



# **Appendix B: Supporting Documentation**





# MEMORANDUM

то:	Project File
FROM:	Marley Madsen, Biologist
DATE:	May 11, 2022
SUBJECT:	Migratory Bird Nesting Survey Alpine Aqueduct Environmental Assessment

#### **INTRODUCTION**

Central Utah Water Conservancy District (District) and the Department of the Interior – Central Utah Project Completion Act Office (Interior) are evaluating alternatives to increase the resiliency and reliability of the Alpine Aqueduct Reach 1 (AA-1). The District and Interior, as Joint Lead Agencies (JLAs), have initiated an Environmental Assessment (EA) to analyze and disclose the potential impacts of the Alpine Aqueduct Reach 1 Replacement and Resiliency Project (Project).

Migratory birds receive protections from the Migratory Bird Treaty Act (MBTA) of 1918, and Executive Order (EO) 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds* requires federal agencies taking actions that could result in take or other negative effects to migratory birds to comply with MBTA. Almost all bird species in the United States are covered by the MBTA. Additionally, the Bald and Golden Eagle Protection Act (BGEPA), originally passed in 1940, provides protection to eagles by prohibiting take.

To ensure project compliance with the MBTA and BGEPA, a nesting bird survey was conducted in the study area. The purpose of this report is to document the results of that survey.

#### **EVALUATION METHODS**

On May 6, 2022, Marley Madsen and Gabriella Lawson of Horrocks Engineers conducted a survey of the study area to locate any existing migratory bird nests and to assess habitat suitability birds. Prior to conducting the survey, areas of potentially suitable habitat were identified from aerial imagery and previous nest occurrence data was reviewed. Survey efforts in the field focused on potentially suitable habitat and the locations of previously recorded nests. At each of these locations, the surveyors listened for bird calls and used binoculars to look for birds and bird sign (e.g., nests, whitewash). When birds or sign were detected, the surveyors attempted to determine if a nest was occupied and to identify the species. The survey took place during the breeding season for most species of birds known to occur in the area.



### SURVEY RESULTS

#### **Habitat Conditions**

The habitat in the study area can be classified as northern mountain brush complex using *Woody Plants* of Utah (Van Buren et al. 2011). This vegetative community occurs in the foothills of mountain ranges and is dominated by shrubs such as Gambel oak (*Quercus gambelii*), bigtooth maple (*Acer grandidentatum*), box elder (*Acer negundo*), curl-leaf mountain mahogany (*Cercocarpus ledifolius*), alderleaf mountain mahogany (*Cercocarpus montanus*), and sagebrush (*Artemisia spp.*).

Due to the 2020 Range Fire, which burned approximately 3,500 acres at the mouth of Provo Canyon, very few trees and shrubs are present in the study area. Instead, the study area is dominated by various species of native and non-native grasses and forbs such as intermediate wheatgrass (*Thinopyrum intermedium*), crested wheatgrass (*Agropyron cristatum*), and bulbous bluegrass (*Poa bulbosa*), and cheat grass (*Bromus tectorum*) (see Figure 1).

In addition to the grassland habitats available in the study area, suitable habitat for migratory birds occurs in small patches of oakbrush, sagebrush, and Utah juniper (*Juniperus osteosperma*), as well as along the large limestone cliffs at the mouth of Provo Canyon (see Figure 2).



**Figure 1:** General habitat conditions in study area. Photo was taken along the Bonneville Shoreline Trail looking south toward Orem/Provo.



**Figure 2:** General habitat conditions along the limestone cliffs on the eastern edge of the study area. The spillway and cement roadway can be seen in the middle/right of the photo. Image was taken using Google Earth Street View.

#### **Migratory Birds**

Six large platform nests were observed in and near the study area during surveys (see attached survey results map). Only one nest was able to be positively identified as belonging to mated pair of red-tailed hawks. The red-tailed hawk nest is located along the limestone cliffs near the eastern edge of the study area (see attached survey results map). The other five nests are located in scattered Utah juniper trees and may belong to common ravens or other large predatory birds (see Figure 3). Other nests belonging to small migratory species undoubtedly occur in and near the study area. For example, flocks of white-throated swifts and barn swallows were observed by the limestone cliffs and there are likely dozens of nests along the cliff face.



**Figure 3:** An example of a migratory bird nest found in the study area. This nest is located in a Utah juniper and belongs to an unknown species of bird.

Several different species of migratory birds and raptors were observed in and near the study area:

- Turkey vulture (Cathartes aura)
- Red-tailed hawk (*Buteo jamaicensis*)
- Great-horned owl (*Bubo virginianus*)
- American kestrel (Falco sparverius)
- Barn swallow (*Hirundo rustica*)
- Spotted towhee (*Pipilo maculatus*)

- Warbling vireo (Vireo gilvus)
- White-throated swift (Aeronautes saxatalis)
- American robin (*Turdus migratorius*)
- Lazuli bunting (Passerina amoena)
- Stellar's jay (Cyanocitta stelleri)

It is unlikely this is a comprehensive list of all the migratory birds and raptors that occur in the study area. However, it does provide evidence that the study area contains enough suitable habitat to support a diverse bird community.

#### **RECOMMENDED MITIGATION**

The following mitigation measures are recommended to avoid impacts to migratory birds:

- All vegetation in the construction area must be cleared and grubbed outside the breeding season for most migratory birds (May 1 August 31).
- Construction activities, including storing equipment and parking vehicles, must not take place directly above or below the red-tailed hawk nest during the nesting season (May 1 August 31).

#### CONCLUSION

There is suitable habitat in the study area for migratory birds. A total of six nests, one belonging to a pair of red-tailed hawks and five belonging to other large birds, were found in and near the study area boundary. At least eleven species of migratory birds occur in and near the study area. If the recommended mitigation measures are implemented, the project would not result in take to migratory birds.

#### REFERENCES

Van Buren, R., Cooper, J.G., Shultz, L.M., and Harper, K.T. 2011. *Woody Plants of Utah*. Utah State University Press. Logan, Utah.



0 400 800 1,600 Feet 1 in = 800 ft

Study Area

Nest



Alpine Aqueduct Migratory Bird Survey Results



# MEMORANDUM

TO:	Project File
FROM:	Gabriella Lawson, Environmental Specialist
DATE:	May 11, 2022
SUBJECT:	Yellow-billed Cuckoo Habitat Noise Analysis Alpine Aqueduct Environmental Assessment

#### INTRODUCTION

Central Utah Water Conservancy District (District) and the Department of the Interior – Central Utah Project Completion Act Office (Interior) are evaluating alternatives to increase the resiliency and reliability of the Alpine Aqueduct Reach 1 (AA-1). The District and Interior, as Joint Lead Agencies (JLAs), have initiated an Environmental Assessment (EA) to analyze and disclose the potential impacts of the Alpine Aqueduct Reach 1 Replacement and Resiliency Project (Project).

Section 7 of the Endangered Species Act (ESA) of 1973 (7 USC §136, 16 USC §1531 et seq.), as amended, requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) if listed species or designated Critical Habitat may be affected by the Preferred Alternative. If adverse impacts would occur as a result of the Preferred Alternative, the ESA requires federal agencies to evaluate the likely effects and ensure that it neither jeopardizes the continued existence of federally listed ESA species, nor results in the destruction or adverse modification of designated Critical Habitat.

Yellow-billed Cuckoo (*Coccyzus americanus*) are federally listed threatened species. Found in mixed native and non-native riparian woodlands. Patches vary in size and shape but must be ≥12-acres and 100m wide or more in at least one location. Quality habitat is structurally diverse with a multi-layered overstory and dense understory. No critical habitat for yellow-billed cuckoo (YBC) exists in or within 0.5-miles of the study area, and no YBC have been observed nearby. However, there is habitat that meets USFWS guidelines for suitable habitat within 0.5-miles of the study area along the Provo River at the mouth of Provo Canyon.

To ensure project compliance with USFWS guidelines, a noise screening was conducted to identify whether noise from project activities would increase the noise levels within suitable habitat for yellow-billed cuckoo. The purpose of this report is to document the results of that screening.

#### **EVALUATION METHODS**

The ambient noise level is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average,

or equivalent, sound level (Leq) over a given period. The sound levels described in this memo are expressed as Leq. Table 1 shows the relationship between decibel changes and the corresponding relative loudness. The Federal Highway Administration Traffic Noise Screening Tool and Roadway Construction Noise Model were used to predict noise levels within adjacent suitable, yellow-billed cuckoo habitat.

Sound Level Change	Relative Loudness
1 dBA	No perceptible change
3 dBA	Barely perceptible change
5 dBA	Readily perceptible change
10 dBA increase	Perceived as twice as loud

# Table 1. Sound Level Change vs. Relative Loudness

## HABITAT LOCATION

Construction noise levels were analyzed for suitable habitat closest (approximately 740-feet) to the proposed construction area (See Figure 1). Traffic noise levels were analyzed for the same suitable habitat point, located 500 feet to the west of mile marker 8.1.



Figure 1. Suitable Habitat Distance to Construction and Roadway

## BASELINE ROADWAY NOISE LEVELS

Baseline roadway noise levels were calculated using the Federal Highway Administration's (FHWA)Traffic Noise Screening Tool (TNST). Average Annual Daily Traffic on US-189 in 2019 was

28,000 vehicles per day with total truck volumes at 26.4% (20.2%. single unit, 6.2% combination unit). Average hourly traffic was set at 2,800 vehicles (700 per lane) as best practice is to take 10% of daily traffic volumes to reflect peak noise. FHWA TNST calculated noise levels to be 59.22 dBA in the closest suitable habitat.

Project S	ettings									
# Nea	ar Lanes 2			T	Near Lane Grade %	2	•	Ground Type	Lawn	•
# Fa	ar Lanes 2			•	Far Lane Grade %		-2	Traffic Average Period	Hourly	
Lane V	Vidth (ft) 1	2		•	Receiver Distance (ft)		500	NAC Category	В	
Paveme	ent Type	verage		•	Receiver Height (ft)		5			
Co	mpute Sub	stantial In	icrease							
Traffic Inp	out									
Diagram	NL 1	NL 2	FL 2	FL 1						
Lane S	Speed (mph	) 55		•	Auto (% of	Hourly Traffic	) 74	Auto Hourly Traffic		518
Average	Total Traffi	-		700	MT (% of	Hourly Traffic	:) 20	MT Hourly Traffic		140
Average H	Hourly Traffi	c		700	HT (% of	Hourly Traffic	) 6	HT Hourly Traffic		42
Computat	tions and	Results	5	Start Com		r lane 1 Summary				
						Progress			100%	
Near	Lane LAeq	1hr (dBA	A)		56.82		Far Lane LAeq 1	hr (dBA)	55.50	_
Grea	ater than N/	AC - 3 dB	17		NO		Total Lane LAeq 1	hr (dBA)	59.22	

Figure 2. FHWA TNST Results for Baseline Roadway Noise Levels

# CONSTRUCTION ACTIVITY NOISE LEVELS

Construction activity noise levels were calculated using FHWA's Roadway Construction Noise Model (RCNM). The RCNM enables the prediction of construction noise levels for a variety of construction operations based on a compilation of empirical data and the application of acoustical propagation formulas. The noise levels were analyzed for construction in the closest suitable habitat (740 feet away) for each piece of equipment that will be used individually and those that are likely to be used together. Results from the analysis are described in the following sections.

## Blasting

The RCNM calculated the noise levels (Leq) associated with blasting to be **50.6 dBA** in the closest suitable habitat, **8.62 dBA less than the baseline roadway noise level**.

_		Case Desc	cription:							Γ					1
Rec	eptor										Noise	Metric:	Leq	•	
		Description	Lan	dUse	E	Daytime Baseline (dBA)	Evening Baseline (dBA)	Bas	httime 🔺 seline BA)			Noise Lir	nit Criter	ria	
1	Cuckoo	Habitat	Residential		-	66.0	66.	0	66.0						
2					-										
3					•								Recep	tor #1	
4					-				•						
Eau	pment	Receptor #1	I: Cuckoo Habit	at									Noise	Limits	
Equi	Active	Descrip		Impact	Usage(%	81	Spec Lmax		Actu Lma		Distance to Receptor	) Estima Shield			
				Device			(dBA)		(dB/	4)	(feet)	(dBA	4)		
1		Concrete Mixer Truck	<b>•</b>			40%		85.0		78.8	740.0		0.0		
2		Backhoe	-			40%		80.0		77.6	740.0	-	0.0		
3		Concrete Mixer Truck	•			10% 🔳		85.0		78.8	740.0	-	0.0		
4		Blasting	<b>•</b>			1% 🗹		94.0		N/A	740.0		0.0		
5		Excavator Jackhammer				10% 🔳		85.0	<b>V</b>	80.7	740.0		0.0		
6		Jackhammer	•	<u> </u>	2	20% 🔳		85.0		88.9	740.0	9	0.0 🔻		
ults					Rec	<u> </u>	Cuckoo H	labital	1			Lina Fr		40.40	
			Calculated (dBA)	D		Noise Lin Eve			1:-1-1		av	Limit Exce		dBA) Nig	
H		Equipment	Lmax* Leg	Lmax	ey Leg	Lmax	ning Leg	Lmax	light Leg	Lmax		Even Lmax	ing Leg	Lmax	nt Leq
			70.6 50.6		N/A			N/				N/A	N/A	N/A	N//
1 E	lasting		70.6 50.6		N/A		N/A	N//				N/A	N/A	N/A	N//
2															
3															
4															



## Jack Hammering

The RCNM calculated the noise levels (Leq) associated with blasting to be **58.5 dBA** in the closest suitable habitat, **0.72 dBA less than the baseline roadway noise level**.

		Case D	escription:														
Rea	eptor		,										Noise	Metric:	Log	•	
		Description		Land	Use	Ba	aytime aseline (dBA)	Evening Baseline (dBA)	Bas	httime seline IBA)	<b>•</b>		_		nit Criter		
1	Cuckoo	Habitat	Resid	ential		-	66.0	66.	.0	66.0	ī						
2						-					-						
3						• • •											
4						•					-				Recep	tor #1	
															Noise	Limits	
		_															_
Equ	ipment	Receptor	#1: Cucke	oo Habita	it												
	Active	Des	cription		Impact Device	Usage(%)	)	Spec Lmax (dBA)			Actual Lmax (dBA)		Distance to Receptor (feet)	Estima Shield (dBA	ited 🔺 ing 🔄		
1		Concrete Mixer Tru	ck	-		40			85.0	V		78.8	740.0	1	0.0		
2		Backhoe		-		40			80.0	V		77.6	740.0	1	0.0		
3		Concrete Mixer Tru	ck	+ + +		40			85.0	V		78.8	740.0	1	0.0		
4		Blasting		-	V		% 🔟		94.0			N/A	740.0		0.0		
5		Excavator				40			85.0	v		80.7	740.0		0.0		
6	1	Jackhammer		-	V	20	)%		85.0	V		88.9	740.0	1	0.0 🔻		
ılts							<u> </u>	Cuckoo I	Habital	t							
			Calculat	ed (dBA)			Noise Lin								edance (		<u> </u>
-		Equipment	Lmax*	1.00	D.	ay Leg	Ever Lmax		۲ Lmax	light Le		Da		Even Lmax		Niq Lmax	
-		Equipment Total	65.5	Leg 58.5	Lmax N/A		Lmax N/A	Leq N/A	Lmax N/		N/A	.max N/A	Leq N/A	Lmax N/A	Leq N/A	Lmax N/A	Leg N/A
1	Jackhamm		65.5	58.5	N/A	N/A	N/A	N/A	NZ NZ		N/A	N/A	N/A	N/A	N/A	N/A	N/A
	odokridilili		00.0	30.5	11/6	10/8	11/6	078	1977			11/6	07/6	11/0	076	11/6	
2										-							

Figure 4. RCNM Result for Jack Hammering

## Concrete Mixer

The RCNM calculated the noise levels (Leq) associated with blasting to be **51.4 dBA** in the closest suitable habitat, **7.82 dBA less than the baseline roadway noise level**.

		Case Descripti	on							Г					
Rec	eptor										Noise	Metric:	Lea	-	
	Descri	otion	Land	Use	Ba	ytime seline fBA)	Evening Baseline (dBA)	Nighttin Baselin (dBA)	ie 🗌			loise Lin			
1	Cuckoo Habitat	Re	esidential		▼	66.0	66.0		6.0						
2					-										
3					-								Recep	tor #1	
4					•				-						-
													Noise	Limits	
<b>-</b>		Receptor #1: Cu	ekoo Habita												
Equ	ipment	receptor #1. cu										1			
	Active	Description		Impact Device	Usage(%)		Spec Lmax (dBA)		Actua Lmax (dBA)	(	Distance to Receptor (feet)	Estima Shieldi (dBA	ng		
1	Dump Tr	uck	<b>*</b>		40	*	84	.0 💌	1	76.5	740.0	1	0.0		
2	Backhoe		4 4 4 4		40		80			77.6	740.0		0.0		
3	🗹 Concrete	Mixer Truck	*		40	%	85	.0 🛛 🖉	1	78.8	740.0	1	0.0		
4	Blasting		•	×	12		94			N/A	740.0		0.0		
5	Excavate		+		40		85			80.7	740.0		0.0		
6	📃 Jackham	mer	-	V	20	%	85	.0 🛛 🖉	í 📃	88.9	740.0	1	0.0 🔻		
Its							Cuckoo Ha	bitat							
		Calc	ulated (dBA)			Noise Lim						.imit Exce			<b>^</b>
-	Equipmer				ay	Even		Nigh			ay	Eveni		Niq	
_	E guipmer Total	t Lma: 55.4	x* Leg 51.4	Lmax N/A	Leq N/A	Lmax N/A	Leg L N/A	max N/A	Leq N/A	Lmax N/A		Lmax N/A	Leq N/A	Lmax N/A	Leg N/A
	Concrete Mixer Truc		51.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A
	Seneroto minor Huor	. 00.4	01.4		1100	1100	1100				1100	1076	1100		1100
1 ( 2 3															
2															

Figure 5 RCNM Result for Concrete Mixer Truck

# Front End Loader

The RCNM calculated the noise levels (Leq) associated with blasting to be **51.7 dBA** in the closest suitable habitat, **7.52 dBA less than the baseline roadway noise level**.

		Case D	escription						_		Г					
Rec	eptor		. 1									Naiss	Metric:	Lan	•	]
		Description		Land	Use	Ba	aytime aseline dBA)	Evening Baseline (dBA)	Night Base (dB					nit Criter	<u> </u>	
1	Cuckoo	Habitat	Reside	ential		-	66.0	66.0	)	66.0						
2						-										]
3						-								Recep	Los #1	
4						-				-						_
														Noise	Limits	
		D	#1. C I.													
Equi	pment	neceptor	#1: Cucka	ю парка												
	Active	Des	cription		Impact Device	Usage(%)		Spec Lmax (dBA)		Actu Lma (dBA	IX N	Distance to Receptor (feet)	Estima Shield (dBA	ing 👘		
4		Blasting		-	V	1	% 🗹		94.0		N/A	740.0		0.0		
5		Excavator		-		40			85.0	4	80.7	740.0		0.0		
6		Jackhammer		+	V	20	%			¥	88.9	740.0		0.0		
7	×	Front End Loader		- -		40				<b>1</b>	79.1	740.0		0.0		
8				-												
9				-										-		
ılts							·	Cuckoo H	labitat							
			Calculat	ed (dBA)			Noise Lim							edance (		
						ay .	Ever		Nic			ay .	Even		Niq	
-		Equipment Total	Lmax* 55.7	Leg 51.7	Lmax N/A	Leg N/A	Lmax N/A	Leg N/A	Lmax N/A	Leg	Lmax		Lmax N/A	Leq N/A	Lmax N/A	Leg N/A
			55.7	51.7	N/A N/A		N/A N/A	N/A N/A	N/A N/A	N/A N/A			N/A N/A	N/A N/A	N/A N/A	N/A N/A
1		Luauei	33.7	51.7	N/A	N/A	N7A	N/A	NZA	N7A	N/A	N78	N/A	N/A	N/A	DIZA
	ront End I															
2	ront End I		_													
	ront End I															

Figure 6. RCNM Result for Front End Loader

# Dump Truck

The RCNM calculated the noise levels (Leq) associated with blasting to be **49.1 dBA** in the closest suitable habitat, **10.12 dBA less** than the baseline roadway noise level.

Dee	eptor	Case Des	cription													_	1
neci	eptor	Description		Land	lUse		Daytime Baseline (dBA)	Evening Baseline (dBA)	Ba	jhttime iseline dBA)	<b>^</b>			Metric: Noise Li	Leq mit Criter	▼ ia	
1	Cuckoo	Habitat	Resid	ential		-	66.0	66	6.0	66.	0						
2						•											
3						•									Recep	tor #1	
4						•					•						
															Noise	Limits	
Equi	pment	Receptor #	1: Cuck	o Habita				Spec			Actual		Distance to	) Estima	ated		
	Active	Descri	ption		Impact Device	Usage(%	5)	Lmax (dBA)			Lmax (dBA)		Receptor (feet)	Shield (dB/	ling		
1	1	Dump Truck		•		4	.0% 🔲		84.0	V		76.5	740.	0	0.0		
2		Backhoe		* * *		4	-0% 🔳		80.0	V		77.6	740.	0	0.0		
3		Concrete Mixer Truck		-			0% 🔲		85.0	V		78.8	740.		0.0		
4		Blasting		-	2		1% 🗹		94.0			N/A	740.		0.0		
5		Excavator		<b>•</b>			.0%		85.0	V		80.7	740.		0.0		
6		Jackhammer		-	¥	2	0%		85.0	V		88.9	740.	0	0.0 🔻		
lts						Rec	eptor #1:		Habita	ıt							
			Calculat	ed (dBA)	_		Noise Lim								eedance (o		
-		Equipment	1	1	D.		Ever		Lmax	Night	eq	Da		Ever		Nig	
			Lmax* 53.0	Leg 49.1	Lmax N/A	Leq N/A	Lmax N/A	Leg N/A			eq N/A	Lmax N/A	Leg N/A	Lmax N/A	Leg N/A	Lmax N/A	Leq N/A
	ump Truc		53.0	49.1	N/A	N/A		N/A			N/A	N/A	N/A	N/A	N/A	N/A	N/A
2				10.1									.,				
;										-							
					value for t												

Figure 7. RCNM Results for Dump Truck

# Track Hoe

The RCNM calculated the noise levels (Leq) associated with blasting to be **53.3 dBA** in the closest suitable habitat, **5.92 dBA less** than the baseline roadway noise level.

		Case D	escription									Г	_				7
Rec	eptor												Noise	Metric:	Lea	•	
		Description		Land	Use	B	aytime aseline (dBA)	Evening Baseline (dBA)	B	ghttime aseline 'dBA)					mit Crite		
1	Cuckoo	Habitat	Resid	ential		-	66.0	66		66.	0						
2						-					-						
3						- -									-		
4						-					•				Recep	otor #1	
															Noise	Limits	
Equ	ipment	Receptor	#1: Cuck	oo Habita	at												
	Active	Des	cription		Impact Device	Usage(%	)	Spec Lmax (dBA)			Actual Lmax (dBA)		Distance to Receptor (feet)	Estima Shield (dB/	ding		
1		Dump Truck		-		40	)% 🔳		84.0	V		76.5	740.0	)	0.0		
2		Backhoe		-		40	)% 🔳		80.0	V		77.6	740.0	)	0.0		
3		Concrete Mixer Tru	ck	-		40	)% 🔳		85.0	V		78.8	740.0	)	0.0		
4		Blasting		+ + +	V	1	% 🗹		94.0			N/A	740.0	)	0.0		
5	1	Excavator		-		40	)%		85.0	V		80.7	740.0	)	0.0		
6		Jackhammer		-	V	20	)% 🔳		85.0	V		88.9	740.0	)	0.0 🔻		
ults						Rece	ptor #1:	Cuckoo	Habita	at							
							Noise Lir	nits (dBA)					Noise	Limit Exce	eedance (	dBA)	
			Laicula	ed (dBA)	D	ay	Eve	ning		Night		D		Ever		Nig	ht
		Equipment	Lmax*	Leq	Lmax	Leq	Lmax	Leq	Lmax	( L	.eq	Lmax	Leg	Lmax	Leq	Lmax	Leg
		Total	57.3	53.3	N/A		N/A			/A	N/A	N/A		N/A	N/A		N/A
	Excavator		57.3	53.3	N/A	N/A	N/A	N/A	N	/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2																	
3																	
4																	
5																	-

Figure 8. RCNM Results for Track Hoe

## Loaders, track hoe, dump truck

The RCNM calculated the noise levels (Leq) associated with blasting to be **56.5 dBA** in the closest suitable habitat, **2.72 dBA less** than the baseline roadway noise level.

		Case De:	scription:												
Rec	eptor		•										l I	<b>-</b>	1
		Description	La	nd Use	Ba	aytime aseline dBA)	Evening Baseline (dBA)	Bas	nttime :eline BA) -			Metric: loise Lir	nit Criter	<u> </u>	
1	Cuckoo	Habitat	Residential		-	66.0	66.0		66.0						
2					-										
3					-								-		
4					-					-			Recep	tor #1	
													Noise	Limits	
Equi	pment	Receptor ‡	1: Cuckoo Hat	itat						L					
	Active	Descr	iption	Impact Device	Usage(%		Spec Lmax (dBA)		L	ctual max IBA)	Distance to Receptor (feet)	Estima Shield (dB4	ing		
1	1	Dump Truck		- 💷	40	%		84.0	V	76.5	740.0	1	0.0		
2		Backhoe		•	40			80.0	<u>_</u>	77.6	740.0		0.0		
3		Concrete Mixer Truck			40			85.0	V	78.8	740.0		0.0		
4		Blasting		- <u>-</u>		% 🖌		94.0		N/A	740.0	)	0.0		
5	1	Excavator		-	40			85.0	1	80.7	740.0	)	0.0		
-		Jackhammer		- V	20	%		85.0	V	88.9	740.0	)	0.0 🔻		
6															
Ilts					Rece	·	Cuckoo H	labitat							
			Calculated (rIR4	1		Noise Lim	its (dBA)						edance (d		
			Calculated (dB/	´ D	ay	Noise Lim Ever	its (dBA) ing	N	light		ay	Even	ing	Nig	
		Equipment	` Lmax* Leq	í D Lmax	ay Leg	Noise Lim Ever Lmax	its (dBA) inq Leq	N Lmax	light Lea	Lmax	ay Leg	Even Lmax	ing Leg	Niq Lmax	Leg
Ilts		Total	Lmax* Leg 57.3 51	´ D Lmax 3.5 N/A	ay Leq N/A	Noise Lim Ever Lmax N/A	its (dBA) inq Leq N/A	N Lmax N/4	light Lea	Lmax ZA N/A	av Leg N/A	Even Lmax N/A	ing Leg N/A	Niq Lmax N/A	Leg N/A
	Dump Truc	Total	Lmax* Leg 57.3 51 53.0 43	<ul> <li>D</li> <li>Lmax</li> <li>5</li> <li>N/A</li> <li>1</li> <li>N/A</li> </ul>	ay Leq N/A N/A	Noise Lim Ever Lmax N/A N/A	its (dBA) ing Leg N/A N/A	N Lmax N/A N/A	light Leo A N	Lmax <mark>/A N/A</mark> /A N/A	ay Leg N/A N/A	Even Lmax N/A N/A	ing Leg N/A N/A	Niq Lmax N/A N/A	Leg N/A N/A
IIts	xcavator	Total sk	Lmax*         Leq           57.3         50           53.0         44           57.3         55	<sup>2</sup> D Lmax 8.5 N/A 8.1 N/A 8.3 N/A	ay Leq N/A N/A N/A	Noise Lim Ever Lmax N/A N/A N/A	its (dBA) ing Leg N/A N/A N/A	N Lmax N/4 N/4 N/4	light Leo A N A N	Lmax /A N/A /A N/A /A N/A	ay Leg N/A N/A N/A N/A	Even Lmax N/A N/A N/A	ing Leg N/A N/A N/A	Niq Lmax N/A N/A N/A	Leg N/A N/A N/A
IIts		Total sk	Lmax* Leg 57.3 51 53.0 43	<sup>2</sup> D Lmax 3.5 N/A 3.1 N/A 3.3 N/A	ay Leq N/A N/A N/A	Noise Lim Ever Lmax N/A N/A	its (dBA) ing Leg N/A N/A	N Lmax N/A N/A	light Leo A N A N	Lmax <mark>/A N/A</mark> /A N/A	ay Leg N/A N/A	Even Lmax N/A N/A	ing Leg N/A N/A	Niq Lmax N/A N/A	Leg N/A N/A

Figure 9. RCNM Results for Loaders, Track Hoe, and Dump Truck

### SUMMARY

On average, noise from construction will be 6.2 dBA less than the baseline roadway noise level within the suitable yellow-billed cuckoo habitat. No construction activities were found to be louder than the baseline roadway noise levels within the potential suitable habitat for yellow-billed cuckoo (Table 2).

Construction Activity	Baseline Roadway Noise Level (dBA)	Construction Activity Noise Level (dBA)	Difference
Blasting	59.22	50.6	-8.62
Jack Hammering	59.22	58.5	-0.72
Concrete Mixer	59.22	51.4	-7.82
Front End Loader	59.22	51.7	-7.52
Dump Truck	59.22	49.1	-10.12
Track Hoe	59.22	53.3	-5.92
Loaders, track hoe, dump truck	59.22	56.5	-2.72

### Table 2. Construction vs. Baseline Roadway Noise Level