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PUBLIC AREA OF PLACY SHOOTING RANGE

BACHELOR THESIS

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CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Environmental Sciences

BACHELOR THESIS ASSIGNMENT

Thi Tuyet Hanh Nguyen

Environmental Engineering

Thesis title

Public area of Placy shooting range

Objectives of thesis

The objective of the thesis is to design public areas of Placy shooting range.

Methodology

The student will write a literature review focused on landscape design, concerning mainly the values of open space, the influence of natural conditions and design principles of commercial estates, on Czech shooting cultures, and on a review of case study references both in the Czech Republic and abroad. The review of case studies will focus mainly on the analysis of amenities complementing the shooting sports (such as recreational activities, physical training, commercial spaces, accommodation, etc.). Subsequently, she will produce site analyses and a summary of Placy owner's business strategy for the shooting range target audience.

Based on the information above, she will devise a program for the public areas of the shooting range (i.e. activities, their spatial requirements, and interconnections) and propose its physical representation.

The proposed extent of the thesis

approximately 50 pages of report, diagrams and sketches, masterplan in 1:500

Keywords

shooting range, design, public space

Recommended information sources

Berry, David. "Preservation of Open Space and the Concept of Value." *The American Journal of Economics and Sociology*, vol. 35, no. 2, [American Journal of Economics and Sociology, Inc., Wiley], 1976, pp. 113–24, <http://www.jstor.org/stable/3485814>.

Loidl, Hans, and Stefan Bernard. *Open(ing) Spaces : Design As Landscape Architecture*, Walter de Gruyter GmbH, 2014. ProQuest Ebook Central, <https://ebookcentral.proquest.com/lib/techlib-ebooks/detail.action?docID=1480471>.



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I hereby declare that I have independently elaborated the bachelor/final thesis with the topic of *Public area of Placy shooting range*, and that I have cited all of the information sources that I used in the thesis as listed at the end of the thesis in the list of used information sources.

Prague

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(author`s signature)

PREFACE

I would like to thank my thesis supervisor, Ing. Vojtěch Novotný, Ph.D. for the guidance and support throughout my thesis journey, especially for helping me with the field trips. Thank you.

ABSTRACT

Placy shooting range is a 12 ha outdoor shooting facility located in Příbram district of the Czech Republic. The range has become famous thanks to its 500 m firing area, which is unique in the country. This bachelor thesis is based on the request of the range's owner for the design of the range's support facilities and open space.

The literature search deals with the issues of open space and commercial landscape design, as well as the subject of shooting ranges and shooting activities in the Czech Republic, taking into place four cases of outdoor shooting range in the country and abroad. The practical part describes the analysis of physical, natural, and organizational conditions of the case study, and the business strategy of Placy's owner. Finally, by combining data obtained from previous parts, a concept plan for the public area of the facility has been expressed, contributing to the range's development.

KEYWORDS

Shooting range, design, public space

ABSTRAKT

Střelnice Placy je venkovní střelnice o rozloze 12 ha nacházející se v okrese Příbram v České republice. Střelnice se proslavila díky své střelecké ploše 500 m, která je v republice unikátní. Tato bakalářská práce vychází z požadavku majitele střelnice na návrh zázemí a otevřeného prostoru střelnice.

Literární rešerše se zabývá problematikou open space a komerčního krajinářství a dále tématem střelnic a střeleckých aktivit v ČR, přičemž se jedná o čtyři případy venkovních střelnic v tuzemsku i zahraničí. V praktické části je popsána analýza fyzických, přírodních a organizačních podmínek případové studie a obchodní strategie majitele Placy. Nakonec byl spojením dat získaných z předchozích dílů vyjádřen koncepční plán veřejného prostoru zařízení přispívající k jeho rozvoji.

KLÍČOVÁ SLOVA

střelnice, design, veřejný prostor

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1. INTRODUCTION

Firearms are not only known as an effective tool to serve the war and national defense, but are also widely used for recreational purposes, such as sports shooting, self-defense, hunting, education, and wildlife protection. However, practicing shooting is not an easy task. In fact, it requires precision and balance, a combination of physical and mental conditions, because “the execution of movement is what makes the result differently” (USA shooting ©2019). Needless to say, the challenge and difficulty of the sport itself are what make the use of shooting ranges more popularly and commonly.

Shooting ranges are places where visitors may participate in multiple ways, including training, competition, skill development, education, and recreation. Therefore, a shooting range should satisfy multiple goals, such as proper operation and recreational enjoyment. Besides that, the proper design of the range's support amenities and open spaces is very important. Those elements are essential for operating the shooting range, boosting business, and increasing social interactions.

Placy shooting range is a 12 ha shooting facility located in Příbram district of the Czech Republic. The range is owned by Mr. Martin Lukeš and his wife, Mrs. Bohdala Lukeš Milcová, one of the top sporting shooters in the Czech Republic. Placy is famous for its 500 m firing area, which is unique in the country. The facility is currently under reconstruction of the existing shooting area and planning of the new shooting sections. The facility's goal is to attract more shooters and their families, not only in the country, but from around the world, as well as host international shooting competitions and other shooting events.

With the desire to extend the facility's business, Placy's owners have requested a design proposal for the range's support facilities and its surrounding. The work of the thesis is based on their demand to find the most effective solution for the design plan of the public area of Placy shooting range.

2. OBJECTIVES

The objectives of the thesis are to break down the understanding of open spaces, and the subject of shooting ranges and shooting culture in the Czech Republic. The work then analyses the case study of Placy shooting range and the business strategy of Placy's owners. Subsequently, combining all data obtained to create a complete design plan for the public area of the facility.

3. METHODOLOGY

The thesis consists of three parts: literature review, case analysis, and design.

The first part is divided into three sections. The first section focuses on values and types of public open space, including the understanding of commercial open space, human activities in such space, and the design principles of its compositions. It is also coped with the management and maintenance of wet meadows in the Czech Republic. The second section describes the field of shooting range and shooting activities in the Czech Republic. This section goes through the history of gun shooting sports, shooting range typologies according to the Czech Standard, the overview of commercial outdoor shooting ranges in the country, and shooting activities in these spaces. The last section is the case studies, where four cases of outdoor shooting range from the Czech Republic and abroad are taken into place. The work then analyzes and concludes their support facilities and open spaces.

The second part is the case study - Placy shooting range. This part describes the analysis of the physical, natural, and organizational conditions of the facility. Accordingly, the location, connectivity, and development of the area are examined. Besides that, terrain, geology, soil, climate, hydrology, the Territorial System of

Ecological Stability, and the Significant Landscape Element are also observed. Furthermore, the analysis also describes the existing land use, and other conditions such as the firing area and existing support facilities, as well as the facility's operation. Subsequently, the business strategy of Placy's owners has been revealed. Finally, from the data obtained, a conclusion on strengths and weaknesses of the case study has been made.

The third and last part is established as the design proposal for the public area of Placy shooting range. The program and concept plan are the result of the previous analysis. Following is the master plan with two design sections referring to two parts of the area of interest. The master plan is supported by a section image that demonstrates the spatial relationship of the design's compositions to the terrain. Finally, visualization images are provided, for a better view of how the design area would look like.

4. LITERATURE REVIEW

4.1 Open space

4.1.1 THE VALUES OF PUBLIC OPEN SPACE

For us, creating open space is a natural act of self-positioning within our surroundings (Loidl et al., 2014, 46). Especially with the rapid loss of open spaces due to expanding urban activities and resource utilization, preserving land for outdoor recreation and environmental protection becomes necessary (Berry, 1976). Public open spaces are mainly conceptualized as parks, civic spaces, public plazas, nature reserves, and greenways (Koohsari et al., 2015). These spaces can be expressed as places allowing the community to meet, connect, play, do sports, and help meet social needs (Heart Foundation ©n.d.). In public open space, the way people engage, socialize, interfere, and connect with other features are strongly dependent on the physical state of the space's compositions, such as the access, design, size, and natural features

(Koohsari et al., 2015). Additionally, attributes including safety, aesthetics, amenities, maintenance, and proximity in public open spaces are essential for influencing social activities (McCormack et al., 2010).

Public open space and its compositions bring many values to people's lives. Berry (1976) expressed six significant kinds of values that people attribute to public open spaces:

- *Utility values* can be determined as monetary terms or a trade-off link between open space and its services, such as outdoor recreation, scenic amenities, and environmental protection (Berry, 1976).
- *Functional values* are indicated as the connection between the open space's preservation and the natural processes, such as protecting water quality, public health safety, and preventing natural hazards (Berry, 1976).
- *Contemplative and aesthetic values* are described in a way that a particular or protected landscape as an open space is desirable because people tend to enjoy the beautiful landscape, and such scenery may anticipate future visits (Berry, 1976).
- *Recreational values* are conveyed in the way that the public open space generally provides places where people can relax, play, and engage in physical activities. Additionally, specific land uses are beneficial to psychological and physical experiences in various forms of outdoor recreation (Berry, 1976).
- *Ecological values* are expressed as the way the unique local plant and animal communities are protected in open spaces. Note that services and amenities in an open space should be in harmony with various natural processes (Berry, 1976).

On the other hand, Woolley (2003) argues that the benefits and opportunities in public open spaces, in general, should be understood from the four aspects: *Social, Health, Environment, and Economics*:

- *Social benefits* are described as the opportunities for people to do things, connect with other people, and relax when participating in events and outdoor activities. In terms of culture and education, a community would also be benefited from activities such as religious group events, programs for children and adults, or competitions that enhance learning and improve social skills and work patterns (Woolley, 2003, 12-35).

- *Health benefits* are identified as physical and mental health benefits, such as improved physical fitness through various passive and active recreation pursuits; the scenes of nature dominated by vegetation can effectively reduce stress; and generally, contact with nature is a human desire for adventure and variety (Woolley, 2003, 36-47).
- *Environmental benefits* are explained in the way that the planning and design of open spaces can be positive attributes towards environmental benefits on climate and environmental amelioration. For example, trees reduce wind speed, improve the air quality in a neighborhood, and reduce the impact of noise. Also, green spaces give opportunities to afford wildlife habitats and human experience (Woolley, 2003, 48-56).
- *Economic benefits* are expressed as open spaces can increase a region's property values, which can be used as regional or national attractions for tourists and increase local economic, employment opportunities, and land values (Woolley, 2003, 61-70).

4.1.2 OPEN SPACE TYPOLOGIES

Generally, the concept of open space typologies has been discussed in many studies. It can be defined based on the physical state of the space, thus, on the hard/soft landscape such as parks, squares, plazas, and playgrounds (Lynch, 1984). Also, it can be classified in terms of its functions, such as spaces for relaxation and creation, nature conservation, etc. (Woolley, 2003 ex Eckbo, 1969). Recently, the Department for Transport, Local Government and the Regions in England (TLGR, 2012) has determined urban open spaces as two sub-sets: green spaces (e.g., parks and gardens, amenity green spaces, allotments, natural and semi-natural urban greenspaces, outdoor sports facilities); and civic spaces (e.g., civic squares, market squares, pedestrian streets, pedestrian areas). Such typology is intended to provide national guidelines for planning purposes and open space strategies.

However, Woolley (2003) argued that open spaces should not be classified from the point of view of planners and designers, but, the user's experiences as the focus of attention. Thus, divided open space into three groups based on the concept of home range:

- Domestic open spaces are physically associated most closely with the home and are socially used by the family, friends, and neighbors (Woolley, 2003, 74).

- Neighborhood open spaces are physically connected to neighbors or a community and are socially used by a family, neighbors, and others within the community (Woolley, 2003, 75).
- Civic open spaces are physically farthest points from home and at strategic or specific locations. Social interactions are likely to increase in those spaces, where one is likely to meet strangers (Woolley, 2003, 75). This group of open spaces is considered the most valuable by either individuals or communities (Woolley, 2003, 114).

According to such determination of open space typology, commercial open spaces, such as squares, plazas, campuses, outdoor sports facilities, office grounds, and recreational spaces, are defined as civic open spaces (Woolley, 2003, 114). Thus, in most cases, there has to be a particular decision for users to visit those spaces or the associated facilities occasionally.

4.1.3 ACTIVITIES IN COMMERCIAL OPEN SPACE

According to Gehl (2010), there are three different types of activities that people engage in when using a common space: necessary activities, optional activities, and social activities. Necessary activities are an integrated part of everyday life or activities that people generally have to undertake under all conditions of weather and outdoor quality. Optional activities otherwise refer to the recreational part. Thus, the weather or place makes the setting desirable for any particular individual, such as walking for fresh air, outdoor exercise, and playing. In comparison, social activities depend upon the presence of people joining meetings, greetings, and conversations happening in the space (Gehl, 2010, 18-21).

In a commercial open space, the most attractive and popular activities belong to the groups of optional and social activities, which are considered the main factors in terms of users' points of view (Woolley, 2003). These are significantly dependent on the physical state of the environment and the outdoor quality of the space, or, a good space quality condition is a prerequisite (Gehl, 2010). Thus, planning and design can be used to influence the extent and character of outdoor activities in such spaces.

At the same time, Woolley (2003) expressed that passive activities are the most frequently undertaken activities in open spaces, while active activities are the primary use. These passive activities include watching children, events, vegetation, wildlife, meeting friends, or visiting restaurants. In comparison, active activities refer to these that often occur in groups such as doing sports, or in individuals such as jogging or outdoor exercising. Both groups of activities may take place in a commercial open

space. However, it most likely depends on the commercial organizations, thus the size and attraction of the events that do take place (Woolley, 2003, 11-13).

4.1.4 COMMERCIAL LANDSCAPE DESIGN

Landscape design refers to the human perception of space, especially to future users, as an essential planning criterion (Mertens, 2010). The other objective and subjective criteria in landscape design aim to solve the landscape problem and legal requirements (Loidl & Bernard, 2014, 33-40). By way of explanation, landscape design can be understood as "making the perspective and outlook in terms of aesthetic, functions, performance, and transformation" (Zeunert, 2017). In general, the landscape design principles should not only involve a combined understanding of the human activities and behaviors, cultural association, and historical influences, but also their interconnection with the natural condition and ecosystem (Goetcheus & Carr, 2016). Therefore, it is crucial to connect those factors as a whole in order to make a compelling and effective design (Zeunert, 2017).

Gehl (2010) expressed that the planning and design of outdoor spaces should include safety and security, reasonable space, furniture, and visual quality. While Shaftoe (2008) discussed that design of suitable public spaces is to understand how people are likely to respond to the available spaces. Thus, to fulfill particular psychological aspects related to essential human behavioral characteristics such as interpersonal distance, distribution, needs for observation and communication, interpretation, coherence, sense of safety, intrigue, and curiosity (Shaftoe, 2008, 50-55). Additionally, the boundaries in open spaces (e.g., buildings, structures, vegetation) also affect the attractiveness and usefulness of space (Mertens, 2010, 66). Regarding human activities discussed earlier, Liuli and Xulei (2014) indicate that each activity type has different environment (space) requirements. Thus, it is necessary to influence the condition of open space and its connection with different types of human (users) activities for landscape design (Koohsari et al., 2015). For example, campus open space comprises a network of malls, corridors, plazas, greens, and courtyards envisioned to support educational, social, and recreational experiences (Planning, Design & Construction ©n.d.).

Commercial space, however, is a place for business, transactions, and profit-making (Huang et al., 2018). Generally, the goal of landscape design of commercial space is to make the space more attractive and inviting to customers. Its functions not only provide consumers with a place to shop, but it is also an alternative place for recreation and entertainment, as well as for strolling, negotiating, and meeting (Huang

et al., 2018). Furthermore, a commercial space generally relates to the economic growth and cultural values of a region. Or, the developmental potential of a city and its economic development can be determined by the commercial space's design, level, and grade. Overall, an appropriate proposal design for a commercial facility can be influenced by three relevant factors: interior design, outdoor space design, human and business activities (Huang et al., 2018). In general, the outdoor space of a sports facility comprises the entrance space, parking space, outdoor gym and playground, and natural features.

Entrance space is defined by surrounding buildings, structures, and landscapes. It functions as an intersection, buffering and organizing traffic (Zhang, Bao & Zhang., 2012). Note that the position and size of the entrance also have a relationship with which sense of spatial enclosure is strong or weak (Liuli & Xulei, 2014). In general, the design of the entrance to commercial facilities should consider providing security, traffic nodes between external and internal spaces, and communication space (Zhang, Bao & Zhang., 2012).

Parking space is a significant part of territorial and urban planning. Placing parking spaces is a process within the regulatory requirements. Thus, any parking lot should provide two types of space: standard parking spaces and parking spaces for people with limited mobility (Babushkina et al., 2021). Moreover, according to Fichter ©2006, a parking lot is not only intended to accommodate vehicle storage (how to fit the greatest number of vehicles into the smallest space), but also emphasizes ecological, aesthetic, and social considerations. For example, the use of appropriate vegetation to shade specific areas and prevent pollution (canopy cover), clearing pathways integrated with the pedestrian realm, providing aesthetic and functional buffers to transitional areas, or encouraging other use such as outdoor cinema and concerts (Fichter ©2006).

Outdoor gyms and playgrounds are environmental infrastructures built in a public open space to promote structured physical activity (Lee et al., 2018). Outdoor physical activity is important as it benefits public health such as fitness, improves mood rehabilitation, gains strength and mental health benefits. In addition, it results from inter-relationships between individuals and their social and physical environment (Lee et al., 2018). Therefore, the design of an outdoor gym should be considered by multiple factors: safety, shade, the age and gender of the user's group, climate and natural condition, socialization and users' routine, maintenance, and management (Jansson et al., 2019). Outdoor gyms are usually installed in urban parks, but other

facilities, such as those adjacent to children's playgrounds or sports grounds may attract more users (Jansson et al., 2019).

Natural features are considered soft transitions in the landscape within a commercial space. From a design perspective, natural features have three major functions in the landscape: aesthetic, structural, and utilitarian (Chapman ©2018). The factors that should be considered in the planning include the types, size, form, and texture of plants, their connection with other features, and the management and maintenance state of such features.

4.2 Wet meadow management in the Czech Republic

The most taxonomically diverse plant communities on Earth are European meadows (Janecek et al. 2013 ex. Wilson et al. 2012). Wet meadows are scattered throughout the Czech Republic, from the lowlands to the mountains. In the Central Bohemia Region, the wet meadows used to be an integral part of the landscape at the foot of central and southern Brdy (Sedlacek ©n.d.). However, the species richness in these meadows has been reduced due to the modification in agricultural practices during the second half of the 20th century (Wotavova et al., 2004). Many meadows have been drained, improved, and changed to arable land or are abandoned (Prach, 2013). Needless to say, these species-rich plant communities are utterly dependent on human management (Bredenkamp, Spada & Kazmierczak, 2002).

Abandonment and fertilization are the main reasons for reducing plant diversity's taxonomic and functional components in wet meadows (Janecek et al., 2013; Wotavova et al., 2004; Prach, 2013). According to Prach (2013), the appropriate way to preserve and restore the meadows is to decrease manure and establish regular mowing. In another study, Bernhardt-Romermann et al. (2011) indicate that management treatments with intermediate disturbance cutting regimes will maximize biomass yields of the meadows. Which, for all plots, mown once or twice a year. This mowing regime enabled the co-occurrence of a large variety of species from many different taxonomical groups, including plants and insects, birds, bryophytes, and other species (WallisDeVries, Poschlod & Wilems, 2002). Additionally, Mudrak et al. (2012) indicate that if the mowing regime does not limit the seed rain, the short-term changes in the mowing regime will not harm the plant community.

Furthermore, plant communities in wet meadows are strongly influenced by the water condition (Loheide & Gorelick, 2007). Therefore, mowing has the advantage of creating an equal disturbance across the vegetation and reinforcing the effect of water limitation on traits and trait scaling on meadows (de Bello et al., 2012). In addition,

site impacts from land use such as stormwater and ditches may reduce native vegetation, but only in highly impacted landscapes (Galatowitsh et al., 2000).

Conclusively, mowing is the most important and effective way to maintain wet meadows and protect plant and animal species related to them. Therefore, landscaping in such spaces should be in harmony with the meadows' condition, characteristics, and maintenance (regular mowing) plan.

4.3 Shooting range and shooting activities in the Czech Republic

4.3.1 HISTORY OF GUN SHOOTING SPORT

Weapons and the art of controlling them are as old as humanity itself, either for defense or hunting purposes. The firearms breakthrough in humankind's history is considered with gunpowder's invention in China more than a thousand years ago. When gunpowder made its way to Europe in the 13th century, it soon became the most advantageous and undeniable comparative military power (Harder & Cunningham ©2021).

The subsequent development of firearms rapidly increased over time. At first, practicing shooting with rifles was well established and was a feature of the recreational scene amongst the Germanic States since the 15th century. Then, target shooting with shotguns was introduced for trapshooting (box traps from which live pigeons are released) in the United States in 1830. It quickly became popular in Europe after that. Later, pistol shooting was included in the modern Olympic Games and soon enhanced as one of the essential features of the Game (Curtis ©n.d.).

Although the first firearms competitions date back to 1471 in Switzerland, the 19th century is considered a period leading to sports shooting. A significant milestone was the inclusion of sports shooting in the first modern Olympic Games program in 1896, the organization of the World Championships in 1897, and the establishment of the International Rifle Federation in 1907 (Janousek ©2002).

In the Czech Republic, the history of civilian possession of firearms dates back almost six hundred years ago, when the effectiveness of small arms was demonstrated during the Hussites war (Gawron ©2021). From that moment on, the civilian possession of weapons was not only the basis of the Hussite military but also an integral part of the Czech culture. In 1524, the first comprehensive legislation on the carrying of firearms in the country was adopted, which lasted until 1938 and was

renewed in 1990. It was interrupted only by the German occupation and the Communist period (Gawron ©2021).

Shooting clubs in the country have existed since the Middle Ages, mainly in northern Bohemia. The first national shooting organization was the Czech Shooting Community, which was founded in 1897 in the Austro-Hungarian Empire. In an independent state after 1918, the organization resumed its activities under the new name, the Czechoslovak Rifle Community. Shortly after, in 1919, it was merged with another existing organization, the Czech Rifle Association. And so, in 1920, the Czechoslovak Republic had already become a member of the International Rifle Association (Brych, 2008).

After the Second World War, shooting sports in the country was organized and carried out mainly by the Sokol Shooting Divisions. Among the most active was, for example, the Sokol Prague Rifle Division established in 1948, and so, in 1951, the union for cooperation with the Army, known under the abbreviated name *Svazarm*, was founded as a unified military organization. The shotgun shooting otherwise was carried out by the units of the Czechoslovak Hunting Association. In 1968, in order to connect with the federal organization of the Republic, the Czechoslovak Rifle Association was divided into two equal components: the Czech Rifle Association and the Slovak Rifle Association (Brych, 2008).

As a member of the International Rifle Association, the country has hosted several international shooting competitions. For example, the 1944 Battery World Championships took place in Luhačovice, the European Championships in Brno in 1963 and 1967, and the European Air Rifle Championships in 1971 in Mezibori (Janousek ©2002).

As a result of its rich history and outstanding organization, shooting has always been among the most successful sports in the Czech Republic.

4.3.2 SHOOTING RANGE TYPOLOGIES

In the Czech Republic, the field of shooting range operation is stipulated by the Czech Technical Standard (ČSN 39 5401). The Standard, which set out regulations for both the design and construction of shooting ranges and the conditions necessary for the operation of existing shooting ranges, divided the types of shooting ranges in the country as follows:

According to the construction solution:

- Outdoor range: shooting range located in an open space.

- Indoor range: shooting range located in an enclosed space.
- Combined range: a shooting range with indoor shooting range characteristics, but a part of the firing range space is not enclosed and can pass through the outdoor space.

According to applicable weapons and ammunition:

- Shooting range for using small firearms.
- Shooting range for using long firearms: intended for using long firearms (including shotguns) with a single bullet.
- Shooting range for using shotguns.
- Shooting range for using gas weapons.
- Shooting range for using paintball.

According to possible bullet escape:

- Covered range: a shooting range in which the interception and protection devices guarantee that no projectile can leave the range.
- Semi-covered range: a shooting range where the protection devices capture all fired projectiles safely but do not guarantee the escape of reflected missiles outside shooting range space.
- Open range: a shooting range in which the interception and protection devices do not guarantee that no projectile can leave the range.

According to shooting distance:

- Range with a fixed shooting distance: a shooting range that allows shooting at only one specified target line.
- Range with fixed shooting distances: a shooting range that allows shooting at more established target lines.
- Range with variable shooting distance: a shooting range that allows shooting at a moving target line.

According to public accessibility:

- Public shooting range: a range that is accessible to the public or a defined part of the public.
- Non-public shooting range: a range that is inaccessible to the public, intended only for private use.

According to the method of the operation:

- Commercial shooting range: a range operated as a business.

- Non-commercial shooting range: a range that operated in a way other than as a business.

According to the purposes of using a shooting range:

- Shooting examination range: a shooting range designed for practice shooting examinations, demonstrating weapons and ammunition, is usually equipped with particular types of equipment.
- Shooting training range: a shooting range designed for training purposes can be multipurpose or modified for firing from a specific type of weapon.
- Sport shooting range: a range designed for sports shooting according to the rules of the relevant disciplines.
- Hunting shooting range: a shooting range designed for hunting disciplines.
- Military shooting range: a shooting range operated by the military or members of the public armed forces under other legislations.

According to the shooting distance at which one can shoot: there are ranges with shooting distances up to 10 m, 20 m, 30 m, 50 m, 100 m, 200 m, 300 m, 500 m, or over 500 m (ČK SOMO ©n.d.).

According to the Standard, the shooting range of each category must be designed from the point of view of safety, environmental hygiene, fire safety, and ecology, its equipment and elements meet the general requirements. In addition, medical equipment must be available in each shooting range in a usable condition, such as a first aid kit. Also, all shooting ranges must be equipped with toilets sized according to the number of users. Finally, and importantly, a need to determine the boundaries of endangered areas by individual ballistic calculation based on the evaluation of the capture and protective equipment of the shooting range concerning the ammunition weapons used.

On the other hand, disciplines in sports shooting are divided into three basic- rifle, pistol, and shotgun. Adapted from the International Shooting Sport Federation, the Czech Shooting Association (CSA ©2017), the following rules apply for the shooting range and its surroundings which is intended to organize a shooting competition:

- Spaces used by shooters, officials, and spectators on rifles and pistols ranges must be protected from the sun, wind, and rain. This protection must not give a significant advantage to any firing point or part of the range.
- Parking, toilet, appropriate medical facilities, an area for commercial displays, a restaurant or facilities for food services, and refreshments should be available.

- Space for weapons and ammunition depots.
- Resting areas for shooters, changing room, meeting and control rooms.

In the Czech Republic, every shooting range must have its Shooting Range Operating Rules, which is posted publicly according to §52 - §55 of Act No. 119/02 Coll., on Weapons and Ammunition. Other documents must be submitted to the Czech Police authority, such as the expert opinion on the design of shooting range administration. Currently, there are about 164 shooting ranges scattered in the Czech Republic (Figure 1).

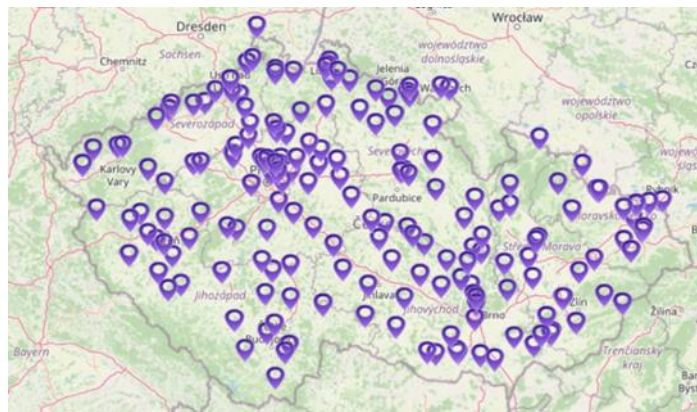


Figure 1: Map of shooting ranges in the Czech Republic
<https://www.tercik.cz/map/map.php?id=194&s1=1>

4.3.3 OUTDOOR SHOOTING RANGE

From a historical point of view, the first outdoor shooting range in Europe is considered Mariánská Skála range, which is located in Usti nad Labem, a city in the north of the Czech Republic. The range is believed to be built in 1617 and is still preserved to this day (Český Rozhlas ©2015).

In the 19th century, along with the development of the shooting sports industry and the establishment of the Czech Shooting Community in Austria-Hungary, outdoor shooting ranges were built for training and competitions, mostly in open spaces of meadows and slopes. The training took place from military weapons that were eliminated by the Austrian Army (Brych, 2008). An example of a shooting range on Střelecký island in Prague from the 19th century is shown in Figure 2.

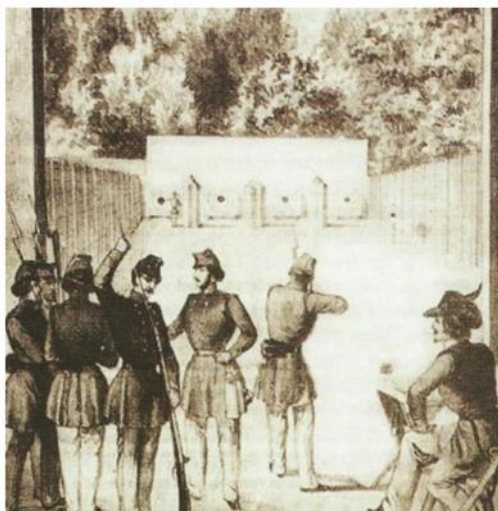


Figure 2: Shooting range on Střelecký island in Prague from the 19th century (Felt, Brych ©Janousek, 2003)

Outdoor shooting ranges in the country were forced to close during the war. After the Second World War, apart from the large number of weapons that were left behind, shooting ranges were in extreme shortage. Those remained were in poor condition. In the Communist period, the possibility of shooting training reopened, but the ranges were only used by the military (Brych, 2008).

According to Zbrane ©n.d., about twenty-four commercial outdoor shooting ranges are operating in the country, which is open to the public at present. Those are scattered in seven regions: Central Bohemia, Ústí nad Labem, Moravian-Silesian, Highlands, Zlín, and Olomouc. The table below shows the list of the ranges with their locations and shooting distances/ types provided (Zbrane ©n.d.) (Table 1).

Region	Shooting range	Shooting distance/ type
Central Bohemia	Placy	50 m, 100 m, 500 m
Central Bohemia	Malý Újezd	25m, 45m, 50m, 100m
Central Bohemia	Mělník	Skeet/ olympic trap/ universal trap/ kompak sporting
Central Bohemia	SSK Milevsko	50m
Central Bohemia	Milovice	30m
Central Bohemia	Byšice	25m, 30m, universal trap
Central Bohemia	SSK Combat Kladno	30m, 50m, 80m
Ústí nad Labem	Oleško	25m, 50m, 300m
Ústí nad Labem	Vražkov	25m

Ústí nad Labem	Skalice	250m
Ústí nad Labem	Hrobčice	50m, 100m, skeet, olympic trap, universal trap
Ústí nad Labem	Ludvíkovice	50m, 300m
Moravian-Silesian	Třinec Borek	25m, 50m
Moravian-Silesian	Stará Bělá	33m, 50m, 100m, skeet, parcours, universal trap
Moravian-Silesian	Hliník	50m
South Bohemian	Borek	25m, 50m
South Bohemian	Břeskáč	25m
South Bohemian	Borovany	50m, skeet
Highlands	Nadostřel	35m, parcours, compact sporting
Highlands	Třebíč	25m
Zlín	Pozděchov	100m, skeet
Olomouc	Lazecká	25m, 300m, universal trap
Olomouc	Jívová	Skeet, universal trap, 40m
Olomouc	Drahany	150m

Table 1: Commercial outdoor shooting ranges in the Czech Republic

4.3.4 SHOOTING ACTIVITIES IN COMMERCIAL OUTDOOR RANGE

Nowadays, shooting activities in a commercial shooting range is extended with many purposes. Amongst the main objectives are practicing for hunting and competitions, which brings shooters to the ranges the most. Besides that, the other aims are taken into place, such as education in wildlife and nature protection, safety using a gun, practicing for personal defenses, and shooting training for law enforcement and National Guards.

Practice for hunting purposes

Hunting has had undeniable importance for human society's development since its early stages (Seplavy, Ruzicka & Pondelicek ©2015). In the Czech Republic, as stated by §2 Act No. 449/2001 Coll. on hunting, the word *myslivost* means "a set of activities carried out in nature in relation to wildlife as part of the ecosystem and the association's activities aimed at maintaining and developing hunting traditions and customs as part of the Czech national cultural heritage". The Czech hunting tradition is considered unique in scope and depth compared to the rest of the world (Soukup ©2009). From an ecological point of view, hunting is an essential service for managing selected parts of the ecosystem in forest management, such as managed forest plants, balanced species population, forest cultivation, biomass production, etc.

Additionally, hunting is also served as a recreational activity, a connection between humans and wildlife, bringing benefits to society's culture, and economy (Soukup ©2009). Nowadays, hunters, gamekeepers, or hunting ground holders need to fulfill the duties of game protection under the Game Management Act, the Act on Nature and Landscape Protection, and the law on prevention of cruelty to animals (Seplavy, Ruzicka & Pondelicek ©2015). For that, they need to carry with them the firearm license, hunting permit, and a hunting license, a passed hunting examination regulated by Act No. 119/2002 Coll. Therefore, practicing shooting for practical examinations or improving shooting skills becomes necessary.

Practical shooting training for competitions.

Shooting sports in the country have undergone a long development. At present, shooting competitions are divided into six categories according to age and gender: younger pupils (up to 12 years old), older pupils (up to 14 years old), younger adolescents (under 16 years old), older adolescents (under 18 years old), senior (over 45 years old) and veterans (over 55 years old) (CSA ©n.d.). Additionally, practical shooting in competitions carries out three main disciplines: practical shooting from pistols or revolvers, practical shooting from rifles, and practical shooting from shotguns (CSA ©n.d.).

Practical shooting is not an easy task. In fact, it requires precision and balance, a matter of excellent and coordinated neuromuscular activities in an appropriate physical and mental condition (CSA ©n.d.). Along with the development of the sport itself and the variety of weapons used in the competitions, more comprehensive training in shooting ranges is therefore demanded.

In conclusion, shooting activities in a commercial outdoor shooting range is usually carried out by the following groups of shooters:

- Applicants for practical professional examinations.
- Members of the Police department or National Guards.
- Weapons holders who intended for sports purposes.
- Members of shooting clubs intended training for competitions.
- From the view of public interest, gun owners practice for defense purposes or for testing new weapons.
- Hunters, gamekeepers, wildlife officers.
- Civilians from age 10 are not weapons holders but enjoy practical shooting with instructors for defense or education purposes (CSA ©n.d.)

4.4 Case studies

4.4.1 THE DEAD ZERO SHOOTING PARK

The Dead Zero shooting park is located in a 102 ha land of Tennessee in the United States. Even though positioned in a remote area of a small town, the park operation has been successful since its opening in November 2017. The facility currently has around one thousand members and has been hosting shooters from across the country and worldwide (SVEC ©2021). The shooting park includes a large number of ranges: 100 yards (~91m) to 1000 yards (~914m) rifle ranges with electronic targets; two trap and skeet fields; two sporting clays courses, a beginner and a more challenging course; eight pistol ranges, and a 3D archery course. Especially, the 1000 yards (~914m) rifle range with electronic targeting is the most effective feature which attracts shooters the most (Dead Zero Shooting Park ©n.d.)

The main support facility of the range is a large clubhouse (~370m²) that encompasses a shop, classroom, and lounge. Members and visitors check-in at the shop, where they can find a wide variety of guns, ammo, clothing, and all types of shooting gear available for purchase. Visitors can rent guns in the shop to use at the range if they do not have their own or if they want to try out something different. The shop also pulls in visitors who just want to shop. Additionally, a classroom with a digital projector and seating for 50 people is provided, as well as a lounge that offers a relaxing space for shooters after a day of shooting. There is also an outdoor pavilion located next to a fully stocked pond. The pavilion seats up to 120 people and is a potential space for hosting events. The main parking lot is located at the main entrance, there is also another car park in front of the clubhouse. At present, food services and accommodation are not provided in the area. However, restaurants and lodgings are already in the future development plan of the shooting park.

In addition, the park is only 15 minutes from Fall Creek Falls State Park, the most visited state park in Tennessee, also a short drive from Mountain Glen RV park and campground, a quiet and beautiful setting with amenities, campsites, and outdoor activities. These places allow shooters and their families to stay overnight after a day of shooting (Dead Zero Shooting Park ©n.d.).



Figure 3: The Dead Zero Shooting Park's map (https://www.tripadvisor.com/LocationPhotoDirectLink-g55353-d12962960-i313496191-The_Dead_Zero_Shooting_Park-Spencer_Tennessee.html)



Figure 4: The Dead Zero Shooting Park (<https://deadzeroshooting.com/>)

4.4.2 Foothills PUBLIC SHOOTING COMPLEX

Foothills Public Shooting Complex of Cleveland County is one of the largest public outdoor shooting complexes in southeastern United States. It is a safe and modern facility for people of all ages and skill levels to enjoy year-round social events, competitive tournaments, and educational classes (Star ©2018). The 75 ha shooting area consists of 8 ranges: rifle ranges with targets shooting up to 250 yards (~228m), ranges for practicing with shotguns, handguns, pistol calibers, or multipurpose ranges, and a 20 yards (~18m) archery practice field. In addition to being used by the general public for recreation, the shooting complex is also used by law enforcement for professional training (Foothills Public Shooting Complex ©n.d.).

The range support facilities include a Range Office-Report (clubhouse) for orientation, check-in, and a shop with a selection of gifts and shooting accessories. The shooting complex provides a unique setting for corporate, civic, and family events, with an outdoor pavilion hosting events. There is also a concession area accommodating catering services and a public restroom with handicap access. Parking is conveniently located at each range with handicap access to all facilities.

Foothills public shooting complex was built on the landfill buffer area of Cleveland Country. The support facilities provide safe and modern access for the public to enjoy shooting sports with reasonable entry fees, especially firearms training for law enforcement agencies and educational classes on hunting safety and firearm fundamentals for locals, youth, and women (Foothills Public Shooting Complex ©n.d.).

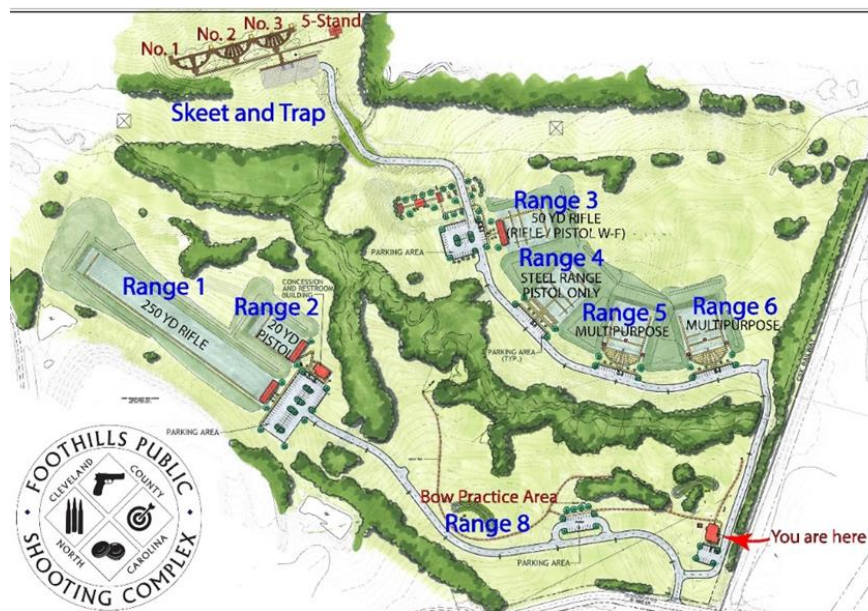


Figure 5: Foothills Public Shooting Complex's map (<https://foothillspublicshooting.cc/ranges/>)

4.4.3 JÍVOVÁ SPORTS SHOOTING COMPLEX

The Jívová sports shooting complex is a 1.08 ha facility located in the countryside with a view of the valley and forests of the Údolí Bystřice Nature Park, a distance of 12 km from Olomouc in the Czech Republic. The shooting range is designed for sports and recreational shooting and for training the state's armed forces. This area is suitable not only for sports shooting, but also for whole families, schools, companies, and a group of friends (Zbrane ©n.d.).



Figure 6: Jívová Sports Shooting Complex (<https://www.strelnicejivova.cz/>,
<https://www.zbrane.cz/strelnice/jivova>)

The range offers traditional skeet and universal trap in shotgun shooting, training courses, and shooting competitions. In addition, the range also offers education in support and development of hunting traditions, protection of landscape and renewable natural resources.

The support facilities of the range are:

- Classroom for up to 40 people.
- A shop for selling/ renting weapons and ammunition.
- Snack bar, restaurant with outdoor grill and seating area.
- Multifunctional children's and workout playground.
- Offering events such as a wedding with a capacity of 300 guests.
- Accommodation with a total capacity of 16 people.
- Charging station for electric cars/scooters/motorcycles.

The shooting range facility is located in the nature park Bystřice, which is giving it opportunities for active leisure in nature. The area is connected to bike paths and hiking trails, thus, offering tourists an attractive place for refreshments, relaxation, sports, but also, for example, recharging e-bikes (Strelnice Jivova ©n.d.).

4.4.4 LØVENSKIOLDBANEN SHOOTING RANGE

Løvenskioldbanen Skytesenter AS is Norway's largest public facility for shooting sports (~14 ha). The facility is located just outside Oslo city center and has been

actively in use since 1951. It opens all year-round and is used by hunters, and recreational shooters from many different clubs, but is also visited by Oslo Police District and His Majesty The King's Guards as their primary training facility for both rifle and pistol courses (Nordic Shooting Region ©2020). The facility consists of four shooting ranges: a rifle range and a running target range are located in the north, a pistol range located in the west, and a shotgun range positioned in eastern facility. In addition, the facility was built to meet international requirements and can host various pistols, rifles, shotguns, and running target events during the Championships (Lerduebanen ©n.d.).

The support facilities in the area are considered complete. There is a parking lot at each range. A cottage with all amenities to arrange events, conferences, food services, and a fireplace room where visitors can arrange meetings and discuss business after the shooting. There is also a hunting shop selling both shotguns and rifles, all equipment for maintenance of weapons, as well as hunting and shooting clothes. An indispensable amenity is the range's storage room, where shooters can buy shotguns of various brands and rifles on request with experienced instructors.

Løvenskioldbanen Skytesenter is very easily accessible from Oslo, the capital city of Norway, giving it potential for outdoor recreations and hosting events. However, accommodation service is not available at present. The range is currently dealing with upgrades to improve noise prevention and environmental protection, including new offices and meeting rooms (Lerduebanen ©n.d.)



Figure 7: Løvenskioldbanen shooting range's map (<https://www.nordicshootingregion.com/shooting-ranges>)



Figure 8: Løvenskioldbanen shooting range

<https://www.gulesider.no/!%C3%B8venskioldbanen+skytesenter+as+eiksmarka/84254515/bedrift>

4.4.5 CONCLUSION

The Dead Zero shooting park	Foothill public shooting complex	The Jívová sports shooting complex	Løvenskioldbanen shooting range
Area			
102 ha	75 ha	1,08 ha	14 ha
Support facilities			
Clubhouse Shop, lounge, classroom Outdoor pavilion Parking lot	Clubhouse Shop, restroom Outdoor pavilion Foodservices Parking lot	Bar, restaurant Parking lot Outdoor activities Accommodation Workout playground Shop, classroom Outdoor pavilion	Cottage Shop Clubhouse Foodservice Parking lot

Table 2: Case studies conclusion

The four case studies above show the analysis of the support facilities available in four different commercial shooting ranges. The Dead Zero shooting park and Foothills public shooting complex are located in the United States, where the shooting sports industry is constantly growing and is considered the most developed in the world, due to its gun culture and the high amount of firearm holders. Commercial outdoor shooting ranges in the United States belong to the states (in the case of Foothill shooting complex) or individuals (in the case of the Dead Zero shooting park), often settled in large nature areas and offer multi-sport shooting types such as shooting clays, archery courses, rifles and small arms courses, target shooting, hunting, competitions, etc. In those cases, the common essential support facilities are the

clubhouse, shop, restroom, outdoor pavilion, and parking. However, in such huge areas of the facilities, outdoor gym and accommodation services are not available. In contrast with the case of the Jívová shooting complex, where sports shooting is offered in a limited area of the only shotgun field. However, the support facilities in the shooting range provide a complex program for non-shooters, such as outdoor activities for families and children, offering events and accommodation services. In the case of Løvenskioldbanen shooting range, even though accommodation is not provided, the support facilities are still considered complete with food services and meeting spaces to serve particular groups of shooters.

Conclusively, the analysis shows the different strategies of available programs and conditions of support facilities in four shooting ranges. These likely depend on the groups of users, their activities and desires, and the business strategies of the shooting range's owners.

5 Case analysis – Placy shooting range

5.1 LOCATION

Placy shooting range is well known as one of the first outdoor shooting facilities in the Czech Republic that offers a 500 m firing area. The 12 ha facility is located in the southern part of Višnová, a municipality in the Příbram district of the Central Bohemia Region (Figure 9-10). It is about 8 km from Příbram center and 60 km from Prague. The shooting range has a total length of 1100 m, GPS coordinates of the shooting range are 49.67183N, 14.10166E (southwestern edge), 49.67509N, 14.11587E (northeastern edge), with altitudes from 480m to 490m (Komenda, 2017).

The facility is located in meadow enclaves in the middle of a forest complex with mosaic characteristics (Figure 11). The topography is typically referred to as valley floodplain landscape, which is a large area of flat land. Additionally, the regional landscape is generally characterized by flat hilly to highland and without significant and contrasting elements (Spatial Plan Visnova ©2017).

Moreover, the landscape of Višnová is divided into two significant different parts: the agricultural landscape in the northeast makes up 30% at lower altitudes (up to 450m) with mainly residential areas, and the dominant forest landscape in the south makes up 70% at altitudes above 500 m without settlements. Placy is one of two only settlements located in this part (Sulcova, 2020).



Figure 9: Location of Višnová (<https://www.kurzy.cz/obec/visnova-okres-pribram/mapy/>)

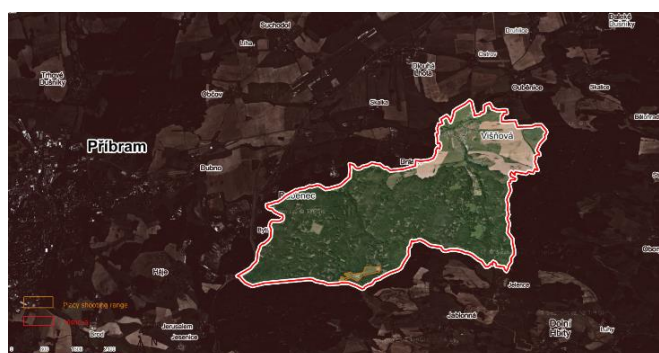


Figure 10: Location of Placy shooting range within Višnová

(<https://en.mapy.cz/zakladni?x=14.1197725&y=49.6921101&z=13&base=ophoto&source=muni&id=4397&ds=1>)



Figure 11: Placy shooting range's territory

(<https://en.mapy.cz/zakladni?x=14.1097758&y=49.6728016&z=16&l=0&base=ophoto>)

5.2 CONNECTIVITY

The facility's connectivity with the center of Příbram is characterized by east-west direction road number 118. Additionally, located in the Central Bohemia Region, the facility is very accessible from other cities of the Czech Republic by car: only 35 minutes from Prague by D4 highway; about one hour drive from Plzeň; and about one and a half hours from České Budějovice. Furthermore, for hosting competitors from

neighboring countries, such as Germany, Austria, or Slovakia, accessibility is considerably favorable: it is only three hours driving from Wien and four hours from Bratislava and Muchen.

However, access to the facility by public transport is considerably limited due to the lack of settlements within the area. In fact, Placy is one of only two settlements within an area of 2 km. Nevertheless, the bus stop *Jabloná, Placy* is positioned 300 m from the facility. The two buses D43 and D42 pass through from Příbram bus station with a duration of 15 minutes. However, the bus routes to the territory are limited and only on workdays (Table 3).

Příbram bus station === > Jabloná, Placy

Bus	Departure time (workdays)
D42	15:09
D43	6:25 12:15 15:00 18:05

Příbram bus station < === Jabloná, Placy

Bus	Departure time (workdays)
D42	6:45
D43	4:50 7:10 13:15 13:21 16:04

Table 3: Příbram bus station - Jabloná, Placy bus schedule

Associated with natural conditions, especially the nearby sightseeing Spalený Vrch and Dolní Hřbity, the area is supported by several cycling and walking trails for outdoor activities:

- Cycling route 8195 passes through Placká Cesta, which starts from Příbram downtown and goes further to the Vltava river connecting Spalený Vrch, Dolní Hřbity, and Kamyk nad Vltavou.
- The green hiking trail starts from the former Příbram uranium shaft mine alongside Placká Cesta, heading to Obory, a village in eastern Příbram. The blue trail otherwise connects the city center to Spalený Vrch and routes along the Vltava river.

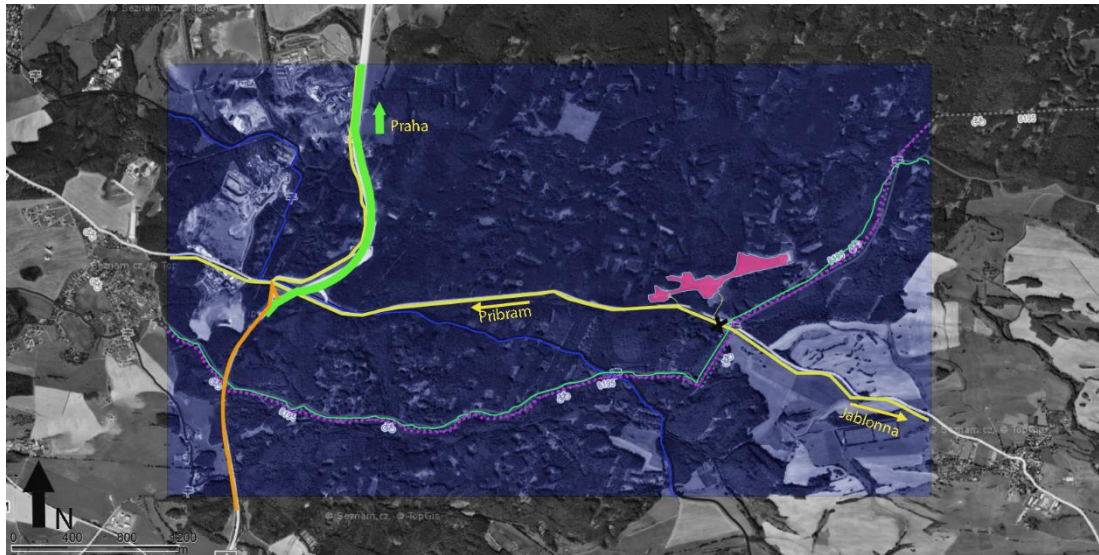


Figure 12: Placy shooting range`s connectivity

5.3 THE LAND`S DEVELOPMENT

Placy shooting range is located in the meadow that has undergone a long history. Captured on the 3rd military map of Bohemia in the 19th century, the meadow is already seen and practically has the same shape as at present (Figure 13) (Sedlacek, Urban & Sommer, 2019). Additionally, in the 19th century, Přebíram was famous as a mining region. Thus, the territory was used to make charcoals, which were needed to develop the local metallurgical and glass industry (Sedlacek , Urban & Sommer, 2019 ex. Balatka, 1984).

The next chapter of the meadow development is illustrated by an orthophoto map from 1953. Yet, there was no military shooting range on the map. It was established there in the 1960s and was used by the Communist government for military and police shooting training until 1989 (Sedlacek, Urban & Sommer, 2019).

After the fall of the Communist period, the use of the shooting range was abolished, and the meadow was partly planted with pine trees by the new owner. A large area was surrounded by overgrown trees, thus changing the site's original natural character - the wet meadow forest (Sedlacek, Urban & Sommer, 2019). In 2012, the Lukes family conveyed the land with the desire to reconstruct the old military range into a sports shooting range that meets international standards. The range was

converted to avoid conflicts with nature conservation by removing the pine trees, starting mowing and restoring drainage ditches, bringing back the meadow's natural character (Sedlacek, Urban & Sommer, 2019). At present, the shape of the shooting sections within the territory and a large part of the removed pine trees are seen from the aerial image (Figure 13).

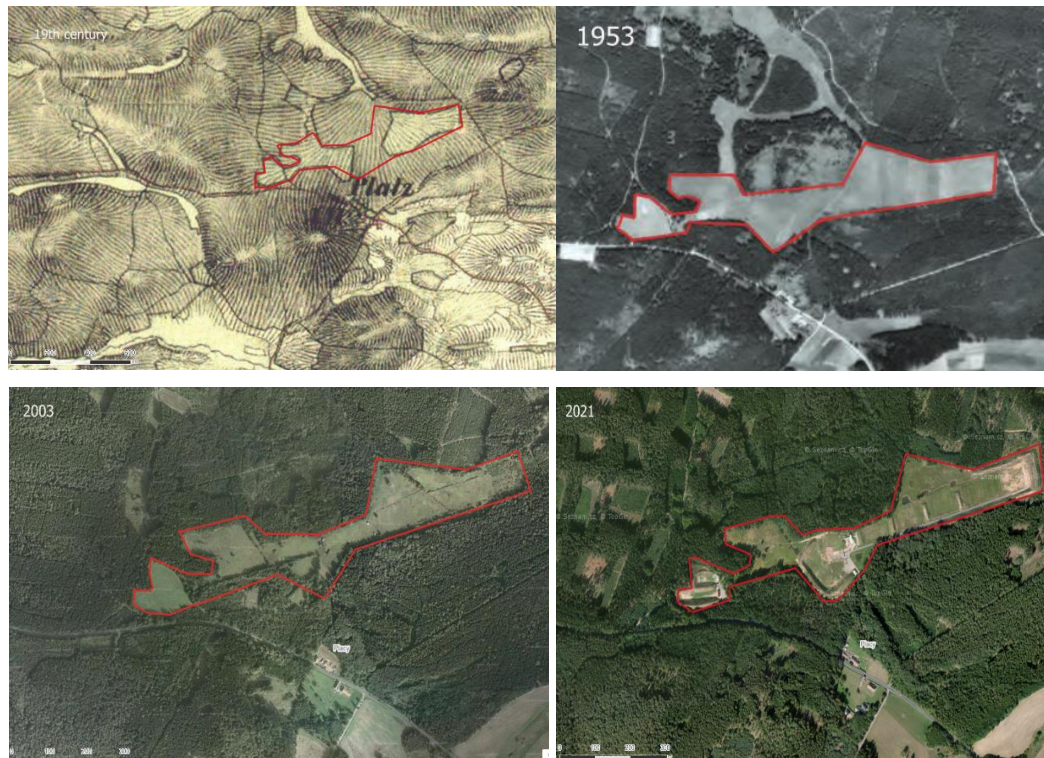


Figure 13: The land's development (<https://en.mapy.cz/19stoleti?x=14.1086493&y=49.6732251&z=15>, Sedlacek, Urban & Sommer., 2019)

5.4 TERRAIN ANALYSIS

To understand the terrain of Placy shooting range, the Digital Terrain Model of the Czech Republic of the 5th generation was used to analyze the slope (Figure 14), aspect (Figure 15), and contour (Figure 16) of the area.

The study area is mainly flat, typical for a valley floodplain landscape, with a slight slope at the easternmost and westernmost of the site, as seen on the slope model. The aspect identifies the downslope direction, from the model can say the haft part of the territory on the west has mainly east, south, to southeast exposure, while the places of the main entrance, parking lot, and clubhouse have north to northeast exposure. The water flow within the area in the west-east direction, and the Drásov stream runs through the range in the north-south direction.

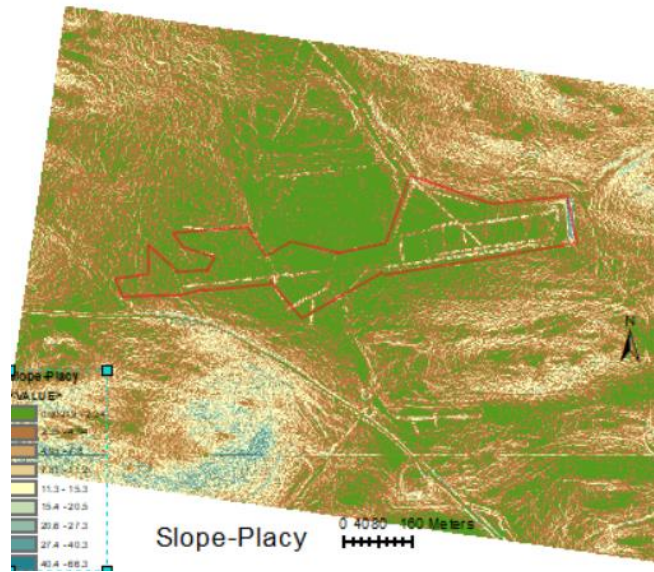


Figure 14: Slope (ArcGIS, 2021)

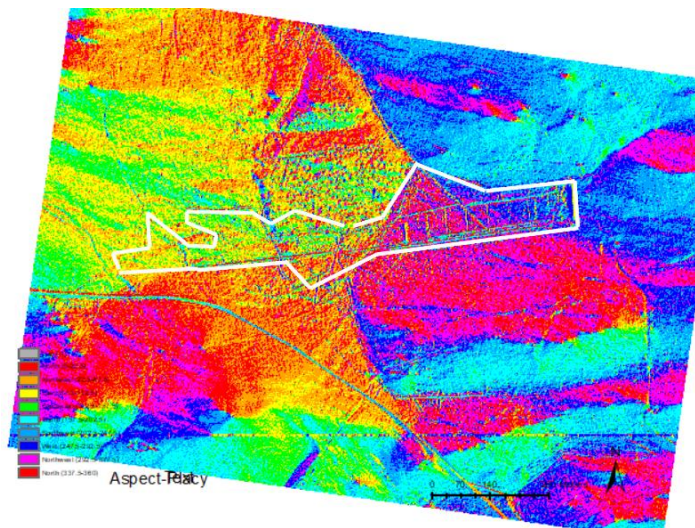


Figure 15: Aspect (ArcGIS, 2021)

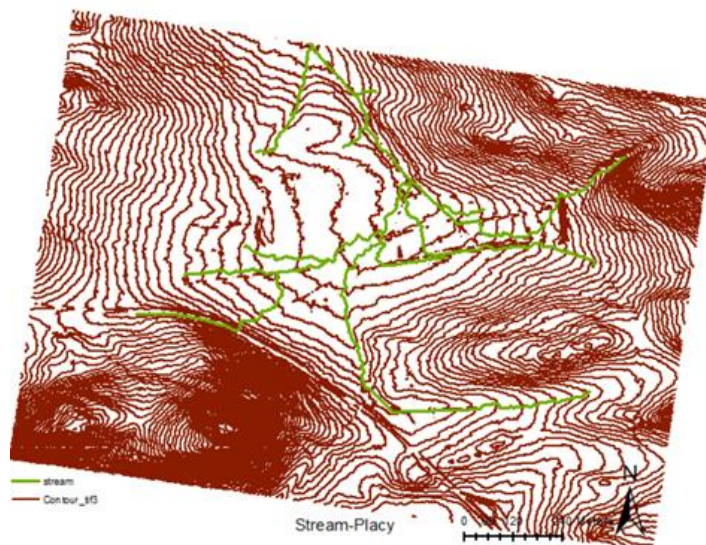


Figure 16: Contour (ArcGIS, 2021)

5.5 GEOLOGY

From the geological point of view, the territory of the Placy shooting range is located in the area which was formed in the Variscan Intrusives era. There is one geological unit at a scale of 1: 500 000 (Figure 17): biotite and amphibole-biotite monzogranites to granodiorites and trondhjemite's, coarse- to medium-grained rocks were formed (Czech Geological Survey ©n.d.).

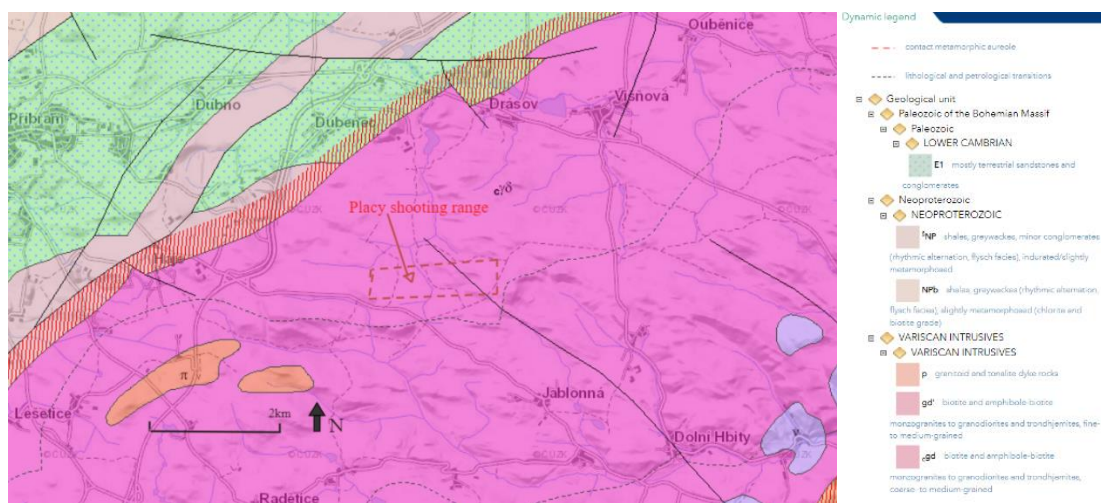


Figure 17: Geological condition (https://mapy.geology.cz/geological_map500/?locale=en)

5.6 SOIL

The analysis of the soil conditions in the territory relies upon the soil map of the Czech Republic on a scale of 1: 50 000 (Figure 18). The classification according to the Czech Geological Survey, there are two types of soil within the area: Cambisol, and Pseudogrey. From the map, the type of cambisol soils appeared in half of the territory on the east, while the pseudogrey soils formed in the second part of the territory on the west.

Cambisol soils are characterized by the absence of a layer of accumulated clay, humus, soluble salts, or iron and aluminum oxides. These soils naturally form on medium to fine-grained material originating from a diverse range of rocks. The environment of the soils is leveled to the mountainous terrain in all climates and a wide range of vegetation types. These soils are used in a wide variety of agricultural uses, in steep lands mainly used for grazing and forestry (World Soil Information, ©n.d.).

Pseudogley soils form where precipitation water drains away significantly slowly into the ground. Beneath a well permeable layer that is waterlogged after rainfall, there is a dense layer with low permeability. Pseudogley soils are unique natural bodies that often host forest and plant communities that prefer changing moisture conditions, Prominently wet pseudogley soils are, due to their extreme site conditions, well-suited for rare animal and plant communities. Tree species tolerating perched soil water such as the common oak, European hornbeam, black alder, and downy birch. These soils are also sensitive to weather conditions and the climate (Internationales Jahr des Bodens © 2015).

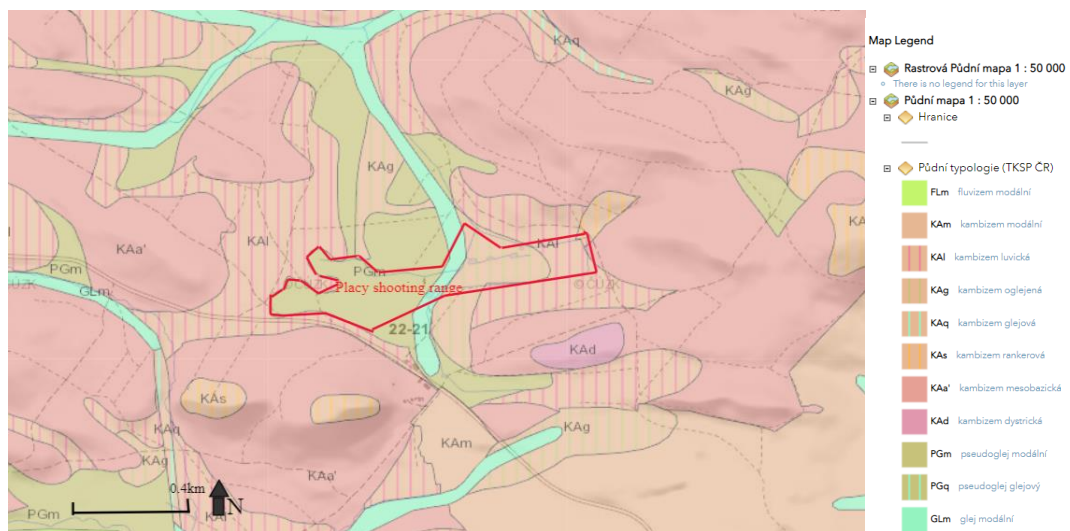


Figure 18: Soil's condition (https://mapy.geology.cz/geological_map500/?locale=en)

Moreover, according to BPEJ classification (rated soil-ecological units), the territory belongs to the 5th protected agricultural land with certified soil ecological unit 5.68.11. The rated soil-ecological unit is a five-digit numerical code used to evaluate agricultural land. The first digit indicates an affiliation with the climate region. The second and third digits determine the classification of the soil. The fourth determines the degree of slope, and the fifth digit expresses the depth of the soil and the skeletalness of the soil profile in combination. According to the Decree on the determination of protected land classes No. 48/2011 Coll, rated soil ecological units are classified into five classes. The fifth protected class represents soils with very low production capacity, such as shallow soils and hydromorphic soils, strongly skeletal and strongly eroded. These soils are mostly indispensable for agricultural purposes. However, other more efficient uses can be accepted. These are mainly soils with a low degree of protection, except for demarcated protection zones and protected areas. In addition, the characteristics of the soil ecological unit 5.68.11 are described

as low production capacity, low infiltration, and permeability, low water retention capacity, and structured with primary clays and colluvial sediments substrates. The soil is suitable for grassing, tank construction but inappropriate for afforestation. Additionally, even though there is a high risk of acidification and compaction, there is no threat of wind erosion (VUMOP ©n.d.).

5.7 CLIMATE

The study area falls into the fifth climatic region, which is moderately warm and humid (VUMOP ©n.d.). The average annual temperature is considered around 7-8°C, with an average rainfall of 550-650(mm) (VUMOP ©n.d.).

5.8 HYDROLOGY

From the hydrological point of view, the facility is situated on the surface water body (DVL_0100) of lower Vltava sub-basin Kocába that flows from springs along to the Vltava River (Spatial Plan Visnova ©2017). Additionally, there is a significant watercourse of Drásov stream (Figure 19), which has been designed for an active flooding zone and floodplain for Q100 (a flood height that has a long-term likelihood of occurring once in every 100 years), obtained by data from the Hydrological Information System (VÚV ©n.d.). The map of the floodplain is drawn in Appendice 1.

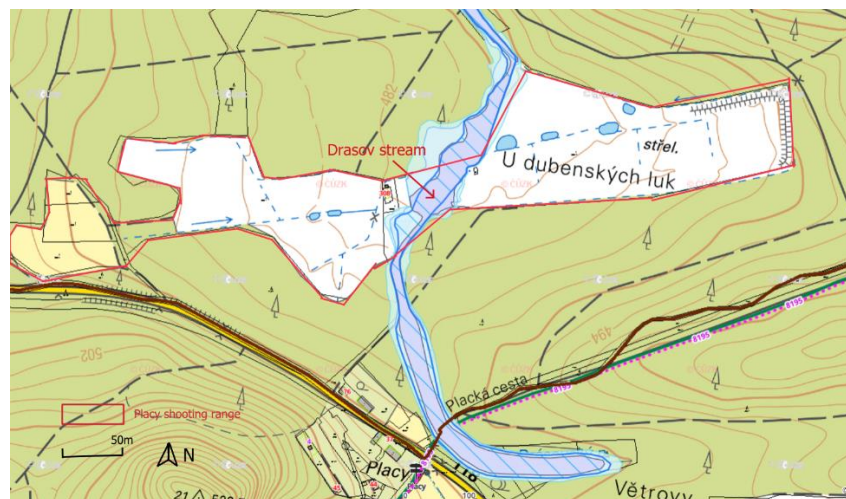


Figure 19: Drásov stream (<https://ags.cuzk.cz/geoprohlice/>)

In the Czech Republic, the law on the water is provisioned under Act No.254/2001 on Water and Amendments: 76/2002 Coll., 320/2002 Coll., 274/2003 Coll., 20/2004 Coll., is known as Water Act.

According to §66 of the Act, floodplain areas are determined as areas exposed to flooding in a natural flood. At the same time, §67 of the Act addressed "locating,

permitting and building structures inside the active zone of the flood plain area is prohibited except for water management structures aimed at regulating the watercourse, flood flow routing, performing flood protection measures or measures which are otherwise related to the watercourse or improve the flow regime, structures for water retention, waste water and rain water disposal and also necessary transport and technical infrastructure structures", with the following forbidden activities in the active zone:

- Extracting raw materials and soil to deteriorate the surface water flow and carry out terrain modifications deteriorating the surface water flow.
- Storing materials, substances, and objects that could be washed away.
- Erecting fences, hedges, and similar obstacles.
- Establishing campgrounds and other temporary accommodation facilities.

However, according to the observation of the Regional Office of the Central Bohemian Region, Department of Environment and Agriculture, and Department of Water Management (Rihova, 2020), there is an uncertain state of the floodplain within the area. Thus, it is unclear which zone/ level of the floodplain's active area the shooting range is located in. Therefore, in accordance with §17 of the Water Act, it is necessary to obtain the stipulation of the water authority addressed by the watercourse administrator and the stakeholders for the affected area of the constructive plan.

5.9 TERRITORIAL SYSTEM OF ECOLOGICAL STABILITY

According to Višnova`s spatial plan (2017), a part of the shooting range belongs to the regional Territorial System of Ecological Stability (hereinafter as "TSES") of the Czech Republic. The 0.5 km regional biocorridor Kotalik-Marhelovka interrupts the meadow of the territory about 60 m from the north and adjoins the regional biocentre of Marhelovka, as expressed in Appendice 1.

In the Czech Republic, the preservation and restoration of the natural landscape, biodiversity conservation, and management of natural resources are prescribed by Act No. 114/1992 Coll., on the Conservation of Nature and Landscape (hereinafter as "Act").

According to §3 of the Act, a TSES is "*a mutually integrated complex of natural and altered, although nearly natural, ecosystem, which maintains natural stability. Systems of ecological stability is distinguished as local, regional, and supra-regional systems.*"

An ecological corridor is a territory that does not facilitate the permanent or long-term existence of a significant number of organisms but does provide for their migration between different biocentres, creating a network of isolated biocentres (AOPK ©n.d)

A biocentre is defined as a biotope or center of biotopes in a landscape, which, due to its condition and scope, facilitates the existence of a natural or near-natural, altered ecosystem (AOPK ©n.d.).

According to §4 of the Act, the protection of a system of ecological stability is "*ensuring the preservation and reproduction of natural wealth*" and the obligation of every owner or user of land that forms this system.

5.10 REGISTERED SIGNIFICANT LANDSCAPE ELEMENT

Furthermore, the analysis has paid attention to the registered Significant Landscape Element (hereinafter as "SLE") Černé Bláto, which is located in the western part of the territory. The SLE Černé Bláto has been registered as a protected area of the Příbram district since 2008 for the preservation of the large population of highly endangered species *Gentiana pneumonanthe*, and bound to them are endangered species *Phengaris Alcon* (Sedlacek, 2019)(Figure 20). The map of SLE Černé Bláto is drawn in Appendice 1.



Figure 20: *Gentiana pneumonanthe* and *Phengaris Alcon*
(<https://johandierckx.aminus3.com/image/2015-12-06.html>)

The SLE, as initially elaborated by the State Institute of Territorial Planning for the State Institute of Monument Care and Nature Conservation in the 1960s and 1970s, later became a part of the Act (Plesnik, 2014).

According to §3 of the Act: "*An SLE, as an environmentally, geomorphologically, or aesthetically valuable part of the landscape, creates the typical appearance of the*

landscape, or contributes towards its stability. SLEs are forests, peatlands, watercourses, ponds, lakes, and floodplains. Other SLEs are also parts of a landscape that the nature conservation authorities register as a significant landscape component, such as particularly wetlands, steppe grasslands, game refuges, continuous grass stretches, mineral and fossil deposits, artificial and natural rock formations, geological outcrops and exposures. A landscape component may also be valuable growths in settlement formations, including historical gardens and park."

Furthermore, §12 of the Act described SLE as "*protected from activities that reduce its aesthetic and natural value. Interventions with a landscape character*". In particular, the siting and permitting of buildings "*may be carried out only with regard to the preservation of the important landscape elements, especially protected areas, cultural areas, landscape dominants, harmonious scale and relationships in the landscape*". Additionally, the approval of the nature conservation authorities must be required for approving and placing buildings that could impair or change the landscape's character. Moreover, "*the key characteristics that co-create the landscape in an SLE area are a relief (natural characteristics) and land use, resp. Share, structure, and scale of individual types of use is a complex characteristic where it is practically impossible to separate historical components*".

Plesnik (2014) expressed that an SLE is affected by the dynamic state of nature, the permanent maintenance with a slight oscillation or spontaneously recovers. According to § 4 of the Act, SLEs must be conserved against damage and destruction. They should be solely used in a way that does not impair their renewal and does not endanger or weaken their stabilizing function. Additionally, those who intend to implement any intervention that might damage or destroy an SLE or endanger and weaken its ecologically stabilizing function must procure a binding statement from the nature conservation authorities. Such interventions include the placing of biding, landscaping, changes of cultures, land drainage, regulation of watercourses and reservoirs, and mineral extraction. The Act also addressed that the Ministry of the Environment shall specify the particulars of the conservation of SLE in a generally binding regulation.

5.11 EXISTING LAND USE

The following information on the existing land use of the shooting range is derived from the spatial plan of Višnova municipality, which was published in 2017 (Spatial Plan Visnova ©2017).

The land parcels of the facility registered in the region are 690/1, 690/2, 690/3, 698/1, 698/7, 698/8, respectively. The facility is defined as a physical education and sports facility, primarily as equipment and structures used to operate the shooting range.

Currently, there are four determining build-up areas presented in the territory (Figure 21):

- Build-up area Z12a is a 0.14 ha land and is used for the support amenities of the range.
- Build-up area Z12b is 0.07 ha land which is suitable for constructing the range covers of shooting sections C and D.
- Build-up area Z12c is a 0.23 ha land for forming shooting section B's range cover.
- Build-up area Z12d is 0.08 ha of land which is used for constructing shooting section A's range cover.

The construction possibility for build-up area Z12a is set out at a maximum of 40% area, the share of a paved area at a maximum of 40%. Overall, the permissible use for ancillary services such as public catering, trade, accommodation, publicly accessible greenery, public spaces, roads, parking spaces, operational and sanitary facilities related to the primary use and related technical infrastructure.

The following areas that are defined in the territory are the natural area (NP) and specific natural area (NP1)(Figure 21). Activities in those areas are possible to carry out with concern for the restrictions of the SLE, protecting the habitats of endangered species, and maintaining the functionality of the regional TSES. The permission uses, such as small landscape architecture, footbridges, furniture, watercourses, or specific forest management. The construction for recreation of the type of walking paths in area NP can be built with an unpaved surface without restrictions. However, transport infrastructure with a paved surface is permissible only in compliance with permeability conditions. Permeable surfaces such as surfaces consisting of non-compacted and compacted rubble, stones, gravel, gravel-sand, grass tiles, vegetation panels, pavement laid with wide joints that allow plant growth, or gravel lawns on driveways and parking areas. For other permeable surfaces and materials with a high ability to drain water into the subsoil, there is a possibility to construct concrete paving with drainage joints, paving made of interstitial concrete, etc.

Additionally, the quantity and distribution of landscape greenery such as forests, natural valley floodplains, and its stability over time should be the priorities of the development plan in the area. Build-up areas, reconstruction areas, or other plans

should not constitute a significant interference with the character of the landscape (Spatial Plan Visnova ©2017).



Figure 21: Placy shooting range's existing land use (Spatial Plan Visnova ©2017)

5.12 THE FACILITY'S EXISTING CONDITIONS

The existing conditions of the facility are expressed in Appendice 2.

The analysis of the existing conditions of the facility describes two parts: the firing area, and the support amenities. The firing area consists of four shooting sections, and the support amenities involve two parking lots, a playground, a clubhouse, and other existing natural features.

5.12.1 Firing areas

At present, there are four shooting sections located in the territory.

Shooting section A is located next to the clubhouse to the east. This section is designed for long-distance shooting from fixed shooting positions with firing lines at distances of 100 m, 200 m, 300 m, 400 m, and 500 m, heading east. There are eight lying shooting positions and six sitting shooting positions. It is mainly used for shooting from long-arms, such as rifles, semi-automatic or automatic rifles, and all legal calibers.

Shooting section B is positioned next to the main entrance on the left. The range is designed for dynamic shooting at a distance from 10 m to 50 m, with the main shooting direction to the southwest. It is one of over 100 m wide range and is currently under reconstruction following the land-use plan regulation. This part is intended for shooting from pistols and revolvers, shotguns, and submachine guns.

Shooting sections C and D are situated at the westernmost of the facility, next to the second entrance and about 400 m from the clubhouse. Section C is intended for

shooting from fixed shooting positions at a distance of 100 m. Section D is designed for shooting up to a distance of 50 m. The firing lines of both ranges are headed west. Both sections are ideally supported for shooting with shotguns and small arms from standing or sitting positions at the range covers. In addition, due to the "U" shaped trap wall, the fields are also appropriate for dynamic shooting training.

In the future, three new shooting ranges will be built in the northeastern of the facility, next to shooting section A.

5.12.2 Support amenities

The range`s support amenities are featured in Appendice 3 and Figure 22.

The clubhouse is about 100 m from the main entrance and 15 m from the edge of the forest. The house was reconstructed from the old military building in the 20th century. At present, it is a 60 m² office where the range`s owners and staff organize the range operation, such as registration, renting guns/ammunition, and is also a meeting place. It is supported by outdoor sitting benches and tables, a lawn with a playground for children, and a fireplace in front of the house. An unpaved walking path connects the clubhouse to shooting sections B, C, and D. There is also a space for spectators behind the firing line of each shooting section.

Next to the clubhouse on the west is container toilets, and another container serves as storage. Wastewater is accommodated in a tank and is transported out by a septic truck when the tank is full.

There is a container placed next to the pond behind shooting range B in the west that is intended to be a sauna in the future.

There are two vehicle parking lots presented in the area. The main parking lot with a capacity of 40 cars is located at the main entrance in the south of the facility. The second parking lot is placed at the second entrance to shooting sections C and D. It can accommodate up to 15 cars. The main parking lot is used for shooting sections A and B, while the second parking lot is served for shooting sections C and D.

Currently, eight small ponds are presented in the territory: a small pond next to the main entrance, surrounded by a small lawn with decorated rocks, perennial grasses, and wildflowers; three other are positioned in western meadow, with one of them is currently extended to serve next to the future sauna; and the rest four small ponds are located in the east of the site, where the construction of the new ranges will take place. The appearance of the ponds not only brings benefits in terms of aesthetic and water management, but also in biodiversity protection as they host several significant

amphibian species. There are several ditches along forest border and within the site to maintain the drainage system of the territory.

The meadow dominates the land of Placy. The orchard grasses meadow is surrounded by coniferous forest. SLE Černé Bláto is located on the west part of the meadow, while a part of the regional biocorridor Kotalik-Marhelovka is placed on the east. There are some grown birch trees in the west, close to the shooting sections C and D, and small birch trees at the playground. The meadows are strictly mowed twice a year, following the guidelines of biological experts.

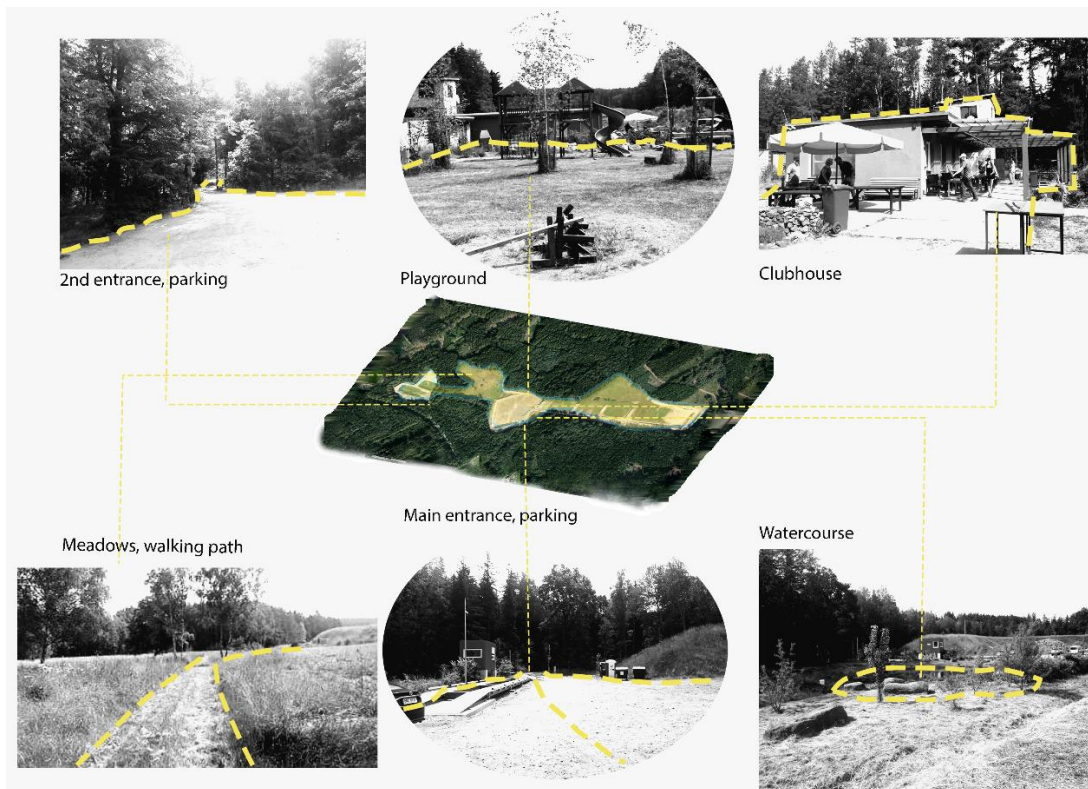


Figure 22: Support amenities (Nguyen, 2021)

Appendice 3 : Support amenities

5.13 THE FACILITY'S OPERATION



(The range's logo) **střelniceplacy**

Placy shooting range has the character of a permanent, open, commercial shooting range, according to the Standard CSN 39 5401 that is described earlier. The facility

is designed for shooting from short and long guns, including sniper rifles, small arms, historical weapons, shotguns, and non-lethal weapons under specified conditions.

The facility is open for the public from Wednesday to Sunday, from 9 am to 5 pm. Shooters can reserve the time and date through online reservation availability on the facility's website (<https://www.placy.cz/>).

Presently, the range offers three experienced shooting packages that are designed as courses; each package's duration is about three hours:

- Pistol course: in the course, shooters will get to know the requirement of the safety rules and have a chance to practice shooting from seven types of self-loading pistols under the supervision of the instructors.
- Shooting course for women: this course is designed for female shooters who want to improve their shooting skills with pistols, shotguns, or rifles.
- Legends package: in this course, shooters have a chance to try shooting with professional and high rate weapons and find out how they work, or what made them famous, under the guidelines of instructors.

In addition, regularly on Wednesday from 2 pm to 5 pm, there is a dynamic shooting training with small arms course, the training is designed for six people.

However, the most attractive activities carried out in the facility are shooting competitions on special occasions. For example, the shooting competition in the name of Seth Kinman, a famous hunter in the West from the 19th century. In addition, a competition named "the Little Twelve" is organized for two-member family teams in shooting from a small shotgun to twelve targets. The newest event under the name "PRS.22 CUP" will take place in spring 2022, carried out for rifle shooting competitions from different distances.

According to the facility's owner, the range is intended for :

- Shooting sports and training for shooting license holders and civilians.
- Shooting training as part of professional examinations to obtain shooting licenses.
- Shooting to verify the functionality of weapons and ammunition.
- Shooting training for members of the Armed Forces.
- Shooting competitions.
- Short gun training/courses for women, and children at least 10 years of age.

When shooting at Placy shooting range, each shooter has his specific privileges according to their level of training and individual shooting skills. Thus, the shooters are divided into three classes (Komenda, 2017):

- Beginner: inexperienced shooter without basic shooting skills, or limited shooting experience. That person is obliged to carry a firearm and conduct ammunition always under the supervision of an instructor or with an experienced firearm license holder.
- Advanced: an advanced shooter with practical shooting skills and experience who can safely handle shooting from different types of permitted weapons
- Elite: an elite, very advanced shooter who can safely handle shooting with all permitted weapons.

5.14 BUSINESS STRATEGY OF PLACY'S OWNER

To capture the business strategy for the future of Placy shooting range, several interviews with the range's owner were done. As obtained from the interviews, there will be the construction of new support facilities and open space. Mr. Lukes, the range's owner, revealed his demand for the new clubhouse, which includes: reception where shooters can do the check-in, rent or leave stuff; storage room (~20m²) to accommodate guns and expensive stuff; pro shop (~300m²) for selling guns and shooting accessories (note that the shop and reception need to have direct access to the storage room); classroom (~40m²); changing room for shooters (~30m²) and accommodation space for the range's staffs (~30m²); restaurant (~60m²) with kitchen and background. Other things, such as the reconstruction of the existing parking lots with the possibility to extend the parking lot in front of shooting section B and space for caravans are also required. About the open spaces for outdoor activities, he addressed that there should be an outdoor gym and playground and other attractive programs for the participants, as well as seating areas.

5.15 CONCLUSION – STRENGTHS AND WEAKNESSES

To help understand the potentials and problems of the area of interest, along with data from this part, the conclusion (Table 4) describes the strengths and weaknesses of the territory under seven different factors: Physical, Economical, Biological, Organizational, Social, Cultural, and Aesthetistical.

FACTORS	STRENGTHS	WEAKNESSES
PHYSICAL	A large area of the land (12ha). Location in the middle of the forest; open landscape, flat	Location in the forest and the sensitivity of TSES, SLE, regional biocorridor and the

	<p>terrain with minimum slope at the entrance.</p> <p>Wet forest meadow and 8 small ponds.</p> <p>Close to various sightseeing and local nature views such as Spaleny Vrch, Houpacka, Velka Skala, etc.</p> <p>Natural barriers around the territory such as drainages might also be used to prevent encroachment and ensure privacy.</p>	<p>floodplain can be barriers to the construction of the new commercial building.</p> <p>Existing clubhouse close to the edge of the forest- not suitable for development.</p>
ECONOMICAL	<p>A commercial shooting range operated year-round with 2 parking lots and 4 shooting areas; A boost for the local economy.</p>	<p>High price of the construction of the new building.</p> <p>High price for management and maintenance of the meadow, and the ponds.</p>
BIOLOGICAL	<p>Hosting several endangered plant, amphibian, insect species.</p> <p>Enhancing the existing biodiversity.</p>	<p>Biodiversity within the territory can be harmed during the construction.</p> <p>Endangered plant species in the meadow can be damaged due to human outdoor activities.</p> <p>Endangered species dependent on the maintenance of meadow and water retention.</p>
ORGANIZATIONAL	<p>Good connections from Prague and other cities by car.</p> <p>The range's organization is appropriate for a commercial facility.</p> <p>Opportunities for outdoor activities inside and outside out of the territory, such as nature walks or cycling. New programs in non-public opening time (5pm-9am), such as camping, concerts.</p>	<p>Only one small clubhouse as support facilities.</p> <p>Irregulated parking lots.</p> <p>Restrictions from protected areas and floodplain limit new constructions.</p>
SOCIAL	<p>Daily day social interactions between the ranges' visitors.</p> <p>Social benefits due to shooting events, competitions.</p>	<p>For now, the regular guests are mainly shooters. They do not bring their family and friends</p>

		because there are no programs for them.
CULTURAL	Heritage of traditional Czech shooting culture. The existing clubhouse is a former military building. Interaction with other countries' shooting culture through international competitions.	Shooting cultural heritage can be a barrier to the development.
AESTHETICAL	Watercourses and meadow in the middle of the forest give the view of wild nature. Orchard grasses meadow in summer.	Disrespecting the natural conditions can destroy the aesthetical values of the territory.

Table 4: Conclusion - strengths and weaknesses



Figure 23: Open landscape, flat terrain with minimum slope, bordered by the forest (Nguyen, 2021)



Figure 24: Watercourse give the view of wild nature and support biodiversity (Nguyen, 2021)



Figure 25: Irregulated existing parking lot (Nguyen, 2021)



Figure 26: Small existing clubhouse close to the edge of the forest- not suitable for development (Nguyen, 2021)

6 Design

6.1 PROGRAM

Considering the user's needs, and the desire of the range's owner, the following features should be the foundation for the concept plan:

- Clubhouse with the reception, pro shop, restaurant, classroom, changing room, and accommodation space.
- Parking spaces for visitors of each shooting section, and the range's staff.
- Open space for non-shooting activities with attractive programs.
- Seating areas and resting spaces for shooters and non-shooters.

- Toilets, as support amenities for firing areas and public areas.
- Reasonable circulation within the site.

6.2 CONCEPT

The concept plan for the public area of Placy shooting range is based on the site analysis and the program. The data from literature sources described earlier helps to understand the design compositions in open spaces, as well as the users' experiences in such spaces. The concept also respects the natural conditions and safety considerations of the site. It is featured in Appendice 4.

The design area is defined as the facility's public area, which is mapped from the open space of shooting sections C, and D to shooting section A. The existing 60 m² clubhouse is considered unsuitability for the development due to its size, and forested border. Therefore, it will be excluded from the concept plan.

There will be a new clubhouse with a total area of 480 m², which is located next to the range cover of shooting section A and is about 35 m far from the forest. The clubhouse encompasses a large pro shop, where visitors can go for check-in, leave stuff, rent or buy guns, and other shooting accessories. Next to it is storage room, classroom, restaurant, changing room for shooters and the range's staff, and accommodation space for the range's staff. As the first check-in point, the clubhouse has direct access from/to the parking lots.

Since access to the facility is limited by public transportation, and visitors mostly come by car, it is important to reconstruct the parking spaces, in order to accommodate the largest number of cars. When the existing parking lot on the left side of the main entrance is full, people can park their car at the gravel meadow parking lot in front of shooting section B, which is arranged for up to 50 cars, with spaces for limited mobility people. This 2nd parking lot would also be used as space for outdoor cinema or concerts during the range's closing hours (5 pm- 9 am). There is also a possibility to store 3 caravans on the right side of the main entrance, which is supported by shade trees. The private parking lot for the range's owner and staff is located in front of the clubhouse and is next to shooting section A's range cover. At the second entrance at shooting sections C, and D, the existing parking lot will be reconstructed to accommodate up to 20 cars, including three parking spaces for limited mobility people.

Open space with outdoor activities is defined in the backyard of the clubhouse. In the meadow, a playground for children and equipped outdoor gym for adults are placed. These elements are supported by seating areas with shade trees and formal garden.

There is also a pavilion with a grill place, where shooters and their families gather together or, ideally, a place to organize outdoor events. To satisfy different kinds of exercises, training grass terraces are made and could be used for all different levels of age: there can be tunnels and slides included in them, which are made for children; for physical training and military training, they can be used for doing cardio run up and down or other types of exercises for a different feel of work out. An example of grass terraces is provided (Figure 27). Furthermore, being supported by a natural wooded forest area, the concept for a monkey park rope (length~110m, heigh ~4m) is made, which would be the most attractive recreation feature in the open space of the site. Figure 28 is an example of a monkey park rope. Additionally, there is also an outdoor resting space with benches for shooters in front of shooting section A`'s range cover, where they can take a break from shooting, or prepare before competitions.



Figure 27 : Grass terraces/ tunnels (<https://www.hideouthouse.com/portfolio-item/mounds-tunnels-caves/>)



Figure 28: Monkey park rope (<https://www.skiareal-rokytnice.cz/letni-aktivita/lanovy-park/>, <http://www.severnicechy.info/dr-en/138-monkey-park-rope-climbing-centre-spindleruv-mlyn.html>)

An essential amenity in the backyard meadow is the toilets, which are positioned next to shooting section B. The toilets are easily accessible from the parking lots, clubhouse and its backyard open space. There will be 4 male toilets, and 4 female toilets, separately.

In the second part of the meadow, there is a seating area around the pond, where the sauna is nearby. The seating area is supported by perennial flowers and grasses with decorated boulders. The sauna is connected with a floating dock of the pond, a natural focal point for the area, and a beautiful place to gather and entertain. Amenity like a dock can have many recreational and aesthetic benefits, as it increases the use of the sauna, or pond exponentially. Additionally, there is a running trail along the forest's edge that supports physical training. However, due to the sensitivity of the SLE Černé Bláto area, the design cared not furtherly disturb this part of the meadow, to support the SLE's character and protect endangered plant species. Heading further to shooting sections C and D, the area is supported by two male and two female bathrooms, which are located between the range cover C and range cover D. Next to the parking lot is an outdoor resting area with benches, which is supported by shade trees. In the concept plan, there is no administrative office for shooting sections C and D because Placy`s owner prefers all visitors to do the check-in at the clubhouse. Finally, the circulation within the design area is backed by several pathways. These pathways connect the clubhouse with each shooting section, to the sauna and running trail in the western part of the meadow. After checking in at the clubhouse, visitors can move to shooting sections C and D either by pathway or by car through the road outside the facility.

6.3 MASTER PLAN

Master plan

Based on the concept plan, a final master plan for the design proposal of public area of Placy shooting range has been made with respect to the spatial requirement of the design features, as well as the facility`s existing conditions.

The master plan consists of two design sections for better clarity. Design section 1 is drawn on a scale of 1:500 and describes the most important part: the new clubhouse and its surrounding with open space in the meadow and parking lots. Design section 2 is represented on a scale of 1:1000. It continually delineates the other features in the western meadow (sauna, seating area, running trail) that are connected by pathways from the clubhouse, as well as parking lot and resting space at shooting sections C and D. The master plan is featured in Appendice 5.

Sections

To understand the spatial relationship between the design elements into the terrain, sections image is provided and is also presented in Appendice 5.

Vegetation

The plants that are used for the design proposal would respect the site`s existing natural condition and biodiversity, especially the maintenance of the meadow and protection of dangerous species (*Gentiana pneumonanthe* and *Phengaris Alcon*). Supported by the sun, the site`s meadow is ideally to grow temperate fruit trees. Apple trees (*Malus Domestica*), pear trees (*Pyrus communis*), and peach trees (*Prunus persica*) would be planted along with shooting section A, in front of the clubhouse at the parking lot and seating area. They would reduce noise and provide a canopy for such areas. The orchard grasses and wildflowers around the ponds have given the site an aesthetical view. These species would be: viper's-bugloss (*Echium vulgare*), brown knapweed (*Centaurea jacea*), yarrow (*Achillea millefolium*), meadow sage (*Salvia pratensis*), pony tails (*Stipa tenuissima*), and pampas grass (*Cortaderia selleona*).

Visualizations

To provide a better view of the design plan, perspective images have been provided (Figure 29-35). These images give the visualization of how the design features in the area would look like. They are also represented in Appendice 6.



Figure 29: Clubhouse and the main entrance (Nguyen, 2022)



Figure 30: 2nd parking lot on gravel meadow in front of shooting section B (Nguyen, 2022)



Figure 31: Clubhouse backyard's open space with the pavilion (Nguyen, 2022)



Figure 32: Playground for children and seating area (Nguyen, 2022)



Figure 33: Equipped outdoor gym (Nguyen, 2022)



Figure 34: Open space in the western meadow with sauna, pond, and running trail (Nguyen, 2022)



Figure 35: Parking lot in front of shooting sections C,D with bathrooms and resting spaces (Nguyen, 2022)

7 Discussion

The new clubhouse is located in specific natural area (NP1) according to the existing land use plan. Additionally, it is situated in the floodplain Q100 and active flooding zone. However, the level of the active flooding zone in the area is still not determined. Thus, it is necessary to obtain the assessment of the water authority for such area. Simultaneously, whether or not the construction is possible to carry out, according to §17 of the Water Act.

Furthermore, the new clubhouse is 35 m distanced from the forest's edge. According to §14 of the Forest Act, for construction within 50 m from the forest, the building authority should decide on the construction only with the consent of the relevant state forest administration with documents on forest preservation, environmental protection, and analysis of the expected impacts.

Additionally, the design plan is positioned in the area of registered SLE Černé Bláto with the protection of the endangered species *Gentiana pneumonanthe* and *Phengaris Alcon*. Thus, permission from the nature conservation authorities for the siting and construction in this area is needed under §12 of Act No. 114/1992 Coll.

Moreover, the maintenance of the site's meadow and watercourses in order to preserve and protect related species should be a priority. According to expert RNDr. O. Sedláček, PhD., SLE Černé Bláto's supervisor, there should be a twice mowing event every year in May and September, and in mosaic (Sulkova, 2020). It is also recommended by several scientific sources described earlier. However, it is

necessary to obtain opinions and guidelines from other biologists and experts to protect other species that are accommodated in the meadow and watercourses within the territory.

8 Conclusion

Shooting sport in the Czech Republic has undergone a long history and is one of the country's most successful sports. However, apart from military and Police shooting ranges, just a few commercial outdoor ranges are open for the public in the country at present. Most of them are located in small areas and offer short firing distances. That is the reason Placy has become popular since its opening in 2012, due to the unique 500 m firing area and three other shooting sections.

The design of public area of Placy shooting range goes towards the range's support amenities and non-shooting activities program. The range's main support amenities are at the new clubhouse (480m²), which is the facility's administrative place. Visitors can go there for check-in, buy or rent guns, join the shooting classes, enjoy food in the restaurant, and other services. There is also accommodation and changing rooms for the range's staff, as well as a preparation space for shooting competitors.

The non-shooting activities are programmed in the meadow and are supported by amenities such as an outdoor gym, children's playground, outdoor pavilion, training space, monkey park rope, sauna, and seating areas. These components are usable for all types of users: shooters and their friends and families, shooting groups, military trainers, and competitors.

On the other hand, the design plan has paid attention to the nature protection of the area, by not disturbing a large part of the area of SLE Černé Bláto, to ensure the preservation of the endangered flower species. However, there are still limitations around the design plan to fulfill nature protection while ensuring the range owner's request. Thus, consulting with biological experts has become necessary.

Additionally, Placy is located in the middle of the forest and is close to various sightseeing and local nature views such as Spálený Vrch, Houpačka, Velká Skála, etc. Thus, support the range's visitors to discover outside the facility, giving a chance for future development and service expansion, such as campsite, and natural protection education.

Last but not least, the design plan would open an opportunity for the development of the range, boosting its business and the local economy, as well as bringing more people to enjoy sports shooting and other recreational activities.

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