Environmental Assessment of a Shooting Range at the Johns River Game Land as an Alternative to the Pisgah/Linville River Game Land Site

Composed by: Little Environments PLLC
16 West Martin St, Suite 507
Raleigh, NC 27601
Authored: Joseph Little
Contact: info@littleenvironments.com
+1 (919) 916 9061

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Division of Engineering and Lands Management
1720 Mail Service Center
Raleigh, NC 27699

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23 pages
and accompanying documents

Introduction and Project Background

The North Carolina Wildlife Resource Commission (NCWRC) has expressed an initiative to improve game lands and develop firing ranges to aid in the management of small arm/rifle practice firing and minimization of open field firing where not necessary. As part of this initiative, the NC WRC conceived and proposed a dual firing range in the existing NCWRC Pisgah Game Land, Linville River Tract. This site posed difficulties due to concerns with adjacent property owners and local community members. As a result the NCWRC is considering an alternative site on the Johns River Game Land in the proximity of an existing Burke County Shooting Range. The site location and layout is shown in the figures below. The total tract of land where the development is to occur is a cumulative 2341 acres. The area for physical disturbance is approximately 4.0 acres or 0.02% of the entire tract. The site is located at the approximate coordinates and is shown in the following figure:

35°47’12.9”N, -81°39’11.2”E

Figure 1. Proposed Range Layout

The area is currently managed and operated by the NCWRC making it an ideal area for the development of this project. Additionally the area is suitable from an environmental standpoint and implementation of the project at this location will have net positive environmental impacts. In the sole development and construction of the site, standard construction BMPs will have to be used and a on-going environmental stewardship plan is recommended. It is expected that the presence of the NCWRC at the site will (1) bring 1300 and 14,600 kg of lead shot into a controlled manageable area that would otherwise be discharged in an uncontrolled manner, and (2) improve environmental education and stewardship in the area. The following document outlines the critical environmental issues on site including project background, purpose and need for action, alternatives, net environmental impacts, flora/fauna and endangered species considerations, topology, soils and groundwater, surface water, local influence, lead deposition, previous use, sound data analysis, conclusions and recommendations. The figure below shows the site vicinity relative to Morganton.

Figure 2. Site Vicinity

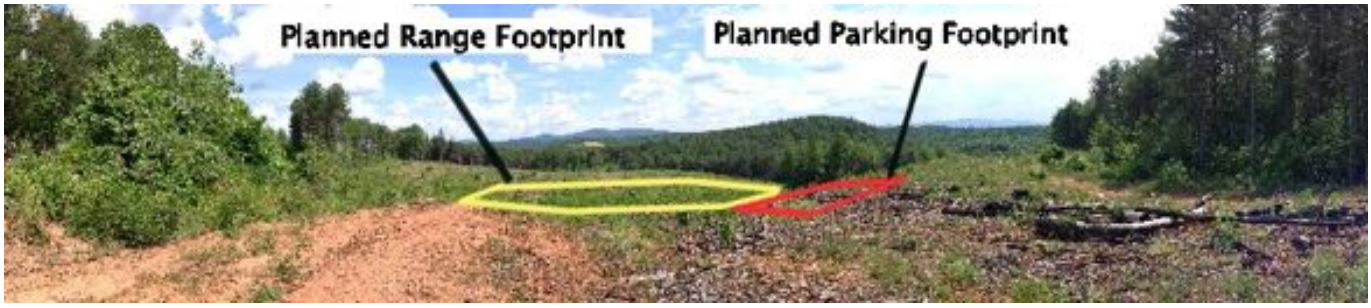

Figure 3. Panorama Showing Footprint of Future Site

Purpose and Need for Action

As lands in North Carolina (NC) become more densely populated and urban sprawl expands into rural areas, it is important that safe and environmentally friendly areas for sport hunting and target shooting exist and are pre-determined. As residential areas encroach on conservation lands, game lands, and national forest, and game land buffer zones become scarcer, an immediate transition from developed residential property to game lands will result. This has the significant potential for future safety issues and increased game land use where game lands exist. Increased use of game lands implies that more shot will be fired per annum and resultantly more shot will be deposited in uncontrolled areas. The intent of the development in the Johns River Game Land, is to provide an area where target shooting can be carried out with relatively easy access to prevent uncontrolled practice shooting, improve environmental stewardship and awareness, and improved shooter safety. Improved shooter safety means reduced accidents and avoidance of significant future environmental impacts associated with medical services. The firing range may be used as a location to support hunter safety courses and proper firearm use, reducing the chance of shooting related injury through practice. A figure prepared by the NCWRC is provided in Appendix C that shows the range location in vicinity to the game land.

Alternatives

This site on the Johns River game land has been evaluated and selected as an alternative to the Linville Tract, Pisgah game land Site. The primary concern on the existing site was the disturbance of tranquillity due the addition of a shooting range in an area where other significantly loud activity was limited. This site is immediately adjacent an operational landfill that operates heavy landfill machinery, and is 0.3 miles from an existing Burke County Sherriff's Shooting Range. While there are some structures and residences in the near vicinity, they are separated by dense forest and varying topology. The site is not expected to exceed a day-night average of 55 decibels at the closest residence due to the operational hours being confined to daylight hours. This is based on data collected by Shield Engineering Inc. that is further analyzed later in this document. Physically this site is very similar in conditions to the Linville Tract site, with a more appropiate surrounding land use that will be more accommodating the future shooting range. The previous environmental assessment document for the Linville site, should be read in conjunction with this document for a better background understanding.

Net Environmental Impacts

The purpose of the shooting range proposed on the Johns River game land is to provide a safe area for target shooting that will allow control of lead deposited on game lands. Resultantly, the project at this location will have net positive environmental impacts on site and in the community. Net environmental impact analysis is the evaluation of the cumulative impacts of a project where some minor impacts can be offset by major environmentally positive impacts. In the case of this proposed project, the positive impacts significantly outweigh any potentially negative impacts. The site, composing less the 0.02% of the entire tract will improve safety, environment stewardship, and management of lead. Ultimately the significantly limited development of this site into a shooting range will have no significant environmental impact and will offset other existing environmental impacts. Adherence to recommendation provided later in this document will also ensure no net environmental impacts.

Flora/Fauna and Endangered Species Considerations

Little Environments' carried out a general site inspection on May 28th, 2015, around 3:00 pm. During this inspection flora and fauna were generally inspected. The fauna that were directly witnessed during the inspection included the red-tailed hawk as well as a turkey dusting site. A photo of the wild turkey dusting site and tracks is shown in the following photo.

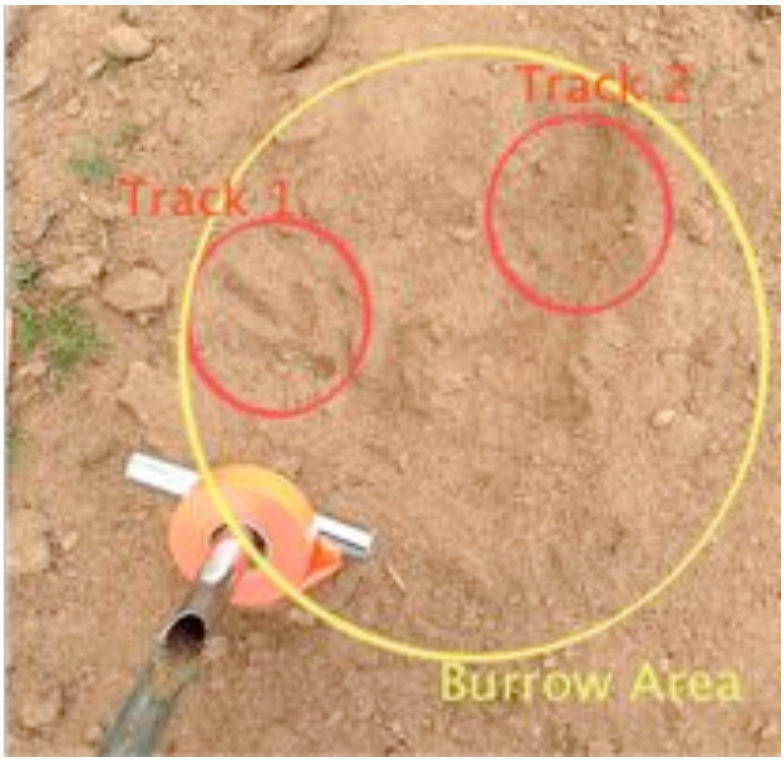

Figure 4. Turkey Tracks and Dusting Site

Figure 5A. Fennel

Figure 5B. Blackberry

Figure 5C. Yellow Poplar and Red Maple Seedlings around Recent Cut Pine Stump

Figure 5D. Common Mullein (Non-Native/introduced Species)

Figure 5E. Recently Established Pine in Clay

Figure 5F. Elderberry

Figure 5G. Lake Shoreline Forest to the South of Future Site (Beginning Secondary Succession, With Significant Undergrowth)

Figure 5H. Canopy of Forest to South of Shooting Range

The flora and fauna witnessed on site were typical of a recent timber clearing or harvesting, as the example plants above are typical of an immediate establishment after clearing. Some of the succeeding plants in the area were non-native, such as the common mullen. It should be noted that the common mullen is however non-invasive. No endangered species were observed on site nor is the local ecology and environment supportive of habitation by typical threatened or endangered species of Burke County. This is based on the common and reported (USFWS) habitats that support

the species. The parameters that were reviewed for endangered species include soil type, ecosystem type, necessary soil moisture, and elevation. This is elaborated on in the following table and description.

No endangered species were witnessed on site. The following tables identified species that are listed as endangered, threatened, or of concern. The site was recently cleared for lumber harvest and the site is in early stages of secondary succession. Considering the state of the site at inspection, threatened or endangered species on the site are not probable. The following table shows the species identified in Burke County and subsequent notes are made identifying the reason for lack of anticipation or expectation of the species in the footprint of the site. It should however be noted that that future site could serve a dual purpose for establishing restorative trial populations of some of the threatened vascular plants.

Table 1.USFWF Identified Threatened and Endangered Species of Burke County

Species	**Status**	**Notes**
Vertebrates		
Bog Turtle *Clemmys muhlenbergii*	Threatened	Site is not Common Habitat
Northern Long-Eared bat *Myotis septentrionalis*	Threatened	No Nesting Areas in existing Open site
Bald Eagle *Haliaeetus leucocephalus*	Bald Eagle Protection Act	No Nesting Areas in existing Open site
Vascular Plant		
Dwarf-Flowered Heartleaf *Hexastylis naniflora*	Threatened	Requires moist soil, Not Anticipated
Heller's Blazing Star *Liatris helleri*	Threatened	Not anticipated to recent clearing and small number of populations known.
Mountain Golden heather *Hudsonia montana*	Threatened	Not in Elevation range
Small Whorled Pogonia *Isotria medeoloides*	Threatened	Not expected, Orchid type plant occurs in understory. Not anticipated due to recent clearing.
Spreading avens *Geum radiatum*	Endangered	Not expected, occurs above 4200 ft
White irisette *Sisyrinchium dichotomum*	Endangered	Distribution focused south of burke County, Not-Probable
Lichen		
Rock Gnome Lichen *Gymnoderma lineare*	Endangered	Found Normally on Vertical Rock faces, not Expected.

*Full USFWS Table including species of concern can be found in appendix B.

Topology

The figure below shows the topology of the site. The future shooting range site is on the western side of a switchback bank that slopes downward at 15-25%. The future parking lot is planned to the west, on the eastern side of the adjacent switchback. The topology lends itself to quick drainage down to wetlands adjacent Lake Rhodhiss. The site has the potential to be in areas with elevation from about 1050' up to about 1130' based on existing topology. The main implications of the topology of the site will be the need for a retention or detention basin to intercept runoff as well as the ability to design and place the shooting range floor at the lowest/deepest topology available to help control sound. During the final design, the further the shooting range can be dug into or cut into the eastern side of a switch back, the better the site will perform at redirecting sound from the residences that are approximately 0.35 miles to the west.

Figure 6. Topology of Site and Surrounding Area

Soils and Ground Water

The soils on site were inspected visually on May 28th. The soils across the site are predominately the same and also contain fragments of organic mulch material from the recent lumber harvest. The observations confirmed the soil composition logged in the 1926 USGS soil survey. This USGS soil survey map is provided in the figure below. The soils in the area are typically impermeable and have low transmissivity. This means that the soils are very resistant to absorbing water on an on-going basis and allowing water to percolate into the groundwater basins. As a

result, the majority of water that will fall on this site during a rain event will drain down through the catchment and into Lake Rhodhiss if not intercepted. The soils present on the site and in the vicinity include (T) Talladega Stony Loam and (Cl) Cecil Clay Loam. Both of these soils have good cation exchange capacities(CEC) meaning they help bind small particles of lead and prevent them from mobilizing. The cecil clay loam is a better material for range backstops, as it does not contain a stony component. Soils that contain stones or rock components are not ideal for backstop and range construction due to the expectation of lead bullet fragmentation upon impact with a rock. Lead is better managed when it is in large pieces. Future sieving of the material or application of a sand veneer in the future design will make the management of lead on the site easier. Ultimately the soils on site make a good barrier to lead infiltration and can be modified or amended during the construction process. A small shallow (Not expected more than 20') groundwater-monitoring well, down slope from the facility, would be an advantage for long term management and monitoring.

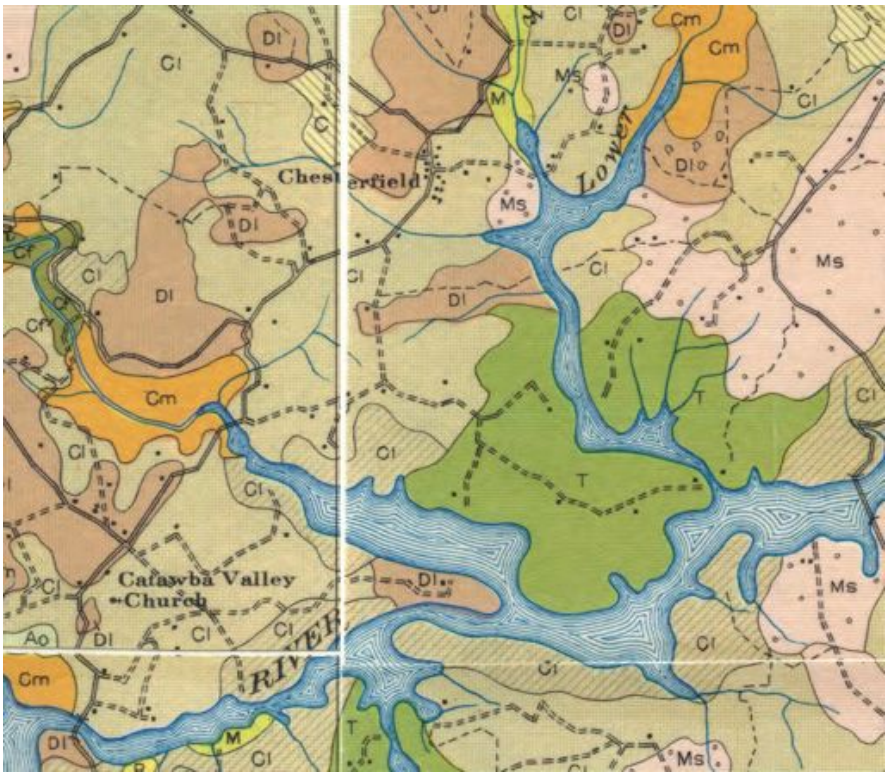

Figure 7. 1926 USGS Soils Map of Area

Surface Water

As the ground is composed of significantly impermeable soils, the surface water on the site drains directly from the site to the south over the clear site, into wetland areas. The longest path of surface drainage is about 2100 feet. The entire drainage catchment where future range will be

located is approximately 48 acres, with the area of impact including about 4.0 acres. Due to the clay/loam content of the soils on site, the soils are very easily eroded. Care should be taken during the design to ensure materials used for the range construction, remain on the range or are either intercepted by a BMP stormwater device. The 48 acre basin, where the site is located, is DENR rated WS-IV C as it is a highly developed area that contributes to a drinking water supply that is additionally used for aquatic life preservation and secondary recreation. The final stormwater design should account for this and incorporate an appropriate factor of safety.

Figure 8. Drainage Catchment for Future Range Location

Local Influence Analysis

In regard to the project objective of attracting target shooters that would otherwise practice on uncontrolled land, it is important to consider the area of customers or users of the site. From the total expected customer base, the quantity of lead deposited can be estimated and is done so later in this document. Various factors contribute to the annual use of a rifle site, including ease of access, knowledge of the site, percent of hunters or gun sportsmen/sportswomen in the area. To be influenced by the site, the user must visit the site and take appreciation of the site and what it has to offer. The figure below shows two radii of 10 miles and 20 miles. Within this area there are several large towns whose populations are expected to make up a significant portion of the site's users. These towns and near proximate towns include Morganton, Valdese, Nebo, Linville, Collettsville, Bethlehem, Patterson, Drexel, Glen Alpine, Laurel Hill, Oak Hill, Little River, Hickory, Salem, Warrior,

Granite Falls, and Lenoir. These radii encompass portions of Caldwell County, Catawba County, Burke County, Cleveland County, and Lincoln County. Total populations for these counties are provided in table 3, below.

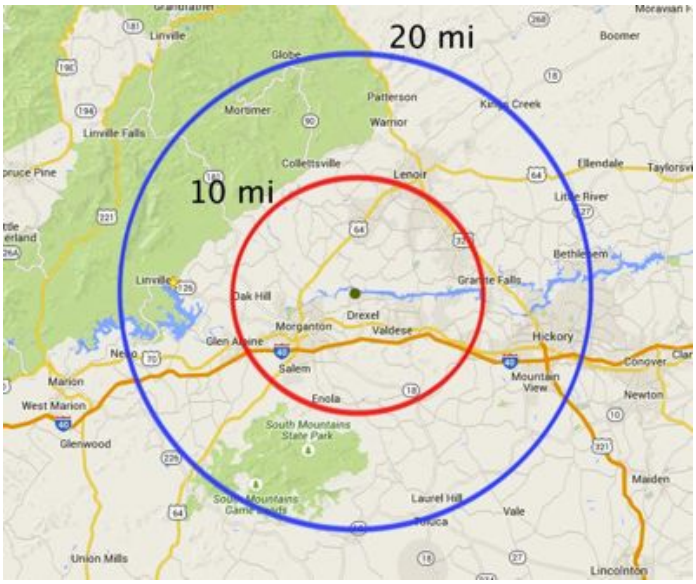

Figure 9. Radial Chart for Approximate Distance Travelled

With a total combined population of 405,703 persons, the population of Burke, Caldwell, Catawba, and Lincoln County make up the primary potential users of the Johns River Shooting Range. Cleveland County has been omitted due to the presence of a developing NCWRC range. State wide statistics published by the National Fish and Wildlife Service, developed from surveys, indicate that approximately 8% of North Carolinians go hunting or shooting each year. Applying these statistics to the total population of these counties provides a potential number of site users of 32,456 persons. It is expected that the total number of visitors will be less, as other hunting preferences exist such as clay or bird shooting over fixed range shooting, however the 32,456 person estimate is a good outreach example based on conservative assumptions. The number above does not consider tourist use or long travel use and is based on the average commute time travel to work of 15-20 minutes being a reasonable time to travel to a location of recreation shooting.

Table 2. Population of Significant Counties Influenced

	BURKE	LINCOLN	CALDWELL	CATAWBA	COMBINED
Urban population	52,136	35,569	54,444	107,595	249,744

Rural population	38,776	42,696	28,585	46,763	156,820
Total population	90,051	78,265	83,029	154,358	405,703

- Population statistics are from NC Department of Commerce 2015 Census

The figure below is the NCDOT map of the local area. The site is approximately 5 miles from I-40. The site has high potential to attract tourist that are visiting Lake James, Lake Rhodhiss, or the John River Game Land. The area also has the potential to serve as a site for warm up or calibration prior to the use of the game land for hunting.

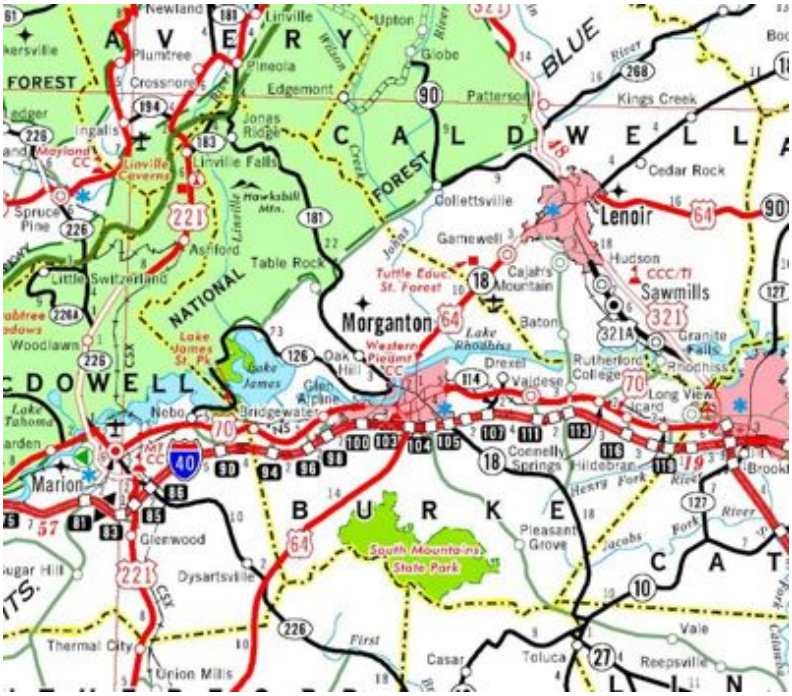

Figure 10.NCDOT Highways Map

The more people that use the site, the more lead will be diverted from uncontrolled practice shooting areas and resultantly more environmental impacts on other properties will be offset. Outreach to the populations including wildlife officer engagement and signage information at site will promote environmental stewardship.

Lead Deposition

Lead deposition on site is expected to be a function of the total users that visit the site. The site is for rifles and handguns only, with the most common caliber bullets expected to be between 45mm and 9mm. Bullets of this caliber range between 7.5 grams and 12 grams with 10 grams being the typical maximum used recreationally. Assuming that the typical site user or customer

fires on average 45 shots, the lead deposited per user could range between 337.5 grams and 450 grams. This makes the number of users that visit the site a critical variable in estimating the lead loading capacity of the site. The lead loading capacity will need to be met with a design by an engineer to support such shooting and user visit frequencies.

Two general methods can be used to determine the number of potential visitors to the site or control the number of visitors to the site. The first method is to estimate the number of users based on available parking. Effectively the number of parking spaces available can be used to control the amount of lead deposited on the site or the number of users can be determined based on the expect out reach of 32,456 persons, as estimated in the previous section. 16 parking spaces are available in the plan for the site. Assuming 200% usage on the weekends, where each space will be filled twice, and 15% usage on each weekday(2.5 visitors per weekday) the estimated number of visitors is 76 users per week or 3952 users per annum.

Table 3. Estimated Lead Deposition on the Future John River Shooting Range

Guest Method	Lower or Higher Lead Shot Per Person(g/pp)	No. of Guest (persons)	Estimated Volume of lead Deposited per Annum (kg)
From Influence or Outreach	337.5g/pp	32,456	10,953 kg pb
From Influence or Outreach	450g/pp	32,456	14,605 kg pb
Based on Parking Control	337.5g/pp	3952	1333 kg pb
Based on Parking Control	450g/pp	3952	1778 kg pb

Previous Land Use, Heritage

Due to the close proximity of the current site to the existing site, similar heritage conclusions can be made. Where deep excavation is to occur, monitoring of excavation during the project construction is recommended for potential artifacts.

Analysis of Sound Data

The new site for the shooting range was chosen based on similar noise producing land uses in the vicinity that would accommodate the addition of a public shooting range. The following environmental sound analysis considers the existing noise sources in the project vicinity and evaluates the potential for additional disturbance above and beyond the already existing conditions. Currently in the vicinity of the proposed NCWRC shooting range site there is an existing shooting range for the Burke County Sheriff's Department as well as an operational landfill. Shield Engineering Inc. and NCWRC staff at various locations including the Sheriff's shooting range, the closest residence, and the proposed NCWRC shooting range site collected sound/noise data. Data Collection methods were similar to the methods employed at the previous site of consideration. This data serves as a basis for this analysis along with standard noise levels produced by machinery and firearms. This data accompanies this document in appendix A, but is summarized in the table below. A photo of the site sound testing is provided below, also showing the potential sound reduction tube that is being considered.

Figure 11. Sound Monitoring Using Sound Reduction Tube

From the data collected it can be deducted that the additional NCWRC shooting range in the area will have no discernable change in the acoustic environment at the adjacent and local properties. The table below shows the comparison of sound attenuation from the current Sheriff shooting range to the local residences.

Table 4. Sound Measurement Comparison between existing Sheriff shooting Range and Proposed NCWRC shooting Range

	NCWRC Shooting Range Noise Source	Sheriff Shooting Range Noise Source
Assumed Source Sound Level at Site	160dBa	160dBa
Sound Level at Location 1	54-56dBa	58dBa
Sound Level at Location 2	Audible but not Quantitatively Discernable	50dBA

From examining the above table one can see that the existing shooting range has a higher impact in regards to sound carrying to local residence than the proposed NCWRC shooting range. Carried sound measurement at Location 1 was higher when the source was the Sheriffs' Department Shooting Range, versus the NCWRC Shooting Range. Carried sound was not quantitatively discernable for location 2 when the source was the proposed NCWRC Shooting Range where the sound was quantitatively discernable when the source was the Burke County Shooting Range. It is also necessary to note that the 50-60dBa sound range is less than the noise caused by general face-to-face conversation.

The figure below is a comparison of the topology on a direct path from the existing Sheriff's Department Shooting Range to the closest residence and a direct path from the proposed shooting range to the closest residence. While the distance is shorter from the NCWRC range, the topology includes a drastic change in elevation immediately adjacent each range. It is anticipated that this quick change in elevation, compounded with forest growth will further aid in attenuating the sound carry. Also provided below is a table demonstrating the sound produced by continuously operating landfill equipment. The continuous 90 dBa produced by the existing landfill operations is more likely to exceed a day-night average of 55dBa than the intermittent shots that will be produced by the proposed future NCWRC shooting range. Additionally the proposed shooting range, with hours limited to daylight, will adhere to the Burke County ordinance Sec. 26-38(9). This is cited in appendix E. Ultimately the implementation of a shooting range at this site will have no significant impact or alteration to the existing environment. Sound attenuation devices may be employed in the design of the shooting range site to be precautious and sensitive to the area.

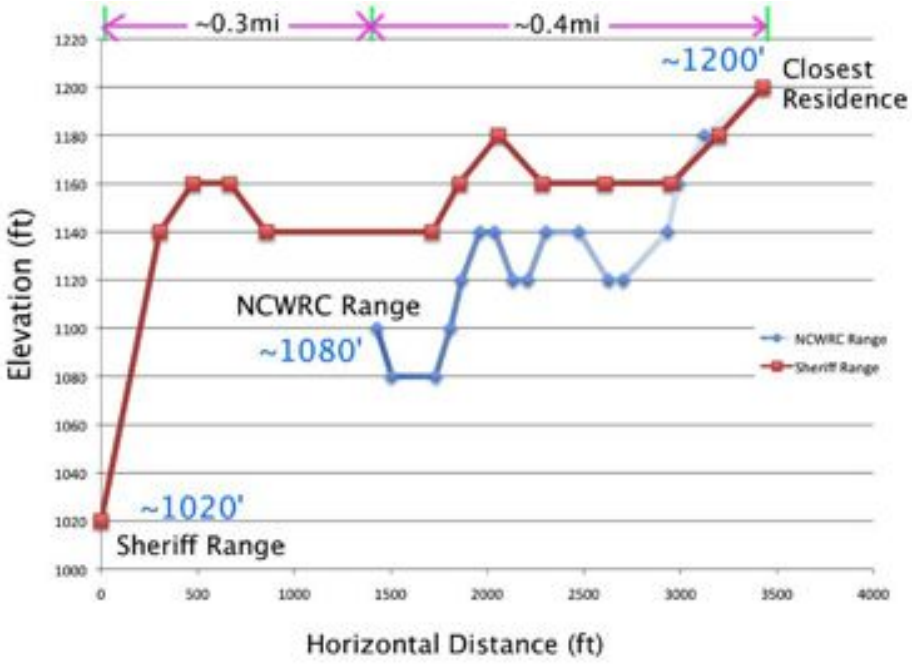

Figure 12. Comparison of topology Change from the Sheriff Range to Closest Residence and from the NCWRC Range to the Closest Residence

Sound Source (distance)	dBA[1]	Response Descriptor
Heavy truck (50 ft) Backhoe (50 ft) Excavator (50 ft) Grader (50 feet) Scrapers (50 ft)	80-92	Hearing damage (8-hour exposure)
Bulldozer (50 ft)	82-92	
Front-end loader (50 ft) Compactor (50 ft)	76-82	
Cranes (50 ft)	70-84	
Generators	70-80	
Freeway traffic (50 ft)	70	Intrusive
Light auto traffic (50 ft)	60	
Normal speech (15 ft)	50	Quiet
Living room, bedroom, library	40	
Soft whisper (15 ft)	30	Very quiet
Broadcasting studio	20	
	10	Just audible
	0	Threshold of hearing

[1] Typical A-weighted noise levels taken with a sound-level meter and expressed as decibels on the "A" scale. The "A" scale approximates the frequency response of the human ear.
Sources: U.S. CEQ 1970; U.S. DOT 1977; U.S. EPA 1971.

Figure 13. General machinery Noises From Landfill Type Equipment
(From Cedar Hill Landfill Study)

Conclusions

After review of the site in regards to above environmental attributes and existing conditions, considering the current game land status of the site, as well as adjacent land uses, the development of a public NCWRC shooting range will have no significant environmental impact. Further the site is expected to improve the overall quality of the environment in the area. The following recommendations are made to ensure future and ongoing environmental quality.

Recommendations

In the development of the NCWRC Shooting Range on the Johns River game land, the following recommendations are made forward:

1. Refrain from future timber harvest to the west of the shooting range where possible.
2. Implement sound reduction technologies as a precautionary measure. This may include sound reduction tubes, a dual use retaining/sound deflection wall to the west, or an acoustic mirror to the west.
3. Design the shooting range to consider the local soils and prevent bullet fragmentation and also verify soil cation exchange capacity (CEC) at time of construction.
4. At the outset of the project, implement real time remote sound monitoring for 1-2 weeks as an alternative to implementing sound reduction devices. Sound reduction devices may not be necessary.
5. Implement a stormwater design that incorporates additional factors of safety due to proximity to class IV waters.
6. Install the range as deep into the topology as possible to aid in sound attenuation.
7. Compose and implement an environmental stewardship plan that monitors the environmental variables of the site on an on-going basis, including but not limited to volume of use.
8. Where possible, re-vegetate the surrounding site area with native species of concern that are typical of the local ecosystem.
9. Were deep excavation is included in the design, include a construction monitoring plan for potential archaeological and heritage encounters.
10. Make plans for future range expansion, should the range use start to significantly surpass the range capacity. This may also include a future shotgun range facility.

9 June 2015

From the Director

Little Environments PLLC thanks the NCWRC for the opportunity to carry out this study and analysis. Little Environments enjoys every opportunity to work with people and the environment, in the environment.

Best Regards,

Joseph Little PE/MIEAust
Managing Director

Little Environments PLLC
3814 Cobb St, Garner, NC 27529, USA
www.littleenvironments.com
joseph.little@littleenvironments.com
+1 (919) 916 9061

References

USFWS Endangered and Threatened Species list 2015

Cedar Hill Landfill, Typical Landfill machinery Noise

Department of Commerce, NC, Access NC Statistics

USFWS Hunting Estimates 2012

Notes

1. This document is in no way an engineering design.

Appendix A- Data Collected By Shield Engineering for Johns River shooting Range Site.

(See Accompanying Document)

Appendix B- USFWS Complete List of Threatened, Endangered, and Species of Concern for Burke County NC.

(See Accompanying Document)

Appendix C- NCWRC Johns River Shooting Range and Game Land

(See Accompanying Document)

Appendix D- Additional Photos

Access Gate to the West

Appendix E- Burk County Sound Ordinance Regarding Firearms

Burke County Ordinance Sec. 26-38(9)

"The firing or discharging of any gun, fireworks, firecracker, gunpowder or other combustible substance in the street or elsewhere for the purpose of making noise or which creates frequent or long continued noises and sounds such that a reasonably prudent person would recognize as likely to unreasonably disturb persons in the vicinity between the hours of 11:00 p.m. and 7:00 a.m., except with the appropriate permit issued under this article or by authorized law enforcement officers discharging their official duties. Properly licensed hunters pursuing game legally and in compliance with all local, state and federal regulations are not in violation of this subsection when discharging weapons toward game."