MANAGEMENT PLAN

SRP SLOVAKIA

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INTRODUCTION

This management plan for Short Rotation Plantation operations of IKEA Industry Slovakia s.r.o. Branch Establishment Malacky Boards outlines the policies and objectives which underlie the SRP business. The document will be implemented with all group member of the resource manager scheme within IKEA Industry and kept up to date as to allow for the incorporation of results from continuous monitoring and field assessments. The associated planning and documentation of activities in the field will be oriented to guide all staff and used to inform affected and interested stakeholders in an appropriate way.

For correct implementation and interpretation of certain parts of the management plan (MP) it is necessary to know the full text of the FSC® (FSC–C133917) forest management standard. The plan states in brackets references to the relevant FSC® (FSC–C133917) principles and criteria of FSC® (FSC–C133917) or other documents (standards / policies). The MP is supplemented or adjusted to guarantee compliance with the FSC® (FSC–C133917) principles and criteria and create conditions for the improvement of the management of SRP management within IKEA Industry and its' group certification members.

Scope of the manual: all staff, group members, and service suppliers within the SRP project of IKEA Industry Slovakia.

Person responsible for Management Plan: Lubos Molitoris

Start of validity of the document: 01.04.2016

BACKGROUND ABOUT FSC® (FSC–C133917)

What is FSC® (FSC–C133917)

Forest Stewardship Council® (FSC–C133917) (FSC) is an independent international non-governmental organization (association), which promotes environmentally appropriate, socially beneficial and economically viable forest management. FSC® (FSC–C133917) creates a space for people with different interests and focus on discussion and problem solving for forest management worldwide. FSC® (FSC–C133917) was established in 1993 and operates globally through a network of national initiatives and regional representations.

FSC® (FSC–C133917) has created an international forest certification system that allows us to identify and verify responsible forest management which respects environmental, social and economic requirements in a balanced way. These requirements are defined in so called FSC® (FSC–C133917) forest management standards based on the 10 principles and 56 criteria.

FSC® (FSC–C133917) principles

#1: Compliance with laws and FSC® (FSC–C133917) Principles

#2: Tenure and use rights and responsibilities

#3: Indigenous peoples' rights

#4: Community relations and worker's rights

#5: Benefits from the forest

#6: Environmental impact

#7: Management plan

#8: Monitoring and assessment

#9: Maintenance of high conservation value forests

#10: Plantations

Certification of short rotation plantations (SRP)

Forest certification is a process in which an independent and accredited organization assesses whether forest management meets the requirements defined in the FSC® (FSC–C133917) forest management standard. FSC® (FSC–

C133917) certificate gives a guarantee that the manager of the plantations applies responsible forest management, equally taken into account environmental, social and economic interests.

Certification of Chain of Custody

Chain of custody or CoC is the "journey" of the wood from the plantations to the consumer, including the various stages of processing, production and distribution. CoC certification provides a guarantee about the origin of wood in FSC® (FSC–C133917) certified products.

FSC® (FSC–C133917) Labeling

The FSC® (FSC–C133917) label on the product gives the consumer a guarantee that the product was made of wooden raw material that comes from a responsibly and sustainably managed forests.

Further links about FSC® (FSC–C133917):

www.fscslovakia.sk

www.fsc.org

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The management objectives of the operation of short rotation plantations (SRP) is the production of wood for the IKEA Industry particle board factory in Malacky. The wood produced in the fast growing poplar plantations needs to fulfill the specific wood specifications demanded by the process technology at the factory. This management plan describes the goals and principles that form an integral part for a successful operation of SRP.

1.1. MANAGEMENT GOALS

The four main management goals or objectives of the SRP operations are

1. Production of wood logs and chips from fast growing poplar clones planted on agricultural soil
2. Reduction of the environmental impact of all activities by choosing the land and field operations in such a way that negative impacts on soil, flora and fauna is avoided or reduced to a minimum
3. Assure economic viable operation by efficiently using available technical and human resources which allow for a production cost of logs and wood chips which are competitive to the regional pulp and industrial wood market.
4. Incorporate rural stakeholder comments and feedback from public institutions to improve the social impact and perception of SRP business in the region

1.2. KEY TARGETS

The SRP project's aims to fulfill three main targets

1. Produce 40 000 bone dry ton (bdt) of logs and wood chips annually from sustainably managed fast growing hybrid poplar plantations
2. Produce the wooden material to a cost which lies below the wood market price for wood of the respective quality
3. Keep the average distance of plantations to the consuming factory in Malacky below 100 km road distance so that the environmental impact and cost for logistics is kept on a low level.

1.3. PROJECT IMPLEMENTATION TIMEFRAME

IKEA Industry Slovakia Branch Establishment Malacky Boards started to establish first SRP plantations in May 2015. In order to reach the expected annual wood production of 40 000 bdt the target is to establish 4000 ha of SRP.

The plantations will be harvested in a five year cycle and regrown as coppice. This reduces cost for plant material and cost for plantations establishment. All plantations will be sustainably managed balancing economic environmental and social aspects of the operations. This will be confirmed by FSC® (FSC−C133917) certifying all plantations in Slovakia within at the latest one year after establishment.

1.4. OUTLINE OF SRP BUSINES OBJECTIVES

The business objective of the SRP business are focusing on two main operations areas

1. Keep the production cost for SRP wood including the cost for plant material, field operations, logistics, wood storage and management low so that the SRP are economically viable
2. Operate all fields in such a way that conflict with land users, land owners and local rural population is avoided.

The first business objective is reached via well designed service agreements and a fair and open selection of suitable service providers. The close partnership with farmers and the cooperation agreements with them ensures that experienced companies manage the fields following best silvicultural and agricultural practices under the guidance and supervision of IKEA Industry's project management. The cooperation with local farm companies which are close to each field reduces travel distance of farm machinery and ensures that the manager of the field is experienced with the local soil conditions and characteristics.

The achievement of the second business objective is of utmost importance for IKEA Industry. The search for suitable land for additional plantations is executed in close cooperation with local farm companies and a cooperation with them is always the preferred business option. Direct lease or purchase of land only reflects a smaller share of the land where SRP is and will be operated in the future.

An open and transparent stakeholder consultation together with an active exchange with the natural conservation agencies and NGOs allows the SRP management to be adapted so that reasonable comments and suggestions from all stakeholder will be incorporated in the SRP management plan and change the way SRP will be operated.

2. DESCRIPTION OF LAND UNDER SRP MANAGEMENT

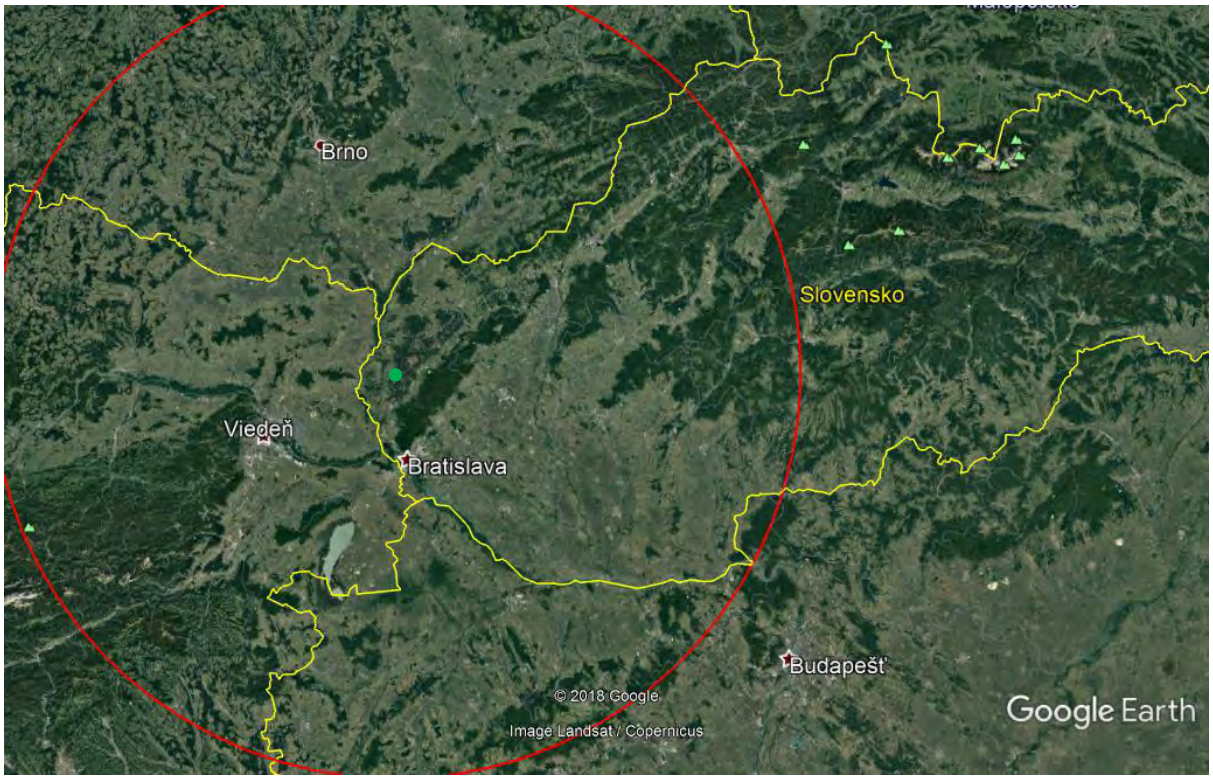


Figure 1 Google Earth satellite image of the project area with IIM in the center of an 150 km circle in blue.

The land where SRP is established center around the particle board factory in Malacky. A maximum distance of 150 km as the crow flies around the factory is deemed to be viable transport distance which make the supply chain and logistics manageable in an economic viable and environmentally sustainable way. The satellite image above shows the location of the factory (green dot) which is expected to consume all the wood produced in the SRP and the red circle depicts the 150 km distance focused in Slovakia. Also fields in parts of the Czech Republic and Hungary would be feasible in terms of transport distance to IIM. The region in western Slovakia is characterized by agricultural and forestry activity. The soils encountered range from sandy, to clay, over to alluvial influenced sites and wetlands. In general the soil in the so called Zahorie Region of West Slovakia is characterized by very light and sandy soils but ground water access is often given within two meter from the top soil which make them very suitable for SRP. Several Natura 2000 and nature protection area exist within the project area.

The quality of the land in the project region is varying from poor soils in the western part of the region to high fertile sites in the more eastern part of the project region close to Nitra. SRP can be established on sites which have the official

assigned bonita quality (BPEJ) of medium poor to poor soils. Slovakia classifies soil quality in 9 classes. SRP will only be established on land of the quality class 5 to 9. Exceptions can by approved by Slovak soil institute (VUPOP) for bonita 3,4 if the soil is eroded or wet. And bonita 1,2 if toxic pollution occurs and soil is not suitable for food production.

2.1. LAND USE AND LAND OWNERSHIP

The land use of the fields where SRP is established and will be established is exclusively on agricultural land. IKEA Industry will never replace forest with SRP. The individual field sizes are not smaller than 10 ha. Only in exceptional cases where several individual fields are within 1 km distance from each other smaller field sizes are planted.

The land ownership is either private or state owned land which is administered land by the Slovak Land Fund (SLF). Before any agreement with a farmer and future FSC® (FSC−C133917) group member is signed their legal relationship to the land and their land use rights are investigated under a legal due diligence. They need land ownership proven by ownership title certificate and or long term lease agreements with written consent from the owner with growing SRP on their land. Since 2017 IKEA Industry is also purchasing land.

2.2. GROUP MEMBERS

The group members of the FSC® (FSC−C133917) certification resource manager scheme consist of the following farm companies registered in the Slovak Republic. In a case where land is leased or purchased directly from the land owner IKEA Industry Malacky (IIM) is the SPR operating group member.

Area per FMU

Row Labels	SRP ha size	Yield **m³/year**	office
Agropek Team	14,80	592	Veľký Grob
Agrováh	12,11	484,4	Tešedíkovo
Alex s.r.o.	27,00	1080	Prešov
First Farms	38,64	1545,6	Plavecký Štvrtok
Ikea Industry	447,05	17882	Malacky
Jakos	68,91	2756,4	Kostolište
PAGRO	8,27	330,8	Závod
PD Budmerice	41,10	1644	Budmerice
PD Čachtice	35,20	1408	Čachtice
PD Lozorno	25,00	1000	Lozorno

ROD Skalica	42,90	1716	Skalica
S.S. Horna Streda	36,20	1448	Horná Streda
SARS Plus	206,00	8240	Malé Leváre
VLM	184,80	7392	Malacky
K.L.K.	28,00	1120	Kočovce
VaPD Modra	10,57	422,8	Modra
SHR Pavlačka	14,00	560	Unín
Harmer Agro	10,00	400	Lakšárska N. Ves
Agropartner	39,00	1560	Plavecký Peter
M. Javorková	20,00	800	Svätý Peter
Grand Total	1309,55	52382	

Figure 2 Table of FSC group members, with field sized and expected yield in m³ wood per FMU (Forest Management Unit).

Four members VLM, SARS, Jakos and IKEA Industry have more than 50 ha of SRP under their management and therefore need to fulfill all FSC® (FSC−C133917) criteria for non SLIMF members including 10 % of set aside land with special nature conservation target and preservation of natural ecosystem services.

All group members need to agree to follow the FSC® (FSC−C133917) principled and criteria and establish environmental protection as well as occupational health and safety protocols. Their roles and responsibilities as well as rules how to enter and leave the SRP group certification scheme are stablished in a separate document, the group management manual.

2.3. ENVIRONMENTAL LIMITATIONS

The project area is home to a number of environmental conservation and protected areas.

- There are and will be no SRP established in designated areas of Natura 2000 with habitat of European importance.
- On fields where Natura 2000 bird protection habitats can be found SRP will only be established where the SRP field operations don't harm the protected species on this habitat. All activities will be monitored in this regard. Guidance in terms of which activities can be done in which time window comes from the act of the respective Natura 2000 bird site.
- Slovakia classified its national protected areas in categories from one to five. Five being the highest protection category and one the lowest. An example of the national conservation areas the satellite image below shows in yellow polygons the location of protected sites of category three or higher. SRP are only legally permitted to be established in protections category one or two. Before any permit is issues from the responsible Land

District Office to plant SRP the environmental district office verifies if the planned SRP is located inside a national nature conservation site.

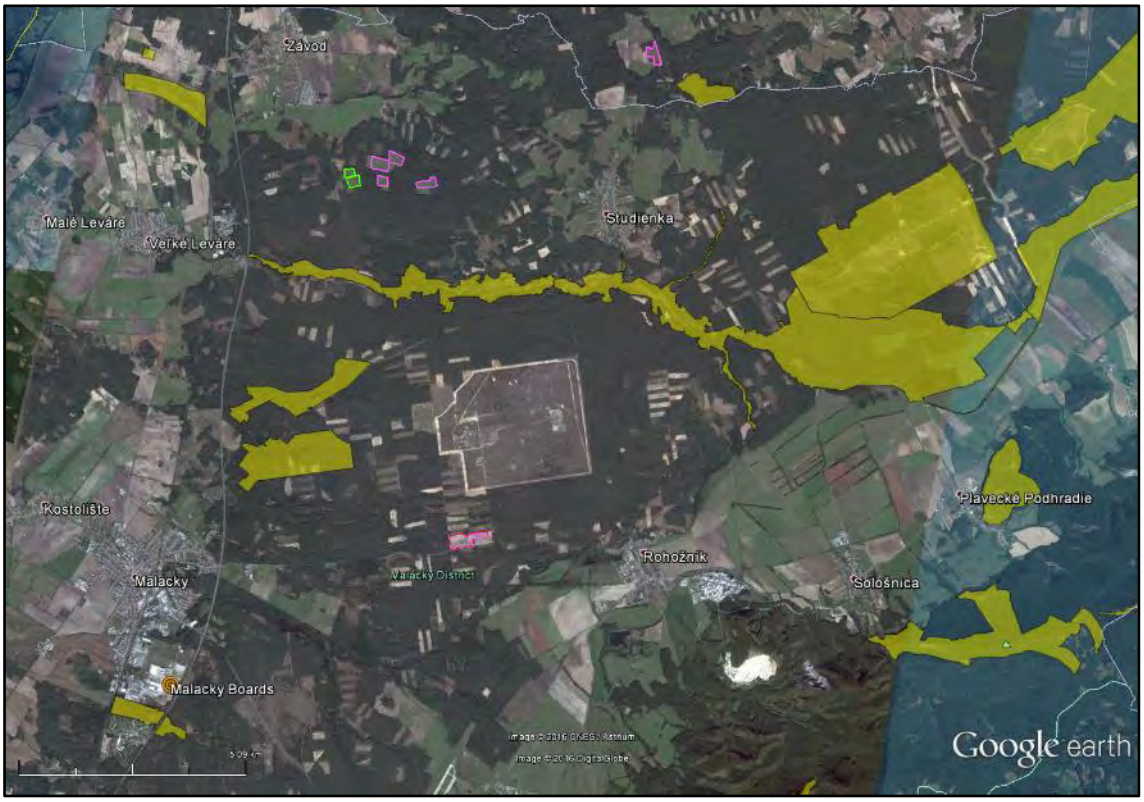


Figure 3 Google Earth satellite image of an example of national nature conservation areas of category 3 or higher in yellow. The green and pink outlined shapes depict fields where SRP are established.

In general by establishing SRP only on agricultural land the environmental impact of SRP on the land is expected to be net positive.

- The soil humus layer will be built up by leaving small branches and leaves in the field
- Where SRP replaces intensive agriculture less agro chemicals will be used
- SRP management is an extensive form of agricultural operation where the frequency of machine use is drastically reduced compared to standard agricultural crop production
- Large amount of CO2 will be stored and sequestered in the trees stems and root systems helping to fight climate change and global warming
- SRP produce industrial wood and biomass outside of the natural forests. This reduces pressure from wood extraction activities and protects valuable habitats within natural forests.

2.4. PROFILE OF ADJACENT LANDS

The adjacent land to the SRP established ranges from plots of permanent grassland to arable land and forest areas. In most cases the agricultural land adjacent to the SRP is managed by the same farm and group member under whose management the respective SRP can be found.

In general there are at least three meter on the side of the SRP left unplanted to the adjacent land. The plantations integrates well without any special effort into the agricultural and silvicultural landscape.

Where water bodies are adjacent to the SRP special care is taken. No agro chemicals are used within a minimum of 10 m of the respective water body.

Figure 4 Image of typical SRP field in the first growing season next to the adjacent agricultural field (Skalica, August 2016)

2.5. SOCIO ECONOMIC CONDITIONS IN PROJECT AREA

The population in the area of Zahorie is around 170,000. Larger towns in the region are Gbely, Holíč, Malacky, Senica, Skalica, Stupava and Šaštín-Stráže. The people in the region were for many years in the past farmers, so there are no big towns, most of the people lived in small villages not far from each other. The average distances between the villages are less than 3 km. In between the villages there are very often small settlements, especially around Myjava and Brezová pod Bradlom, called kopanice, osady or samoty. This region is well known for producing high quality wines, especially in the regions around the town Skalica.

The region is geographically separated from the rest of the Slovakia by the small Carpathian mountain ridge, the people are often referred to as Moravians rather than Slovaks so they speak a distinct dialect of Slovak language similar to Czech.

In terms of Gross Domestic Product (GDP) the western Slovak region is among the richest in Slovakia. The table below depicts the GDP per capita in Bratislava region and western Slovakia in general.

Bratislavský region	Slovakia	43,100
Overall Western Slovakia	Slovakia	16,700

Figure 5 Table depicting GDP per capita (2013) in Euro in Bratislava region and Western Slovakia

The region has a higher share of foreign-owned firms (16.1%) compared to Slovak average (14.6%). Unemployment rates were relative low in the Western Slovakia (Trnava, Trenčín, Nitra and Bratislava) average is 6,52 % (april 2016). Per capita gross domestic product (GDP) in this region is significantly higher than country average. The current structural changes within the economy of the region contribute to growth of the high and medium high technology manufacturing sector.

The rural population in the project area often have difficulties to find work in the many international companies that are located in the region. These people are offered employment and income opportunities by the SRP project. Field activities such as planting and manual weed control generate high demand in manual and often untrained labor. Especially for parts of the local population which don't meet high educational standards these activities form an income opportunity which might otherwise be difficult to find.

General Socio Economic Background for Slovak Republic

IN the whole Slovak Republic unemployment is still a big problem. Overall 12.1% of Slovak children live in a household with at least one long term unemployed parent. Life expectancy in the Slovak Republic (76.5 years) is among the lowest in the OECD. The Slovak Republic has the second highest level of educational attainment in the OECD.

3. MANAGEMENT SYSTEM OF SRP

The management system of SRP is reflecting the operation of a productive forest plantation with focus on high yields, timber quality and net positive environmental and social impact.

3.1. MANAGEMENT SYSTEM BACKGROUND

Plantations with hybrid poplar have a long history in many European countries mainly in Italy and Hungary. SRP is seen by the European common agricultural policy (CAP) as one important land use type to mitigate climate change and set the EU economies on a path for sustainable resources and energy generation.

3.2. PLANTING REGIME

The plantations are established in a three meter between the rows and two meter in the row planting distance. This regime leads to a number of 1670 trees per ha. This planting density has direct implications for the ideal rotation length. Depending on the number of trees planted per ha the vegetation cycles until the tree canopies start to overshadow each other.

3.3. ROTATION LENGTH

The SRP are in average scheduled to be harvested at the end of the fifth vegetation season. In a planting density of 1660 trees per ha the trees in the majority of the cases start to overshadow each other in the sixth growing season in the edaphic and climate conditions present in Western Slovakia. The harvesting of each individual plantation will be based on the evaluation of site specific growth parameters, and will be conducted in the 7th vegetation season latest. The target is to achieve four five year rotation cycles limiting the total plantation lifetime to a maximum of 20 years. At the end of the 20 year plantation life time the soil will be reconverted so that it is suitable in the following year for growing agricultural crops.

3.4. SOIL SAMPLES AND SOIL PREPARATION

On all fields soil samples are taken to evaluate their suitability for SRP. Main characteristics that are tested is the available ground water and water availability

in general, PH and nutrient availability. Poplar is sensitive to salinity therefore also the salt content of the soil is evaluated in cases where soil sampling indicates its possible higher presence, in subsequent laboratory analysis. In average depending on the heterogeneity of the specific site one soil sample is taken for every five ha of plantation. Connected to this site evaluation is also a preliminary achievable yield estimation.

Figure 6 Photo of soil expert evaluating site suitability for SRP

Once the soil is deemed suitable for SRP and an agreement with the land owner or farmer who has the land use rights is reached the soil preparation resembles closely the activities for standard crop production.

- The soil is deep loosened or plowed to a depth of minimum 40 cm.
- Afterwards the soil is refined with a heavy agricultural disk or cultivator to generate a level and homogenous seed bed.
- In the beginning of March depending on the temperature and moisture in the soil the planting material will be delivered cooled and fresh for immediate planting in the prepared soil.
- In rare cases where weed pressure is exceptionally high, the use of a total herbicide is considered to allow for a successful SRP establishment
- Each use of herbicide will be justified individually, reported, and monitored. A separate document (Annex) is available where the details of the project's herbicide policy is laid out.

3.5. PLANT MATERIAL AND PLANTATION ESTABLISHMENT

The plant material fulfills the following minimum specification separately agreed in the service agreement with the plant material supplier.

- fresh one year old rod,
- diameter at thin end not less than 1.5 cm,
- bark undamaged,
- rod length 1.7 m to 2 m long,
- completely lignified,
- free of any side branches

The planting machine depicted in the image below brings the rods into the deep loosened and prepared soil. Planting depth varies depending on site conditions and ground water availability between 40 cm and 120 cm. The soil is compacted afterwards by two heavy iron disks so that the rod had ideal rooting conditions and cannot easily be removed manually from the ground. The planting window starts in late autumn around 2nd week of November and ends latest in the 3rd week of May. Ideal time for planting is considered to be the month of March.

The planting machine productivity varies between three and seven ha per working day.

Figure 7 Photo of plantation establishment with 2 m long rods planted 80 cm deep into the prepared soil

3.6. PLANTATION MAINTENANCE

Especially in the growing season directly after establishment the weed control and proper SRP maintenance is of crucial importance to achieve good survival and growth rates in the future.

A specially adapted disk harrow passes three time in the first SRP growing season to mechanically control the weed in the three meter wide gap between the trees. It is done through a disc harrower "X" shaped. The disc is pulled by a 120 hp tractor. The disc harrowing can start 40- 45 days after planting and the last passage just before the end of the growing season. The productivity of a disc is about 15-20 ha/day.

Singling of the young trees is necessary to achieve the needed wood quality, diameter and growth rates. When the fresh shoots are about 50 cm long the co-dominant shoots will be cut manually so that only the dominant shoot develops

the main trunk. This work step is usually necessary in early July in the year of establishment.

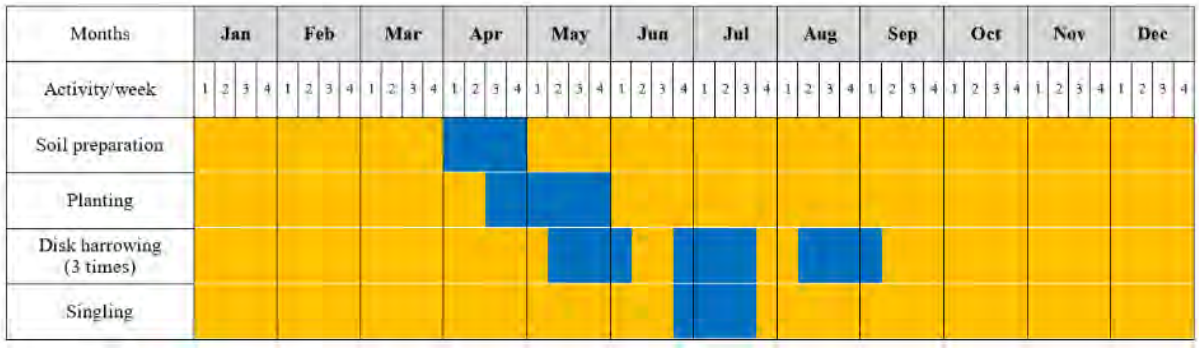


Figure 8 The table shows the scheduled maintenance work necessary in the first SRP growing season.

3.7. WOOD QUALITY

The expected wood fulfill the following specifications after the 5 year growth cycle

- 4 m long logs
- Length deviations +- 5 % are acceptable
- Minimum diameter below bark at thick end of 15 cm
- Minimum diameter below bark at thin end of 8 cm
- Moisture above 45 % relative at time of harvest
- Density of the wood varying between 280 kg/m³ to 380 kg/m³

Figure 9 Photo of SRP poplar logs waiting to be processed in the factory

The poplar tree at end of its 5th growing cycle is expected to yield approximately 60 % of its total biomass in 4 m logs fraction meeting the above specified requirements.

The remaining 40 % of the tree consisting of thin diameter logs and branches will be chipped on the field and used for biomass and standard particle board production in the factory.

3.8. YIELD

The achievable yield level vary greatly depending on local site conditions on water availability.

In average the fields are expected to yield 8 bdt / ha and year.

The real yield will likely vary between 5 bdt to 12 bdt in the first rotation cycle. Yields are expected to increase by app 20 % in the second rotation as the trees will already have well established root system once they regrow in spring after harvest.

3.9. SPECIES SELECTION

The selected poplar clones are a selection of the most productive Italian clones licensed by the company Alasia New Clones.

The three hybrids planted predominantly have shown to yield good and stable growth results in North Hungary and East Austria under similar climate and soil conditions present in the SRP project area in Slovakia.

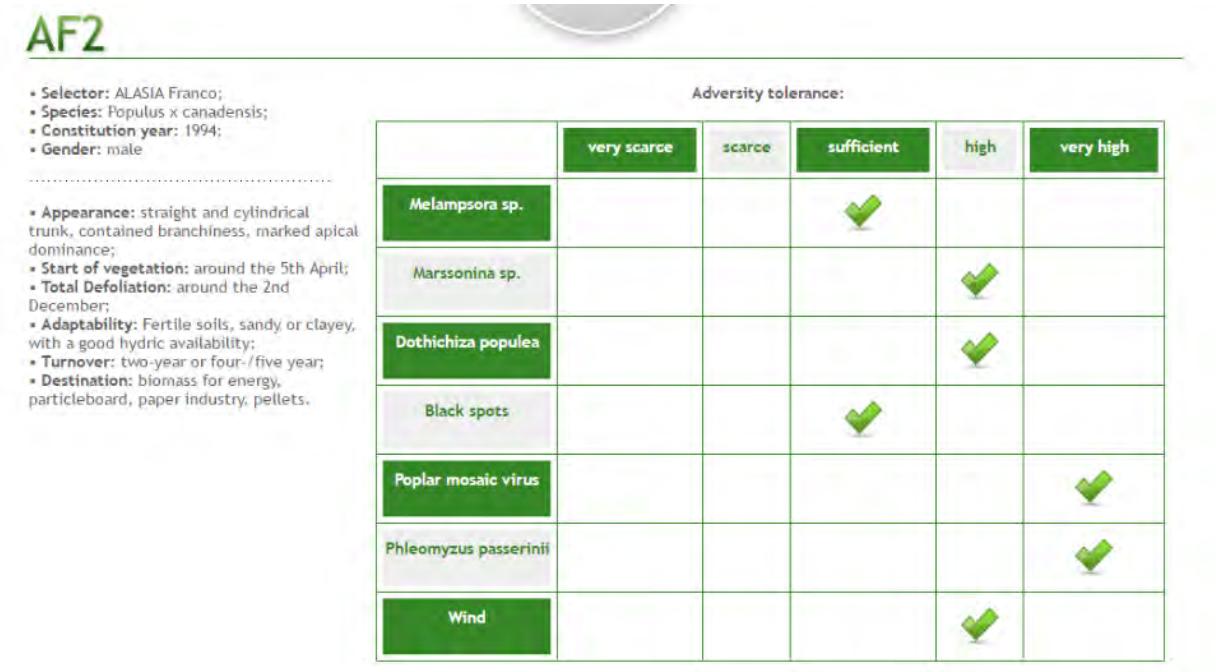


Figure 10 Overview table for AF2 clone with parental combination and adversity resistance

Additionally and next to AF2, more modern clones like AF 16 and AF 18 are planted which promise to surpass AF2 in terms of growth and adversity resistance. In the project area 4 clone trials are established to increase diversity in the fields in the future and select the most suitable clones for the specific site available for SRP.

Aditionally fields are planted with Vesten clones which are licensed by INBO company in Belgium and sold via the licensed nursery Biopoplar in Italy.

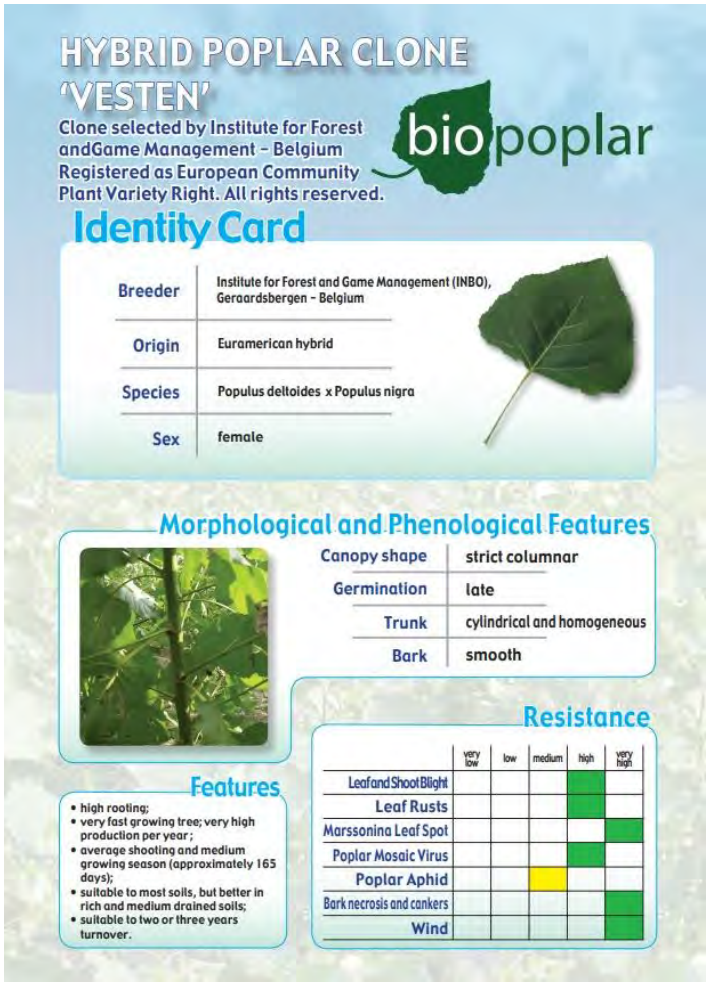


Figure 11: Technidal Data Sheet for Vesten Clone

4. MONITORING OF SRP GROWTH DYNAMICS

4.1. INVENTORY TECHNIQUE IN SRP

The SRP stands are very homogenous in nature. The planting regime and distance between the individual trees is kept as constant as possible in the field.

In the first two year general estimations of survival rates and height growth will be conducted on each field. These measurements do not yet serve to derive a growth of m³/ha and year or bdt/ha and year.

In the third growing season then it is deemed worthwhile to conduct the first growth inventory. For this the height of the tree (+- 2 cm) and diameter at 1.3m height will be measured (+- 1 mm).

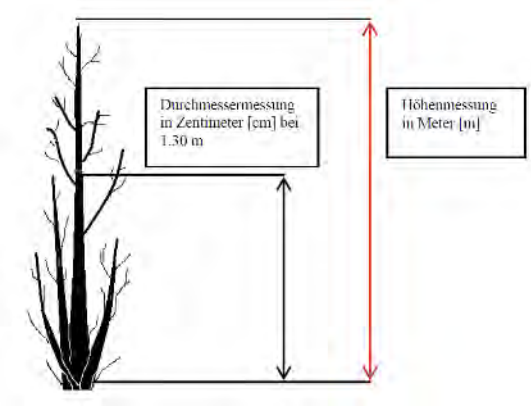


Figure 12 Image of exemplified measure variable to determine yield on a field by field basis

In order to achieve a reliable yield estimation the site has to be classified in homogenous growth or heterogeneous growth. In a second step the survival rate is determined visually in

- Very High 100 to 90 %
- High 90 to 80 %
- Medium 80 to 70 %
- Low 70 to 50 %
- Very low 50 or less %

The acceptable error margin defined for the yield estimation is 5 %.

The software tool yield calculator published by Prof Röhle from the Technical University of Dresden especially developed for poplar SRP will be used to determine the number of rows and number of trees that need to be measured in order to achieve the acceptable error margin based on present survival rate and site homogeneity.

The results of the yield estimations will be given in m³/ha and year and bdt/ha and year. When the plantation will be harvested after the fifth growing season the estimated measured values will be cross checked with the harvested biomass. This biomass is determined on a weight basis derived from the truck scale readings when the material is transported to the factory in Malacky.

4.2. YIELD INVENTORY SCHEDULE

The yield inventory schedule for each rotation and field goes as follows:

- Growing Season 1: Measuring average shoot length and survival on 5 % of trees randomly selected on the field
- Growing Season 2: Measuring average shoot length and survival on 5 % of trees randomly selected on the field
- Growing Season 3: Measuring of diameter at 1.3m and tree height of statistically significant sub sample
- Growing Season 4 Measuring of diameter at 1.3 m and tree height of statistically significant sub sample
- Growing Season 5 Measuring of diameter at 1.3 m and tree height of statistically significant sub sample and validation of estimated yield by really harvested biomass arriving on trucks to the factory.

In the growing season after each harvest plantation regrow from the cut stem in a coppice system. The trees will be singled once again and the growth and inventory cycle starts again.

Figure 13 Pictures of 6 year old root. On the left the one year old regrowth after harvest was not singled. The picture on the right shows the same regrowth but singled in the middle of its first season of regrowth.

4.3. FIRST GROWTH INVENTORY RESULTS

The first round of growth inventory on all fields was executed in the winter months of 2017 / 2018. Fields that were less than 2 years of age were just evaluated vitality classes. For older plantations also the diameter at breast height was measures

An overview over first results is summarized below.

Table 1: Results of yield / growth inventory of 2018 measurements

ID	Year of establishment	Age	Number of trees	Height				Diameter at breast height				Vitality class	Survival (%)	Area of the plot (ha)	Nr. Of trees (pcs/ha)	Basal area (m^2/ha)	Volume (m^3/ha)
				Amount (pcs)	Mean (m)	Maximum (m)	SD	Amount (pcs)	Mean (m)	Maximum (m)	SD						
S04 G	2016	2	273	60	3,7	5,1	0,7484	240	3,1	5,9	1,1573		87,91%	0,1786	1 344	1,4	9,1
S04 W	2016	2	292	59	2,8	4,8	1,0566	239	2,1	5,3	1,2051		81,85%	0,1806	1 323	0,6	6,0
S05 A	2016	2	294	62	6,8	8,3	1,0255	244	5,7	9,6	1,9103		82,99%	0,1844	1 323	4,4	22,8
S06 A	2016	2	293	60	3,3	4,7	1,1461	245	2,7	5,4	1,6634		83,62%	0,1631	1 502	1,4	9,7
S07 G	2016	2	280	60	5,1	8,2	1,8402	221	4,7	8,6	1,9976		78,93%	0,1780	1 241	2,9	16,1
S07 M	2016	2	381	57	3,7	6,5	1,4446	262	2,8	8,1	1,4149		68,77%	0,2896	905	1,1	7,0
S07 W	2016	2	413	60	2,7	3,9	0,7648	248	2,1	4,0	0,9793		60,05%	0,2733	908	0,5	4,6
S08 G	2015	3	245	60	8,1	9,2	0,7161	228	8,0	11,1	1,6045		93,06%	0,1136	2 007	11,9	64,2
S08 W	2015	3	269	60	6,9	8,2	0,9687	240	6,3	10,6	1,7642		89,22%	0,1406	1 707	6,5	34,2
S09 A	2016	2	265	60	3,7	6,0	1,4102	240	2,8	6,0	1,4505		90,57%	0,1397	1 718	1,4	10,1
S10 A	2017	1	261	240	1,8	2,6	0,3911					2,6	91,95%	0,1771	1 355		
S11 G	2017	1	270	237	1,4	2,6	0,4018					1,7	87,78%	0,1813	1 307		
S11 M	2017	1	297	245	1,0	2,4	0,3048					1,1	82,49%	0,2066	1 186		
S11 W	2017	1	288	239	1,0	1,6	0,3274					1,0	82,99%	0,1927	1 240		
S12 A	2017	1	244	240	2,2	3,1	0,3208					3,6	98,36%	0,1499	1 601		
T01 A	2016	2	252	61	3,2	4,1	0,4356	247	2,3	13,2	0,9844		98,02%	0,1548	1 596	0,8	6,8
T02 A	2016	2	270	74	2,8	4,6	0,6838	267	1,9	4,4	0,7120		98,89%	0,1869	1 428	0,5	6,9
T03 A	2017	1	265	252	1,6	2,9	0,4155					2,3	95,09%	0,1725	1 461		
T05 A	2017	1	252	236	2,5	3,7	0,4940					3,9	93,65%	0,1617	1 460		
T06 A	2017	1	282	239	2,1	5,1	0,6758					2,9	84,75%	0,1749	1 366		
T06 B	2017	1	241	240	2,9	3,9	0,4250					4,6	99,59%	0,1470	1 633		

T06 C	2017	1	251	240	2,1	4,4	0,6250					3,2	95,62%	0,1426	1 683		
T06 D	2017	1	260	238	2,2	3,4	0,5625					3,3	91,54%	0,1586	1 501		
T06 E	2017	1	321	239	1,4	3,2	0,6379					1,4	74,45%	0,1952	1 225		
T07 A	2017	1	247	240	2,1	3,3	0,3327					3,3	97,17%	0,1470	1 633		
T10 A	2017	1	248	240	1,4	2,7	0,3429					1,9	96,77%	0,1352	1 776		

4.4. EIA MONITORING RESULT

The monitoring of rare species occurrence and adverse environmental impact and occurrence of invasive species is done together with the operational field control where each field is targeted to be visited and evaluated at least once a month.

A more in depth evaluation is done by Daphne a project partner of a Horizon 2020 EU project. Their role in the SRP project is the EIA of all fields. An extract describing Daphne's role in the project as extract from the approved EU project's proposal below:

Before any land agreement is signed a thorough EIA is conducted. After verbally agreeing with farmers and/or land owners on possible fields, IKEA IIM will request an expert opinion from the responsible environmental district office. In this step it will be clarified if the candidate field forms part of the EU's Natura 2000 habitat network or any other protected landscape area which would forbid the establishment of poplar plantations, the introduction of exotic plant material into the environment and execution of agricultural operations such as deep ploughing and disk harrowing.

Fast-growing trees are planted in monocultures on agricultural land and have obvious advantages over native plants in competing for light, nutrient, and water resources. Therefore, large-scale tree plantations have led to increasing concerns regarding their adverse effects on biodiversity. A monitoring system focused on most relevant indicator groups of species will be established to determine trends in relation to biodiversity of the fast-growing poplar plantations. New plantations will be monitored including baseline monitoring on new plots before establishment of plantations. The partner 7 (DAPHNE) will be responsible for independent and objective evaluation of biodiversity monitoring data.

Description of approach

1. Preparation of monitoring methodologies for each group – vegetation, birds, amphibians, butterflies and beetles, including field form with defined monitoring parameters.
2. Preparation of the information system for data collection.
3. Field monitoring, input of data into the database, evaluation and reporting.

Vegetation monitoring

The method of repeated recording of species composition at plantations will be used. If necessary, due to occurrence of rare or invasive species, permanent plots will be established. The target plots should be visited 2-times in a year, while first visit should be carried out in the spring period (April to May, before the first disk tillage) and the second visit in the autumn (late August, September, early October). Number and frequency of native and rare species will be considered, as well as representation of the most frequent invasive neophytes in the region.

Zoological monitoring

Birds

Monitoring of birds will focus on recording of the species diversity, estimation of the population size, identification of breeding and foraging habitats (e.g. temporary wetlands). It will be executed on each of the existing plot of poplar plantations primarily by line transect method. It is planned to execute 5-8 monitoring visits on each plot during the vegetation period. The monitoring visits will be executed in the period from April – September, while in May and June 2 visits per month should be carried out. In addition to that 1-2 visits in the winter period, i.e. in November – December (after falling off the tree leaves) should be carried out to record bird nests. As for the first monitoring cycle it is proposed to carry out monitoring of birds annually for 5 years in order to cover the whole production period of the plantations by monitoring.

Amphibians

Monitoring of amphibians will focus on recording species diversity, estimation of the population size, identification of breeding habitats (e.g. temporary wetlands) and migration corridors. The target plots should be visited 4-times in a year, while first 2 visits should be carried out in the spring period (March to May) and the remaining 2 visits in the autumn (September – October). Amphibians will be monitored presumably by visual and acoustic registration of individuals on monitoring points (point count) or transects (transect method). In addition capture/release method for recording of tadpoles and thus determination of breeding can be executed as well.

Invertebrates

Monitoring of invertebrates will focus on butterflies (*Lepidoptera*, *Rhopalocera*) and beetles (Coleoptera) with the aim of recording species diversity with special focus on conservation target species, red list and rare species as well as those considered as pests on wood. The target plots should be visited 4 times during vegetation period, while first 2 visits should be carried out in spring period (April – June), third in the summer (July – August) and last in the autumn (September – October), especially for beetles.

Monitoring of butterflies will be executed by visual identification of imagoes or larvae and by catch/release method using standard entomological nets for catching insects. Monitoring of beetles will be done preferably by installing non-lethal pitfall traps and by visual observation of imagoes in autumn.

Overall there were no endangered species found on the fields. Biodiversity as well as soil structure is approved on fields that were previously under intensive agricultural use.

A more detailed analysis for a field in Dubnani, CZ was done, which is not part of this FSC® (FSC−C133917) scheme. For information purpose how results of monitoring of endangered species occurrence look like please refer to the link http://www.daphne.sk/d4eu/ and summary below.

The evaluation was done by Daphne, an environmental NGO which specializes in these kind of analysis. Extract of the report on rare species occurrence below:

Methodology.

One passage by transect method:

- Width line of 5m
- Each species of amphibian seen or heard is counted.

- One passage during the afternoon (in period of reproduction, *Bombina bombina* starts to sing during the afternoon), after rainy day
- Transect occurred in the tree fields and along preferential habitat for amphibians around the tree field.
- No amphibian were found in the tree field. Around the tree field, *Pelophylax sp.* (green frog) was found in many places (every place with enough water), and *Bombina bombina* (European fire-bellied toad) was contacted in one place. No others amphibians were contacted, but the majority of others amphibians are more active during the evening or the night.
- *Bombina bombina* was only heard, and *Pelophylax sp*. was seen and heard.
- *Bombina bombina* are present in a wetland pasture, good for its reproduction (photos below).
- The area around the tree field are wet and composed by different wetlands or habitat associated with wetlands like floodmeadows, pond or reed beds (annexe 1) and also trees. Bombina bombina can occupied these different habitats. Even if *Bombina bombina* wasn't found in others places that do not mean that it wasn't in these others places. Outside reproduction, *Bombina bombina* are very discrete, and difficult to spot it.
- The capacity of dispersion of the images of *Bombina bombina* can be superior at 500m.

5. ENVIRONMENTAL SAFEGUARDS

The activities on the field to plant and operate SRP have unavoidable environmental impacts. Some of them have to be classified as clearly positive (e.g. reduce use of machinery, avoided use of agrochemicals, build-up of humus layer, storing of increased amount of CO_2 compared to previous land use) other pose a potential threat to the environment and potentially endangered ecosystems.

The following paragraph analyses the potential risk and threats that SRP poses to the environment and describes the safeguards established to avoid or minimize any negative impact.

5.1. GOALS OF ENVIRONMENTAL SAFEGUARDS

The environmental safeguards put in place have the goal to minimize or avoid any potentially negative effects from the SRP operation on the environment. One key cornerstone in this regard is that SRP will never be established on forest land. Several studies have shown that the otherwise positive environmental effects of SRP are outweighed by negative ones if SRP replaces intact forest land.

Below follows a list of some key environmental safeguards in place in the SRP operation of the project:

- Harvest activities from mid-autumn until early spring reduce environmental impact of machinery and the disturbance of plants and animals

- Skidding opposite to the slope – reducing land degradation.
- In the stands, where there are springs, wells or wet ponds when planning cutting distant from the immediate vicinity of the water areas in order to preserve the habitat.
- Do not use construction waste or other materials to maintain roads or other infrastructure.

5.2. ENVIRONMENTAL IMPACT ASSESSMENTS

Below in the table the methodology of the environmental assessment in connection with SRP operation is described

Inpact on the environment	Description
Negligible 0	damage is very small, short and insignificant, it is not necessary to take any corrective measures or return the natural environment to its original state
Low 1	damage is small, it requires minimal intervention to return to its original state (i.e. without the use of machinery)
medium 2	damage requires action of a major character on restoring the environment to its original state (i.e. use of mech. equipment)
High 3	damage requires the preparation of re-cultivation projects
Irreversible 4	damage cannot be repaired and the environment is destroyed

Evaluation of soil damage

Soil erosion is only of negligible importance for the SRP operations since no plantations will be established in areas with more than 10 degree inclination. As SRP replaces agricultural land use soil that were prone to soil erosion before will be less impacted by the kinetic energy of rain drops or wind as the tree roots from the fast growing poplar trees are somewhat stabilizing the top soil structure.

List of possible activities and their potential impact on the environment

Activity	Impact	Potential impact on the environment
The SRP operations include relatively low-risk activities, involving mainly only small or negligible impacts on the environment; only in exceptional cases impacts may be large. Where these large effects are expected (e.g. nature conservations sites with rare species occurrence that depend on arable land use) will be avoided and not be planted with SRP.		
Soil Preparation	- damage to previous grass cover - destroying of bird nests - leakage of oil products into the soil - disturbance of animals - change of land cover and ecosystems - change of water regime on the site	0-2 0-3 0-3 0-1 0-2 0-1
Pruning and weed control	- damage of protected plants - disturbance of animals - use of FSC® (FSC–C133917) allowed chemicals - garbage left on fields	0-1 0-1 0-2 0-1
Selective Harvesting	- disruption of soil cover - damage to protected plants - disturbance of protected animals - change of habitat - damage to river beds, water channels	0-2 0-2 0-1 0-2 0-3
Thinning and Singling	- damage of standing trees - leakage of oil products - disturbance of animals - damage of birds' nests	0-1 0-3 0-1 0-2

	- damage to protected plants	0-1
Activities which may result in significant environmental impacts		
Clear cut harvesting and wood transport	- Damage to streams, wetlands springs - Leakage of oil - Damage (destruction) of the habitat of protected species - Damage to protected plants and their habitats - Disturbance of animals - The destruction of nests of birds - Damage to standing trees	0-3 0-3 0-4 0-2 0-2 0-2 0-1
Modification of water flows, meliorations, change of waterways -	- Change (destruction) of habitats of protected species - Damage (destruction) damage to riparian vegetation cover and soil erosion - Changes in the hydrological regime of the area	0-4 0-4 0-3
Building of roads and other construction activities	- Change (destruction) of habitats of protected species - Damage to soil cover and erosion - Changes in the hydrological regime - Disturbance of animals - The destruction of nests of birds - Damage to standing trees	0-4 0-3 0-3 0-2 0-2 0-1
Use of chemicals	- Bio accumulation of harmful chemicals in organism - Leakage of chemicals into the ground water - Pollution of water ways, and channels	0-4 0-4 0-4

	- Pollution of mammals, birds and insects present on the field	0-4

5.3. IDENTIFICATION OF RARE OR THREATENED SPECIES

Rare or threatened species are identified via reviewing the descriptions and applicable acts of nature conservation sites.

Relevant nature conservation sites in the project area are:

- CHKO Zahorie
- Natura 2000 Bird Site Zahorske Pomoravie
- Natura 2000 Bird Site Uľanská Mokraď
- Natura 2000 Bird Site Dolné Považie
-

A selection of iconic threatened or rare species that occur in the project regions and are potentially affected by the SRP activities are:

BIRDS

- *Milvus milvus (*red kite), critically endangered

Figure 14 Photo of hunting Milvus milvus

- *Falco cherrug (saker* falcon), criticially endangered

Figure 15 Photo of Falco cherrug in flight

- *Crex crex (corn crake)*

Figure 16 Photo of Crex crex

AMPHIBIAN

- *Bombina bombina (*european fire bellied toad)

Figure 17 Photo of Bombina bombina

INSECTS

- *Lucanus cervus (stag beetle)*

Figure 18 Photo of Lucanus cervus

- *Maculinea teleius (scarce large blue butterfly), endangered*

Figure 19 Photo of Maculinea teleius

MAMMALS

- *Castor fiber (European beaver)*

Figure 20 Photo of Castor fiber

FLORA

- *Sanguisorba officialis* (great burnet)

Figure 21 Photo of Sanguisorba officialis, which is the exclusive feeding plant for Maculinea teleius.

- *Angelica palustris (marsh angelica), critically endangered*

Figure 22 Photo of Angelica palustris

- *Iris humilis subsp. arenaria (Sand iris), critically endangered*

Figure 23 Photo of Iris humilis

The list of species is selected by considerations where it is evaluated if harvest or any other field activity actually does affect the growing, hunting, mating or nesting pattern of the respective species. A complete list of all protected species in the Slovak Republic is available as attachment to the document.

5.4. PROTECTION OF RARE OR THREATENED SPECIES

If protected or rare species are found present on the field where we established or plan to establish SRP this is noted in the biodiversity monitoring table of Daphne – Institute of applied ecology, or in a separate report for IIMA If a protected, rare or endangered species is found present the SRP activities are evaluated individually and judged if they pose a threat to the existence of the species on this site in cooperation with Daphne – Institute of applied ecology.

In case any activity is found to be harmful to the species in question a mitigation actions will be suggested or if the negative effect on the species cannot be avoided SRP will not be planted on the respective field.

The presence and status of the species encountered on the SRP field will be monitored continuously and findings reported in the biodiversity monitoring table of Daphne.

5.5. SET ASIDE AREA

There are three set-aside areas managed under this SRP project so far. The management plan foresees for these fields no intervention with the natural habitat and ecosystem.

Table 2 Overview over Non SLIMF Group Members and SRP ha sizes per catchment area

Non-SLIMF SRP ha per catchment	
FMU	SRP ha size
Ikea Industry	*447,05*
Morava	137,02
Váh	131,23
Ipeľ	53.3
Nitra	125,5
SARS Plus	*206*
Morava	206
VLM	*184,80*
Morava	184,80
Total	837,85

Dunaj

The first site is located in the nature reserve called Starý háj in cadaster of Bratislava - Petržalka, with the level of protection 4and 5 according to Slovak Nature conservation law. Nature reserve is declared for the protection of a natural floodplain forest with the occurrence of several protected species of plants and animals.

Figure: Green outline Nature reserve Starý háj

Váh

The second site is located in the nature reserve called Lošonský háj in cadaster of Horné Orešany, with the highest level of protection 5 according to Slovak Nature conservation law.

This conservation and set-aside objective is aimed to protect well-preserved forest ecosystem of national importance.

Figure: Blue outline Nature reserve Lošonský háj

The third site is located in the nature reserve called Bolehlav in cadaster of Dolné Orešany, with the highest level of protection 5 according to Slovak Nature conservation law. Nature reserve is declared for the protection of a preserved example of forest communities of beech-oak and oak-beech vegetation stage on the SE edge of the Little Carpathians on the crystalline bedrock.

Figure: Green outline Nature reserve Bolehlav

Ipeľ

This site is located in cadaster of Malinovec, Low conservation value *Robinia pseudoacacia* forest in the middle of the plantation left for natural evolution process.

6. MAPS

This chapter gives an overview in a number of satellite maps from the program google earth over all SRP fields. The SRP project in general works with the software google earth and a licensed copy of ArcGis 10.2 for geographic information and analysis.

The table below summarizes all field of SRP indicating their sizes, managing group member, year of establishment, and expected yield on a field by field basis.

Year of Establishment and Location	Net planted [ha]
2015	25
Skalica	24.7
12987/00	19.5
12993	5.2
2016	363
Adamov	18.75
3520/3	18.75
Budmerice	24.29
2755	13.1
2760	11.19
Horna Streda	34.9
701/2, 1324/20	34.9
Kopcany	117.67
2630/1, ex orchard	10.5
3156/1-2-3 Trinity	22.74
3382/1	42.02
3536/1 Cunin	34.32
3549, Triangle	8.09
Laksarska Nova Ves	8.22
6646/1	8.22
Lozorno	8.5
6998/1	8.5
Mikulásov	7.73
VLM I	7.73
Nivky	38.49
3	16.82
4	4.7
5	6.92
1 and 2	10.05
Pernek	11.71
192/1	11.71
Rohoznik	92.82
5212/66, Puskac	10.5
8706/1, 8701/1-2-3,5	63.8
Heli	18.52
2017	394
Bucany	14.5

Field 1, 2, and 3	14.5
Budmerice	16.83
Project II	16.83
Castkovce	33.9
Field East	15
Field West	18.9
Kostoliste	39.04
Jakos II North	27.91
Jakos II South	11.13
Plav Podhradie	10.12
Alex I a	3.82
Alex I b	6.3
Plav Stvrtok	26.2
Hajek	26.2
Plavecky Mikulas	27.47
Agropartner I	27.47
Rohoznik	21.7
Nursery	21.7
SARS II	70.26
Kopcany, SLF II	70.26
Sasinkovo	75.2
Field 1	75.2
Skalica	16.5
Cath Church	7.02
Cath Church II, garden house	9.48
Solosnica	18.6
Alex II a	5.2
Alex II b	13.4
Velke Levare	7.32
Cath Church I	7.32
Velky Grob	14.83
2204/1	14.83
Vistuk	2
C 45839	2
2018	164
Laksarska Nova Ves	12.8
Urbar North	4.5
Urbar South	8.3
Lozorno	15.8
E 4490	15.8
Mikulasov	5.7
VLM II	5.7
Povoda	19.5
E 162/3	19.5
Prievaly	3.8
VLM II	3.8
Rohoznik	11.06

u. Vodarne	11.06
Sastin Straze	9.98
Halas Field	9.98
Skalica	42.5
12987/00	15.3
C10251, C9826, C9823 City Owned	27.2
Stupava	14
Urbar I	12.2
Urbar II	1.8
Surianky	17.5
E 98	17.5
Vistuk	11.5
C 45839	11.5
2019	277
Horne Obdokovce	102
Purchase I	102
Kocovce	24.5
649/1	24.5
Laksarska Nova Ves	8.2
Church	8.2
Malinovec	53.3
Purchase I	53.3
Mikulasov	2.4
Missing Piece	2.4
Modra	10.56
Cluster	10.56
Plavecky Mikulas	3.2
Agropartner II	3.2
Povoda	11
Pr II	11
Skalica	37.64
12993	3.64
Cath Church Repl	34
Unin	13
Church	13
Plavecky Peter	10
Church	10
2020	49.36
Svätý Peter	20
C 5244	
Gajary	29,36
Jakos	
2021	12
Trstín – Purchase I	12
Grand Total	1,309,55 ha

Figure 24 Summary table of all SRP fields in the project (1 285,4 ha)

6.1. SRP FIELD LOCATIONS

Below follow a collection of maps for all fields under the SRP project. The table on the previous page indicated in the first column the order number. These are used as general identifier for every field. All map captions indicate the size of the field, the order number, and cadaster where the field is located.

Figure 25: Field locations in Skalica region

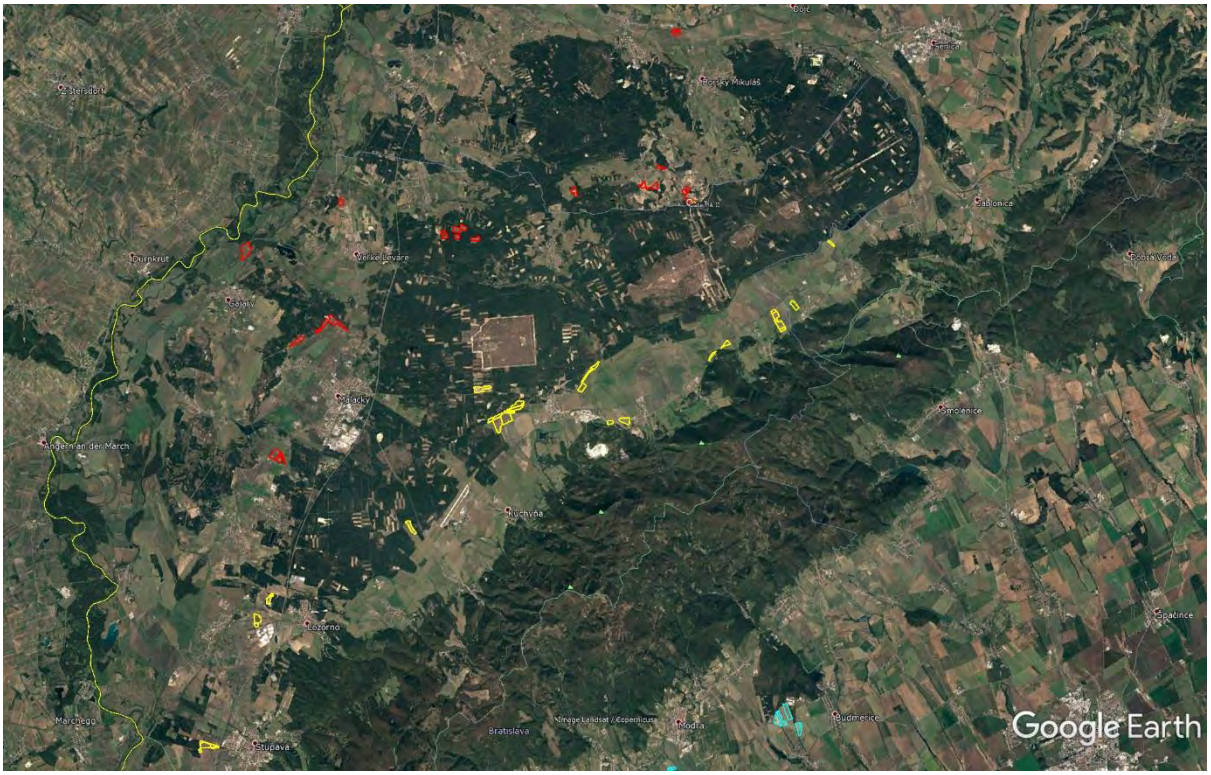
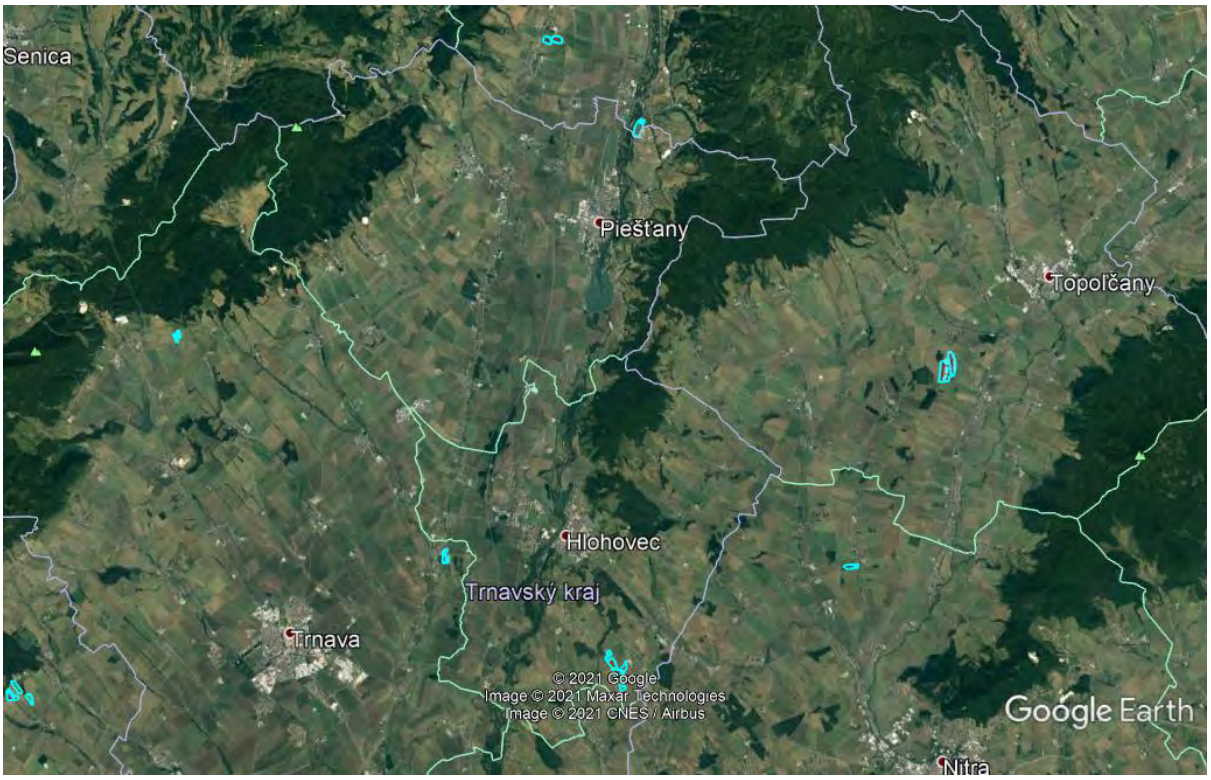


Figure 26: Field Locations in Malacky (red) and Rohoznik (yellow) region

A)


Google Earth

B)


Senica
Piešťany
Topoľčany
Hlohovec
Trnavský kraj
Trnava
© 2021 Google
Image © 2021 Maxar Technologies
Image © 2021 CNES / Airbus
Google Earth
Nitra

C)

D)

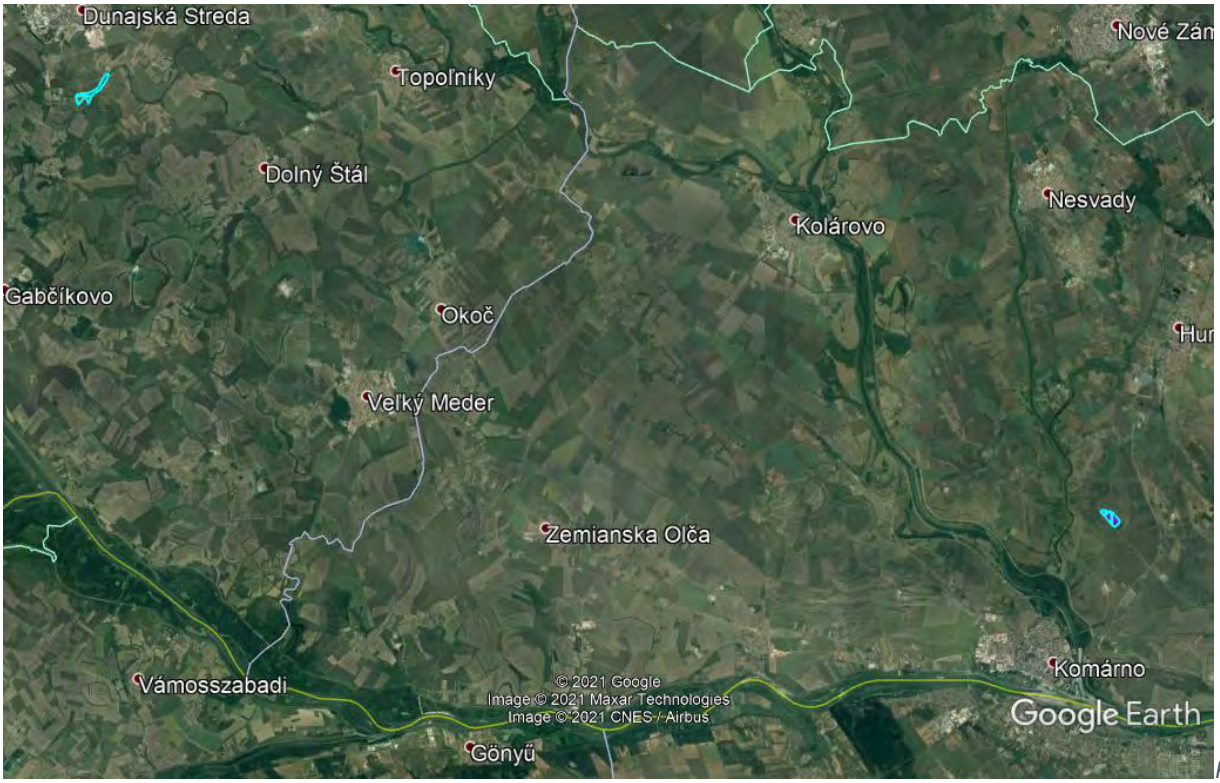


Figure 27: A) B) C) D) Field Locations in Trnava and Nitra region

For all fields where SRP is established a written consent of the owner exists where the owner states that they agree with the establishment of SRP on their land.

Land ownership is in general highly scattered in Slovakia. SRP is only feasible from a legal point of view where a written consent of all owner or majority owner can be proved to the Land District Office which is registering the SRP field.

6.2. RELEVANT AREAS OF NATURE PROTECTION

In this chapter a number of maps will be given which type, shape, extend and location of nature conservation areas which are covering or are close to the SRP fields. The location of the SRP fields are marked in turquoise and yellow outline without fill. The field in figure 55 marked in red outline indicated the set-aside area for the two non-SLIMF members VLM and SARS Plus.

There are in principal four main conservation area types to be distinguished.

Legend:

orange - Natura 2000 birds directive sites

turquoise - Natura 2000 habitats directive sites

red – CHKO

light green - Nature reserves

Figure 28 Map of Nature conservation areas near Skalica, Kopcany and Adamov fields.

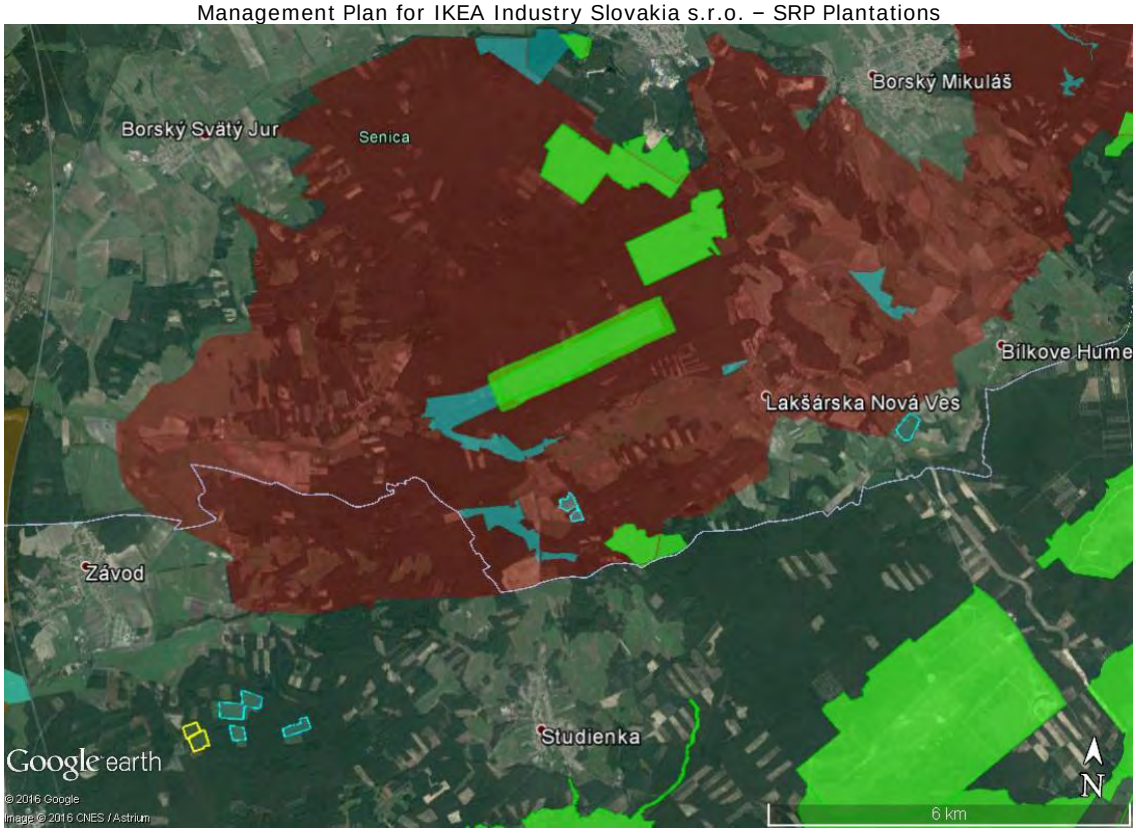


Figure 29 Map of Nature conservation areas and Nivky, Laksarska Nova ves and Mikulašov fields

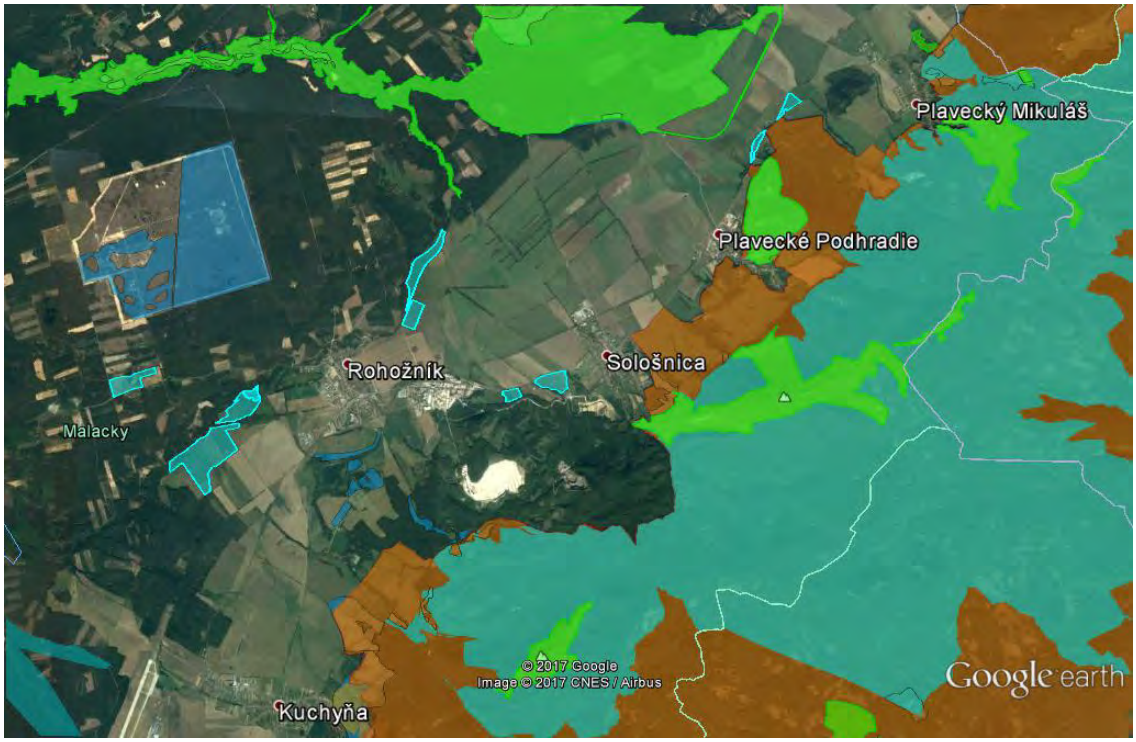


Figure 30 Map of Nature conservation areas and Rohožník? Plavecké Podhradie, Plavecký Mikuláš fields. Set aside field marked in red outline. East 17 ha for non SLIMF member VLM and west 14 ha for non SLIMF member SARS Plus

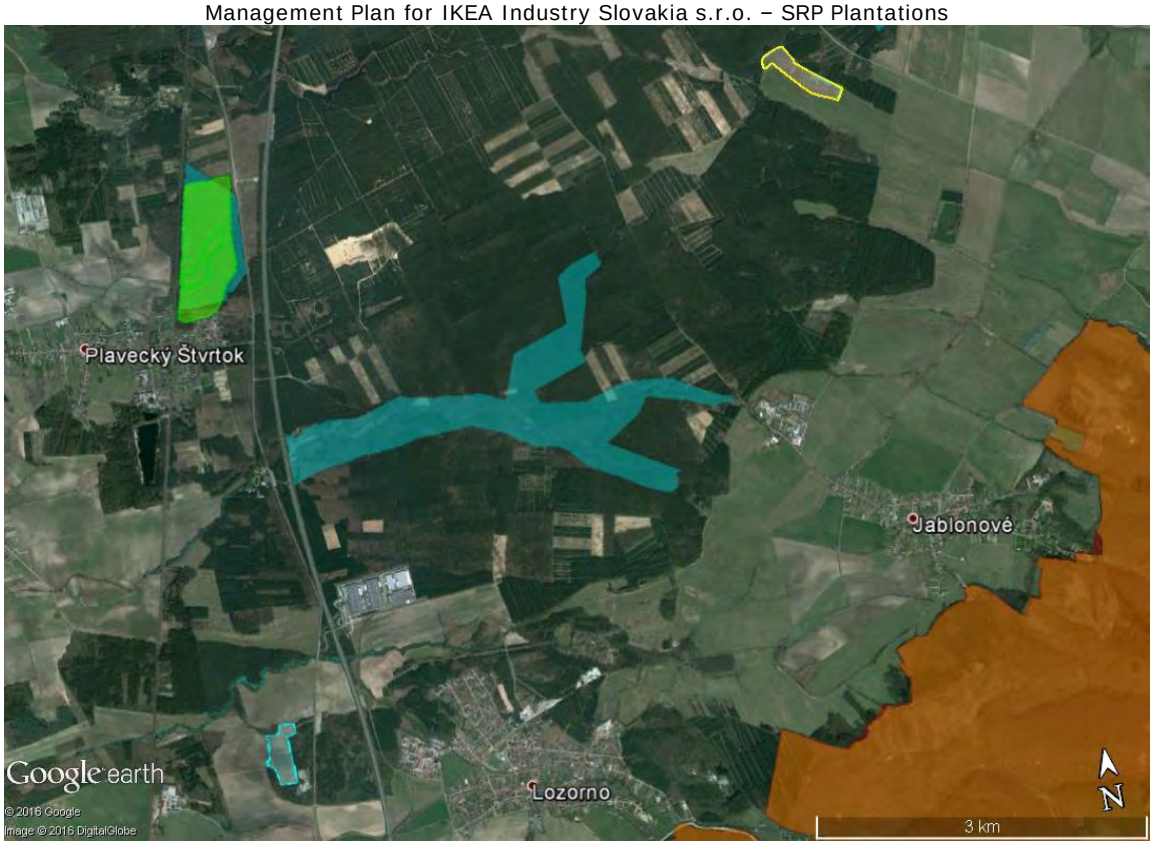


Figure 31 Map of Nature conservation areas and fields in Pernek and Lozorno

Figure 32 Map of Nature conservation areas and fields in Horna Streda and Častkovce

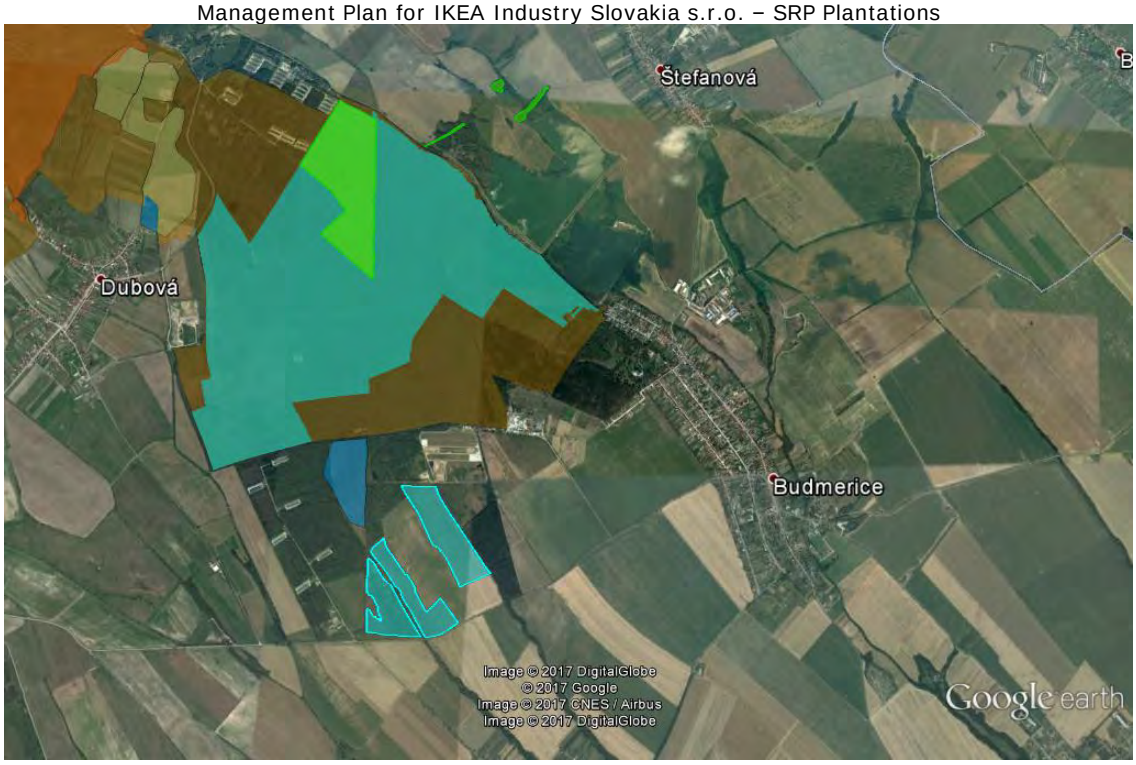


Figure 33 Map of Nature conservation areas and fields in Budmerice

Figure 34 Map of Nature conservation areas and fields in Veľký Grob

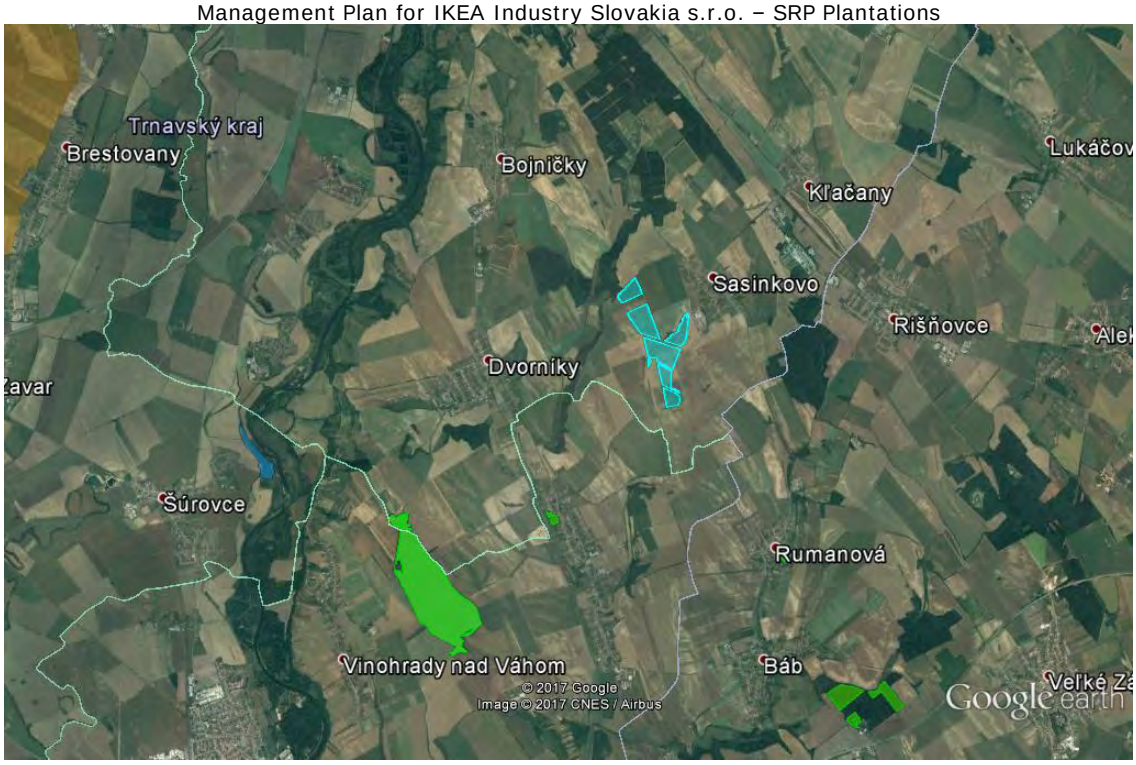


Figure 71 Map of Nature conservation areas and fields in Sasinkovo

Figure 72 Map of Nature conservation areas and fields in Bučany

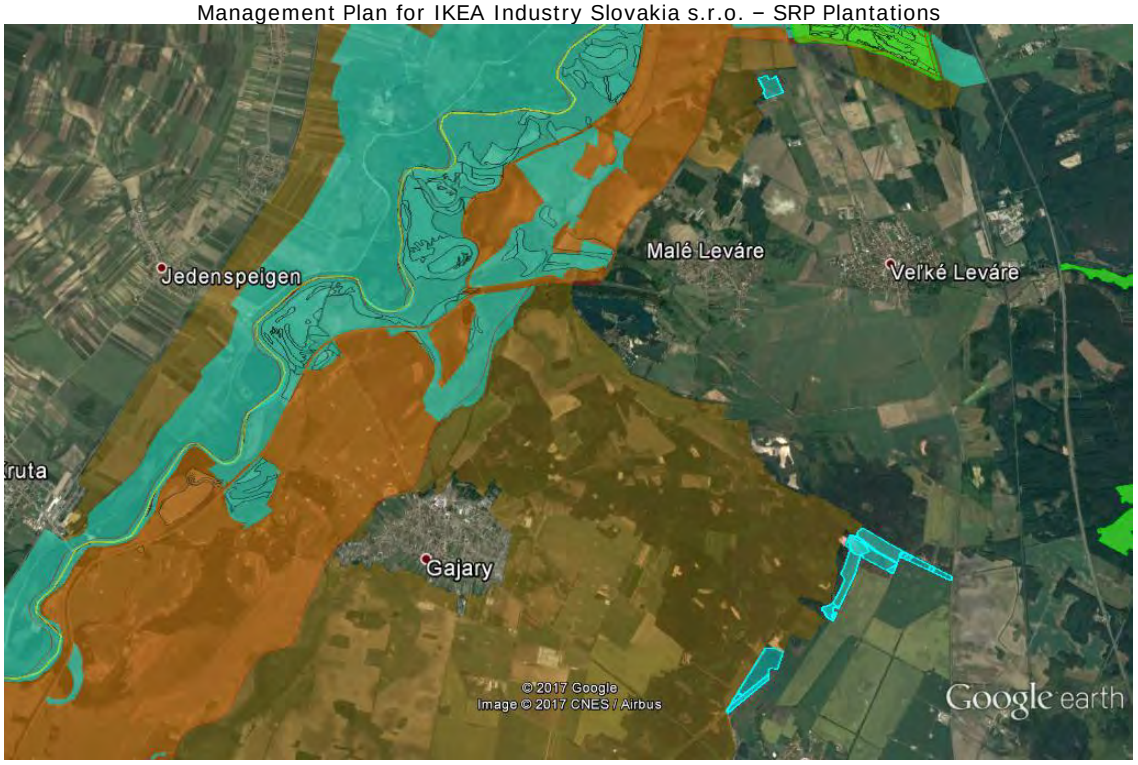


Figure 35 A Map of Nature conservation areas and fields in Kostolište and veľké Leváre

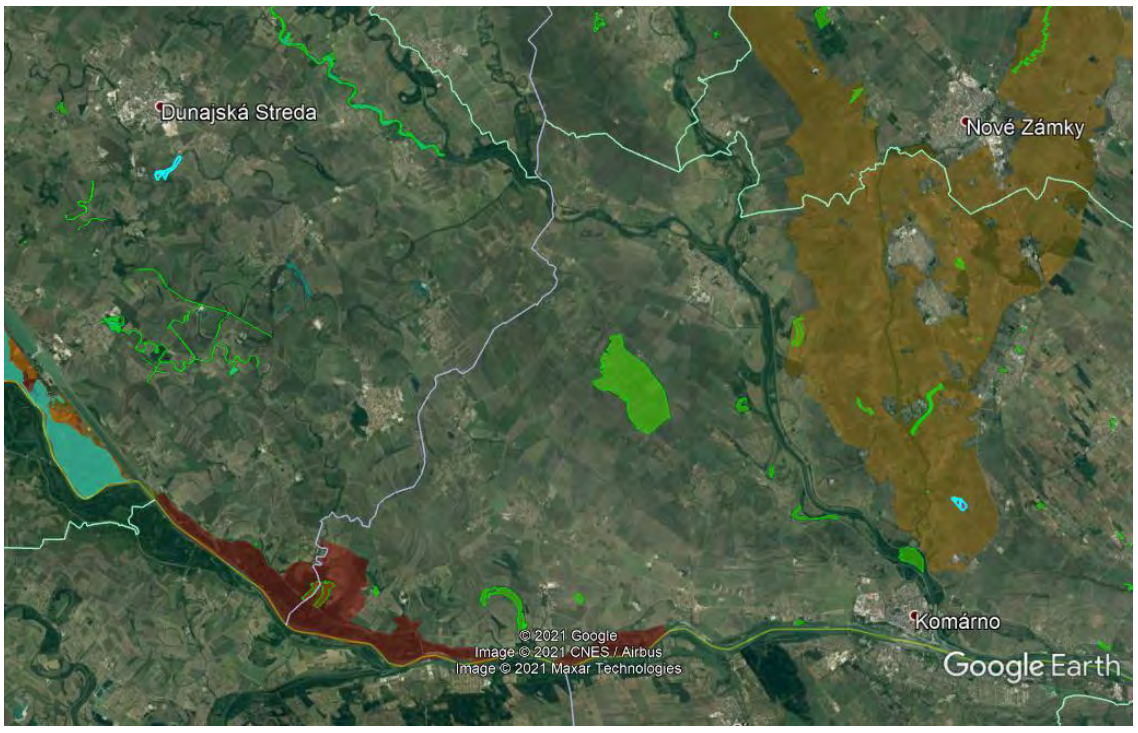


Figure 36 B Map of Nature conservation areas and fields in Povoda and Sv. Peter

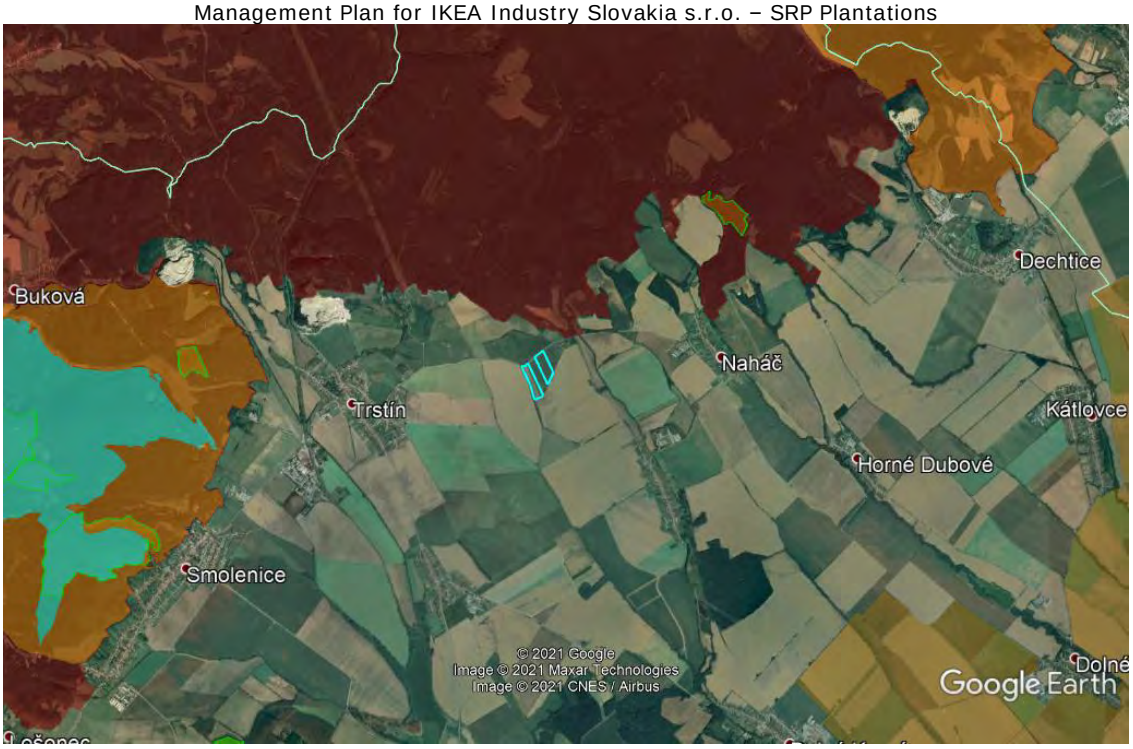


Figure 37 C Map of Nature conservation areas and fields in Trstín

7. HARVEST OF SRP

In average after five growing seasons the SRP plantation will be mechanically harvested.

The time window of harvest is strictly defined by the vegetation season. In order to allow for a good regrowth of the cut stems the harvest can only be executed in the month where leaves are fallen. This is the case in the months November, December, January, February, March. Depending on the clone and the climate conditions of the respective year of harvest also parts of April can be feasible for harvest operations.

Before harvest and subsequent road transport of logs the neighboring communities and mayors will be informed of planned activities. The resulting possible noise, dust and vibrations from increased heavy traffic through villages will be openly discussed with the local stakeholders and their comments and suggestions taken into account for the planning of harvest and log transport activities.

7.1. GOAL OF SELECTED HARVEST TECHNOLOGY

The hybrid poplar plantations are very homogenous in terms of diameter and age classes. The harvest machine selected expected to work best in these kind of stands is a feller-buncher with mounted shear.

The goals targeted are

- Fast and reliable harvest of poplar stems of given dimensions

- The expected diameter at 1.3m range from 10 to 23 cm
- Tree heights are expected to range from 10 to 16 m
- Reduction of damages to soil and cut poplar root system
- Efficient separation of log fraction and chip fraction at side of field
- Reduction of adverse environmental impacts and avoidance of any negative impact on protected, rare or threatened species.

Clear cut area for an individual field will be specifically defined as maximum 90 ha if the field is situated within a populated area. Populated areas are areas within 2 km of villages or other human settlements.

Justification: SRP plantations are established currently on arable land following the Soil protection. As the result of the avoidance of pesticides and artificial fertilizers the biodiversity increases compared to conventional crops. The above-mentioned legislation orders to perform recultivation of the whole plantation after 20 years. Plantations range in size from 10 to 90 ha and are located in Western Slovakia as mosaic.

7.2. DESCRIPTION OF HARVEST TECHNOLOGY

Recently poplar SRC is evolving in Italy towards a hybrid growing technique, still regenerate by coppice but with intermediate rotation length and densities, about 5 years and 1,600 plants per hectares respectively. This system is named Medium Rotation Coppice (MRC) and aims to solve some of the weak points of SRC plantations. By producing trees of a bigger size the biomass/fiber quality is enhanced thanks to a lower bark to wood ratio. In 5 years poplar trees of MRC plantations can get an average diameter at breast height (130 cm from ground level) of 14-16 cm, over 15 meters height and an average mass of about 120 kg per tree (51 oven dry kg per tree considering a 56% moisture content at harvest). Such trees cannot be harvested with foragers, even if equipped with SRC headers, and forestry equipment must be deployed. Typically forest machinery in Europe is designed for cut-to-length (CTL) production. With harvesters felling and processing the trees and forwarders (or tractors with forest trailers) for the extraction of timber. In MRC plantations, trees processing (delimbing and cross-cutting) is often undesired since the whole tree may be used for the production of wood chips. Trees are felled and bunched in a first operation, then extracted and chipped or transported as logs. By working with different machines the named operations can be performed as a simultaneous system or scheduled in different periods: whole trees can be stocked at roadside and chipped on demand of the factory in Malacky, reducing the centralized storage costs.

In the envisioned harvest- and transport supply chain the poplar stems will be cut by a tracked feller buncher mounted with a hot disk (image below) or shear. The bundled trees will be transported from the field to the road side by a clam bunk skidder where they will be processed on demand into log (60 %) and chip (40 %) fraction.

Once the trees are transported to the side of the field a wood processor head will delimb the logs and cut them to 4 m length. The minimum diameter at 4 m length will be 8 cm. Logs,

branches and tree tops falling below this minimum diameter will be fed into a truck mounted mobile chipper. This chipper will directly blow the fresh brown chips into a moving floor trailer with a loading capacity of 90 m³.

Figure 38 Photo of tracked feller buncher harvester with hot disk harvesting a hybrid poplar plantation in Minnesota, USA.

Figure 39 Photo of clambunk forwarder used for on-field transport of prebundled whole trees

7.3. ECONOMICAL CONSIDERATION OF SRP HARVEST OPERATIONS

The table below summarizes the economic calculation of harvesting cost. The numbers given are in fresh tons. Average moisture content of the wood is 50 % relative at time of harvest.

Operation	**Productivity**	**Cost**	**Cost**
	bdt/SMH	Euro/SMH	Euro/bdt
Felling	5.6	45	8,0
Forwarding	3.9	50	12,8
Processing	6.4	50	7.8
	Total cost to harvest and extract logs to the truck loading site		**28.6**

Figure 40 Table of calculation of harvest- and on field logistic cost

During the subsequent harvest trials during next seasons the technological development in the field of machinery applications will be closely observed. The used system will be adapted as soon as there are more efficient machines available.

8. LIST OF ATTACHMENTS

- SGS Qualifor Forest Management Standard Slovakia
- SR List of relevant SK legislation
- List of international treaties valid in SK
- List of ratified international labor conventions
- List of stakeholders
- List of places of cultural, historic, religious and landscape-aesthetic significance
- List of selected representative samples of forest ecosystems
- List of protected species
- Forests with high conservation value
- FSC® (FSC−C133917) list of prohibited substances / WHO Pesticide List
- Specification and take over protocol
- Corrective action request form (CAR)
- Pesticide Policy and Integrated Pest Management
- FSC® (FSC−C133917) Group Management Manual