

4.3 Site Assessment

The background of the slide is a dark teal color. It features a series of light teal, wavy, horizontal lines that resemble topographic contour lines or a stylized landscape. These lines are layered, with some being more prominent than others, creating a sense of depth and movement across the page.

4.3.2 Location

Location of Silesia Project

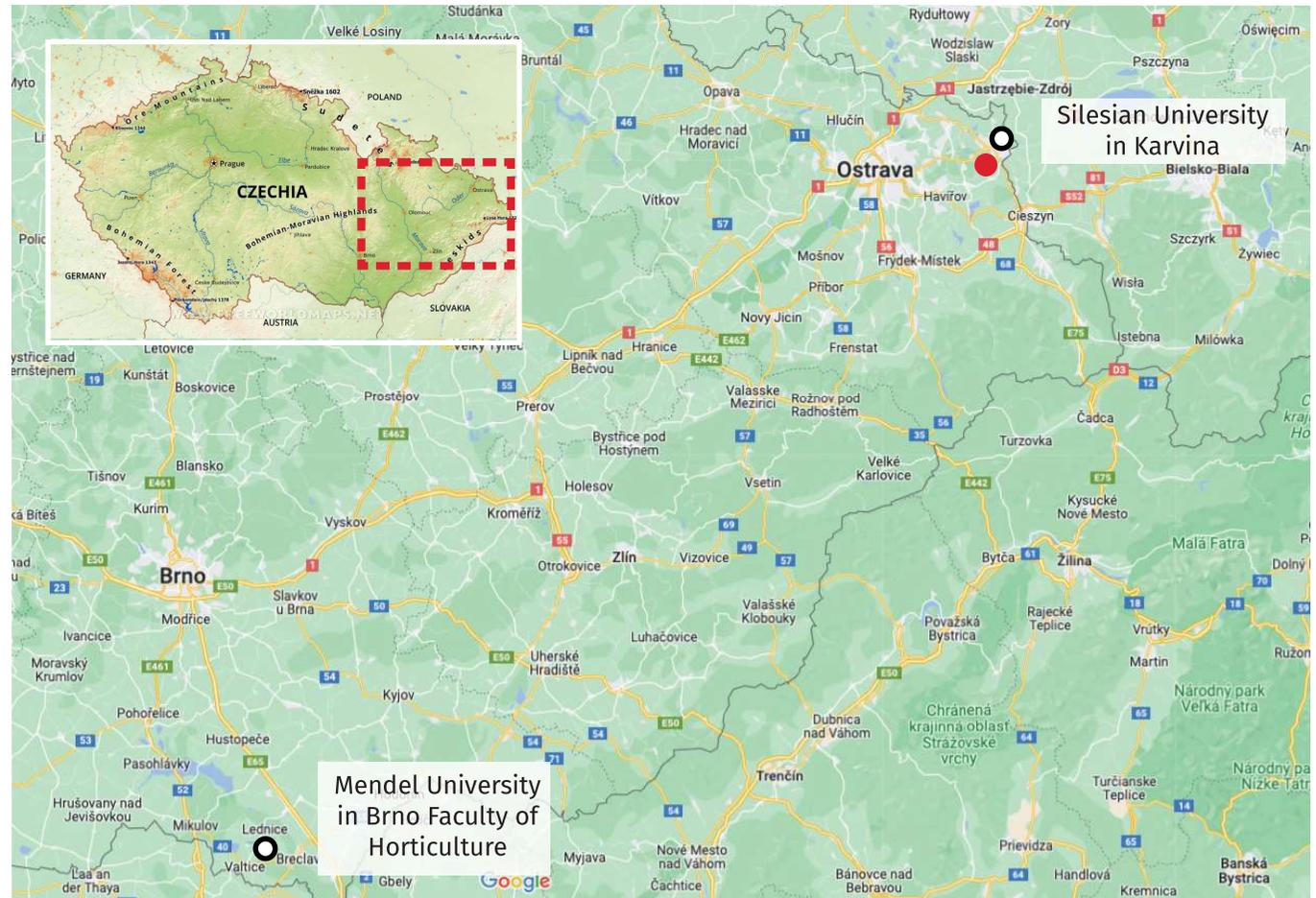
- Site
- Capital



4.3.2 Location

Location of Silesia Project and university partners

- Site
- University partners

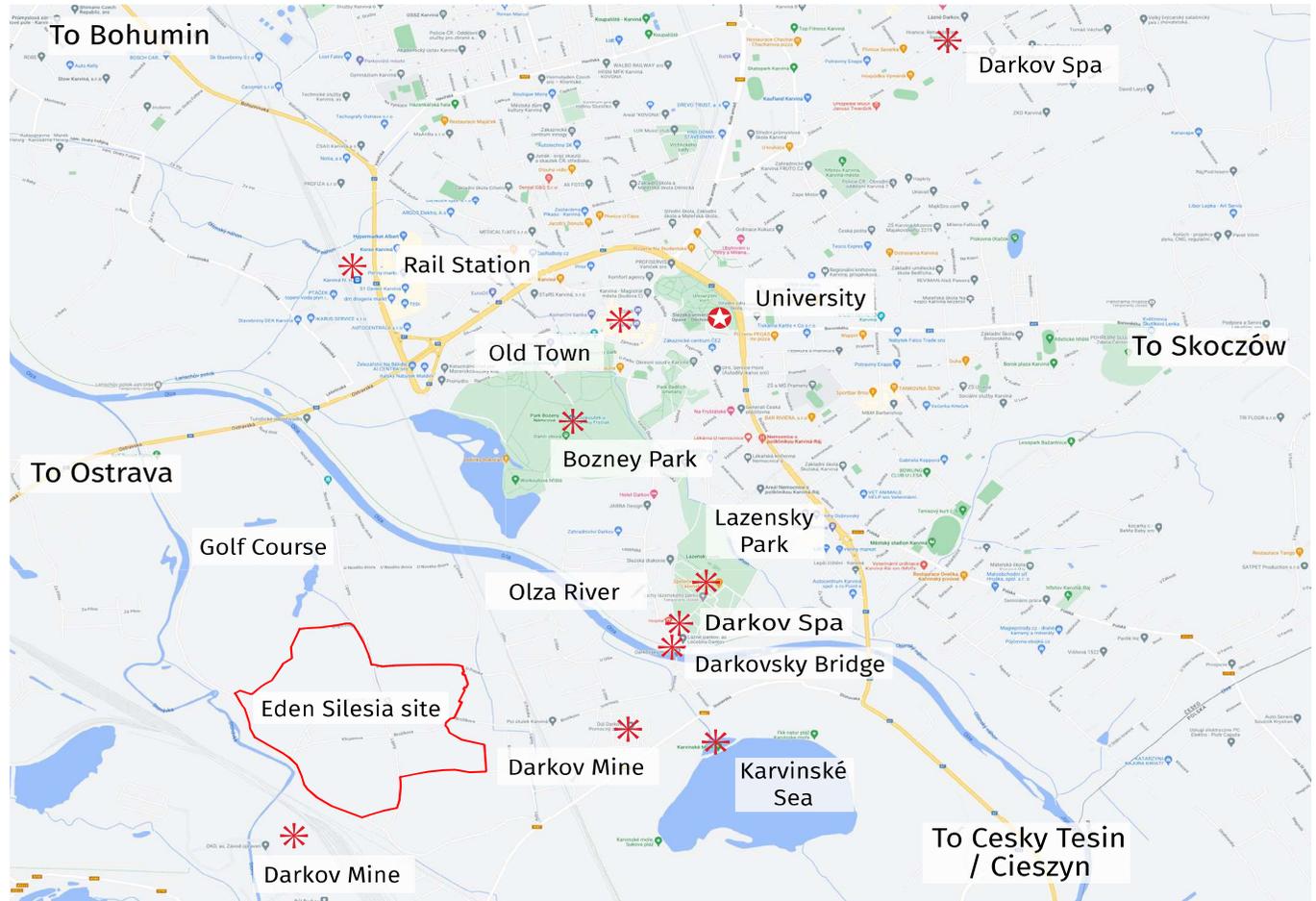


4.3.2 Location

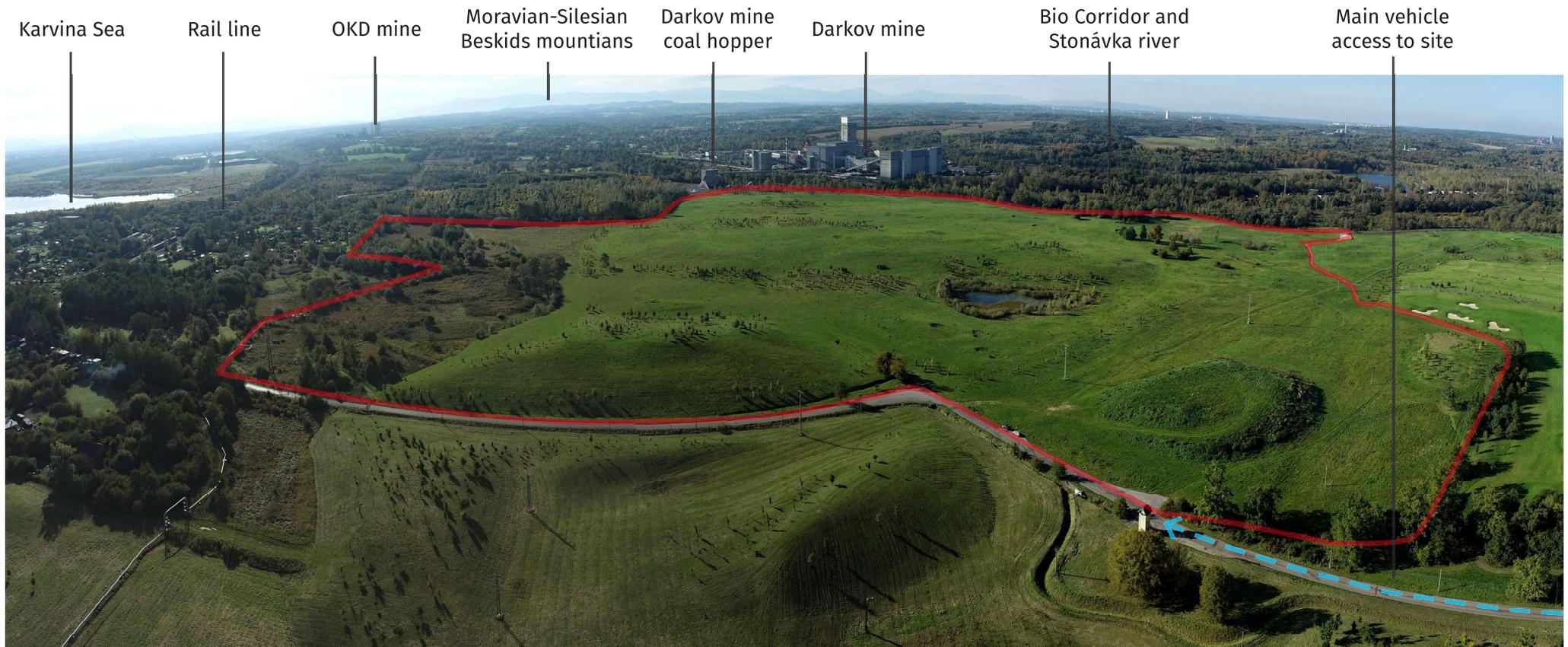
Karvina : Location of Silesia Project

- Site
- ✱ Silesian University

The campus of the Silesian University in Opava - School of Business Administration is located in the centre of Karvina, 2 km from the location of the proposed site. The site area is known locally as Lipiny.



4.3.2 South-west aerial view



4.3.2 North-east aerial view

Main vehicle
access to site

Karvina Frystat
town square

Rail and new road
river crossing

Darkov Bridge

Karvina Sea

Stonávka river

Bio Corridor

Darkov mine
coal hopper



New Karvina bypass
(under construction)

4.3.3 Site Connections

Viewpoints from Lipiny Site



Looking south towards site entrance.



Formed hills on lands to the east outside of boundary.



Coal hopper, with conveyor belt over rail line into mine.



Access road alongside "Arena" towards woods and mine.



Stonávka river, with rail bridge in view.

4.3.3 Site Connections

Viewpoints inside the Lipiny Site boundary



Looking eastwards along HV power lines and road corner.



Looking south with over lake towards the mine.



Looking back at hill at northern corner and topsoil stockpile.



Looking over lake toward Karvina with rail and road bridges.

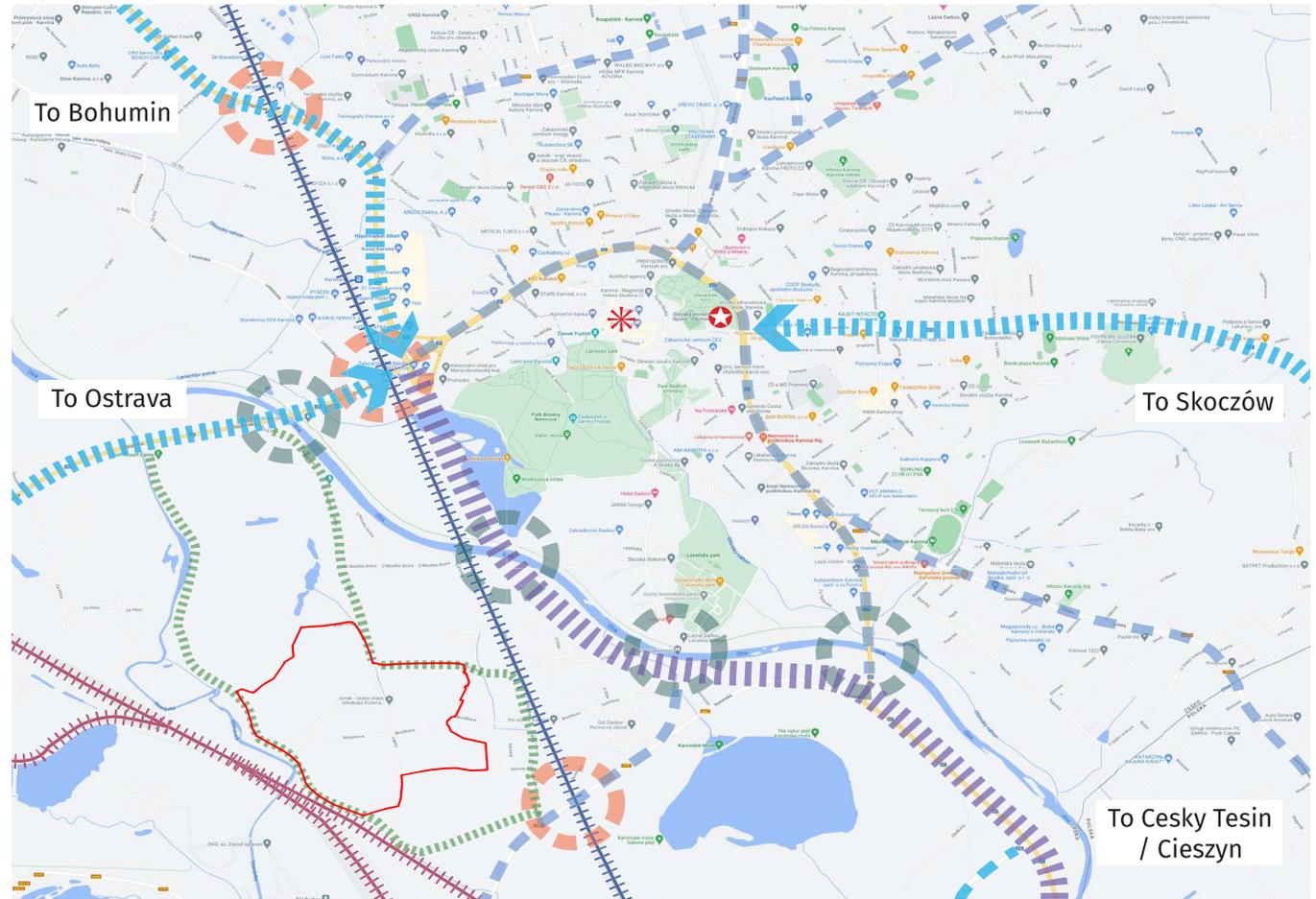


Looking north toward largest hill by roadside.

4.3.4 Connectivity

Existing road and rail links

-  Site
-  University of Silesia
-  Karvina/ Freystat Old Town
-  New Bypass (under construction)
-  Main roads into Karvina
-  Circulatory Roads
-  Vehicle access to site
-  Rail line : Passenger
-  Rail line : Freight
-  Crossings : Road bridges over rail line
-  Crossings : Road and pedestrian over river



4.3.4 Connectivity

Barriers between Karvina and Lipiny Site



River Olza



Rail line



...and now new bypass.

4.3.4 Connectivity

International road connections

- Site
- Capital

The Lipiny Site is at the heart of central Europe and less than a half day drive from several major cities - population centres that also attract international tourism.

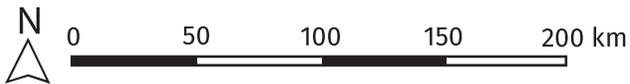
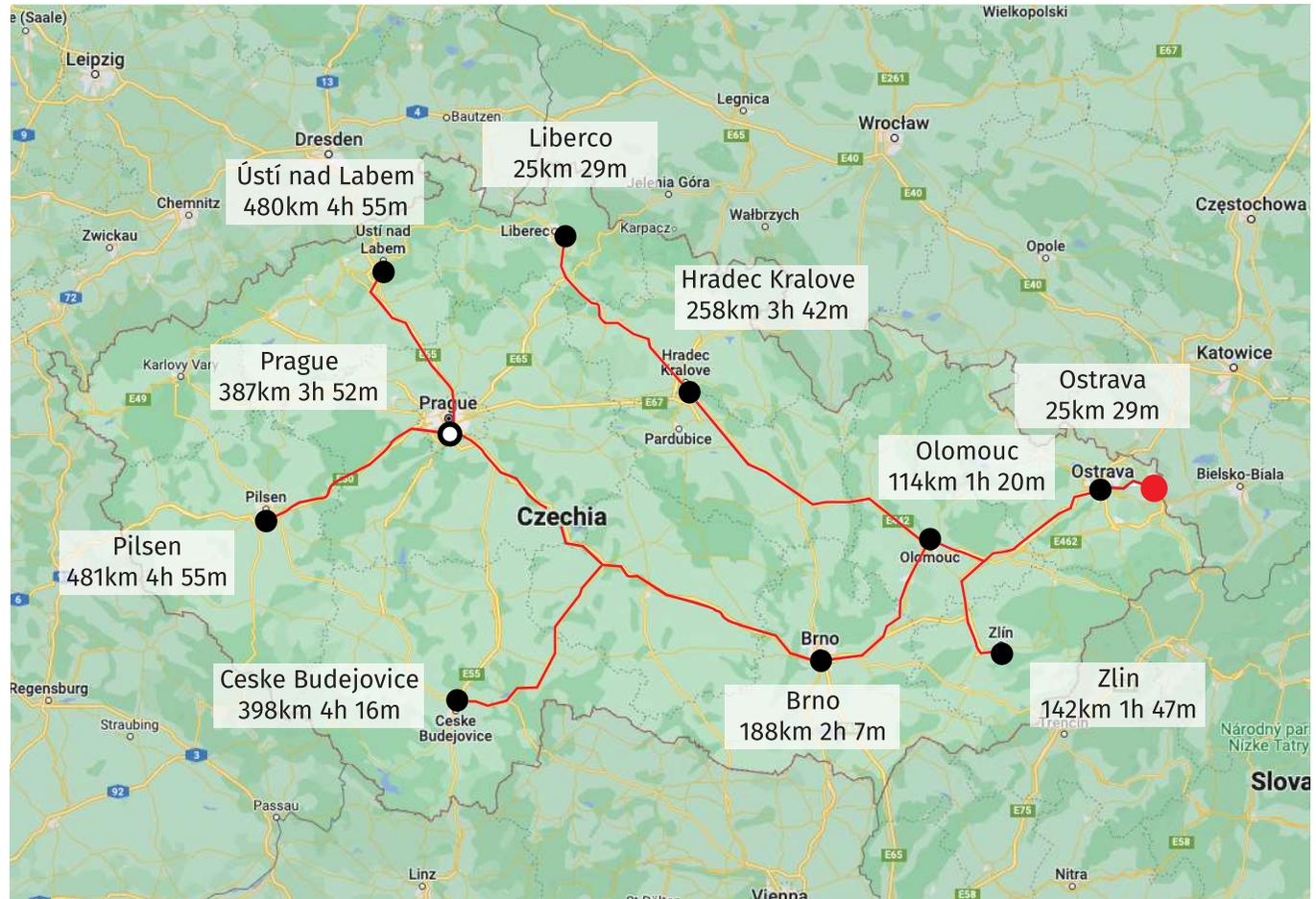


4.3.4 Connectivity

Czechia road connections

- Site
- Capital

The Lipiny Site is easily accessible from Czechia's fast and efficient major road network.

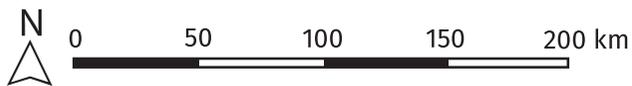


4.3.4 Connectivity

Highspeed international rail connections

- Site
- Capital

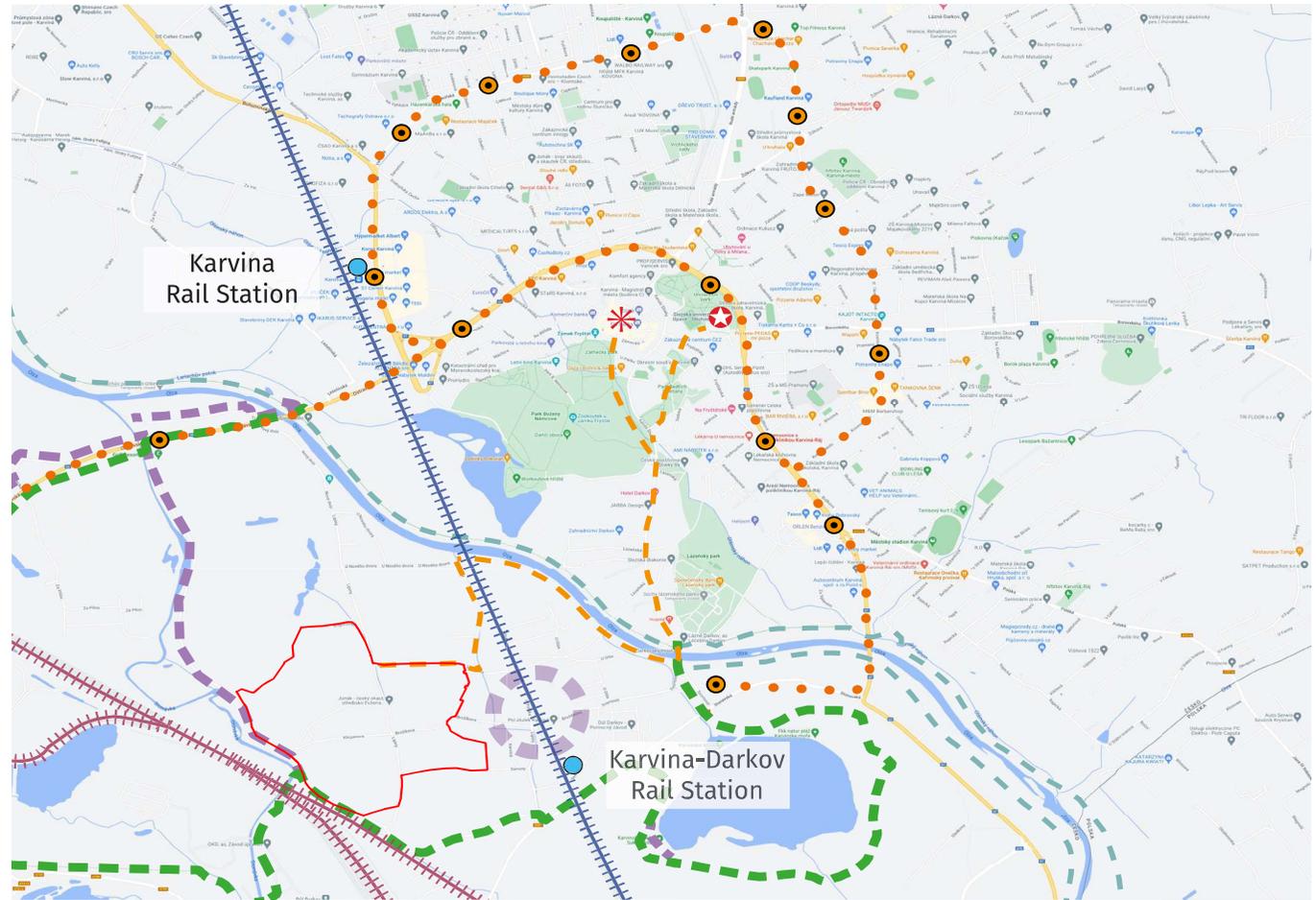
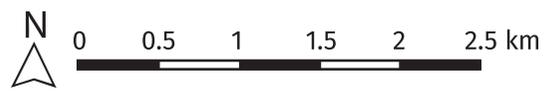
High speed rail links offer journeys from Ostrava to Prague in 3 hours 25 minutes, with connections to major cities in Germany, Poland, Slovakia and Austria.



4.3.4 Connectivity

Active travel

- Site
- ★ University of Silesia
- ✳ Karvina/ Freystat Old Town
- Tram network (under construction)
- Tram stop
- Official Cycle routes
- Temporary Cycle routes
- - - Proposed New cycle route
- - - Existing riverside foot/cycle paths
- ||||| Rail line : Passenger
- ||||| Rail line : Freight
- Rail station
- Proposed new rail station and foot crossing



4.3.4 Pedestrian/Cycle connections

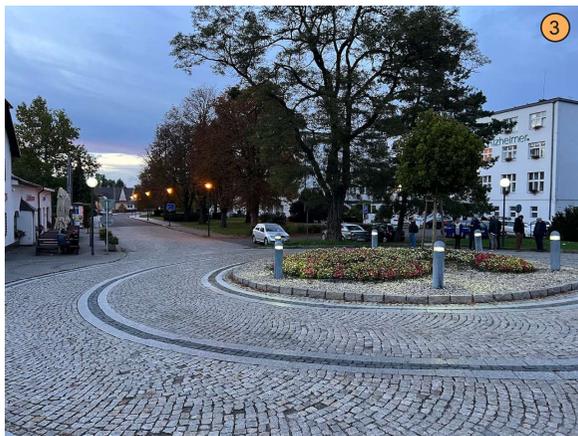
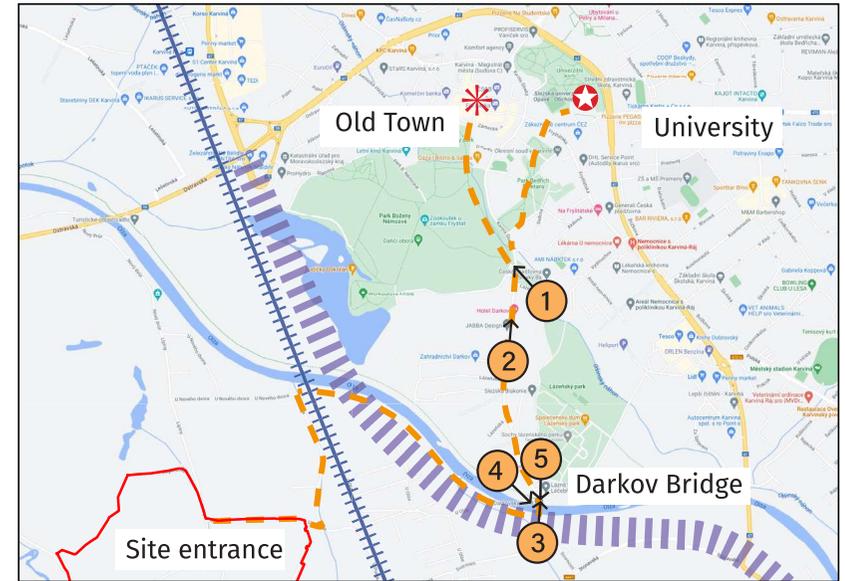
Existing paths : Routes from Old Town and Silesia University to Darkov Bridge



Cycle and pedestrian only paths in Bozeny Park



Quite residential road Lazenska Street



Darkov Spa and Bistro



Darkov Bridge



Cycle and pedestrian only across Darkov Bridge

4.3.4 Pedestrian/Cycle connections

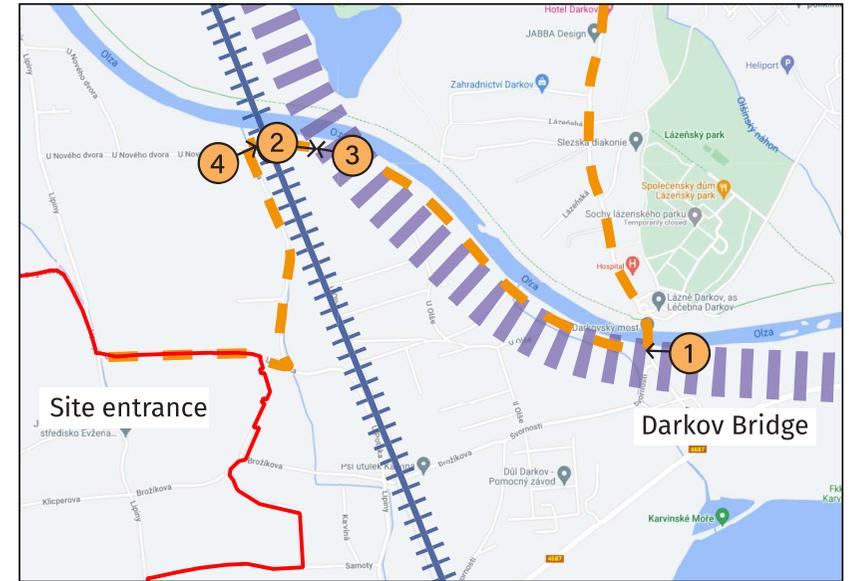
New Paths : Routes from Darkov Bridge along western side of Olza River under bridges into site



Unmetalled path north-west along Olza river berm.



Beneath bypass bridge showing berm cut through.



Pathway under rail line. Looking away from new road bridge.



Pathway under rail line. Looking towards new road bridge.



View from U Noveho Dvora road towards river Olza.

4.3.4 Pedestrian/Cycle connections

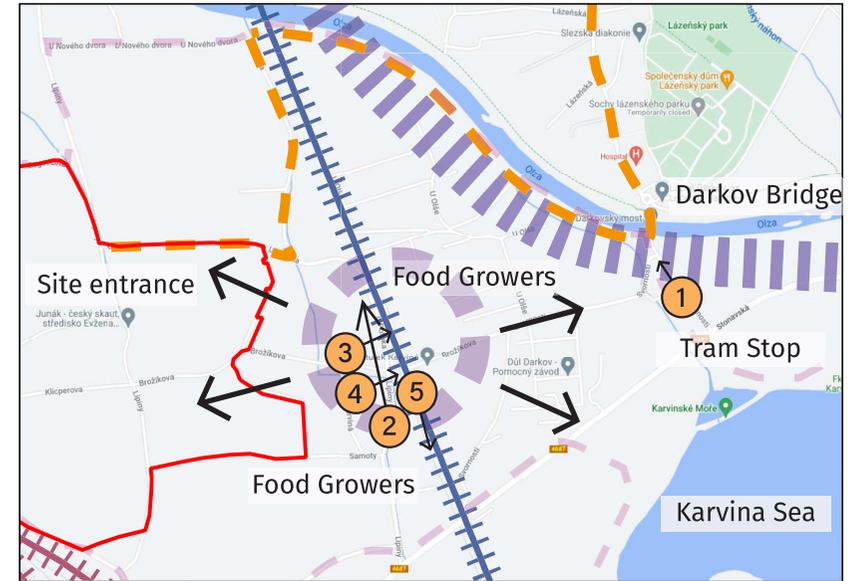
New rail station and foot crossing : Linking site to Karvina Sea and growing communities.



Pedestrian underpass to Darkov bridge below new bypass.



Cyclists crossing rail line and travelling north.



Allotment communities on eastern side of rail line.



Looking east down Brozikova Street across rail line.

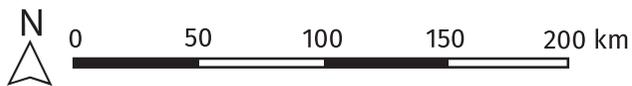
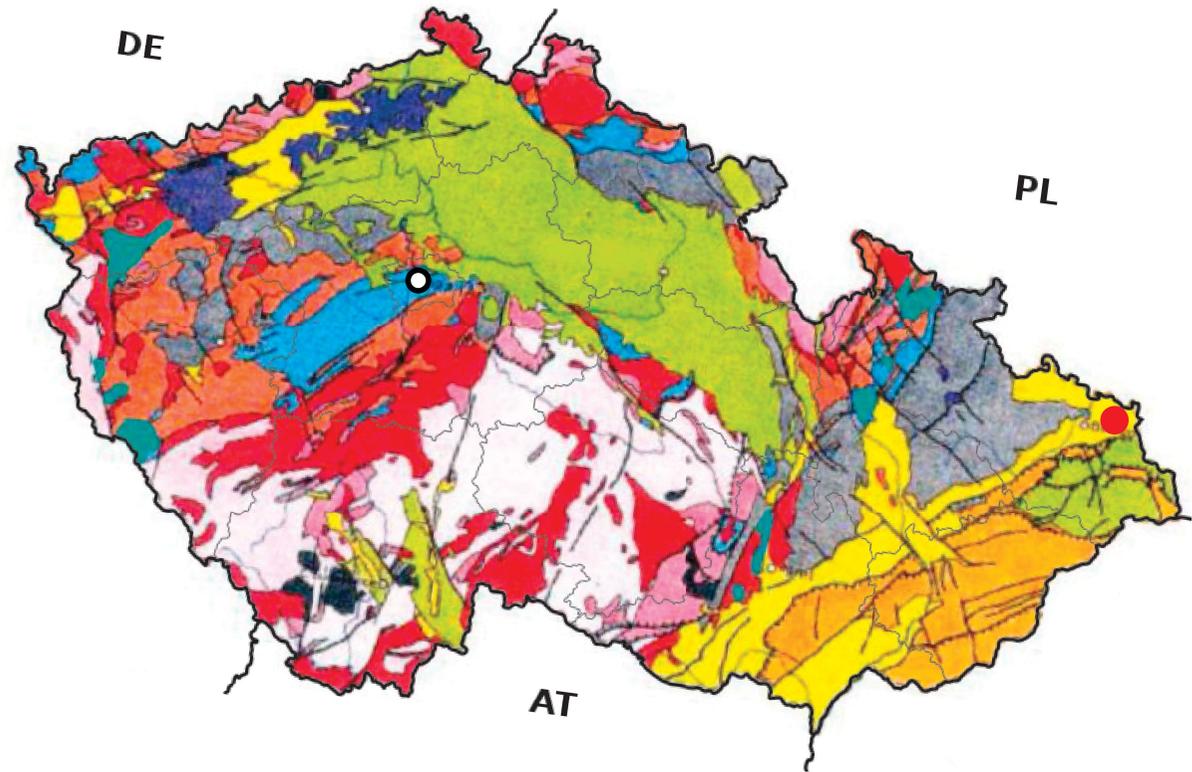


Old platform on western side of rail line south of Brozikova St.

4.3.5 Geology

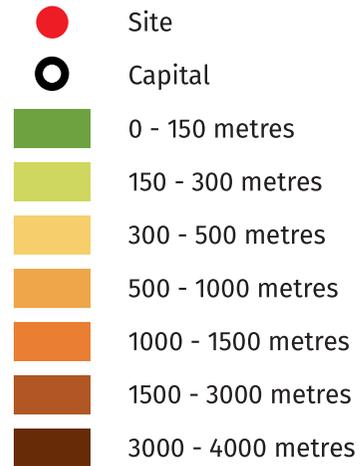
Geology of Czechia and Silesia region

- Site
- Capital
- Neogene
- Paleogene
- Mesozoic
- Upper Paleozoic
- Lower Paleozoic
- Upper Preterozoic
- Neovulcanites
- Granitoids
- Orthogneisses
- Basic rocks
- Granulites
- Metamorphites

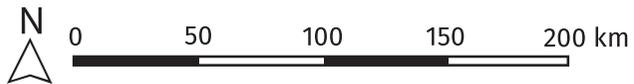
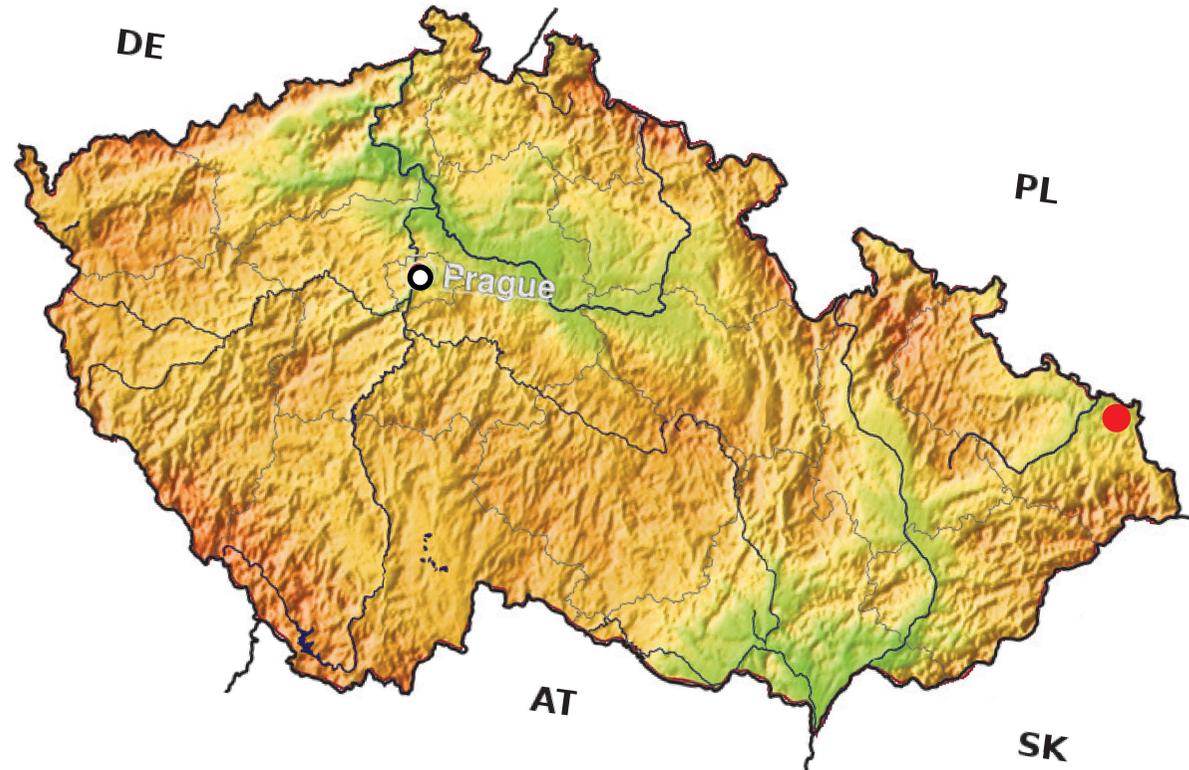


4.3.6 Topography

Landform of Czechia region

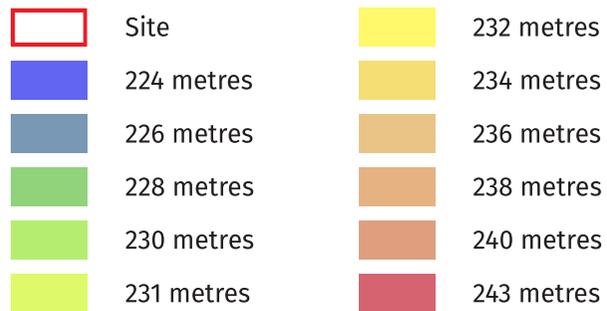


Karvina and the Lipiny site occupy low lying land alongside the Olza River which flows into the major Oder River. This is a river that flows north through Poland and ultimately into the Baltic Sea.

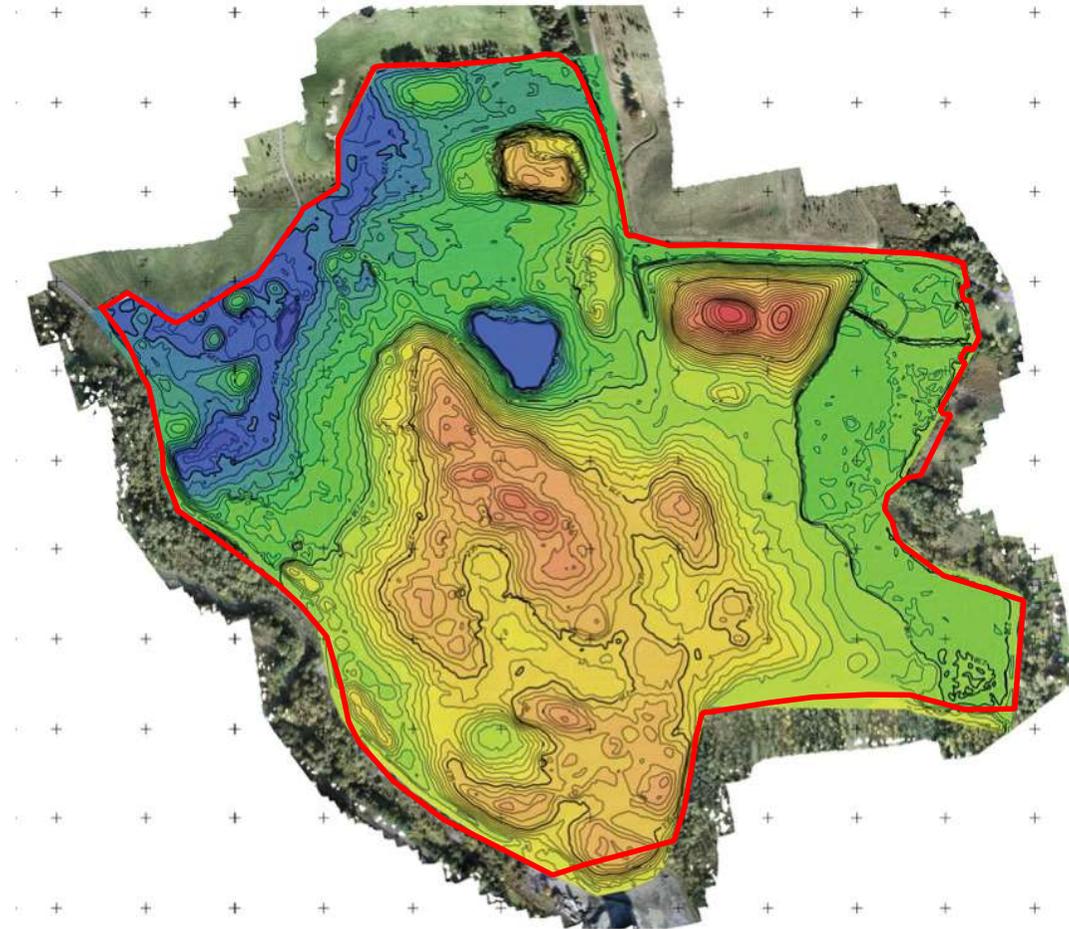


4.3.6 Topography

Landform of site



When the site was restored, it was contoured with the intention of it becoming an extension to the golf course to the north so the site has a gently undulating landform. Low lying land - which is wet year round - separates the site from the golf course and a lake was also created. The main feature of the site is a high mound in the north east of the site.



4.3.7 Hydrology

Extent of recorded risk of flooding from rivers

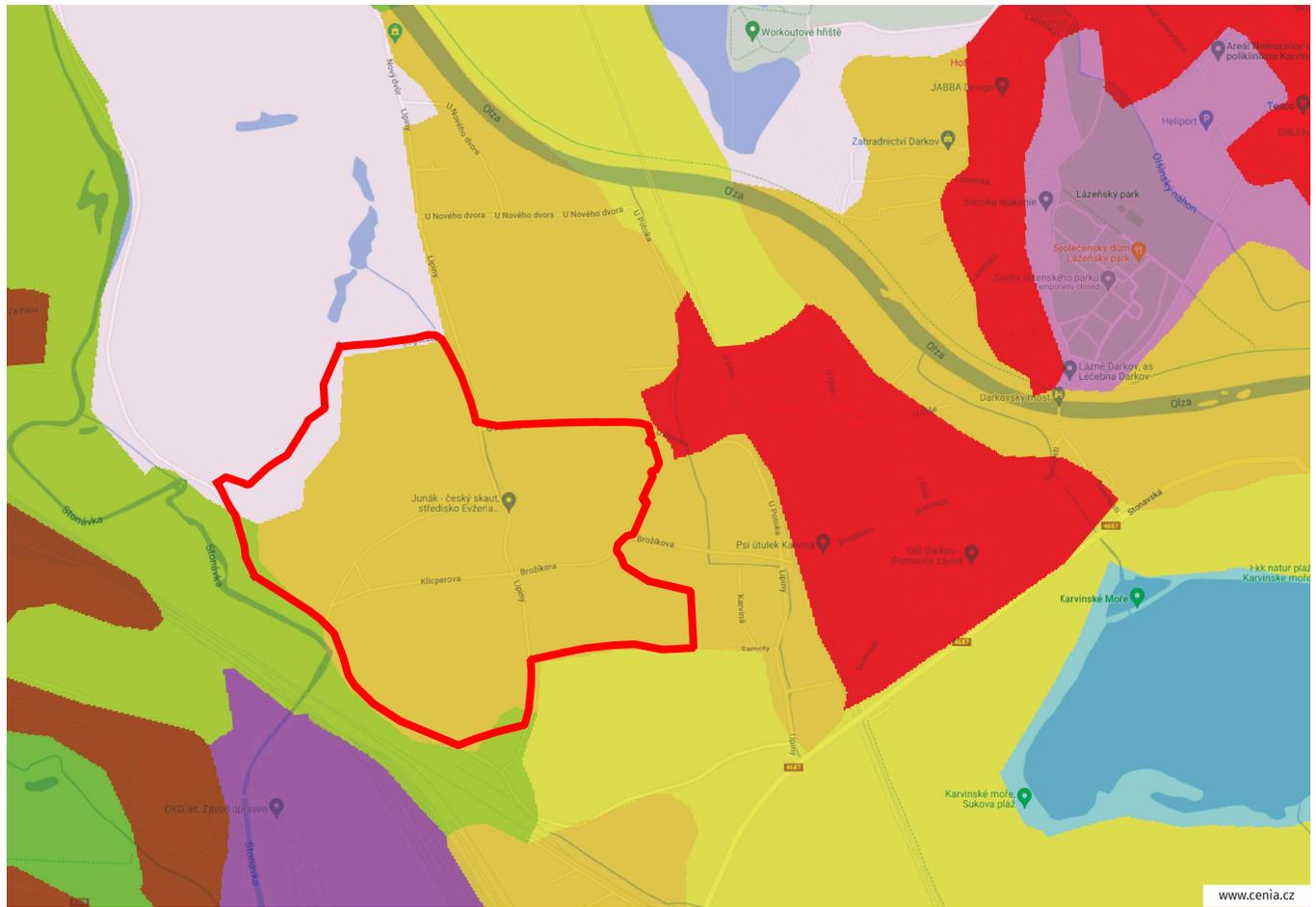
-  Site
-  Water body
-  River
-  Watercourse
-  Floodzone



4.3.8 Land use

Areas within rural and urban setting

-  Site
-  Urban Development
-  Area of Urban Greenery
-  Lipiny Golf Course
-  Mixed forest
-  Agriculture with mixed vegetation
-  Meadows
-  Water body
-  Landfills
-  Industrial Zone

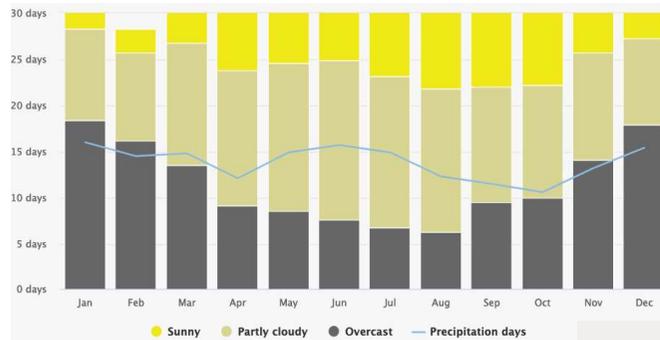


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4.3.9 Climate

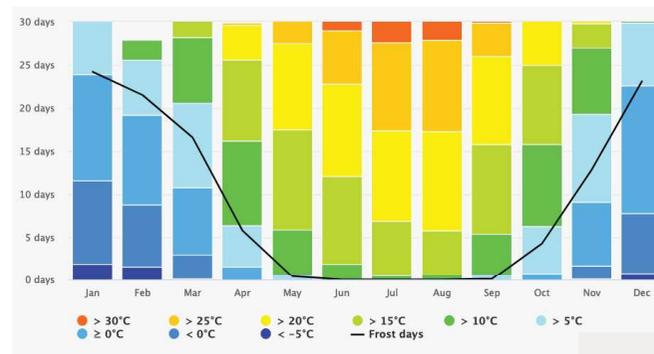
In Karviná, the summers are comfortable; the winters are freezing, snowy, and windy; and it is partly cloudy year round. Over the course of the year, the temperature typically varies from -4°C to 24°C and is rarely below -13°C or above 30°C .

The warm season lasts for 3.6 months, from 24 May to 10 September, with an average daily high temperature above 20°C . The hottest month of the year in Karviná is July, with an average high of 24°C and low of 13°C .

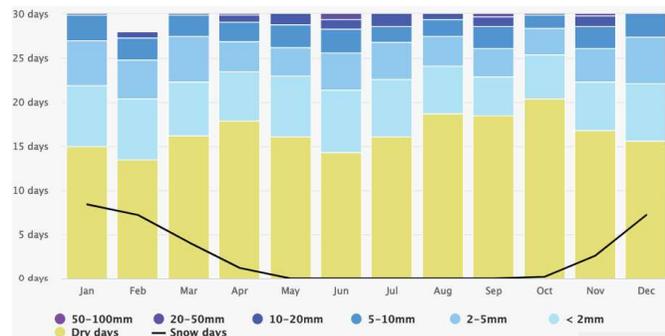


The cold season lasts for 3.5 months, from 22 November to 5 March, with an average daily high temperature below 6°C . The coldest month of the year in Karviná is January, with an average low of -4°C and high of 1°C .

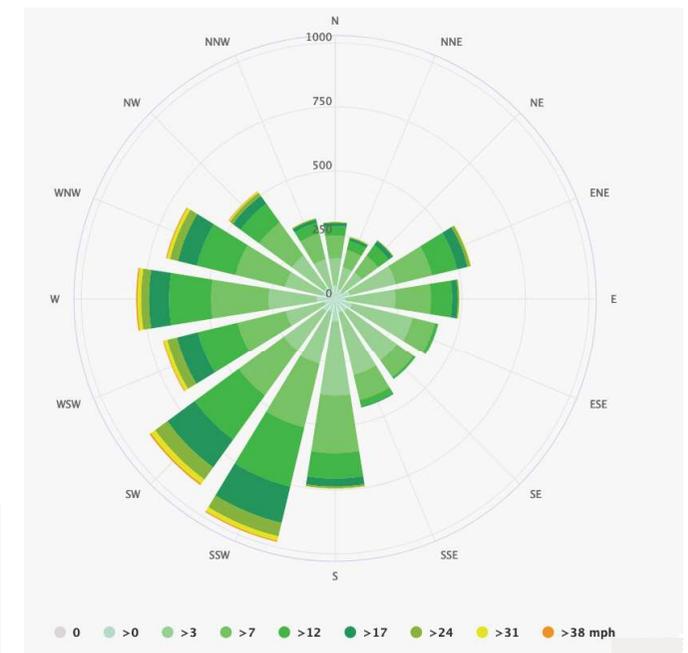
The maximum temperature diagram for Karvina displays how many days per month reach certain temperatures.



The precipitation diagram below shows on how many days per month, certain precipitation amounts are reached for Karvina.



The wind rose for Karvina shows how many hours per year the wind blows from the indicated direction.

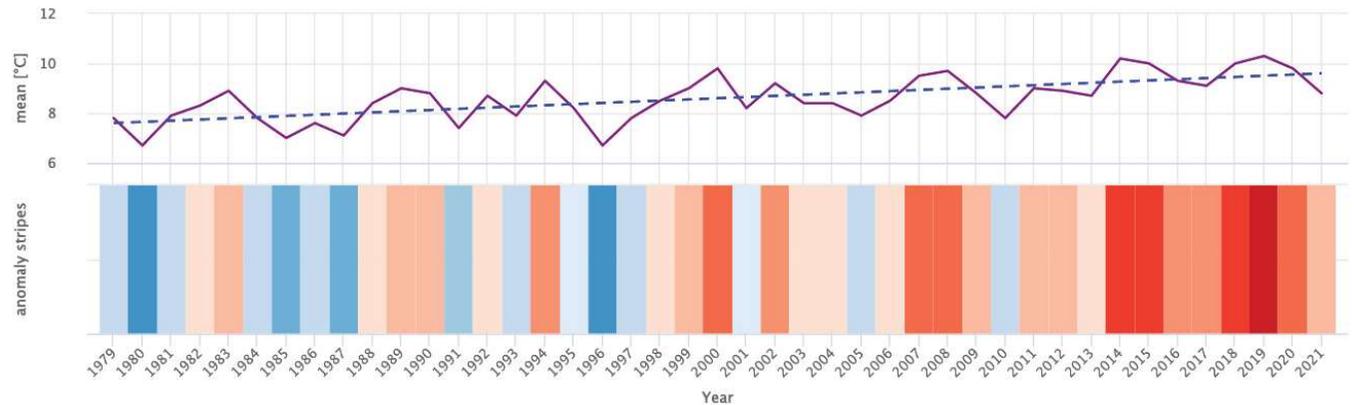


4.3.9 Climate Change

Yearly temperature trend 1979 - 2022 for Karvina

The top graph shows an estimate of the mean annual temperature for the larger region of Karviná. The dashed blue line shows a linear climate change trend of the region getting warmer due to climate change.

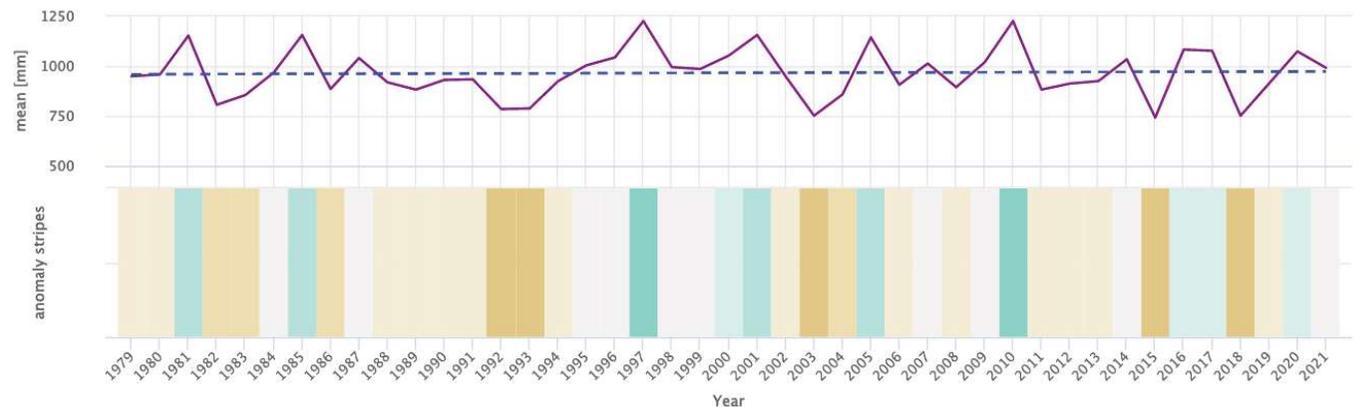
In the lower part the graph shows the so called warming stripes, with each coloured stripe representing the average temperature for a year - blue for colder and red for warmer years.



Yearly precipitation trend 1979 - 2022 for Karvina

The top graph shows an estimate of mean total precipitation for the larger region of Karviná. The dashed blue line shows that the precipitation trend is positive and is getting wetter in Karvina is getting wetter due to climate change.

The lower part the graph shows the so called precipitation stripes. Each coloured stripe represents the total precipitation of a year - green for wetter and brown for drier years.



4.3.10 Ecology

Regional ecological connectivity

-  Site
-  Regional Biocorridor
-  Regional Biocentre
-  Potential Wildlife Connections

The Ministry for the Environment for Czechia has identified the potential for a national ecological network.

Biocorridors (wildlife corridors) interconnect with biocentres (wildlife habitats), thus enabling migration, interactions and permeability of the landscape for organisms.

There is opportunity to create bio-corridors through the Lipiny site which connect the identified regional bio-corridors and bio-centres - to support this regional biodiversity network.



4.3.11 Ground Engineering

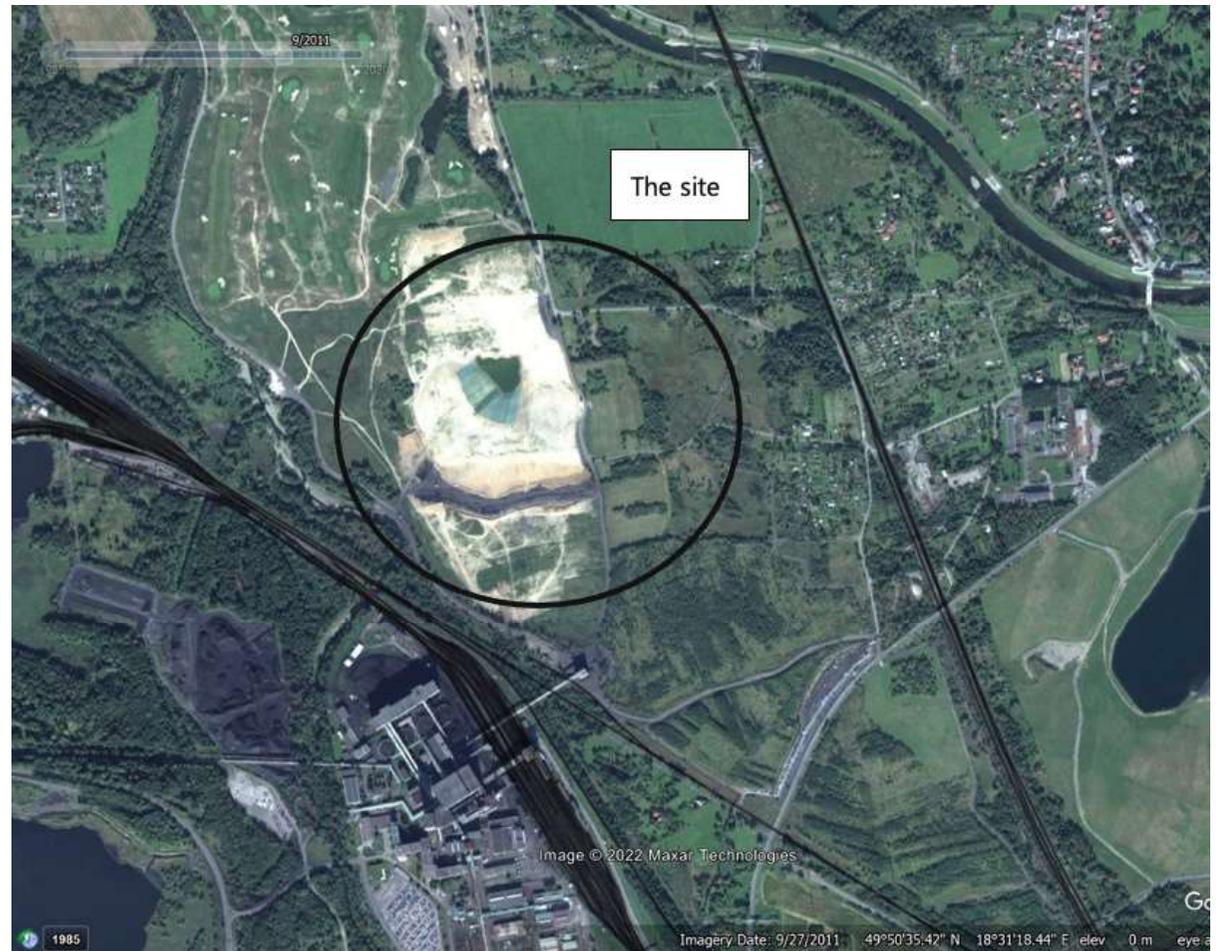
The site has undergone significant earthworks from 2010 onwards, including the creation of the pond in the middle of the site and various mounds (ref Google Earth Pro).

It is understood that the wider area and potentially the site itself has been historically used as a storage area for mine waste (waste rock).

Reclamation of the land to the northwest by the Ostrava-Karvina Mining Company comprised the creation of a world class Karvina – Lipiny Golf Resort.

The entire area of land between the Olše and Stonávka rivers is shown to be ‘reclaimed’ between 2012 – 2015 as shown on the extract of Figure 3 (Havrlant, Jan & Krtička, Luděk. (2014).

The exact nature of the earthworks and land reclamation on the site is currently unknown. However, it is likely that there will be records both from the Darkov Mine and Karvina – Lipiny Golf Resort which will be able to provide further information on this. It may also be possible to liaise with the groundworks contractor who completed the works for more detailed evidence.



4.3.11 Ground Engineering

Geology

The available borehole records from the adjacent Darkov Mine record limited extents of Quaternary deposits overlying significant depths of Miocene 'cover formations', which according termed 'slin' – i.e. marl'. Beneath this between ~300-330 m below ground level (bgl) is the Carboniferous Karvina Formation - 'Doubrava' beds, which contain multiple layers of coal which have been mined since the 1800's. The significant depth of the 'cover formations' is shown in green on the schematic cross section extract of Figure 1 (Konicek et al, 2022). The Darkov mine's deepest shaft reached beyond 1km bgl.

Mining

The coal in this area was mined using longwall techniques and controlled caving. This method allows the coal workings to collapse at depth once they have been extracted. The key issue with this method is the fact that the collapsed strata then causes the layers above to become unstable and also move downwards. This process then propagates upwards in a funnel shape causing large areas of subsidence and flooded depressions at surface. Evidence from the local area can be seen at the leaning Church of St. Peter of Alcantara ~2.3km west of the site. The church has undergone ~37 m of subsidence over the years and is permanently tilted to the south.

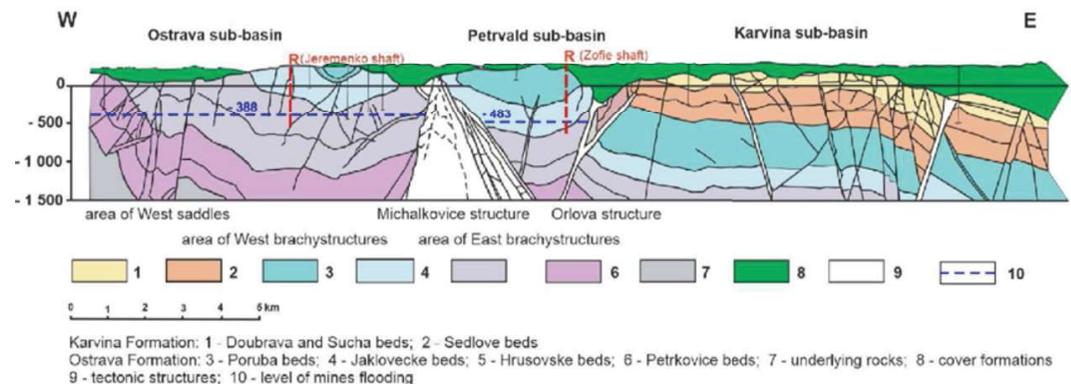
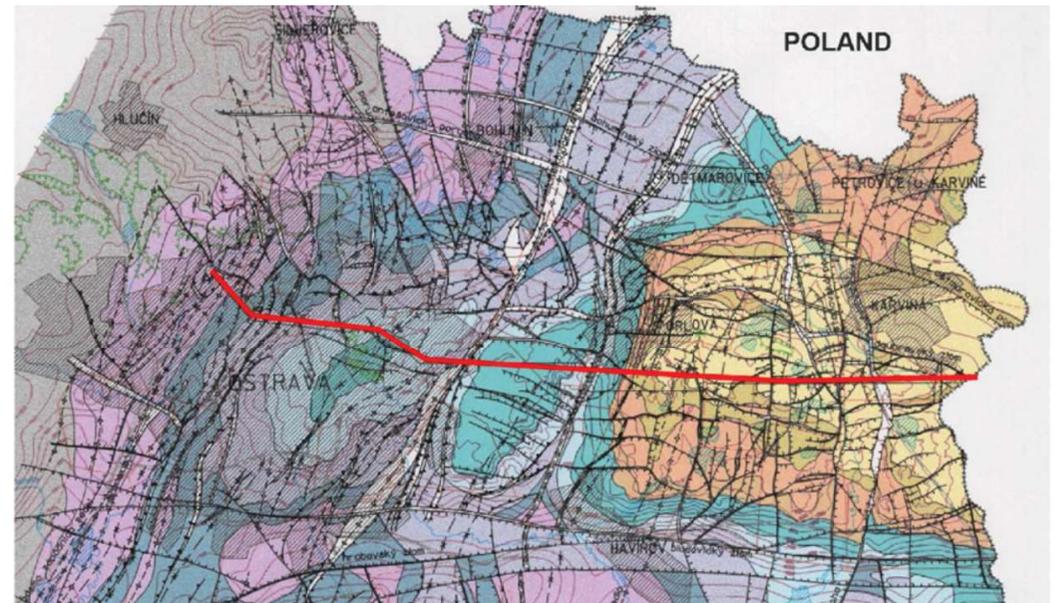


Fig. 1. Simplified geological situation of Ostrava, Petřval and Karvina sub-basins e geological map above (not in scale; read line e location of cross section) and cross-section below; modified according to Dopita (Dopita M. Geology of the Czech part of the upper silesian basin. Prague: Ministry of the Environment of the Czech Republic; 1997. p. 278. [10] Grygar R, Vavro M. Ev.)

Ref: Havrlant, Jan & Krtička, Luděk. (2014). Reclamation of devastated landscape in the Karviná region (Czech Republic). Environmental & Socio-economic Studies. 2. 1-12. 10.1515/environ-2015-0044.

4.3.12 Site Assessment Matrix

No.	Criteria	Site assessment principles	Lipiny Site
1	Story	Does the site have character and does the local environment or culture inspire a particular response or theme(s)?	The site and its setting have a rich history and, for more than 200 years, these have been based around fossil fuel (coal) extraction. The region is now seeking a new identity to mark the transition from 'black to green.' The site embodies the challenges of the 21st Century and these are at the heart of the Eden Mission. The site, region and aspirations for the future inspire many themes.
2	Transformation	Eden does transformational projects. Is the site degraded with potential for transformation?	While veiled in green, the site is scarred by the legacy of underground coal mining. There is significant opportunity for transformation of both the site and the image of the region.
3	Community	Is the site connected to community and are the local population able to benefit from the project? Will they be supportive?	The project is close to the local community as it is less than 2km from the centre of Karvina., the project is close to the local community. The river and new bypass are physical barriers to access but there are existing and new crossing points. The city has suffered from de-population with closure of the mines, so an exciting new green development on the doorstep will provide amenity and opportunities for local people.
4	Impact	Could the site act as a catalyst for wider regeneration? Could the site enable greater social impact in disadvantaged communities? Does it have wider regional impact and potential to develop eco-tourism, bio-economy and educational initiatives.	The site and the project aim to be a symbol for a 'green' future for the region as well as a catalyst for the creation of a wider social and economic impacts. Adjacent potential development sites and post-mining facilities create the opportunity to spin-off a bio-economy cluster. SLU School of Business Management and CEPIS add to the attractiveness of the area for investment and regeneration.
5	Size	Does the site have enough space to develop an Eden Project and room for future changes and growth? Does the site offer unique or interesting aspects in terms of land form and condition and can the project deliver net gains to the local ecology and landscape?	At more than 50 hectares with an interesting but unchallenging topography, there is plenty of space for the Silesia Project as well as space and flexibility for future developments. Adjacent development sites and post-mining facilities are of great interest too.

4.3.12 Site Assessment Matrix

No.	Criteria	Site assessment principles	Lipiny Site
6	Landscape	Does the site offer unique or interesting aspects in terms of land form and condition and can the project deliver net gains to the local ecology and landscape?	This large site has been capped and gently contoured which offers few constraints and many opportunities to create interest and amenity. The site is bounded to the east and west by rich and valuable ecological assets – wetlands and developing woodland. This presents a great opportunity to connect these assets and contribute to the wider blue and green infrastructure of the region.
7	Connections	Does the site have transport connections and local population to support the required audience size?	As seen from the previous diagrams, the site is well connected by road – the adjacent bypass connects directly into the regional road network with local roads creating easy access to the site. There is an existing network of cycle and pedestrian paths to connect into. The proposed tram link is exciting and offers the potential for more sustainable transport from Ostrava and nearby cities. There is also potential to re-use the mining rail network.
8	Regenerative Sustainability	Sustainability, carbon and life cycle factors. Does the site offer the potential to be off grid or Net Zero?	With opportunities for solar, wind and geothermal energy, early assessment suggest that the site could achieve the ambition of net zero in construction and operation.
9	Resilience	Is the site impacted by noise, sea level rise and flooding, forest fires or other environmental risks such as pollution?	Natural risks on this site are relatively low. We know that mining related settlement has already taken place and understand the site is now stable. The site seems now to be relatively resilient.
10	Constraints	Challenges to delivery? Does the site allow for early or speedy delivery? Are there major constraints for development and future expansion? Does the site generate specific cost or delivery risks.	Ground investigation will be needed to assess the stability for buildings – but it is not anticipated that this will be a constraint or significant cost. The site is large enough and the master plan is flexible so that structures can move to an optimal location, if necessary.