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Innovation und Technologie

Annex 2: Electricity and gas transmission demand corridors

Environmental report as part of the SEA to the NIP

Vienna, 2023

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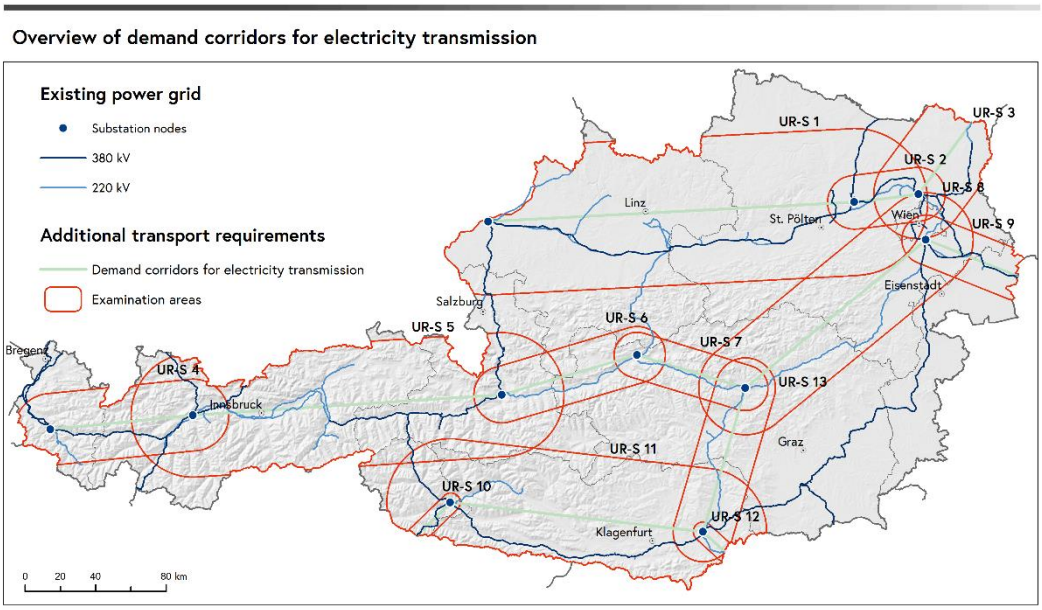
1 Electricity transport demand corridors

The study areas of the electricity transmission demand corridors covered are shown (Figure 1) below. Study areas are located in all federal provinces and only concern areas within the national territory of Austria. By definition, a study area extends over a straight line between two substation nodes to be connected, which were provided with a buffer area with an aspect ratio of length to width of at least 2.5 : 1. In order to take existing routes and constraint points (substations) into account, deviating buffer widths were also selected in case of need.

Figure 1 Overview map of the study areas of the electricity transmission demand corridors (UR-S 1 to UR-S 13) in Austria.



A raster data set with a cell size of 50 m x 50 m is available for each of the study areas. The area categories[1] included in each grid cell of the study area is known. Based on this, the conflict risk was calculated and presented on an area-wide basis using these grid cells (50 m x 50 m resolution). The classification is implemented with the help of a four-part scale and assigns low (1), medium (2), high (3) or very high (4) conflict risk to the respective network cells of the study areas.

Table 1 Colour-coding of the conflict risk in the map sections

Assessment levels	Low	Medium	High	Very high
Conflict risk	1	2	3	4

Areas that could not be assigned to any of the area categories were not assessed. Therefore, potential conflict risks cannot be ruled out in these small-scale areas and so these may require further examination in case of need.

In addition, a comparable factor for the average conflict risk, the conflict risk density, was calculated for each study area.

In addition to the area-wide consideration of the conflict risk associated with the erection of overhead power lines, the consideration of cross-cutting obstructions was also carried out separately. Large-area and possibly barrier-forming areas with a high conflict risk are defined as "cross-cutting obstructions".

This study does not include an integrated consideration of the technical feasibility. However, the presentation of the slope gradient in the study areas, in addition to the conflict risk of the various environmentally related area categories, is intended to provide an initial assessment of the impact of the slope gradient on technical feasibility.

No difficulties are to be expected for slopes of 0 to 20%. Slopes of 20 to 40% entail restrictions in the type of foundation. Micro piles or at least stepped standard foundations are required. From a slope of 40%, it is assumed that the erection of masts is only possible with considerable additional technical and financial effort. During construction, additional

[1] A detailed description is provided in the environmental report in chapter 2.4.3.

slope stabilisation measures are required for the excavation pits, e.g. reinforced shotcrete stabilisation and, if necessary, drainage measures. From this slope onwards, the retention of excavated material and the stabilisation of the recultivated construction site are also of great importance. The erection of pylons on slopes greater than 60% is only possible in individual cases and with extreme special solutions. Transmission network operators avoid this category in planning wherever possible.

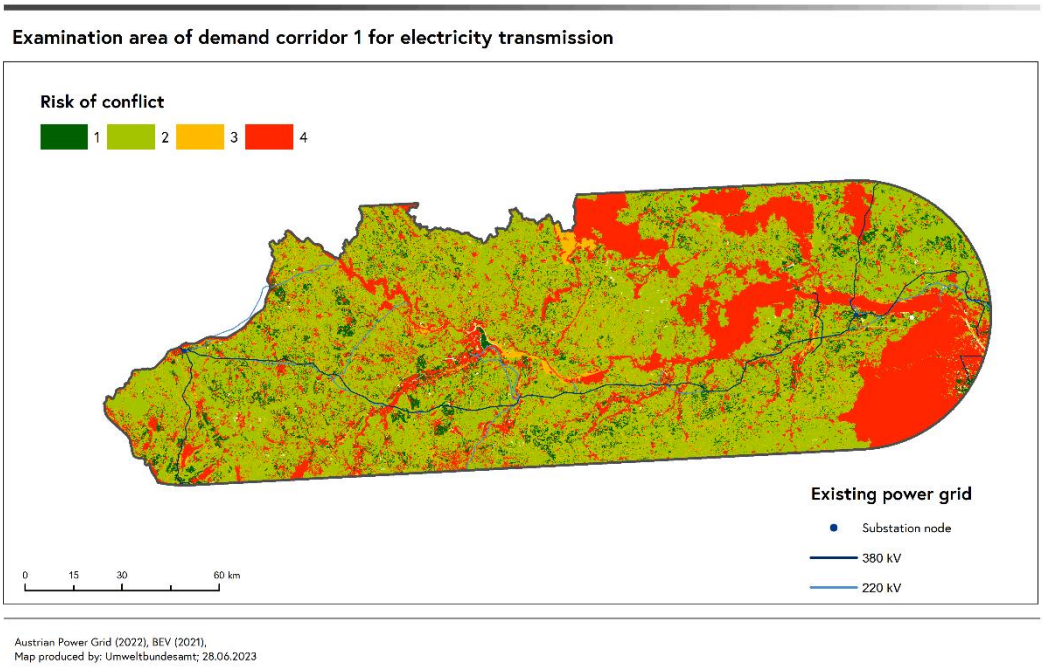
1.1 Study area for electricity transmission demand corridor 1: St. Peter (Upper Austria) – Dürnrohr (Lower Austria)

Design type	Overhead power line
Expansion form	Network expansion: Erection of an overhead line as new construction

Study area

Location of the study area / federal states	Connection of the substations St. Peter am Hart (Upper Austria) – Dürnrohr (Lower Austria) / Upper Austria, Lower Austria and Salzburg
Size of the study area	19,060.2 km²

Figure 2 Study area - Electricity transmission demand corridor 1



Conflict risk area balance

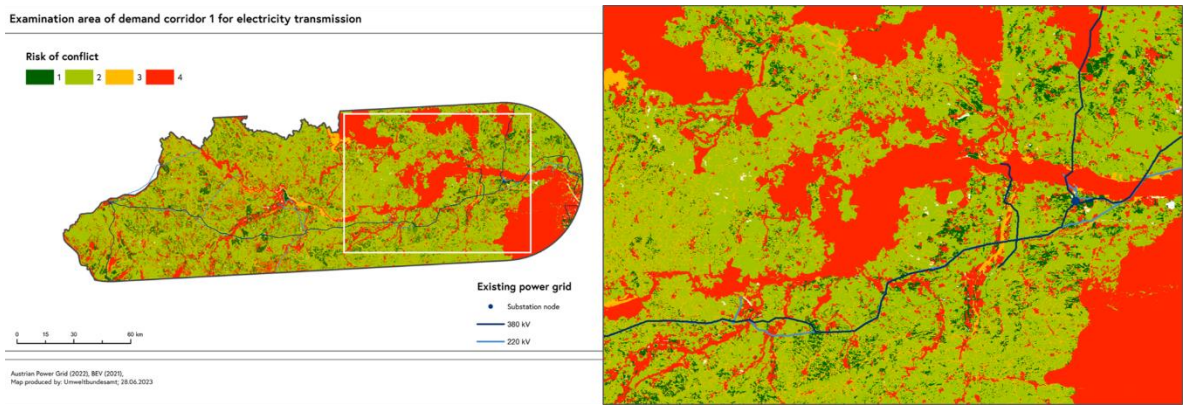
Conflict risk 1 (low)	1,452.3 km²
Conflict risk 2 (medium)	10,611.8 km²
Conflict risk 3 (high)	2,000.2 km²
Conflict risk 4 (very high)	4,890.1 km²
Not assessed	105.8 km²

Assessment of the conflict risk across protected resources

Conflict risk density in the study area	2.53
Straight-line distance between network interconnection points	208 km

Cross-cutting obstruction 1

Figure 3 Cross-cutting obstruction 1 in electricity transmission demand corridor 1

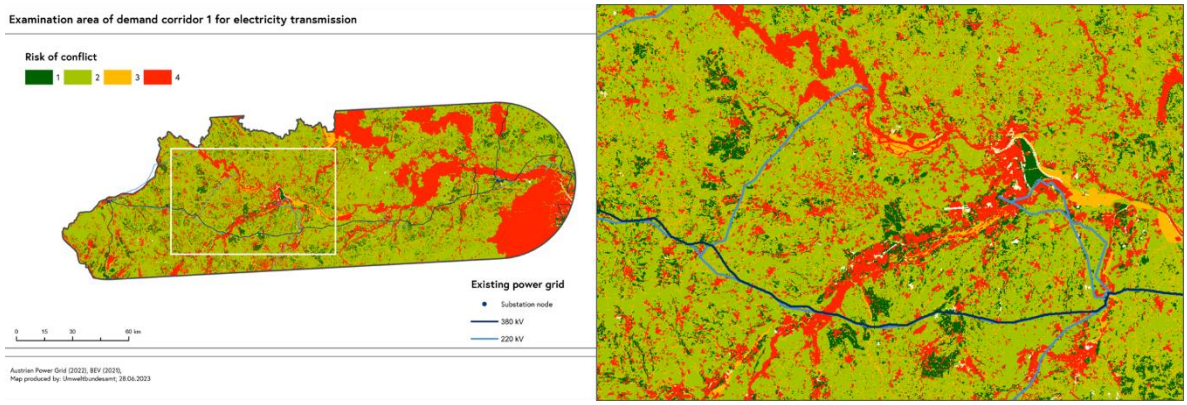


Cause of cross-cutting obstruction 1

Tullnerfelder Donau floodplain flora-fauna habitat area and Tullnerfelder Donau floodplain bird sanctuary; Wienerwald biosphere park, Wienerwald flora-fauna habitat area – Thermenregion and Wienerwald bird sanctuary – Thermenregion as well as closed settlement areas of the conurbations near the Danube in Tulln, Stockerau, Korneuburg, Klosterneuburg and Vienna.

Cross-cutting obstruction 2

Figure 4 Cross-cutting obstruction 2 in electricity transmission demand corridor 1



Cause of cross-cutting obstruction 2

Closed settlement areas of the Upper Austrian Central Region or Enns-Linz-Traun-Wels axis; Upper Danube flora-fauna habitat area and Aschach Valley and Eferding Basin flora-fauna habitat area

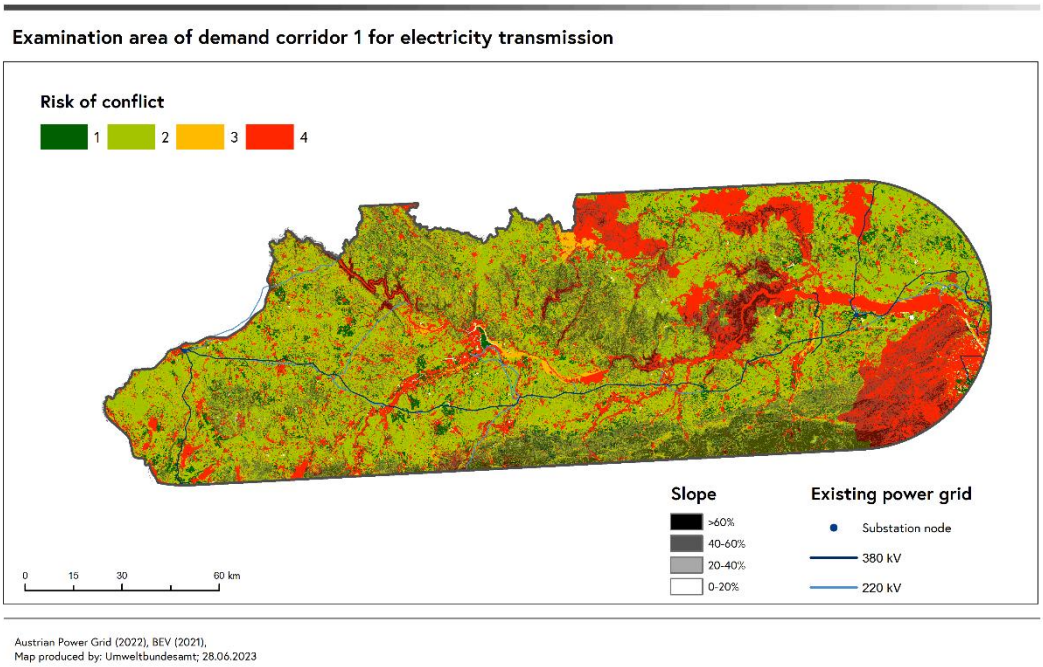
Protected areas in the study area

Table 2 Number of protected areas

Designation	Quantity
Natura 2000	76
Nature reserves	116
Nature parks	15
Landscape conservation areas	55
Protected landscape areas	18
Internationally significant wetlands (Ramsar)	2

Topography

Figure 5 Topography of the study area - electricity transmission demand corridor 1



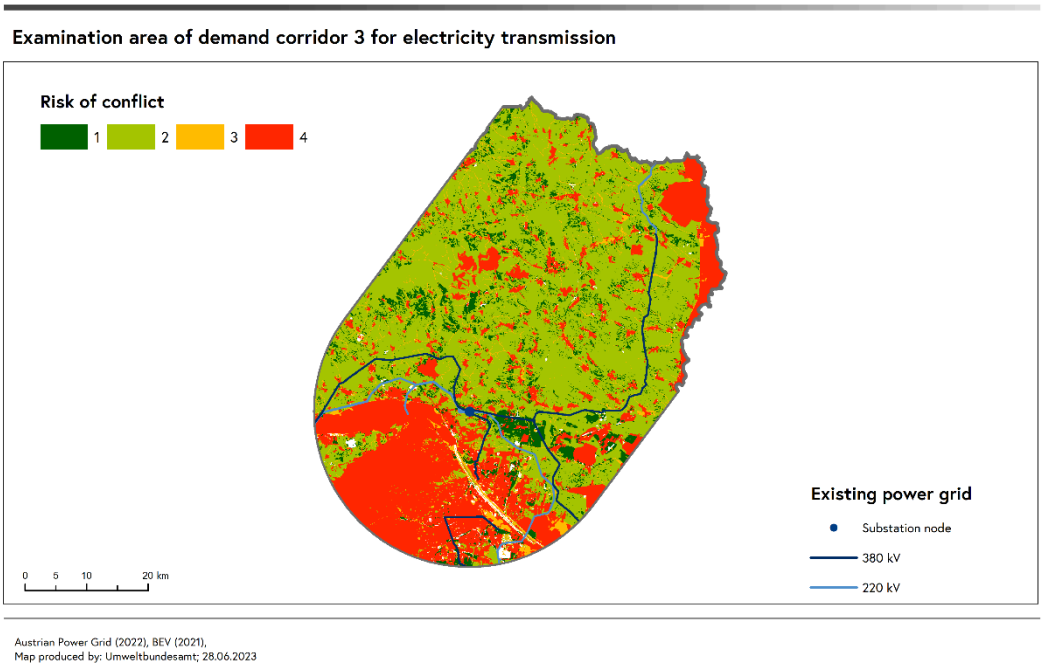
1.2 Study area for electricity transmission demand corridor 3: Bisamberg (Lower Austria) – national border (CZ)

Design type	Overhead power line
Expansion form	Network expansion: Erection of an overhead line as new construction

Study area

Location of the study area / federal states	Connection of the substation Bisamberg (Lower Austria) – state border (CZ) / Lower Austria and Vienna
Size of the study area	3,388.7 km²

Figure 6 Study area - Electricity transmission demand corridor 3



Conflict risk area balance

Conflict risk 1 (low)	285.3 km²
Conflict risk 2 (medium)	1954.3 km²
Conflict risk 3 (high)	161.2 km²
Conflict risk 4 (very high)	948.3 km²
Not assessed	39.6 km²

Assessment of the conflict risk across protected resources

Conflict risk density in the study area	2.50
Straight-line distance between network interconnection points	50.6 km

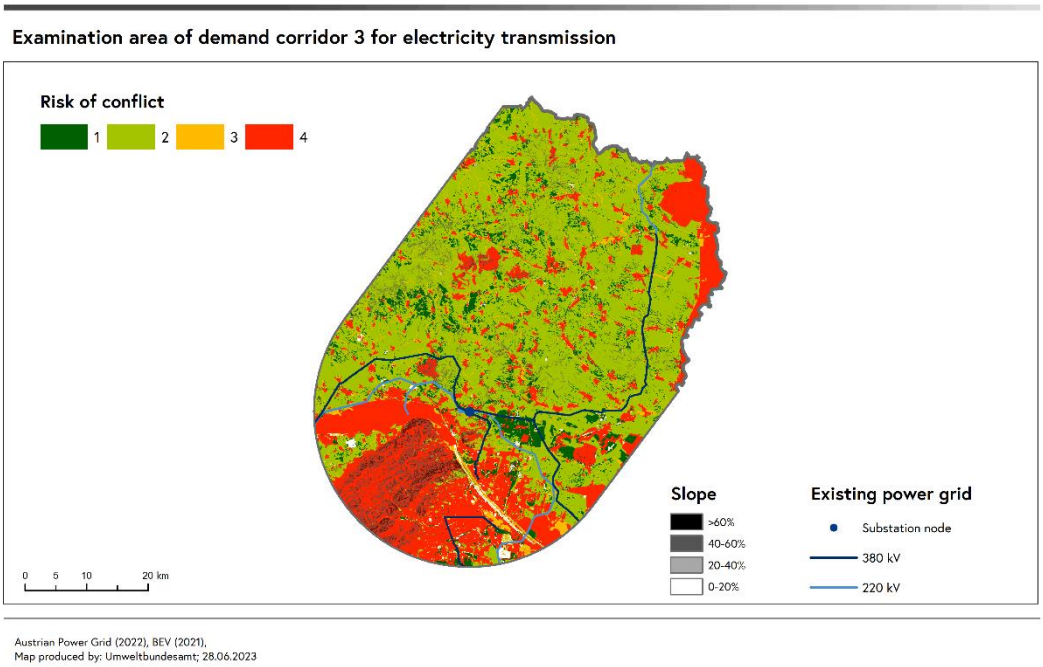
Protected areas in the study area

Table 3 Number of protected areas

Designation	Quantity
National parks	1
Natura 2000	16
Nature reserves	15
Nature parks	6
Landscape conservation areas	43
Protected landscape areas	2
Internationally significant wetlands (Ramsar)	2

Topography

Figure 7 Topography of the study area - electricity transmission demand corridor 3



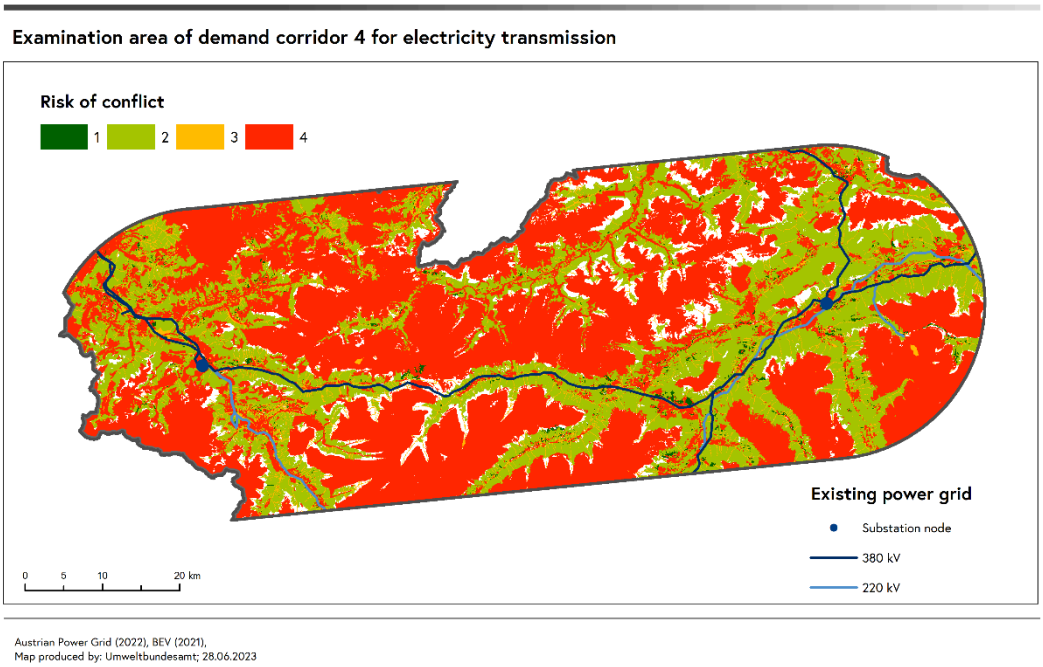
1.3 Study area electricity transmission demand corridor 4: Bürs (Vorarlberg) – Haiming (Tyrol)

Design type	Overhead power line
Expansion form	Network expansion: Erection of an overhead line as new construction

Study area

Location of the study area / federal states	Connection of the substations Bürs (Vorarlberg) - Haiming (Tyrol) / Vorarlberg and Tyrol
Size of the study area	4,269.6 km²

Figure 8 Study area - Electricity transmission demand corridor 4



Conflict risk area balance

Conflict risk 1 (low)	37.8 km²
Conflict risk 2 (medium)	1,363.4 km²
Conflict risk 3 (high)	203.2 km²
Conflict risk 4 (very high)	2,373.5 km²
Not assessed	291.8 km²

Assessment of the conflict risk across protected resources

Conflict risk density in the study area	3.01
Straight-line distance between network interconnection points	81.3 km

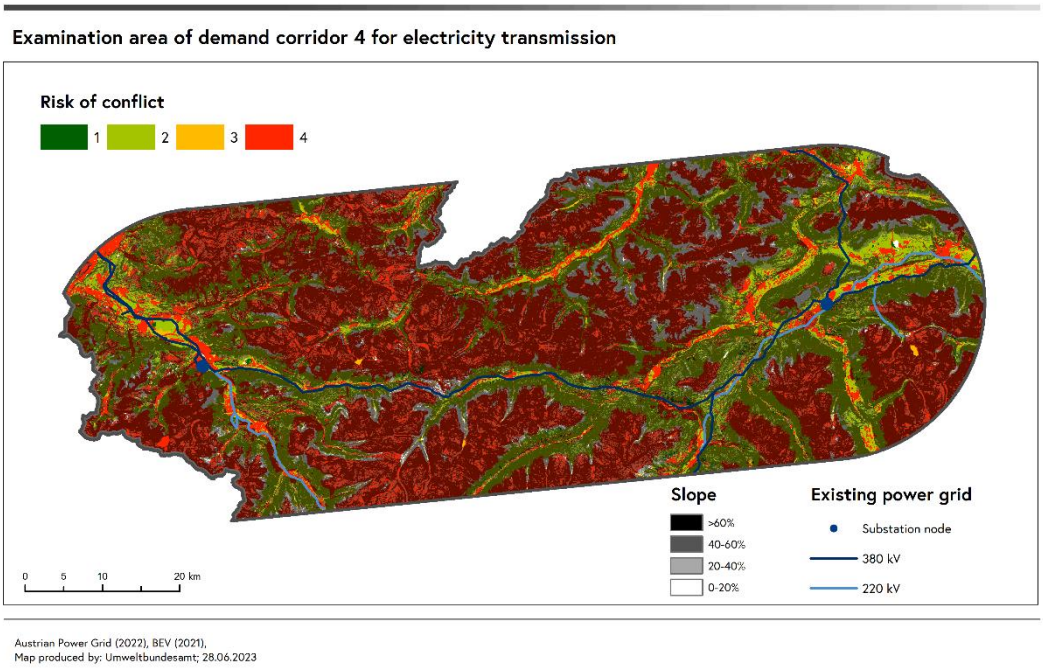
Protected areas in the study area

Table 4 Number of protected areas

Designation	Quantity
Natura 2000	30
Nature reserves	20
Nature parks	3
Landscape conservation areas	7
Protected landscape areas	10

Topography

Figure 9 Topography of the study area - electricity transmission demand corridor 4



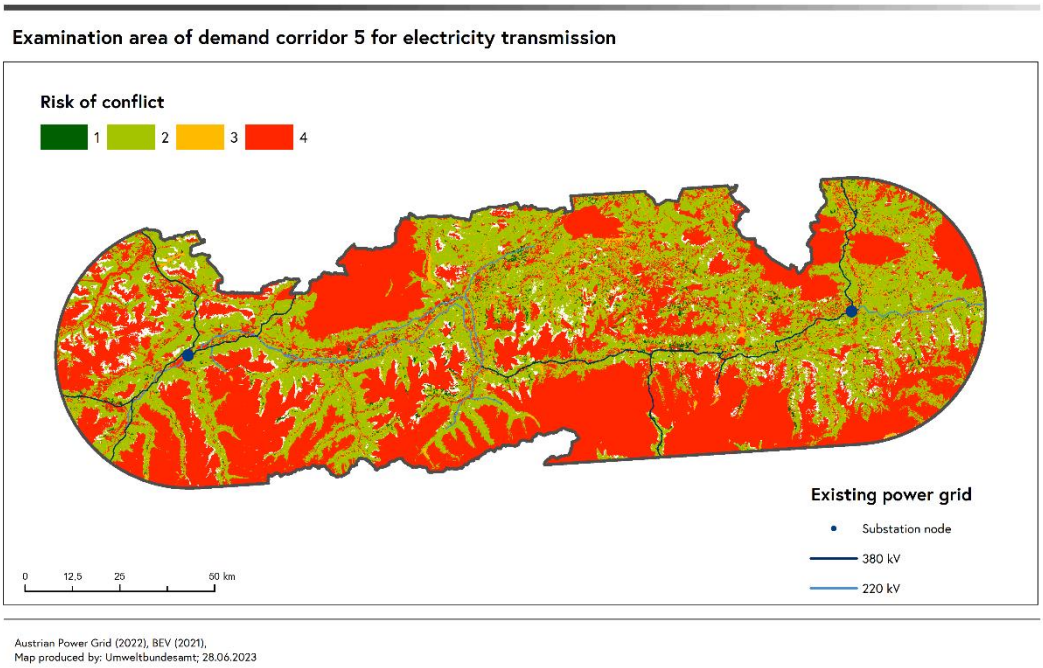
1.4 Study area for electricity transmission demand corridor 5: Haiming (Tyrol) - Pongau (Salzburg)

Design type	Overhead power line
Expansion form	Network expansion: Erection of an overhead line as new construction

Study area

Location of the study area / federal states	Connection of the substations Haiming (Tyrol) – Pongau (Salzburg) / Tyrol, Salzburg, Upper Austria and Steiermark
Size of the study area	14,598.7 km²

Figure 10 Study area - Electricity transmission demand corridor 5



Conflict risk area balance

Conflict risk 1 (low)	247.2 km²
Conflict risk 2 (medium)	5,788.7 km²
Conflict risk 3 (high)	767.5 km²
Conflict risk 4 (very high)	7,152.1 km²
Not assessed	643.2 km²

Assessment of the conflict risk across protected resources

Conflict risk density in the study area	2.93
Straight-line distance between network interconnection points	175.6 km

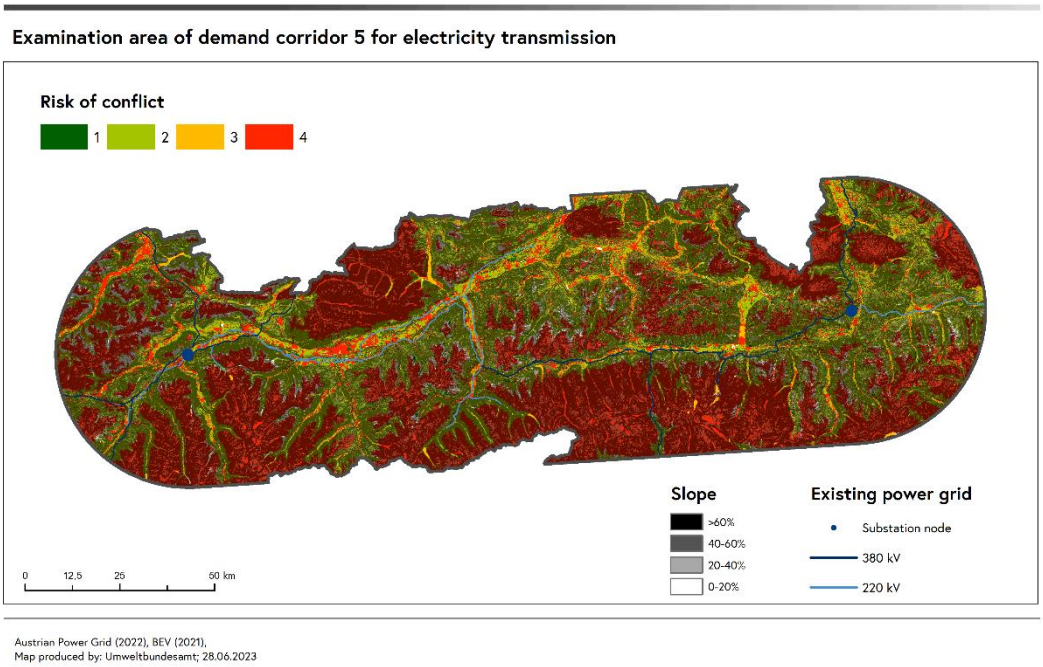
Protected areas in the study area

Table 5 Number of protected areas

Designation	Quantity
National parks	1
Natura 2000	54
Nature reserves	44
Nature parks	7
Landscape conservation areas	48
Protected landscape areas	71
Internationally significant wetlands (Ramsar)	6

Topography

Figure 11 Topography of the study area - electricity transmission demand corridor 5



1.5 Study area electricity transmission demand corridor 9: Vienna South-east (Vienna) – National border (HU)

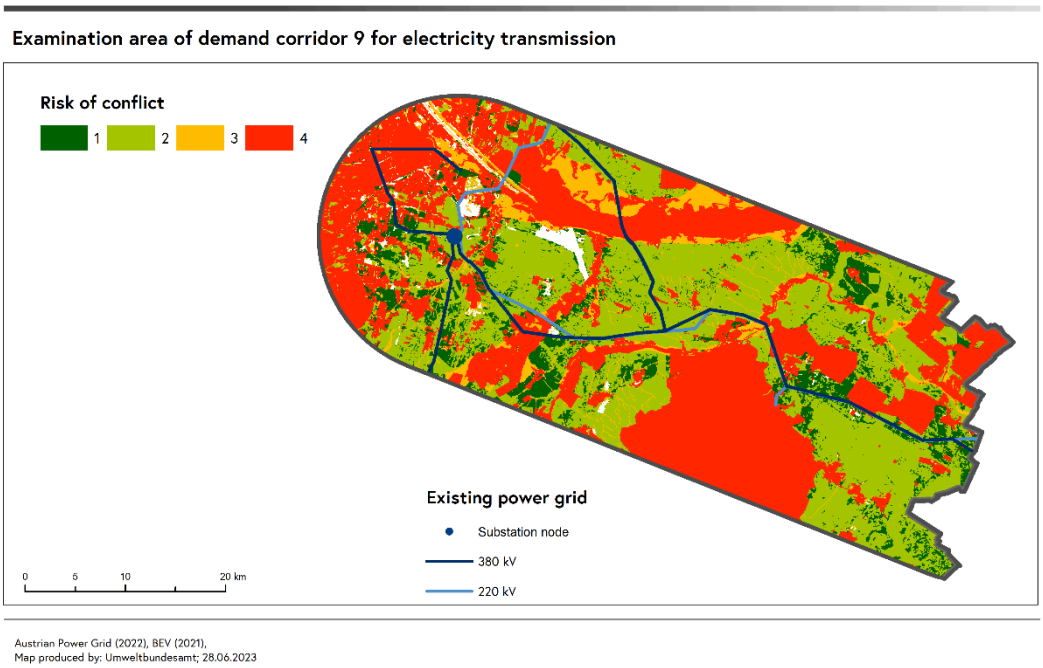
Design type	Overhead power line
Expansion form	Network expansion: Erection of an overhead line as new construction

Study area

Location of the study area / federal states	Connection of the substation Vienna South-east (Vienna) – National border (HU) / Steiermark, Lower Austria, Burgenland and Vienna

Size of the study area	1,826.6 km²

Figure 12 Study area - Electricity transmission demand corridor 9



Conflict risk area balance

Conflict risk 1 (low)	186.5 km²
Conflict risk 2 (medium)	705.5 km²
Conflict risk 3 (high)	125.3 km²
Conflict risk 4 (very high)	770.8 km²
Not assessed	38.5 km²

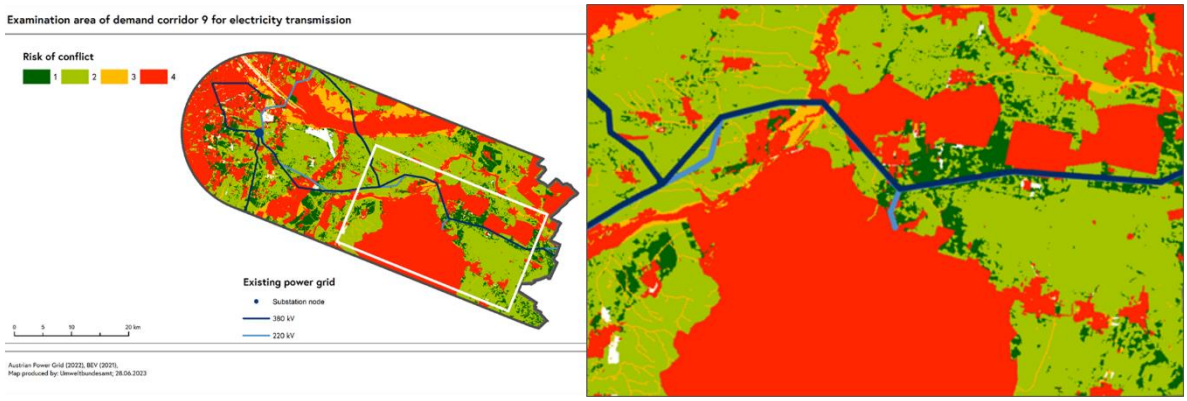
Assessment of the conflict risk across protected resources

Conflict risk density in the study area	2.77

Straight-line distance between network interconnection points	55.8 km

Cross-cutting obstruction

Figure 13 Cross-cutting obstruction in electricity transmission demand corridor 9



Cause of the cross-cutting obstruction

Neusiedler lake flora-fauna habitat area – North-east Leitha mountains, wet plain flora-fauna habitat area – Leitha floodplain, area Parndorf heath flora-fauna habitat as well as Neusiedler lake bird sanctuary – North-east Leitha mountains, bird sanctuary wet plain – Leitha floodplain, Parndorf plain bird sanctuary – heathland

Protected areas in the study area

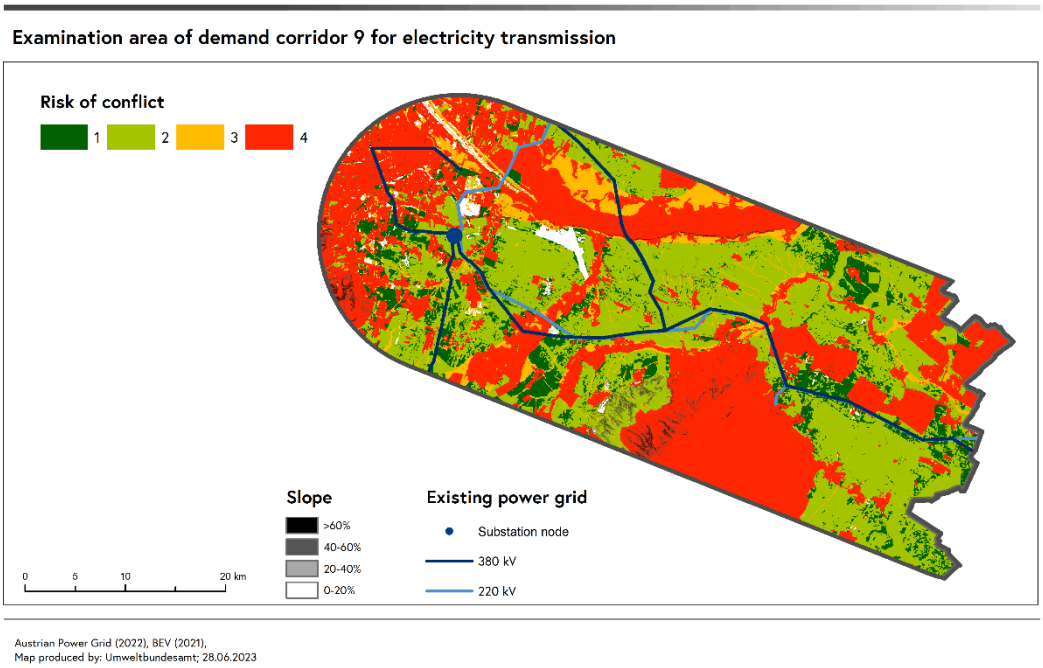
Table 6 Number of protected areas

Designation	Quantity
National parks	2
Natura 2000	17
Nature reserves	16
Nature parks	3

Designation	Quantity
Landscape conservation areas	26
Protected landscape areas	2
Internationally significant wetlands (Ramsar)	2

Topography

Figure 14 Topography of the study area - electricity transmission demand corridor 9



1.6 Study area electricity transmission demand corridor 10: Lienz (Tyrol) – National border (IT)

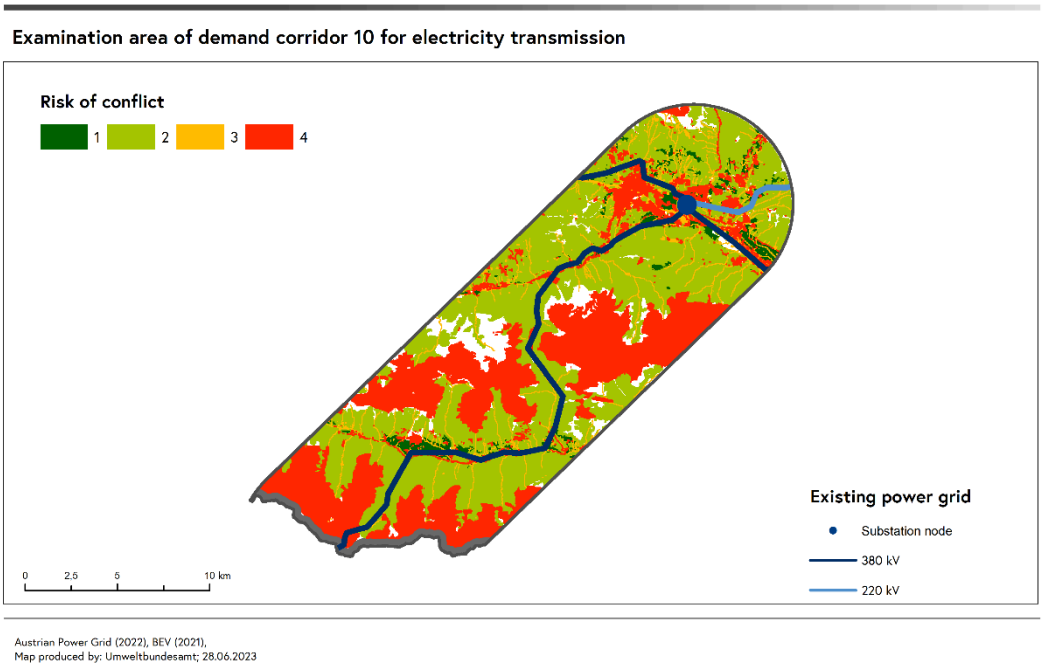
Design type	Overhead power line

Expansion form	Network expansion: Erection of an overhead line as new construction

Study area

Location of the study area / federal states	Connection of the substation Lienz (Tyrol) – National border (IT) / Tyrol and Carinthia
Size of the study area	322.5 km²

Figure 15 Study area - Electricity transmission demand corridor 10



Conflict risk area balance

Conflict risk 1 (low)	9 km²
Conflict risk 2 (medium)	158.4 km²
Conflict risk 3 (high)	19.4 km²
Conflict risk 4 (very high)	115.8 km²

Not assessed	19.9 km²

Assessment of the conflict risk across protected resources

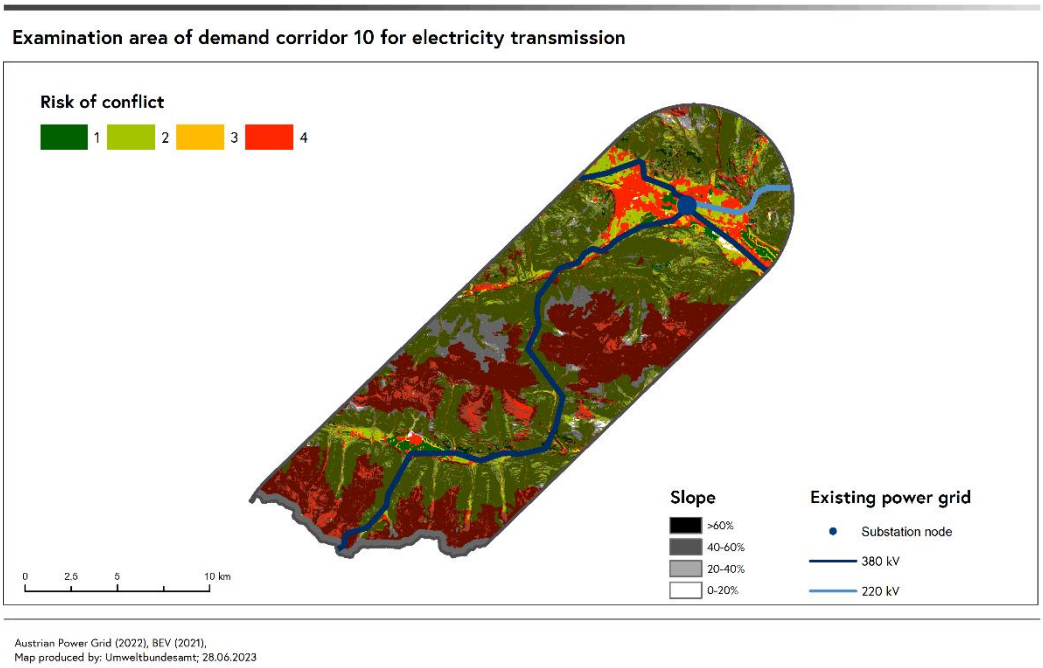
Conflict risk density in the study area	2.63
Straight-line distance between network interconnection points	27 km

Protected areas in the study area

None

Topography

Figure 16 Topography of the study area - electricity transmission demand corridor 10



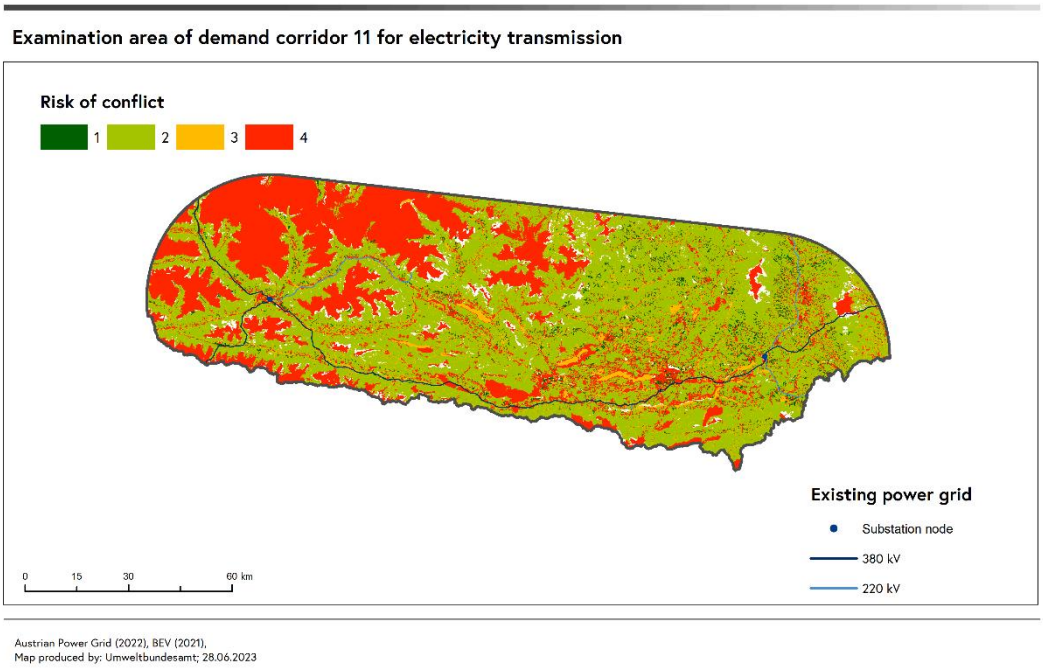
1.7 Study area electricity transmission demand corridor 11: Lienz (Tyrol) – Obersielach (Carinthia)

Design type	Overhead power line
Expansion form	Network expansion: Erection of an overhead line as new construction

Study area

Location of the study area / federal states	Connection of the substations Lienz (Tyrol) – Obersielach (Carinthia) / Tyrol, Carinthia, Salzburg and Steiermark
Size of the study area	11,926.7 km²

Figure 17 Study area - Electricity transmission demand corridor 11



Conflict risk area balance

Conflict risk 1 (low)	327.9 km²
Conflict risk 2 (medium)	6,810.5 km²
Conflict risk 3 (high)	783.5 km²
Conflict risk 4 (very high)	3,597 km²
Not assessed	407.8 km²

Assessment of the conflict risk across protected resources

Conflict risk density in the study area	2.57
Straight-line distance between network interconnection points	144.2 km

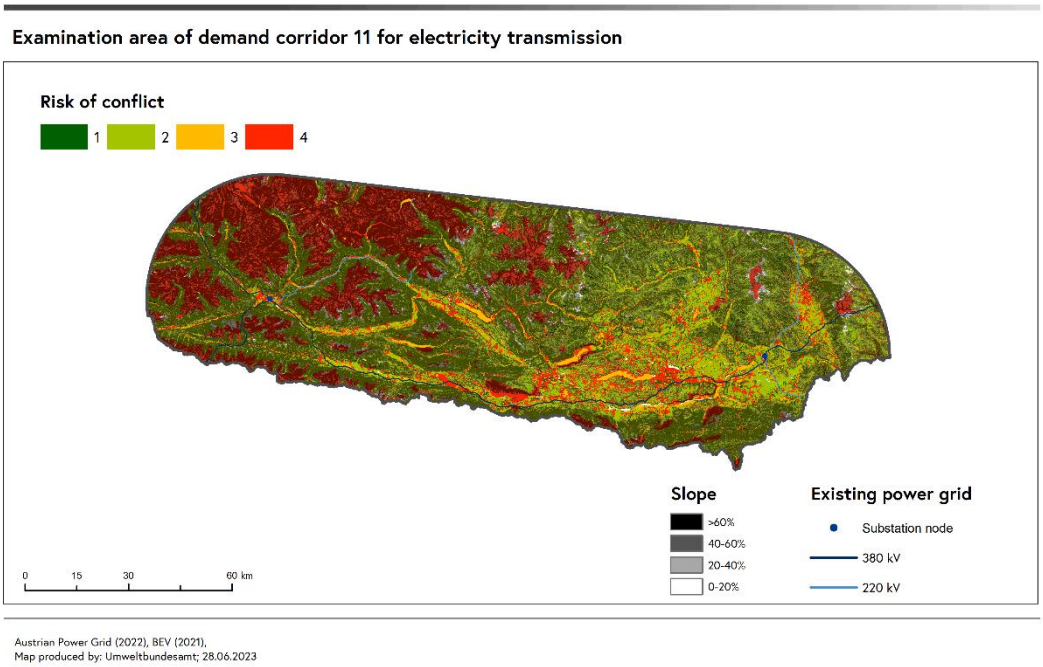
Protected areas in the study area

Table 7 Number of protected areas

Designation	Quantity
National parks	1
Natura 2000	83
Nature reserves	48
Nature parks	3
Landscape conservation areas	88
Protected landscape areas	4
Internationally significant wetlands (Ramsar)	7

Topography

Figure 18 Topography of the study area - electricity transmission demand corridor 11



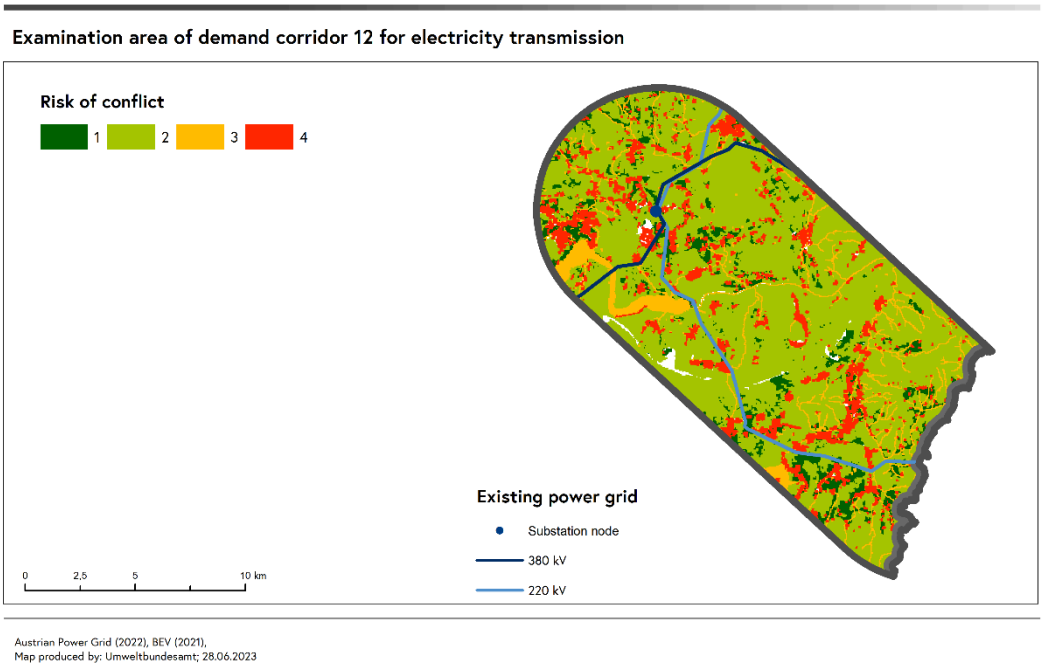
1.8 Study area electricity transmission demand corridor 12: Obersielach (Carinthia) – National border (SI)

Design type	Overhead power line
Expansion form	Network expansion: Erection of an overhead line as new construction

Study area

Location of the study area / federal states	Connection of the substation Obersielach (Carinthia) – National border (SI) / Carinthia
Size of the study area	235.1 km²

Figure 19 Study area - Electricity transmission demand corridor 12



Conflict risk area balance

Conflict risk 1 (low)	17.9 km²
Conflict risk 2 (medium)	165.3 km²
Conflict risk 3 (high)	19.7 km²
Conflict risk 4 (very high)	28.7 km²
Not assessed	3.5 km²

Assessment of the conflict risk across protected resources

Conflict risk density in the study area	2.22
Straight-line distance between network interconnection points	16.7 km

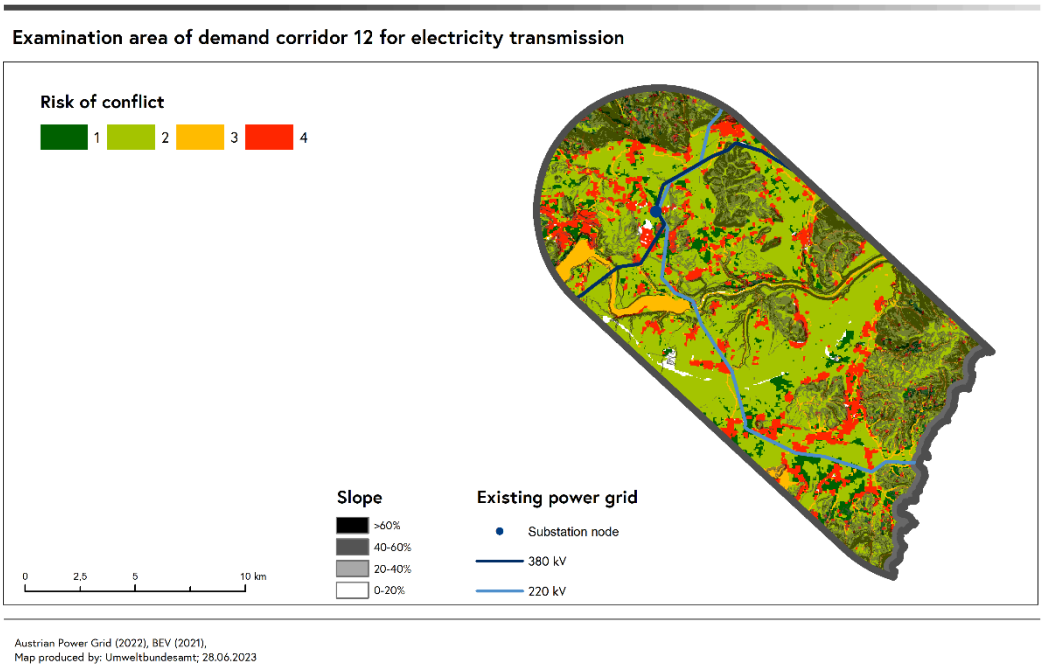
Protected areas in the study area

Table 8 Number of protected areas

Designation	Quantity
Natura 2000	4
Landscape conservation areas	3

Topography

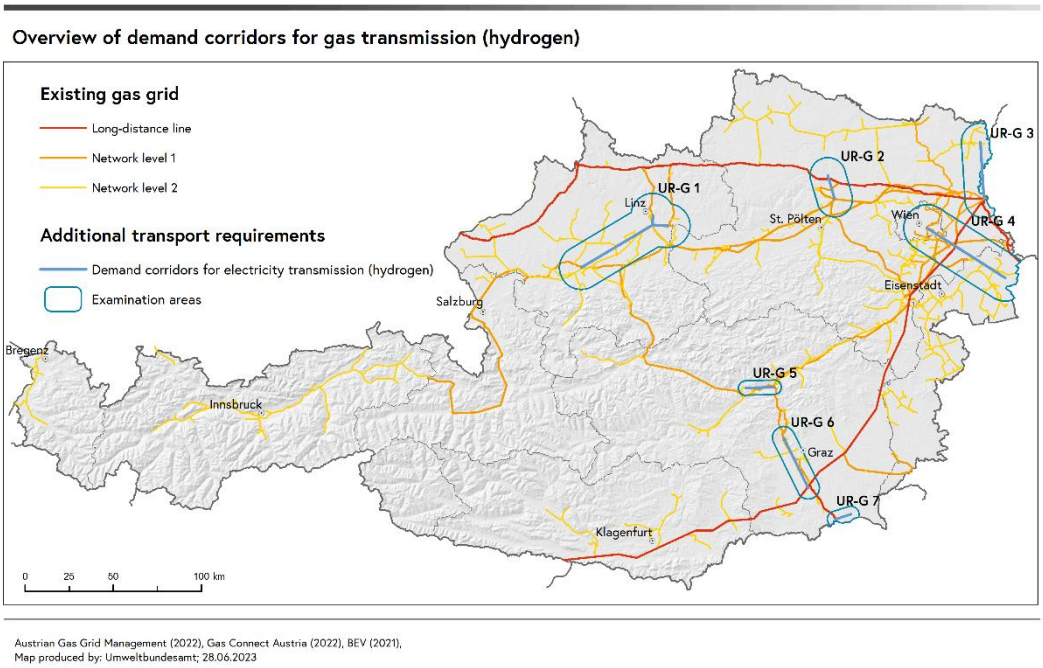
Figure 20 Topography of the study area - electricity transmission demand corridor 12



2 gas transport demand corridors (hydrogen)

The seven processed study areas of the gas transport demand corridors (hydrogen) are shown (Figure 21) below. Study areas are located in all federal provinces and only concern areas within the national borders of Austria. By definition, a study area extends over straight lines between connection nodes to be connected, which were provided with a buffer area in the aspect ratio of length to width of at least 2.5 : 1. In order to take existing pipelines and constraint points into account, different buffer widths were chosen for the study area.

Figure 21 Overview map of the study areas of the gas transmission demand corridors (UR-G 1 to UR-G 7) in Austria



A raster data set with a cell size of 50 m x 50 m is available for each of the study areas. The area categories[2] included in each grid cell of the study area is known. Based on this, the conflict risk was calculated and presented on an area-wide basis using these grid cells (50 m x 50 m resolution). The classification is implemented with the help of a four-part scale and assigns low (1), medium (2), high (3) or very high (4) conflict risk to the respective network cells of the study areas. Areas that could not be assigned to any of the area categories used were not assessed. A potential risk of conflict can therefore not be ruled out in these small-scale areas and requires further examination in the event of an incident. In addition, a comparable factor for the average conflict risk, the conflict risk density, was calculated for each study area.

In addition to the area-wide consideration of the conflict risk associated with the erection of gas pipelines, the consideration of cross-cutting obstructions was also carried out separately. Large-area and possibly barrier-forming areas with a high conflict risk are defined as "cross-cutting obstructions".

This study does not include an integrated consideration of the technical feasibility. In addition to the conflict risk of the various environmental area categories, the presentation of the slope gradient in the study areas is intended to provide an initial assessment of the impact of the slope gradient on feasibility.

2.1 Study area - gas transport demand corridor (hydrogen) 3: Baumgarten – Hohenau an der March (Lower Austria)

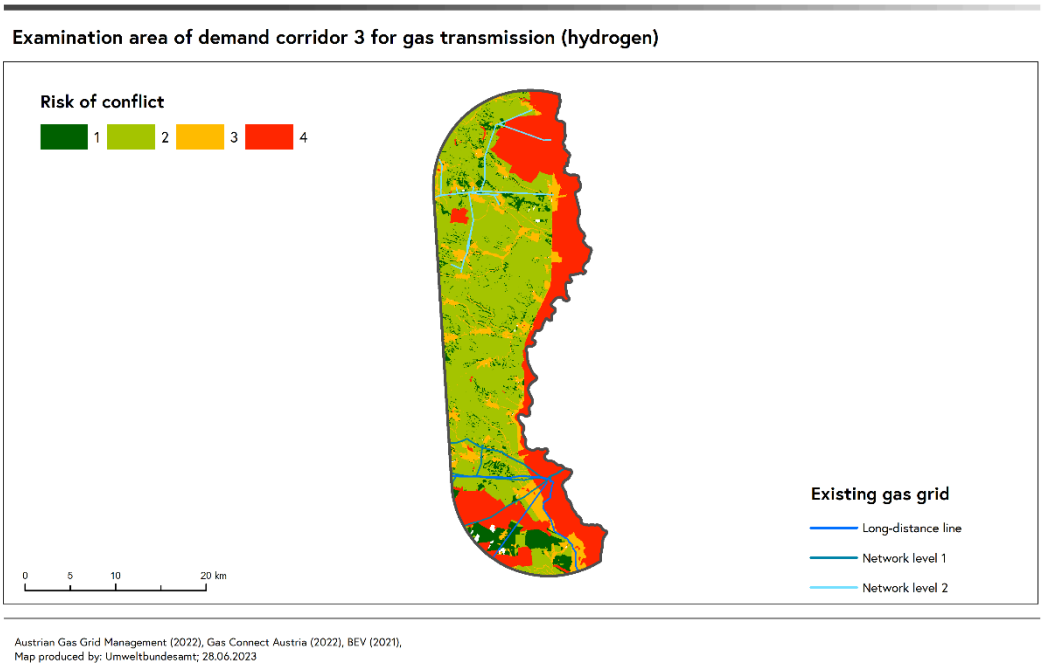
Design type	Gas pipelines for hydrogen transport
Expansion form	Network expansion: Erection of a gas pipeline (hydrogen) as new construction

Study area

Location of the study area / federal states	Connection of the existing pipelines in the area Baumgarten – Hohenau an der March (Lower Austria) / Lower Austria
Size of the study area	655.1 km²

[2] A detailed description is provided in the environmental report in chapter 2.4.3.

Figure 22 Study area - gas transport demand corridor (hydrogen) 3



Conflict risk area balance

Conflict risk 1 (low)	50.3 km²
Conflict risk 2 (medium)	353.8 km²
Conflict risk 3 (high)	70 km²
Conflict risk 4 (very high)	178.8 km²
Not assessed	2.2 km²

Assessment of the conflict risk across protected resources

Conflict risk density in the study area	2.57
Straight-line distance between network interconnection points	32.2 km

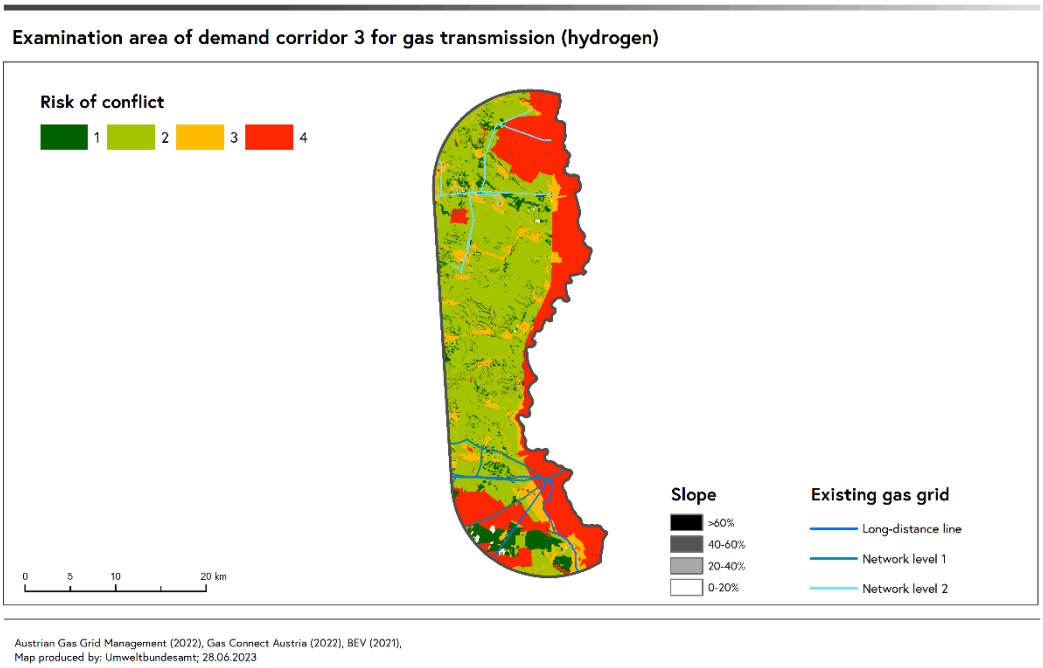
Protected areas in the study area

Table 9 Number of protected areas

Designation	Quantity
Natura 2000	5
Nature reserves	9
Nature parks	1
Landscape conservation areas	2
Internationally significant wetlands (Ramsar)	1

Topography

Figure 23 Topography of the study area - gas transport demand corridor (hydrogen) 3



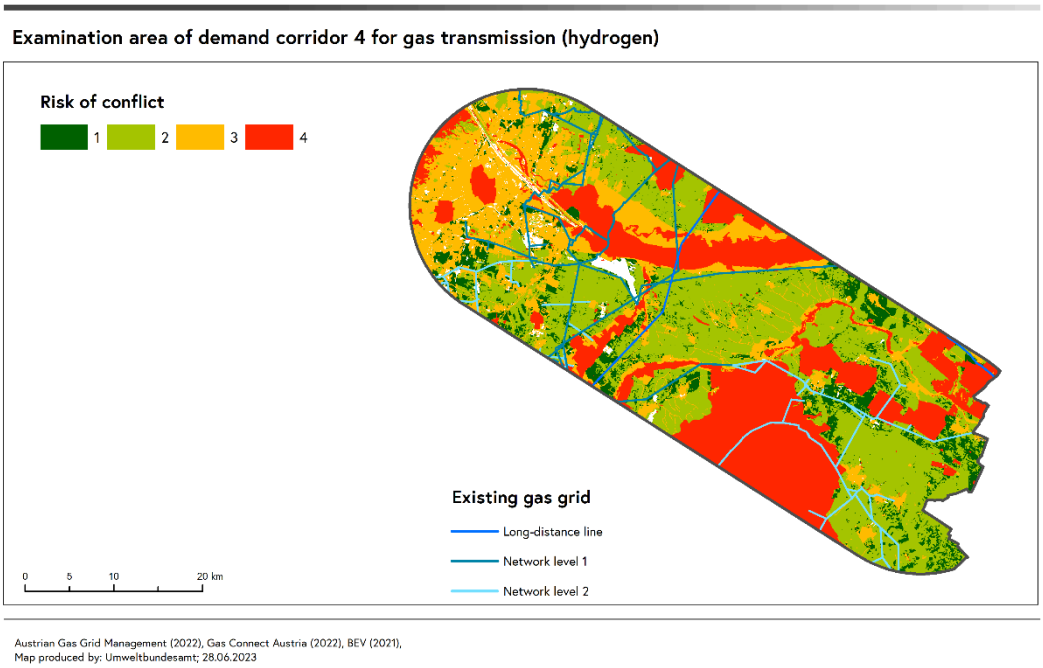
2.2 Study area - gas transport demand corridor (hydrogen) 4: Simmering (Vienna) – Nickelsdorf (Bgld.)

Design type	Gas pipelines for hydrogen transport
Expansion form	Network expansion: Erection of a gas pipeline (hydrogen) as new construction

Study area

Location of the study area / federal states	Development of the area Simmering (Vienna) – Nickelsdorf (Burgenland) / Vienna, Lower Austria and Burgenland
Size of the study area	1,796.4 km²

Figure 24 Study area - gas transport demand corridor (hydrogen) 4



Conflict risk area balance

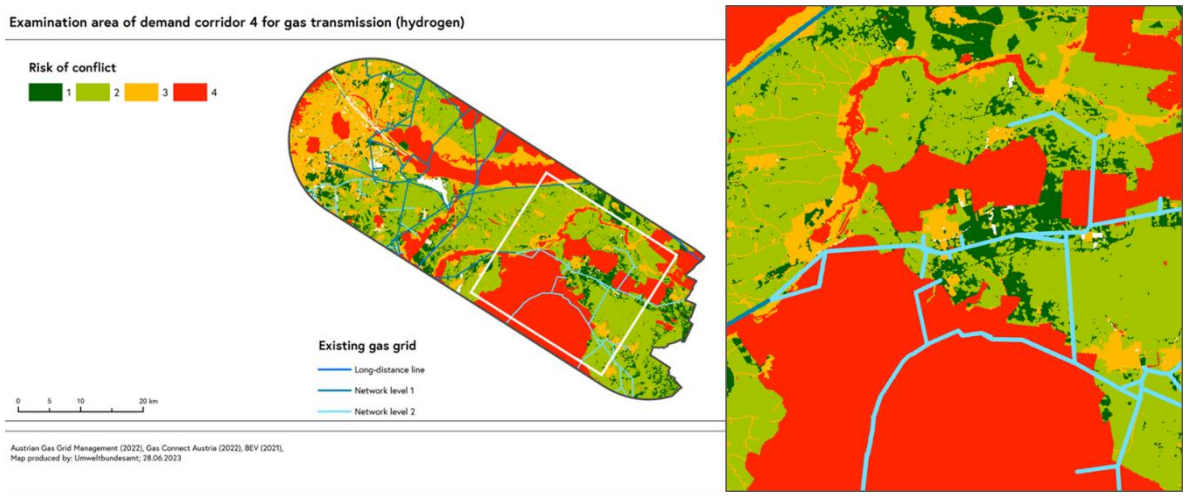
Conflict risk 1 (low)	166.4 km²
Conflict risk 2 (medium)	712.9 km²
Conflict risk 3 (high)	385.8 km²
Conflict risk 4 (very high)	496.7 km²
Not assessed	34.7 km²

Assessment of the conflict risk across protected resources

Conflict risk density in the study area	2.64
Straight-line distance between network interconnection points	61.7 km

Cross-cutting obstruction

Figure 25 Cross-cutting obstruction in gas transport demand corridor (hydrogen) 4



Cause of the cross-cutting obstruction

Neusiedler lake flora-fauna habitat area – North-east Leitha mountains, wet plain flora-fauna habitat area – Leitha floodplain, area Parndorf heath flora-fauna habitat as well as Neusiedler lake bird sanctuary – North-east Leitha mountains, bird sanctuary wet plain – Leitha floodplain, Parndorf plain bird sanctuary – heathland

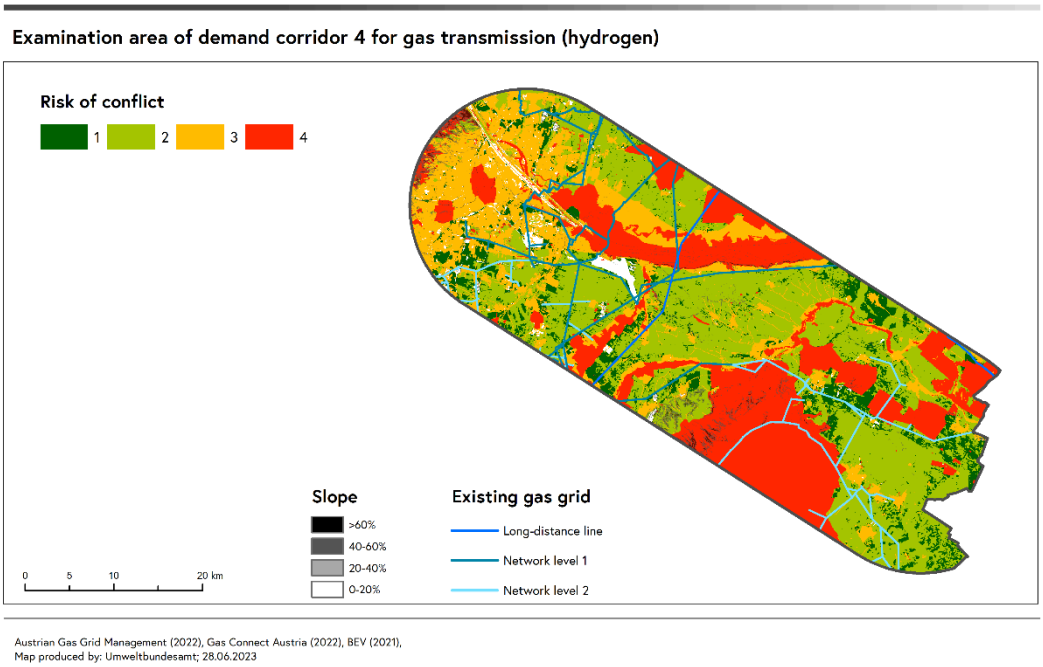
Protected areas in the study area

Table 10 Number of protected areas

Designation	Quantity
National parks	2
Natura 2000	16
Nature reserves	13
Nature parks	1
Landscape conservation areas	38
Protected landscape areas	2
Internationally significant wetlands (Ramsar)	2

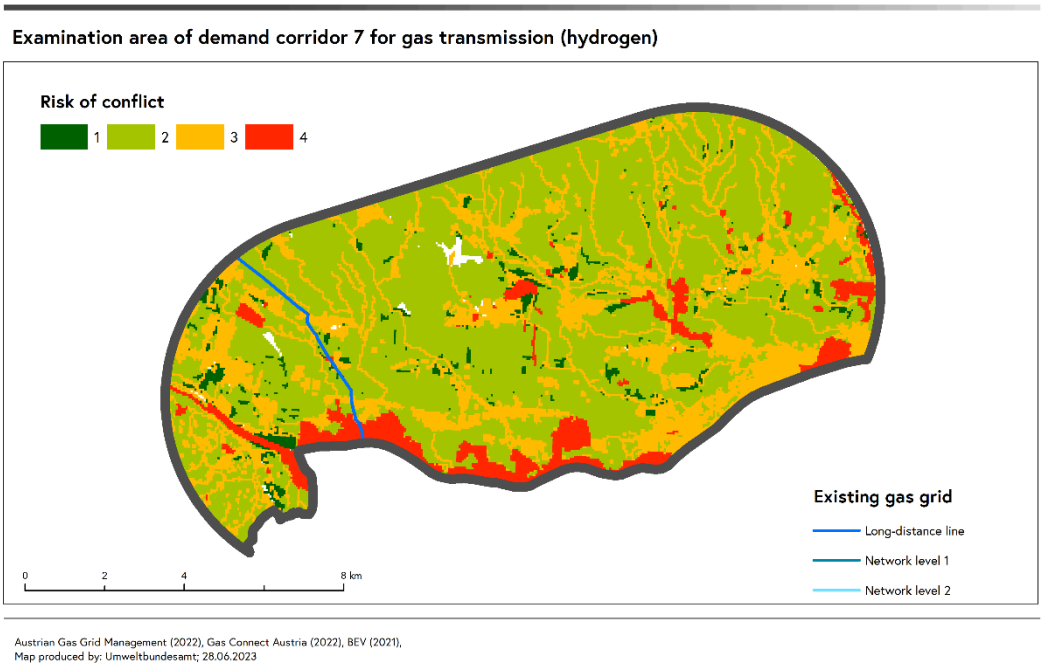
Topography

Figure 26 Topography of the study area - gas transport demand corridor (hydrogen) 4



Austrian Gas Grid Management (2022), Gas Connect Austria (2022), BEV (2021),
Map produced by: Umweltbundesamt; 28.06.2023

Figure 27 Study area - gas transport demand corridor (hydrogen) 7



Conflict risk area balance

Conflict risk 1 (low)	3.5 km²
Conflict risk 2 (medium)	76 km²
Conflict risk 3 (high)	33.6 km²
Conflict risk 4 (very high)	10 km²
Not assessed	0.6 km²

Assessment of the conflict risk across protected resources

Conflict risk density in the study area	2.40
Straight-line distance between network interconnection points	9.2 km

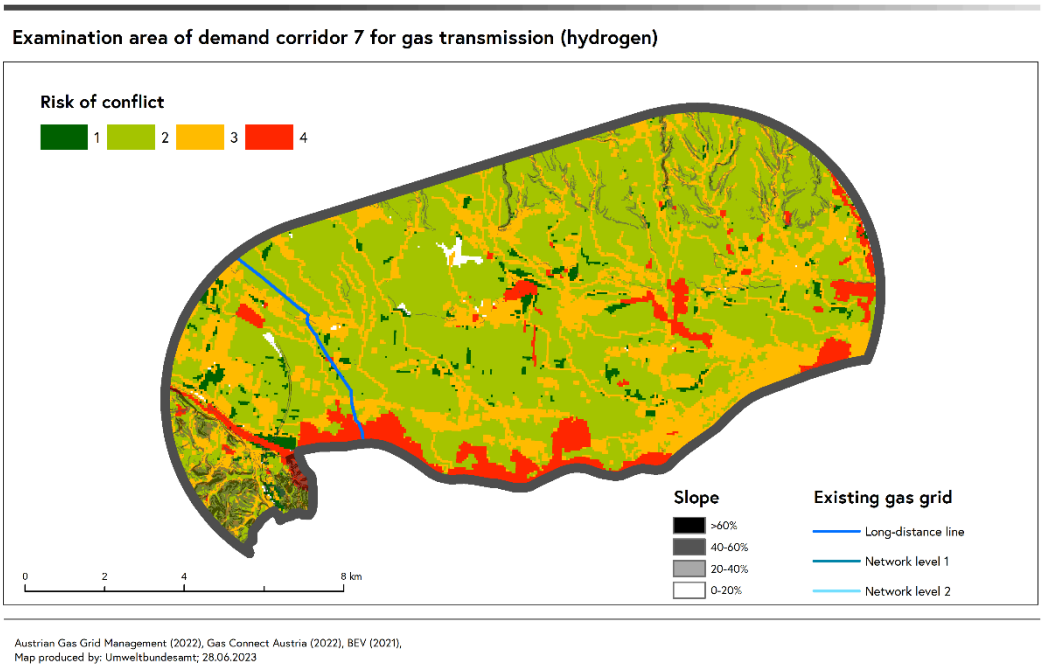
Protected areas in the study area

Table 11 Number of protected areas

Designation	Quantity
Natura 2000	2
Nature reserves	2
Nature parks	1
Landscape conservation areas	4
Protected landscape areas	5

Topography

Figure 28 Topography of the study area - gas transport demand corridor (hydrogen) 7



2.3 Overall assessment

The study areas covered differ due to the spanned distance, the topology, but also in order to record the existing pipelines. A comparison of the conflict risk of the study areas can therefore only be made on the basis of the area-weighted mean values. The conflict risk density calculated in this way shows values of 2.16 to 2.64 for all study areas and thus, when considered as a whole, a medium (2) to high (3) average conflict risk (Table 12).

Table 12: Overview of the study areas UR-S 1 to UR-S 7 and presentation of area and conflict risk density

Assessment area	Designation	Area (km^2)	Conflict risk density
UR-G 1	Vöcklabruck – Linz –Enns (Upper Austria)	1,958.2	2.23
UR-G 2	Traismauer – Langenlois (Lower Austria)	597.2	2.56
UR-G 3	Baumgarten – Hohenau an der March (Lower Austria)	655.1	2.57
UR-G 4	Simmering (W) – Nickelsdorf (Bgld.)	1,796.4	2.64
UR-G 5	St. Peter-Freienstein – Bruck an der Mur (Stmk.)	181.9	2.16
UR-G 6	Grafendorf – Gratwein (Stmk.)	523.6	2.39
UR-G 7	Straß – Mureck (Stmk.)	123.6	2.40

The conflict risk values presented are maximum values based on the data used and do not represent a conclusive or even exclusionary assessment in the sense of actual route planning. In the detailed assessment, other non-assessed protected resources may well occur in areas with a low (1) or medium (2) risk of conflict and would have to be taken into account if necessary. Equally, however, areas with a high (3) or very high (4) risk of conflict are by no means exclusion areas. The presentation of the conflict risk of the study areas is intended to serve as a high-level indicator for detailed planning.

List of tables

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