APPENDIX C – ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

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Table B1 Climate and Air Quality. Scenario: Onshore Wind

Climate and Air Quality. Scenario One – Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Climate Value = H Vulnerability = N Sensitivity = N	Wind generation has potential for small long term beneficial effects on climate where it replaces traditional energy sources	Direct	M	Operation - VS High Frequency	Reversible permanent	VL	National	Positive	Assumes technology improves to reduce need for traditional energy generators to increase production in times of low energy yield.	N
Air Quality Value = H Vulnerability =L Sensitivity =M	Wind generation will cause emissions from plant and machinery during construction	Direct	H	Construction -S High Frequency	Reversible, temporary	VL	Local	Negative	-	N
	Wind generation will reduce air emissions during operation where it replaces traditional energy sources		M	Operation, L; Low Frequency	Reversible permanent	L	Local	Positive	-	N
Odour Value = L Vulnerability = N Sensitivity =N	No odour effects	-	-	-	-	-	-	-	-	-

Table B2 Climate and Air Quality. Scenario: Small Hydropower

Climate and Air Quality. Scenario Two – Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Climate Value = H Vulnerability = N Sensitivity = N	Small-hydropower has potential for small long term beneficial effects on climate where it replaces traditional energy sources	Direct	M	Operation - VS High Frequency	Reversible permanent	VL	Regional	Positive	Assumes technology improves to reduce need for traditional energy generators to increase production in times of low energy yield.	N
Air Quality Value = H Vulnerability =L Sensitivity =M	Small hydro generation will cause emissions from plant and machinery during construction,	Direct	H	Construction, S Operation, L High Frequency	Reversible, temporary	VL	Local	Negative	-	N

	Small hydro will reduce air emissions during operation where it replaces traditional energy sources		M	Operation, L Low Frequency	Reversible permanent	L	Local	Positive	-	N
Odour Value = L Vulnerability = N Sensitivity =N	Localised effects during operation to workers and residents associated with odours.	Direct	L	Operation, L Low Frequency	Reversible permanent	L	Local	Negative	-	N

Table B3 Climate and Air Quality. Scenario: Solar Photovoltaic

Climate and Air Quality. Scenario Three: Solar Photovoltaic										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Climate Value = H Vulnerability = N Sensitivity = N	Solar PV has potential for small long term beneficial effects on climate where it replaces traditional energy sources	Direct	M	Operation - VS High Frequency	Reversible permanent	VL	National	Positive	Assumes technology improves to reduce need for traditional energy generators to increase production in times of low energy yield.	N
Air Quality Value = H Vulnerability =L Sensitivity =M	Solar PV generation will cause emissions from plant and machinery during construction,	Direct	H	Construction -S High Frequency	Reversible, temporary	VL	Local	Negative	-	N
	Solar PV will reduce air emissions during operation where it replaces traditional energy sources		M	Operation, L Low Frequency	Reversible permanent	L	Local	Positive	-	N
Odour Value = L Vulnerability = N Sensitivity =N	No odour effects	-	-	-	-	-	-	-	-	-

Table B4 Climate and Air Quality. Scenario: Biomass Using Wood Residues

Climate and Air Quality. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Climate Value = H Vulnerability = L Sensitivity = M	Biomass production has potential for small long term beneficial effects on climate where it replaces traditional energy sources	Direct	M	Operation - VS High Frequency	Reversible permanent	VL	National	Positive	Assumes technology improves to reduce need for traditional energy generators to increase production in times of low energy yield.	N
Air Quality Value = H Vulnerability =M Sensitivity =M	Emissions from combustion -- limited SO2, NOx and PMs, and possible ancillary transportation of wood from source	Direct	H	Construction, S Operation, L Intermittent frequency	Reversible permanent	M	Regional	Negative	-	Y
Odour Value = M Vulnerability = M Sensitivity =M	Odour from biomass emissions (e.g. methane)	Direct	M	Operation - L Low Frequency	Reversible permanent	L	Local	Negative	-	Y

Table B5 Climate and Air Quality. Scenario: Biomass Using Agricultural Residues

Climate and Air Quality. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Climate Value = H Vulnerability = L Sensitivity = M	Biomass production has potential for small long term beneficial effects on climate where it replaces traditional energy sources	Direct	M	Operation - VS High Frequency	Reversible permanent	VL	National	Positive	Assumes technology improves to reduce need for traditional energy generators to increase production in times of low energy yield.	N
Air Quality Value = H Vulnerability =M Sensitivity =M	Emissions from combustion -- limited SO2, NOx and PMs, and possible ancillary transportation of feedstock	Direct	H	Construction, S Operation, L Intermittent frequency	Reversible permanent	M	Regional	Negative	-	Y
Odour Value = L Vulnerability = M Sensitivity =M	Odour from biomass emissions (e.g. methane)	Direct	M	Operation - L Low Frequency	Reversible permanent	L	Local	Negative	None	Y

Table B6 Climate and Air Quality. Scenario: Biogas Using Landfill Gas

Climate and Air Quality. Scenario Six: Biogas Using Landfill Gas										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Climate Value = H Vulnerability = L Sensitivity = M	Biogas production has potential for small long term beneficial effects on climate where it replaces traditional energy sources	Direct	M	Operation - VS High Frequency	Reversible permanent	VL	National	Positive	Assumes technology improves to reduce need for traditional energy generators to increase production in times of low energy yield.	N
Air Quality Value = H Vulnerability =M Sensitivity =M	-	-	-	-	-	-	-	-	-	-
Odour Value = L Vulnerability = M Sensitivity =M	Odour from biogas emissions during lining of the landfill and general operations (e.g. methane)	Direct	M	Construction, S Operation, L Intermittent frequency	Reversible permanent	L	Local	Negative		N

Table B7 Climate and Air Quality. Scenario: Biogas Using Animal Residues

Climate and Air Quality. Scenario Seven: Biogas Using Animal Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Climate Value = H Vulnerability = L Sensitivity = M	Biogas production has potential for small long term beneficial effects on climate where it replaces traditional energy sources	Direct	M	Operation - VS High Frequency	Reversible permanent	VL	National	Positive	Assumes technology improves to reduce need for traditional energy generators to increase production in times of low energy yield.	N
Air Quality Value = H Vulnerability =M Sensitivity =M	Emissions from combustion - NOx, SOx, VOCs, CO, and PM10s	Direct	H	Construction-S Operation-L	Irreversible permanent	M	Local	Negative		Y
Odour Value = M Vulnerability = M Sensitivity =M	Odour from biogas emissions during lining of manure ponds and general operations.	Direct	M	Construction - S Operation-L	Reversible permanent	L	Local	Negative		Y

Table B8 Surface Water and Groundwater. Scenario: Onshore Wind

Surface Water and Groundwater. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Surface Water Resources Value (H) Vulnerability (L) Sensitivity (M)	Altered surface runoff contribution to watercourses and ditches as a result of land disturbance and minor land take.	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
				Operation - L Low frequency	Reversible; Permanent	VL	Local	Negative	-	N
Surface Water Quality Value (H) Vulnerability (L) Sensitivity (M)	Altered surface water quality from particulates and contaminants and changes in water chemistry which may result	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
				Operation - L Low frequency	Reversible; Permanent	VL	Local	Negative	-	N
Flooding regime Value (H) Vulnerability (L) Sensitivity (M)	Development in floodplain that would alter flood passage and storage dynamics.	Direct effect, in local watershed only.	VL	Construction – S Operation - L	Reversible; Permanent	VL	Local	Negative	Applicable where scheme would be constructed within a floodplain	Y
Groundwater Resource Value (H) Vulnerability (L) Sensitivity (M)	Altered groundwater resource from increased contributions to groundwater as a result of land disturbance.	Direct effect on local ground water resource.	VL	Construction - VS Low frequency	Reversible; Temporary	VL	Local	Negative	-	N
Groundwater quality Value (H) Vulnerability (L) Sensitivity (M)	Altered groundwater quality from contributions or poor quality water to groundwater as a result of land disturbance.	Direct effect on local ground water resource.	VL	Construction - VS, Low frequency	Reversible; Temporary	VL	Local	Negative	-	N

Table B9 Surface Water and Groundwater. Scenario: Small Hydropower

Surface Water and Groundwater. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Surface Water Resources Value (H) Vulnerability (H) Sensitivity (H)	Altered surface runoff contribution to water courses and ditches as a result of land disturbance, and alterations in watercourse flows through impoundment. Upstream countries (Poland, Belarus, Russia) could be impacted by flooding from impounded reservoir hydropower systems placed near borders and downstream countries (Moldova, Romania, Hungary) could be impacted by run-of-river effect on surface water flow	Direct effect, in local watershed only.	M	Construction – S Medium frequency	Reversible Temporary	M	Local, Trans-boundary if site location is adjacent or near national border (Carpathian Region)	Negative	-	Y
				Run of River - L High Frequency Reservoir with Storage – L High Frequency	Reversible Permanent	M	Local, Trans-boundary if site location is adjacent or near national border (Carpathian Region)	Negative	Effect may improve to be neutral over time as receptor attains new equilibrium.	Y
Surface Water Quality Value (H) Vulnerability (M) Sensitivity (M)	Altered surface water quality from particulates, contaminants, and impoundments and changes in water chemistry which may result.	Direct effect, in local watershed only.	M to H	Construction – S Medium frequency	Reversible Temporary	M to L	Local, Trans-boundary if site location is adjacent or near national border (Carpathian Region)	Negative	-	Y
				Run of River: L High Frequency Reservoir with Storage – L High Frequency	Reversible Permanent	L		Negative	Effect may improve to be neutral over time as receptor attains new equilibrium.	Y
Flooding regime Value (H) Vulnerability (H) Sensitivity (H)	Development in floodplain that would alter flood passage and storage dynamics.	Direct effect, in local watershed only.	M	Construction – S Operation – L Low frequency	Reversible; Permanent	VL	Local Trans-boundary if site location is adjacent or near national border (Carpathian Region)	Negative	Applicable where scheme would be constructed within a floodplain	Y
Groundwater Resource Value (H)	Altered groundwater resource input as a result of land	Direct effect, in local watershed only	VL	Construction – S Low frequency Operation - L Low	Reversible; Temporary	VL	local	Negative	-	N

Surface Water and Groundwater. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Vulnerability (L) Sensitivity (M)	disturbance and/or penstock diversion from long section of natural river channel			frequency						
Groundwater quality Value (H) Vulnerability (L) Sensitivity (M)	Altered groundwater quality from increased contributions to groundwater as a result of land disturbance and/or penstock diversion from long section of natural river channel	Direct effect, in local watershed only	VL	Construction – S Low frequency Operation – L Low frequency	Reversible; Temporary	VL	Local	Negative	-	N

Table B10 Surface Water and Groundwater. Scenario: Solar Photovoltaic

Surface Water and Groundwater. Scenario Three: Solar Photovoltaic										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Surface Water Resources Value (H) Vulnerability (L) Sensitivity (M)	Altered surface runoff contribution to watercourses and ditches as a result of land disturbance and minor land take and periodic washing of solar panels	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
				Operation - L Low frequency	Reversible; Permanent	VL	Local	Negative	-	N
Surface Water Quality Value (H) Vulnerability (L) Sensitivity (M)	Altered surface water quality from particulates and contaminants and changes in water chemistry which may result	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
				Operation - L Low frequency	Reversible; Permanent	L	Local	Negative	-	N
Flooding regime Value (H) Vulnerability (L) Sensitivity (M)	Development in floodplain that would alter flood passage and storage	Direct effect, in local watershed only.	M	Construction – S Operation – L Low frequency	Reversible; Permanent	VL	Local Trans-boundary if site location is adjacent or near	Negative	Applicable where scheme would be constructed within a floodplain	Y

	dynamics.						national border (Carpathian Region)			
Groundwater Resource Value (H) Vulnerability (L) Sensitivity (M)	Altered groundwater resource from increased contributions to groundwater as a result of land disturbance.	Direct effect on local ground water resource.	VL	Construction - VS Low frequency	Reversible; Temporary	VL	Local	Negative	-	N
Groundwater quality Value (H) Vulnerability (L) Sensitivity (M)	Altered groundwater quality from contributions or poor quality water to groundwater as a result of land disturbance.	Direct effect on local ground water resource.	VL	Construction - VS, Low frequency	Reversible; Temporary	VL	Local	Negative	-	N

Table B11 Surface Water and Groundwater. Scenario: Biomass Using Wood Residues

Surface Water and Groundwater. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Surface Water Resources Value (H) Vulnerability (M) Sensitivity (M)	Altered surface runoff contribution to watercourses and ditches as a result of land disturbance and minor land take.	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
	Changes in surface water flows through extraction for cooling water from river or lake	Direct effect, in local watershed only.	L	Operation - L High frequency	Reversible; Permanent	M	Local	Negative	-	Y
Surface Water Quality Value (H) Vulnerability (M) Sensitivity (M)	Altered surface water quality from particulates and contaminants and changes in water chemistry which may result	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
	Increased surface water temperatures downstream resulting from once	Direct effect, in local watershed only.	H	Operation - L High frequency	Reversible; Permanent	M	Local	Negative	-	Y

Surface Water and Groundwater. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	through cooling.									
Flooding regime Value (H) Vulnerability (M) Sensitivity (M)	Development in floodplain that would alter flood passage and storage dynamics.	Direct effect, in local watershed only.	M	Construction – S Operation – L Low frequency	Reversible; Permanent	VL	Local Trans-boundary if site location is adjacent or near national border (Carpathian Region)	Negative	Applicable where scheme would be constructed within a floodplain	Y
Groundwater Resource Value (H) Vulnerability (M) Sensitivity (M)	Altered groundwater resource from increased contributions to groundwater as a result of land disturbance.	Direct effect on local ground water resource.	VL	Construction - VS Low frequency	Reversible; Temporary	VL	Local	Negative	-	N
Groundwater quality Value (H) Vulnerability (M) Sensitivity (M)	Altered groundwater quality from contributions or poor quality water to groundwater system as a result of land disturbance.	Direct effect on local ground water resource.	VL	Construction - VS, Low frequency	Temporary Reversible;	VL	Local	Negative	-	N
	Altered groundwater quality from leachate seepage during operation.	Direct effect on local ground water resource.	VL	Operation - L Low frequency	Permanent Reversible;	L	Local	Negative	-	Y

Table B12 Surface Water and Groundwater. Scenario: Biomass Using Agricultural Residues

Surface Water and Groundwater. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Surface Water Resources Value (H) Vulnerability (M) Sensitivity (M)	Altered surface runoff contribution to watercourses and ditches as a result of land disturbance and minor land take.	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
	Changes in surface water flows through	Direct effect, in local watershed only.	L	Operation - L High frequency	Reversible; Permanent	M	Local	Negative	-	Y

Surface Water and Groundwater. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	extraction for cooling water from river or lake									
Surface Water Quality Value (H) Vulnerability (M) Sensitivity (M)	Altered surface water quality from particulates and contaminants and changes in water chemistry which may result	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
	Increased surface water temperatures downstream resulting from once through cooling.	Direct effect, in local watershed only.	H	Operation - L High frequency	Reversible; Permanent	M	Local	Negative	-	Y
Flooding regime Value (H) Vulnerability (M) Sensitivity (M)	Development in floodplain that would alter flood passage and storage dynamics.	Direct effect, in local watershed only.	M	Construction – S Operation – L Low frequency	Reversible; Permanent	VL	Local Trans-boundary if site location is adjacent or near national border (Carpathian Region)	Negative	Applicable where scheme would be constructed within a floodplain	Y
Groundwater Resource Value (H) Vulnerability (M) Sensitivity (M)	Altered groundwater resource from increased contributions to groundwater as a result of land disturbance.	Direct effect on local ground water resource.	VL	Construction - VS Low frequency	Reversible; Temporary	VL	Local	Negative	-	N
Groundwater quality Value (H) Vulnerability (M) Sensitivity (M)	Altered groundwater quality from contributions or poor quality water to groundwater system as a result of land disturbance.	Direct effect on local ground water resource.	VL	Construction - VS, Low frequency	Temporary Reversible;	VL	Local	Negative	-	N
	Altered groundwater quality from leachate seepage during operation.	Direct effect on local ground water resource.	VL	Operation - L Low frequency	Permanent Reversible;	L	Local	Negative	-	Y

Table B13 Surface Water and Groundwater. Scenario: Biogas Using Landfill Gas

Surface Water and Groundwater. Scenario Six: Biogas Using Landfill Gas										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Surface Water Resources Value (H) Vulnerability (L) Sensitivity (M)	Altered surface runoff contribution to watercourses and ditches as a result of land and landfill disturbance.	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
				Operation - L Low frequency	Reversible; Permanent	VL	Local	Negative	-	N
Surface Water Quality Value (H) Vulnerability (M) Sensitivity (M)	Altered surface water quality from particulates and contaminants and changes in water chemistry which may result	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
				Operation - L Low frequency	Reversible; Permanent	L	Local	Negative	-	N
Flooding regime Value (H) Vulnerability (L) Sensitivity (M)	Development in floodplain that would alter flood passage and storage dynamics.	Direct effect, in local watershed only.	M	Construction – S Operation – L Low frequency	Reversible; Permanent	VL	Local Trans-boundary if site location is adjacent or near national border (Carpathian Region)	Negative	Applicable where scheme would be constructed within a floodplain	Y
Groundwater Resource Value (H) Vulnerability (L) Sensitivity (M)	Altered groundwater resource from increased contributions to groundwater as a result of land and landfill disturbance.	Direct effect on local groundwater resource.	VL	Construction - VS Low frequency	Reversible; Temporary	VL	Local	Negative	-	N
Groundwater quality Value (H) Vulnerability (M) Sensitivity (M)	Altered groundwater quality from contributions or poor quality water to groundwater system as a result of land and landfill disturbance.	Direct effect on local ground water resource.	VL	Construction - VS, Low frequency	Temporary Reversible;	VL	Local	Negative	-	N
	Altered groundwater quality from leachate seepage during operation.	Direct effect on local ground water resource.	VL	Operation - L Low frequency	Permanent Reversible;	L	Local	Negative	-	Y

Table B14 Surface Water and Groundwater. Scenario: Biogas Using Animal Manure

Surface Water and Groundwater. Scenario Seven: Biogas Using Animal Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Surface Water Resources Value (H) Vulnerability (L) Sensitivity (M)	Altered surface runoff contribution to watercourses and ditches as a result of land disturbance and minor land take.	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
				Operation - L Low frequency	Reversible; Permanent	VL	Local	Negative	-	N
Surface Water Quality Value (H) Vulnerability (M) Sensitivity (M)	Altered surface water quality from particulates and contaminants and changes in water chemistry which may result	Direct effect, in local watershed only.	M	Construction - S Low frequency	Reversible; Temporary	L	Local	Negative	-	Y
				Operation - L Low frequency	Reversible; Permanent	L	Local	Negative	-	N
	Application of liquid digestate to land surface as liquid fertiliser, runoff from storage areas, or recycled in process to dilute freshwater intake	Direct effect, in local watershed only.	L	Operation - L Low frequency	Reversible; Permanent	L	Local	Negative	-	Y
Flooding regime Value (H) Vulnerability (L) Sensitivity (M)	Development in floodplain that would alter flood passage and storage dynamics.	Direct effect, in local watershed only.	M	Construction – S Operation – L Low frequency	Reversible; Permanent	VL	Local Trans-boundary if site location is adjacent or near national border (Carpathian Region)	Negative	Applicable where scheme would be constructed within a floodplain	Y
Groundwater Resource Value (H) Vulnerability (L) Sensitivity (M)	Altered groundwater resource from increased contributions to groundwater as a result of land disturbance.	Direct effect on local ground water resource.	VL	Construction - VS Low frequency	Reversible; Temporary	VL	Local	Negative	-	N
Groundwater quality Value (H) Vulnerability (M) Sensitivity (M)	Altered groundwater quality from contributions or poor quality water to groundwater system as a result of land disturbance.	Direct effect on local ground water resource.	VL	Construction - VS, Low frequency	Temporary Reversible;	VL	Local	Negative	-	N
	Altered groundwater quality from leachate seepage during operation.	Direct effect on local ground water resource.	VL	Operation - L Low frequency	Permanent Reversible;	L	Local	Negative	-	Y

Table B15 Geology and Soils. Scenario: Onshore Wind

Geology and Soils. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Bedrock Geology Value – Low Vulnerability – Low Sensitivity - Low	Alteration from – from site clearing and grading; excavation of foundation(s)	Direct	Medium	Construction - L Frequency - intermittent	Irreversible, Permanent	Very Low	Local	Negative	Assume – some excavation and/or blasting in constructing pile or pier foundations	N
Landslide Hazard Areas Value – Low Vulnerability – Medium Sensitivity - Medium	No effects on landslide hazard areas	-	-	-	-	-	-	-	Assume - schemes are not built on slopes greater than 20%	-
High Value Soils Value – High Vulnerability – Medium Sensitivity - Medium	Loss from erosion; removal of soil for construction laydown, roads, facilities footprints; limitation use for agricultural production (competing high value use);	Direct,	Medium	Construction - S Low frequency	Irreversible Temporary/ Permanent	Medium	Local	Negative	Assume – sites will allow dual use including agricultural production	N
Contaminated Lands Value – Low Vulnerability – Medium Sensitivity - Medium	Creation of pollution pathways for contaminants during construction,	Direct	Low	Construction – S Operation - L Low frequency	Reversible Temporary	Very Low	Local	Negative	Assume spillage or release of contaminants exacerbates existing level of contamination	N
	Placement of facilities on brownfield sites to provide beneficial reuse of lands if constructed using best management practices.	Direct	Low	Operation - L Low frequency	Reversible permanent	Very Low	Local	Positive	-	N
Soil Composition Value – Low Vulnerability – Medium Sensitivity – Medium	Degradation from removal of vegetation during construction	Direct and indirect	Low	Construction – S Frequency – intermittent	Reversible Temporary	Low	Local	Negative	-	Y

Table B16 Geology and Soils. Scenario: Small Hydropower

Geology and Soils. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Bedrock Geology Value – Low Vulnerability – Low Sensitivity – Low	Alteration from – from site clearing and grading; excavation of foundation(s), construction of diversions and dams, and blasting of bedrock	Direct	Medium	Construction - L Frequency - intermittent	Irreversible, Permanent	Very Low	Local	Negative	Assume - some excavation and/or blasting in constructing dam or diversion	N
Landslide Hazard Areas Value – Low Vulnerability – Medium Sensitivity – Medium	Increased potential of occurrence from removal of vegetation, changes in drainage inundation from impoundments, and increased gradients from infrastructure could increase risk. Construction of 'run-of-river' typically occur in mountainous terrain and activities in landslide hazard areas could result in increased risk of adverse effects.	Direct	Low	Construction – S Operation - L Low frequency	Reversible Temporary	Very Low	Local	Negative	Assume - Removal of vegetation during construction, changes in drainage and inundation from impoundments contribute to landslide occurrence	N
High Value Soils Value – High Vulnerability – Medium Sensitivity – Medium	Loss from erosion; removal of lands from agricultural production (competing high value use);	Direct	Medium	Construction – S Operation - L Low frequency	Irreversible Temporary/ Permanent	Medium	Local	Negative	Assume – impoundment will eliminate productive use of underlying soils, may alter local drainage and erosion.	Y
Contaminated Lands Value – Low Vulnerability – Medium Sensitivity - Medium	Creation of pollution pathways for contaminants during construction,	Direct	Low	Construction – S Operation - L Low frequency	Reversible Temporary	Very Low	Local	Negative	Assume spillage or release of contaminants exacerbates existing level of contamination	N
	Placement of facilities on brownfield sites to provide beneficial reuse of lands if constructed using best management practices.	Direct	Low	Operation - L Low frequency	Reversible permanent	Very Low	Local	Positive	-	N
Soil Composition Value – Low Vulnerability – Medium Sensitivity – Medium	Degradation from removal of vegetation; inundation from impoundment	Direct	Medium-Low	Construction – S Frequency – intermittent	Reversible Temporary	Low	Local	Negative	Assume moisture content of soil affected from unlined impoundment	Y

Table B17 Geology and Soils. Scenario: Solar Photovoltaic

Geology and Soils. Scenario Three: Solar Photovoltaic										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Bedrock Geology Value – Low Vulnerability – Low Sensitivity - Low	Alteration from – from site clearing and grading	Direct	Medium	Construction - L Frequency intermittent	Irreversible, Permanent	Very Low	Local	Negative	Assume - limited excavation and/or blasting in site clearing and grading	N
Landslide Hazard Areas Value – Low Vulnerability – Medium Sensitivity - Medium	No effects on landslide hazard areas	-	-	-	-	-	-	-	Assume - schemes are not built on slopes greater than 5%	-
High Value Soils Value – High Vulnerability – Medium Sensitivity - Medium	Loss from erosion; removal of lands from agricultural production (competing high value use).	Direct	Medium	Construction – S Operation - L Low frequency	Irreversible Temporary/ Permanent	High	Local	Negative	Assume – clearing and levelling of site will alter drainage, vegetative growth to be limited/controlled throughout operations.	Y
Contaminated Lands Value – Low Vulnerability – Medium Sensitivity - Medium	Creation of pollution pathways for contaminants during construction,	Direct	Low	Construction – S Operation - L Low frequency	Reversible Temporary	Very Low	Local	Negative	Assume spillage or release of contaminants exacerbates existing level of contamination	N
	Placement of facilities on brownfield sites to provide beneficial reuse of lands if constructed using best management practices.	Direct	Low	Operation - L Low frequency	Reversible permanent	Very Low	Local	Positive	-	N
Soil Composition Value – Low Vulnerability – Medium Sensitivity – Medium	Degradation from removal of vegetation; panel washing chemicals percolation into soil	Direct	Medium-Low	Construction – S Operation - M Frequency – intermittent	Reversible Temporary	Low	Local	Negative	-	Y

Table B18 Geology and Soils. Scenario: Biomass Using Wood Residues

Geology and Soils. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Bedrock Geology Value – Low Vulnerability – Low Sensitivity – Low	Alteration from site clearing and grading, excavation, of foundation(s)	Direct	Medium	Construction - L Frequency intermittent	Irreversible, Permanent	Very Low	Local	Negative	Assume - limited excavation and/or blasting in site clearing and grading	N
Landslide Hazard Areas Value – Low Vulnerability – Medium Sensitivity – Medium	No effects on landslide hazard areas	-	-	-	-	-	-	-	Assume - schemes are not built on slopes greater than 20%	-
High Value Soils Value – High Vulnerability – Medium Sensitivity – Medium	Loss from erosion; removal of lands from agricultural production (competing high value use).	Direct	Medium	Construction – S Operation - L Low frequency	Irreversible Temporary/ Permanent	Medium	Local	Negative	Assume – site / facilities will eliminate productive use of underlying soils, alter local drainage and erosion.	Y
Contaminated Lands Value – Low Vulnerability – Medium Sensitivity - Medium	Creation of pollution pathways for contaminants during construction,	Direct	Low	Construction – S Operation - L Low frequency	Reversible Temporary	Very Low	Local	Negative	Assume spillage or release of contaminants exacerbates existing level of contamination	N
	Placement of facilities on brownfield sites to provide beneficial reuse of lands if constructed using best management practices.	Direct	Low	Operation - L Low frequency	Reversible permanent	Very Low	Local	Positive	-	N
Soil Composition Value – Low Vulnerability – Medium Sensitivity – Medium	Degradation from removal of vegetation, and compaction under facilities, and deposition of pollutants, release of leachate and disposal of combustion by-products	Direct	Medium-Low	Construction – S Operation - M Frequency – intermittent	Reversible Temporary	Low	Local	Negative	-	Y

Table B19 Geology and Soils. Scenario Five: Biomass Using Agricultural Residues

Geology and Soils. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Bedrock Geology Value – Low Vulnerability – Low Sensitivity - Low	Alteration from site clearing and grading, excavation, of foundation(s)	Direct)	Medium	Construction - VS Frequency intermittent	Irreversible, Permanent	Very Low	Local	Negative	Assume – some excavation and/or blasting in foundation construction	N
Landslide Hazard Areas Value – Low Vulnerability – Medium Sensitivity - Medium	No effects on landslide hazard areas	-	-	-	-	-	-	-	Assume - schemes are not built on slopes greater than 20%	-
High Value Soils Value – High Vulnerability – Medium Sensitivity - Medium	Loss from erosion; removal of lands from agricultural production (competing high value use).	Direct	Medium	Construction - L Operation - L Low frequency	Irreversible Temporary/ Permanent	Medium	Local	Negative	Assume – site / facilities will eliminate productive use of underlying soils, alter local drainage and erosion. Uncertainty – fuel supply and storage area requirements	Y
Contaminated Lands Value – Low Vulnerability – Medium Sensitivity - Medium	Creation of pollution pathways for contaminants during construction,	Direct	Low	Construction – S Operation - L Low frequency	Reversible Temporary	Very Low	Local	Negative	Assume spillage or release of contaminants exacerbates existing level of contamination	N
	Placement of facilities on brownfield sites to provide beneficial reuse of lands if constructed using best management practices.	Direct	Low	Operation - L Low frequency	Reversible permanent	Very Low	Local	Positive	-	N
Soil Composition Value – Low Vulnerability – Medium Sensitivity – Medium	Degradation from removal of vegetation, and compaction under facilities, and deposition of pollutants, release of leachate and disposal of combustion by-products	Direct	Medium-Low	Construction – S Operation - M Frequency – intermittent	Reversible Temporary	Low	Local	Negative	-	Y

Table B20 Geology and Soils. Scenario Six: Biogas Using Landfill Gas

Geology and Soils. Scenario Six: Biogas Using Landfill Gas										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Bedrock Geology Value – Low Vulnerability – Low Sensitivity – Low	Alteration from site clearing and grading, excavation, of foundation(s)	Direct	Medium	Construction - VS Frequency intermittent	Irreversible, Permanent	Very Low	Local	Negative	Assume – some excavation and/or blasting in foundation construction	N
Landslide Hazard Areas Value – Low Vulnerability – Medium Sensitivity – Medium	No effects on landslide hazard areas	-	-	-	-	-	-	-	Assume - schemes are not built on slopes greater than 20%	-
High Value Soils Value – High Vulnerability – Medium Sensitivity – Medium	Loss from erosion; removal of lands from agricultural production (competing high value use).	Direct	Very Low	Construction - L& Operation - L Low frequency	Irreversible Temporary/ Permanent	Low	Local	Negative	Assume – limited presence of high value soils adjacent to landfill that may be impacted.	N
Contaminated Lands Value – Low Vulnerability – Medium Sensitivity - Medium	Creation of pollution pathways for contaminants during construction,	Direct	Low	Construction – S Operation - L Low frequency	Reversible Temporary	Very Low	Local	Negative	Assume spillage or release of contaminants exacerbates existing level of contamination	N
	Placement of facilities on brownfield sites to provide beneficial reuse of lands if constructed using best management practices.	Direct	Low	Operation - L Low frequency	Reversible permanent	Very Low	Local	Positive	-	N
Soil composition Value – Low Vulnerability – Medium Sensitivity –Medium	Limited disturbance of soils during construction of supporting infrastructure for municipal landfill gas production	Direct	Medium	Construction – S	Reversible Temporary	Low	Local	Negative	-	N
	Degradation from acidification of soils resulting from deposition of pollutants	Direct	Medium-Low	Operation - M Frequency – intermittent	Reversible Temporary	Low	Local	Negative	-	Yes

Table B21 Geology and Soils. Scenario Seven: Biogas Using Animal Manure

Geology and Soils. Scenario Seven: Biogas Using Animal Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Bedrock Geology Value – Low Vulnerability – Low Sensitivity – Low	Alteration from site clearing and grading, excavation, of foundation(s)	Direct	Medium	Construction - VS Frequency intermittent	Irreversible, Permanent	Very Low	Local	Negative	Assume – some excavation and/or blasting in foundation construction	N
Landslide Hazard Areas Value – Low Vulnerability – Medium Sensitivity – Medium	No effects on landslide hazard areas	-	-	-	-	-	-	-	Assume - schemes are not built on slopes greater than 20%	-
High Value Soils Value – High Vulnerability – Medium Sensitivity – Medium	Loss from erosion; removal of lands from agricultural production (competing high value use).	Direct Cumulative / consequential increased grazing and feed production	Medium	Construction – L Operation - L Low frequency	Irreversible Temporary/ Permanent	Medium	Local	Negative	Assume – facility located proximate to concentrated animal populations. Uncertainty – Source(s) of waste	Y
Contaminated Lands Value – Low Vulnerability – Medium Sensitivity - Medium	Creation of pollution pathways for contaminants during construction,	Direct	Low	Construction – S Operation - L Low frequency	Reversible Temporary	Very Low	Local	Negative	Assume spillage or release of contaminants exacerbates existing level of contamination	N
	Placement of facilities on brownfield sites to provide beneficial reuse of lands if constructed using best management practices.	Direct	Low	Operation - L Low frequency	Reversible permanent	Very Low	Local	Positive	-	N
Soil composition Value – Low Vulnerability – Medium Sensitivity – Medium	Degradation from removal of vegetation, and compaction under facilities, and deposition of pollutants, release of leachate and disposal of combustion by-products/ waste	Direct	Medium-Low	Construction – S Operation - M Frequency – intermittent	Reversible Temporary	Low	Local	Negative	Assume constituents of by-product land application effects soil composition	Y

Table B22 Landscape and Biodiversity. Scenario One: Onshore Wind

Landscape and Biodiversity. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Protected Landscapes Value = High Vulnerability = High Sensitivity = high	Installation of Wind farm arrays and above ground power lines will affect landscape character , setting and visual amenity of protected landscapes.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	Irreversible; Permanent	H	Unitary authority - International; Transboundary. (if visible from the Ukrainian border)	Negative	Assumptions: Array area < 4 800ha with turbines 100m high. Visible for up to 30km. Protected forest cannot be recreated within 50 years	Y
	The installation of new power lines will form new linear features affecting landscape character and visual amenity surrounding the development.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	Irreversible; Permanent	H	Unitary authority - International; Transboundary. (if visible from the Ukrainian border)	Negative	Assumptions: Assuming simple pole construction up to 8m high, visible for up to 5km	Y
Protected Biodiversity Areas Value H, Vulnerability H, Sensitivity H	Land take from wind farm array(s) leading to direct loss of habitat for migratory bird populations at Ramsar sites on the Black Sea – Crimea Azov Sea coasts.	Direct; Cumulative; Far field	H	Construction and operation; Long term; Continuous	Permanent; Reversible	H	International, transboundary, reductions in bird populations may lead to population impacts on the Black Sea Flyway sites.	Negative	Assumptions: Development locations are unconstrained within resource scenario areas	Y
	Bird strike from turbine operation and additional above ground transmission infrastructure leading to reductions in Ramsar site migratory bird populations.	Direct; Cumulative; Far field	H	Operation; Long term; and, Continuous	Permanent; Reversible	H	International; Transboundary. (Reductions in bird populations may lead to population impacts on the Black Sea Flyway sites.)	Negative	Assumptions: Development locations unconstrained within resource scenario areas	Y
	Land take from wind farm arrays leading to direct loss of habitat within Regional Nature Reserves within Western Broadleaf, Carpathian & Northern Mixed Forest Zones	Direct; Cumulative	H	Construction and operation; Long term; Continuous	Permanent, Irreversible	L-M (<10 - >50% of Regional Reserves in specified zones in scenario area)	Regional	Negative	Assumptions: Development locations unconstrained within resource scenario areas	Y

Landscape and Biodiversity. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Protected Species Value H, Vulnerability H, Sensitivity H	Loss of habitat for bats foraging (woodland, river corridor, meadow) and roosting (woodland, karst caves) due to construction and footprint of wind farm array and access routes.	Direct; Cumulative	H	Construction and operation; Long term; Continuous.	Permanent; Irreversible	L- M (Wind Power development scenario restricted to >10 - >50 suitable habitat areas).	Regional	Negative	Assumptions: Development locations unconstrained within resource scenario areas. Limitations: Distribution of different bat species uncertain	Y
	Bat strike from turbine operation leading to reductions in bat populations in the Crimea, Pollisia, Steppe and Carpathian Zones.	Direct; Cumulative	H	Operation; Long term; Continuous	Permanent; Reversible	M (Wind Power operation has the potential to affect migratory bat species).	Regional	Negative	Assumptions: Development locations unconstrained. Bat colonies are associated with karst landforms and woodland. Limitations: Distribution of different bat species uncertain	Y
	Loss of nesting, roosting and foraging habitat for resident protected bird populations of raptors, and endemic species.	Direct; Cumulative	M	Construction and operation; Long term; Continuous	Reversible; Permanent	M	Regional (Northern Mixed and Western Broadleaf Forest Zones)	Negative	Assumptions: Limitations: Distribution and populations of bird species within wind resource areas	Y
	Bird strike from turbine operation leading to reductions in resident protected bird populations of raptors, and endemic species.	Direct; Cumulative	M	Operation; Long term; Continuous	Reversible; Permanent	M	Regional (Northern Mixed and Western Broadleaf forest Zones)	Negative	Distribution and populations of bird species within wind resource areas	Y

Landscape and Biodiversity. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Reduction in range of Bison (and other herding species) in the Northern Mixed and Western Broadleaf forest Zones due to habitat loss and fragmentation.	Direct; Cumulative	M	Construction and operation; Long term; Continuous	Irreversible; Permanent	L-M (Wind Power development scenario restricted to <10 - >50 suitable habitat areas).	Regional	Negative	Assumptions: Bison range based on regional landscape zones. Limitations: Specific information/mapping on range area.	Y
	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life, including protected species such as anadromous fish.	Direct and indirect	L	Construction; Short term; Intermittent	Reversible; temporary	VL	Local	Negative	Assumptions and Limitations: Erodibility of soils is low to moderate	N
Unregulated High Quality Landscape Value = High Vulnerability = High Sensitivity = High Including undisturbed natural landscapes and scenic and/or historic landscapes	Installation of Wind farm will affect landscape character and visual amenity of high quality landscapes over wide areas of land within and adjacent to resource area zones.	Direct; Far field; Cumulative	H	Construction and operation; Long term; Continuous	Irreversible; Permanent	H	Unitary authority - International; Transboundary. (if visible from the Ukrainian border)	Negative	Assumptions: Array area < 4 800ha with turbines 100m high. Visible for up to 30km. Decommissioning - replanting and re-profiling landform, is effective, excepting forest landscape.	Y
	The loss of large areas of trees and vegetation within forested landscapes will change landscape character and visual amenity.	Direct. Cumulative	H	Construction and operation; Long term; Continuous	Irreversible; Permanent	H	Unitary authority - International; Transboundary (if visible from the Ukrainian border)	Negative	Assumptions: As above and; Forest cannot be recreated within 50 years	Y

Landscape and Biodiversity. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	The installation of new power lines will form new linear features in protected landscapes, affecting landscape character and visual amenity surrounding the development.	Direct; Far field; Cumulative	H	Construction and operation; Long term; Continuous	Reversible*; Permanent (*Irreversible if forested land is lost as forest cannot be recreated within 50 years)	H	Unitary authority - International; Transboundary (if visible from the Ukrainian border)	Negative	Assumptions: Decommissioning - replanting and re-profiling landform, is effective, excepting forest landscape. Assuming simple pole construction up to 8m high, visible for up to 5km	Y
Unregulated Landscape Low Quality Arable Value = Low Vulnerability = High Sensitivity = Medium	Installation of Wind farm arrays and above ground power lines will affect landscape character and visual amenity of all arable landscapes The nature of uniform expanses of flat cropland landscape will exacerbate the effects.	Direct; Cumulative	H	Construction and operation; Long term; Continuous	Reversible*; Permanent (*Irreversible if forested land is lost as forest cannot be recreated within 50 years)	L	Unitary authority - International; Transboundary (if visible from the Ukrainian border)er)	Negative	Assumptions: Array area < 4 800ha with turbines 100m high. Visible for up to 30km. Decommissioning - replanting and re-profiling landform, is effective.	Y
Unregulated Landscape Low Quality Including urban, industrial, land intensely managed for animal husbandry Value = Low Vulnerability = Medium Sensitivity = Medium	Installation of Wind farm arrays against an industrialised landscape backdrop will affect of landscape character and visual amenity, effects may be reduced by the prominence of other structures within this landscape.	Direct. Cumulative	H	Construction and operation; Long term; Continuous	Reversible; Permanent	M	Unitary authority - International; Transboundary(if visible from the Ukrainian border)	Negative	Assumptions: Array area < 4 800ha with turbines 100m high. Visible for up to 30km. Decommissioning - replanting and re-profiling landform, is effective.	Y

Landscape and Biodiversity. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Installation of wind farm arrays and above ground power lines within residential areas and settlements in low quality landscapes could affect visual amenity.	Direct. Cumulative* (*Cumulative effects of pylons and cables should be considered in relation to existing or proposed power lines)	H	Construction and operation; Long term; Continuous	Reversible; Permanent	H	Unitary authority - International; Transboundary(if visible from the Ukrainian border)	Negative	Assumptions: Array area < 4 800ha with turbines 100m high. Visible for up to 30km. Decommissioning - replanting and re-profiling landform, is effective.	Y
	The installation of new power lines will form new linear features affecting landscape character and visual amenity surrounding the development.	Direct; Far field; Cumulative* (*Cumulative effects of pylons and cables should be considered in relation to existing or proposed power lines)	H	Construction and operation; Long term; Continuous	Reversible; Permanent	M	Unitary authority - International; Transboundary(if visible from the Ukrainian border)	Negative	Assumptions: Decommissioning - replanting and re-profiling landform, is effective, excepting forest landscape. Assuming simple pole construction up to 8m high, visible for up to 5km	Y
Aquatic Ecosystems Value = H Vulnerability= L Sensitivity = L	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life.	Direct and indirect	L	Construction; Short-term; Intermittent. (Effects during operation would likely be minimal.)	Reversible; Temporary	VL	Local	Negative	Assumptions and Limitations: Erodibility of soils is low to moderate	N
Unprotected remnant natural ecosystems (Value H, Vulnerability H, Sensitivity H)	Land take from wind farm arrays, new access routes and transmission lines leading to direct loss of forest, Yaila, grassland savannah habitats and associated reduction in ecosystem function	Direct; Cumulative	H	Construction and operation; Long term; Continuous	Reversible (Yaila and meadows, Savannah); Irreversible (Forest); Permanent	M	Regional (Forest, Yaila and meadows - Carpathian, Western Broadleaf and Mixed Forest Zones, Forest Steppe) (Grassland and Savannah in the Steppe & Crimea zones)	Negative	Assumptions: Array area < 4 800ha with turbines 100m high. Visible for up to 30km. Decommissioning - replanting and re-profiling landform, is effective.	Y

Landscape and Biodiversity. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Unprotected adapted ecosystems (Value L, Vulnerability L, Sensitivity L)	Land take from wind farm arrays, new access routes and transmission lines leading to loss of cropland/natural habitat mosaic and croplands habitats	Direct; Cumulative	H	Construction and operation; Long term; Continuous	Reversible; Permanent	M (cropland -natural habitat mosaic)	Regional All scenario areas	Negative	Urban area ecology will not be affected	Y
						L (cropland)	Regional All scenario areas	Negative	Urban area ecology will not be affected	Y

Table B23 Landscape and Biodiversity. Scenario Two: Small Hydropower

Landscape and Biodiversity. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Protected Landscapes Value = High Vulnerability = High Sensitivity = high	New dams and flooded areas within will affect the landscape character and setting of protected landscapes in the: Carpathian Uplands and the Carpathian Foothills and Mountain Zones (The Dniester and Tissa River Basins): Forest Steppe and Northern Steppe Zones (The Dnieper tributaries)	Direct; Cumulative* If sited in visual proximity to a larger facility then the effect could extend the impact of that existing facility. (*The construction of a number of small Hydropower facilities over a wide area in the Carpathians may have cumulative effects on the wider landscape)	H	Construction and operation; Long term; Continuous	Reversible * Permanent (*Irreversible if construction involves major earthworks) (*Irreversible if forested land is lost as forest cannot be recreated within 50 years)	H	Local – International*; Transboundary* (*if located with 20 km of the borders to Romania. Poland or Slovakia.)	Negative	Assumptions: Effect could be significant up to 10-20km. Unconstrained development of hydropower within or within 20km of receptors. Views from/to elevated positions will be prominent in the landscape, impacting on landscape character, visual amenity and the setting of protected landscapes.	Y

Landscape and Biodiversity. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	The presence of new structures and buildings may effect landscape character, visual amenity and the setting of protected landscapes.	Direct Cumulative	H	Construction and operation; Long term; Continuous	Reversible * Permanent	L	Local	Negative		Y
Protected Biodiversity Areas Value H, Vulnerability H, Sensitivity H	Additional damming of water courses may lead to changes in the hydrological regime of water dependent or flooding of terrestrial Protected Sites.	Direct	M	Operation; Long term; Continuous	Permanent; Reversible	L-H	International; Transboundary, (Potential downstream effects in the Tisla and Dniester catchments are transboundary.)	Negative	Assumptions: Hydropower development is unconstrained by location of protected sites	Y
	Loss of protected habitats due to vegetation clearance associated with requirements for additional access and clearance of newly flooded areas	Direct	H	Construction and operation; Long term; Continuous	Permanent, Irreversible (Natural forest) Reversible (all other habitat types)	L-H	Regional Restricted to sites within the headwaters of the Tisla Basin (Unesco Becch Forests), and the Dnipro (Dnipro Oril floodplains) and Dneister (Lower Smotrych River) floodplains	Negative	As above	Y
Protected Species (Value H, Vulnerability H, Sensitivity H)	Altered patterns of erosion and sediment deposition degrades water quality impacting on aquatic habitat of protected fish and invertebrate species through smothering, turbidity and river bed changes.	Direct	M	Construction, Short term Intermittent	Reversible; Temporary.	L	Local	Negative	Assumptions: No erosion control measures in place Limitations: Erodibility of soils unknown Reservoir levels and release flows unspecified.	Y
				Operation; Long term; Continuous	Reversible; Permanent.	L	Local	Negative	As above	Y

Landscape and Biodiversity. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Change in availability of prey for protected fish and aquatic invertebrates due to impoundment effects on sediment and erosion processes.	Indirect	M	Operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative		Y
	Blockage of upstream and/or downstream migration of protected fish (e.g., anadromous fish) and other aquatic organisms affecting feeding, reproduction, and seasonal movements of target species.	Direct; Cumulative	H	Construction and operation; Long term; Continuous	Reversible; Permanent.	H	International; Transboundary.	Negative	Assumptions: Migratory species utilise the affected reach of river Multiple developments along a watercourse or catchment. Protected migratory species, such as anadromous fish, the impacts can extend throughout the affected river basin and beyond.	Y
	Blockage of upstream and/or downstream movements of prey leading to reduced aquatic populations and changes in aquatic ecosystems that depend on the target species for directly affected.	Indirect; Cumulative	H	Construction and operation; Long term; Continuous	Reversible; Permanent	H	International; Transboundary.	Negative	Assumptions: Migratory species utilise the affected reach of river Multiple developments along a watercourse or catchment.	Y
	Entrainment of aquatic organisms in intake flows; impingement of aquatic organisms on intake screens leading to increased mortality	Direct; Cumulative	H	Operation; Long-term; Continuous	Reversible; Permanent	M	Local	Negative	The impacts of entrainment/impingement will depend on the type, distribution and biological characteristics of the affected species and the effectiveness of aquatic protection facilities to be implemented.	Y

Landscape and Biodiversity. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Decline in populations of aquatic species dependent on target species for food, biological hosts, directly affected by entrainment effects	Indirect; Cumulative	H	Operation; Long-term; Continuous	Reversible; Permanent	M	Local	Negative	As above	Y
	Modifications to instream flows , water quality (e.g., water temperature, dissolved oxygen levels, nutrient levels, etc.), and physical habitat; conversion of lotic (riverine) to lentic (lake) habitat due to impoundment construction	Direct and indirect;	H	Operation; Long term; Continuous	Permanent; irreversible (within new impoundment).	H	Local	Negative		Y
					Reversible; Permanent (downstream reaches or bypass reaches)	H	Local	Negative		Y
	Loss of habitats for protected fauna species (bats, birds, mammals) due to vegetation clearance associated with requirements for additional access and clearance of newly flooded areas	Direct	M	Construction and Operation Long term Continuous	Reversible; Permanent	L	Local	Negative	Assumptions: Reversible effects assume planting post decommissioning will provide suitable functional habitat within 50 years.	Y
Unregulated Landscape High Quality Landscape Value = High Vulnerability = High Sensitivity = High	The presence of new dams and flooded areas within will affect the landscape character and setting of high quality landscapes due to flooding of valued features	Direct	M	Construction and Operation Long term Continuous	Irreversible; Permanent	L	Local	Negative	Effect could be significant up to 10-20km. Unconstrained development of hydropower within or within 20km of receptors. Views from/to elevated positions will be prominent in the landscape.	Y

Landscape and Biodiversity. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Unregulated Landscape Arable Value = Low Vulnerability = High Sensitivity = Medium	The presence of new dams and flooded areas within will affect arable landscape character	Direct	M	Construction and Operation Long term Continuous	Irreversible; Permanent	VL	Local	Negative	As above	N
Aquatic Ecosystems Value: High Vulnerability: Low Sensitivity: Low	Altered patterns of erosion and sediment deposition degrades water quality impacting on aquatic habitat of fish and invertebrate species through smothering, turbidity and river bed changes.	Direct	M	Construction; Short term; Intermittent	Reversible; Temporary.	L	Local	Negative	Assumptions: No erosion control measures in place Limitations: Erodibility of soils unknown Reservoir levels and release flows unspecified.	Y
				Operation; Long term; Continuous	Reversible; Permanent.	L	Local	Negative	As above	Y
	Blockage of upstream and/or downstream migration of fish and other aquatic organisms, resulting in reduced aquatic populations and changes in aquatic ecosystems as a result of feeding, reproduction, and seasonal movements of affected target species	Direct; Cumulative	H	Construction and operation; Long term; Continuous	Reversible; Permanent.	H	International; Transboundary.	Negative	Assumptions: Migratory species utilise the affected reach of river Multiple developments along a watercourse or catchment. Migratory species, such as anadromous fish, the impacts can extend throughout the affected river basin and beyond.	Y
	Blockage of upstream and/or downstream movements of prey leading to reduced aquatic populations and changes in aquatic ecosystems that depend on the target species for directly affected.	Indirect; Cumulative	H	Construction and operation; Long term; Continuous	Reversible; Permanent	H	International; Transboundary.	Negative	Assumptions: Migratory species utilise the affected reach of river Multiple developments along a watercourse or catchment.	Y

Landscape and Biodiversity. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Entrainment of aquatic organisms in intake flows; impingement of aquatic organisms on intake screens leading to increased mortality	Direct; Cumulative	H	Operation; Long-term; Continuous	Reversible; Permanent	M	Local	Negative	The impacts of entrainment/impingement will depend on the type, distribution and biological characteristics of the affected species and the effectiveness of aquatic protection facilities to be implemented.	Y
	Decline in populations of aquatic species dependent on target species for food, biological hosts, directly affected by entrainment effects	Indirect; Cumulative	H	Operation; Long-term; Continuous	Reversible; Permanent	M	Local	Negative	As above	Y
Aquatic Ecosystems Value: High Vulnerability: Low Sensitivity: Low	Modifications to instream flows , water quality (e.g., water temperature, dissolved oxygen levels, nutrient levels, etc.), and physical habitat; conversion of lotic (riverine) to lentic (lake) habitat due to impoundment construction	Direct and indirect;	H	Operation; Long term; Continuous	Permanent; Irreversible (within new impoundment).	H	Local	Negative		Y
					Permanent; Reversible (downstream reaches or bypass reaches)	H	Local	Negative		Y
Unprotected remnant natural ecosystems (Value H, Vulnerability H, Sensitivity H)	Loss of forest, riparian, Yaila and meadow habitats due to vegetation clearance associated with requirements for additional access and clearance of newly flooded areas	Direct; Cumulative	M	Construction and Operation; Long term; Continuous	Reversible; Irreversible (Forest); Permanent	L	Local	Negative	Assumptions: Assumes decommissioning includes removal of impoundments. Assume planting post decommissioning will provide suitable functional habitat (excl. Forest)within 50 years	Y

Landscape and Biodiversity. Scenario Two: Small Hydropower									
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Unprotected adapted ecosystems (Value L, Vulnerability L, Sensitivity L)	Loss of cropland - natural habitat mosaic and croplands habitats due to vegetation clearance associated with requirements for additional access and clearance of newly flooded areas	Direct; Cumulative	M	Construction and Operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	As above	N

Table B24 Landscape and Biodiversity. Scenario Three: Solar Photovoltaic

Landscape and Biodiversity. Scenario Three: Solar Photovoltaic										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Protected Landscapes Value = High Vulnerability = High Sensitivity = high	The introduction of photovoltaic panels, new structures and power lines will affect landscape character, setting and visual amenity of protected landscapes in the Crimean Steppe and Foothills and Mountains and Odessa.	Direct; Far field; Cumulative	H	Construction and operation; Long term; Continuous	Irreversible Permanent	H	Local – International; Transboundary (if visible from the Ukrainian border)	Negative	Assumptions: Effect could be significant up to 10-20km. Decommissioning - replanting and re-profiling landform, is effective. Unconstrained development of photovoltaic array within or within 20km of receptors. Forest cannot be recreated within 50 years	Y

Landscape and Biodiversity. Scenario Three: Solar Photovoltaic										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Protected Biodiversity Areas Value H, Vulnerability H, Sensitivity H	Land take from solar array(s) leading to direct loss of habitat for migratory bird populations at Ramsar sites on the Black Sea – Crimea Azov Sea coasts.	Direct; Cumulative; Far field	H	Construction and operation; Long term; Continuous	Permanent; Reversible	H	International, transboundary, reductions in bird populations may lead to population impacts on the Black Sea Flyway sites.	Negative	Assumptions: Development locations are unconstrained within resource scenario areas	Y
	All National and regional Nature Reserves with the exception of the westernmost oblasts and mountainous terrain areas in the Carpathian and Crimea.	Direct; Cumulative;	H	Long term during all phases. Effects will be present throughout the project lifecycle	Permanent; Reversible	H	National	Negative	Assumptions: Development locations are unconstrained within resource scenario areas	Y
	Increased potential for bird strike associated additional above ground power line development within or adjacent to Ramsar sites on the Black Sea – Crimea Azov Sea coasts.	Direct	M	Operation; Long term; and, Continuous	Permanent; Reversible	L-M	International; Transboundary. (Reductions in bird populations may lead to population impacts on the Black Sea Flyway sites.)	Negative	Assumptions: Development locations unconstrained within resource scenario areas	Y
Protected Species (Value H, Vulnerability H, Sensitivity H)	Loss of habitat for bats foraging (woodland, river corridor, meadow) and roosting (woodland, karst caves) due to construction and footprint of photovoltaic arrays and access routes.	Direct; Cumulative	H	Construction and operation; Long term; Continuous.	Permanent; Irreversible	M	Regional	Negative	Assumptions: Development locations unconstrained within resource scenario areas. Limitations: Distribution of different bat species uncertain	Y
	Loss of nesting, roosting and foraging habitat for resident protected bird populations of raptors, and endemic species.	Direct; Cumulative	M	Construction and operation; Long term; Continuous	Reversible; Permanent	M	Regional (Predominantly Northern Mixed Forest, Forest Steppe and Steppe Zones and Northern Crimea Zones)	Negative	Distribution and populations of bird species within resource areas	Y

Landscape and Biodiversity. Scenario Three: Solar Photovoltaic										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Reduction in range of Bison (and other herding species) in the Northern Mixed Forest Zone due to habitat loss and fragmentation	Direct ; Cumulative	M	Construction and operation; Long term Continuous	Irreversible; Permanent	L	Regional	Negative	Assumptions: Bison range based on regional landscape zones. Limitations: Specific information/mapping on range area. Uncertainty over protected species outside of protected areas.	Y
	Increased incidence or bird and bat strike associated additional above ground power line development	Direct; Cumulative	M	Operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	New power line development likely to be small scale outside of main bird migration corridors	Y
	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life, including protected species such as anadromous fish (e.g. sturgeon species).	Direct and indirect	L	Construction; Short-term; Intermittent.	Reversible; Temporary	VL	Local	Negative	Assumptions and Limitations: Erodibility of soils is low to moderate	N
Unregulated High Quality Landscape Value = High Vulnerability = High Sensitivity = High Including undisturbed natural landscapes and scenic and/or historic landscapes	Photovoltaic arrays are likely to affect landscape character and visual amenity over a wide area: however the majority of the development will be low lying so the effect on visually amenity will be most apparent when viewed from elevated or close locations.	Direct; Far field; Cumulative	H	Construction and operation; Long term; Continuous	Reversible Permanent	H	Local – International*; Transboundary* (*if visible from the Ukrainian border.)	Negative	Assumptions: Effect could be significant up to 10-20km. Decommissioning - replanting and re-profiling landform, is effective, excepting forest landscape. Unconstrained development of photovoltaic array within or within 20km of receptors.	Y

Landscape and Biodiversity. Scenario Three: Solar Photovoltaic										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	The installation of new power lines will form new linear features in protected landscapes, affecting landscape character and visual amenity surrounding the development.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	Reversible Permanent	H	As above	Negative	Assumptions: Decommissioning - replanting and re-profiling landform, is effective. It has been assumed that forested areas are excluded. Assuming simple pole construction up to 8m high, visible for up to 5km	Y
Unregulated Landscape Arable Value = Low Vulnerability = High Sensitivity = Medium	Photovoltaic arrays are likely to affect landscape character and visual amenity over a wide area: however the majority of the development (excepting new buildings) will be low lying so the effect on visually amenity will be most apparent when viewed from close locations in a flat expansive arable landscape.	Direct; Far field; Cumulative	H	Construction and operation; Long term; Continuous	Reversible Permanent	L	Local – International*; Transboundary* (*if located with 20 km of the Ukrainian border.)	Negative	Assumptions: Effect could be significant up to 10-20km. Decommissioning - replanting and re-profiling landform, is effective, excepting forest landscape. Unconstrained development of photovoltaic array within or within 20km of receptors.	Y
Unregulated Landscape Low Quality Value = Low Vulnerability = Medium Sensitivity = Medium	Installation of photovoltaic arrays against an industrialised landscape backdrop will affects of landscape character and visual amenity, but effects may be reduced by the prominence of other structures within this landscape.	Direct; Far field; Cumulative	H	Construction and operation; Long term; Continuous	As above	M	As above	Negative	As above	Y

Landscape and Biodiversity. Scenario Three: Solar Photovoltaic										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	The installation of new power lines will form new linear features, affecting landscape character and visual amenity surrounding the development.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	As above	M	As above	Negative	Assumptions: Decommissioning - replanting and re-profiling landform, is effective, excepting forest landscape. Assuming simple pole construction up to 8m high, visible for up to 5km	Y
Aquatic Ecosystems Value = H Vulnerability= L Sensitivity = L	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life.	Direct and indirect	L	Construction; Short term; Intermittent	Reversible; temporary	VL	Local	Negative	Assumptions and Limitations: Erodibility of soils is low to moderate	N
Unprotected remnant natural ecosystems (Value H, Vulnerability H, Sensitivity H)	Land take from photovoltaic arrays, new access routes and transmission lines leading to direct loss of forest, Yaila, grassland and savannah habitats and associated reduction in ecosystem function	Direct; Cumulative	H	Construction and operation; Long term; Continuous.	Reversible (Yaila and meadows); Irreversible (Forest); Permanent	M	Regional (Forest, Yaila and meadows: Carpathian, Western Broadleaf and Mixed Forest Zones, Forest Steppe)	Negative	Assumptions: Assumes decommissioning includes removal of impoundments. Assume planting post decommissioning will provide suitable functional habitat (excl. Forest)within 50 years	Y
					Reversible (Savannah) Permanent	L	Regional Grassland and Savannah in the Steppe & Crimea zones	Negative		Y
Unprotected adapted ecosystems (Value L, Vulnerability L, Sensitivity L)	Land take from photovoltaic arrays, new access routes and transmission lines leading to loss of cropland/natural habitat mosaic and croplands habitats	Direct; Cumulative	H	Construction and operation; Long term; Continuous	Reversible; Permanent	M (cropland -natural habitat mosaic)	Regional All scenario areas	Negative	Urban area ecology will not be affected	Y
						L (cropland)	Regional All scenario areas	Negative	Urban area ecology will not be affected	N

Table B25 Landscape and Biodiversity. Scenario Four: Biomass Using Wood Residues

Landscape and Biodiversity. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Protected Landscapes Value = High Vulnerability = High Sensitivity = high	The introduction of biomass facilities and ancillary linear development will affect landscape character, setting and visual amenity of protected landscapes in Mixed Forest Zone and the Forest Steppe (Zhytomyr), Carpathian Mountains and Foothills Zone (Zakarpattia).	Direct; Far field; Cumulative	H	Construction and operation; Long term; Continuous	Reversible Permanent	H	Local – International*; Transboundary* (*if visible from the Ukrainian border.)	Negative	Assumptions: Development area up to 25 ha with boiler building up to 58m high. Effect could be significant up to 30km. Protected forest cannot be recreated within 50 years	Y
Protected Biodiversity Areas (Value H, Vulnerability H, Sensitivity H)	Land take and associated transmission and fuel delivery access in Carpathian Biosphere and Nationally/Regionally Protected Areas..	Direct	L	Construction and operation; Long term; Continuous	Irreversible; Permanent	L	Local	Negative	Assumptions: Loss of protected natural forest is irreversible. Land take is limited by site boundary Magnitude based on scenario limited to one 20MW development in each oblast of Zhytomer and Zakarpatia (See Biomass paper 1.2.1)	Y

Landscape and Biodiversity. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Protected Species (Value H, Vulnerability H, Sensitivity H)	Loss of woodland habitat for bats foraging and roosting (woodland, river corridor) due to scheme construction and footprint and access routes.	Direct	M	Construction and operation; Long term; Continuous	Irreversible; Permanent	L-M	Local	Negative	Assumptions: Loss of forest is irreversible. Land take is limited by site boundary Magnitude based on scenario limited to one 20MW development in each oblast of Zhytomer and Zakarpatia (See Biomass paper 1.2.1)	Y
	Reduction in range of Bison (and other herding species) in the Northern Mixed and Western Broadleaf forest Zones due to habitat loss and fragmentation associated with land take and potential increase in mortality due to increase in HGV movements.	Direct	M	Operation	Irreversible; Permanent	L	Local – Regional (140 trips a day within radius of <100km)	Negative	Assumptions: Plant land take indiscriminate within supply area	Y
	Increased incidence or bird and bat strike associated additional above ground power line development	Direct	M	Operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	New power line development likely to be small scale outside of main bird migration corridors	Y
	Wastewater flows, if discharged to streams, degrade water quality and in turn, impact aquatic communities that depend on affected aquatic organisms for food , biological hosts, etc	Direct and indirect	M	Operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	Assumptions: Use of cooling towers. Cooling tower blowdown is typically high in total dissolved solids and can result in localised water quality degradation and thermal impacts.	Y

Landscape and Biodiversity. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Water supply withdrawals from surface streams may impact streamflows, aquatic habitat and associated communities that depend on the target species for food, biological hosts, etc. .	Direct and indirect; Cumulative .	M	Operation; Long term; Continuous	Reversible, Permanent	L	Local	Negative	Assumptions: Low magnitude assessment assumes the use of closed cycle cooling system (cooling towers) Multiple facilities are located on same watercourses or within same catchment	Y
	Water supply withdrawals can also result in entrainment and impingement of aquatic organisms leading to injury and/or mortality	Direct and indirect; Cumulative	M	Operation; Long term; Continuous	Reversible, Permanent	L	Local	Negative	As above	Y
	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life, including protected species such as anadromous fish (e.g. sturgeon species)	Direct and indirect	L	Construction; Short term; Intermittent	Reversible; Temporary	VL	Local	Negative	Assumptions: No erosion control measures in place Limitations: Erodibility of soils unknown.	Y

Landscape and Biodiversity. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Unregulated Landscape High Quality Landscape Value = High Vulnerability = High Sensitivity = High	The introduction of biomass facilities and disruption from increase in vehicle movements will affect visual amenity and landscape character.	Direct; Far field; Cumulative)	H	Construction and operation; Long Term; Continuous	Reversible, Permanent	H	Local – International*; Transboundary* (*if visible from the Ukrainian border.)	Negative	Assumptions: Development area up to 25 ha with boiler building up to 58m high. Effect could be significant up to 30km.	Y
	The installation of new power lines will form new linear features in the landscape, affecting landscape character and visual amenity surrounding the development.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	Reversible * Permanent	H	As above	Negative	Assumptions: Decommissioning - replanting and re-profiling landform, is effective, excepting forest landscape. Assuming simple pole construction up to 8m high, visible for up to 5km	Y
Unregulated Landscape Arable Value = Low Vulnerability = High Sensitivity = Medium	Existing land cover and features will be replaced with new buildings and tall structures, affecting landscape character and visual amenity as will increased truck movements.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	Reversible * Permanent	M	Local – International*; Transboundary* (*if visible from the Ukrainian border.)	Negative	Assumptions: Development area up to 25 ha with boiler building up to 58m high. Effect could be significant up to 30km. .	Y
Unregulated Landscape Low Quality Value = Low Vulnerability = Medium Sensitivity = Medium	The introduction of biomass facilities and disruption from increase in vehicle movements will affect visual amenity and landscape character.. In a heavily industrialised landscape effects may not be so apparent, unless viewed from close or elevated locations.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	Reversible Permanent	M	Local – International*; Transboundary* (*if visible from the Ukrainian border.)	Negative	As above.	Y

Landscape and Biodiversity. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Aquatic Ecosystems Value = H Vulnerability= L Sensitivity = L	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life.	Direct and indirect	L	Construction; Short term; Intermittent	Reversible; temporary	VL	Local	Negative	Assumptions: No erosion control measures in place Limitations: Erodibility of soils unknown.	Y
	Wastewater flows, if discharged to streams, degrade water quality and in turn, impact aquatic communities that depend on affected aquatic organisms for food , biological hosts, etc	Direct and indirect	M	Operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	Assumptions: Use of cooling towers. Cooling tower blowdown is typically high in total dissolved solids and can result in localised water quality degradation and thermal impacts.	Y
	Water supply withdrawals from surface streams may impact streamflows, aquatic habitat and associated communities that depend on the target species for food, biological hosts, etc.	Direct and indirect; Cumulative .	M	Operation; Long term; Continuous	Reversible, Permanent	VL	Local	Negative	Assumptions: VL magnitude assessment assumes the use of closed cycle cooling system (cooling towers) Multiple facilities are located on same watercourses or within same catchment	N
	Water supply withdrawals can also result in entrainment and impingement of aquatic organisms leading to injury and/or mortality	Direct and indirect; Cumulative	M	Operation; Long term; Continuous	Reversible, Permanent	VL	Local	Negative	As above	N

Landscape and Biodiversity. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Unprotected remnant natural ecosystems (Value H, Vulnerability H, Sensitivity H)	Land take associated with biomass development and access routes leading to loss of forests, Yaila and meadows and grassland in the Northern Mixed and Western Broadleaf Forest Zones	Direct	L-M	Construction and operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	Assumptions: Plant land take indiscriminate within supply area	Y
Unprotected adapted ecosystems (Value L, Vulnerability L, Sensitivity L)	Land take associated with biomass development access routes leading to loss of cropland/natural habitat mosaic and croplands habitats in the Northern Mixed and Western Broadleaf forest Zones	Direct	M	Construction and operation; Long term; Continuous	Reversible; Permanent	L (cropland -natural habitat mosaic)	Regional All scenario areas	Negative	Assumptions: Urban area ecology will not be affected	Y
						VL (cropland)	Regional All scenario areas	Negative	Urban area ecology will not be affected	N

Table B26 Landscape and Biodiversity. Scenario Five: Biomass Using Agricultural Residues

Landscape and Biodiversity. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Protected Landscapes Value = High Vulnerability = High Sensitivity = high	The introduction of biomass facilities and ancillary linear development will affect landscape character, setting and visual amenity of protected landscapes	Direct; Far field; Cumulative	H	Construction and operation; Long term; Continuous	Reversible Permanent	H	Local – International*; Transboundary* (*if visible from the Ukrainian border.)	Negative	Assumptions: Development area up to 25 ha with boiler building up to 58m high. Effect could be significant up to 30km.	Y

Landscape and Biodiversity. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Protected Biodiversity Areas (Value H, Vulnerability H, Sensitivity H)	Land take for CHP in Western Oblasts and Crimea	Direct	L	Construction and operation; Long term; Continuous	Reversible; Permanent	VL	Local	Negative	-	Y
	Land take for 2 x 20-50MW plant in each oblast within the central, northern, southern and south western regions	Direct	L	Construction and operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	-	Y
	Expansion of fuel handling areas at coal fired power plants converted to biomass power plants	Direct	L	Construction and operation; Long term; Continuous	Reversible; Permanent	VL	Local	Negative	-	Y
	Increased potential for bird strike associated additional above ground power line development within or adjacent to Crimean Ramsar Sites.	Direct	M	Operation	Reversible; Permanent	L-M	Local	Negative	New power line development unconstrained	Y
Protected Species (Value H, Vulnerability H, Sensitivity H)	Loss of habitat due to land take for CHP in Western Oblasts and Crimea	Direct	L	Construction and operation; Long term; Continuous	Reversible; Permanent	VL	Local	Negative	-	Y
	Loss of habitat due to land take for 2 x 20-50MW plant in each oblast within the central, northern, southern and south western regions	Direct	L	Construction and operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	-	Y
	Expansion of fuel handling areas at coal fired power plants converted to biomass power plants in Donbass Region and Chernhiv and Mykolaiv Oblasts	Direct	L	Construction and operation; Long term; Continuous	Reversible; Permanent	VL	Local	Negative	-	Y

Landscape and Biodiversity. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Increase in mortality of ranging protected species due to increased vehicle movements and improvements to road networks associated with delivery of fuel to site.	Indirect	M	Operation Long term; Continuous	Reversible; Permanent	L	Local - Regional Based 100km (30 000ha) supply area	Negative	-	Y
	Increased incidence or bird and bat strike associated additional above ground power line development	Direct	M	Operation Long term; Continuous	Reversible; Permanent	L	Local	Negative	New power line development likely to be small scale outside of main bird migration corridors	Y
	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life, including protected species such as anadromous fish (e.g. sturgeon species).	Direct and indirect	L	Construction; Short term; Intermittent	Reversible; Temporary	VL	Local	Negative	Assumptions: No erosion control measures in place Limitations: Erodibility of soils unknown.	Y
	Wastewater flows, if discharged to streams, degrade water quality and in turn, impact aquatic communities that depend on affected aquatic organisms for food , biological hosts, etc	Direct and indirect	M	Operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	Assumptions: Use of cooling towers. Cooling tower blowdown is typically high in total dissolved solids and can result in localised water quality degradation and thermal impacts.	Y

Landscape and Biodiversity. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Water supply withdrawals from surface streams may impact streamflows, aquatic habitat and associated communities that depend on the target species for food, biological hosts, etc.	Direct and indirect; Cumulative .	M	Operation; Long term; Continuous	Reversible, Permanent	L	Local	Negative	Assumptions: Low magnitude assessment assumes the use of closed cycle cooling system (cooling towers) Multiple facilities are located on same watercourses or within same catchment	Y
	Water supply withdrawals can also result in entrainment and impingement of aquatic organisms leading to injury and/or mortality	Direct and indirect; Cumulative	M	Operation; Long term; Continuous	Reversible, Permanent	L	Local	Negative	As above	Y
Unregulated Landscape High Quality Landscape Value = High Vulnerability = High Sensitivity = High Including undisturbed natural landscapes and scenic and/or historic towns, villages and features.	The introduction of new biomass facilities and disruption from an increase in vehicle movements will affect visual amenity and landscape character.	Direct; Far field; Cumulative	H	Construction and operation; Long term; Continuous	Reversible Permanent	H	Local – International*; Transboundary* (*if visible from the Ukrainian border.)	Negative	Assumptions: Biomass development is of the 25 ha order. Boiler building up to 58m high. Effect could be significant up to 30km. Decommissioning - replanting and re-profiling landform is effective, excepting forest landscape. Unconstrained development of biomass facility within or within 30km of receptors.	Y

Landscape and Biodiversity. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	The installation of new power lines will form new linear features in the landscape, affecting landscape character and visual amenity surrounding the development.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	Reversible Permanent	M	As above	Negative	Assumptions: Decommissioning - replanting and re-profiling landform, is effective, excepting forest landscape. Assuming simple pole construction up to 8m high, visible for up to 5km	Y
Unregulated Landscape Arable Value = Low Vulnerability = High Sensitivity = Medium	Existing land cover and features will be replaced with new buildings and tall structures, effecting landscape character and visual amenity as will increased truck movements.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	Reversible * Permanent	M	Local – International*; Transboundary* (*if visible from the Ukrainian border)	Negative	Assumptions: Development area up to 25 ha with boiler building up to 58m high. Effect could be significant up to 30km.	Y
Unregulated Landscape Low Quality Value = Low Vulnerability = Medium Sensitivity = Medium	The introduction of biomass facilities and disruption from increase in vehicle movements will affect visual amenity and landscape character.	As above	H	As above	As above	M	As above	Negative	As above	Y
	Settlements in low quality landscapes are likely to be sensitive to this type of Biomass development particularly if there are views from elevated locations. Potentially a large number of people could be affected.	As above	H	As above	As above	H	As above	Negative	As above	Y

Landscape and Biodiversity. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Aquatic Ecosystems Value: High Vulnerability: Low Sensitivity: Low	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life.	Direct and indirect	L	Construction; Short term; Intermittent	Reversible; temporary	VL	Local	Negative	Assumptions: No erosion control measures in place Limitations: Erodibility of soils unknown.	Y
	Wastewater flows, if discharged to streams, degrade water quality and in turn, impact aquatic communities that depend on affected aquatic organisms for food , biological hosts, etc	Direct and indirect	M	Operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	Assumptions: Use of cooling towers. Cooling tower blowdown is typically high in total dissolved solids and can result in localised water quality degradation and thermal impacts.	Y
	Water supply withdrawals from surface streams may impact streamflows, aquatic habitat and associated communities that depend on the target species for food, biological hosts, etc.	Direct and indirect; Cumulative .	M	Operation; Long term; Continuous	Reversible, Permanent	L	Local	Negative	Assumptions: Low magnitude assessment assumes the use of closed cycle cooling system (cooling towers) Multiple facilities are located on same watercourses or within same catchment	Y
	Water supply withdrawals can also result in entrainment and impingement of aquatic organisms leading to injury and/or mortality	Direct and indirect; Cumulative	M	Operation; Long term; Continuous	Reversible, Permanent	L	Local	Negative	As above	Y
Unprotected remnant natural ecosystems (Value H, Vulnerability H, Sensitivity H)	Land take for CHP in Western Oblasts and Crimea	Direct	L	Construction and operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	Y	Y

Landscape and Biodiversity. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Land take for 2 x 20-50MW plant in each oblast within the central, northern, southern and south western regions	Direct	M	Construction and operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	Y	Y
	Expansion of fuel handling areas at coal fired power plants converted to biomass power plants	Direct	L	Construction and operation; Long term; Continuous	Reversible; Permanent	L	Local	Negative	Y	N
Unprotected adapted ecosystems (Value L, Vulnerability L, Sensitivity L)	Land take for CHP in Western Oblasts and Crimea	Direct	H	Construction and operation; Long term; Continuous	Reversible; Permanent	VL (cropland -natural habitat mosaic)	Regional All scenario areas	Negative	Urban area ecology will not be affected	N
						VL (cropland)	Regional All scenario areas	Negative	Urban area ecology will not be affected	N
	Land take for 2 x 20-50MW plant in each oblast within the central, northern, southern and south western regions	Direct	H	Construction and operation; Long term; Continuous	Reversible; Permanent	L (cropland -natural habitat mosaic)	Local All scenario areas	Negative	Urban area ecology will not be affected	Y
						VL (cropland)	Regional All scenario areas	Negative	Urban area ecology will not be affected	N
	Expansion of fuel handling areas at coal fired power plants converted to biomass power plants	Direct	H	Construction and operation; Long term; Continuous	Reversible; Permanent	L (cropland -natural habitat mosaic)	Local All scenario areas	Negative	Urban area ecology will not be affected	Y
						VL (cropland)	Regional All scenario areas	Negative	Urban area ecology will not be affected	N

Table B27 Landscape and Biodiversity. Scenario Six: Biogas Using Landfill Gas

Landscape and Biodiversity. Scenario Six: Biogas Using Landfill Gas										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Protected Landscapes Value = High Vulnerability = High Sensitivity = high	New buildings and structures and power lines will affect landscape character and visual amenity of areas adjacent to landfill locations. It is unlikely that protected landscapes will be found within landfill sites however it is possible that the new structures could affect their setting.	Direct; Far field; Cumulative	L	Construction and operation; Long Term; Continuous	Reversible Permanent	H	Local	Negative	Assumptions: The height of new buildings is up to 24m. Effect could be significant up to 10 - 20km.	Y
Protected Biodiversity Areas (Value H, Vulnerability H, Sensitivity H)	Limited land take <1ha leading to loss of habitat.	Direct	VL	Construction and operation; Long term Continuous	Reversible; Permanent	VL	Local	Negative	Assumptions: LFG developments will be sited close to existing landfills	N
Protected Species (Value H, Vulnerability H, Sensitivity H)	Loss of habitat due to limited land take <1ha associated with construction of power generation facilities	Direct	L	Construction and operation; Long term; Continuous	Reversible; Permanent	VL	Local	Negative	Assumptions: Land take close to existing landfill unlikely to support populations of protected species	N
	Increased incidence of bird and bat strike associated additional above ground power line development	Direct	M	Operation; Long term; Continuous	Reversible; Permanent	M	Local	Negative	Assumptions: New power line development likely to be small scale however, landfill sites are known to attract large populations of gulls and other scavenging birds.	Y
	Wastewater flows, if discharged to streams, degrade water quality and in turn, impact aquatic communities that depend on affected aquatic organisms for food , biological hosts, etc	Direct and indirect	VL	Operation; Long term; Continuous	Reversible; Permanent	VL	Local	Negative	Assumptions: Facility will generate little or no wastewater such that discharge to streams is not necessary.	N

Landscape and Biodiversity. Scenario Six: Biogas Using Landfill Gas										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Water supply withdrawals from surface streams may impact streamflows and thus affect aquatic communities. Water supply withdrawals can also result in entrainment and impingement of aquatic organisms.	Direct	VL	Operation; Long term; Continuous	Permanent; Reversible	VL	Local	Negative	Assumptions: Scenario description indicates that water requirements will be negligible.	N
	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life.	Direct and indirect	L	Construction; Short term; Intermittent	Reversible; temporary	VL	Local	Negative	Assumptions: No erosion control measures in place Limitations: Erodibility of soils unknown.	Y
Unregulated High Quality Landscape Value = High Vulnerability = High Sensitivity = High Including undisturbed natural landscapes and scenic and/or historic landscapes	New buildings and structures and linear ancillary development (e.g. power lines) will affect landscape character and visual amenity replacing existing land cover with new built structures. It is unlikely that protected landscapes will be found within landfill sites however it is possible that the height and mass of new structures could affect their setting.	Direct; Far field; Cumulative	L	Construction and operation; Long Term; Continuous	As above	H	Local	Negative	Assumptions: The height of new buildings is up to 24m. Effect could be significant up to 10 - 20km.	Y

Landscape and Biodiversity. Scenario Six: Biogas Using Landfill Gas										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Unregulated Landscape Arable Value = Low Vulnerability = High Sensitivity = Medium	Landfill sites are not generally used for arable purposes. However, the addition of new buildings and structures affect the character and visual amenity. Structures are likely to be close to high population centres and in a flat arable landscape there may be few existing screening features.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	Reversible Permanent	M	Local	Negative	Assumptions: The height of new buildings is up to 24m. Effect could be significant up to 10 - 20km.	Y
Unregulated Landscape Low Quality Value = Low Vulnerability = Medium Sensitivity = Medium	The introduction of new buildings, structures and ancillary linear development (e.g. power lines) will affect landscape character and visual amenity. They are likely to be close to high population centres. In a heavily industrialised landscape new structures may be less noticeable, unless viewed from close or elevated locations.	As above	H	As above	Reversible * Permanent (*Irreversible if forested land is lost as forest cannot be recreated within 50 years)	M	Local	Negative	Assumptions: The height of new buildings is up to 24m. Effect could be significant up to 10 - 20km.	Y

Landscape and Biodiversity. Scenario Six: Biogas Using Landfill Gas										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Aquatic Ecosystems Value: High Vulnerability: Low Sensitivity: Low	Wastewater flows, if discharged to streams, degrade water quality and in turn, impact aquatic communities that depend on affected aquatic organisms for food , biological hosts, etc	Direct and indirect	VL	Operation; Long term; Continuous	Reversible; Permanent	VL	Local	Negative	Assumptions: Facility will generate little or no wastewater such that discharge to streams is not necessary.	N
	Water supply withdrawals from surface streams may impact streamflows and thus affect aquatic communities. Water supply withdrawals can also result in entrainment and impingement of aquatic organisms.	Direct	VL	Operation; Long term; Continuous	Permanent; Reversible	VL	Local	Negative	Assumptions: Scenario description indicates that water requirements will be negligible.	N
	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life.	Direct and indirect	L	Construction; Short term; Intermittent	Reversible; temporary	VL	Local	Negative	Assumptions: No erosion control measures in place Limitations: Erodibility of soils unknown.	Y
Unprotected remnant natural ecosystems (Value H, Vulnerability H, Sensitivity H)	Loss of habitat due to limited land take <1ha associated with construction of power generation facilities	Direct	L	Construction and operation; Long term Continuous	Reversible; Permanent	VL	Local	Negative	Land take close to existing landfill likely to be degraded due to existing landfill operations	N
Unprotected adapted ecosystems (Value L, Vulnerability L, Sensitivity L)	Loss of habitat due to limited land take <1ha associated with construction of power generation facilities	Direct	L	Construction and operation; Long term Continuous	Reversible; Permanent	VL	Local	Negative	Land take close to existing landfill likely to be degraded due to existing landfill operations	N

Table B28 Landscape and Biodiversity. Scenario Seven: Biogas Using Animal Manure

Landscape and Biodiversity. Scenario Seven: Biogas Using Animal Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Protected Landscapes Value = High Vulnerability = High Sensitivity = high	New buildings, structures and ancillary development (e.g. power lines). Development will affect landscape character and visual amenity by replacing the existing land cover with new features.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	Reversible * Permanent (*Irreversible if forested land is lost as forest cannot be recreated within 50 years)	H	Local – International*; Transboundary* (*if visible from the Ukrainian border).	Negative	Assumptions: Development area up to 5 ha with building up to 24m. Effect could be significant up to 10 - 20km.	Y
Protected Biodiversity Areas (Value H, Vulnerability H, Sensitivity H)	Land take associated with (<5ha per development, ~160ha cumulatively nationwide) leading to loss of habitat within protected biodiversity areas	Direct, Cumulative	L	Construction and operation; Long term Continuous	Reversible; Permanent	L-M	Local	Negative	Assumptions: Development is unconstrained but likely to be within or in close proximity to intensive livestock farming units	Y
Protected Species (Value H, Vulnerability H, Sensitivity H)	Increased incidence or bird and bat strike associated additional above ground power line development	Direct	M	Operation; Long term; Continuous	Reversible; Permanent	L-M	Local	Negative	Assumptions: New power line development likely to be small scale outside of main bird migration corridors	Y
	Wastewater flows, if discharged to streams, degrade water quality and in turn, impact aquatic communities that depend on affected aquatic organisms for food , biological hosts, etc	Direct and indirect	VL	Operation; Long term; Continuous	Reversible; Permanent	VL	Local	Negative	Assumptions: Facility will generate little or no wastewater such that discharge to streams is not necessary.	N

Landscape and Biodiversity. Scenario Seven: Biogas Using Animal Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Water supply withdrawals from surface streams may impact streamflows and thus affect aquatic communities. Water supply withdrawals can also result in entrainment and impingement of aquatic organisms.	Direct	VL	Operation; Long term; Continuous	Permanent; Reversible	VL	Local	Negative	Assumptions: Scenario description indicates that water requirements will be negligible.	N
	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life.	Direct and indirect	L	Construction; Short term; Intermittent	Reversible; temporary	VL	Local	Negative	Assumptions: No erosion control measures in place Limitations: Erodibility of soils unknown.	Y
Unregulated High Quality Landscape Value = High Vulnerability = High Sensitivity = High Including undisturbed natural landscapes and scenic and/or historic landscapes	New buildings, structures and ancillary development (e.g. power lines). Development will affect landscape character and visual amenity by replacing the existing land cover with new features.	As above	H	As above	As above	H	As above	Negative	Assumptions: Development area up to 5 ha with building up to 24m. Effect could be significant up to 10 - 20km.	Y

Landscape and Biodiversity. Scenario Seven: Biogas Using Animal Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Unregulated Landscape Arable Value = Low Vulnerability = High Sensitivity = Medium	New buildings, structures and ancillary development (e.g. power lines). Development will affect landscape character and visual amenity by replacing the existing land cover with new features.	Direct; Far field; Cumulative	H	Construction and operation; Long Term; Continuous	Reversible * Permanent (*Irreversible if forested land is lost as forest cannot be recreated within 50 years)	M	Local – International*; Transboundary* (*if visible from the Ukrainian border).	Negative	Assumptions: Development area up to 5 ha with building up to 24m. Effect could be significant up to 10 - 20km.	Y
Unregulated Landscape Low Quality Value = Low Vulnerability = Medium Sensitivity = Medium	New buildings, structures and ancillary development (e.g. power lines). Development will affect landscape character and visual amenity by replacing the existing land cover with new features. In a an industrialised landscape the effect on views may not be so apparent, unless viewed from close or elevated locations.	As above	H	As above	As above	M	As above	Negative	As above	Y
Aquatic Ecosystems Value: High Vulnerability: Low Sensitivity: Low	Wastewater flows, if discharged to streams, degrade water quality and in turn, impact aquatic communities that depend on affected aquatic organisms for food , biological hosts, etc	Direct and indirect	VL	Operation; Long term; Continuous	Reversible; Permanent	VL	Local	Negative	Assumptions: Facility will generate little or no wastewater such that discharge to streams is not necessary.	N

Landscape and Biodiversity. Scenario Seven: Biogas Using Animal Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Water supply withdrawals from surface streams may impact streamflows and thus affect aquatic communities. Water supply withdrawals can also result in entrainment and impingement of aquatic organisms.	Direct	VL	Operation; Long term; Continuous	Permanent; Reversible	VL	Local	Negative	Assumptions: Scenario description indicates that water requirements will be negligible.	N
	Erosion and stormwater runoff degrades water quality of receiving stream and associated habitat and in turn, impacts aquatic life.	Direct and indirect	L	Construction; Short term; Intermittent	Reversible; temporary	VL	Local	Negative	Assumptions: No erosion control measures in place Limitations: Erodibility of soils unknown.	Y
Unprotected remnant natural ecosystems Value H, Vulnerability H Sensitivity H	Land take associated with (<5ha per development, ~160ha cumulatively nationwide) leading to loss of habitat	Direct	L	Construction and operation; Long term; Continuous	Reversible	L-M	Local	Negative	Development is unconstrained but likely to be within or in close proximity to intensive livestock farming units	Y
Unprotected adapted ecosystems Value L, Vulnerability L Sensitivity L	Land take associated with (<5ha per development, ~160ha cumulatively nationwide) leading to loss of habitat	Direct	M	Construction and operation	Reversible, Permanent	L (cropland -natural habitat mosaic)	Local All scenario areas	Negative	Urban area ecology will not be affected	Y
						VL (cropland)	Regional All scenario areas	Negative	Urban area ecology will not be affected	N

Table B29 Community and Socio-economics. Scenario One: Onshore Wind

Community and Socio-economics. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Demographics Value H= Vulnerability = L Sensitivity = M	Possible relocation of communities or households due to construction of wind turbines, access roads or transmission lines	Direct	L - Due to low likelihood of settlements in areas prone to high sustained winds	Construction and Operation, - L	Irreversible/ Permanent	H	Local	Negative	Assumes communities will not be built in areas with high sustained winds	Y
	Potential ethnic disputes over placement of wind farms either due to perception of favouritism for one ethnic group over another	Direct	VL - more likely in areas with higher ethnic minorities, including Crimea, and oblasts bordering other countries.	Construction and operation - L	Reversible/ Temporary	M	Local	Negative	Assumes placement in areas with high ethnic minorities	Y
Human Health Value = H Vulnerability = L Sensitivity =M	Noise and dust during construction due to access road and foundation construction	Direct	M, depending on proximity of settlements to sites	Construction - VS	Reversible/ Temporary	VL	Local	Negative	-	Y
	Potential injury to workers building foundations, installing turbines, and power transmission lines including exposure to hazardous chemicals and risks of falling.	Direct	H	Construction and operation - S	Reversible/ Temporary	H	Local	Negative	Assumes no health safety or environmental requirements in place	Y
	Potential disruption due to noise from turbines during operation	Direct depending on proximity	L, depending on proximity of settlements to wind farms	Operation - L	Reversible/ Temporary	VL - for noise during operation	Local	Negative	Assumes turbine noise is audible to humans	Y
	Possible negative effects if homes or cultivated fields are too close to power lines due to exposure of electromagnetic fields	Direct	H	Operation - L	Reversible/Temporary	VL	Local	Negative	Assumes voltage high enough to harm humans	Y
Employment Value = H Vulnerability = L Sensitivity =M	Installation and maintenance favourable for employment and	Direct	M	Short term for labour during construction Long term for maintenance	Reversible/ Temporary	VL – only of a small number of labourers will be needed for construction or	Regional – may draw employees from nearby oblasts	Positive	Employment opportunities for regional population, and indirect employment	Y

Community and Socio-economics. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	earnings			operations		platforms/foundations and fewer needed to maintain wind turbines			opportunities for secondary support also such as food preparation, infrastructure support etc.	
Economic Sectors Value = H Vulnerability = L Sensitivity =M	Improved energy reliability positive for economic development	Direct – reliability of energy in more remote areas, especially in Crimea	M	Long term for improved access to energy	Reversible/ Permanent	M	Regional	Positive	-	Y
	Negative effect on agricultural activities during construction of foundations, towers and turbines and connecting power transmission lines and towers, as well as during routine maintenance activities	Direct	H	Short term for construction and decommissioning, long term and regular (monthly) during operations for maintenance	Reversible/ Temporary	VL	Local	Negative	Assume installation in agricultural areas	Y
Infrastructure Value = H Vulnerability = M Sensitivity = M	Pressure on road systems due to increased traffic of heavy materials during construction of wind farms, including foundations, and transmission lie towers	Direct	M - depending on location of facilities proximity to major roadways	Very short term for traffic disruptions during construction	Reversible/ Temporary	L	Local for traffic	Negative	Roads near facility currently not equipped for heavy equipment transport	Y

Community and Socio-economics. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	Required additional construction of transmission lines to connect to grid	Direct	H	Very short term for construction of power transmission lines	Reversible/ Temporary	L	Local	Positive from a socio-economic standpoint for increased employment and improved infrastructure	Uncertainty - Costs of building lines will be borne by contracting agent	Y
	Increase in energy availability and access to energy on transmission network	Direct	H	Long term for energy availability	Reversible/ Temporary	M	Regional	Positive	-	Y
Natural Resource Use Value = H Vulnerability =L Sensitivity =M	Effect on environmental image and ecotourism potential	Direct	L	Long term	Reversible/ Temporary	M	Regional – depending on placement of turbines, especially along ridges	Positive if presented as power source for eco tourism amenities	Positive effect for natural resource use image of Ukraine	Y

Table B30 Community and Socio-economics. Scenario Two: Small Hydropower

Community and Socio-economics. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Demographics Value H= Vulnerability = M Sensitivity = M	Possible relocation of communities or households due to construction of hydropower facilities, access roads or transmission lines	Direct	L	Construction and Operation, Long Term	Irreversible/ Permanent	L - Due to low likelihood of settlements in areas very close to flowing water	Local	Negative	Assumes low likelihood of settlements in areas very close to flowing water	Y
	Potential ethnic disputes over placement of hydropower facilities either due to perception of favouritism for one ethnic group over another	Direct	VL	Construction and operation Long Term	Reversible/ Temporary	L - more likely in areas with higher ethnic minorities, including Crimea, and oblasts bordering other countries.	Local	Negative	Assumes placement in areas with high ethnic minorities	Y
Human Health Value = H Vulnerability = M Sensitivity =M	Noise, vibration and dust during construction due to access road and hydropower facilities construction	Direct	M - depending on proximity of settlements to sites	Noise, dust and dirt - short term during construction of hydropower facilities and roads/outbuildings	Reversible/ Temporary	L	Local	Negative	Assumes construction of hydropower facilities near human settlements	Y
	Potential injury to workers building hydropower facilities, installing turbines, and power transmission lines including exposure to hazardous chemicals and risks of falling.	Direct	H	During construction, operation or decommissioning,, Short term and often during all activities and maintenance	Reversible/ Temporary	H	Local	Negative	Assumes no health safety or environmental requirements in place	Y
	Possible negative effects if homes or cultivated fields are too close to power lines due to exposure of electromagnetic fields	Direct	H	During operations and long term	Reversible/Temporary	VL	Local	Negative	Assumes voltage high enough to harm humans	Y
Employment Value = H Vulnerability = L Sensitivity =M	Employment of labour for all phases of construction, operation, maintenance and	Direct for all phases, and indirect for components manufacturing	H – construction and labour requirements are certain.	Short to medium depending on type of hydropower used, long term for operation and	Reversible and temporary effect for construction employment permanent for	VL– small percentage of population will be employed	Local	Positive	Assumed labour from local sources is available	Y

Community and Socio-economics. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	decommissioning			maintenance. Frequency will be intermittent	operations and maintenance					
Economic Sectors Value = H Vulnerability = L Sensitivity =M	Disruption to flow and effects on water quality during construction but improved flow regulation for impoundment	Direct effect	H - due to the need to alter flows during construction and filling	During construction short term, during operations long term and intermittent	Reversible and temporary during construction, Irreversible and temporary during operation	L - depending on down stream settlements and agricultural activities. Also depends on magnitude of flooding and size of dam	Local unless on transboundary river such as the Tisa	Negative for initial disruption during construction and filling Positive for operations	Assumes no flow regulation in non-impoundment systems	Y
Infrastructure Value = H Vulnerability = M Sensitivity = M	Increased demand on local roads and bridges for access for heavy of equipment, Increased demand on transmission lines	Indirect and cumulative effect on roads and bridges, Direct for transmission lines	H	Short term during construction, less critical during operation, significant short term for decommissioning	Reversible and temporary	M - depending on location of facility in proximity to cement and steel production	Local unless on transboundary river such as the Tisa where access roads require border crossing, If sale of energy to neighbouring countries, transmission lines will be transboundary as well	Negative if not adequately addresses, but positive knock on effect for increased employment to fortify infrastructure.	Assumed roadways and bridges are strong enough for heavy equipment transport and that roads will need to built to the facility site	Y
	Required additional construction of transmission lines to connect to grid	Direct	H	Very short term for construction of power transmission lines	Reversible/ Temporary	L	Local	Positive from a socio-economic standpoint for increased employment and improved infrastructure	Costs of building lines will be borne by contracting agent	Y
Natural Resource Use Value = H Vulnerability =M Sensitivity =M	Possible change in flow may effect mining operations near rivers	Direct depending on location of mining facility	L/ VL	Short term negative during construction, long term during operation, short term negative during decommissioning, Intermittent	Irreversible and temporary during construction and decommissioning, irreversible and permanent during operation	L / VL	Local, except may be transboundary with the Tisa. For mining this may be significant for downstream countries	Negative	Assumes flow disruption during construction, but normalisation during operations	Y

Table B31 Community and Socio-economics. Scenario Three: Solar Photovoltaic

Community and Socio-economics. Scenario Three: Solar Photovoltaic										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Demographics Value H= Vulnerability = M Sensitivity = M	Possible relocation of communities or households due to construction of solar PV facilities, access roads or transmission lines	Direct	L	Construction and Operation, Long Term	Irreversible/ Permanent	L - Low likelihood of sites selected in active communities	Local	Negative	Assumes low site selection will favour large open areas not currently settled	Y
	Potential ethnic disputes over placement of solar PV facilities either due to perception of favouritism for one ethnic group over another	Direct	VL	Construction and operation Long Term	Reversible/ Temporary	L - more likely in areas with higher ethnic minorities, including Crimea, and oblasts bordering other countries.	Local	Negative	Assumes placement in areas with high ethnic minorities	Y
Human Health Value = H Vulnerability = M Sensitivity =M	Noise and dust during construction due to access road and foundation construction	Direct	M - depending on proximity of settlements to sites	Noise, dust and dirt - very short term during construction of foundations and roads/outbuildings	Reversible/ Temporary	VL	Local	Negative	-	Y
	Potential injury to workers building panels and power transmission lines including exposure to hazardous chemicals and risks of falling.	Direct	High	During construction, operation or decommissioning,, Short term and often during all activities and maintenance	Reversible/ Temporary	High for all workers	Local	Negative	Assumes no health safety or environmental requirements in place	Y
Employment Value = H Vulnerability = L Sensitivity =M	Installation and maintenance favourable for employment and earnings	Direct	M	Short term for labour during construction Long term for maintenance operations	Reversible/ Temporary	VL – only of a small number of labourers will be needed for construction or platforms/foundations and fewer needed to maintain solar PV units	Regional – may draw employees from nearby oblasts	Positive	Employment opportunities for regional population, and indirect employment opportunities for secondary support also such as food preparation, infrastructure support etc.	Y
Economic Sectors Value = H Vulnerability = L Sensitivity =M	Improved energy reliability positive for economic development	Direct – reliability of energy in more remote areas, especially in Crimea	M	Long term for improved access to energy	Reversible/ Permanent	M	Regional	Positive	-	Y
	Negative effect on	Direct	H	Short term for	Reversible/	VL	Local	Negative	Assume installation	Y

Community and Socio-economics. Scenario Three: Solar Photovoltaic										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
	agricultural activities during construction and operation and on other connected lands during connecting power transmission lines and towers, as well as during routine maintenance activities			construction and decommissioning, long term and regular (monthly) during operations for maintenance	Temporary				in agricultural areas	
Infrastructure Value = H Vulnerability = L Sensitivity = M	Pressure on road systems due to increased traffic of heavy materials during construction of wind farms, including foundations, and transmission lie towers	Direct	M - depending on location of facilities proximity to major roadways	Very short term for traffic disruptions during construction	Reversible/ Temporary	L	Local for traffic	Negative	Roads near facility currently not equipped for heavy equipment transport	Y
	Required additional construction of transmission lines to connect to grid	Direct	H	Very short term for construction of power transmission lines	Reversible/ Temporary	L	Local	Positive from a socio-economic standpoint for increased employment and improved infrastructure	Costs of building lines will be borne by contracting agent	Y
	Increase in energy availability and access to energy on transmission network	Direct	H	Long term for energy availability	Reversible/ Temporary	M	Regional	Positive	-	Y
Natural Resource Use Value = H Vulnerability =L Sensitivity =M	Improved environmental image and ecotourism potential	Direct	L	Long term	Reversible/ Temporary	M	Regional	Positive if presented as power source for eco tourism amenities	Positive effect for natural resource use image of Ukraine	Y

Table B32 Community and Socio-economics. Scenario Four: Biomass Using Wood Residues

Community and Socio-economics. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Demographics Value H= Vulnerability = M Sensitivity = M	Potential disputes over placement, especially in urbanised areas or areas with high ethnic minority populations	Direct	M - if CHP will be near communities	Long term throughout all phases, and ongoing if unresolved	Reversible/Permanent	L	Local	Negative	Uncertain if placement near communities common practice	Y
Human Health Value = H Vulnerability = L Sensitivity =M	Noise and dust during construction due to access road, facility construction and transmission line foundation construction	Direct	M - depending on proximity of settlements to sites	Noise, dust and dirt - very short term during construction of facility of foundations and roads	Reversible/ Temporary	VL	Local	Negative	Uncertain if new facilities must be built or if older can be retrofitted	Y
	Potential injury to workers building CHP plant, foundations, installing turbines, and power transmission lines including exposure to hazardous chemicals and risks of falling.	Direct	H	During construction, operation or decommissioning,, Short term and often during all activities and maintenance	Reversible/ Temporary	H	Local	Negative	Assumes no health safety or environmental requirements in place	Y
	Potential off- gassing smoke during operations	Direct	M	during operation and long term, constant frequency	Reversible/temporary	L - but potentially intense (High) in areas down wind from CHP	local	Negative	Assumes no use of scrubbers to reduce emissions	Y
	Possible negative effects if homes or cultivated fields are too close to power lines due to exposure of electromagnetic fields	Direct	H	During operations and long term	Reversible/Temporary	VL	Local	Negative	Assumes voltage high enough to harm humans	Y
Employment Value = H Vulnerability = L Sensitivity =M	Positive – employment rural areas for collection of materials, as well as construction operations and maintenance	Direct	H	Short term during construction, long term for fewer workers during operations,	Reversible/temporary	L / VL	Local	Positive	Assumes local labour pool will be used to collect materials	Y
Economic Sectors Value = H	Improved energy reliability positive for	Direct – reliability of energy in more	M	Long term for improved access to	Reversible/ Permanent	M	Regional	Positive	-	Y

Community and Socio-economics. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Vulnerability = L Sensitivity =M	economic development	remote areas,		energy						
Infrastructure Value = H Vulnerability = M Sensitivity = M	Effect on roadways, bridges and increased traffic if storage site is not proximal to CHP.	Roadways, bridges, traffic – direct	H	Roadways, bridges, traffic – During all phases, and long term, with high frequency, highest during harvest / none growth/dormant season	Roadways, bridges, traffic – Reversible/temporary P	L - depending on sources of biomass and proximity of storage	Roadways, bridges, traffic – Regional Power transmission - regional	Roadways, bridges, traffic – negative Power transmission - positive	Uncertain of proximity of storage facility to CHP.	Y
	Potential improvement to reliability of energy supply and transmission lines	Direct	H	During operations	Reversible/temporary	L	Regional	Positive	-	Y
	Required additional construction of transmission lines to connect to grid	Direct	H	Very short term for construction of power transmission lines	Reversible/ Temporary	L	Local	Positive from a socio-economic standpoint for increased employment and improved infrastructure	Uncertainty - Costs of building lines will be borne by contracting agent	Y
Natural Resource Use Value = H Vulnerability =M Sensitivity =M	Visual and land access aesthetic effect on recreational activities such as hiking, eco-tourism, fishing and hunting.	Direct depending on harvesting sites	L	All phases , long term	Reversible/temporary as woody growth returns	VL	Local	Negative	Assumes harvest of woody biomass significant enough to make an effect on visual landscape	Y
	Improvements to infrastructure and interest in renewable energy could increase eco tourism.	Indirect	L	Operational phases, long term	Reversible/temporary	V	Local	Positive	Assumes inclusion in marketing of ecotourism	Y

Table B33 Community and Socio-economics. Scenario Five: Biomass Using Agricultural Residues

Community and Socio-economics. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Demographics Value H= Vulnerability = L Sensitivity = M	Potential disputes over placement, especially in urban areas or areas with high ethnic minority populations	Direct	M - if CHP will be near communities	L throughout all phases, and on going if unresolved	Reversible/Permanent	L	Local	Negative	Uncertain if placement near communities common practice	Y
Human Health Value = H Vulnerability = L Sensitivity =M	Noise and dust during construction due to access road, facility construction and transmission line foundation construction	Direct	M - depending on proximity of settlements to sites	Noise, dust and dirt - very short term during construction of facility of foundations and roads	Reversible/ Temporary	VL	Local	Negative	Uncertain if new facilities must be built or if older can be retrofitted	Y
	Potential injury to workers building CHP plant, foundations, installing turbines, and power transmission lines including exposure to hazardous chemicals and risks of falling.	Direct	H	During construction, operation or decommissioning,, Short term and often during all activities and maintenance	Reversible/ Temporary	H	Local	Negative	Assumes no health safety or environmental requirements in place	Y
	Potential off-gassing,, smoke during operations	Direct	M	during operation and long term, constant frequency	Reversible/temporary	L - but potentially intense (High) in areas down wind from CHP	local	Negative	Assumes no use of scrubbers to reduce emissions	Y
	Potential improvement in respiratory health because of seasonal burning of biomass	Direct	H - for rural communities	During operation and long term	Reversible/temporary	L	Local	Positive	Assumes use of common Eastern European practice of burning off residues of fields after harvests	Y
	Possible negative effects if homes or cultivated fields are too close to power transmission lines due to exposure of electromagnetic fields	Direct	H	During operations and long term	Reversible/Temporary	VL	Local	Negative	Assumes voltage high enough to harm humans	Y
Employment Value = H Vulnerability = L	Positive – employment rural areas for collection of	Direct	H	Short term during construction, long term for fewer	Reversible/temporary	L / VL	Local	Positive	-	Y

Sensitivity =M	materials, as well as construction operations and maintenance			workers during operations, including transportation, roadway maintenance						
Economic Sectors Value = H Vulnerability = L Sensitivity =M	Loss of soil fertility for agriculture from shift in burning of biomass in fields	Direct	M- depending on type of biomass used	During operation and long term	Reversible/temporary	L	Local/regional	Negative	Soil fertility – assumes biomass burned in fields or ash used for fertiliser as per Eastern European traditional agricultural practices	Y
	Improved energy reliability positive for economic development	Direct – reliability of energy in more remote areas,	M	Long term for improved access to energy	Reversible/ Permanent	M	Regional	Positive	-	Y
Infrastructure Value = H Vulnerability = L Sensitivity = M	Effect on roadways, bridges and increased traffic is storage site is not proximal to CHP.	direct	H	During all phases, and long term, with high frequency, highest during harvest season	Reversible/temporary	L - depending on sources of biomass and proximity of storage	Regional	Negative	Uncertain if using type of agricultural biomass, and proximity of storage facility to CHP.	Y
	Potential improvement to reliability of energy supply and transmission lines	Direct	H	During operations	Reversible/temporary	L	Regional	Positive	-	Y
	Required additional construction of transmission lines to connect to grid	Direct	H	Very short term for construction of power transmission lines	Reversible/ Temporary	L	Local	Positive from a socio-economic standpoint for increased employment and improved infrastructure	Uncertainty - Costs of building lines will be borne by contracting agent	Y
Natural Resource Use Value = H Vulnerability =M Sensitivity =M	Improvements to infrastructure and interest in renewable energy could increase eco tourism.	indirect	L	operational phases, long term	Reversible/temporary	VL	Local	Positive	Assumes inclusion in marketing of ecotourism	Y

Table B34 Community and Socio-economics. Scenario Six: Biogas Using Landfill Gas

Community and Socio-economics. Scenario Six: Biogas Using Landfill Gas										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Demographics Value H= Vulnerability = L Sensitivity = M	Possible vulnerability if transmission lines cross through settlements requiring resettlement	Direct	L – unlikely settlements will be close to existing landfills	All phases, and constant	Reversible/Permanent	VL	Local	Negative	Assumes site selection will be at existing landfills, but transmission lines may cross through communities	Y
Human Health Value = H Vulnerability = L Sensitivity =M	Noise and dust during construction of facility and transmission line foundation construction	Direct	M - depending on proximity of settlements to sites	Noise, dust and dirt - very short term during construction of facility of foundations and roads	Reversible/ Temporary	VL	Local	Negative	Uncertain if construction will increase traffic on roads	Y
	Potential injury to workers, building, biogas plant, foundations, and power transmission lines including exposure to hazardous chemicals and risks of falling.	Direct	H	During construction, operation or decommissioning,, Short term and often during all activities and maintenance	Reversible/ Temporary	H	Local	Negative	Assumes no health safety or environmental requirements in place	Y
	Possible vulnerability if transmission lines cross through settlements or	Direct	H	During operations long term	Reversible/Temporary	VL	Local	Positive	Assumes landfills currently have foul odours	Y
	Possible negative effects if homes or cultivated fields are too close to power lines due to exposure of electromagnetic fields	Direct	H	During operations and long term	Reversible/Temporary	VL	Local	Negative	Assumes voltage high enough to harm humans	Y
Employment Value = H Vulnerability = L Sensitivity =M	Installation, operation and maintenance favorable for employment	Direct	H	Higher but short term during construction, and decommissioning, Long term through operations	Reversible/Temporary	VL of total eligible population	Local	Positive	Assumes additional employment needed beyond current landfill workers	
Economic Sectors Value = H Vulnerability = L Sensitivity =L	Possible small economic dislocation due to power lines	Direct	H	During operations	Temporary/reversible	L	Local	Negative	Assumed no change in economic sectors as a result of LFG power plants.	Y
Infrastructure	Increase in energy	Direct	H	During operations	Temporary /reversible	L	Local	Positive	Assumes increase in	Y

Value = H Vulnerability = M Sensitivity = M	availability and access to energy on transmission network,								traffic for construction will not be significant from normal landfill traffic	
Natural Resource Use Value = H Vulnerability =L Sensitivity =M	Possible loss of visual amenities due to power transmission lines	Direct	M	During all phases	Temporary /reversible	L	Local	Negative	Assumes no significant change from current natural resource use	Y

Table B35 Community and Socio-economics. Scenario Seven: Biogas Using Animal Residues

Community and Socio-economics. Scenario Seven: Biogas Using Animal Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
Demographics Value H= Vulnerability = L Sensitivity =M	Possible vulnerability if transmission lines cross through settlements requiring resettlement	Direct	L – unlikely settlements will be close to existing feedlots	All phases, and constant	Reversible/Permanent	VL	Local	Negative	Assumes site selection will be at existing feedlots, but transmission lines may cross through communities	Y
Human Health Value = H Vulnerability = L Sensitivity =M	Noise and dust during construction of facility and transmission line foundation construction	Direct	M - depending on proximity of settlements to sites	Noise, dust and dirt - very short term during construction of facility of foundations and roads	Reversible/ Temporary	VL	Local	Negative	Uncertain if construction will increase traffic on roads	Y
	Potential injury to workers, building, biogas plant, foundations, and power transmission lines including exposure to hazardous chemicals and risks of falling.	Direct	H	During construction, operation or decommissioning,, Short term and often during all activities and maintenance	Reversible/ Temporary	H	Local	Negative	Assumes no health safety or environmental requirements in place	Y
	Possible vulnerability if transmission lines cross through settlements or	Direct	H	During operations long term	Reversible/Temporary	VL	Local	Positive	Assumes feedlots currently have foul odours	Y
	Possible negative effects if homes or cultivated fields are too close to power lines due to exposure	Direct	H	During operations and long term	Reversible/Temporary	VL	Local	Negative	Assumes voltage high enough to harm humans	Y

	of electromagnetic fields									
Employment Value = H Vulnerability = L Sensitivity =M	Installation, operation and maintenance favourable for employment	Direct	H	Higher but short term during construction, and decommissioning, Long term through operations	Reversible/temporary	VL of total eligible population	Local	Positive	Assumes additional employment needed beyond current farm workers	Y
Economic Sectors Value = H Vulnerability = L Sensitivity =M	Possible small economic dislocation due to power lines	Direct	H	During operations will be long term, but short term working of agricultural fields (less than 6 hours per day) may be possible	Temporary/reversible	L	Local	Negative	Assumed no change in economic sectors as a result of LFG power plants.	Y
Infrastructure Value = H Vulnerability = M Sensitivity = M	Increase in energy availability and access to energy on transmission network, but increased congestion due to transportation of fuel.	Direct	H	During operations	Temporary /reversible	L	Local	Positive – for improved infrastructure Negative – for congestion	-	Y
Natural Resource Use Value = H Vulnerability =L Sensitivity =M	Possible loss of visual amenities due to power transmission lines	Direct	M	During all phases	Temporary /reversible	L	Local	Negative	Assumes no significant change from current natural resource use	Y

Table B36 Cultural Heritage. Scenario One: Onshore Wind

Cultural Heritage. Scenario One: Onshore Wind										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
UNESCO World Heritage Sites and sites on the UNESCO Tentative List (Value H, Vulnerability L, Sensitivity M)	Loss and/or damage to sites from physical footprint of the foundations of turbine structure, transmission lines and construction activities.	Direct	VL – These sites are well known and in limited locations development is unlikely to be sited on or adjacent to cultural heritage resource.	Occurs during construction, L	Irreversible, permanent	Uncertain (probably none)	International if sites are affected.	Negative.	-	Y
	Change to the context/setting of sites due to physical presence of turbine structures and transmission lines.		L – Several sites coincide with remote upland or steppe areas which would be suited to wind power development.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent	Uncertain: H - None	International if sites are affected. Note that some sites are trans-boundary – e.g. the Struve Geodetic Arc		Uncertain – depends on exact location of wind development and zone of visual influence in relation to sites.	Y
Registered cultural heritage sites. (Value L-H, Vulnerability M-H, Sensitivity M-H)	Loss and/or damage to sites from physical footprint of the foundations of turbine structure, transmission lines and construction activities.	Direct	M – There are large numbers of cultural heritage sites and reserves in areas of wind potential – in particular L'viv, Volyn, Ternopil, Khmelnytski, Cherkasy Oblasts, and coastal areas along the Black Sea and Crimea.	Occurs during construction, Long term	Irreversible, permanent	Uncertain: H- None	National to local, depending on importance and extent of cultural heritage receptor.	Negative	Uncertain – exact location of wind power in relation to cultural heritage sites not known at this stage.	Y
	Change to the context/setting of sites due to physical presence of turbine structures and transmission lines.		M – Several sites coincide with remote upland or steppe areas which would be suited to wind power development.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent				Uncertain – depends on exact location of wind development and zone of visual influence in relation to sites.	
Unknown or unregistered cultural heritage sites (Value L-H, Vulnerability H, Sensitivity M-H)	Loss and/or damage to sites from physical footprint of the foundations of turbine structure, transmission lines and construction activities.	Direct	M – There is potential for unknown archaeological sites on elevated ground, coastal and steppe areas . In particular, the Western, Southwestern and Central regions.	Occurs during construction, Long term.	Irreversible, permanent	Uncertain: H- None	International to local, depending on importance and extent of cultural heritage receptor.	Negative if remains are destroyed/ damaged Positive if location and excavation presents opportunity to further knowledge of Ukrainian cultural heritage.	Uncertainty associated with location of unknown or unrecorded sites in relation to wind development.	Y
	Change to the context/setting of		M – Potential for sites in upland or	Occurs mainly during operation,	Reversible (decommissioning			Negative.	Uncertain – depends on exact location of	

	sites due to physical presence of turbine structures and transmission lines.		steppe areas which would be suited to wind power development.	Long term.	would remove effect), permanent				wind development and zone of visual influence in relation to unknown sites.	
Intangible cultural heritage (Value L-H, Vulnerability L, Sensitivity L-M)	Loss, partial loss or disruption to cultural practice or resource – such as change to historical grazing practice or valued mountain peaks in upland areas occupied by wind development.	Direct	M – low, depending on location of windfarm in relation to land-use and practices.	Occurs mainly during operation. Long term	Irreversible Permanent	Uncertain: H - None	Local	Negative	Uncertain – Location of windpower and presence of intangible cultural heritage.	Y

Table B37 Cultural Heritage. Scenario Two: Small Hydropower

Cultural Heritage. Scenario Two: Small Hydropower										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
UNESCO World Heritage Sites and sites on the UNESCO Tentative List (Value H, Vulnerability L, Sensitivity M)	Loss and/or damage to sites from physical footprint of the structures (esp. excavated dam/ diversion channel), transmission lines, and construction activities.	Direct	VL – These sites are well known and in limited locations development is unlikely to be sited on or adjacent to cultural heritage resource.	Occurs during construction, Long term.	Irreversible, permanent	Uncertain (probably none)	International if sites are affected.	Negative.	-	N
	Change to the context/setting of sites due to presence of dam/diversion structure, transmission lines, impounded water.		VL – It is unlikely that larger components would affect setting of these sites due to distant location.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent				It is assumed that due to the requirements of hydropower and location of UNESCO sites, they would not be within zone of visual influence.	N
Registered cultural heritage sites. (Value L-H, Vulnerability M-H, Sensitivity M-H)	Loss and/or damage to sites from physical footprint of the structures (esp. excavated dam/ diversion channel), transmission lines, and construction activities.	Direct	L– There are high concentrations of cultural heritage sites and reserves in areas of hydropower potential – major rivers in Carpathians and Central Ukraine. However, structures are relatively small,	Occurs during construction, Long term	Irreversible, permanent	Uncertain: H - None	National to local, depending on importance and extent of cultural heritage receptor. .	Negative	Uncertain – exact location of hydropower in relation to cultural heritage sites not known at this stage.	Y

			reducing chance of effect.							
	Inundation of sites upstream of impoundment, reducing access to the resource, but possibly increasing preservation.		L – Registered cultural heritage sites coincide with river valleys, although areas impounded likely to be small (7-10ha)	Occurs mainly during operation, long terms.	Reversible (decommissioning would remove effect), permanent			Negative if access to sites is lost. Positive if inundation would help preserve site.	Uncertain – areas of inundation in relation to sites not known.	
	Change to the context/setting of sites due to presence of dam/diversion structure, transmission lines, impounded water.		L – There are a number of sites along major rivers in Carpathians and Central Ukraine and sites which may coincide with hydropower development.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent			Negative.	Uncertain – depends on exact location of hydropower and zone of visual influence in relation to sites.	
Unknown or unregistered cultural heritage sites (Value L-H, Vulnerability M-H, Sensitivity M-H)	Loss and/or damage to sites from physical footprint of the structures (esp. excavated dam/ diversion channel), transmission lines, and construction activities.	Direct	L – There is potential for unknown cultural heritage sites in areas of hydropower potential – major rivers in Carpathians and Central Ukraine	Occurs during construction, Long term.	Irreversible, permanent	Uncertain: H - None	International to local, depending on importance and extent of cultural heritage receptor. .	Negative if remains are destroyed/ damaged Positive if location and excavation presents opportunity to further knowledge of Ukrainian cultural heritage.	Uncertainty associated with location of unknown or unrecorded sites in relation to hydropower development	Y
	Inundation of sites upstream of impoundment, reducing access to the resource, but possibly increasing preservation.		L – Large numbers of cultural heritage sites, although areas impounded likely to be small (7-10ha)	Occurs mainly during operation, long terms.	Reversible (decommissioning would remove effect), permanent			Negative if access to sites is lost. Positive if inundation would help preserve site.	Uncertain – areas of inundation in relation to sites not known.	
	Change to the context/setting of sites due to presence of dam/diversion structure, transmission lines, impounded water..		L –river valleys are rich in cultural heritage but scale of hydropower development is likely to be small.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent			Negative.	Uncertain – exact location of hydropower in relation to cultural heritage sites not known at this stage.	
Intangible cultural heritage (Value L-H, Vulnerability L, Sensitivity L-M)	Loss, partial loss or disruption to cultural practice or resource, such as fishing sites, structures and viewpoints.	Direct	L -VL – Unlikely to coincide with cultural heritage due to specific location and small scale.	Occurs mainly during operation. Long term	Irreversible Permanent	Uncertain: H - None	Local	Negative	Uncertain – Location of small hydropower and presence of intangible cultural heritage.	Y

Table B38 Cultural Heritage. Scenario Three: Solar Photovoltaic

Cultural Heritage. Scenario Three: Solar Photovoltaic										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
UNESCO World Heritage Sites and sites on the UNESCO Tentative List (Value H, Vulnerability L, Sensitivity M)	Loss and/or damage to sites from physical footprint of the foundations of racking and other structures, transmission lines, site grading and other construction activities.	Direct	VL – These sites are well known and in limited locations development is unlikely to be sited on or adjacent to cultural heritage resource.	Occurs during construction, L	Irreversible, permanent	Uncertain (probably none)	International if sites are affected.	Negative.	-	Y
	Change to the context/setting of sites due to areas of PV.		VL– Solar development likely to be distant from sites.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent				-	Y
Registered cultural heritage sites. (Value L-H, Vulnerability M, Sensitivity M-H)	Loss and/or damage to sites from physical footprint of the foundations of racking and other structures, transmission lines, site grading and other construction activities.	Direct	L – There are several sites in areas of high solar potential – Southern, Southwestern, Central Ukraine & Crimea and due to potential for large land-take these sites may be affected.	Occurs during construction, Long term	Irreversible, permanent	Uncertain: H - None	National to local, depending on importance and extent of cultural heritage receptor. .	Negative	Uncertain – exact location of solar power in relation to cultural heritage sites not known at this stage.	Y
	Change to the context/setting of sites due to areas of PV.		L – Several sites coincide with areas of high solar power potential.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent				Uncertain – depends on exact location of solar power and zone of visual influence in relation to sites.	
Unknown or unregistered cultural heritage sites (Value L-H, Vulnerability M, Sensitivity M-H)	Loss and/or damage to sites from physical footprint of the foundations of racking and other structures, transmission lines, site grading and other construction activities.	Direct	M–There are areas of archaeological potential within Southern, Southwestern, Central Ukraine & Crimea and due to potential for large land-take these sites may be affected.	Occurs during construction, Long term	Irreversible, permanent	Uncertain: H - None	International to local, depending on importance and extent of cultural heritage receptor.	Negative if remains are destroyed/ damaged Positive if location and excavation presents opportunity to further knowledge of Ukrainian cultural heritage.	Uncertain – exact location of solar power in relation to cultural heritage sites not known at this stage.	Y
	Change to the context/setting of sites due to areas of PV.		M – Areas of high solar power potential have potential for unknown archaeology.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent			Negative.	Uncertain – depends on exact location of solar power and zone of visual influence in relation to sites.	

Intangible cultural heritage (Value L-H, Vulnerability L, Sensitivity L-M)	Loss, partial loss or disruption to cultural practice or resource, e.g. through change of land use.	Direct	L - VL- unlikely to coincide with intangible cultural heritage.	Occurs mainly during operation. Long term	Irreversible Permanent	Uncertain: H - None	Local	Negative	Uncertain – Location of solar power and presence of intangible cultural heritage.	Y

Table B39 Cultural Heritage. Scenario Four: Biomass Using Wood Residues

Cultural Heritage. Scenario Four: Biomass Using Wood Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
UNESCO World Heritage Sites and sites on the UNESCO Tentative List (Value H, Vulnerability L-None, Sensitivity M-L)	Loss and/or damage to sites from physical footprint of structures, transmission lines, underground utilities and construction activities.	Direct	VL – These sites are well known and in limited locations development is unlikely to be sited on or adjacent to cultural heritage resource.	Occurs during construction, L.	Irreversible, permanent	Uncertain (probably none) Uncertain (probably None)	International if sites are affected.	Negative.	-	Y
	Change to the context/setting of sites due to physical presence of facility, particularly boiler and cooling towers.		VL – There is limited potential for visual intrusion due to location of sites in relation to potential biomass facilities, in addition to their limited scale.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent				It is assumed that due to the nature and location of many of the UNESCO sites, they would not be within zone of visual influence of biomass developments.	
Registered cultural heritage sites. (Value L-H, Vulnerability L, Sensitivity M-None)	Loss and/or damage to sites from physical footprint of structures, transmission lines, underground utilities and construction activities.	Direct	M – L. There are potentially a range of cultural heritage sites and reserves in areas of agricultural biomass potential – in particular along Chernihiv, Kyiv, Zhytomyr Oblasts in the Central region and Zakarpattia, L'viv in the Western Region,	Occurs during construction, Long term	Irreversible, permanent	Uncertain: H - None	National to local, depending on importance and extent of cultural heritage receptor.	Negative	Uncertainty with location of sites related to exact locations of biomass development. And ability to re-use existing coal-fired boilers.	Y
	Change to the context/setting of sites due to physical presence of facility, particularly boiler		M – L. Several cultural heritage sites are likely to coincide with areas with wood resources for	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent				Uncertain – depends on exact location of biomass development and zone of visual	

	and cooling towers.		potential biomass development.						influence in relation to cultural heritage sites.	
Unknown or unregistered cultural heritage sites (Value L-H, Vulnerability L - None, Sensitivity M-None)	Loss and/or damage to sites from physical footprint of structures, transmission lines, underground utilities and construction activities.	Direct	M – L. There is potential for unknown archaeological sites within woody biomass areas.	Occurs during construction, Long term.	Irreversible, permanent	Uncertain: H - None	International to local, depending on importance and extent of cultural heritage receptor.	Negative if remains are destroyed/ damaged Positive if location and excavation presents opportunity to further knowledge of Ukrainian cultural heritage.	Uncertainty associated with location of unknown or unrecorded sites in relation to biomass development.	Y
	Change to the context/setting of sites due to physical presence of facility, particularly boiler and cooling towers.		M – Cultural heritage sites are likely to coincide with woody biomass resource.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent		International to local, depending on importance and extent of cultural heritage receptor.	Negative.	Uncertain – depends on exact location of biomass development and zone of visual influence in relation to sites.	
Intangible cultural heritage (Value L-H, Vulnerability L, Sensitivity L-M)	Loss, partial loss or disruption to cultural practice or resource, for example through changes in traditional land-use or loss of structures.	Direct	M-L, depending on location of biomass.	Occurs mainly during operation. Long term	Irreversible Permanent	Uncertain: H - None	Local	Negative	Uncertain – Location of biomass and presence of intangible cultural heritage.	Y

Table B40 Cultural Heritage. Scenario Five: Biomass Using Agricultural Residues

Cultural Heritage. Scenario Five: Biomass Using Agricultural Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
UNESCO World Heritage Sites and sites on the UNESCO Tentative List (Value H, Vulnerability L-None, Sensitivity L-M)	Loss and/or damage to sites from physical footprint of structures, underground utilities, transmission lines, and construction activities.	Direct	VL – These sites are well known and in limited locations development is unlikely to be sited on or adjacent to cultural heritage resource.	Occurs during construction, L.	Irreversible, permanent	Uncertain (probably none)	International if sites are affected.	Negative.	-	Y
	Change to the context/setting of sites due to physical presence of facility, particularly boiler		VL – There is limited potential for visual intrusion,	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent				It is assumed that due to the nature and location of many of the UNESCO sites, they would not be	

	and cooling towers.								within zone of visual influence of biomass developments.	
Registered cultural heritage sites. (Value L-H, Vulnerability M-None, Sensitivity M-None)	Loss and/or damage to sites from physical footprint of structures, underground utilities, transmission lines, and construction activities.	Direct	M – L. There are potentially a range of cultural heritage sites and reserves in areas of agricultural biomass potential – in particular along the Dnieper, Central, Northern, South and Eastern agricultural plains and steppes,	Occurs during construction, Long term	Irreversible, permanent	Uncertain: H - None	National to local, depending on importance and extent of cultural heritage receptor.	Negative	Uncertainty with location of sites related to exact locations of biomass development. And ability to re-use existing coal-fired boilers.	Y
	Change to the context/setting of sites due to physical presence of facility, particularly boiler and cooling towers.		M – L. Several cultural heritage sites are likely to coincide with agricultural areas suitable for biomass development.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent				Uncertain – depends on exact location of biomass development and zone of visual influence in relation to cultural heritage sites.	
Unknown or unregistered cultural heritage sites (Value L-H, Vulnerability M-None, Sensitivity H-None)	Loss and/or damage to sites from physical footprint of structures, transmission lines, underground utilities and construction activities.	Direct	M – L. There is potential for unknown archaeological sites within agricultural areas, although survival of some sites may be affected by previous intensity of agriculture.	Occurs during construction, Long term.	Irreversible, permanent	Uncertain: H - None	International to local, depending on importance and extent of cultural heritage receptor.	Negative if remains are destroyed/ damaged Positive if location and excavation presents opportunity to further knowledge of Ukrainian cultural heritage.	Uncertainty associated with location and survival of unknown or unrecorded sites, particularly in agricultural areas.	Y
	Change to the context/setting of sites due to physical presence of facility, particularly boiler and cooling towers.		M – L. Cultural heritage sites have potential to coincide with agricultural areas suitable for biomass development.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent			Negative.	Uncertain – depends on exact location of biomass development and zone of visual influence in relation to sites.	
Intangible cultural heritage (Value L-H, Vulnerability L, Sensitivity L-M)	Loss, partial loss or disruption to cultural practice or resource.	Direct	M-L, depending on location of biomass.	Occurs mainly during operation. Long term	Irreversible Permanent	Uncertain: H - None	Local	Negative	Uncertain – Location of biomass and presence of intangible cultural heritage.	Y

Table B41 Cultural Heritage. Scenario Six: Biogas Using Landfill Gas

Cultural Heritage. Scenario Six: Biogas Using Landfill Gas										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
UNESCO World Heritage Sites and sites on the UNESCO Tentative List (Value H, Vulnerability L, Sensitivity M)	Loss and/or damage to sites from physical footprint of treatment and energy recovery facilities, transmission lines, and construction activities.	Direct	VL – These sites are well known and in limited locations development is unlikely to be sited on or adjacent to cultural heritage resource.	Occurs during construction, L	Irreversible, permanent	None	International if sites are affected.	Negative.	-	Y
	Change to the context/setting of sites due to physical presence of facility components.		VL – There is limited potential for visual intrusion due to small scale of biogas structures.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent				It is assumed that due to the nature and location of many of the UNESCO sites, they would not be within zone of visual influence of biogas developments.	
Registered cultural heritage sites. (Value L-H, Vulnerability M-H, Sensitivity M-H)	Loss and/or damage to sites from physical footprint of treatment and energy recovery facilities, transmission lines, and construction activities.	Direct	VL – Due to use of existing landfill sites and the small scale of modifications required.	Occurs during construction, Long term	Irreversible, permanent	None - VL	National to local, depending on importance and extent of cultural heritage receptor. .	Negative	Exact locations of landfill and registered sites can't be compared at this scale but assumed that they are unlikely to coincide.	N
	Change to the context/setting of sites due to physical presence of facility components.		VL – There is limited potential for visual intrusion due to small scale of biogas structures and existing degradation of setting from landfill.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent				Exact locations of landfill and registered sites can't be compared at this scale but assumed that they are unlikely to coincide.	
Unknown or unregistered cultural heritage sites (Value L-H, Vulnerability H, Sensitivity M-H)	Loss and/or damage to sites from physical footprint of treatment and energy recovery facilities, transmission lines, and construction	Direct	VL – Due to use of existing landfill sites and the small scale of modifications required, it is unlikely new sites will be discovered.	Occurs during construction, Long term	Irreversible, permanent	None - VL	International to local, depending on importance and extent of cultural heritage receptor.	Negative if remains are destroyed/ damaged Positive if location and excavation presents opportunity to further knowledge	Uncertainty associated with unknown sites in relation to landfill and ancillary works.	N

	activities. Change to the context/setting of sites due to physical presence of facility components.		VL – There is limited potential for visual intrusion due to small scale of biogas structures and existing degradation of setting from landfill.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent			of Ukrainian cultural heritage. Negative.		
Intangible cultural heritage (Value L-H, Vulnerability L, Sensitivity L-M)	Loss, partial loss or disruption to cultural practice or resource	Direct	VL - None	Occurs mainly during operation. Long term	Irreversible Permanent	Uncertain: H - None	Local	Negative		N

Table B42 Cultural Heritage. Scenario Seven: Biogas Using Animal Residues

Cultural Heritage. Scenario Seven: Biogas Using Animal Residues										
Receptor (value (H/L)and vulnerability (H/M/L/None)) Sensitivity (H/M/L/None))	**Description of effect**	**Direct or Indirect; Far-field effect; Cumulative effect; or effect resulting from Consequential Development**	**Probability (H/M/L/VL)**	**Duration (occurs during construction, operation or decommissioning phase and L/M/S/VS term) and frequency**	**Irreversible/ reversible; temporary/ permanent**	**Magnitude (H/M/L/VL)**	**Spatial extent & trans-boundary**	**Positive/ Negative**	**Assumptions, Limitations, Uncertainties**	**Significant (Y/N)**
UNESCO World Heritage Sites and sites on the UNESCO Tentative List (Value H, Vulnerability L, Sensitivity M)	Loss and/or damage to sites from physical footprint of lagoons/tanks, transmission lines, and other structures and construction activities. Change to the context/setting of sites due to physical presence of facility.	Direct	VL – These sites are well known and in limited locations development is unlikely to be sited on or adjacent to cultural heritage resource. VL – There is limited potential for visual intrusion,	Occurs during construction, L Occurs mainly during operation, Long term.	Irreversible, permanent Reversible (decommissioning would remove effect), permanent	None	International if sites are affected.	Negative. Negative.	I- It is assumed that due to the nature and location of many of the UNESCO sites, they would not be within zone of visual influence of biogas developments.	Y
Registered cultural heritage sites. (Value L-H, Vulnerability M-H, Sensitivity M-H)	Loss and/or damage to sites from physical footprint of lagoons/tanks, transmission lines, and other structures and construction activities.	Direct	L-VL. Due to location within existing farms.	Occurs during construction, Long term	Irreversible, permanent	Uncertain: H – None Size would be limited (approx 5ha) but excavation would be to some depth (approx 2.5m).	National to local, depending on importance and extent of cultural heritage receptor.	Negative	Uncertainty with location of cultural heritage sites in relation to location of biogas development. Assume that these are unlikely to coincide.	N

	Change to the context/setting of sites due to physical presence of facility.		VL. Due to location within existing farms.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent	Uncertain but likely to be VL due to setting within existing farms.			Assumes that development is within existing farms with low cultural heritage value.	
Unknown or unregistered cultural heritage sites (Value L-H, Vulnerability H, Sensitivity M-H)	Loss and/or damage to sites from physical footprint of lagoons/tanks, transmission lines, and other structures and construction activities.	Direct	L-VL. Due to location within existing farms.	Occurs during construction, Long term.	Irreversible, permanent	Uncertain: H – None. Size would be limited (approx 5ha) but excavation would be to some depth (approx 2.5m).	International to local, depending on importance and extent of cultural heritage receptor.	Negative if remains are destroyed/ damaged Positive if location and excavation presents opportunity to further knowledge of Ukrainian cultural heritage.	Uncertainty associated with location and survival of unknown or unrecorded sites, particularly in agricultural areas.	Y
	Change to the context/setting of sites due to physical presence of facility.		VL. Due to location within existing farms.	Occurs mainly during operation, Long term.	Reversible (decommissioning would remove effect), permanent	Uncertain but likely to be VL due to setting within existing farms		Negative.	Assumes that development is within existing farms with low cultural heritage value.	
Intangible cultural heritage (Value L-H, Vulnerability L, Sensitivity L-M)	Loss, partial loss or disruption to cultural practice or resource	Direct	L - VL, depending on location of biogas in relation to land-use and practices.	Occurs mainly during operation. Long term	Irreversible Permanent	Uncertain: H - None	Local	Negative	Uncertain – Location of biogas and presence of intangible cultural heritage.	N