initial concept for proposed incremental projects within the I-11 Corridor that could be pursued in the future, following completion of the Tier 1 EIS. A Tier 1 document will not include design details.

Scope of a Tier 1 EIS

A Tier 1 EIS encompasses a programmatic approach for identifying existing and future conditions and evaluating the comprehensive effects of the project on the region. The decision at the end of the Tier 1 EIS process would select a 2,000-foot-wide Build Corridor Alternative that would advance to further design and Tier 2 NEPA analysis or select the No Build Alternative. Tier 2 environmental studies would be required to determine the specific alignment of I-11, including design details, and would evaluate more specific project-level issues, such as individual property impacts and specific mitigation. Tier 2 environmental studies could occur in phases, breaking up the 280-mile long Nogales to Wickenburg corridor into interim projects or shorter segments, as funding becomes available. Figure 2 provides context to the level of detail in a Tier 1 environmental study.

Figure 2. Tier 1 Environmental Study Level of Detail



INVEST MODULE AND SCORING

INVEST Module

The I-11 Tier 1 EIS corridor alternatives represent the range of viewpoints voiced during the study, from supporting the development of a mostly new corridor (Green) to using the existing corridors as much as possible (Orange), and a mix of the two (Purple). INVEST was used for this project as a case study to qualitatively assess the three Build Corridor Alternatives and present their scorings in this INVEST memorandum using the Project Development (PD) Module and the System Planning for States (SPS) module for purposes of linking NEPA and planning studies to incorporate sustainability into the long range project development process. The SPS is traditionally the first step in the lifecycle of a transportation project, and the module includes criteria to self-evaluate an agency's system-level planning and programming policies, processes, procedures and practices. The SPS module in the current INVEST includes a total of seventeen (17) criteria that are generally organized from system analysis to corridor wide metropolitan planning programs. PD is traditionally the second step in the lifecycle of a transportation project, where specific projects are planned, designed, and constructed. The PD module in the current INVEST includes a total of thirty-three (33) criteria that are generally organized from planning to design to construction. The PD criteria are further organized into seven (7) scorecards for the evaluation of projects. The scorecards are designed to identify applicable criteria based on the project type (paving, small/spot improvements, new facility/corridor project) and location (urban/rural). Six (6) of these scorecards pre-identify criteria that are most likely to be applicable for the project type and location.

Because the study is 280-mile in length, the corridor alternatives were assessed using the PD – Urban Extended scorecard, comprised of thirty-three (33)criteria, defined as a new roadway facility; structure projects where nothing of its type currently exists; and major reconstruction projects that add travel lanes to an existing roadway or bridge. Additionally, this evaluation also included SPS that considers regional evaluations for economics, social, multimodal planning, and other regional planning considerations. Combining the criteria of these two modules for this case study will help further understand the linkages that can be made to NEPA planning, project development, and sustainability.

In addition to the PD – SPS criteria, the I-11 Tier 1 EIS also completed innovative and “above and beyond” practices that could be identified as Innovative Criteria. As described by the FHWA INVEST tool, the Innovative Criteria allows sustainable innovations and emerging technologies to be addressed in their projects or programs evaluation that are not represented in INVEST in order to earn points for these innovations. For the purposes of this case study evaluation, the following Innovative Criteria are identified:

SPR-IN-01 – Use of Emerging Technology for Alternatives Analysis (Quantm): Because of the high level analysis needed at the Tier 1 level, an innovative GIS program was used to design roadway and railway alignments. The software uses topographic information, engineering design criteria, and environmental constrains to generate a list of optimized alignments. This helped refined a range of reasonable alternatives at this Tier 1 high level with consideration from all public, agency, and tribal stakeholders.

SPR-IN-02 – Above and Beyond Public Input with Udall Foundation Efforts: The ADOT and FHWA engaged with the public in Southern Arizona in an additional effort to seek input on the Tier 1 effort. This coordination effort was undertaken with the study team and the US Institute for Environmental Conflict Resolution (Udall Foundation). A series of workshops and meetings were had to discuss the Tier 1 study and valuable input was provided to the study team for incorporation into the EIS.

SPR-IN-03 – Above and Beyond Section 106 Programmatic Agreement & NEPA Innovative Process for Tier 1 Studies: Because the future of Tier 2 studies is unknown and not programmed or funded, the ADOT and FHWA sought out an innovative way to ensure compliance with Section 106 and the National Historic Preservation Act through the use of a project specific Tier 1 Programmatic Agreement (PA). This PA allowed decisions for the process, implementation, and coordination to be discussed and formally documented in the Tier 1 document for any future Tier 2 projects.

The current version of INVEST is Version 1.3, which is the result of extensive user input and collaboration that began in 2017. FHWA launched INVEST Version 1.0 in October 2012 with a national webcast. Upon the release of INVEST Version 1.0, FHWA solicited partnerships with transportation departments, metropolitan planning organizations, federal land managers, and local governments that chose to use INVEST Version 1.0 to assess and enhance the sustainability of their projects and programs. INVEST Versions 1.1 (released in January 2015) and 1.2 (released in September 2015) included revisions to INVEST based on extensive feedback received from these partnerships. Version 1.3 was launched in April 2018.

The basis for INVEST's sustainability scoring is its criteria. An INVEST criterion is a collection of results-based sustainable solutions or best practices, combined based on similarity in discipline or timing and including a goal, description, and requirements.

ADOT Sustainability Program and INVEST

Arizona's transportation infrastructure is spread over 114,000 square miles, operates from sea level to 8,000 feet, and withstands temperatures that range from below 0°F to over 120°F. Maintaining optimum health and performance of this infrastructure is critical to Arizona's economic vitality, quality of life, and natural and built environments. The ADOT recognizes the critical need to plan and prioritize resources more efficiently in order to maintain and operate a robust, economically beneficial transportation network. The ADOT also recognizes the importance of delivering transportation solutions in a more sustainable manner to achieve economic, social, and environmental goals. The ADOT has moved from the early stages of identifying sustainable strategies in 2010 to implementing a sustainable transportation program that encompasses core administrative, planning, design, construction, operation, and maintenance activities.

The three primary principles of sustainability focus on achieving an efficient, well-balanced use of economic, social, and environmental resources—commonly known as the triple bottom line (Figure 3). In theory, this will allow for proper use of funding while attaining all potential project needs and objectives. A sustainable highway, for example, will not only incorporate mobility and transportation alternatives but also consider safety, accessibility, livability, asset management, and environmental stewardship. As stated in the *Guidebook for Sustainability Performance Measurement for Transportation Agencies*;

> Often, a goal will support more than one principle. Yet no one goal in itself is sufficient to achieve sustainability - it takes multiple goals, pursued in concert, to promote sustainability. When a final set of goals is defined, it's important to crosscheck the package of goals to ensure that all of the principles are well addressed. In doing so, take care not to force-fit the goals to make them map to the principles. A balanced goal set, however, achieves comprehensive coverage of the basic principles of sustainability… (NCHRP Report 708, 2011, p. 20, p. 47).

Figure 3. Sustainable development across all disciplines

To support its sustainability program, the ADOT has made optimal use of the INVEST program. The ADOT initially became interested in using INVEST in 2010, then in beta testing, while in the midst of updating two of its long-term planning documents, *Building a Quality Arizona (bqAZ)* and *What Moves You Arizona?* Arizona was—and is continuing to—go through a period of rapid demographic change and population growth. Simultaneously, many members of the public have become more informed about the transportation planning process and demand that transportation projects address more than just mobility and accessibility needs to also include environmental, social, and economic components. The ADOT began discussing sustainability principles as the FHWA first sent out a call to state transportation departments to pilot the tool. INVEST provided the opportunity to connect the sustainability principles already under discussion at the ADOT with actual activities. Key outcomes of ADOT's initial work with INVEST included:

- Scoring over 50 individual transportation projects using the PD module and developing recommendations for improvements to agency sustainability practices based on the evaluation;
- Integrating recommendations and sustainability concepts into ADOT manuals and guidance, including the ADOT *Complete Transportation Guidebook* completed in February 2016;
- Conducting sustainability training with internal ADOT departments and external stakeholders and partners; and
- Developing a sustainability award program to recognize ADOT projects and projects managers that go above and beyond, as measured by the INVEST score, best management practices, and collaboration.

The ADOT continues to use, expand, and improve INVEST as one of the cornerstones of its Sustainable Transportation Program.

INVEST APPLICATION ON I-11 BUILD CORRIDOR ALTERNATIVES

Scoring Summary

The PD Urban Extended and SPS scorecards were used for this effort. All three I-11 Build Corridor Alternatives received the same scoring for the Project Development Module each criterion because the INVEST scorecard is structured based on the process followed, not a comparative evaluation of the results of the process. Therefore, since all three were compared using the same process as part of the I-11 Tier 1 EIS, this tool does not provide enough detailed differentiation measures to contribute to a decision on a Preferred Alternative, but rather reflects sustainable outcomes and useful considerations for integrating sustainability into Tier 2 NEPA processes. What this alternatives analysis effort did present, was where certain criteria would better reside in other phases, and overall, act as a sustainable corridor baseline for future phases – EIS Tier 2, design, construction, operating, and maintenance.

In considering opportunities to link sustainability and NEPA through the INVEST, the evaluation also used selected System Planning for States criteria, and three additional innovative criteria identified as part of the Tier 1 EIS study. Based on the assessment at this Tier 1 level, each of the three Build Corridor Alternatives scored the same. The three innovative criteria also provided additional potential points for the scoring assessment. This cross-utilization of criteria from different modules allowed for the Tier 1 EIS study to identify the relevant sustainability considerations at this Tier 1 level, and allowed for more flexibility in scoring than was provided in the Project Development module only. **This portion of the effort presented the need in future INVEST versions to include a new dedicated Corridor Planning and Environmental Study module.**

Table 1 presents a summary of each criteria, the total scoring achieved, and notes on the application of that criteria to the I-11 study effort. **Table 2** presents the detailed PD scoring matrix, including columns denoting which is the most applicable project development phase to consider each criterion. This is critical for tracking future progress, to be proactive and incorporate sustainability considerations as early in the process as feasible in Tier 2 studies. The hybrid criteria had a total of 299 available points. The scoring effort garnered a total of 111 points. **On a percentage basis, this corridor already starts with 37% of the sustainability attributes, being considered in the study, are deemed having reached a sustainable threshold according to INVEST. This forms the sustainable baseline to work from in future phases.**

Lessons Learned and Opportunities for Future NEPA Studies

At an early stage in the project development process, it was anticipated that this INVEST case study for I-11 Build Corridor Alternatives would not attain a high level rating based on one chosen module alone. Overall, criteria in Project Development related to design or construction received fewer points, as those project development activities are beyond the scope of this Tier 1 study. Considering this information, the ADOT identified relevant NEPA planning scoring criteria in other modules such as SPS and Innovative Criteria that allowed for a more broad and conceptual INVEST scoring with NEPA and sustainability elements. This flexible approach of multiple criteria and modules allowed for a multi-level evaluation that considered NEPA and sustainability not only in the project development design stage, but also combined the higher level

planning and programming considerations that are also considered in NEPA. Combining the elements of planning, programming, and project development with NEPA through INVEST created an evaluation process that considered the NEPA and sustainability linkages through all phases of a corridors lifecycle.

Utilization of INVEST on a series of planning-level alternatives and NEPA studies would be most beneficial with a flexible criteria approach such as the one used in this case study, since the ADOT has many different studies and evaluations at different levels. Additionally, this high level evaluation could be documented as a way to identify and track the relevant sustainability considerations at each level of evaluation, such as a Tier 1 study and Tier 2 study.

Regardless of the type of planning/environmental review process, revisiting the INVEST criteria at the start of each project phase is ideal to continue to integrate sustainability elements into a project and maintain sight on the goals and potential sustainability solutions.

Table 1. I-11 Build Corridor Alternatives INVEST Scoring Summary

ID	Criteria	Available Points	INVEST Scoring			Criteria Application Notes
			Purple	Green	Orange	
TOTAL		**299**	**111**	**111**	**111**	
PD-01	Economic Analyses	5	3	3	3	Economic analyses were a key part of the alternatives evaluation process, but at the Tier 1 level, and an initial economic analysis was completed but will be refined in Tier 2
PD-02	Lifecycle Cost Analyses	3	0	0	0	*More applicable in later project phases.*
PD-03	Context Sensitive Project Development	10	6	6	6	The alternatives scored well on planning-related criteria; three sub-criteria are specifically related to construction activities and should be considered in later project phases.
PD-04	Highway and Traffic Safety	10	4	4	4	Safety analyses were conducted, but not using road safety audit procedures that include human factor analyses. This added level of detail can be explored further in later phases (Tier 2).
PD-05	Educational Outreach	2	2	2	2	Outreach is a critical component of every project and should continue to be an active component of all project phases.
PD-06	Tracking Environmental Commitments	5	0	0	0	*More applicable in later project phases.*
PD-07	Habitat Restoration	7	3	3	3	At this Tier 1 level high quality environmental resources were identified and avoided to the extent possible within the corridor. Further evaluation will confirm in Tier 2 analysis.
PD-08	Stormwater Quality and Flow Control	6	0	0	0	*More applicable in later project phases.*
PD-09	Ecological Connectivity	4	3	3	3	Ecological connectivity was considered and measures have been taken to avoid impacts, and would be further analyzed in Tier 2 studies.

Table 1. I-11 Build Corridor Alternatives INVEST Scoring Summary (continued)

ID	Criteria	Available Points	INVEST Scoring			Criteria Application Notes
			Purple	Green	Orange	
PD-10	Pedestrian Facilities	3	0	0	0	*More applicable in later project phases.*
PD-11	Bicycle Facilities	3	0	0	0	*More applicable in later project phases.*
PD-12	Transit and HOV Facilities	3	0	0	0	Transit considered in EIS but not at the facility level.
PD-13	Freight Mobility	7 (max)	0	0	0	*More applicable in later project phases.*
PD-14	ITS for System Operations	5	0	0	0	*More applicable in later project phases.*
PD-15	Historic, Archaeological, and Cultural Preservation	3 (max)	2	2	2	Actions have been taken to minimize impact to historic, archeological, and cultural resources, however specific mitigation measures will not be defined until a final alignment is selected.
PD-16	Scenic, Natural, or Recreational Qualities	3 (max)	1	1	1	Although at a Tier 1 level, historic and scenic recreational facilities were identified within the study area that ADOT has committed to minimize impacts in a Tier 2 study
PD-17	Energy Efficiency	8	0	0	0	*More applicable in later project phases.*
PD-18	Site Vegetation, Maintenance and Irrigation	6	6	6	6	Although at a Tier 1 level, the EIS includes strategies for vegetation planning and prevention through the study area. This will be further refined in Tier 2 with an ADOT project. Standards are already in place for noxious and invasive species control.
PD-19	Reduce, Reuse and Repurpose Materials	12 (max)	0	0	0	*More applicable in later project phases.*
PD-20	Recycle Materials	10 (max)	0	0	0	*More applicable in later project phases.*
PD-21	Earthwork Balance	5	0	0	0	*More applicable in later project phases.*
PD-22	Long-Life Pavement	7 (max)	0	0	0	*More applicable in later project phases.*
PD-23	Reduced Energy and Emissions in PM	3 (max)	0	0	0	*More applicable in later project phases.*

Table 1. I-11 Build Corridor Alternatives INVEST Scoring Summary (continued)

ID	Criteria	Available Points	INVEST Scoring			Criteria Application Notes
			Purple	Green	Orange	
PD-24	Permeable Pavement	2	0	0	0	*More applicable in later project phases.*
PD-25	Construction Environmental Training	1	0	0	0	*More applicable in later project phases.*
PD-26	Construction Equipment Emission Reduction	2 (max)	0	0	0	*More applicable in later project phases.*
PD-27	Construction Noise Mitigation	2	0	0	0	*More applicable in later project phases.*
PD-28	Construction Quality Control Plan	5	0	0	0	*More applicable in later project phases.*
PD-29	Construction Waste Management	4	0	0	0	*More applicable in later project phases.*
PD-30	Low Impact Development	3	0	0	0	*More applicable in later project phases.*
PD-31	Infrastructure Resiliency Plan and Design	12	0	0	0	*More applicable in later project phases.*
PD-32	Light Pollution	3	0	0	0	*More applicable in later project phases.*
PD-33	Noise Abatement	5 (max)	0	0	0	*More applicable in later project phases.*
System Planning for States Criteria except for SPS 4, 6, 7, 9, 10, 11, 12, 15, 16 did not align with this effort						
SRS-01	Integrated Planning	15	8	8	8	Commitment to participate in local land use planning (i.e., White Tanks Conservancy), metropolitan planning organizations, and other regulatory agencies. This commitments will be kept in future Tier 2 efforts.
SPS-02	Integrated Planning – Natural Env.	15	10	10	10	Invited AGFD as the only non-federal Cooperating Agency. Commitment for wildlife studies to inform Tier 2 – i.e. setting up corridor at landscape-scale level for multiple future projects.
SPS – 03	Integrated Planning-Social	15	4	4	4	Public engagement is inherently part of NEPA. Investment in wildlife studies and participation in local land planning.

Table 1. I-11 Build Corridor Alternatives INVEST Scoring Summary (continued)

ID	Criteria	Available Points	INVEST Scoring			Criteria Application Notes
			Purple	Green	Orange	
SPS-05	Access and Affordability	**15**	11	11	11	The study considered and analyzed many traffic and transportation related effects for access, equity, and populations in our EIS and in our public outreach efforts. A fundamental part of the EIS analysis and consideration at Tier 1 level
SPS-08	Freights and Goods Access	**15**	2	2	2	Freight and mobility were considered for incorporation at the Tier 1 level.
SPS-13	Analysis Methods	**15**	11	11	11	The travel demand model used for EIS and other analysis within the EIS were all peer reviewed and approved by regional, state, and federal agencies and included a high level of data that would be further refined at Tier 2
SPS-14	TSMO	15	6	6	6	The EIS considered ITS and TSMO strategies in it's documentation, and included efforts to connect the ADOT agency goals with a future I-11 roadway. Further refinements to include update TSMO strategies will be needed in a possible Tier 2 study
SPS - 17	Planning and Env Linkages	15	14	14	14	Because this is a Tier 1 EIS, NEPA planning and environmental linkages were the focal point of consideration in regards to alternatives analysis and decision making process. Further linkages and NEPA considerations will be evaluated in Tier 2 studies.
SPS-IN-01	Innovative Criteria – Quantm	5	5	5	5	An innovative GIS program was used for analysis
SPS-IN-02	Innovative Criteria - Udall	5	5	5	5	Above and beyond public and stakeholder outreach was conducted
SPS-IN-03	Innovative Criteria – Section 106 PA	5	5	5	5	Above and beyond Section 106 regulatory requirements were met for NEPA/Section 106

Appendix: I-11 PD and SPR Module Scorecards