Proposed Methodology for Establishing an Off-site Mitigation Fee for Utility-Scale Solar Energy Development Within Designated Solar Energy Zones[1]

1. Use of the Off-site Mitigation Fee

The solar energy mitigation fee is a fee paid by a BLM right-of-way grantee for the purpose of funding off-site mitigation designed to compensate for all or some of the unavoidable impacts associated with developing utility-scale solar energy generation facilities on public lands. Upon payment of the full amount of the solar mitigation fee, the developer is released from further obligations for the successful accomplishment of off-site mitigation actions. Payment of the mitigation fee does not relieve the developer of the either the obligation to implement the stipulations specified in the right-of-way grant for avoiding and/or minimizing impacts on-site; or pay a mitigation fee required by a Section 7 permit issued by the U.S. Fish and Wildlife Service under the Endangered Species Act (ESA).

2. Methodology for Calculating the Off-site Mitigation Fee for Individual Right-of-Ways

The off-site mitigation fee for a project is calculated by multiplying the number of acres granted by the right-of-way (ROW) by a *per acre mitigation fee*.

Formula: *Project Mitigation Fee = (Acres Granted by ROW) x (Per Acre Mitigation Fee)*

2.1 Calculating the per acre off-site mitigation fee

The *per acre mitigation fee* is calculated for each SEZ, by multiplying a mitigation base fee by a multiplier that adjusts the fee in consideration of the general landscape condition of the ROW and the value of the impacted resources. Resource values may be ecological, economic and/or social in nature.

Formula: *Per-acre Off-site Mitigation Fee = (Mitigation Action Implementation Fee – ESA Section 7 permit mitigation fee) x (Landscape Condition/Resource Value Multiplier)*

2.1.1 Calculating the Base fee for off-site mitigation fee

The base fee for off-site mitigation is a dollar figure set by the BLM that is the approximate cost of replacing one developed acre with an equivalent intact acre of the same ecological character. 'Replacement' can be accomplished in several ways, including:

- Acquisition of non-federal land or rights in land
- Restoration of disturbed federal land
- Prevention of the loss of imminently threatened federal land

The first two strategies require a front-end capital investment. All three strategies require ongoing management (and the associated funding) to achieve long-term success. These costs can vary greatly

[1] Revised to match methodology described in 3-21-2013 Webinar.

depending on such variables as market conditions, location, the intensity of the restoration effort, and timing. Accordingly, the mitigation base fee will be developed by conducting a market analysis just prior to a lease offering. The products of the market analysis are estimates of what it would cost to:

- Purchase and manage (for the term of the right-of-way) an equivalent acre in the same state and ecological sub-region
- Restore and manage (for the term of the right-of-way) a disturbed acre in the same state and ecological sub-region
- Effectively neutralize an imminent threat to an equivalent acre of federal land in the same state and ecological sub-region and manage the acre in a manner that sustains the resource values for the term of the right-of-way and the time required to restore the SEZ upon expiration of the right-of-way.

The BLM authorized officer will use the results of the market analysis together with the prioritized list of mitigation actions developed in the Development of Regional Mitigation Goals and Objectives section of this document to set the base fee just prior to leasing.

3. Rationale for adjusting the base fee by relative landscape condition and resource value

The rationale for adjusting the base fee for off-site mitigation by the relative landscape condition and resource value of the lands included in the ROW is twofold:

- Some places are already disturbed by current or previous uses (such as abandoned mines)
- Some ecological systems (and the economic, and/or social systems they support) are more valuable than others in terms of biological diversity and/or productivity, scenic values, habitat value, etc.

By adjusting the base fee for off-site mitigation by the relative landscape condition (i.e., degree to which it has been altered) and resource value is that the fees charged for the loss of unaltered and valuable ecosystem resources should be higher than those for already altered and less valuable areas.

3.1 Quantifying Landscape Condition and Resource Values

The adjustment to the mitigation fee based on the landscape condition and resource values would be made by applying a single multiplier that takes both into account. Through analysis presented in the Solar Programmatic Environmental Impact Statement (PEIS), the BLM attempted to delineate areas for solar development that avoid, or at least minimize the loss of resource values. The resulting SEZs are the areas that emerged from this process as the most desirable for solar development. The boundaries of the SEZs are found in the Final Solar PEIS [BLM and DOE 2012]. The method for establishing multipliers for these two factors (landscape condition and resource value) in the SEZs is discussed in sections 3.1.1 and 3.1.2 respectively. Section 3.2 describes how these two factors are used to establish SEZ-specific multipliers for mitigation fees.

3.1.1 Quantifying Landscape Condition

The condition of the landscape in each SEZ can be determined by using data on landscape condition from an applicable BLM Rapid Eco-regional Assessment (REA), and/or from other data sources. For example, in the Mojave Basin and Range REA (BLM 2013a) and the Central Basin and Range REA (BLM 2013b), the landscape condition maps provide a value between 0 and 1 for each 30 meter square within each ecoregion. The higher the value, the more intact the natural landscape is, while the lower the value, the more altered the landscape is. Nearly intact lands, such as ruderal vegetation[2] recovering towards natural vegetation, are given a high score of 0.9, while irrigated agriculture is given a 0.3 and urban/industrial development a very low score of 0.05. Additional background information on the landscape condition models used in these REAs is provided in Appendix A.

The proposed method compares the average landscape condition value, calculated over the entire SEZ, to the average landscape condition value of the entire ecoregion in which the SEZ is located. This method recognizes the fact that the value of non-altered lands in SEZs is higher if the region in which that SEZ is located has relatively less intact land.

For the initial analysis, data from two BLM REAs were used, allowing the characterization of intactness for 8 of the 17 SEZs identified in the Solar PEIS. Data for the Dry Lake and Amargosa Valley SEZs in Nevada are available in the Mojave Basin and Range (MBR) REA, while data for the remaining Nevada SEZs (Dry Lake Valley North, Gold Point, and Millers) and the Utah SEZs (Escalante Valley, Milford Flats, and Wah Wah Valley) are available in the Central Basin and Range (CBR) REA. The landscape condition for other SEZs will be assessed when applicable REA or other data become available.

A summary of the landscape conditions in the entire CBR and MBR ecoregions is provided in Table 1. The average landscape condition in the CBR ecoregion is 73.0 with a standard deviation of 15.5, while the average landscape condition in the MBR ecoregion is 76.6 with a standard deviation of 13.8. The average ranges for each ecoregion (discussed below), using one-half of one standard deviation, are therefore equal to 65.2 – 80.7 for the CBR ecoregion and 69.7 – 83.5 for the MBR ecoregion.

Table 1 – Summary of Landscape Condition Values in the CBR and MBR Ecoregions.

Ecoregion	Average Landscape Condition Value	Standard Deviation (SD)	Average +/- 0.5 SD
CBR	73.0	15.5	65.2 – 80.7
MBR	76.6	13.8	69.7 – 83.5

A statistical approach to define SEZ categories based on landscape condition is proposed. The SEZ average value was compared to the ecoregion average (+/- 0.5*SD) to classify each SEZ into one of three landscape condition categories: (1) more altered than the ecoregion as a whole, (2) similar alteration to the ecoregion as a whole, or (3) less altered than the ecoregion as a whole. The inclusion of the standard

[2] Ruderal vegetation is present in areas historically cleared for farming, but recovering towards natural vegetation over recent decades.

deviation of the ecoregion in the equation provides a statistical basis for differentiating SEZ categories that accounts for variability that is inherent in spatial data.

Category 1: *SEZ Landscape Condition More Altered Than the Ecoregion*

The SEZ condition is considered more altered than the ecoregion if the SEZ average landscape condition value is less than the average ecoregion landscape condition value minus one-half of one standard deviation unit of the average ecoregion condition:

$$ALC_{SEZ} < [ALC_{Ecoregion} – (0.5*SD_{Ecoregion})]$$

where ALC_{SEZ} = average landscape condition of the sez; $ALC_{ECOREGION}$ = average landscape condition of the ecoregion; and $SD_{Ecoregion}$ = standard deviation for the ecoregion data

Category 2: *SEZ Landscape Condition Similar to Ecoregion*

The SEZ condition is considered similar to the ecoregion if the SEZ average landscape condition value is within one-half of one standard deviation unit (+/-) of the average ecoregion landscape condition value:

$$[ALC_{Ecoregion} – (0.5*SD_{Ecoregion})] < ALC_{SEZ} < [ALC_{Ecoregion} + (0.5*SD_{Ecoregion})]$$

Category 3: *SEZ Landscape Condition Less Altered Than the Ecoregion*

The SEZ condition is considered less altered than the ecoregion if the SEZ average landscape condition value is greater than the average ecoregion condition value plus one-half of one standard deviation unit of the average ecoregion condition:

$$ALC_{SEZ} > [ALC_{Ecoregion} + (0.5*SD_{Ecoregion})]$$

Results of Landscape Condition Calculations

Based on this assessment for the eight SEZs evaluated, two of the SEZs (Dry Lake and Wah Wah Valley) are more altered than the surrounding ecoregion, five of the SEZs (Amargosa Valley, Dry Lake Valley North, Millers, Escalante, and Milford Flats South) have condition values that are similar to the surrounding ecoregion, and 1 SEZ (Gold Point) is less altered than the surrounding ecoregion.

3.1.2 Quantifying Resource Value

The BLM Off-site Mitigation Handbook offers the following guidelines for determining the relative importance of resource values:

- The value placed on the resource in the land use plan. For example, Visual Resource Management Class II has a higher level of importance than Class III; and acre per acre, riparian areas are generally considered to be more valuable than uplands, depending on the resource scarcity and values being considered.
- The rarity of the resource
- The legal status or state or national policy status of the resource. For example, Greater Sage-Grouse is a BLM-sensitive species and a candidate species under the Endangered Species Act. Its habitat is important on a range-wide and inter-regional basis as well as having local importance. Other examples include units of the National Landscape Conservation System (NLCS) (National Monuments, National Conservation Areas, Wilderness Areas, Wilderness Study Areas, Wild and Scenic Rivers, and National Historic and Scenic Trails).
- The resilience of the resource in the face of change and impact. For example, some animal species may acclimate fairly well to certain levels or types of development, while other species may decrease in population or abandon the area entirely, at least over the short term. BLM Resource Management Plans

A point scoring system will be used to assign the relative importance of an area proposed for solar development. The system calls for a numerical score between 0 and 3 to be assigned for each of the four categories derived from the above guidelines. Table 2 summarizes the categories and criteria for assigning the numerical scores. The four scores would then be summed to derive a total score between 0 (least important) to 12 (most important).

Table 2: Criteria for Assessing Relative Importance of Resource Values

Points	Value in the RMP	Rarity	Legal/Policy Status	Resilience
3	Afforded special designation in law and/or in the RMP (additional changes to be provided)	Resources values specifically identified as rare at a national level are present	Special permitting required by law (ESA, BGEPA, etc.)	Not resilient
2	Afforded a special designation in the RMP (ACEC, SRMA, etc.) and identified as an avoidance area.	Resources values specifically identified as rare at a regional level are present	Special permitting required by policy	Low resilience
1	Not avoidance, but specific protective management prescriptions	Resources values specifically identified as rare in the planning area are present	Special protection measures required by policy	Somewhat resilient
0	Not avoidance, no specific protective management prescriptions	Resources values specifically identified as rare in the planning area are not present	General protection measures required by policy	Highly resilient

For the purpose of developing a multiplier, four categories for summarizing relative importance of the resource values in the area proposed for development will be used. Table 3 summarizes the categories and the associated score ranges for each.

The initial scoring would be done by a BLM interdisciplinary team in the BLM Field Office responsible for the SEZ. The BLM authorized officer will, in consultation with other agencies, local government, and stakeholders, approve the importance score of the impacted lands.

Table 3: Resource Value Categories and Associated Scores

Total Score		Resource Value Category
Low End	High End	
10	12	Critical
7	9	High
4	6	Moderate
0	3	Low

3.2 Determining SEZ-Specific Fee-Multipliers

Combining the categories established in section 2.3 for both landscape condition and resource value derives the SEZ fee-multipliers. Table 4 suggests multipliers to use for each combination of landscape condition and resource value category.

Table 4 – Proposed Multipliers for Establishing SEZ Mitigation Fees (as Percent of per Acre fee)

		Resource Value			
		Critical	High	Moderate	Low
SEZ Landscape Condition Relative to Ecoregion	SEZ Less Altered Than Ecoregion	100	80	60	40
	SEZ Similar to Ecoregion	80	60	40	20
	SEZ More Altered Than Ecoregion	60	40	20	0

Using the multiplier system proposed in Table 4, no mitigation fees, other than fees required to address special-status species and impacts not covered by resource value assessment (e.g., ESA-species mitigation; off-site mitigation action requirements identified through consultation), would be assessed for SEZs with a landscape condition more altered than that of the ecoregion as a whole and having a low resource value. The multipliers increase with increasing levels of landscape intactness and resource value. This fee structure is compatible with the aim of the BLM Solar Program of offering incentives for solar development within SEZs. Moderate fees less than the cost of the corresponding proposed mitigation actions would be assessed for SEZs with landscape values similar to those of the ecoregion as a whole, in keeping with the concept of providing incentives for development within SEZs but still supporting the offset of the impacts of that development. For SEZs having an average landscape condition less altered than the ecoregion as a whole and high or critical resource value, the mitigation fee would be close to or equal to the cost of the corresponding proposed mitigation actions.

The formula proposed for using the multipliers to calculate the per acre mitigation fee is as follows:

Per Acre Fee = (Mitigation Action Implementation Fee – ESA Section 7 permit mitigation fee) x (Landscape Condition/Resource Value Multiplier)
(Note – also would subtract any mitigation fees required by law or other policy in additional to the ESA Section 7 permit mitigation fee from the Mitiation Action Implementation Fee

To aid in interpreting the use of the multiplier suggested in Table 4 above, the average landscape condition values for the eight SEZs covered by the CBR and MBR REAs were calculated for each SEZ; the values are presented in **Table 5**. The resource value evaluations for these SEZs are not yet available, so the specific proposed multiplier is not yet known.

Table 5 – Summary of Landscape Conditions and Identification of Condition Category for Select SEZs.

SEZ	Ecoregion	Average SEZ Landscape Condition Value	SEZ Landscape Condition Category
Amargosa Valley	MBR	71.6	Similar to Ecoregion
Dry Lake	MBR	57.4	More Altered Than Ecoregion
Dry Lake Valley North	CBR	80.2	Similar to Ecoregion
Gold Point	CBR	82.4	Less Altered Than Ecoregion
Millers	CBR	79.2	Similar to Ecoregion
Escalante Valley	CBR	72.9	Similar to Ecoregion
Milford Flats South	CBR	68.1	Similar to Ecoregion
Wah Wah Valley	CBR	56.4	More Altered Than Ecoregion

4. Examples of Mitigation Fee Calculation

4.1 Example 1: Dry Lake SEZ (Clark County, Nevada)

- ***Example**** *Mitigation Base Fee =$1,728/acre*

  *The amount is taken from The Nature Conservancy 2013 Dry Lake SEZ: Candidate Compensatory Mitigation Sites and Actions for Unavoidable Impacts – Coyote Springs Acquisition and Management Example. Use of this example does not imply either BLM selection or endorsement of this project – it used here for illustrative purposes only

- Size of the proposed development (area in ROW Grant) = 500 acres
- Average Landscape Condition Value of the Mojave Desert eco region (from Table 1): 76.6, standard deviation = 13.8
- Average Dry Lake SEZ Landscape condition value from the BLM REA (Table 5): 57.4

$$ALC_{SEZ} > [ALC_{Ecoregion} – (0.5*SD_{Ecoregion})]$$

ALC_{SEZ} = average landscape condition of the Dry Lake SEZ (from Table 5) = 57.4
$ALC_{ECOREGION}$ = average landscape condition of the ecoregion (from Table 1) = 76.6
$SD_{Ecoregion}$ = standard deviation for the ecoregion data (from Table 1) = 13.8

57.4 < (76.6 – (0.5 * 13.8)
57.4 < (76.6 – 6.9)
57.4 < 69.7
Conclusion: SEZ more altered than ecoregion

Resource Value Importance Assessment (from Table 2)

Example responses only – Values have not been approved by the BLM authorized officer

Points	Situation in the SEZ (Example)	Score
Value in the RMP	Not avoidance, but specific protective management prescriptions	1
Rarity	Resources values specifically identified as a rare at a regional level are present	3
Policy Status	General protection measures required by policy	3
Resilience	Low resilience	2
TOTAL		**9**

Resource Importance Category for a score of 9 (from Table 3): High

Landscape Condition and Resource Value Multiplier: (from Table 4):

- Landscape Condition: More altered than the eco-region

- Resource Value: High
- Multiplier (from Table 4) = 40%

The Dry Lake SEZ is in an area covered by a section 7 permit issued to the BLM for Desert Tortoise under the Endangered Species Act, so $810 per acre would be assessed if the ROW were issued in 2013

Formula: Per Acre Mitigation Fee = (Mitigation Base Fee – ESA Section 7 fee) x (Importance, Condition, and SEZ Multiplier)

Per Acre Mitigation Fee = ($1,728/acre - $810/acre) x (40%) = $367 per acre

Formula: Project Mitigation Fee = (Size of the Project) x (Per Acre Mitigation Fee)

Project Mitigation Fee (Example) = (500 acres) x ($367/acre) = $183,600

4.2 Example 2: Dry Lake Valley North SEZ (Lincoln County, Nevada)

- ***Example**** *Mitigation Base Fee =$1,728/acre*

  *The amount is taken from The Nature Conservancy 2013 Dry Lake SEZ: Candidate Compensatory Mitigation Sites and Actions for Unavoidable Impacts – Coyote Springs Acquisition and Management Example – use of this example does not imply either BLM selection or endorsement of this project – it used here for illustrative purposes only

- Size of the proposed development (area in ROW Grant) = 500 acres
- Average Landscape Condition Value of the Great Basin ecoregion (from Table 1): 73.0, standard deviation = 15.5
- Average Dry Lake North SEZ Landscape condition value from the BLM REA (from Table 5): 80.2

$$ALC_{SEZ} > [ALC_{Ecoregion} - (0.5*SD_{Ecoregion})]$$

ALC_{SEZ} = average landscape condition of the sez = 80.2
$ALC_{ECOREGION}$ = average landscape condition of the ecoregion = 73.0
$SD_{Ecoregion}$ = standard deviation for the ecoregion data = 15.5

73 > (80.2 – (0.5 * 15.5)
73 > (80.2 – 7.75)
73 > 72.45
Conclusion: SEZ Similar to ecoregion

Resource Value Importance Assessment (from Table 2)
Example responses only – Values have not been approved by the BLM authorized officer

Points	Situation in the SEZ (Example)	Score
Value in the RMP	Not avoidance, but specific protective management prescriptions	1
Rarity	Resources values specifically identified as a rare at a regional level are present	1
Policy Status	General protection measures required by policy	0
Resilience	Low resilience	2
TOTAL		**4**

Resource Importance Category for a score of 5 (from Table 3): Moderate

Landscape Condition and Resource Value Multiplier: (from Table 4):

- Landscape Condition: Similar to Ecosystem
- Resource Value: Moderate
- Multiplier = 40%

Per Acre Mitigation Fee = (Mitigation Base Fee)x(Importance, Condition, and SEZ Multiplier)

Formula: *Per Acre Mitigation Fee = ($1,728/acre) x (40%) = $691 per acre*

Formula: Project Mitigation Fee = (Size of the Project) x (Per Acre Mitigation Fee)

Project Mitigation Fee (Example) = (500 acres) x ($691/acre) = $345,500

The Dry Lake Valley North SEZ is presently not in an area covered by a habitat conservation plan for a species listed under the Endangered Species Act, so no Federal off-site mitigation fees would be applicable.

5 References

BLM (Bureau of Land Management), 2013a, *Mojave Basin and Range Rapid Ecoregional Assessment*. Information available at: http://www.blm.gov/wo/st/en/prog/more/Landscape_Approach/reas/mojave.html#memo.

BLM (Bureau of Land Management), 2013b, *Central Basin and Range Rapid Ecoregional Assessment*. Information available at: http://www.blm.gov/wo/st/en/prog/more/Landscape_Approach/reas/cbasinrange.html

BLM and DOE (U.S. Department of Energy), 2012, *Final Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States*, FES 12-24, DOE/EIS-0403, July

Appendix A: Background Information: Landscape Condition Model

The landscape condition model was produced for both the Mojave Basin and Range REA and the Central Basin and Range REA. The landscape condition model is a combination of two factors, land-use and a distance decay function. Different land-use categories were assigned a relative value between 0.05 and 1, representing very high impact to very low impact, respectively. According to the REA: " Values close to 1.0 imply relatively little ecological impact form the land sue. For example, a given patch of 'ruderal' vegetation – historically cleared for farming, but recovering towards natural vegetation over recent decades, is given a Very Low (0.9) score for site impact as compared with irrigated agriculture (high Impact 0.3) or high density urban/industrial development (very high impact 0.05)."

The second model parameter is a distance decay function, which considers how the distance at which the land-use in question has a "negligible impact." Again, values were scaled from 0 to 1, with 0 representing land-uses that decay more gradually over space, such as highways, and 1 representing land-uses that decay very quickly over space, such as pasture. The table below lists a number of examples of both land-use categories and distance decay values as designated in the MBR. A full description of the landscape condition model and how it was developed can be found on page 53 of the MBR Final REA Report II-C-3.

Table: Ecological stressor source, site-impact scores, and distance decay scores implemented for the landscape condition model for MBR (Table take from MBR REA, page 54).

Ecological Stressor Source	Site Impact Score	Presumed Relative Stress	Distance Decay Score	Impact Approaches Negligible
Transportation				
Dirt roads, 4-wheel drive	0.7	Low	0.5	200m
Local, neighborhood and connecting roads	0.5	Medium	0.5	200m
Secondary and connecting roads	0.2	High	0.2	500m
Primary Highways with limited access	0.05	Very High	0.1	1000m
Primary Highways without limited access	0.05	Very High	0.05	2000m
Urban and Industrial Development				
Low Density Development	0.6	Medium	0.5	200m
Medium Density Development	0.5	Medium	0.5	200m
Powerline/Transmission lines	0.5	Medium	0.9	100m
Oil /gas Wells	0.5	Medium	0.2	500m
High Density Development	0.05	Very High	0.05	2000m
Mines	0.05	Very High	0.2	500m
Managed and Modified Land Cover				
Ruderal Forest & Upland	0.9	Very Low	1	0m
Native Veg. with introduced Species	0.9	Very Low	1	0m
Pasture	0.9	Very Low	0.9	100m
Recently Logged	0.9	Very Low	0.5	200m
Managed Tree Plantations	0.8	Low	0.5	200m
Introduced Tree & Shrub	0.5	Medium	0.5	200m
Introduced Upland grass & forb	0.5	Medium	0.5	200m
Introduced Wetland	0.3	High	0.8	125m
Cultivated Agriculture	0.3	High	0.5	200m