Final Project Report

1. Contestant profile

▪ Contestant name:	**Jitka Hrežová**
▪ Contestant occupation:	Teacher
▪ University / Organisation	Gymnázium a SOŠZE Vyškov, příspěvková organizace
▪ E-mail:	
▪ Phone (incl. country code):	
▪ Number of people in your team:	**7**

2. Project overview

Title:	QuarryExplorationTrail
Contest:	Czech Republic
Quarry name:	Opatovice Quarry
Prize category: (select all appropriate)	☒Education and Raising Awareness ☐Habitat and Species Research ☐Biodiversity Management ☒Student Project ☐Beyond Quarry Borders

Abstract

The aim of our project, called "**Quarry Exploration Trail**", was to map the biodiversity in **Opatovice Quarry** and particularly raise awareness of this mining area, which is of great importance for Vyškov. Our team members, based at Gymnázium a SOŠZE Vyškov, are Lucie Zbořilová, Martin Kocourek, Petr Míka, Karolína Zelená, Jaroslav Horáček, Veronika Tupá and Ms. Jitka Hrežová, MSc. Our work on the project also required advice from specialists in various fields: the director of Botanic Garden of Palacký University in Olomouc, Mr. David Cigánek, MSc. was a big help to us when identifying the flora in the quarry; two teachers from our school, Petr Kudlička, MSc. and Renata Máslová, MSc., gave us advice concerning the creation of the map. Thus, joining forces in an unusual cooperation of students with teachers and experts, we managed to complete the project to its successful end.

Because the quarry in question is **still active**, we had to adapt our project and our work according to these circumstances. Together with Mr. Cigánek we mapped the plant species, and we even found some significant ones, which surprised us just as much as we were surprised by the mesmerising beauty of the details of relatively common plants. Throughout our work we recorded the results of our field research in an **online photo gallery**, which was created for this purpose.Photographs are divided into four parts, according to the date on which was each given plant found. Thanks to this we are able to observe certain species throughout their whole life, from spring to autumn. The goal of this mapping was to find and attractively capture as many plant species as possible, with the intention to show to the public that a quarry, which is usually regarded as a place that disrupts the landscape, can be a place where an incredible variety and diversity of organisms is developed.

Another part of our project was the construction of **the lookout over the quarry**. Our aim was to build a place which introduces the quarry to the public from a different perspective and leaves a positive feeling. It is a place that offers a very nice view of the quarry and the surrounding countryside. In addition to a relaxing potential, the lookout also fulfils other aspects related to our research. **An information board** can be found there, which basically informs the visitors about the results of our work. You can find information concerning biodiversity, succession or the insect house there.

The above mentioned **insect house** forms another part of our lookout. It is used mainly by *solitary bees, ladybugs, lacewings* and other insects as a shelter and a place to lay eggs. As students, we would very much like to pass the imaginary relay to younger peers, who are thus offered a chance to monitor the insect house and see what insect species will settle there and observe the overall development of the place.

Given that many significant tourist points in close or more distant surroundings of Vyškov can be spotted from the lookout, we decided to make use of this advantage and to help the visitors with orientation in the horizon. An oriented **map** was prepared, on which the visitor can find all the places of interest pinpointed by us with the bonus of photographs.

During the **exhibition** of photographs, which we managed to organize, we presented the results of our work to the public, shared our views of the competition itself and, most importantly, presented to the public several dozens of photographs, which were made in the quarry. At that point our project was coming to an end.

Final report

Timetable

April 2016

- The first trip to the quarry took place; research of the vernal vegetation
- The final place for the lookout is picked
- Thinking about the design and composition of planned photo gallery
- Making a shortlist of the photographs for the exhibition

May 2016

- Second biological expedition for fauna and flora of the quarry and its surroundings
- Making another shortlist of photographs for the exhibition
- Working on the design of the lookout
- Submitting to the management of the quarry our two final ideas for the lookout

June 2016

- Third biological expedition; observing the summer vegetation
- Again, making a shortlist of the photographs for the exhibition
- Setting a date of the exhibition and booking our school assembly hall for the purpose
- Arranging a performance of the band Maggots at the exhibition
- Finding out the number of panels made available by the school for the purposes of exhibiting the photos
- A positive decision and a building permit for the lookout was given by the management of the quarry – realisation date planned for mid-August
- The idea of creating an oriented map at the lookout came up

July 2016

- Creating an invitation for the exhibition and its publication on Facebook
- First suggestions concerning the information board
- Starting to create the map
- Working on the first and second parts of the photo gallery on the school webpage (not yet public)
- Preparing the individual parts of the information board – drawing of the succession, the text about it, introduction, choosing the photographs, information about the insect hotel
- Building the construction of the insect house

August 2016

- Working on the third part of the photo gallery
- Publication of the invitation for the exhibition on the school webpage
- Contacting the local press (Vyškovský deník) and Vyškov television

- Building of the lookout over the quarry
- Installation of the insect house near the lookout
- Working on the map
- Finalizing the information board
- Ordering kolaches for the exhibition

September 2016

- Last expedition for the flora of the quarry; observing the coming autumnal vegetation
- Working on the fourth part of the photo gallery
- Finalization, final checking and publication of the webpage with the photo gallery
- Finalizing the map
- Shopping for refreshments for the exhibition, baking the honey cake
- Exhibition of the “Quarry Exploration Trail”
- Manufacturing of the information board and the map and their installation at the lookout
- Grand opening of the Lookout
- Writing the final report

Photo Gallery

The photo gallery, or the photo herbarium, focuses on flora of the so-called primary succession and the plant species which grow near the quarry pit – specifically the glade, grove, field and ruderal vegetation.

The gallery is a part of our school website and will be used during botany lessons and in preparation for biological competitions. The web address (*https://sites.google.com/a/gykovy.cz/qla-opatovice*) and also a QR code is available on the information board at the lookout. All the photos were taken with Canon EOS 760D camera by a member of our team, our photographer Lucie Zbořilová.

The plant species were recorded during our regular trips to the quarry. Those were taken on Saturdays, because on the weekends even the still active quarry storeys could be surveyed. It may seem that on these active parts of the quarry the vegetation would be in the phase of downturn; however, we found that even in such places one can find interesting plant species – such as *Tragopogondubius* – or the so-called plant nanisms of *Echiumvulgare*, *Tanacetumvulgare* or *Lactucaserriola*. Even here nature showcases its colours and in combination with the surrounding stone we find it to be a secret waiting to be discovered.

The quarry and the surrounding countryside taught us to focus and during our research expeditions we learned to look for the details that are crucial when identifying plant species. Gradually we realized, for example, that even a tiny bit of a plant, such as a segment of a leaf blade, barely perceptible to the human eye, is vital for the distinction between *Trifoliumcampestre* and *Medicagolupulina* – two plants with yellow inflorescence that are morphologically very similar. And so we were increasingly reassured in the knowledge that beauty, variety and biodiversity is in the little things.

The photo gallery is divided into four parts according to the chronological order of our trips to the quarry, namely “Photo Gallery 16 April 2016”, “Photo Gallery 8 May 2016”, “Photo Gallery 4 June 2016” and “Photo Gallery 3 September 2016”. We tried to register the plants every month for 6 months, from April to September. The only exception are July and August, during which we did not manage to gather together enough team members due to summer holiday. That creates an opportunity for anyone interested to fill in this time gap.

The plants are listed in alphabetical order. For each plant the Latin and Czech names are given as well as its family and a place of discovery.

The first part of the gallery presents the plants as pioneering species on the overburden and plants of the wider surroundings of the quarry pit – the so-called species of glade, grove, field and ruderal vegetation. In total there are 30 recorded items.

In the second and third parts a location in the quarry pit and its surroundings is given for each plant. Here we see an opportunity for the future to mark these locations on the map to complement the given information. The second part of the gallery contains 36 items and the third contains 56. Therefore, the most numerous in registered species is the gallery of July 4.

The fourth part of the gallery offers plants registered on individual quarry storeys and the adjacent paths between them. 39 items were recorded.

By opting for different structure for each part of the photo gallery, we believe it will be interesting and easy for the visitors to navigate. Certain plants are repeated in the galleries, but that is because we registered them in different stages of their life. For example, we managed to capture *Lupinuspolyphyllus* in its vegetative stage with green leaves, then its inflorescence created and in the last stage of fruit – with pods. The life cycle of *Fragaria vesca*, *Tussilago farfara*, *Lotus corniculatus*, *Taraxacum officinale*, *Arabidopsisthaliana*, *Capsellabursa-pastoris* and others is similarly documented.

From our botany expert we learned a lot of interesting information concerning the plants we encountered. For example that *Arabidopsisthaliana*, a plant with a short life cycle, is important for genetic research; or that plants which are not getting enough nutrients exhibit stunted growth are called “nanisms” (or “hungry forms”). We captured a *Rubus* which had unevenly distributed yellow stains on its leaves – and we were informed that these are called “variegated” leaves. We registered plants that are not so commonly found and would not be expected in a quarry: for example *Eragrostisminor* or a herb from the family *Rosaceae*, *Potentillaalba*. The genus *Berteroa* is in the Czech Republic represented solely by *Berteroaincana* – which was also found in the surroundings of the quarry pit. We were also amazed by the various colours and shapes of the flower of *Solanumdulcamara*, otherwise poisonous herb, and got acquainted with an invasive plant called *Impatiensglandulifera*. During our last trip to the quarry we made our biggest discovery: a plant labelled as **C2** (highly endangered species) called *Chenopodiumbotrys*. All these findings brought us joy as well as edification. A necessary tool for recognition of plant species was botanical atlas *Klíč ke květeně České republiky, Akademia, Praha 2002.*

Summary: In total we managed to register **123 species of plants** and 1 species of *Basidiomycota*. 42 is the number of the plant families represented, the most numerous one being *Asteraceae*. The second most numerous one was *Rosaceae* and sharing the third and fourth places were families *Fabaceae* and *Poaceae*.

The list of all the species can be found in the appendices.

The Lookout Over The Quarry

On one of our trips to the quarry we found a place with a beautiful view of the surrounding landscape and the quarry itself and so it occurred to us to build a lookout there. Over the winter we would meet and discuss different designs for it. The requirement of the management of the quarry that the lookout had to be easy to construct and not disruptive of the surrounding quarry, had to be taken into account. In spring 2016 we presented two of our best designs to the management. One of them was approved and we could start with realisation.

The lookout is situated on the southern edge of the quarry near a cycling route, which makes it easier to get to.

Before the construction of the lookout itself, the ground of the place had to be modified with heavy machinery. The surface was then covered with Moravian greywacke, which was taken from the quarry itself and serves to stabilize the surface. The lookout is enclosed from the rest of the quarry by metal railing painted grey. For all the technically demanding work, we would like to thank the head of the quarry, Mr. Hubert Jelínek. We then filled the railing with chain-link fencing to ensure that all the safety requirements were met and we also cut out the shrubs and small trees that blocked the view.

In the middle of the lookout there is a huge boulder, serving also as a table, on which an oriented map with all the important points of the surrounding landscape is put. Around it there are smaller round stones, wooden stools and benches carved out stumps for sitting. Those were installed in cooperation with the quarry staff. It turned out that the combination of stone and wood is quite impressive.

The insect house, which we think raises the attractiveness of the place, is installed in close proximity behind the railings. There are also two information boards. The one, which informs about our project, we designed and assembled ourselves. The other one deals with the history and present practices of stone mining and was provided after agreement by the management of the quarry. Thus, together the two boards offer visitors complete information about the place. The boards and the map were installed on **21 September 2016**, when the lookout was **officially opened**.

The result of this project is not only a beautiful place for relaxation, but also for exploring various species of animals in the insect house or getting more information on how exactly the quarry works.

We hope that out lookout will attract many visitors who will be happy to return there.

Information Board

The information board forms yet another part of our project of the lookout. We used all the knowledge acquired during our field trips to the quarry when creating it. Firstly, each team member drew up their own ideas for it either on paper or using a PowerPoint presentation. The final composition emerged from the synthesis of all the sub-concepts.

The upper rim of the board holds the title “Lookout over the Quarry” on a green background. On the bottom edge, also on a green background, there are logos of all the important sponsors and supporters of the competition. The space in between is divided into two parts: on the left there is a description of the competition; also our team is introduced, which is complemented by a photo, and the results of our work are presented. On the right information about the insect house is provided. Above that the process of succession is explained in more detail, which is accompanied by a hand-drawn sketch of this natural development.

And this piece of the already quite complicated mosaic was a huge challenge. The author of the sketch, our team member Karolína, was spending the summer holiday working in Mallorca. The most difficult thing to manage was the long-distance online communication. How does one explain via Messenger how to portray succession?

Karolína recalls: “I shared all my ideas in short messages. And when I finally managed to conjure up a perfect idea after three hours of drawing on paper, my proposal was rejected. I was told that the individual phases of the process needed to be separated by a space, so that the developmental phases could be seen clearly at a glance. As you can imagine, I was disgusted – I had put so much effort into it! Nevertheless, I could not give up! The next day I made time and got to work again, silently hoping that the second attempt will be successful. This time I was more patient and diligent in removing the flaws and after five hours of hard work I sent my new proposal in. And my effort paid off – I was even commended. My masterpiece had yet to go through some minor alterations by computer programme to smooth out the transitions and match the colours, but other than that my work was done. I was in seventh heaven for actually having done it.”

The overall effect of the board is completed by photographs of the captured fauna and flora: *Lotus corniculatus*, *Echium vulgare*, *Solanum dulcamara*, *Tragopogon dubius* and *Symphytum officinale*.

The Insect House

The insect house is a wooden structure, which serves for attracting and settlement of solitary species of insects, such as for example *solitary bees*, *spiders, earwigs, ladybirds* etc. For that reason are the insect houses filled with different kinds of materials, which try to simulate the insects’ natural habitat – e. g. cavities, cracks and gaps. Insects use these houses (sometimes also called ‘hotels’ or ‘loggeries’) for laying and developing of their eggs and larvae, which grow into adults the following year.

Our decision on building the insect house was unanimous for various reasons: the first was that we wanted to try to support the insects in this locality thus giving it a better chance for development. The other was

the attractiveness of such a construction. Nowadays, the insect hotels are becoming a 'hit' and therefore we did not hesitate to plan its installation in close proximity to the lookout. Thus incoming visitors will not have to look for the loggery with difficulty, but will be able to view it right from the lookout. Yet another reason we had for this construction was that the insect house is a great experiment for us. We would be very much interested in seeing what species will settle there. This also opens an opportunity for the involvement of younger students when monitoring the life in the insect hotel.

We built the insect house ourselves in our free time during the summer holiday. We drew up a simple sketch and secured the necessary material – spruce logs varying from 7 to 17 cm in diameter, rebars, nails and metal screws. We assembled the external structure before transporting it to the lookout, where we anchored it 30 cm into the ground. To ensure better stability we propped it from behind with spruce braces. Then we filled the interior with miscellaneous material – spruce bark, cones and hollow stems of the plants of the family Apiaceae, dry reeds, perforated bricks and wooden blocks with drilled-in holes. The back side of the house was fortified with chain-link fencing.

During the official opening of the lookout we already registered first insects settling in the insect house.

The Map

The beginning of the creation of the map dated back to June 2016 when we decided to incorporate it into our project. During the summer holidays we discussed the proposals which would appeal to everyone involved. Finally, we chose the first proposal, discussed and immediately started working on it. We met about once a week and slowly started putting the pieces together. When the map started to take the final shape, we changed our mind and started from scratch. We agreed that the map field should be more extensive and should include all the points of interest the visitors can actually see from the lookout. Up to that point, we had been working with only a section of the map covering the close vicinity of the quarry; the new draft encompassed an area delimited by *Frýdlant nad Ostravicí* to the north, *Lysá hora* to the east, *the city of Zlín* to the south and *Drahanská vrchovina* to the west.

In the original concept the map was to be complemented by two panoramic photos of the view – one with the *Kojál transmitter* and the other showing the *Beskids, Hostýnské vrchy and Litenčická pahorkatina*. However, we changed our mind about this part also and have added detailed photographs of interesting locations selected by us. Thus our map took a final shape and we could move on to the manufacturing.

However, before we could get started, we had to visit the place itself and explore it properly. We drew not only from our theoretical knowledge of geography, but also from practical findings which we acquired by using compass and tourist maps. We used the help of several internet applications for drawing the horizon. It also took several separate visits to the place to capture the horizon on panoramic photos.

The actual creation of the map was carried out in a programme called ArcMap, to which our school owns a license. We worked with a freely downloadable geographic database called ArcČR 500, from which we gradually picked specific map layers useful for our purposes – e. g. forests, roads or cities. Each of the elements had to be edited individually, so that together they would form a visually pleasing whole. We edited colour as well

as borders, captions and other details practically negligible for an ordinary visitor. It was indeed a finicky and tedious work, but we were motivated by the desire to finish the job successfully and thus to make a good use of our long-term diligence.

When we achieved the desired result we shared it with the rest of the team. We have received positive responses from them as well as from our advisors in the field of geography. We pieced together the final layout of the board and sent it to a firm which specializes in this kind of printing. In the end the plate is made of anodized aluminium and the map is printed on a foil that is weather resistant – holds against UV radiation, rain, wind or snow.

The board consists of these sections:

Map Field

The main objective is to show the visitors what they can see from the lookout. That is why the most important tourist destinations are pointed out:

The Kojál Transmitter – situated 12 km from the lookout on Drahanská vrchovina; with height of 339.5 m it is the third tallest construction in the Czech Republic.

Lysá hora – with its 1323 m above the sea level it is the highest peak of Moravian-Silesian Beskids and is recognized for its typical bare peak. It is not however in closer surroundings – it is separated from the lookout by a distance of 112.4 km; therefore it can be seen only at times in suitable weather and good visibility.

Hostýn, a place of pilgrimage – situated in Hostýnské vrchy 55.7 km from the lookout.

Church of St. Michael in Švábenice – lies 13.3 km from the lookout and is worth seeing up-close as well

Litenčická pahorkatina – forms a part of the Central Moravian Carpathians and it extends in south to southeast direction from the lookout. its highest peak is Hradisko with 518 metres above the sea level.

Not all the places that can be seen are marked on the map, however. From the lookout one can also see:

The Březina Military Training Area – created in 1951 in the wooded area of Drahanská vrchovina

Vodní nádrž Opatovice – it is not only a water source for Vyškov and the surrounding area, but also a refuge for many animal species protected by law.

The Vyškov Gate and Subcarpathia – it forms a divide between Drahanská vrchovina and Litenčická pahorkatina.

Map Section

Another part of the board is a section of the map showcasing the close surroundings of the quarry and serves for better orientation and identification of the nearest villages.

Map Legend and Label

A legend and a label belong to the standard components which every map should have, therefore we too included them in ours.

Photographs

The layout is completed with detailed photographs of three places selected by us and that can be seen from the lookout: the Kojál Transmitter, church of St. Michael in Švábenice and the place of pilgrimage of St. Hostýn. The trio of photos is accompanied by our own panoramic photo, taken from the lookout, thanks to which it is possible to identify the distant hills.

When the layout was created and sent for printing the only thing left to do was to put the finished map in its designated place – on the stone table in the middle of the lookout. On 21 September the whole team met with the management of the quarry and both the map and the two information boards were put in their places. And with this the map, as well as the lookout were officially complete.

Exhibition

To present our findings to the public, raise the awareness of biodiversity and share the beauty of nature in Opatovice, we decided to organize an exhibition of photographs.

The preparations took quite a long time – one might say from the very beginning, actually, because during the first field trip to the quarry, which took place in April, we took many photos of what we observed. The date of the exhibition was agreed on by the end of June and we booked the time and space in **the assembly hall** of our school, **Gymnázium a SOŠZE Vyškov**. During July we created the official invitation and in August we published it on Facebook and the school website. We also sent it to the local newspaper, Vyškovský deník, and Vyškov television.

By the end of August we started printing out the photographs. We decided to take it upon ourselves and print the photos out on our school printer – we were satisfied with the quality of the print, therefore we felt no need to pay for the service elsewhere. However, in two cases (an enlargement of the view of the quarry and a photo of our QLA team) we decided to put the photos on a large A3 format, the printing of which was ordered at a specialized shop in Vyškov. The first week in September the last photographs were printed, as our last expedition for the flora of the quarry took place on 3 September.

In total we took **1.500 photographs**, while 90 of them were printed out for the purposes of the exhibition. The exhibited material was divided into three parts: fauna, flora and our work. Our school provided the panels on which we placed the photographs. The photos on each panel were arranged in a different way to avoid monotony, and so that each could attract the visitor's attention in its own way. The most photographs were

dedicated to plants, where we focused on the details, such as shapes, colouring of the flowers, inflorescence and fruits.

We also managed to capture several invertebrate animals, e. g. invasive species of *ladybird* (larvae an adult), *tiger beetles, Cucullia verbasci, Tettigonia cantans, spiders of the genus Lycosa, Apis mellifera, hoverflies,* representatives of the family *Syrphidae*; *Helix pomatia*, representatives of the families *Coliadinae* and *Rhyssinae* and *Oedipodacaerulescens*, which we at first thought to be *Oedipodagermanica* (listed in the red book of endangered species), but when it flew the blue colouring of the wings was clearly visible.

There was also a small collection of stones from the quarry prepared as yet another part of the exhibition: greywacke, conglomerate, cobbles, calcite and fossilized plant remnants in slate.

Various refreshments were prepared for the visitors: cakes, a honey cake made by Lucka, sticks, potato chips and such. The visitors also had the opportunity to taste herbal tea prepared from the herbs which can be found in the quarry and a Fair Trade coffee. The songs performed by the band **Maggots** helped to create the nice overall atmosphere.

The exhibition itself took place on **15 September 2016** in the assembly hall of Gymnázium and SOŠZE Vyškov. The event officially began at 4pm, when our whole team ascended the stage to explain what exactly the QLA competition is about. Gradually we handed the microphone to one another so that each of us had the chance to share their experience, to tell how the project benefited them and also to tell the public about all the things we managed to create over the past 6 months and of which we are very proud. We were awarded by, I think, a great, sincere and heartfelt applause. Therefore we are all very happy that we were able to create something real for others. And we are excited that in the future someone will come to our lookout to admire the view and will be able to consult the map to find out where exactly he or she is, will check out our insect house and perhaps read some new facts on the information board. In our team we agreed, that this lovely feeling is better that all the A's in the world.

Another great success for us is the promised cooperation with the head of the grammar school project called "Living History", Jana Kolčářová, MA and the representatives of the town of Vyškov: during the Days of Sights and Cultural Heritage 2017 in Vyškov our photographs will be displayed as a part of an exhibition called "Stone" in the cellars of the old monastery. Furthermore, the curators of the exhibition, Jana Kolčářová, MA and Iveta Höferová, MA, promised to install our photographs in a permanent exposition in the hospital and health centre in Vyškov.

Project tags (select all appropriate):

This will be use to classify your project in the project archive (that is also available online)

Project focus:

- ☒Biodiversity management
- ☐Cooperation programmes
- ☒Education and Raising awareness
- ☐Endangered and protected species
- ☐Invasive species
- ☐Landscape management - rehabilitation
- ☐Rehabilitation
- ☐Scientific research
- ☐Soil management
- ☐Urban ecology
- ☐Water management

Flora:

- ☐Conifers and cycads
- ☐Ferns
- ☒Flowering plants
- ☒Fungi
- ☐Mosses and liverworts

Fauna:

- ☐Amphibians
- ☐Birds
- ☐Dragonflies & Butterflies
- ☐Fish
- ☒Mammals
- ☐Reptiles
- ☒Spiders
- ☒Other insects
- ☐Other species

Habitat:

- ☐Cave
- ☒Cliffs
- ☐Fields - crops/culture
- ☐Forest
- ☐Grassland
- ☐Human settlement
- ☒Open areas of rocky grounds
- ☐Recreational areas
- ☒Screes
- ☒Shrubs & groves
- ☐Soil
- ☐Wander biotopes
- ☐Water bodies (flowing, standing)
- ☐Wetland

Stakeholders:

- ☐Authorities
- ☐Local community
- ☐NGOs
- ☒Schools
- ☐Universities

List of appendices

- Invitation to the exhibition
- List of species
- Chenopodium botrys
- Information board
- The map
- Draft of the lookout
- Draft and result of insect house
- Exhibition
- Grand opening of the Lookout
- Visitors

Invitation to the exhibition

List of species

#	Czech name	Latin name
1	**Borovice lesní**	*Pinus sylvestris*
2	**Bez černý**	*Sambucus nigra*
3	**Bez červený**	*Sambucus racemosa*
4	**Bez chebdí**	*Sambucus ebulus*
5	**Čekanka obecná**	*Cichorium intybus*
6	**Česnáček lékařský**	*Alliaria petiolata*
7	**Divizna velkokvětá**	*Verbascum densiflorum*
8	**Drchnička rolní**	*Anagallis arvensis*
9	**Dvouzubec černoplodý**	*Bidens frondou*
10	**Hadinec obecný**	*Echium vulgo*
11	**Heřmánek terčovitý**	*Matricaria discoidea*
12	**Heřmánkovec nevonný**	*Tripleurospermum inodorum*
13	**Hledíček nejmenší**	*Microrrhinum minus*
14	**Hluchavka bílá**	*Lamium alba*
15	**Hluchavka nachová**	*Lamium purpureum*
16	**Hluchavka objímavá**	*Lamium amplexicaule*
17	**Huseníček rolní**	*Arabidopsis thaliana*
18	**Chmel otáčivý**	*Humulus lupulus*
19	**Chrastavec rolní**	*Knautia arvensis*
20	**Chrpa čekánek**	*Centaurea skabiosa*
21	**Chrpa chlumní**	*Centaurea triumfettii*
22	**Jahodník obecný**	*Fragaria vesca*
23	**Jestřábník zední**	*Hieracium murorum*
24	**Jetel ladní**	*Trifolium campestre*
25	**Jetel rolní**	*Trifolium arvense*
26	**Ježatka kuří noha**	*Echinochloa crus-galli*
27	**Jitrocel kopinatý**	*Plantago lanceolata*
28	**Jitrocel prostřední pravý**	*Plantago media*
29	**Jitrocel větší**	*Plantago major*
30	**Kakost smrdutý**	*Geranium robertianum*
31	**Karbinec evropský**	*Lycopus europaeus*
32	**Kokoška pastuší tobolka**	*Capsella bursa – pastoris*
33	**Komonice bílá**	*Melilotus albus*
34	**Komonice lékařská**	*Melilotus officinalis*
35	**Kopretina irkutská**	*Leucanthemum ircutianum*
36	**Kopřiva dvoudomá**	*Urtica dioica*
37	**Kostival lékařský**	*Symphytum officinale*
38	**Kozí brada pochybná**	*Tragopogon dubius*
39	**Kozlíček polníček**	*Valerianella locusta*
40	**Krtičník hlíznatý**	*Scrophularia nodosa*
41	**Kručinka barvířská**	*Genista tinctoria*
42	**Krvavec menší**	*Sanguisorba minor*
43	**Křehkýš vodní**	*Myosoton aquaticum*
44	**Lebeda lesklá**	*Atriplex sagittata*
45	**Lilek černý**	*Solanum nigrum*
46	**Lilek potměchuť**	*Solanum dulcamara*
47	**Lipnice roční**	*Poa annua*
48	**Lipnice smáčknutá**	*Poa compressa*
49	**Lnice květel**	*Linaria vulgaris*
50	**Locika kompasová**	*Lactuca serriola*

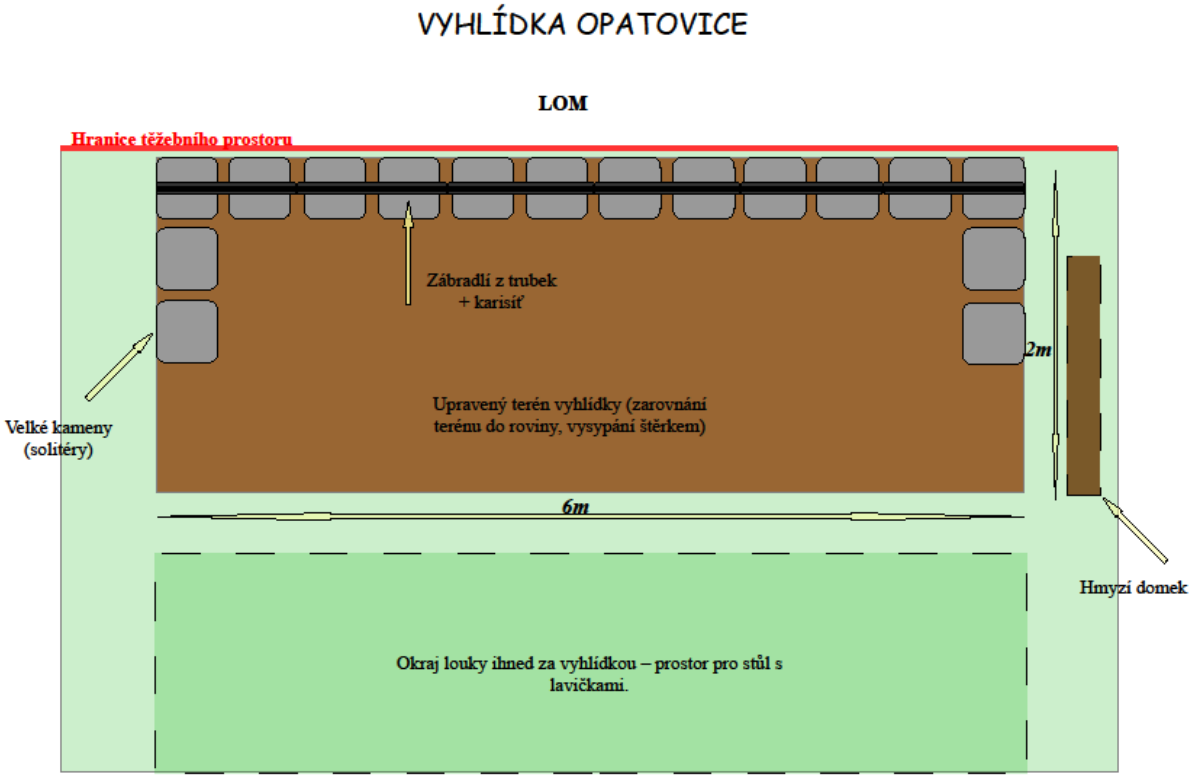
51	**Mák vlčí**	*Papaver rhoeas*
52	**Merlík bílý**	*Chenopodium album*
53	**Merlík hroznový**	*Chenopodium botrys*
54	**Milička menší**	*Eragrostis minor*
55	**Mléč rolní**	*Sonchus arvensis*
56	**Modřín opadavý**	*Larix decidua*
57	**Mochna bílá**	*Potentilla alba*
58	**Mochna husí**	*Potentilla anserina*
59	**Mochna plazivá**	*Potentilla reptans*
60	**Mochna stříbrná**	*Potentilla argentea*
61	**Mrkev obecná**	*Daucus carota*
62	**Netýkavka žláznatá**	*Impatiens glandulifera*
63	**Opletka obecná**	*Fallopia convolvulus*
64	**Ostružiník ježiník**	*Rubus caesius*
65	**Ovsík vyvýšený**	*Arrhenatherum elatius*
66	**Pelyněk černobýl**	*Artemisia vulgarit*
67	**Pcháč rolní**	*Cirsium arvense*
68	**Písečnice douškolistá**	*Arenaria serpyllifolia*
69	**Podběl lékařský**	*Tussilago farfara*
70	**Pomněnka hajní**	*Myosotis nemorosa*
71	**Pryskyřník prudký**	*Ranunculus acris*
72	**Pryšec chvojka**	*Euphorbia cyparissias*
73	**Pryšec kolovratec**	*Euphorbia helioscopia*
74	**Přeslička rolní**	*Equisetum arvense*
75	**Psárka plavá**	*Alopecurus aequalis*
76	**Psineček výběžkatý**	*Agrostis stolonifera*
77	**Ptačinec velkokvětý**	*Stellaria holostea*
78	**Ptačinec žabinec**	*Stellaria media*
79	**Pupava obecná**	*Carlina vulgarit*
80	**Rdesno červivec**	*Persicaria maculosa*
81	**Rdesno menší**	*Polygonum minor*
82	**Rdesno ptačí**	*Polygonum aviculare*
83	**Rozrazil horský**	*Veronica montana*
84	**Rozrazil perský**	*Veronica persica*
85	**Rozrazil polní**	*Veronica agrestis*
86	**Rožec rolní**	*Cerastium arvense*
87	**Růže šípková**	*Rosa canina agg.*
88	**Sasanka hajní**	*Anemone nemorosa*
89	**Silenka nadmutá**	*Silene vulgaris*
90	**Sítina článkovaná**	*Juncus articulatus*
91	**Smetanka lékařská**	*Taraxacum sec. Ruderalia*
92	**Smolnička obecná**	*Lychnis vikaria*
93	**Srstka angrešt**	*Ribes uva-crispa*
94	**Strdivka nicí**	*Melica nutans*
95	**Svída krvavá**	*Cornus sanguinea*
96	**Svízel povázka**	*Galium mollugo*
97	**Svízelka lysá**	*Cruciata glabra*
98	**Svlačec rolní**	*Convolvulus arvensis*
99	**Šedivka šedá**	*Berteroa incana*
100	**Škarda střešní**	*Crepis tectorum*
101	**Šrucha zelná pravá**	*Portulaca oleracea*
102	**Štírovník růžkatý**	*Lotus corniculatus*
103	**Tolice dětelová**	*Medicago lupulina*

104	**Topol osika**	*Populus tremula*
105	**Trnka obecná**	*Prunus spinosa*
106	**Trnovník akát**	*Robinia pseudoacacia*
107	**Trojštět žlutavý**	*Trisetum flavescens*
108	**Třezalka tečkovaná**	*Hypericum perforatum*
109	**Třtina křovištní**	*Calamagrostis epigejos*
110	**Turan roční**	*Erigeron annuus*
111	**Úhorník mnohodílný**	*Descurainia sophia*
112	**Ucho Jidášovo**	*Hirneola auricula-judae*
113	**Violka rolní**	*Viola arvensis*
114	**Vlaštovičník větší**	*Chelidonium majus*
115	**Vlčí bob mnoholistý**	*Lupinus polyphyllus*
116	**Vratič obecný**	*Tanacetum vulgare*
117	**Vrba křehká**	*Salix fragilit*
118	**Vrbovka chlumní**	*Epilobium collinum*
119	**Vrbovka rozmarýnolistá**	*Epilobium dodonaei*
120	**Zemědým lékařský**	*Fumaria officinalis*
121	**Zimolez obecný**	*Lonicera xylosteum*
122	**Zlatobýl kanadský**	*Solidago canadensis*
123	**Zvonek broskvolistý**	*Campanula persicifolia*
124	**Žabník jitrocelový**	*Alisma plantago-aquatica*

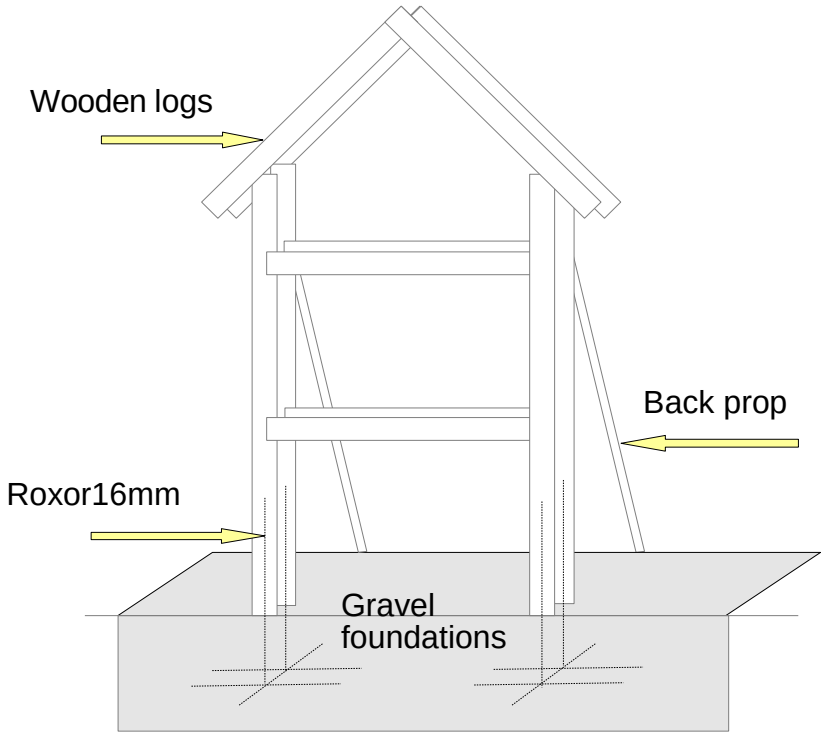
Highly endangered species – Chenopodium botrys

Information board and the map

Draft of the lookout over the quarry



Draft and result of insect house



Exhibition


ARRY LIFE
AWARD
vítězí

Grand opening of the lookout

Visitors