

/Bird life and flight operations

The environment at Munich Airport

Living ideas – Connecting lives





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/Foreword

Dear Reader,

Flughafen München GmbH (FMG) operates a central infrastructure facility for aviation, and, as part of an international network, creates the basis for global mobility. We bring people together across borders, while at the same time welcoming an open, fair and equal dialog with all groups of stakeholders.

Protection of the environment, climate and natural resources is an extremely important element of our responsibility to the community. In view of this, in our entrepreneurial and future-oriented actions we strive to achieve a successful balance between economics, ecology and social objectives.

Munich Airport sees its position within the »Nördliches Erdinger Moos« European bird sanctuary as a special nature conservation feature. FMG takes its responsibility for the diverse range of bird life associated with this location very seriously, and is facing the challenge of reconciling air operations and bird conservation. The stable bird populations on the Airport meadows confirm the successful co-existence of flight operations and bird life. The aim is to repeat the standards at the first European airport to be awarded the title of »5-Star-Airport« when it comes to nature conservation.

We welcome your interest in our company and its commitment to nature conservation, and in particular bird protection.

Dr. Michael Kerkloh

Thomas Weyer



Introduction

When people think about Munich Airport, the mental picture they usually have is technology oriented: the Airport with its numerous buildings, terminals, aprons, runways, the surrounding road network and of course the aircraft taking off and landing.

Only a few would probably initially suppose that unique, diverse bird life had colonized in direct proximity, including rare species, some of which are even threatened with extinction. And what is more difficult to believe is that a few of the birds also feel at home on the meadows right next to the runways. Numerous curlews, lapwings, skylarks, corn buntings, partridges and corncrakes breed and rear their young extremely successfully there each spring. That is also the reason why the Airport meadows – as the fields around the technical installations for the runways are commonly referred to – together with the areas in the north bordering the Erdinger Moos were declared a European bird sanctuary, the »Nördliches Erdinger Moos«, in 2008.

The »home« of Munich Airport, the Erdinger Moos, is an area of moorland that has been used and dramatically changed by man for centuries, and which over the decades has increasingly lost its typical character. A broad range of nature conservation measures together with the necessary care on the part of the Airport have, however, considerably improved it again in recent decades.

/Munich Airport in facts and figures



After a seven-year construction period, Munich Airport started operations at its new location on May 17, 1992 with one terminal and two runways. Since then it has continued to develop, and with two terminals and the additional satellite building for passenger handling, is one of the most important and busiest airports in Europe. In 2015 the second largest airport in Germany recorded 41 million passengers and 380,000 aircraft movements. At the beginning of 2015, it became the first European airport to be awarded the title of »5-Star-Airport«. It also provides secure jobs for 32,000 employees, and is therefore a key factor in the economic prosperity of the area as a whole.

Almost two thirds of the Airport grounds have not been sealed or paved, the majority of which are green spaces. In addition to operational use for air traffic, these offer a habitat for rare species of birds and plants. Since its implementation, a well-conceived biotope management has been upgrading the airport meadows. They now have a far greater ecological significance and a wider range of species compared, for example, to intensively farmed, monotonous grassland or arable land outside the Airport.

Extensive surveys of the population of flora and fauna in 2006 and 2007 in and around the Airport grounds showed that important populations of bird species – and particularly meadow nesting birds – are at home especially on the Airport meadows, but also in the northern area just outside the perimeter of the Airport. As rare species come here to breed each year, for example the lapwing, Eurasian curlew, corn bunting, skylark, quail and partridge, the »Nördliches Erdinger Moos« was declared to be an ecologically valuable habitat under the Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds [EU Birds Directive], Section 4 [1] and [2], and designated a European bird sanctuary. The enclosed meadows around the runways constitute a major component of the area. Today the biotope management of these meadows meets the increasing demands of nature conservation, while continuing to prioritise flight safety aspects.



Sketch of the former moorland [A. Ringler]

/The historic Erdinger Moos

Originally the Erdinger Moos was a fen covering around 25 square kilometers at the northern edge of the Munich gravel plain. Its creation can be attributed to the former high groundwater levels in this area. Today the region is still referred to as »Erdinger Moos«, despite the fact that it has now largely lost its typical moorland character. The Airport takes up six percent of the Erdinger Moos, with an area of some 1.500 hectares.

The agricultural use of the Erdinger Moos began back in the 8th century, concentrating on the production of straw and grazing. The moor was also a hunting area. The first attempts to drain the moorland and cultivate it were made at the start of the 18th century. Today's Goldach, which runs to the north of the Airport perimeter, was laid out as a drainage ditch, for example. The first peat digging companies also appeared at this time. The area retained most of its moorland character up to the start of the 19th century, when the landscape continued to be defined by spring fen and reed marsh areas, bog and fen woods and sedge and moor grass meadows.

Permanent changes to the landscape only took place following major drainage measures and increased peat extraction. The Middle Isar Canal built at the start of the 20th century greatly lowered the groundwater level, thereby draining around a quarter of the Erdinger Moos. The use of mineral fertilizer also enabled the moor soil, which is low in nutrients, to be used to grow grain and vegetables for the first time. By 1931, approximately 90 percent of the original area of the Erdinger Moos had already been cultivated, and transformed into a treeless farming landscape.




The effects of the progressive use associated with the drainage were also felt by the flora and fauna in the Erdinger Moos. Originally a wide variety of typical plant and animal communities was indigenous in the extensively used fen. The biodiversity declined radically over the years, and many of the species of flora and fauna found then have now disappeared completely. Black storks were last sighted in the Erdinger Moos at the turn of the century, and redshanks continued breeding there until the 1930s. The last black grouse were to be found in Viehlaßmoos until 1960. 16 rare species – especially spring fen plants and marshland birds – disappeared from the Erdinger Moos between 1964 and 1979, and therefore long before the Airport was built.



The »Nördliches Erdinger Moos« European bird sanctuary

40 species of birds that are endangered or threatened with extinction find a specially protected habitat in the Nördliches Erdinger Moos.

These include:

-  The Eurasian curlew;
-  The lapwing; and
-  The blue-headed wagtail.

/The »Nördliches Erdinger Moos« European bird sanctuary

European bird sanctuaries are designated on the basis of Article 4 [1] of the EU Birds Directive. Their purpose is to preserve, maintain and re-establish habitats for wild bird species. They, together with the conservation areas under the Habitats Directive, make up Natura 2000 – the European network of protected areas.

The European bird sanctuary »Nördliches Erdinger Moos« was designated on 8th July 2008 and its 4,525 hectares encompass the Airport meadows around the two runways as well as the areas bordering the northern Erdinger Moos mainly to the north and east of the Airport grounds. It is an important stepping stone in the Natura 2000 ecological network throughout Europe, and among other things protects eleven of the currently 181 species or subspecies of birds mentioned as being particularly endangered or in special need of conservation in Annex I of the EU Bird Directive.

Around 2,500 hectares of the conservation area are owned by FMG. The Airport meadows along the runways account for 658 hectares. FMG regularly has the meadows mapped to record bird populations and to reliably monitor their development.

The bird sanctuary is of high national importance to the preservation of bird species in the open and semi-open fen landscapes. It harbours significant populations of the Eurasian curlew, the lapwing and the corn bunting, as well as many other species found in still waters, reeds and silt zones, for example the bluethroat; at the same time, it offers a special protection function for red crested pochards, gadwalls, penduline tits and little ringed plovers. Above all the designation of the area as a European bird sanctuary is due to the rich numbers of Eurasian curlews on the Airport meadows. Today the grounds of Munich Airport are regularly one of the three most important breeding grounds for the Eurasian curlew in Bavaria, as confirmed by the State Office of the Environment in its 2014 report on meadow breeding birds. In 2015, the Airport meadows breeding area had the biggest population of Eurasian curlews in Bavaria. The »Nördliches Erdinger Moos« European bird sanctuary is one of the best areas for the protection of 40 species of birds in Bavaria.

A European bird sanctuary is created

Under the EU Birds Directive (Article 4 (1) and (4) of Directive 2009/147/EC of 30 November 2009), Member States declare regions as sanctuaries.

Areas that are most suitable for preserving the species listed in Annex I and Article 4 (2) are selected.

The only criteria for selection are ornithological.

Delineating zones for economic reasons is not permitted.

Under Article 13b (1) Sentence 1 of the Bavarian Nature Conservation Act, the participation of those involved is required when selecting European bird sanctuaries.

Selection of the Nördliches Erdinger Moos as a European bird sanctuary was based on the species found there.

There was public participation/a dialog procedure in 2007.

The area was designated as the »Nördliches Erdinger Moos« bird sanctuary on July 8, 2008.

Natura 2000

EU-wide network of sanctuaries to protect endangered or typical habitats and species.

Components are sanctuaries under the Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009) and conservation areas under the Flora and Fauna Habitat Directive (Directive 92/43/EEC of the Council of 21 May 1992 to protect natural habitats and animals and plants in the wild).

At 20 percent of the EU area, this is the biggest network of protected areas in the world.



The 40 protected bird species in the bird sanctuary

Portraits of selected bird species

The »Nördliches Erdinger Moos« European bird sanctuary still has notable populations of birds that have become rare and which are therefore in particular need of protection. The local conditions required for their habitat can only be found in a few places in today's cultivated landscape. These ideal conditions are present at the Airport, especially on the meadows alongside the runways. The following species, which are the principal species on the Airport meadows and are occasionally seen in the surrounding areas, are of special significance.

The Eurasian curlew

The Eurasian curlew originally colonised lowlands, in particular the sedge marshes in fens and treeless raised bogs. Current breeding can predominantly be found on fen and raised marsh soils, also on arable land and peat digging areas. High groundwater levels, short, sparse vegetation, soil that can be »prodded« and small ponds with open, muddy banks are extremely important for its colonisation. The birds nest on the ground, and prefer a dry or slightly moist surface, usually in low or herbaceous vegetation. These birds are extremely territorial, and they breed within a few meters of the same place, year for year.

Over 50 pairs regularly breed and successfully raise their young on the meadows alongside the runways each year. Only 500

breeding pairs of this species remain in Bavaria, which is why the Eurasian curlew is classified as being »threatened with extinction« (Level 1) on the Bavarian Red List. Over 95 percent of the entire Eurasian curlew population in the bird sanctuary are found on the Airport meadows inside the Airport perimeter. The meadows were the second most important breeding ground for the Eurasian curlew in 2014, and the most highly populated breeding ground in Bavaria in 2015.

The lapwing

The lapwing was originally only found on wetlands. Today it is usually seen on farmland. It builds its nest on the ground in open country or on raised areas on grassland. Open, flat spaces with few trees and with scattered, very short vegetation or partially open ground near

groundwater are important for colonisation. When conditions are favourable, the species breeds in colonies. They are also extremely territorial. If the location changes, they may move to nearby, more favourable or comparable locations. Its breeding success is impaired by the intensification of agriculture, a lack of wetlands and dense vegetation. The poor Airport meadows represent an ideal, undisturbed breeding area. Well over 100 breeding pairs of lapwings can be found here each year. The lapwing is classified as highly endangered in Bavaria (Bavarian Red List: Level 2).



Eurasian curlew



Lapwing

The skylark

The skylark is a species found in open countryside and is a ground-nesting bird. It prefers low or at least not too dense grass or vegetation on dry to intermittently wet ground. The terrain should be open or there should be a largely open skyline. Typical biotopes are arable land, poor grassland and fallow ground with not too dense vegetation. Fast growing crops on intensively farmed land make the fields unattractive as nesting sites for skylarks. Mowing green spaces several times a year also frequently results in lost broods. This has led to the skylark population in Bavaria being classified as endangered [Bavarian Red List: Level 3]. Large populations continue to thrive, however, on the poor Airport meadows.



Skylark

The little ringed plover

The original breeding habitats of little ringed plover were stone, gravel and sand embankments without vegetation as well as bare or sparsely covered, drying, muddy stretches of riverbanks on the foothills of hills and lowland streams, and also the sandy banks of large lakes. Today it can almost exclusively be found in manmade habitats such as gravel and sand quarries, sludge disposal sites, dredge dumps, clarification ponds, wastewater farms and peat bogs in raised bogs. It may occasionally be sited on arable land and forest clearings, while small areas of clear ground suffice as a nesting site. In urban areas it happily uses building sites, tree nurseries and gravel-covered flat roofs for breeding. It requires bare, open areas with gravel or stony ground for its nest. Mapping frequently shows that random areas of virgin soil are accepted as habitat. This explains why the little ringed plover can be found on the gravelly seepage areas on the Airport meadows. It is classified as endangered on the Bavarian Red List [Level 3].



Little ringed plover

The corn bunting

The corn bunting is an inconspicuous bird that is more likely to be heard than seen. It is one of the ground nesting birds, and is a characteristic species in open agricultural landscapes. It colonises open, almost forest-free regions with extensive agricultural or grassland use. It can also be found on straw and reed meadows, preferably on heavy, lime soil with mosaic-like, diverse use structures or on ruderal areas, i. e. areas with stony, low humus soil. Important habitat features are isolated trees, barns and fences as perches for singing, with an elevated position for the males. Unpaved tracks and borders are used as foraging habitats. The nest is built in structures on the edges of dense ground vegetation free from bushes and trees. At the Airport, the perimeter fence is used for singing and the meadows for breeding. The corn bunting has Level 1 status on the Bavarian Red List [threatened with extinction].



Corn bunting

The quail

In central Europe the quail almost only colonises farmland. It prefers open habitats, where possible agricultural land without bushes and trees with warm and fresh sandy, moor or deep loess or black earth soil. In particular it seeks out summer grains [except for oats] as well as winter wheat, clover, lucerne, peas and arable crops as well as grassland and ruderal meadows. As a ground nesting bird, the quail builds its nest under the cover of tall grass and undergrowth. The Airport meadows are an ideal habitat for it. In Bavaria they are on the early warning list [Bavarian Red List: Level V].



Quail

The corncrake

The ground nesting, principally nocturnal corncrake uses extensive, open to semi-open lowlands as its habitat, for example fens or the agricultural river and valley meadows in hill country. It also likes to colonise marsh areas with tall-growing sedge or reed canary grass in landside reed beds where larger bodies of water meet reed meadows or in moor locations [mineral soils with a high proportion of undecomposed organic matter] with tall grass. For its nesting site it needs tall vegetation, preferably in meadows or fields. Occasionally it builds its nest on the edges of low bushes, field hedges or individual trees. The corncrake is an unsettled visitor to the Airport meadows. It likes the tall grass that grows there. In Bavaria the corncrake is threatened with extinction [Bavarian Red List: Level 1].



Corncrake

The bluethroat

The habitat of the bluethroat encompasses riverbanks, oxbow lakes and lakes with silt zones covered with reed, reed canary grass, bulrushes or willowherb. This bird can, however, also be seen in alder or willow softwood floodplains and on fens and transition bogs. The important structures are dense vegetation as a nesting site, raised perches for singing and sparsely covered or bare areas for foraging. If suitable structures are present, bluethroats also live on areas of water from quarries, ponds and agricultural landscapes [for example grain and rapeseed cultivation] that are crossed by reed-lined ditches. The nest is made close to the ground in dense vegetation. On the outskirts of the Airport, the bluethroat is found on FMG compensation areas along the Siebentagwerksgraben [ditch] in the Viehlaßmoos. It is on the early warning list of the Bavarian Red List [Level V].



Bluethroat



Red List endangered categories

- 0 = Extinct or disappeared
- 1 = Threatened with extinction
- 2 = Highly endangered
- 3 = Endangered
- 6 = Assumed to be endangered, but status is unknown
- R = Extremely rare species and species with geographic restrictions
- V = Species on the early warning list
- D = Insufficient data
- * = Not endangered

- 1 Bittern, *Botaurus stellaris* [RLB: 1, RLD: 2]; Annex I Birds Directive
- 2 White Stork, *Ciconia ciconia* [RLB: 3, RLD: 3]; Annex I Birds Directive
- 3 Hen Harrier, *Circus cyaneus* [RLB: 1, RLD: 2]; Annex I Birds Directive
- 4 Marsh Harrier, *Circus aeruginosus* [RLB: 3, RLD: *]; Annex I Birds Directive
- 5 Montague's Harrier, *Circus pygargus* [RLB: 1, RLD: 2]; Annex I Birds Directive
- 6 Spotted Crane, *Porzana porzana* [RLB: 1, RLD: 1]; Annex I Birds Directive
- 7 Corncrake, *Crex crex* [RLB: 1, RLD: 2]; Annex I Birds Directive
- 8 Ruff, *Philomachus pugnax* [RLB: 0, RLD: 1]; Annex I Birds Directive
- 9 Grey-Headed Woodpecker, *Picus canus* [RLB: 3, RLD: 2]; Annex I Birds Directive
- 10 Bluethroat, *Luscinia svecica* [RLB: V, RLD: V]; Annex I Birds Directive
- 11 Red-Backed Shrike, *Lanius collurio* [RLB: *, RLD: *]; Annex I Birds Directive
- 12 Little Grebe, *Tachybaptus ruficollis* [RLB: *, RLD: *]
- 13 Great Crested Grebe, *Podiceps cristatus* [RLB: *, RLD: *]
- 14 Gadwall, *Anas strepera* [RLB: 3, RLD: *]
- 15 Red-Crested Pochard, *Netta rufina* [RLB: 3, RLD: *]
- 16 Tufted Duck, *Aythya fuligula* [RLB: *, RLD: *]
- 17 Quail, *Coturnix coturnix* [RLB: V, RLD: *]
- 18 Water Rail, *Rallus aquaticus* [RLB: 2, RLD: V]
- 19 Little Ringed Plover, *Charadrius dubius* [RLB: 3, RLD: *]
- 20 Lapwing, *Vanellus vanellus* [RLB: 2, RLD: 2]
- 21 Common Snipe, *Gallinago gallinago* [RLB: 1, RLD: 1]
- 22 Eurasian Curlew, *Numenius arquata* [RLB: 1, RLD: 1]
- 23 Turtle Dove, *Streptopelia turtur* [RLB: V, RLD: 3]
- 24 Skylark, *Alauda arvensis* [RLB: 3, RLD: 3]
- 25 Sand Martin, *Riparia riparia* [RLB: V, RLD: *]
- 26 Tree Pipit, *Anthus trivialis* [RLB: 3, RLD: V]
- 27 Meadow Pipit, *Anthus pratensis* [RLB: V, RLD: V]
- 28 Blue-Headed Wagtail, *Motacilla flava* [RLB: 3, RLD: *]
- 29 Nightingale, *Luscinia megarhynchos* [RLB: *, RLD: *]
- 30 Redstart, *Phoenicurus phoenicurus* [RLB: 3, RLD: *]
- 31 Whinchat, *Saxicola rubetra* [RLB: 2, RLD: 3]
- 32 River Warbler, *Locustella fluviatilis* [RLB: 3, RLD: *]
- 33 Savi's Warbler, *Locustella luscinioides* [RLB: 3, RLD: *]
- 34 Sedge Warbler, *Acrocephalus schoenobaenus* [RLB: 1, RLD: V]
- 35 Reed Warbler, *Acrocephalus scirpaceus* [RLB: *, RLD: *]
- 36 Great Reed Warbler, *Acrocephalus arundinaceus* [RLB: 2, RLD: V]
- 37 Pied Flycatcher, *Ficedula hypoleuca* [RLB: *, RLD: *]
- 38 Penduline Tit, *Remiz pendulinus* [RLB: 3, RLD: *]
- 39 Golden Oriole, *Oriolus oriolus* [RLB: V, RLD: V]
- 40 Corn Bunting, *Emberiza calandra* [RLB: 1, RLD: 3]

The interaction of bird protection and flight safety

Collisions between aircraft and animals, and in particular with birds – a »bird strike« – may present a risk to air traffic safety. Even if Munich Airport is located inside a European bird sanctuary, flight safety is the number one priority at all times. Munich Airport takes a number of measures to guarantee safe and correct airport operations and keep animals that would affect flight safety at a distance. Specially trained staff closely monitor the flight operations areas. Often it is sufficient to approach any birds presenting a risk to an aircraft in a vehicle, which causes them to fly off. They are generally scared off using pyro-acoustics, in other words signal pistols firing blanks which emit a loud bang, whistling noise or generate a flash of light.

Munich Airport primarily relies on special biotope management adapted to local conditions to prevent bird strike. This succeeds in reconciling what would at first appear to be opposing objectives – preventing bird strike and protecting the bird species. The valuable meadows that were low in nutrients when the Airport was built need little mowing. As a rule they are only mowed twice, because mowing flushes out insects that would attract heavy species and flocks of birds relevant to flight safety. For this reason, the long grass management method is deployed. Due to the lack of visual contact to each other, flocks of bird species such as seagulls and starlings avoid the tall grass, while heavy birds such as buzzards and herons do so because the tall grass makes foraging more difficult. Since meadow breeding birds do not occur in flocks at Munich Airport and also spend less time flying, they are not numbered among the species relevant to flight safety. Ground nesting birds



Eurasian curlew

benefit from the sparse vegetation cover on poor meadows for breeding and foraging. The meadow breeders also benefit from the mowing times chosen to suit ground nesting birds. The late autumn clean-up cut ensures that the birds find low vegetation on their arrival in spring, which means favourable breeding conditions on clearly visible areas. The main cut in the summer is conducted after the breeding period, as from 16th July, so that young birds not yet able to fly will not be harmed. The cut grass is taken away so that the soil remains poor, and to prevent it making the runways dirty. For safety reasons, this mowing regime does not extend to the green spaces around the transmitter zones, the apron area and the green areas directly next to the taxiways and runways. These are mown more often as required to ensure the visibility of signs and functioning of radar systems etc. [safety cut].

A further measure to prevent bird strike is a special soil structure, especially in the area of the runways, to keep possible prey for raptors, such as mice, away from the Airport meadows. The ground around the runways is thus characterised by a high skeletal fraction, which means the proportion of stony material is relatively high. The surface structure is moreover only a few centimeters thick. These two factors help make the Airport meadows a less attractive habitat for small mammals. By contrast, ground nesting birds prefer this ground structure as it is excellent for foraging. With their long beaks, Eurasian curlews in particular find it easy to »poke around« in this terrain. The less dense vegetation on the high skeleton ground also facilitates foraging.

The success of all of these efforts is reflected in the low rates of bird strike at Munich Airport, which are regularly below national rates.



Lapwing

Surveys on and around the Airport meadows

Right from the start, the Airport established and has continued to develop a special biotope management system on the Airport meadows. Mowing twice yearly and removing the cut grass takes nutrients away from the soil over a long period. The consequence of this special care concept is that diverse, valuable flora and fauna have been able to adapt to it over the years. Surveys have proven that due to their vast size, the Airport meadows, which are poor in nutrients but richer in species as a result, are ideally suited as nesting sites for numerous meadow breeding species of birds. Ornithologists with special knowledge of species regularly inspect the meadows inside the safety area from March to June, and record when, where, how many and which species of birds they have seen. These data are then evaluated and documented in overview maps. They help recognise any changes in population development at an early stage, and make it easier to identify possible causes and take the necessary action.

FMG is also involved in bird protection in the surrounding area, however. It investigates so-called hotspots, which have proven suitable owing to already known and representative bird populations. For example, birds in the »Lüsse«-area or

in the »Viehlaßmoos«-area are mapped. The populations observed are documented, recorded on maps, and then related to the bird sanctuary as a whole. This process delivers clear information about the breeding stock in the entire bird sanctuary and thus information about the habitat quality.

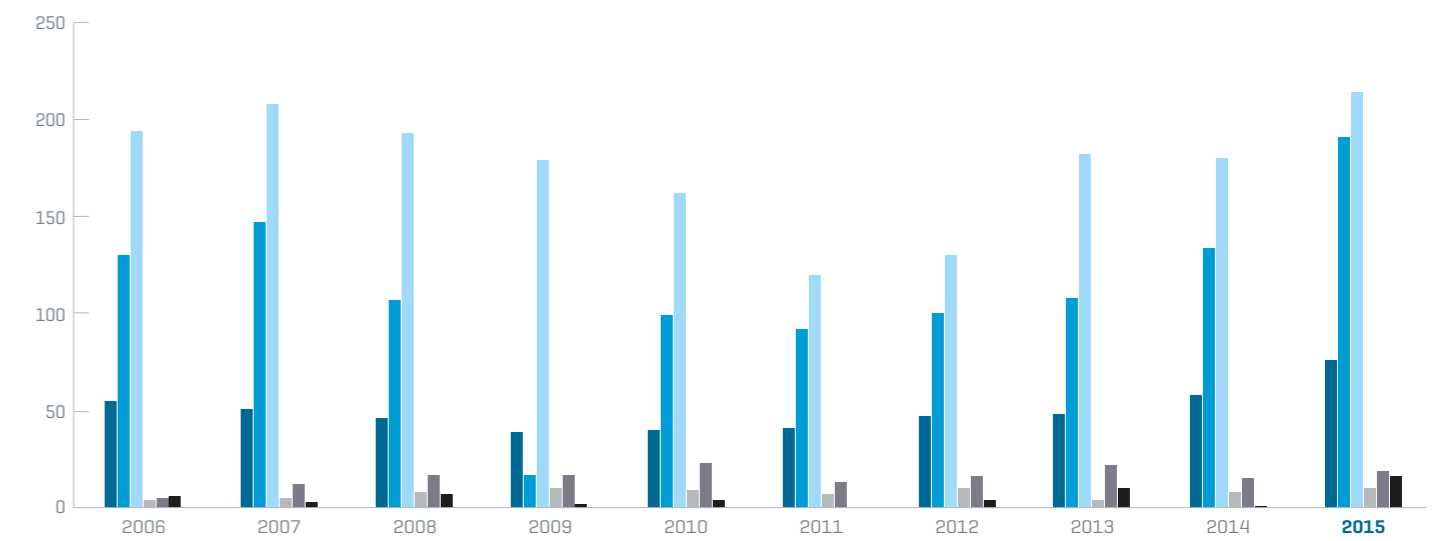
The data collected on the Airport meadows so far on average indicate a constant population development subject to natural fluctuations. The species of birds recorded here include in particular Eurasian curlews, lapwings, skylarks, corn buntings, partridges and quail. For example, in 2015, the largest population of the Eurasian curlew anywhere in Bavaria was to be found on the Airport meadows.

The populations in the area outside the Airport perimeter are declining significantly by contrast, especially with respect to the skylark. In 2006, 366 pairs of skylarks bred in the bird sanctuary outside the Airport perimeter, compared to just 125 pairs in 2015. The main reasons for this decline lie in the intensive agricultural use of the arable land and growth in the number of predators. The 2015 data for the Eurasian curlew show that traditional breeding sites outside the Airport perimeter fence continue to be occupied, but that the birds are no longer breeding. The numbers of Eurasian curlews are also declining outside: in 2015 there were just three breeding pairs, a big drop from eight pairs in 2006.

Particularly important bird species on the Airport meadows in the »Nördliches Erdinger Moos« European bird sanctuary

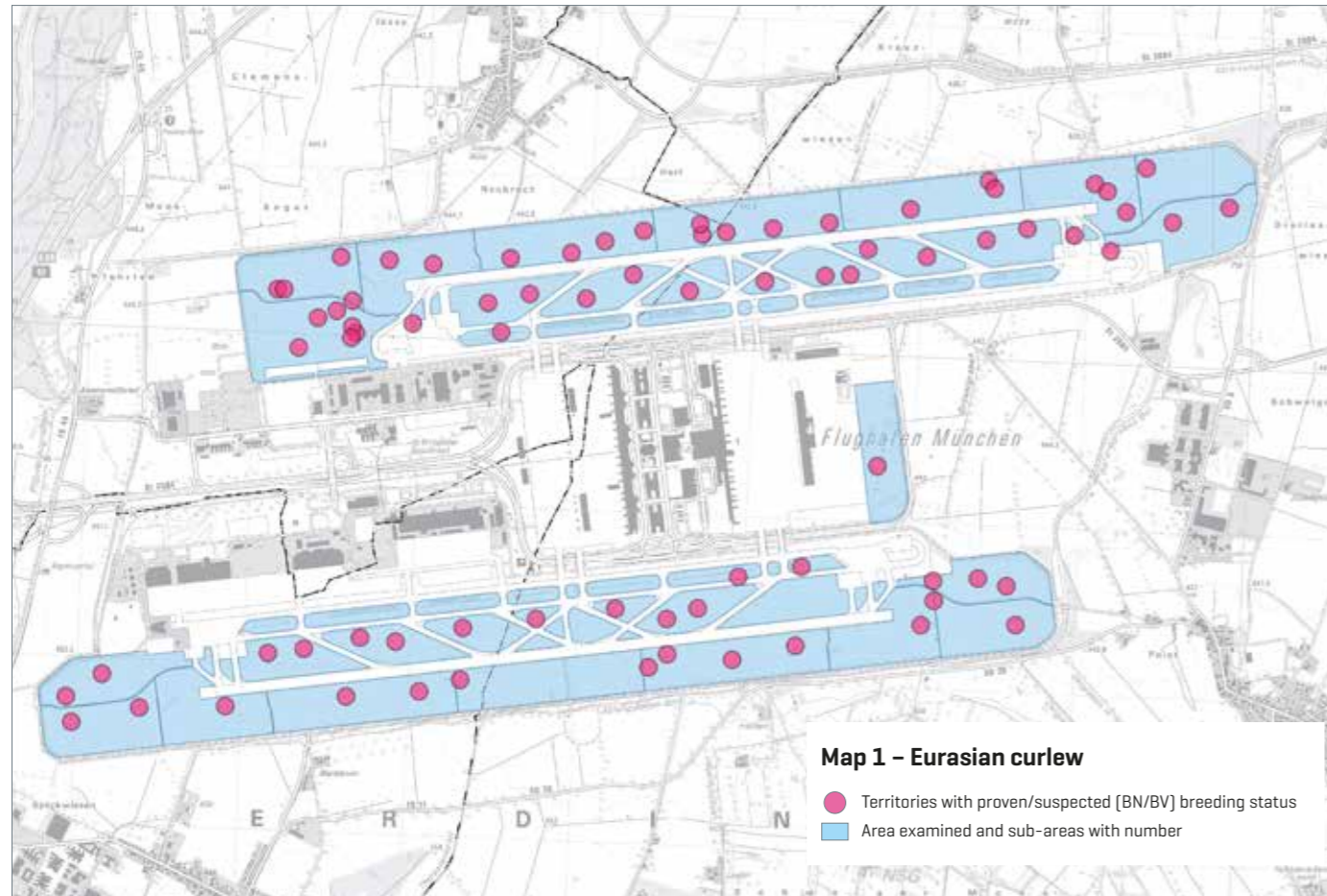
2006 to 2015

■ Eurasian curlew ■ Lapwing ■ Skylark ■ Corn bunting ■ Partridge ■ Quail

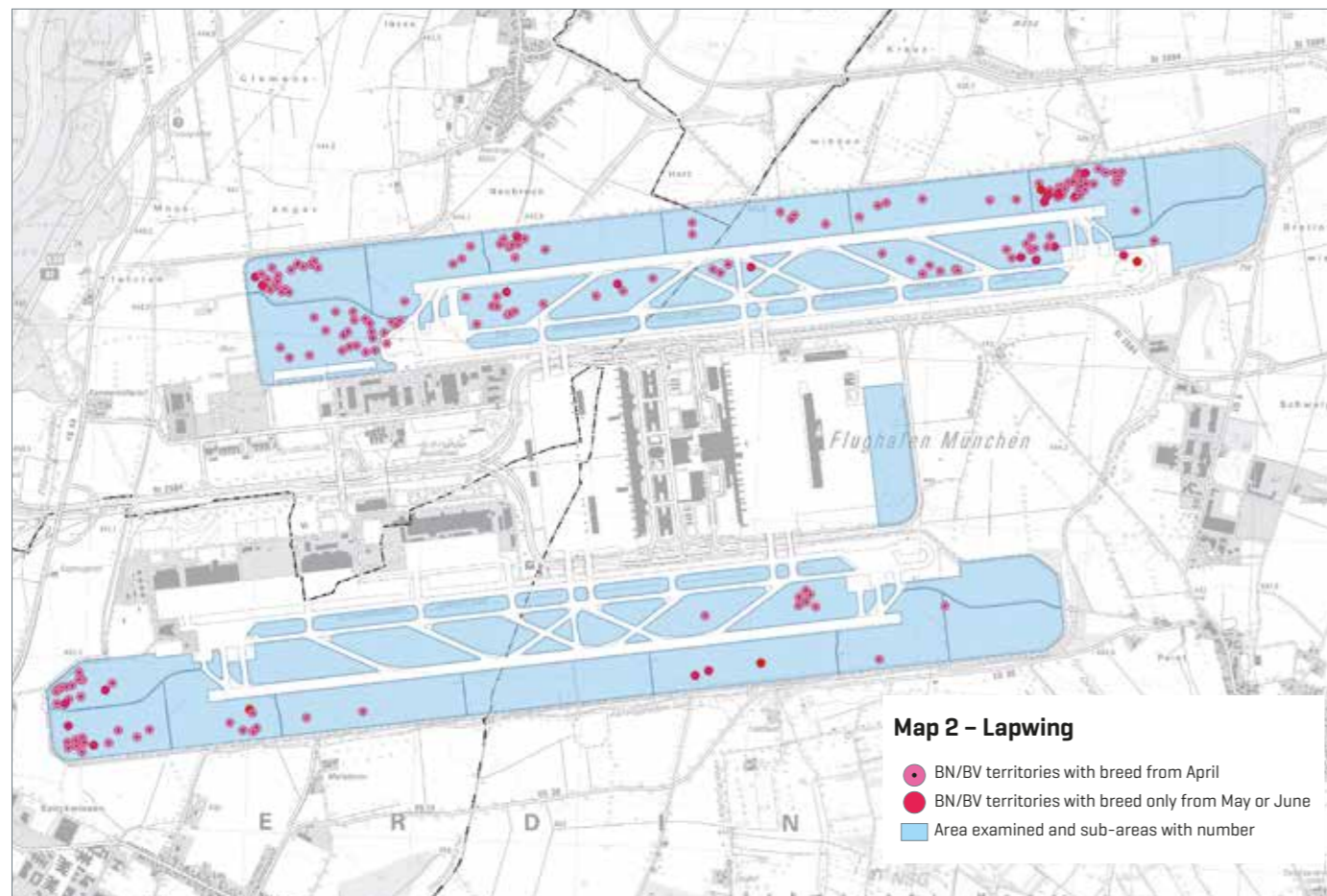


Overview of the 40 species of birds

The protection of the 40 species of birds is stipulated for the »Nördliches Erdinger Moos« European bird sanctuary. The species listed are officially classified according to their different levels of risk as set out in the 2005 Bavarian Red List (RLB) and the 2008 German Red List (RLD). Eleven species are also listed in the Birds Directive.



Territorial mapping of the Eurasian curlew in 2015 on the Airport meadows



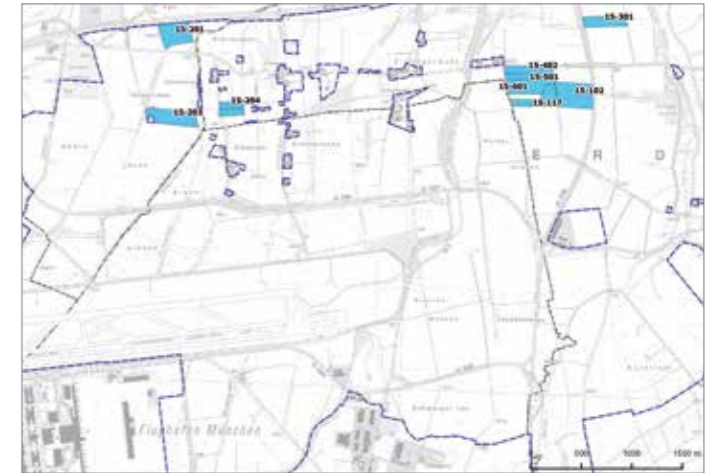
Territorial mapping of the Lapwing in 2015 on the Airport meadows

Commitment to bird protection

Flughafen München GmbH takes concerted steps to preserve and promote protected species of birds. These measures are often tailored to the specific needs of a certain breed. They usually become necessary during the course of construction or conversion projects. A few measures are set out below by way of example.

Nest protection for the lapwing

In 2012, FMG launched the first phase of a pilot project lasting several years on a total of approximately 70 hectares in the »Nördliches Erdinger Moos« European bird sanctuary; this project involved action to support the population of lapwings. Most of these areas belong to FMG and are leased to farmers. The test area in subsequent years was around 44 hectares, in the third phase in 2014 around 35 hectares and in the fourth phase in 2015 around 43 hectares. FMG located and marked all breeding sites there, and agreed with farmers that the lapwing nests were to be protected during the period from March 15 to June 30. Farmers were given a »reward« for finding any additional nests. They were also given financial support for adapting cultivation in ways that improved the habitat quality for the lapwing. For example, maize with the appropriate soil cultivation was only sown after May 15, in order to prevent damage to any existing clutches. Most fledglings are already able to fly by this time.



Section of the bird sanctuary: areas with nest protection for the lapwing in 2015 (Office H2, 2015)

Growing carrots and potatoes is also a type of cultivation favoured by lapwings.

In previous years of the project, there was a one hundred percent rate of protected clutches, which means that none of the identified and checked nests was lost through agricultural cultivation over the observation period. The hatching rate in 2012 to 2015 averaged 2.3 young per clutch. This voluntary measure, which has been successful so far, is now set to be continued in coming years.



Lapwing clutch



Eurasian curlew

Attractive space for the Eurasian curlew in the Freisinger Moos

In the course of the approval process for construction work in the area of the Eastern and South-Eastern apron, it was discovered that a pair of Eurasian curlews had settled there. Since the work was likely to greatly restrict the reproduction site, the authority responsible stipulated population supporting measures in the planning approval dated July 1, 2011. Since 2012, a 15-hectare plot of meadowland on the »Lange Haken«, a traditional Eurasian curlew breeding area in the »Freisinger Moos« European bird sanctuary, has been enclosed by an electric fence to protect clutches from predators and thereby improve what had previously been poor breeding success.

Mowing only once in the summer and autumn means that the grassland in this area of the Freisinger Moos is extensively farmed. The old excavation areas in the central part of the enclosure are only mown once a year to maintain the prevailing character of the valuable moor grass. This cultivation increases the suitability as a habitat for meadow breeders.

In 2012 three breeding pairs settled near the area with these measures, and succeeded in raising fledglings able to fly. In 2013 there were two breeding pairs with the same result. Since the summer of 2013, some parts of this area have only been mown every two years, which provides areas of tall grass and herbaceous borders that make it a more attractive breeding space. By 2014 this mowing cycle had already produced positive results: the activity of the two breeding pairs was clearly concentrated on the enclosed area, and especially its central point. Two other pairs were observed in the proximity of the compensation area.

The inspection in 2015 ultimately demonstrated that this measure was producing the desired result. Two pairs of Eurasian curlews bred inside the area in question, and raised a total of five young. The objective of significantly increasing breeding success within the enclosed areas was therefore achieved.



Clutch of the Eurasian curlew



»Lange Haken«: protective electrical fence for meadow breeding birds



Partridges

»Lark windows« and »flowering strips« for partridges

Since 2013, Munich Airport has had a temporary logistics area with a large concrete mixer and concrete crusher for the conversion of the Eastern apron on the east of the Airport grounds inside the »Nördliches Erdinger Moos« European bird sanctuary. Various measures helped minimise or prevent impact on skylarks and partridges. So-called »lark windows« were set up in 2013 in two nearby grain fields to the north and south of the logistics area, comprising three hectares in total; these are individual sections measuring around 25 square metres which are left out during sowing. These »windows« are used by skylarks as breeding habitats. In addition, fallow strips measuring around 1,600 square meters in total were left on the edges of both fields in 2014,



Airport meadows biotope

and mixed wild flowers were sown on these. These 10 to 25 meter wide »flowering strips« provide the partridges with breeding and foraging habitats. They consist of several species of grass, fast and reliably germinating cultivated perennials as well as annual and biennial species that seed themselves.

Inspections so far have shown that the skylark also makes some use of the windows and flowering strips on the southern piece of land. The two pairs of partridges present sought out the flowering strips in the northern area for foraging, and in 2015 both flowering strips were the central habitat for two breeding pairs. The birds therefore accept this space which has been designed to be of interest to them.



Skylark



Little ringed plover

Gravel hollows for the little ringed plover

The construction of the logistics area described above might also have disturbed a pair of little ringed plovers. The virgin soil found there offers attractive, potential nesting sites for these birds. In order to prevent any such damage, a suitable area of habitat was created very close to the logistics area.

Two plots each measuring approximately 2,000 square meters on two hectares of gravelly virgin soil to the north of the planned logistics area, containing puddles and pools, have been arranged as an alternative habitat for the little ringed plover. At the same time, warning tape on the familiar breeding sites of the birds prevents them colonising the logistics area again, with the associated risk to their eggs. The examinations conducted between 2013 and 2015 have shown that the little ringed plover is gradually accepting the areas laid out for it. In 2014 and 2015 one breeding pair was already seen there, whilst a further pair was clearly positioning itself in that direction.



Compensation area with puddles created for the little ringed plover



Corncrake

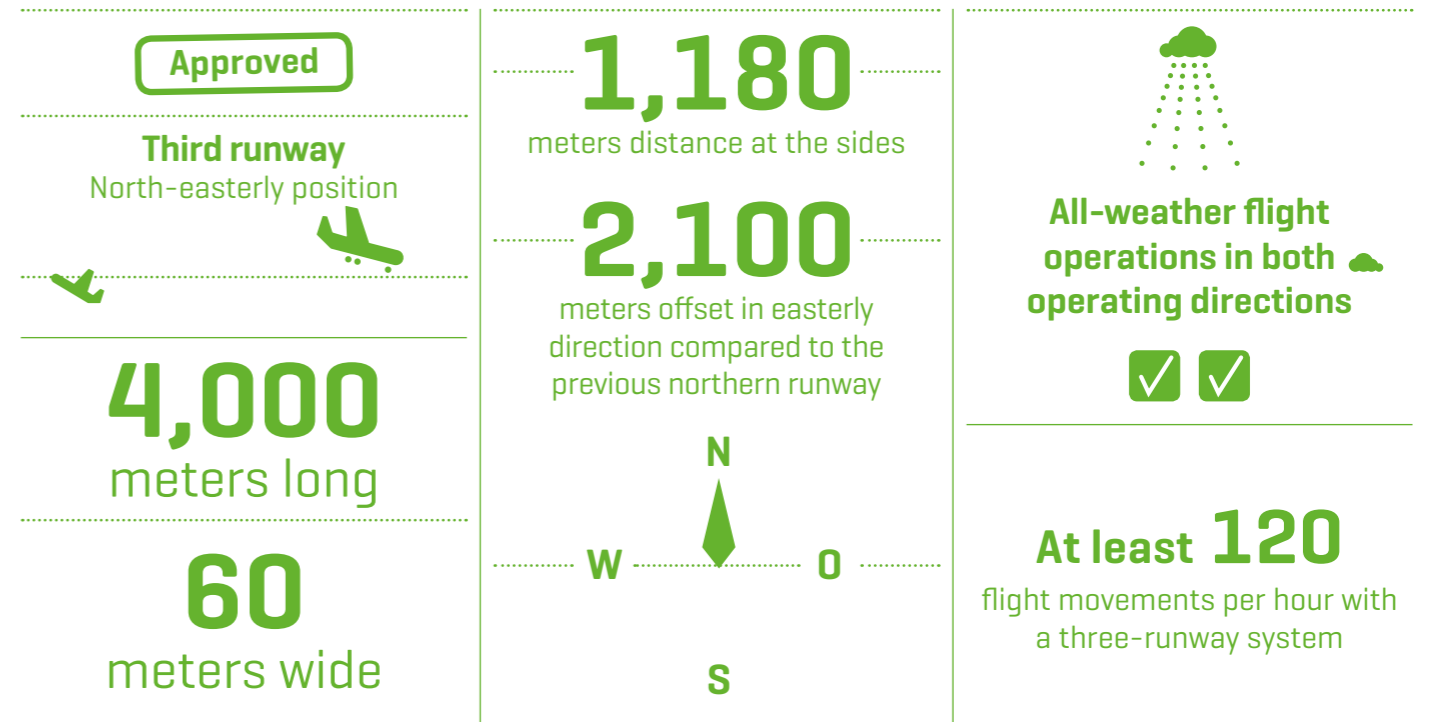
Mowing on the Airport meadows for the corncrake

Because several meadow breeders are found on the Airport meadows, in the interests of wildlife conservation no mowing is generally permitted during the breeding period between March 15 and July 15. The only exceptions for safety reasons apply to the areas around the transmitter, along the taxiways and the perimeter fencing. The breeding period for the corncrake starts in mid-May, however, and is therefore later than the other meadow breeders on the Airport meadows. Any second clutches of the corncrakes may occur up to the beginning of August, and young birds are usually to be observed from mid-June. Any mowing in mid-July might hit unfledged young birds. The common practice is therefore to omit the mid-July mowing of tall summer grass where there are known to be corncrakes in the area, and to wait until the end of August before mowing where possible, as long as this does not compromise flight safety.

Protection for meadow breeders – responsibility and obligation

All of these examples demonstrate that Munich Airport meets the responsibilities and obligations associated with its position within the European bird sanctuary. The aim is not merely to maintain the status of rare species, but rather to take targeted action to improve the conservation status. It is crucially important here to take consideration of the various species, since the rare species to be protected can only survive at the Airport in the long term if suitable habitat conditions are present. The protection concept during further construction developments at the Airport is equally as important as long-term, sustainable planning in accordance with environmental and nature conservation. It is furthermore crucial to monitor the efficacy of measures to make sure that the objectives are being realised.

/The third runway and the bird sanctuary



In 2012 the Southern Bavaria Aviation Office approved the third runway to the north-east of the existing runway system in line with the planning application: it will be 4,000 meters long, 60 meters wide, a distance of 1,180 meters to the sides and be offset by 2,100 meters in an easterly direction in relation to the existing northern runway. It is designed to ensure that at least 120 flights per hour instead of the present plannable 90 flight movements can be handled efficiently. There will be no night flights. In total, the third runway with all follow-up measures will cover around 870 hectares over and above current use, 340 hectares of which will be newly sealed. Around 500 hectares is grassland. The changed planning approval notice dated July 5, 2011 specifies substantial landscape maintenance measures to compensate for the impact on nature and the countryside. These involve both compensation and substitute measures and measures to ensure coherence with the Natura 2000

network together with conservation measures. These will be implemented on an area measuring 806 hectares in all. This balances the impact on nature and the countryside caused by the project. FMG was additionally required to lay out and maintain the newly created Airport meadows inside the perimeter with a total area of around 286 hectares to permanently meet the habitat requirements of meadow breeding species of birds.

The changed planning approval notice dated July 5, 2011 comes to the conclusion that, with the intended measures, no significant impairments are to be expected at the »Nördliches Erdinger Moos« European bird sanctuary. After careful inspection, the Bavarian Administrative Court examined and confirmed this concept in the course of legal proceedings. The Federal Administrative Court confirms this judgement and rejected all complaints associated with it.

/Legal framework in a European bird sanctuary

As an important transport hub, Munich Airport continues to evolve. This brings with it numerous structural projects inside and outside the Airport grounds. Legal regulations concerning conservation and site protection must fundamentally be complied with during construction work and projects [Federal Act for the Protection of Nature – BNatSchG]. Due to its location in the European bird sanctuary »Nördliches Erdinger Moos«, this is particularly the case for Munich Airport. For this reason, there is regular close coordination with the responsible nature conservation authorities.

The most important legal principles:

Section 33 (1) BNatSchG

This paragraph deals with territorial protection in Natura 2000 areas, i.e. FFH and European bird sanctuary areas. »All changes and disturbances that could lead to significant adverse effects on a Natura 2000 site, in the elements of the site that are central to the conservation objectives or protection purpose shall be prohibited«.

Section 34 (1) BNatSchG

This regulation concerning territorial protection guarantees that projects are examined before their approval or implementation for their compatibility with the conservation objectives of a Natura 2000 site if, individually or in interaction with other projects or plans, they are likely to cause significant adverse effects to the site.

Section 44 (1) BNatSchG

Here the Federal Act for the Protection of Nature deals with the protection of especially protected or certain other species of flora and fauna. The following are accordingly prohibited:

- »To pursue, capture, injure or kill wild animals of specially protected species, or to take from the wild, damage or destroy their developmental stages;
- To significantly disturb wild animals of the strictly protected species and of European bird species during their breeding, rearing, moulting, hibernation and migration periods; a disturbance shall be deemed significant if it causes the conservation status of the local population to worsen;

- To take from the wild, damage or destroy the breeding or nesting sites of wild animals;
- To take from the wild protected species of wild plants or their developmental stages, or to damage or destroy them or their sites«

Section 45 (7) BNatSchG

Pursuant to this regulation, the following exceptions to Section 44 (1) BNatSchG are permitted:

- »In order to prevent considerable damage to agriculture, forestry, fisheries, water resources or other considerable economic damage;
- In order to protect naturally occurring animals and plants;
- For purposes of research, teaching, education or reintroduction, or for the breeding operations or artificial propagation measures necessary for these purposes;
- In the interests of public health, public safety, including defence and protection of the civilian population, or of beneficial consequences of primary importance for the environment;
- For other imperative reasons of overriding public interest, including those of a social or economic nature«

An exception may only be approved if there are no reasonable alternatives and the conservation status of the populations does not worsen.

Section 15 (1) and (2) BNatSchG

In the event of interventions in nature and the landscape, the intervening party is obliged to refrain from causing any avoidable adverse effects, and to compensate for any unavoidable adverse effects by means of nature conservation and landscape management measures. This regulation applies as a general rule, and must also be observed inside Natura 2000 sites.

/Bird life and flight operations: an example of co-existence

Bird life has established itself in what, at first glance, would appear to be the very technically prevalent environment at Munich Airport. To bring this phenomenon to the attention of the outside world, numerous events allow visitors and Airport employees to get closer to the flora and fauna on the Airport grounds. Environmental tours within the enclosed security area are offered, for example under the »BayernTourNatur« environmental education measure initiated by the Bavarian State Ministry of the Environment and Consumer Protection. In spring, participants can observe the diversity of bird life on the Airport meadows, and see the high biotope quality for themselves.

Tours and other events of this kind enable people to find out about the importance of nature conservation and in particular bird protection under expert supervision. This sharpens their awareness for nature conservation. The Airport is not merely perceived as a technical installation, but also as special habitats for rare species of birds. The numbers of participants show that interested parties, visitors and employees are happy to take up an offer of this kind. Bird protection and airport operations at Munich Airport are an example of co-existence.



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