

Annex E: Sample Tables and Environmental Checklists

E.1 Example Summary Table

E.2 Example Leopold Matrix

E.3 Example and Template Mitigation and Monitoring Forms

From the *TANAPA Environmental Management Plan Guidelines for Road Improvements* (September 2001) (Tanzania National Parks). Created as a result of a USAID Environmental Assessment of a roads program for Tanzania's National Parks.

Example Summary Table: Synopsis of Environmental Decisions for DAPI/PAA Activities by [PVO]: FY 1998

Note 1: This is an example only. Information entered is preliminary and illustrative, based on Title II PVO=s activities in Ethiopia; it parallels the Strategic Objective and Intermediate Results (IR) structure of the DAPs, which is meant to facilitate linkage to regular planning and results reporting tools
Note 2: % of T II = proportion of Title II resources apportioned to the line items, with subtotals if possible.]

Geographic attributes and operating principles: USAID-funded DAP activities are sited ... [give overall details on broader distributional factors and operating principles]

Types of Activities/ Interventions/Components: [develop under sub-headings of major activities, with more detail rather than less]	Geographic Distribution, Location [this may be adequately addressed at top left]	Sites/Projects (number, other) [at lowest practical level]	Scale & Quantity [give as much detail as practical]	Unit ha, etc. [> 1 unit is poss.]	% of Title II Resources	Expected Determinations [preliminary only: CE, ND, or PD]
IR 1: Increased Agricultural Crop Production						
Farmers training in: general agriculture, irrigation, agronomy, vegetable production, etc.	Tigray, Oromyia, SNNPR	Adama, Damota II, Kite Awalaelo, Shone, and Tiya	approx. 500 farmers trained for 3-6 days: FY 98	people	2.5	CE with provisions for training in environmental sustainability principles and practices
Agricultural extension and demonstration of improved agricultural practices (e.g., improved seeds, fertilizers, planting methods, crop protection)	Tigray, Oromyia	Adama, Kite Awalaelo	300 farmers to field days on 5 cooperative farmers= fields	number of events/ farmers	2	CE with provisions for training in environmental sustainability principles and practices
Agricultural credit provisionCtied to those trained in program	Tigray, Oromyia, SNNPR	Adama, Damota II, Kite Awalaelo, Shone, Tiya	cash to be disbursed to 1,560 farmers	funds/ number of farmers	2	CE or ND with conditions when indirect env. harm could result from lending activities
Types of Activities/ Interventions/Components: [develop under sub-headings of major activities, with more detail rather than less]	Geographic Distribution, Location [this may be	Sites/Projects (number, other) [at lowest	Scale & Quantity [give as much detail as practical]	Unit [more than one is poss.]	% of T II	Expected Determinations [preliminary only]

Annex E.1

	<i>adequately addressed at top left]</i>	<i>practical level]</i>					
Earth fill dam construction	Tigray, Oromia	Kite Awalaelo, Tiya	5 dams, ea. 1 M m3 capacity over 5 yrs. 2 dams, ea. 0.2 M m3 capacity, 1999 & 2000	no./cu.m	30	PD, which could be addressed through PEA, including ponds, microbasins, water supply, etc.	
Diversion of river water for irrigation (Ariver diversion@)	Tigray	Kite Awalaelo	10 km diversion scheme 99-01	km	2	PD or ND with conditions	
Road rehabilitation/construction - feeder roads maintenance - ford construction - small wooden bridge construction	Tigray, Oromyia Adama, Kite Damota, Kite Awalaelo, Shone, Tiya	45 PAs	380 km of roads in and 14 small bridges will be constructed during the five years under the FFW program	km	12	ND with conditions? PEA may be done	
Subtotal %							
Types of Activities/ Interventions/Components: <i>[develop under sub-headings of major activities, with more detail rather than less]</i>	Geographic Distribution, Location <i>[this may be adequately addressed at top left]</i>	Sites/Projects (number, other) <i>[at lowest practical level]</i>	Scale & Quantity <i>[give as much detail as practical]</i>	Unit <i>[more than one is poss.]</i>	% of T II	Expected Determination <i>[preliminary only]</i>	
IR 2: Increased Household Income							
Farmers= training in micro-enterprises and business skills (basketry, beekeeping, agroforestry, soap and candle making, pottery, etc.)	Adama, Damota II, Shoneand Tiya in Oromia and SNNPR	90 PAs	Over 5 years, 230 farmers in beekeeping; 2,500 in agroforestry; 2,100 in IGA	no.	1.8	CE with provisions for training in environmental sustainability principles and practices	ND
Tree crop seedling production and distribution (coffee, fruit trees)			100,000 to 1,000,000 farmers	no.	2		

Subtotal %									
IR 3: Improved Health Status in Target Areas: health and nutrition education, food supplementation									
Training in nutrition, food storage and preservation								1	CE
Potable water supply Pond construction/rehabilitation			65 ponds max 40,000 cu.m					5	PD or ND with conditions TBD relating to mitigation and monitoring
Types of Activities/ Interventions/Components: <i>[develop under sub-headings of major activities, with more detail rather than less]</i>	Geographic Distribution, Location <i>[this may be adequately addressed at top left]</i>	Sites/Projects (number, other) <i>[at lowest practical level]</i>	Scale & Quantity <i>[give as much detail as practical]</i>	Unit <i>[more than one is poss.]</i>	% of T II	Expected Determinations <i>[preliminary only]</i>			
Drilling bore holes	Adama, Kilte Awlaelo and Shone in Tigray; Oromia and SNNPR	35 PAs	35 bore holes; 2 with 150 m depth at Adama; 3 @ 120 m depth at Shone and 30 with 60 m depth at Kilte Awlaelo during 5 yrs.	no.; m depth	4	ND with conditions relating to aquifer protection, use of proper engineering; water committees will be formed and trained			
Water management committees formed and functioning; linked to bore hole, water supply activities				no.	2	CE with provisions for training in environmental sustainability principles and practices			
Constructing demo latrines		Tiya	5 in 1997	no.	0.5	CE with provisions for hygiene mitigation			

Annex E.1

Subtotal %							
IR 4: Natural Resource Base Maintained							
Farmer training (soil and water conservation techniques, mud technology, fuel efficient mud stove making, etc.)						2	CE with provisions for training in environmental sustainability principles and practices
Tree seedling production/nurseries		... community nurseries, PVO	11.5 M seedlings	no.		2.5	CE or ND w/good practices and technical accuracy
Tree seedling planting		... sites	11.4 Million	no.		2	ND without conditions
Hillside terrace construction		.. sites	370 km during 5 yrs.	km		4	ND with conditions involving a subsequent screening and review process with mitigation measures identified
Hillside terrace maintenance		.. sites	3000	km		2	ND with conditions
Check dam construction		.. sites	25	no.		2	ND with conditions
Soil bund construction		.. sites	1990	km		3	ND with conditions
Microbasin construction for tree establishment		.. sites	125,000 basins max 2 sq.m. in 1998-99	no.		1	ND with conditions
Biological conservation measures (area closure, living mulches, etc.)		59 sites	50 closures of avg. 100 ha	no.		3	ND with conditions: activities must be defined and separately screened
Subtotal %							
IR 5: Emergency Response Capacity Maintained							

Annex E.1

Studies and plans		5	no.	0.5	
Subtotal %					
Grand Total %					

Acronyms: ADP: Area Development Program; CE: Categorical Exclusion; EA: Environmental Assessment; ND: Negative Determination; PD: positive Determination; PA: Peasant Associations; PEA: Programmatic Environmental Assessment; TBD: to be determined.

Annex E.2: Sample Road Improvements Environmental Impact Matrix

Legend

Adverse Impact Level	Beneficial Impact Level
<input type="radio"/>	Low <input type="radio"/>
<input type="radio"/>	Medium <input type="radio"/>
<input type="radio"/>	High <input type="radio"/>

Impact Category ⇒	Activities ⇕	Physical Resources														Ecological Systems										Landscape					Socio-Economic																											
		Soil Erosion	Debris Deposition	Siltation	Soil Compaction	Surface Runoff	Hydrology	Topography	Drainage	Wetlands	Surface Water Quantity	Surface Water Quality	Ground Water Quantity	Ground Water Quality	Habitat Change	Species Diversity	Alien Species	Vegetation	Poaching	Wildlife Movement	Animal Harassment	Ecological Function	Exceptional Resources	Tropical Forest	Scenic Quality	Wilderness Quality	Viewshed	Carrying Capacity	Visitor Experience	Human Settlement	Compatibility w/ Policies	Cost to Agency	Benefit to Agency	Costs to Communities	Benefits to Communities	Health	Disease Vectors	Noise Levels	Dust Levels	Risks/Hazards	Employment	Local Economy	Tourist Industry															
Construction	Vegetation clearing	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	●	○	○	○	○	○	○													
	Construction camp	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	○	○	○	○	○	○	○	○	○	○	○										
	Quarry management	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○							
	Trucking gravel	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○						
	Cutting & filling	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●	●	●	●	●	●	●	●	●	●	○	○	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○					

Impact Category ⇒	Physical Resources	Ecological Systems	Landscape	Socio-Economic			
Activities ↓ Off-road driving	Soil Erosion	●					
	Debris Deposition	●					
De-commissioning Ripping old road Shaping Revegetation	Soil Erosion	●					
	Debris Deposition	●					
	Siltation	●					
	Soil Compaction	●					
	Surface Runoff	●					
	Hydrology	●					
	Topography						
	Drainage	●					
	Wetlands	●					
	Surface Water Quantity	●					
	Surface Water Quality	●					
	Ground Water Quantity						
Ground Water Quality							
	Habitat Change	●					
	Species Diversity	●					
	Alien Species						
	Vegetation	●					
	Poaching	○					
	Wildlife Movement	●					
	Animal Harassment	●					
	Ecological Function	●					
	Exceptional Resources	●					
	Tropical Forest	●					
	Scenic Quality	●					
	Wilderness Quality	●					
	Views	●					
	Carrying Capacity						
	Visitor Experience	●					
	Human Settlement						
	Compatibility w/ Policies	●					
	Cost to Agency	●					
	Benefit to Agency	○					
	Costs to Communities						
	Benefits to Communities						
	Health						
	Disease Vectors						
	Noise Levels						
	Dust Levels	●					
	Risks/Hazards	●					
	Employment						
	Local Economy						
	Tourist Industry	●					

**Table 4. TANAPA Environmental Mitigation/Enhancement Form for Road Improvements
for Serengeti National Park [SAMPLE ONLY]
(To be submitted with annual *Environmental Management Workplan*)**

Adverse Impact Description: Soil Erosion

Impact No. 1

Year: 2001

Road Segment (junction to junction or road name): _____

No.	a. Description of Mitigation/Enhancement Measure	b. Description of Followup	c. Followup Dates	d. Unit(s)/ Individuals Responsible (Initials)		e. Cost high(h); medium (m); low(l); very low (v)	f. Mitigation Achieved (If yes, provide date. If no, elaborate below))
				Unit	Indiv		
1.1	Planning and Design						
1.11	Develop and provide TANAPA design stands to control erosion	Quarterly Review of Progress		TANAPA Headquarters Engineering and Planning Manager		L-M	
1.12	Develop standards for following contours, avoiding gradients greater than 10%, or long downhill straight stretches	Quarterly Review of Progress		TANAPA Headquarters Engineering and Planning Manager		L-M	
1.13	Use a multidisciplinary team in selecting new routes	On-going		ER Coordinator And TANAPA Planning Manager			
1.2	Construction						
1.2.1	Minimize amount of clearing			Works		L	
1.2.2	Limit earth moving to dry seasons			Works		L	

Annex E.3

No.	a. Description of Mitigation/Enhancement Measure	b. Description of Followup	c. Followup Dates	d. Unit(s)/ Individuals Responsible (Initials)	e. Cost high(h); medium (m); low(l); very low (vl)	f. Mitigation Achieved (If yes, provide date. If no, elaborate below))
1.2.3	Protect disturbed areas			Works	M	
1.2.4	Store topsoil for respreading			Works	L	
1.2.5	Installation of temporary erosion protection	Check to see protection is still in place		Works	M	
1.2.6	Installation of permanent erosion protection	Check to see protection is still in place		Works	H	
1.2.7	Revegetation of disturbed areas	Check to see reveg doing OK		Works	M	
1.2.8	More drainage turnouts as required based on erosion	Clean as required		Works	M	
1.2.9	Drainage check dams as required based on erosion	Repair as required		Works	M	
1.2.10	Higher quality murrum or surfacing based on continuing road damage			Works	H	
1.2.11	Sufficient culverts for good distribution of surface runoff			Works	M	
1.2.12	Minimize cuts/fills in sensitive areas (wetlands)			Works	H	
1.2.13	Install oil/water separators for maintenance yard surface runoff			Works	H	
1.3	Operation					
1.3.1	Maintain drainage structures	Clean as required		Works	M	
1.3.2	Maintain roadway surface	Grade as required		Works	M	

Annex E.3

No.	a. Description of Mitigation/Enhancement Measure	b. Description of Followup	c. Followup Dates	d. Unit(s)/ Individuals Responsible (Initials)	e. Cost high(h); medium (m); low(l); very low (vl)	f. Mitigation Achieved (If yes, provide date. If no, elaborate below))
1.3.3	Close roads that may be damaged during wet season			WIC	H	
1.3.4	Use higher grade murrum on heavily-used route			Works	H	
1.3.5	Temporarily close road to allow environment to recuperate			WIC	H	
1.3.6	Install/maintain water-catchment trenches	Clean as required		Works	M	
1.3.7	Fill potholes, remove downed trees/limbs	As required		Works	M	
1.3.8	Control fuel/oil/wastes to prevent water contamination	Inspect Yearly		Works	H	
1.3.9	Ensure drainage turnouts sufficient to allow runoff percolation	Inspect Yearly		Works	M	
1.3.10	Minimize surface water use for roads during dry season			Works	M	
1.3.11	Prewet murrum prior to dry season; store to keep damp			Works	M	
1.3.12	Monitor fuel tanks and fuel piping for leakage	Monthly		Works	M	
1.3.13	Collect/remove all waste oil	Monthly		Works	M	
1.3.14	Install concrete fueling pads			Works	H	
1.4	Decommissioning (Restoration)					
1.4.1	Reroute / decommission original road segment			WIC	H	
1.4.2	Ensure successful vegetation	Verify reveg survival		Ecologist	M	

No.	a. Description of Mitigation/Enhancement Measure	b. Description of Followup	c. Followup Dates	d. Unit(s)/ Individuals Responsible (Initials)	e. Cost high(h); medium (m); low(l); very low (vl)	f. Mitigation Achieved (If yes, provide date. If no, elaborate below))
1.4.3	Provide drainage/shaping as required to prevent erosion/siltation	Verify erosion not occurring		Works	M	

Problem(s) Encountered:

Nature of needed followup action:

Responsible individual for followup:

Schedule for followup:

Other comments:

Signature of Preparer: _____ **Date:** _____

**Table 5. TANAPA Road Improvements Environmental Monitoring Form
for Serengeti National Park [SAMPLE ONLY]
(To be submitted with annual *Environmental Management Workplan*)**

Adverse Impact Description: Soil Erosion Impact Number: 1 Year: 2001

Road Segment (junction to junction or road name): _____

No.	a. Mitigation/Enhancement Measure/ Issues/Elements to be Monitored	b. Unit(s)/ Individuals Responsible	c. Indicator(s) For Monitoring	d. Monitoring Method Used	e. Monitoring Frequency	f. Monitoring Cost high(h); medium (m); low(l); very low (vl)	g. Problem Encountered Check if yes, an elaborate below	h. Monitor Date(s):
	Design	Unit Indiv						
	Construction							
1	Minimize amount of clearing	Works	Erosion	Visual inspection	daily	L		
2	Limit earth moving to dry seasons	Works	Erosion	Visual inspection	daily	L		
3	Restore disturbed areas	Works	Erosion	Visual inspection	Start, midterm, finish	M		
4	Store topsoil for respreading	Works	Erosion	Visual inspection	Start, midterm, finish	L		
5	Installation of temporary erosion protection	Works	Erosion	Visual inspection	Start, midterm, finish	H		

No.	a. Mitigation/Enhancement Measure/ Issues/Elements to be Monitored	b. Unit(s)/ Individuals Responsible	c. Indicator(s) For Monitoring	d. Monitoring Method Used	e. Monitoring Frequency	f. Monitoring Cost high(h); medium (m); low(l); very low (vl)	g. Problem Encountered Check if yes, an elaborate below	h. Monitor Date(s):
					finish			
6	Installation of permanent erosion protection	Works	Erosion	Visual inspection	Start, midterm, finish	H		
7	Revegetation of disturbed areas	Ecologist	Reveg and erosion	Visual inspection	Start, midterm, finish	M		
8	Reroute / decommission original road segment	Ecologist	Reveg and erosion	Visual inspection	Start, finish, +1 year	L		
9	More drainage turnouts as required based on erosion	Works	Erosion	Visual inspection	Start, finish, +1 year	M		
10	Drainage check dams as required based on erosion	Works	Erosion	Visual inspection	Start, finish, +1 year	M		
11	Higher quality murrum or surfacing based on continuing road damage	Works	Road surface deterioration	Visual inspection Visual inspection	Start, finish, +1 year	M		
12	Sufficient culverts for good distribution of surface runoff	Ecologist	Vegetative effects each side of road	Visual inspection photos	Start, finish, +1 year	M		
13	Minimize cuts/fills in sensitive areas (wetlands)	Ecologist	Vegetative effects each side of road	Visual inspection	Start, finish, +1 year	M		
14	Install oil/water separators for maintenance yard surface runoff	Works	Oil in separator	sample	monthly	M		

No.	a. Mitigation/Enhancement Measure/ Issues/Elements to be Monitored	b. Unit(s)/ Individuals Responsible	c. Indicator(s) For Monitoring	d. Monitoring Method Used	e. Monitoring Frequency	f. Monitoring Cost high(h); medium (m); low(l); very low (vl)	g. Problem Encountered Check if yes, an elaborate below	h. Monitor Date(s):
	Operation							
15	Maintain drainage structures	Works	Erosion & siltation	Photos	yearly	M		
16	Maintain roadway surface	Works	Surface condition	Photos	yearly	M		
17	Close roads that may be damaged during wet season	Works	Surface damage	Inspect	Start of wet season	H		
18	Higher grade murrum on heavily-used route	Works	Surface condition	Photos	yearly	M		
19	Temporary road closure to allow environment to recuperate	Works	Surface condition	Photos	yearly	H		
20	Install/maintain water-catchment trenches	Works	Erosion & siltation	Photos	yearly	M		
21	Fill potholes, remove downed trees/limbs	Works	Multiple tracks	Inspect	3 months	M		
22	Fuel/oil/wastes controlled to prevent water contamination	Works	Oil on ground	Inspect	3 months	M		
23	Drainage turnouts sufficient to allow runoff percolation	Works	Erosion & siltation	Photos	yearly	M		
24	Minimize surface water use for roads during dry season	Works	Lack of surface water	Inspect	Midway through dry season	L		
25	Prewet murrum prior to dry season; store to keep damp	Works	Moisture evident	Inspect	Midway through dry	L		

No.	a. Mitigation/Enhancement Measure/ Issues/Elements to be Monitored	b. Unit(s)/ Individuals Responsible	c. Indicator(s) For Monitoring	d. Monitoring Method Used	e. Monitoring Frequency	f. Monitoring Cost high(h); medium (m); low(l); very low (vl)	g. Problem Encountered Check if yes, an elaborate below	h. Monitor Date(s):
					season			
26	Monitor fuel tanks and fuel piping for leakage	Works	Oil on ground	Inspect	3 months	M		
27	Collect/remove all waste oil	Works	Oil on ground	Inspect	3 months	M		
28	Install concrete fueling pads	Works	Oil on ground	Inspect	3 months	M		
	Decommissioning (Restoration)							
29	Ensure successful revegetation	Ecologist	Reveg and erosion	Photos	Start, finish, +1 year	M		
30	Provide drainage/shaping as required to prevent erosion/siltation	Works	Reveg and erosion	Photos	Start, finish, +1 year	M		

Problem(s) Encountered:

Nature of needed followup action:

Responsible individual for followup:

Schedule for followup:

Other comments:

Signature of Preparer: _____ **Date:** _____

TANAPA Road Improvements Environmental Management Plan - Mitigation Status
 (To be submitted with annual *Environmental Management Workplan*)

Adverse Impact Description: _____ Impact No. _____ Year _____

Road Segment (junction to junction or road name): _____

No.	a. Description of Mitigation/Enhancement Measure	b. Description of Needed Followup	c. Followup Dates	d. Unit(s)/ Individual(s) Responsible (Initials)		e. Cost high(h); medium (m); low(l); very low (vl)	f. Mitigation Achieved (If yes, provide date, if no, elaborate below)
				Unit	Indiv		
	Design						
	Construction						

Annex E.3

No.	a. Description of Mitigation/Enhancement Measure	b. Description of Needed Followup	c. Followup Dates	d. Unit(s)/ Individual(s) Responsible (Initials)	e. Cost high(h); medium (m); low(l); very low (vl)	f. Mitigation Achieved (If yes, provide date, if no, elaborate below)

Annex E.3

No.	a. Description of Mitigation/Enhancement Measure	b. Description of Needed Followup	c. Followup Dates	d. Unit(s)/ Individual(s) Responsible (Initials)	e. Cost high(h); medium (m); low(l); very low (vl)	f. Mitigation Achieved (If yes, provide date, if no, elaborate below)

Problem(s) Encountered:

Nature of needed followup action:

Responsible individual for followup:

Schedule for followup:

Other comments:

Name of Preparer (Print): _____

Title of Preparer: _____

Signature of Preparer: _____ **Date:** _____

TANAPA Road Improvements Environmental Management Plan - Monitoring Sheet
 (To be submitted with annual *Environmental Management Workplan*)

Adverse Impact Description: _____ Impact No. _____ Year _____

Road Segment (junction to junction or road name): _____

No.	a. Description of Mitigation/ Enhancement Measure/Issues/ Elements to be Monitored	b. Unit(s)/ individual(s) Responsible (Initials)		c. Indicator(s) Used for Monitoring	d. Monitoring Method Used	e. Monitoring Frequency Needed	f. Monitoring Cost High(h) Medium (m) Low(l) Very low (vl)	g. Problem Encountered Check if yes, an elaborate below	h. Dates Monitored
		Unit	Indiv						
	Design								
	Construction								

Annex E.3

No.	a. Description of Mitigation/ Enhancement Measure/Issues/ Elements to be Monitored	b. Unit(s)/ Individual(s) Responsible (Initials)	c. Indicator(s) Used for Monitoring	d. Monitoring Method Used	e. Monitoring Frequency Needed	f. Monitoring Cost High(h) Medium (m) Low(l) Very low (vl)	g. Problem Encountered Check if yes, an elaborate below	h. Dates Monitored
	Operation							

No.	a. Description of Mitigation/ Enhancement Measure/Issues/ Elements to be Monitored	b. Unit(s)/ Individual(s) Responsible (Initials)	c. Indicator(s) Used for Monitoring	d. Monitoring Method Used	e. Monitoring Frequency Needed	f. Monitoring Cost High(h) Medium (m) Low(l) Very low (vl)	g. Problem Encountered Check if yes, an elaborate below	h. Dates Monitored
	Decommissioning (Restoration)							

Problem(s) Encountered:

Nature of needed followup action:

Responsible individual for followup:

Schedule for followup:

Other comments:

Name of Preparer (Print): _____

Title of Preparer: _____

Signature of Preparer: _____ **Date:** _____