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4.1 Introduction

Section 4 is the detailed analysis of environmental impacts associated with the proposed land acquisition. The study area set out in Section 3 will be reviewed to determine impacts from six possible alternatives:

- ❖ Alternative I: East/West (preferred alternative);
- ❖ Alternative II: East Gate/South;
- ❖ Alternative III: East Gate;
- ❖ Alternative IV: Southwest/East Gate/UTM 90;
- ❖ Alternative V: East Gate/UTM 90; and
- ❖ Alternative VI: No Action.

Each alternative is examined to determine whether there is no impact, a non-significant impact or a significant impact to each of the resource areas from the proposed project. Significant impacts may be addressed with mitigation that reduces the impact to non-significant.

The impact analysis is divided by alternatives. Each resource is analyzed within the alternative to determine the significance. Cumulative impacts are discussed at the end of each resource section in each alternative.

4.2 Geology

The ROI for geology corresponds with the study area.

Geologic impacts are considered potentially significant or significant if:

- ❖ A geologic feature of unusual value for study or interpretation is disturbed;
- ❖ Geologic processes that threaten human life or property are triggered or accelerated;
- ❖ Substantial alteration of topography occurs; and/or

4.2.1 Alternative I: East/West

Alternative I will result in minor impacts on the geologic environment due. Impacts would include speeding up erosional geologic process. Unconsolidated alluvium will be ground into finer particles in high and moderate use areas. Portions of the upper surface of other geological formations such as rock outcrops and exposed bedrock with less than 20 percent slope would be ground up into unconsolidated alluvium. Earthquake danger will not be increased. Geologic features over 20 percent slope are primarily features other than consolidated alluvium and they would not be impacted by the military use of existing roads within this alternative. Primary geologic impacts associated with this alternative result from heavy equipment movement and temporary excavations, e.g. digging fighting positions for equipment and soldiers. Additional non-significant, impacts may occur to geologic landforms due to road grading and siting of infrastructure for instrumentation and communication.

4.2.1.1 Impacts

No significant indirect or direct impacts related to geologic resources and hazards are anticipated to occur under this alternative.

4.2.1.2 Mitigation

The short-term impacts of digging fighting positions will be mitigated by backfilling those sites at completion of each rotation.

4.2.2 Alternative II: East Gate/South

Alternative II will result in the same impacts on the geologic environment and mitigation measures as detailed above in Alternative I.

4.2.3 Alternative III: East Gate

Alternative III will result in the same impacts on the geologic environment and mitigation measures as detailed above in Alternative I.

4.2.4 Alternative IV: Southwest/East Gate/UTM 90

Alternative IV will result in the same impacts on the geologic environment and mitigation measures as detailed above in Alternative I.

4.2.5 Alternative V: East Gate/UTM 90

Alternative V will result in the same impacts on the geologic environment and require the same mitigation measures as detailed above in Alternative I.

4.2.6 Alternative VI: No action

Continued current use of congressionally withdrawn lands will result in some impacts to geologic features, processes, or topography. Under this alternative, Fort Irwin lands below the UTM-90 gridline will continue to be off limits to mechanized Army training and no new impacts will occur. Impacts on Fort Irwin will continue from training activities. Open pit mining will continue in the Eastgate area, resulting in landform changes.

4.2.7 Cumulative Impacts

Cumulative impacts to geology over the ROI from past, present, and future actions when combined with the insignificant impacts to geology from the proposed project will not be significant.

4.3 Soils

4.3.1 Impacts

The ROI for soils is the study area. Soils in the study area will be impacted primarily by off road military vehicle use. In low use areas primarily adjacent to steep slopes, disturbance will be limited to vehicle tracks. In moderately used areas, primarily on upper alluvial fans, the wheel ruts will begin coalescing and wind erosion will remove soil particles from the disturbed area. The larger soil particles will abrade the undisturbed soils surface and plant surfaces. In high use areas, primarily in valley bottoms, the soil surface will become unstable and vegetative cover will be reduced up to 90 percent. Wind erosion will no longer be localized but will become regional within the valley. The soil will also be susceptible to water erosion from both winter rains and intense summer thundershowers. Water erosion will include both sheet erosion and channelized erosion. Over time the surface soil horizon will be replaced by unstable sand.

Soil surface disturbance within the proposed expansion area has been estimated to be low, moderate or high. In low use areas, light surface disturbance will result in localized increases in destabilization where vehicles leave wheel or track ruts. Mychorrizal relationships and surface crusts will be severely damaged where the wheel or tracks traverse. The width of the disturbance will be such that re-growth of microorganisms could take place. The time interval for recovery would probably take at least one human generation, based on growth rates from experiments conducted in the Colorado and Great Basin Deserts.

Surface disturbance in moderate use areas would result in a steady increase in disturbance over time. Natural recovery rates will be much slower than the rate of disturbance. Approximately one-half of the soil surfaces will be directly or indirectly destabilized by military activities. Recovery will not begin until the disturbance ceased.

In heavy use areas, nearly all the soil surface will be destabilized by military activities. The remaining vegetation will not be enough to counteract the effects of wind erosion.

Every alternative will significantly impact soils by crushing rock outcrops, disturbing desert pavement, compacting soil layers, and increasing wind and water erosion. Dry lakebeds or playa soils have low permeability and medium runoff, and the erosion hazard is high when the soils are dry. Playas recover from damage to a certain extent after rains fill the lakebeds, but are nevertheless off limits to military vehicles.

Impacts to soils could be considered significant if any of the following occurred:

- ❖ If a disruption of an approximately contiguous 640-acre, or larger, area of soil surface is disturbed to the point that it cannot be rehabilitated within a 10-year period;
- ❖ If vehicles or other direct mechanical apparatus disturbs the surface of a dry lakebed or playa deposit, whereby the upper clay surface crust is disturbed and underlying fine sediment is exposed to wind erosion.

Table 4.3-1 shows the relationship between predicted impacts and soil erodibility for each Alternative.

Table 4.3-1: Relationship Between Predicted Impacts and Soil Erodibility					
No Use	ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III	ALTERNATIVE IV	ALTERNATIVE V
Low Erodibility (acres)	2,752	1,859	1,850	2,752	1,850
Moderate Erodibility (acres)	12,418	16,445	4,025	15,888	7,675
High Erodibility (acres)	1,846	7,004	0	2,583	0
Low Use	ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III	ALTERNATIVE IV	ALTERNATIVE V
Low Erodibility (acres)	2,553	2,600	2,553	2,553	2,553
Moderate Erodibility (acres)	4,243	12,224	3,396	14,637	3,298
High Erodibility (acres)	0	0	0	0	0

MODERATE USE	ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III	ALTERNATIVE IV	ALTERNATIVE V
Low Erodibility (acres)	17,940	13,619	13,619	17,940	13,619
Moderate Erodibility (acres)	36,021	20,608	15,831	42,025	17,058
High Erodibility (acres)	10,168	342	0	10,168	
HIGH USE	ALTERNATIVE I	ALTERNATIVE II	ALTERNATIVE III	ALTERNATIVE IV	ALTERNATIVE V
Low Erodibility (acres)	3,270	483	474	3,270	474
Moderate Erodibility (acres)	48,545	74,061	7,981	69,165	25,315
High Erodibility (acres)	2,132	6,046	0	2,183	0

4.3.2 Mitigation

To mitigate impacts on dry lakebeds, all lakebed surfaces are off limits for all military activities (see Section 3.3.2.25). In addition, there will be a 25-meter setback from the edge of the lakebed or playa. Because there are no means of mitigating surface soil disturbance in heavy and moderate use areas and the associated erosion generated by military equipment in the desert environment, residual impacts on soils may be significant. These disturbances will be lessened by fencing conservation areas, requiring use of existing road systems, and expanding the Integrated Training Area Management (ITAM) re-vegetation, dust palliatives application, and erosion controls into the expanded maneuverable training area. The feasibility of all mitigation measures is that they are highly likely to occur as proposed. Congress has authorized up to \$75 million in funding for conservation actions related to the proposed project, which may occur inside or outside the project area, and all other actions will be funded and implemented through on-going programs presently in place at Fort Irwin. Additionally, mitigation measures that are proposed off the post boundary have been coordinated with the BLM and are designed to integrate into the land use planning effort contained within the CDCA and in the West Mojave Plan.

4.3.3 Alternative VI: No Action

Under Alternative VI, withdrawn lands will remain under Army control until an alternative land use is determined. Use must be consistent with applicable land use plans: the CDA Plan for public lands, San Bernardino General Plan, and the West Mojave Coordinated Management Plan. Impacts will remain as currently experienced.

4.3.4 Cumulative Impacts

Significant cumulative impacts to soils will occur within the ROI due the combination of past, present, and future actions and the proposed project. Soil disturbance has occurred and will continue to occur over vast areas of land as urban and commercial growth continue from past and present population increases, utilities, and other commercial operations, such as mining and agriculture continue to expand. This trend in growth is expected to continue into the future as land becomes scarcer for private and commercial development in Los Angeles, Orange, Riverside, San Diego, and San Bernardino Counties. While no significant impact is expected to playas due to this growth, as most playas in the ROI are under federal management, disturbance will occur to thousands of acres of land that will not be rehabilitated in the near conceivable future due to grading, building, and other commercial activities. Proposed land purchases due to mitigation for the proposed project of over 100,000 acres depending upon the alternative chosen, will reduce impacts to soils within the ROI as land that is currently available for private development will be transferred to the federal government for management. This action will result in a diminution of the anticipated future cumulative impacts.

4.4 Water Resources

Impacts to water resources could be considered significant if any of the following occurred:

- ❖ Water table levels are reduced to such an extent that spring flows are diminished or production at existing wells within that basin or adjacent interconnected basins falls below economically feasible or practical engineering limits;
- ❖ Groundwater quality changes occur because of increasing salinity or mineral content that can negate the water's value for domestic, industrial, or agricultural consumption;
- ❖ Existing drainage patterns are altered;
- ❖ The quality of ephemeral surface water resources available for wildlife at dry lakes, spring flows, or linear riparian systems with ephemeral flows is degraded; and/or
- ❖ Increases in water quality constituents that could lead to violation of specific state and federal standards.

4.4.1 Alternative I: East/West

4.4.1.1 Impacts

Groundwater

There will be no net increase in the number of rotations or soldiers training at the NTC as a result of the land expansion therefore, the amount of water needed by Fort Irwin will not increase. Currently, there are no near-future plans or designs to pump water from the land expansion areas. The land expansion is not expected to have impacts on basin draw-down or water quantity.

Use of areas not previously used for training could result in potential spill impacts from vehicle use, field vehicle maintenance activities, hazardous materials transfer and storage. Storing and handling hazardous materials in the study area could result in accidental spills. Fort Irwin has in place a Spill Prevention Control and Countermeasures Plan with guidelines on how to deal with

hazardous substance spills. If groundwater is threatened due to a hazardous substance spill the Regional Water Quality Control Board is contacted immediately in accordance with the Fort Irwin Spill Prevention Control and Countermeasures Plan. There will be no significant impact to water quality.

Surface Water

Springs in the study area would not be used as a source for human consumption in association with Army activities. Therefore, spring water drawdown would not be affected by Alternative I. It is not anticipated that spring water quality would change significantly from what currently exists, because springs are off-limits areas for military use. Impacts to springs are not considered significant.

4.4.1.2 Mitigation

Utilizing the current groundwater and surface water practices/procedures for hazardous substance spills and implementing them in the expansion area, mitigation measures will not be necessary.

4.4.2 Alternative II: East Gate/South

Alternative II will result in the same impacts to water resources and mitigation measures as detailed above in Alternative I.

4.4.3 Alternative III: East Gate

Alternative III will result in the same impacts to water resources and mitigation measures as detailed above in Alternative I.

4.4.4 Alternative IV: Southwest/East Gate/UTM 90

Alternative IV will result in the same impacts to water resources and mitigation measures as detailed above in Alternative I.

4.4.5 Alternative V: East Gate/UTM 90

Alternative V will result in the same impacts to water resources and mitigation measures as detailed above in Alternative I.

4.4.6 Alternative VI: No Action

Under Alternative VI, the continuation of use of Fort Irwin is not anticipated to result in significant drawdown of Irwin, Bicycle, and Langford Basins.

4.4.7 Cumulative Impacts

Cumulative impacts to water resources are not expected to be significant. The proposed project will likely only impact the immediate ground water basins in the study area in a non-significant manner. There is little private development occurring in this area as most land is under federal ownership or vacant, and no stresses on the groundwater supply are expected. No increase in water use is expected due to the proposed project and no degradation of ground water is expected to occur due to required mitigation for hazardous waste and toxic spills during rotational training activity. The southeastern portion of all alternatives is within the Cronese Valley basin and the southeastern corner of Alternative II is within the Mojave River Valley Basin; each alternative has

the potential to impact those basins, however impacts would be fully mitigated by implementation of the above listed mitigation measures for each alternative. Springs located in each alternative would be fully protected and in most cases restored to natural conditions by removal of non-native and invasive plant life. Therefore, impacts to springs and other surface waters is expected to be cumulatively insignificant and may even contribute to a positive cumulative impact as more springs and surface waters are restored and receive protection in the ROI by private and governmental agencies.

4.5 Biological Resources

The Proposed Action and alternatives will have substantial impacts on vegetation and wildlife through loss of individuals and viable communities, loss of food sources, loss of access to water resources, disruption of travel corridors and nesting areas for wildlife, and affects of increased dust and erosion on vegetation.

Impacts on vegetation and wildlife are considered significant if any of the following occurred:

- ❖ Loss of individuals or populations of a federal or state listed endangered or threatened species or its habitat;
- ❖ Loss of critical and/or declining wildlife habitat that is sensitive or rare in the region in question, such as riparian woodlands, wetlands, cliff face formations, and surface water sources;
- ❖ Substantial loss of populations or habitat of a species that is a federal candidate, is federally proposed for listing, is a California species of special concern, is on the California Native Plant Society (CNPS) Inventory List 1B or 2, is BLM Sensitive, is regionally rare, or is otherwise so sensitive as to jeopardize the continued existence of the species in the region;
- ❖ Loss or long-term disruption of a major wildlife movement corridor;
- ❖ Loss of at least 5 percent of undisturbed habitat(s) encompassing a contiguous biogeographic region, such as that found in a single valley, mountain range, or coastline;
- ❖ Substantial loss of natural vegetation that is slow to recover; and/or
- ❖ Substantial loss of species or community diversity in natural vegetation and wildlife habitat.

The definition of “substantial” is dependent on the species in question. Much of the discussion of impacts to the desert tortoise and Lane Mountain milk-vetch are covered in greater depth by the *Biological Assessment For the Proposed Addition of Maneuver Training Land at Fort Irwin, CA* completed in 2003 (see Appendix B). The contents of that document are incorporated herein by reference.