**JOINT IMPLEMENTATION LAND USE, LAND-USE CHANGE AND FORESTRY PROJECT DESIGN DOCUMENT FORM**
**Version 01- in effect as of: 1 October 2006**

## CONTENTS

## SECTION A. General description of the LULUCF project

### A.1. Title of the LULUCF project:

>>
«Carbon sequestration via afforestation in Siberian settlements, Russian Federation»

Type of project: Sequestration of greenhouse gases from the atmosphere

Sectoral scope: (14) Land Use, Land Use Change and Forestry

Version: 08

Date: 26.04.2012

### A.2. Description of the LULUCF project:

>>
The project is devoted to activities on protection and management of the afforested degraded agricultural land in Zalesovo district, 142 km from Barnaul, the capital of Altai Kray of the Russian Federation. The project covers 9489,37 hectares of land, that have the status of non-forested area.

*Project objectives:*

- reduction of the anthropogenic burden on the environment and impacts of global climate change on Altai region through increase of the afforested areas and, subsequently, increase of CO2 sequestration from the atmosphere;
- development of the algorithms for estimation of the carbon absorption in forest ecosystems on the local level, and through that, implementation of the JI project activities corresponding to atr. 6 of Kyoto Protocol;
- development of the mechanisms for active management and protection of the forest areas, not included in the State Forest Fund.

*Situation before the project*

Before the forest protection measures organized under this project since 2000, this land must have been used purely for agricultural purposes (the targeted use of land). This means that according to the Land Code of the Russian Federation, all trees on that land must have been destroyed via cutting or could be destroyed due to the forest fires.

*Project*
The project activities are aimed at sequestration of CO2 via creation of new forest (carbon-absorbing forest growing) on the post-agrogenic crude soils of Ob-Chumysh rivers interfluve in Zalesovo district, due to stopping active agricultural activities and organization of forest protection and management measures.

The following priority measures have been included in the project activities:
1) Creation of the forest fire-prevention strips (1,5-3,0 m wide) on the boarders of project land;
2) Periodic monitoring of the project territory via the visual monitoring during the field visits and analysis of the satellite pictures;
3) Cooperation with the forest enterprises in the neighboring areas;
4) Additional attraction of the automobiles and tractors for forest protection in the project territory;
5) Cooperation with the local community, Zalesovo municipality and administration of Altai Kray on this project;

6) Coordination of the forest fire protection with the Inter-Regional Fire Fighting Commission (including Altai and Kemerovo regions).

The projects aims at using modern methods and technologies for annual inventory and protection of forest land from diseases and fires, including those related to the agricultural straw firing, etc.

The project is protected from the institutional risk via close cooperation with Zalesovo municipality, renting the project land for 49 years, use of the land for the authorized purposes.

NGO CEI is the leading Russian non-governmental, not-for-profit organization working on realization of the Constitutional rights for favorable environment and reliable information about its state, health protection, compensation of damage to human health and property caused by violation of the environmental laws and regulation.

The main directions of NGO CEI work:

- Analytical support of decision making on environmental management and sustainable use of natural resources, mitigation of climate change and reduction of damage and adaptation to climatic change impacts;
- Dissemination of information about the modern, innovative, market-based methods for reduction of environmental pollution, rational use of natural resources, implementation of the international climate change agreements;
- Practical projects and programs on environmental improvements, sustainable development, including preparation and implementation of afforestation and forest management projects, reduction of carbon emissions, use of renewable energy sources, energy efficiency improvement and energy saving.

NGO CEI is guided by the principles of sustainable development and environmental and social responsibility, as well as support of Joint Implementation activities under the art. 6 of Kyoto Protocol to UNFCCC.

Hence, through this project NGO CEI resolves both the issue of mitigation of climate change and development of the mechanisms for attracting carbon investments into the afforestation and forest management projects in Russia and worldwide.

The main factors allowing to implement this project include as follows:

- Possibility of its implementation under the Kyoto Protocol mechanism (JI) for minimization of the costs on annual renting of land, maintenance and protection of the forest on project land, as well as further reinvesting in similar activities in Altai Kray aimed at environmental improvements and creation of forest belts for protection of agricultural land, avoiding soil erosion, loss of humus, biodiversity conservation, etc. Thus, when discussing the project idea at the working meetings with municipal and regional authorities, and assessing the opportunity for getting investments from the project ERUs, NGO CEI took positive decision about possibility of project implementation under Art. 6 of Kyoto Protocol;
- Following the principles of sustainable development and best practice will significantly reduce carbon emissions/increase sequestration of carbon from the atmosphere and positively affect the quality of local environment.

Realization of the project was dealt with overcoming of a number of economic obstacles. However, NGO CEI believes that the revenue from sale of project ERUs will allow to resolve the financial barriers further on.

The project activity does not lead to expansion of the activities undertaken before the project, outside of project boundaries, i.e. the project does not lead to extension of the land area. The territory of afforested land is the same before and after the project. The project activity facilitates natural afforestation of the typical species in that areas (mainly birch)[1].

*Kyoto history of project:*

*- 6 July 2000 – Request to the regional forest authorities about consideration of the possibility to implement a pilot carbon sequestration afforestation project under art. 6 of Kyoto Protocol to UNFCCC. Determination of the partners on the project in Zalesovo district of Altai krai.*
*- 14 July 2000 – Request for initiation of development and implementation of the pilot project on carbon sequestration via afforestation in Zalesovo district on the territory of agricultural and other land (inconvenient, etc.) that can satisfy requirements of atr. 6 of Kyoto Protocol.*
*- 20 July 2000 – Agreement on cooperation in implementation of the carbon sequestration afforestation project with the local partner organization, including measures on monitoring of trees and soil, risks of forest fires and diseases, illegal logging and destruction of trees, creation of forest fire protective lines on the territory of municipal "land redistribution fund" (approx. 10000 hectares).*
*- 2000-2007 – Annual implementation of measures on monitoring of trees and soil, risks of forest fires and diseases, illegal logging and destruction of trees, creation of forest fire protective lines on the territory of selected project lands.*
*- 6 September 2007 – Meeting of the Working Group on project implementation in Administration of Zalesovo municipality on the progress in realization of project activities, determination of tasks until 2012 and coordination of activities and management of the project.*
*- 2007-2012 – Scientific research on assessment of carbon sequestration by trees and soil, setting boundaries of project lands, preparation of the information materials for development of project design documentation, preparation of the contracts for renting the project land, monitoring of trees and soil, risks of forest fires and diseases, illegal logging and destruction of trees, creation of forest fire protective lines on the territory of selected project lands.*

*Starting conditions*
According to the starting conditions, the project land would have to be used for their "targeted" purpose which is the agricultural activity (plowing land), without any environmental and climate mitigating measures. This would be determined by the current practice of the similar land in this district. According to the annual reports by Zalesovo municipal administration, 100% of the existing Land Redistribution Fund is "targeted" for agricultural use.

None of the measures, except the project activities aimed at saving of the new forest grown on the agricultural land, could change the type of using this land.

Hence, the baseline scenario is determined by the following:

- Absence of the incentives for implementation of this project. The use of agricultural land for "targeted" purposes is considered as business as usual. The project activity does not aim at further logging and sale of timber (due to various reasons, such as low value of birch and other species, very long period of maturing, lack of demand, etc.). Hence, the environmental activity

[1] The forest zoning by vegetation was done by Professor G.V.Krylov (1962): the south-western part of Zalesovo territory is related to the steppe zone of presalairsky forest, and the north-eastern zone relates to salairsky low mountain forest. The forest in the project territory is related to flat forest type. The main species are birch (Betula pendula, B. pubescens), aspen (Populus tremula), and rarely pine (Pinus sylvestris) and larch (Larix sibirica). Source: G.V.Krylov, Forest resources and forest vegetation zoning of Siberia and Far East, Moscow, 1962.

does not bring any benefits, so that Zalesovo administration (as the primary owner of the land) would never consider such measures as priority ones.

- Absence of the investment attractiveness of such projects. Without JI mechanism, NGO CEI would not implement this project as it is not commercially viable without revenue from ERUs sale.

*Emission reductions/ sequestration*

The project will bring the following results:

- Significant sequestration of carbon dioxide from the atmosphere;
- Substantial improvement of the environmental situation in Zalesovo district and Altai Kray, including climate change mitigation and adaptation, increased biodiversity, watershed protection, reduction of soil erosion, reduction of risks of forest fires in the neighborhood with local villages and towns, etc.
- Improvement of the quality of life, creation of new jobs for local population.

**A.3. Project participants:**

>>

| **Party involved** | **Legal entity project participant (as applicable)** | **Please indicate if the Party involved wishes to be considered as project participant (Yes/No)** |
|---|---|---|
| Party A – Russian Federation (Accepting Party) | Autonomous Noncommercial Organization "Center for Environmental Innovation" (NGO CEI) | No |
| Party B | - | - |

**A.4. Technical description of the LULUCF project:**

**A.4.1. Location of the LULUCF project:**

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**Russian Federation, Altay Kray, Zalesovo District.**

**A.4.1.1. Host Party(ies):**

>>

**Russian Federation.**

**A.4.1.2. Region/State/Province etc.:**

> **Altay region**


**A.4.1.3. City/Town/Community etc.:**

Zalesovo district. Village Zalesovo.


**A.4.1.4. Detailed delineation of the project boundary including information allowing the unique identification of the LULUCF project:**

>>

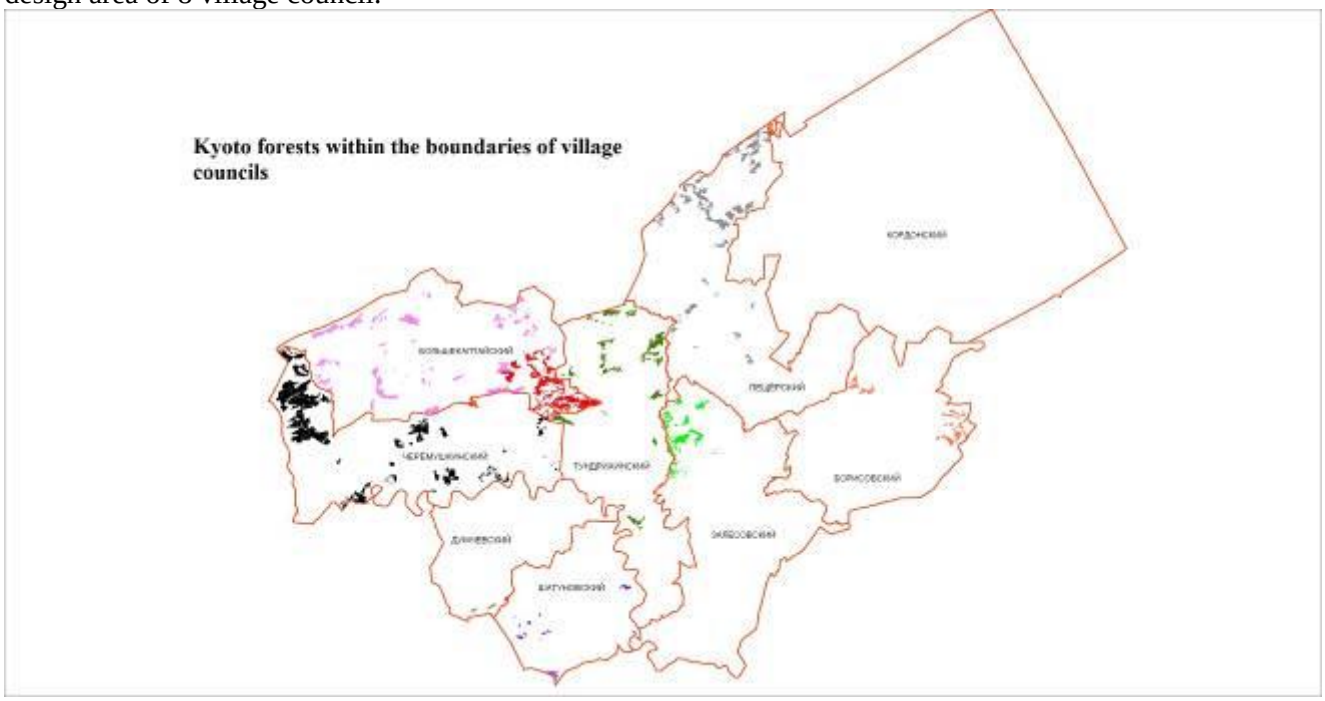
The project land boundaries are determined by OOO GEOS Company (License ALG-00238G of 13/02/2008[2]) with the normative precision according to the Methodological Guidelines for setting boundaries (land surveying) of the land objects (Letter of Roszemcadastr of 18.04.2003).

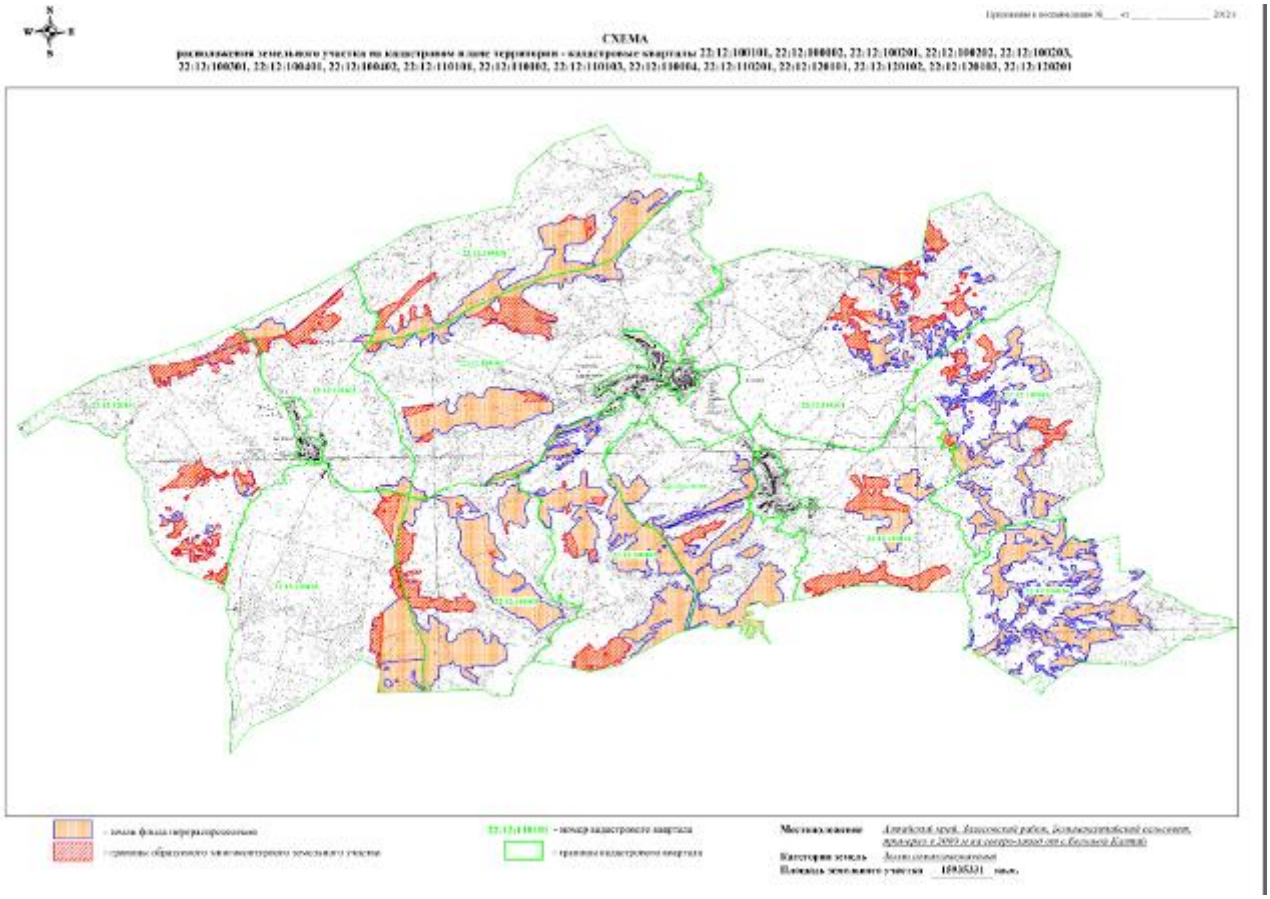
| Cadaster number | Address | Area, hectares |
|---|---|---|
| 22:12:000000:55 | Altai Kray, Zalesovo District, Shatunovsky selsovet, approx. 3000 m south-east of Shatunovo village | 149,654 |
| 22:12:000000:54 | Altai Kray, Zalesovo District, Bolshekaltaisky selsovet, approx. 3000 m north-west of Bolshoi Kaltai village | 1593,5329 |
| 22:12:000000:52 | Altai Kray, Zalesovo District, Borisovsky selsovet, approx. 5000 m north-east of Borisovo village | 419,2173 |
| 22:12:300301:420 | Altai Kray, Zalesovo District, Dumchevsky selsovet, approx. 10200 m south of Dumchevo village | 29,6621 |
| 22:12:000000:53 | Altai Kray, Zalesovo District, Zalesovsky selsovet, approx. 2500 m north-west of Zalesovo village | 628,6265 |
| 22:12:000000:56 | Altai Kray, Zalesovo District, Peschersky selsovet, approx. 4000 m north of Pescherki village | 1507,5968 |
| 22:12:000000:57 | Altai Kray, Zalesovo District, Tundrikhinsky selsovet, approx. 5000 m north-east of Tundrikha village | 958,0243 |
| 22:12:000000:58 | Altai Kray, Zalesovo District, Cheremushkinsky selsovet, approx. 3000 m north-west of Cheremushki | 2924,7812 |

[2] http://www.to22.rosreestr.ru/upload/to22/files/Лицензии%20геодезические_с%20изм.-см.pdf

| | | |
|---|---|---|
| | village | |
| 22:12:000000:46 | Altai Kray, Zalesovo District, Bolshekaltaisky selsovet, approx. 7300 m south-east of Talitsa village | 1278,2755 |
| Total | | 9489,3706 |

Below are the inventory numbers and binding to the countryside, according to an official land survey design area of 8 village council.





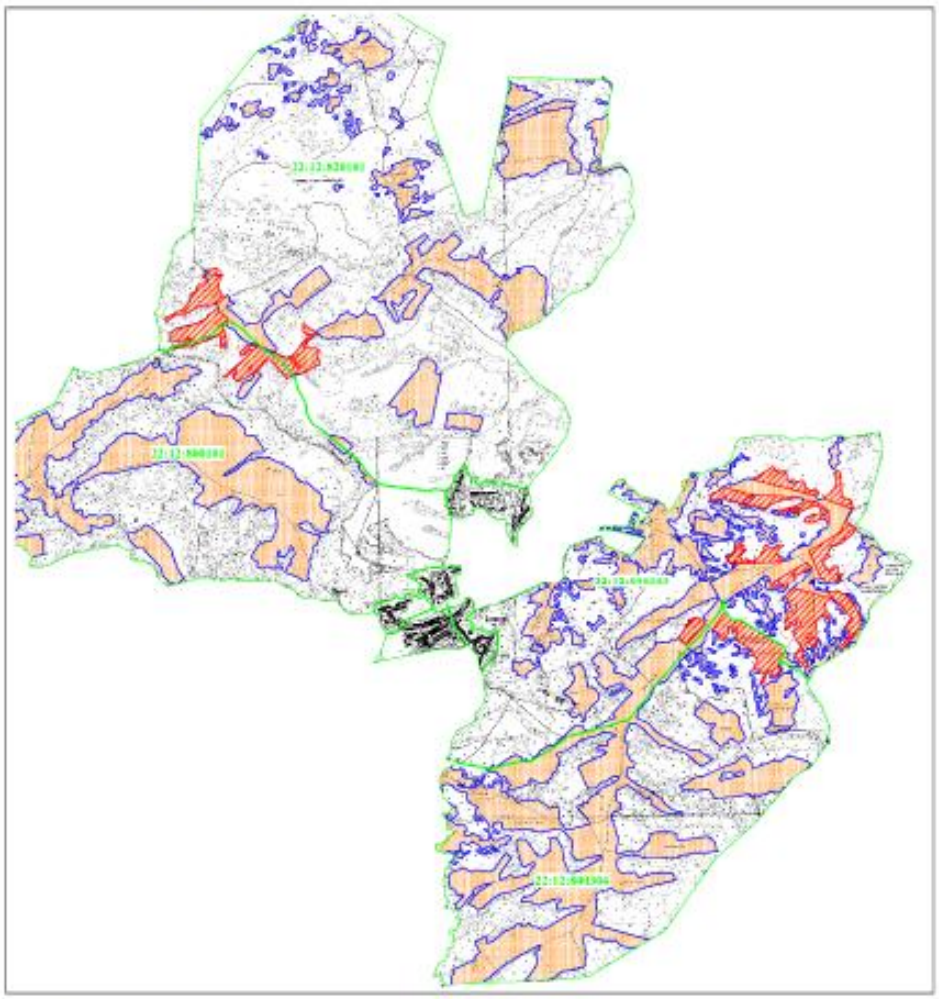
СХЕМА

Приложение к постановлению №___ от ____ _____ 2012 г.

**СХЕМА**

**расположения земельного участка на**

**кадастровом плане территории - кадастровые кварталы 22:12:800101, 22:12:800303, 22:12:800304, 22:12:820101**



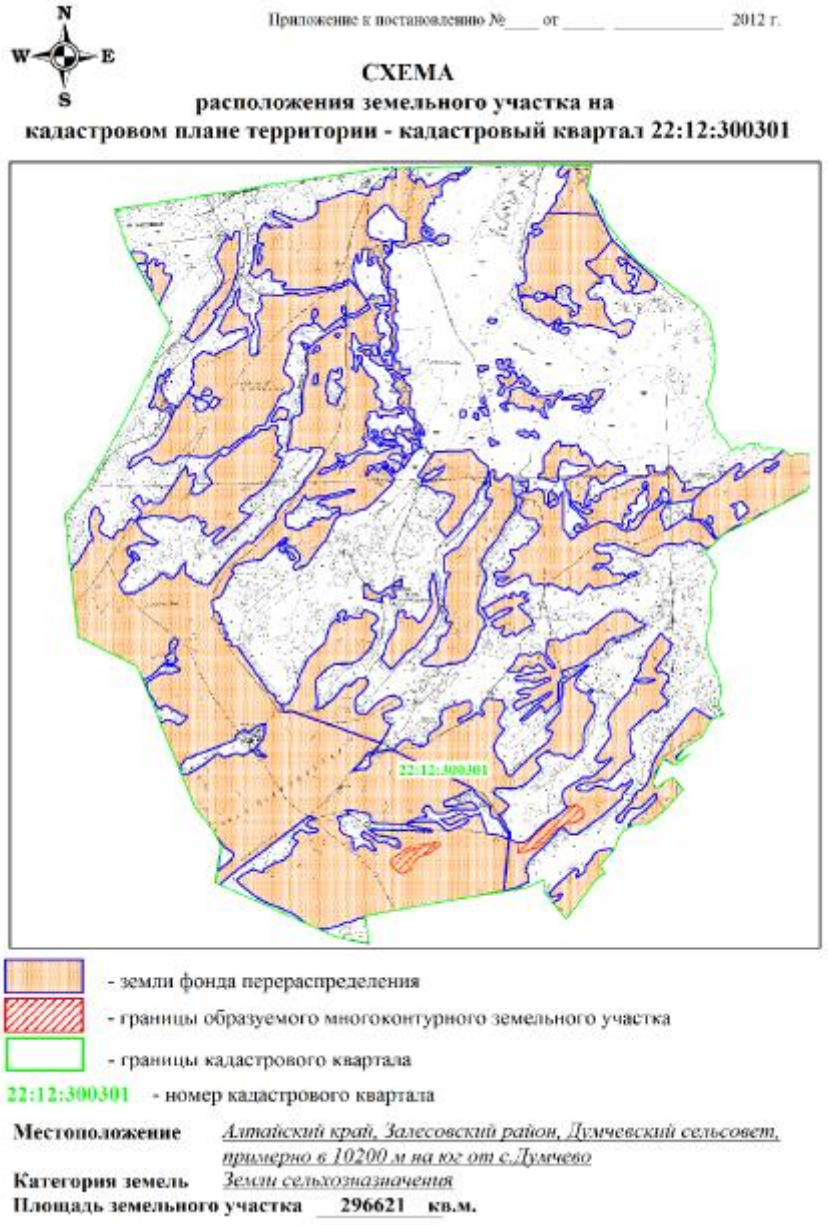
- границы земельных участков, сведения о которых содержатся в ГКН
- границы обрабатываемого многоконтурного земельного участка
- границы кадастрового квартала

22:12:800101 - номер кадастрового квартала

**Местоположение** *Алтайский край, Залесовский район, Борисовский сельсовет, ориентир в 5000 м на северо-восток от с.Борисово*

**Категория земель** *Земли сельскохозяйственного*

**Площадь земельного участка** 4192171 кв.м.


N
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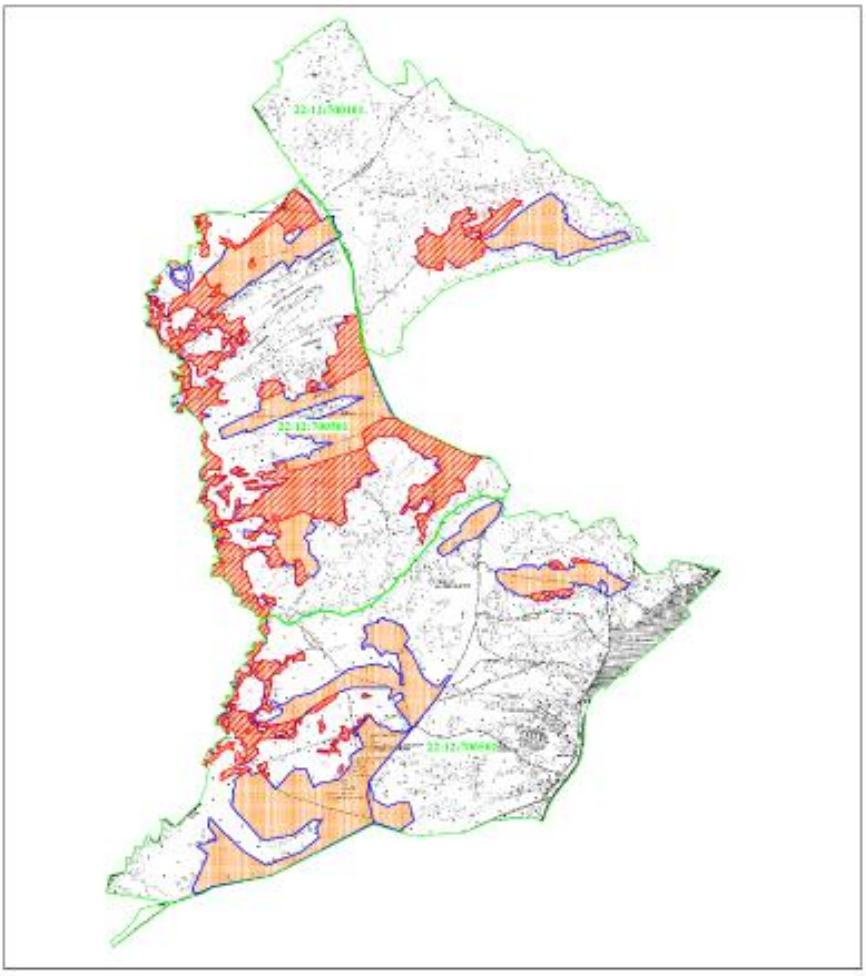
S
Приложение к постановлению №____ от _____ _____ 2012 г.
СХЕМА
расположения земельного участка на
кадастровом плане территории - кадастровый квартал 22:12:300301
22:12:300301
- земли фонда перераспределения
- границы образуемого многоконтурного земельного участка
- границы кадастрового квартала
22:12:300301 - номер кадастрового квартала
Местоположение Алтайский край, Залесовский район, Думчевский сельсовет, примерно в 10200 м на юг от с.Думчево
Категория земель Земли сельхозназначения
Площадь земельного участка 296621 кв.м.

Приложение к постановлению №____ от _____ _____ 2012 г.

**СХЕМА**

**расположения земельного участка на**

**кадастровом плане территории - кадастровые кварталы 22:12:700101, 22:12:700501, 22:12:700502**



- границы земельных участков, сведения о которых содержатся в ГКН
- границы образуемого многоконтурного земельного участка
- границы кадастрового квартала

22:12:700501 - номер кадастрового квартала

**Местоположение** *Алтайский край, Залесовский район, Залесовский сельсовет, примерно в 2500 м на северо-запад от с.Залесово*

**Категория земель** *Земли сельскохозяйственного*

**Площадь земельного участка** **6286263** **кв.м.**

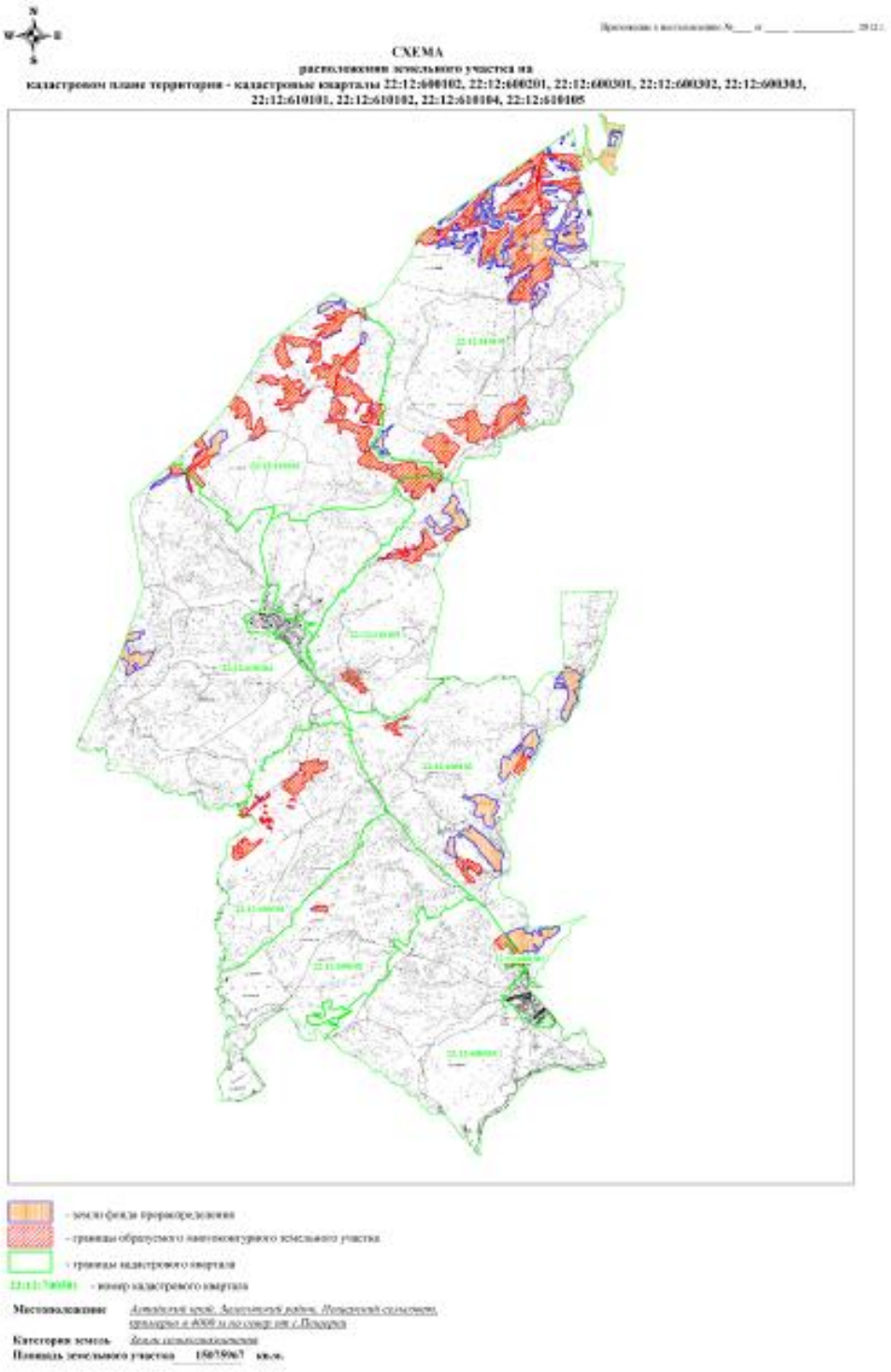

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СХЕМА
расположения земельного участка на
кадастровом плане территории - кадастровые кварталы 22:12:600102, 22:12:600201, 22:12:600301, 22:12:600302, 22:12:600303,
22:12:610101, 22:12:610102, 22:12:610104, 22:12:610105
- земли фонда перераспределения
- границы образуемого многоконтурного земельного участка
- границы кадастрового квартала
- номер кадастрового квартала
Местоположение
Категория земель
Площадь земельного участка 1507996 кв.м.

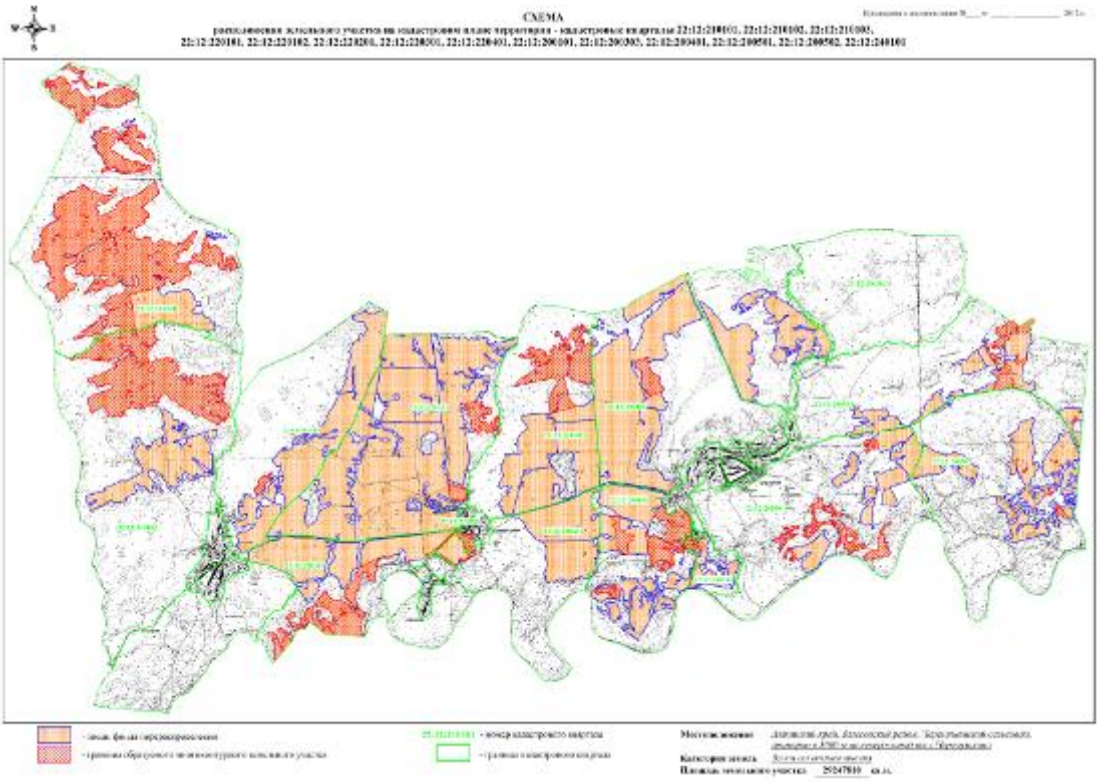
СХЕМА
- земли фонда перераспределения
- границы образуемого многоконтурного земельного участка
- номер кадастрового квартала
- границы кадастрового квартала
Местоположение
Категория земель
Площадь земельного участка

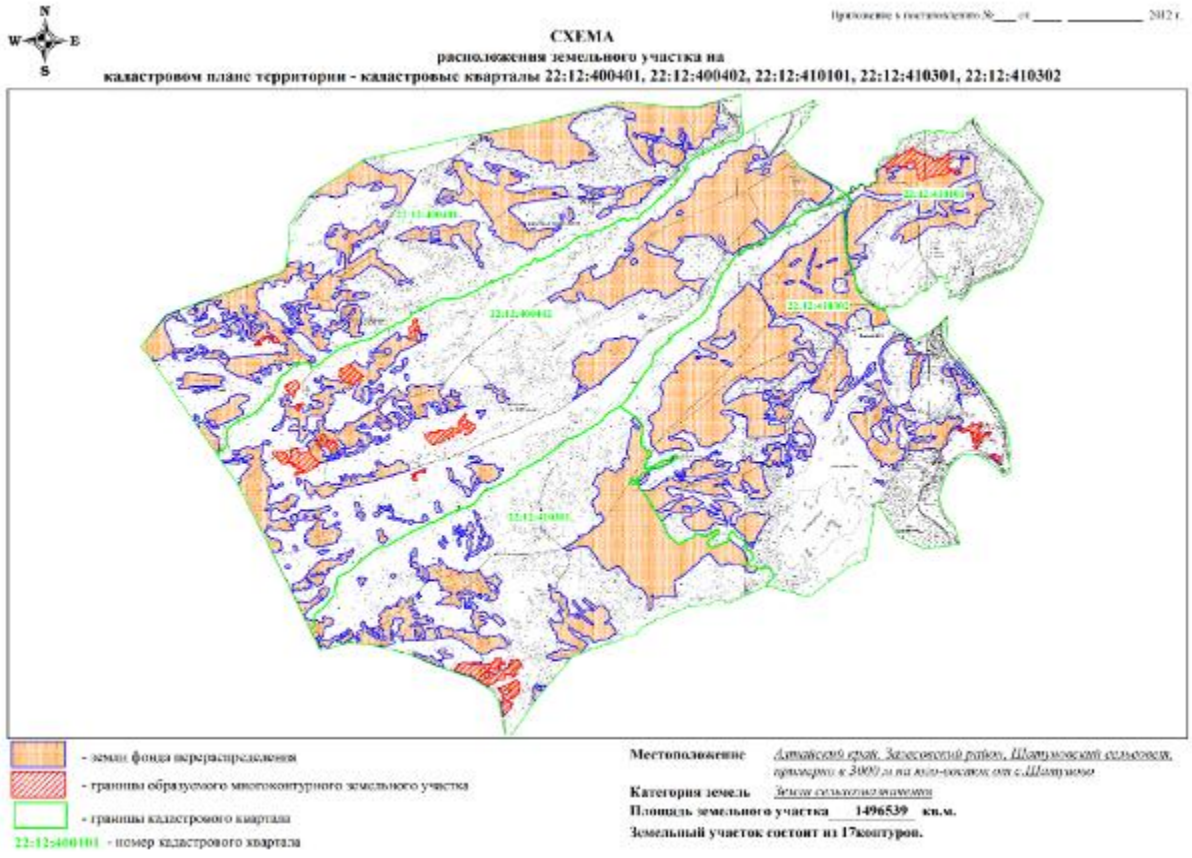
N
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СХЕМА
расположения земельного участка на
кадастровом плане территории - кадастровые кварталы 22:12:400401, 22:12:400402, 22:12:410101, 22:12:410301, 22:12:410302
- земли фонда перераспределения
- границы образуемого многоконтурного земельного участка
- границы кадастрового квартала
22:12:400101 - номер кадастрового квартала
Местоположение Алтайский край, Залесовский район, Шатунихский сельсовет, примерно в 3000 м на юго-восток от с. Шатунихо
Категория земель Земли сельскохозяйственного
Площадь земельного участка 1496539 кв.м.
Земельный участок состоит из 17контуров.

**A.4.2. Conformity with the definitions of LULUCF activities:**

>>

*Conformity with the definition of Kyoto forest*

According to Art. 3.3 of Kyoto Protocol and related definitions (FCCC/KP/CMP/2005/8/Add.3, Page 5), "Forest" is a minimum area of land of 0.05–1.0 hectare with tree crown cover (or equivalent stocking level) of more than 10–30 per cent with trees with the potential to reach a minimum height of 2–5 metres at maturity in situ. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 10–30 per cent or tree height of 2–5 metres are included under forest, as are areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest.

The project land areas with trees are consistent with the term "Kyoto forest", as determined by the Decision of the Meeting of the Parties of Kyoto Protocol 16/CMP.1. Specifically, they correspond to the requirements of the land area over 0.05-1.0 hectares with the tree coverage (or equal level of carbon storage), 10-30% of which is able to reach minimum height of 2-5 meters in the maturing period.

The following characteristics of sample plots of the project land allow to implement this project under Art. 3.3 of Kyoto Protocol:

| # of sample plot | Average height of trees, m | Average diameter of trees, cm | Basal area, sq.m/ha |
|---|---|---|---|
| 1 | 10,1 | 8,5 | 52,2 |
| 2 | 8,1 | 6,5 | 69,6 |
| 3 | 7,8 | 6,5 | 109,4 |
| 4 | 11,7 | 11,1 | 78,0 |
| 5 | 4,0 | 4,4 | 68,7 |
| 6 | 7,9 | 5,1 | 77,6 |
| 7 | 6,0 | 4,5 | 86,3 |
| 8 | 9,1 | 8,6 | 109,6 |
| 9 | 7,0 | 6,5 | 86,2 |
| 10 | 9,5 | 8,3 | 107,9 |
| 11 | 7,5 | 5,7 | 99,6 |
| 12 | 6,5 | 4,4 | 72,4 |
| 13 | 8,3 | 7,4 | 114,2 |
| 14 | 5,0 | 4,2 | 66,8 |

*Selection of the type of activity*

Decision 16/CMP.1 // 3 // clarifies the terms "afforestation" and "reforestation" as follows:

-"Afforestation" is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through growing, seeding and/or the human-induced promotion of natural seed sources

-"Reforestation" is the direct human-induced conversion of non-forested land to forested land through growing, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land.

The project land areas comply with the Afforestation type of activity due to the following reasons:
During collectivization (1930s) a number of kolkhozes were established in Zalesovo District of Altay Kray. Later on these kolkhozes were reorganized into larger ones and their land was joint and used for the agricultural purposes. That is documented by the State Acts of Ownership rights. All documentation, including the maps identifying location of the land is kept in Zalesovo District Archive.

In 1960-1970s, further process of reorganization of the agricultural enterprises took place and a number of sovkhozes were established: Zalesovsky, Pravda, Truzhennik, Bolshevik, Borisovsky, Lnovod. All the agricultural land pieces were assigned to these sovkhozes for further "targeted" use as plowing land. (The map of agricultural lands of 1973 is available in Zalesovo District Archive.)

The sovkhozes had agricultural production (plowing and harvesting grains) on the lands until 1990s. The state of land in 1990s is documented in the State Book of Land Use for Zalesovo District (available in Zalesovo District Archive).

As far as the project land areas had been included in the lands of kolkhozes and, later, sovkhozes, they were not covered by forest at least since 1930s and until 1990s.

Afforestation of the territory within the project boundaries does not violate the existing legislation on the land use or environmental protection.

**A.4.3. Technology(ies) to be employed, or measures, operations or actions to be implemented by the LULUCF project:**

>>
The project activities are aimed at sequestration of CO2 via creation of new forest (carbon-absorbing forest growing) on the post-agrogenic crude soils of Ob-Chumysh rivers interfluve in Zalesovo district, due to stopping active agricultural activities and organization of forest protection and management measures.

The following priority measures have been included in the project activities:
1) Creation of the forest fire-prevention strips (1,5-3,0 m wide) on the boarders of project land;
2) Periodic monitoring of the project territory via the visual monitoring during the field visits and analysis of the satellite pictures;
3) Cooperation with the forest enterprises in the neighboring areas;
4) Additional attraction of the automobiles and tractors for forest protection in the project territory;
5) Cooperation with the local community, Zalesovo municipality and administration of Altai Kray on this project;
6) Coordination of the forest fire protection with the Inter-Regional Fire Fighting Commission (including Altai and Kemerovo regions).

The projects aims at using modern methods and technologies for annual inventory and protection of forest land from diseases and fires, including those related to the agricultural straw firing, etc.

**A.4.4. Brief explanation of how the net anthropogenic removals by sinks are to be enhanced by the proposed JI LULUCF project, including why these enhancements would not occur in the absence of the proposed project, taking into account national and/or sectoral policies and circumstances:**

>>
The project aims at sequestration of CO2 from the atmosphere. Such sequestration can only be achieved by implementing the project activities on creation and protection of the carbon-absorbing forest.

NGO CEI has been working on the innovative approaches to climate mitigation policies and measures, including those on sequestration of CO2 by forest, located out of the territory of the State Forest Fund, and in the areas where there was no forest for many decades.

Creation of the forest for accumulation of carbon on non-forest land has been never considered seriously in Russia, as such type of land would be used for agricultural or other purposes bringing commercial benefits (business as usual). However, the project does not aim at harvesting and sale of wood, thus putting in doubt the commercial feasibility of such activity. So the land owners have never considered such activities as priority ones.

Current Russian legislation does not regulate emissions of CO2, and thus allow to increase CO2 emissions. So Zalesovo municipal administration is not limited anyhow with the emission quota and is not responsible for any mitigation policy at the moment. Hence, the GHG emissions related to agricultural activities on the project land (without project) would likely occur.

Without this project, the carbon sequestration would not happen, as the usual practice of using such land is for agricultural purpose, meaning that no activities on keeping the carbon stored in the trees and soil.

These arguments as well as the information in Section illustrate that without Kyoto Protocol JI mechanism NGO CEI would not be able to increase carbon sequestration and reduce emissions. It is only feasible if the project is implemented as JI project.

**A.4.4.1. Estimated enhancements of net anthropogenic removals by sinks over the crediting period:**

>>

| | Years |
|---|---|
| Length of the crediting period | 5 |
| Year | Estimate of annual emission reductions in tonnes of $CO_2$equivalent |
| 2008 | 361 634 |
| 2009 | 356 976 |
| 2010 | 353 169 |
| 2011 | 349 951 |
| 2012 | 347 164 |
| Total estimated emission reductions over the crediting period (tonnes of $CO_2$ equivalent) | 1 768 894 |
| Annual average of emission reductions over the crediting period (tonnes of $CO_2$ equivalent) | 353 779 |

In case of extending the crediting period beyond 2012 the monitoring plan and calculation of emission reductions will remain unchanged, which will be determined according to formulas in D sections

| | Years |
|---|---|
| Length of the second crediting period | 5 |
| Year | Estimate of annual emission reductions in tonnes of $CO_2$equivalent |

| | |
|---|---|
| 2013 | 347 164 |
| 2014 | 347 164 |
| 2015 | 347 164 |
| 2016 | 347 164 |
| 2017 | 347 164 |
| Total estimated emission reductions over the crediting period (tonnes of $CO_2$ equivalent) | 1 735 818 |
| Annual average of emission reductions over the crediting period (tonnes of $CO_2$ equivalent) | 347 164 |

## A.5. Project approval by the Parties involved:

>>

On September 15, 2011 the Chairman of the Russian Federation Government signed Resolution 780 "On measures for realization of Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change". This document depicts a JI-project approval procedure in the Russian Federation.

According to item 4 of the Provision the approval of projects will be carried out by the Ministry of Economic Development of the Russian Federation based on consideration of submitted project proposals. Competitive selection of demands is carried out by the operator of carbon units (Sberbank of RF) according to the item 10 of the Government Decree of the Russian Federation № 780.
According to item 7 of the Provision the application structure includes «the positive expert opinion on the project design documentation prepared according to the international requirements by the accredited independent entity chosen by the applicant».

Thus, according to the legislation of the Russian Federation in the field of JI projects realization, the Project approval is possible after reception of the positive determination opinion from AIE.
The project approval by non-host Party will be received after the approval getting from the Russian Federation.

## SECTION B. Baseline

### B.1. Description and justification of the baseline chosen:

>>

**Description of baseline setting approach**

For the description and setting of baseline a JI specific approach was applied. It was developed in accordance with paragraph 9 (a) of the "Guidance on criteria for baseline setting and monitoring" Version 03[3]. The approach presumes:

Step. 1. Indication and description of the approach chosen regarding the baseline setting;
Step. 2. Application of the approach chosen.

Below the indicated steps are provided more detailed.

*Step. 1. Indication and description of the approach chosen regarding baseline setting*

Baseline is setting based upon analyses of different alternative scenarios including the proposed project activity without JI component. Criteria for baseline setting are established as "key factors". All the alternatives will be scrutinized for the sake of their dependence on these key factors. The most plausible alternative is the one that is less influenced by these factors. So the applied approach consists of the stages:

a) *Description of alternative scenarios;*
b) *Description of key factors;*
c) *Analysis of influence of key factors on indicated alternatives;*
d) *Choosing of the most plausible alternative scenario.*

*Step. 2. Application of chosen approach*

Alternative scenarios available for the project owner are listed below:
1. Continuation of existing situation, that means targeted use of project lands – agricultural use for production of end product (ploughing-up and seeding; pasture of livestock, etc.);
2. The project itself, that means preservation and management of forest on the project lands by devolution of rights on previous environmental protection measures and getting of it in long time rent for their damaging prevention (without JI registration).

***Influence of chosen alternatives to the existing lows and regulations***

Projects that are in touch with forest protection activity are in accordance with existing legal norms and standards. Forest management activity on non-forest lands is not managed by any legal norms.

**Conclusion:** Hence, none of the alternatives contradicts the existing legal norms and can be analyses further.

[3] http://ji.unfccc.int/Ref/Documents/Baseline_setting_and_monitoring.pdf

**Alternative scenario 1 is the most possible and viable as is the common practice of targeted use of lands in redistribution fund.**

Before the start of 1990 these lands were used by collective farms (kolkhoz and sovkhoz) as a ploughing-up lands and pastures for livestock. After 1990 the use of these lands as agricultural lands stopped, and by the end of 90-ths they were transferred in redistribution lands fund. After that they would be transferred to new owners for use by private entities and farms for agricultural needs. It is necessary to emphasize that these lands are non-forest lands and doesn't need forest management measures such as growing, treatment and cut of wood. Thus it may be concluded the alternative to be the most feasible and viable. It is not prevented by any barrier or obstacles, hence is the baseline.

Alternative scenario 2 is analyzed as less feasible and viable without JI registration.

Due to the lands were abandoned and were not used for a couple of years they were transferred to redistribution lands in 2000. After that they were planned to be transferred to the private agricultural company but due to the interactions with ANO (CEI) and administration they were officially transferred for the purpose of forest growing:
*1. Creation of fire-prevention forest lines (width 1.5 meters);*
*2. Monitoring of project are by satellites;*
*3. Interactions with forestry on the borders of project land;*
*4. Disposal of necessary machines for protection of the forest;*
*5. Relations with community and administration of Altai region.*

Nowadays researched project areas with trees can be treated as "forest" from the Kyoto protocol point of view (paragraphs 3 and 4, article 3)[4], it means that the territory with the area 0.05-1.0 hectares covered by forest plants (or equal level of sequestration), and more than 10-30% of trees are able to reach minimal height 2-5 meters in the period of ripening.

Protection and managing of forested lands, that have status of agricultural lands, is the activity that has serious organizational and institutional barriers and private investing for a long period of time for preserving the forest in healthy condition and fire-prevention. Besides such activity is commercially unprofitable because it doesn't envisage any revenue for an investor, except possibility to sell sequestrated emissions on international carbon market. Thus, this scenario is not viable without getting the ERUs, hence it is not the baseline.

Additionality of the project will be demonstrated in Section B.4.
As CO2 will not be sequestrated due to the agricultural use for end product production, then the sequestration under the baseline are zero. Hence, tabular forms for key parameters used for baseline establishing were not filled.

**B.2. Carbon pools selected:**

For the sequestration of CO2 were used carbon pools:

| Carbon pools | Selected (yes/no) | Justification/Explanation (If needed, please use the space at the bottom of the table) |
|---|---|---|
| Above-ground biomass | Yes | Is the main source of sequestration by project. Is calculated based on forest surveying made by FGBOU VPO "Altai State |

[4] Decission 16/CMP1 FCCC/KP/CMP/2005/8/Add.3 page 5.

| | | |
|---|---|---|
| | | Agricultural University" and represented in research file of Kyoto forest |
| Below-ground biomass | Yes | Is the main source of sequestration by project. Is calculated based on forest surveying made by FGBOU VPO "Altai State Agricultural University" and represented in research file of Kyoto forest |
| Dead wood | No | Neglected for conservativeness, because by project it will sequestrate carbon dioxide but under the baseline it would not exist due to agricultural use of the territory. |
| Litter | No | Neglected for conservativeness, because by project it will sequestrate carbon dioxide but under the baseline it would not exist due to agricultural use of the territory. |
| Soil organic carbon | Yes | Is the main source of sequestration by project. Is calculated based on forest surveying made by FGBOU VPO "Altai State Agricultural University" and represented in research file of Kyoto forest |

**B.3. Specification of the greenhouse gas sources whose emissions will be part of the LULUCF project:**

>>

| Source | Gas | Included/excluded | Justification |
|---|---|---|---|
| Use of fertilizers | CO2 | excluded | Excluded as fertilizers are not used by project. |
| | CH4 | excluded | Excluded as fertilizers are not used by project. |
| | N2O | excluded | Excluded as fertilizers are not used by project. |
| Combustion of fossil fuels used in on-site vehicles | CO2 | excluded | Excluded for conservativeness. For explanation see Section B.5. |
| | CH4 | excluded | Excluded for conservativeness. For explanation see Section B.5. |
| | N2O | excluded | Excluded for conservativeness. For explanation see Section B.5. |

According baseline, when there will be agricultural land use, actual emissions would be:
- combustion of fuels in agricultural machines and mechanisms;
- methane emissions from livestock;
- emissions from fertilizers.

These emissions are absent in project because the use of mechanisms and machines for forest management is much less than under agricultural cultivation. Agricultural lands are treated yearly and many times per year (they are plugged, crops treatment includes many stages: weeding, gathering, winning, etc.). Livestock is emitted methane due to the stomach (mainly cows) and crops. When fertilizers are used they could cause emissions of CO2 and N2O.
Under the project these emissions are absent at all (from livestock and fertilizers) or much less (combustion of fuel in machines and mechanisms). Therefore, these emission sources were assumed zero for simplification and this is conservative.

**B.4. Description of how the net anthropogenic removals by sinks are enhanced above those that would have occurred in the absence of the JI LULUCF project:**

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Additionality was demonstrated according to the paragraph 2 (a) of the Annex I to the "Guidance on criteria for baseline setting and monitoring" version 03 by "Provision of traceable and transparent information showing that the baseline was identified on the basis of conservative assumptions, that the project scenario is not part of the identified baseline scenario and that the project will lead to reductions

of anthropogenic emissions by sources or enhancements of net anthropogenic removals by sinks of GHGs".

Analysis made in Section B.1 shows that the proposed project is not baseline.

Demonstration and assessment of additionally is made by consecutive analysis that includes 5 stages. If the investment analysis shows that Project is not the most financially attractive, then from the stage 2 the stage 4 should be performed.

Stage 1. Identification of alternatives;
Stage 2. Investment analysis, and (or)
Stage 3. Barrier analysis;
Stage 4. Common practice analysis.
Stage 5. Provision of additionally proofs

**Application of the chosen approach**

**Stage 1. Identification of alternatives**

Identification of alternatives for further analysis were made in Section B.1.

1**.** ***Continuation of existing situation, that means targeted use of project lands – agricultural use for production of end product (plugging-up and seeding; pasture of livestock, etc.);***
2. ***The project itself, that means preservation and management of forest on the project lands by devolution of rights on previous environmental protection measures and getting of it in long time rent for their damaging prevention (without JI registration).***

**Stage 2. Investment analysis**

On the stage is determined:
- Whether Project alternative is the most financially and economically attractive;
- If the project is economically or financially viable without revenue from ERUs sales.

***Substage 2a: Determine of appropriate analysis method***
There are three methods applicable for investment analysis: simple cost analysis, investment comparison analysis and benchmark analysis.
A simple cost analysis (Option I) shall be applied if the proposed JI project and the alternatives identified on Stage 1 generate no financial or economic benefits other than JI related income. In other areas of the project owner is not held to any reforestation and forest protection activities. The proposed JI project doesn't pose any revenue from forest sale or fuel economy. Therefore simple cost analysis is applied.

***Substage 2b: Option 1. Simple cost analysis***
Under the baseline project lands would be rented by agricultural firm for pluggin-up and growing of agricultural products. Herewith company ANO CEI – project investor, would not invest money to forest management activity, hence its expenses would be zero. On the project land another owner would not make any forest management activity.

The cost of the project scenario of 10.3 million rubles, which consists of the following costs: 9.9 million investment, spent a year in 2000-2011 digging-inforests, ie protection, conservation of forests, 0.421 million-investment in determine the boundaries of project forest area.

These investments are completely unrecoverable (sunk), and in essence - environmental charity. The only source of income can be a sale of emission reductions.The only source of revenue could be ERUs sales.

Therefore, project investor ANO CEI can't receive any income except ERUs sales.

Comparison of investments by Alternative scenario 1 and 2:

| | Alternative scenario 1 | Alternative scenario 2 (the Project) |
|---|---|---|
| Investments, mln. of rubles | 0 | 10.3 |
| Type of investments | - | Private |

By the comparison of investments by the two scenarios it can be concluded that Alternative scenario 2 is unprofitable for the project participant against the Alternative scenario 1.

**Stage 4. Common practice analysis**
The stage amplifies assessments made on previous stages and provides common practice analysis of reforestation activity by project.

Creation of forest lands on non-forest territories for carbon dioxide sequestration is not carried out in Russia.

Reforestation activity is an obligatory measure performed by timber procurer or its subcontractor on the rent forest territory. However, this kind of activity is obliged to be performed only on rent or private forest lands ("forest fund" lands). Project lands are not forest fund lands, whence they are not the common practice.

The only one LULUCF JI project in Primorsky krai published on UNFCCC site[5] is implemented on the forest fund lands. It envisage stop of exploitation of the existing forests and their protection (change of forestry management) this is the difference of it from the project activity in this project.

Hence, project activity is not a common practice. Therefore the project is additional.

**Conclusion:** The performed analysis clearly shows that the Project activity is not economically attractive, is not the common practice, whence is additional.

**B.5. Description of how the definition of the project boundary is applied to the LULUCF project:**

>>
In accordance with "Guidance on criteria for baseline setting and monitoring" version 03 LULUCF project boundaries should include unique geographical identification. Boundaries shall be defined for every separate area and shall not include areas in between these sites.
Project area has no breaks and is a whole. The site has the following coordinates and cadastre number, defined in the process of demarcation
In the project boundaries are included GHG sequestrations due to the project activity that are under project participant control. In the assessment are considered only significant emissions (more than 1% of total project sequestrations).

5
http://ji.unfccc.int/JI_Projects/DB/ULD19J1NDCZQ6A5GRW1ZC5C2A17CE0/PublicPDD/52ZLCD3NWXK59AC6KTL9VCDF3Z240O/view.html

In the table below sources of GHG sequestrations and types of GHG are shown.

Table B5.1. GHG sequestration sources

| Scenario | Source | Type of gas | Include/Exclude | Comment |
|---|---|---|---|---|
| Project activity | Above-ground biomass | $CO_2$ | Included | The main source pf project sequestration |
| | Below-ground biomass/soil | $CO_2$ | Included | The main source pf project sequestration |

Leakage assessment

In accordance with "Guidance on criteria for baseline setting and monitoring" version 03 leakage are defined as "the net change of anthropogenic emissions by sources and/or removals by sinks of GHGs which occurs outside the project boundary, and that can be measured and is directly attributable to the JI project". In case the potential leakage assessed, project participants shall analyses the potential leakage of the JI project and describe and justify what kind of leakage shall be calculated and what can be neglected.

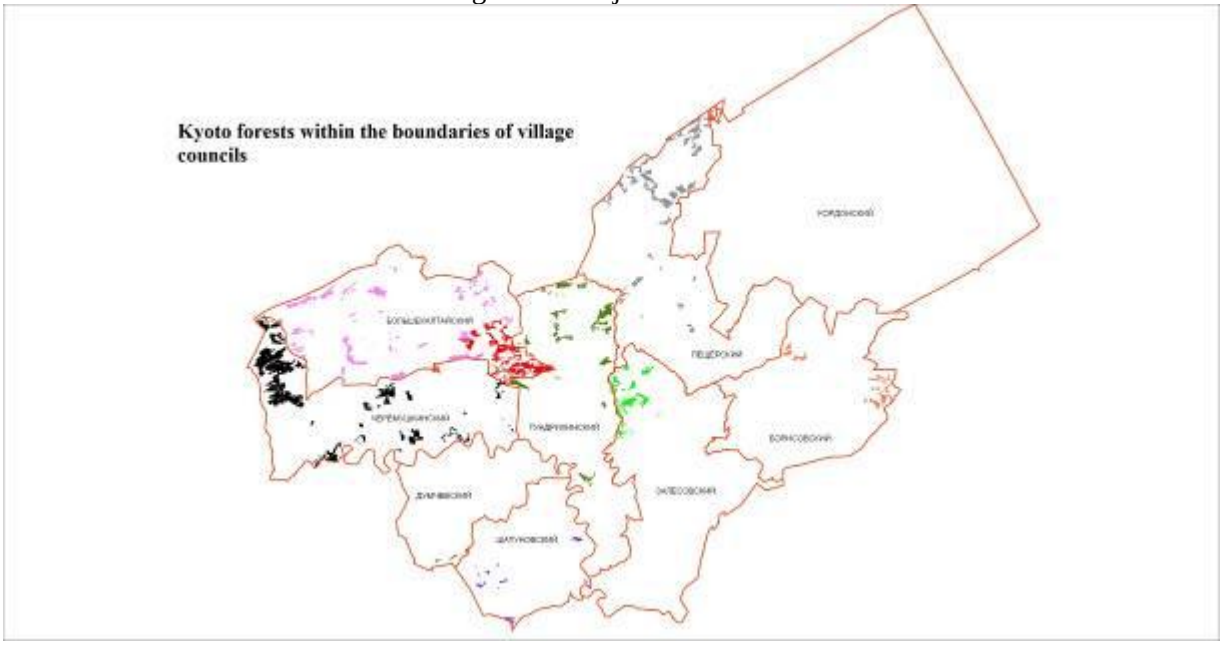
Project envisages the combustion of diesel fuel by machines by project and under baseline.

Main potential emissions that could be treated as leakage under the project – emissions due to oil extraction and refining for diesel fuel manufacturing.

By taking account that under the baseline the area would be used as agricultural land, in other words would be mechanically impacted many times per year and annually, it can be concluded that emissions from diesel fuel combustion by agricultural mechanisms would be higher than in the process of forestry machines treatment. In other words under the project activity is the reduction of fuel consumption (and its production), whence there is emission reduction outside the project boundaries. However, they won't be considered for conservativeness.

Project boundaries include all the project reforestation area that is under the managing of project participant.

Fig B.3.1. Project boundaries.




**B.6. Further baseline information, including the date of baseline setting and the name(s) of the person(s)/entity(ies) setting the baseline:**

>>

Date of baseline setting: 25/03/2012

The developer of the baseline: Nonprofit Organization Center for Environmental Innovation, Moscow, Lobachevsky 46, k.17
Contact: Andrey Stetsenko, President.
Tel.: +7-926-911-05-14
Fax: +7-499-431-47-57
Email: abc@ngo-cei.ru

## SECTION C. Duration of the LULUCF project / crediting period

**C.1. Starting date of the project:**

Project start date 20/07/2000 - Agreement on cooperation in implementation of the carbon sequestration afforestation project with the local partner organization, including measures on monitoring of trees

**C.2. Expected operational lifetime of the project:**

The service life of the project will be at least 50 years or 600 months, from 20/07/2000 to 20/07/2050.

**C.3. Length of the crediting period:**

>>

Period in accordance with the budget period of the Kyoto Protocol get 5 years or 60 months: from 01.01.2008 to 31 December 2012.

## SECTION D. Monitoring plan

The monitoring plan is described throughout a section D in accordance with paragraph 30 of the Guidance on criteria for baseline setting and monitoring. Project developer applies its own methodology for monitoring plan (JI specific approach) in accordance with paragraph 9 (a) of the Guidance on criteria for baseline setting and monitoring (Version 03), and other applicable JI guidelines. The JI-approach includes consideration of the following steps:

*Step. A. Indication and description of the approach taken regarding the installation of monitoring (Indication and description of the approach chosen regarding monitoring).*
*Step. Two. Application of the approach (Application of the approach chosen).*

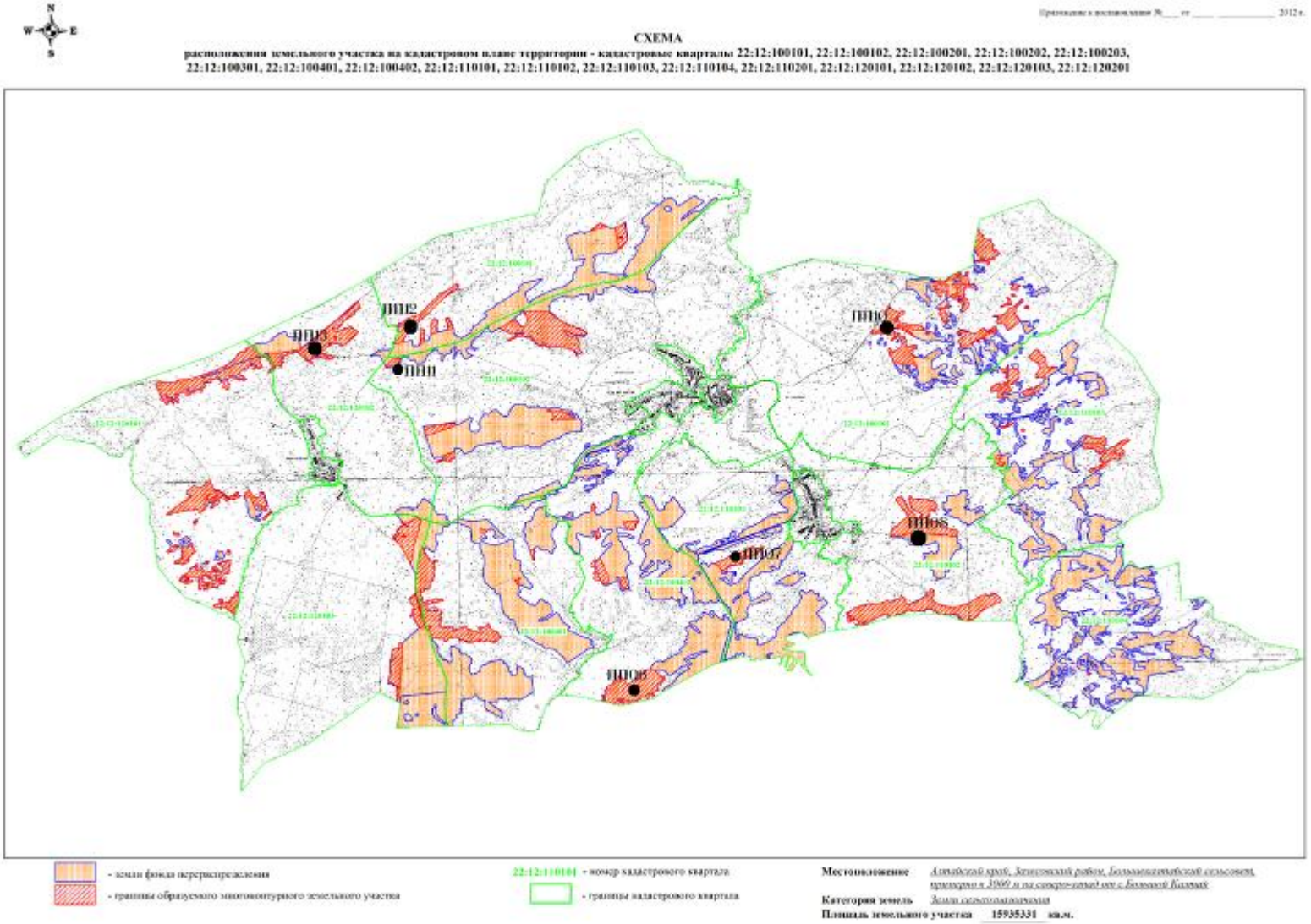
The following is a more detailed description of the chosen approach.

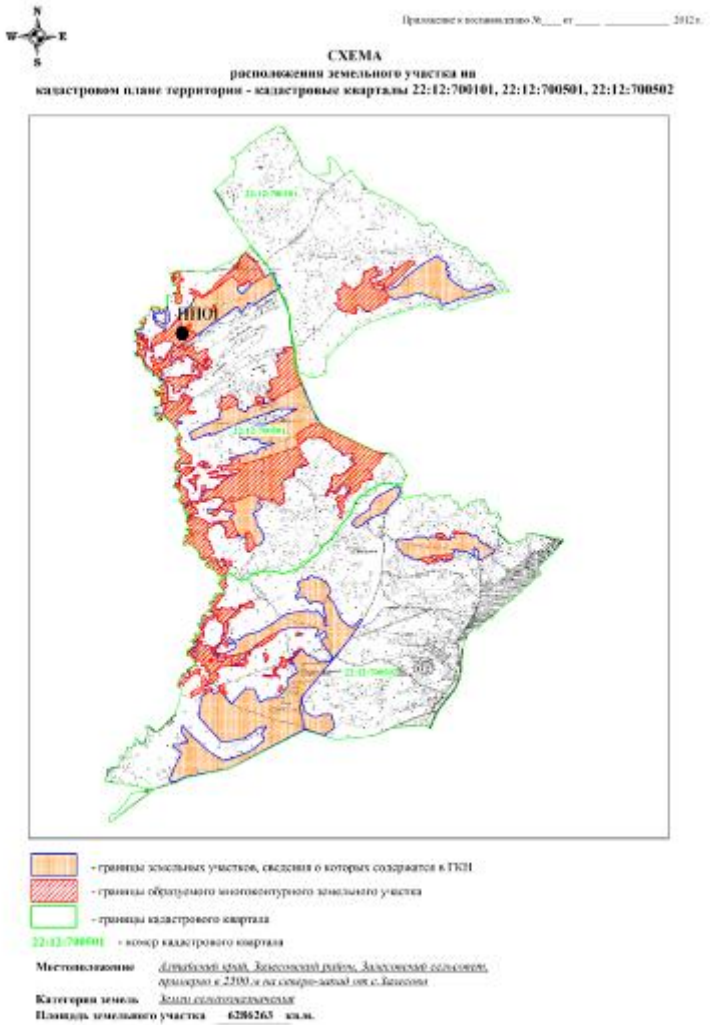
*Step. A. Indication and description of the approach taken regarding the installation of monitoring (Indication and description of the approach chosen regarding monitoring).*

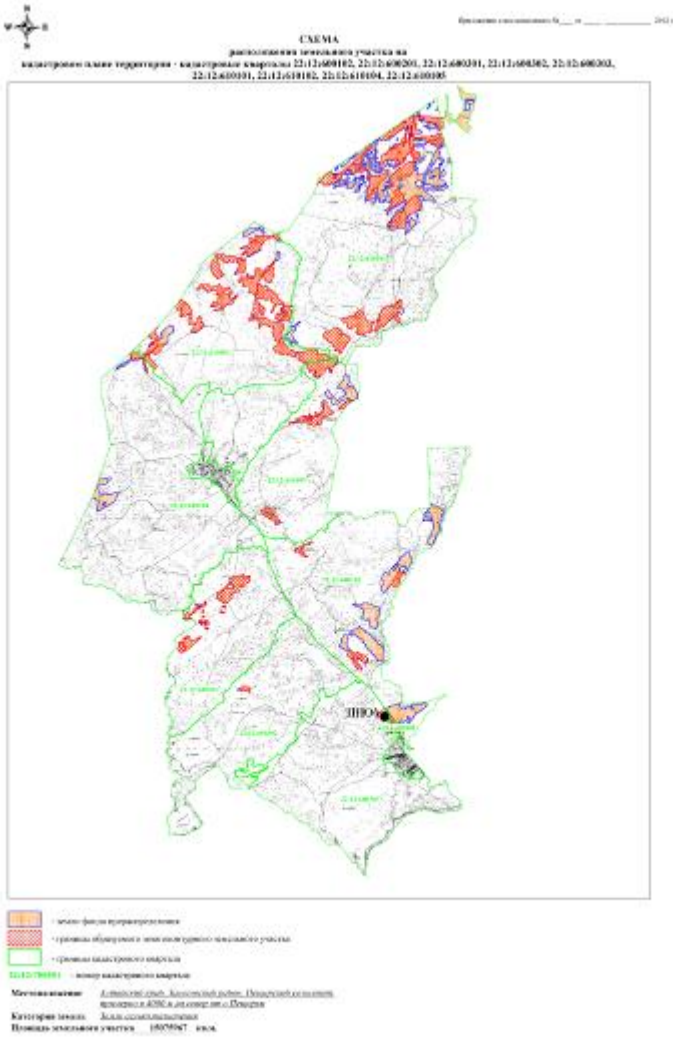
The list of default values necessary for calculations are established in Table D.1-1.

| Parameter | Value | Comments |
|---|---|---|
| Sq | 9489.37 ha | Square project area determined based on result of determine of project boundary's; |
| $\rho_к$ | for birch 638 kg/m3<br>for aspen 495 kg/m3 | Wood density in accordance with the definition of wood density in accordance with GOST 23431-79) for each test site; |
| J | 250 | Conversion factor of the square cross-sections of trees at one site in the cross-sectional area of trees per 1 ha; |
| K | 0.4 or 0.44 | Coefficient, that for pine, larch, birch, aspen, gray alder, linden, oak and hornbeam equals 0.4, for the remaining trees - 0.44; |

The monitoring will involve all of the defined survey areas, as the project is carried out on all of them.


N
W
E
S
СХЕМА
расположения земельного участка на кадастровом плане территории - кадастровые кварталы 22:12:100101, 22:12:100102, 22:12:100201, 22:12:100202, 22:12:100203, 22:12:100301, 22:12:100401, 22:12:100402, 22:12:110101, 22:12:110102, 22:12:110103, 22:12:110104, 22:12:110201, 22:12:120101, 22:12:120102, 22:12:120103, 22:12:120201
- земли фонда перераспределения
- границы образуемого многоконтурного земельного участка
22:12:110101 - номер кадастрового квартала
- границы кадастрового квартала
Местоположение Алтайский край, Змеиногорский район, Большегривинский сельсовет, примерно в 3000 м на северо-запад от с. Большой Калтай
Категория земель Земли сельскохозяйственного
Площадь земельного участка 15935331 кв.м.


Приложение к постановлению №___ от _____ _____ 2012 г.
СХЕМА
расположения земельного участка на
кадастровом плане территории - кадастровые кварталы 22:12:700101, 22:12:700501, 22:12:700502
НПО1
- границы земельных участков, сведения о которых содержатся в ГКН
- границы образуемого многоконтурного земельного участка
- границы кадастрового квартала
22:12:700501 - номер кадастрового квартала
Местоположение Алтайский край, Кытмановский район, Кытмановский сельсовет, примерно в 2300 м на северо-запад от с. Кытманово
Категория земель Земли сельскохозяйственные
Площадь земельного участка 6286263 кв.м.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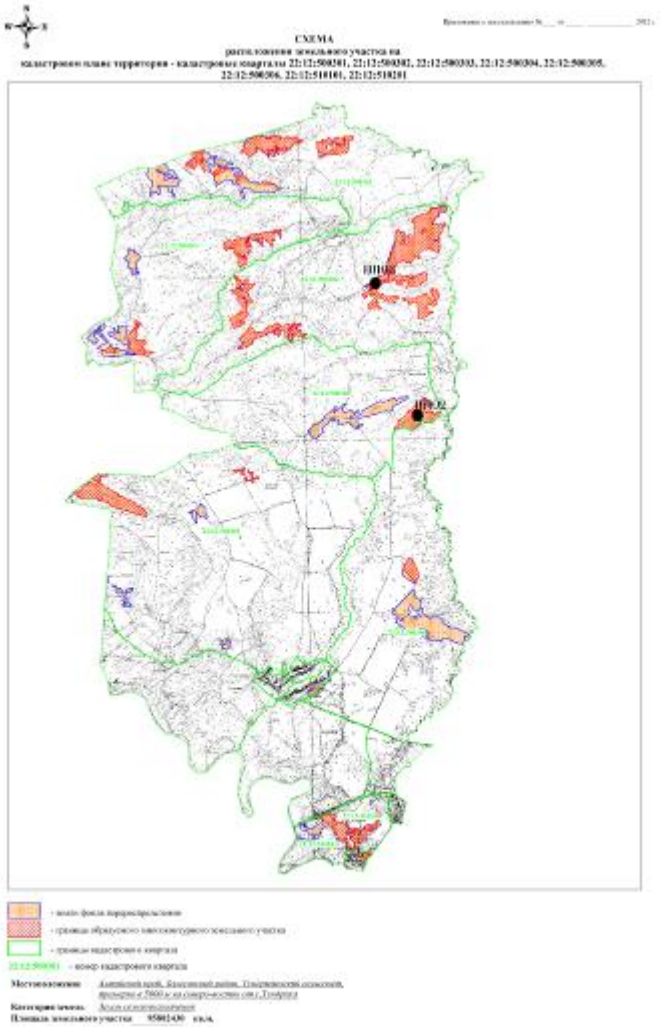
расположения земельного участка на
кадастровом плане территории - кадастровые кварталы 22:12:690102, 22:12:690201, 22:12:690301, 22:12:690302, 22:12:690303, 22:12:690501, 22:12:610102, 22:12:610104, 22:12:610105
НПО2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расположения земельного участка на
кадастровом плане территории - кадастровых кварталах 22:12:500201, 22:12:500202, 22:12:500203, 22:12:500204, 22:12:500205, 22:12:500206, 22:12:510101, 22:12:510201

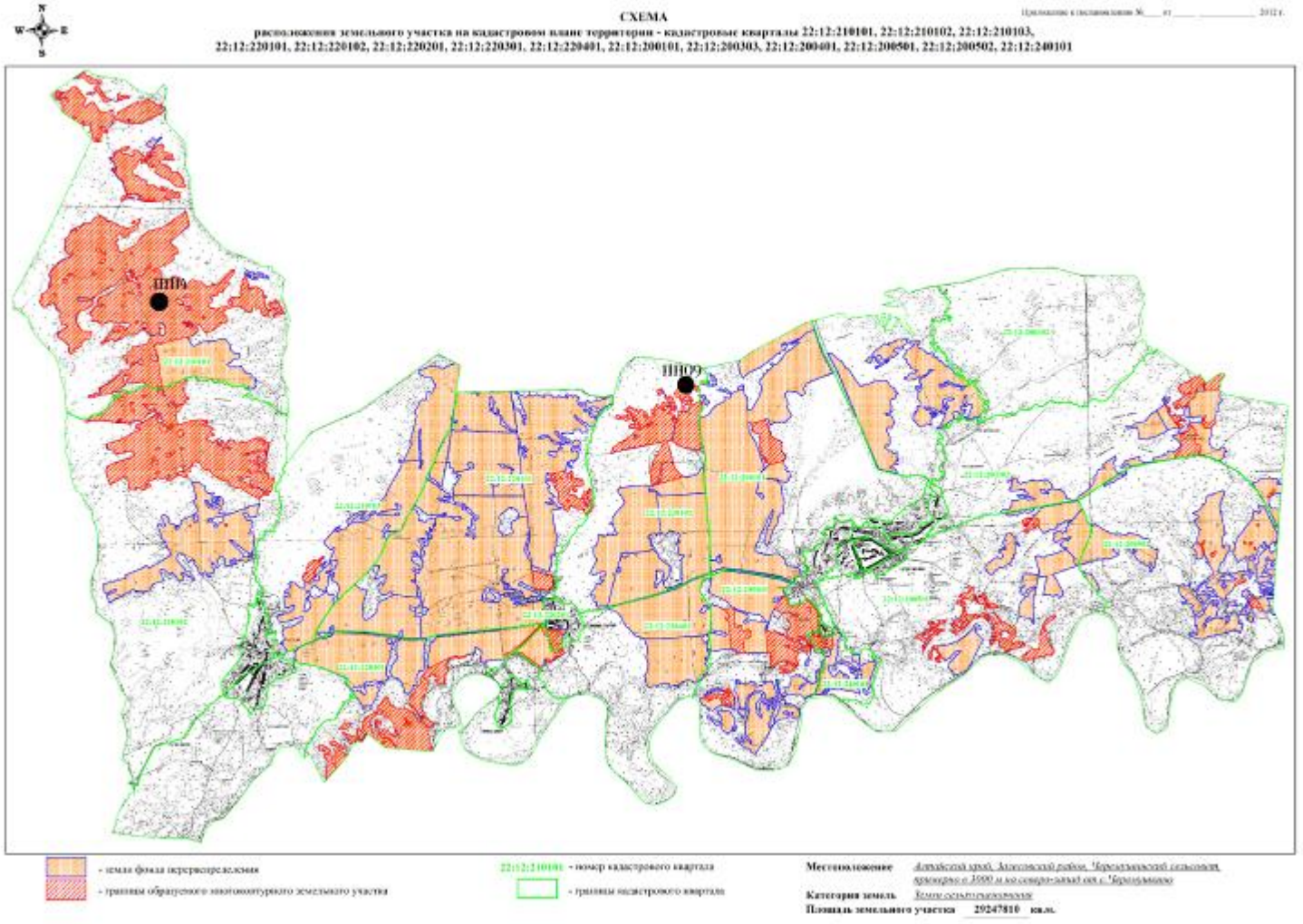


СХЕМА
расположения земельного участка на кадастровом плане территории - кадастровые кварталы 22:12:210101, 22:12:210102, 22:12:210103, 22:12:220101, 22:12:220102, 22:12:220201, 22:12:220301, 22:12:220401, 22:12:200101, 22:12:200303, 22:12:200401, 22:12:200501, 22:12:200502, 22:12:240101
- земли фонда перераспределения
- границы образуемого многоконтурного земельного участка
- номер кадастрового квартала
- границы кадастрового квартала
Местоположение
Категория земель
Площадь земельного участка 29247810 кв.м.

Detailed description of monitoring of the trial areas

| № trial area | Average height of trees, m | Average diameter of trees, cm | Basal area, sq.m/ha |
|---|---|---|---|
| 1 | 10,1 | 8,5 | 52,2 |
| 2 | 8,1 | 6,5 | 69,6 |
| 3 | 7,8 | 6,5 | 109,4 |
| 4 | 11,7 | 11,1 | 78,0 |
| 5 | 4,0 | 4,4 | 68,7 |
| 6 | 7,9 | 5,1 | 77,6 |
| 7 | 6,0 | 4,5 | 86,3 |
| 8 | 9,1 | 8,6 | 109,6 |
| 9 | 7,0 | 6,5 | 86,2 |
| 10 | 9,5 | 8,3 | 107,9 |
| 11 | 7,5 | 5,7 | 99,6 |
| 12 | 6,5 | 4,4 | 72,4 |
| 13 | 8,3 | 7,4 | 114,2 |
| 14 | 5,0 | 4,2 | 66,8 |

Detailed description of location of the trial areas

| № trial area | Predominant type | Coordinates | Name of Village Council |
|---|---|---|---|
| 01 | Birch | 54 03.792 084 35.524 | Zalesovsky |
| 02 | Birch | 54 04.158 084 35.579 | Tundrihinsky |
| 03 | Aspen | 54 06.496 084 34.985 | Tundrihinsky |
| 04 | Birch | 54 06.678 084 45.561 | Peshtersko |
| 05 | Birch | 54 03.825 084 16.080 | Cheremushkinsky |
| 06 | Birch | 54 03.198 084 13.634 | Bolshekaltaysky |
| 07 | Birch | 54 05.126 084 15.961 | Bolshekaltaysky |
| 08 | Birch | 54 05.605 084 20.720 | Bolshekaltaysky |
| 09 | Birch | 54 02.822 084 13.301 | Cheremushkinsky |
| 10 | Birch | 54 08.676 084 20.141 | Bolshekaltaysky |

| | | | |
|---|---|---|---|
| 11 | Birch | 54 08.139 084 07.749 | Bolshekaltaysky |
| 12 | Birch | 54 08.359 084 07.792 | Bolshekaltaysky |
| 13 | Birch | 54 08.171 084 05.721 | Bolshekaltaysky |
| 14 | Birch | 54 03.224 084 00.916 | Cheremushkinsky |

Description of monitoring points

***l* - the number of trees in the trial area, pc;**

$G_i$ **- cross sectional area of the i trunk of the tree, m2;**

$d_i$ **- trunk diameter of i tree, m;**

$h_i$ **- height of the i tree, m.**

Monitoring of these parameters is necessary to calculate the absorption of pure CO2. The remaining parameters is calculated.

The objects of study were land redistribution fund overgrown forests in the Altai region Zalesovo village. The total area of 9486 hectares. The method of research was chosen in accordance with the intended purpose and objectives[6].
The objects of research were the lands of redistribution fund that are overgrowing with forests in the Altaiskij Krai district Zalesovo. The total area - 9486 hectares.
The method of research was chosen in accordance with the defines objectives and goals.
Formation of the forest occurs on gray forest postagrogenic soils of Ob-Chumyshskoe interfluve as a result of termination of agricultural activity. In order to determine stock of timber in forest that grows on the project areas and to evaluate the changes in it, the NGO “Center for Environmental Innovation" with Federal state budgetary educational institution of Higher Education "Altai State Agricultural University" have organized by field expeditions (Agreement № 54 from 12.12.2011). The law does not require licensing of the foregoing type of activity (Federal law from 04.05.2011 N 99-ФЗ (reduction from 19.10.2011, with changes from 21.11.2011) "On Licensing Certain Types of Activities"[7]). The Researched projected areas with plantations of trees fall under the concept of

[6] MINISTRY OF AGRICULTURE OF THE RUSSIAN FEDERATION FEDERAL BUDGET STATE EDUCATIONAL INSTITUTION OF HIGHER EDUCATION
Altai State Agricultural University REPORT ABOUT RESEARCH WORK "Carbon sequestration in forest plantations Zalesovo area of the Altai Territory "

[7] http://base.consultant.ru/cons/cgi/online.cgi?req=doc;base=LAW;n=120629

"Kyoto forest" means an area of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30% of trees able to reach a minimum height of 2-5 meters at maturation (Decision of the Meeting of the Parties to the Kyoto Protocol 16/CMP.1[8]).

Ascertainment of boundaries of the ground plots was produced by LLC "Geos" with specified regulatory accuracy in accordance with the Methodological recommendations for determine the boundaries of project areas (in the red. Of Roszemkadastr's letter from 04/18/2003[9]). Quantitative and qualitative characteristics of the forests were determined on trial areas based on the sampling method of observation, in full compliance with the laws of probability theory, math statistics and using the regular links between forest valuations parameters of plantations of trees. Frequency of repeated observations on the trial areas is 10 years (Guidelines for the State Forest Inventory (Approved by order of the Federal Forestry Agency of 10.11.2011 № 472[10]), hereinafter Guidelines).

**D.1. Description of monitoring plan chosen:**

>>

The monitoring plan is described throughout a section D in accordance with paragraph 30 of the Guidance on criteria for baseline setting and monitoring. Project developer applies its own methodology for monitoring plan (JI specific approach) in accordance with paragraph 9 (a) of the Guidance on criteria for baseline setting and monitoring (Version 03), and other applicable JI guidelines. The JI-approach includes consideration of the following steps:

Step. 1. Indication and description of the approach taken regarding the installation of monitoring (Indication and description of the approach chosen regarding monitoring).
Step. 2. Application of the approach (Application of the approach chosen).

The application of monitoring plan is described in below sections D.1.1, D.1.2, D.1.2.3, D.1.2.4 and D.1.4

*Determination of the number of plots begins with a definition of the stock stands at selected areas. This requires preliminary measurements at 5 sites. After receiving the results of growing stock of forest of forest, the result is substituted into the formula for calculating the test areas. See hereinafter stated below justify*

**D.1.1. Sampling design and stratification:**

>>

[8] http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf

[9] http://www.geoevrocom.ru/index.php?option=com_content&task=view&id=70

[10] http://www.rosleshoz.gov.ru/docs/leshoz/199/Metod._rekomendatcii.pdf

*Determination of the number of plots begins with a definition of the stock stands at selected areas. This requires preliminary measurements at 5 sites. After receiving the results of growing stock of forest, the result is substituted into the formula for calculating the test areas.*
*See hereinafter stated below justify*

*Determination of the number pledged of plots*
To calculate the number of pledged plots need to know the estimated value of the arithmetic mean and variance changes in the stock of wood for 5 years. For this was a preliminary survey of the project area in December 2011. At this stage, conducted a visual inspection of about 2,000 hectares are available at the time of land overgrown with forest.
Inspected the area with woody vegetation fall under the concept of "Kyoto forest" means an area of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30% of trees able to reach a minimum height of 2-5 meters at maturity (Decision of the Meeting of the Parties to the Kyoto Protocol 16/CMP.1[11]) To determine the changes in the stock of wood for 5 years and its variance were identified five areas (rather 3- accordance with the laws of probability), which laid the circular sample plots with a radius of 3.57 m and an area of 40 m2. The radius and the area of sample plots determined in accordance with paragraph 3 of Annex 6. Methodical recommendations to increase the area up to 40m2 and accordingly the radius to 3.57 m (2.82m in Appendix 25). The increase was necessary to increase the accuracy and greater number of trial area in the end. This only improve the accuracy of the results to determine carbon stocks.

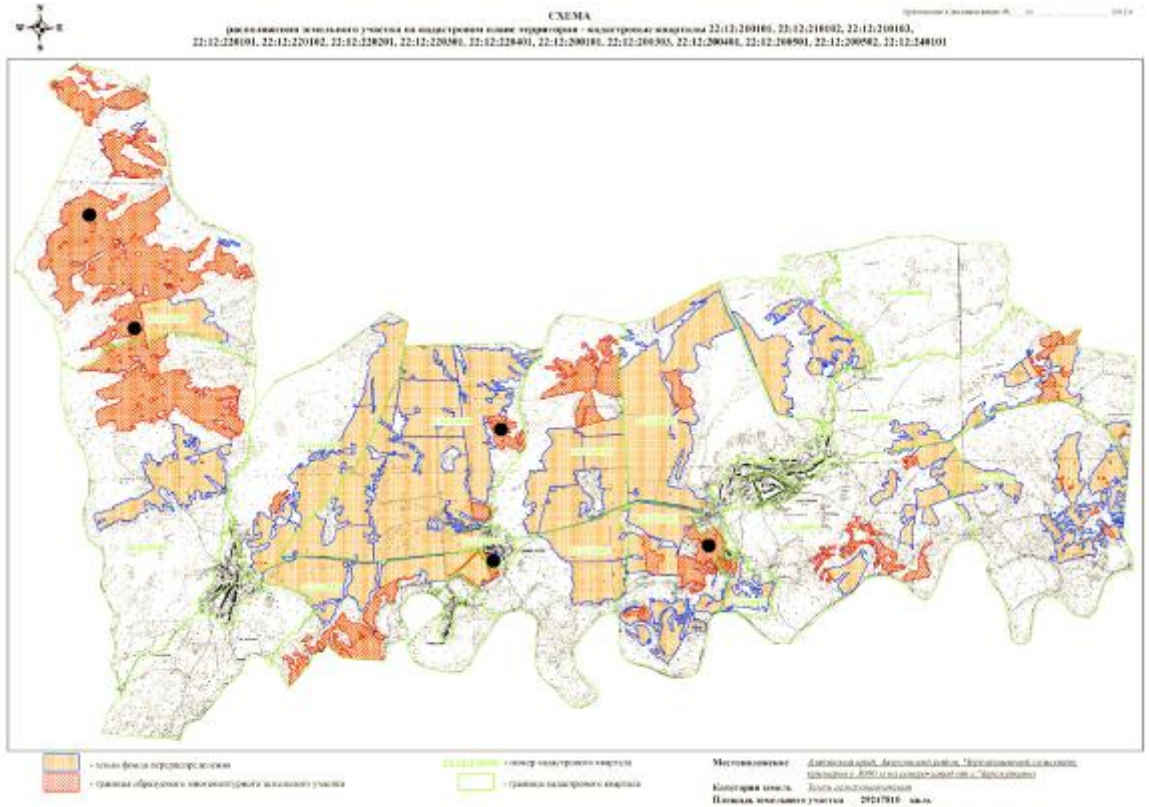
Qantitative and qualitative characteristics of the project identified in the forest plots based on the sampling method of observation, in full compliance with the laws of probability theory, mathematical statistics and the use of regular links between taxation parameters of forest stands. Frequency of repeated observations on the plots is 10 years (Guidelines for the State Forest Inventory (Approved by order of the Federal Forestry Agency of 10.11.2011 № 472), hereinafter Guidelines)[12].

*Materials and tools*: tape measure 50 m, 5 m measuring tape, measuring fork, pendulum altimeter, an ax, a saw hand, enumeration lists, Digital Cameras Canon EOS 50D, Canon Power Shot A570 IS, GPS-Navigation Garmin Etrex Venture HC and Garmin GPS Map62s .

Preliminary surveys point to calculate the number of sample plots (5):

[11] http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf

[12] http://www.rosleshoz.gov.ru/docs/leshoz/199/Metod._rekomendatcii.pdf




After the enumeration was determined by the number of saplings (units / ha), basal areas (m2/ha), stock (m3/ha), changes in the stock for 1 year and 5 years (m3 / d) (Table 1).

Table1 with results of surveys point

| № areas | Age plot number, y | Average height of the trees, m | Average diameter of trees,sm | Basal area, sq.m/ha | Stock, m3/ha | Changes in stock (average for 1 year), m3/ha | Changes in stock a (average for 5 years), m3/ha |
|---|---|---|---|---|---|---|---|
| 1 | 8 | 5,1 | 5,5 | 96,2 | 311,6 | 38,9 | 194,8 |
| 2 | 7 | 4,8 | 4,6 | 61,9 | 193,0 | 27,6 | 137,9 |
| 3 | 8 | 5,1 | 3,8 | 65,5 | 212,1 | 26,5 | 132,6 |
| 4 | 10 | 6,1 | 5,8 | 82,5 | 300,4 | 30,0 | 150,2 |
| 5 | 9 | 5,7 | 5,4 | 69,8 | 243,0 | 27,0 | 135,0 |

Statistical indicators of changes in growing stock of forest over 5 years taken to calculate the total amount pledged sample plots: = 150 m3/ha ,S2 = 670 m3/ha/Please see attached excel files.

*On the basis of the results obtained were the number of plots on which the survey will be conducted on the basis of which will be calculated amount of carbon stocks.*

Sampling area is a concentric circular area of constant radius. The spatial location of plots was carried out in accordance with the Guidance, which was taken as a basis for the principle of combining systematic and random sampling to ensure a statistically representative data to determine the accuracy of the planned total stock of wood. Sampling areas were located at random, while striving for a more even their placement throughout the facility works. The scheme of the study area and photos plots are given in the appendix.

Taxation characteristics were determined using the method of measuring by eye, as the most accurate method of applied according to the forest management instruction (hereinafter - Instructions) approved by the Order № 31 from 06.02.2008 Russian Ministry of Natural Resources[13]. At the same time ground circular enumeration of constant radius was used. The use of circular areas of constant radius, due to the presence of thick undergrowth, where the use relaskopic methods is difficult.

Annex 4 of the forest management instruction shows that relaskopic number of sites (we have a constant radius), and in Annex 5 is no differentiation of the diameter of trees less than 16 cm and the fullness of the trees is limited to 1.0 (we have more). Therefore, the calculation of the number of sites and their

[13] http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf

radii are determined in accordance with the Guidance for the State Forest Inventory (Appendix 6).
The radius and the area of sample plots determined in accordance with paragraph 3 of Annex 6. Methodical recommendations to increase the area up to 40m2 and accordingly the radius to 3.57 m (2.82m in Appendix 25).

The increase was necessary to increase the accuracy and greater number of trial area in the end. This only improve the accuracy of the results to determine carbon stocks.

To determine the average height of most components of the tree species represented in the forest taxation isolated instrumental measurements were made at the height of trees that are close to average. To determine the age of these same trees were selected drill cores age of wood. The average height and average diameter of the stand were determined as the arithmetic means of measurements at the middle element of the forest trees. The radius of circular enumeration areas was determined in accordance with Annex 5 of the Regulations.

*Explanation of the sample calculations(by foundation quantity of trial areas)*

The calculation began with the probability of t = 1,96 (confidence interval, 0.95), since in this case with a probability of 95% of our values fall within the confidence interval (see table below). The calculation was repeated for as long as the estimated value of y differ by no more than 1 from the intended one.

Provides the following calculations:

Step 1: $y = \max\left(\frac{t^2 s^2}{(\bar{x}q)^2}\right) = \left(\frac{1{,}96^2 \cdot 670}{(150 \cdot 0{,}1)^2}\right) = 11{,}4$, t = 11 at 0,95, this is 2,228,:

Step 2: $y = \max\left(\frac{t^2 s^2}{(\bar{x}q)^2}\right) = \left(\frac{2{,}228^2 \cdot 670}{(150 \cdot 0{,}1)^2}\right) = 14{,}8$ , delta 14,8-11,4>1,0, next round off from 14,8 to 15, see data *t* for 15 at 0,95. This is 2,145:

Step 3: $y = \max\left(\frac{t^2 s^2}{(\bar{x}q)^2}\right) = \left(\frac{2{,}145^2 \cdot 670}{(150 \cdot 0{,}1)^2}\right) = 13{,}7$, delta 14,8-13,7>1,0, next round off from 13,7 to 14, see data *t* for 14 at 0,95. This is 2,160,

next step:

Step 4: $y = \max\left(\frac{t^2 s^2}{(\bar{x}q)^2}\right) = \left(\frac{2{,}16^2 \cdot 670}{(150 \cdot 0{,}1)^2}\right) = 13{,}9 \approx 14$, delta 13,9-13,7<1,0, calculation stop. Round off from 13,9 to 14 and use - **14 a number of sites needed for our study.**

*where:*
*s - dispersion (obtained on the test trials) = 670 in our case*
*x - mean change in rate for 5 years = 150 in our case*
*q - the specified accuracy = 10% in our case*

VALUE Quantile Student's distribution

| Data | The value $t_\gamma$ for confidence intervals $\gamma$ for bilateral | | | | |
|---|---|---|---|---|---|
| | 0,70 | 0,80 | 0,90 | 0,95 | 0,99 |
| 2 | 1,963 | 3,078 | 6,314 | 12,706 | 63,657 |
| 3 | 1,336 | 1,886 | 2,920 | 4,303 | 9,925 |
| 4 | 1,250 | 1,638 | 2,353 | 3,182 | 5,841 |
| 5 | 1,190 | 1,533 | 2,132 | 2,776 | 4,604 |
| 6 | 1,156 | 1,476 | 2,015 | 2,571 | 4,032 |
| 7 | 1,134 | 1,440 | 1,943 | 2,447 | 3,707 |
| 8 | 1,119 | 1,415 | 1,895 | 2,365 | 3,499 |
| 9 | 1,108 | 1,397 | 1,860 | 2,306 | 3,355 |
| 10 | 1,100 | 1,383 | 1,833 | 2,262 | 3,250 |
| 11 | 1,093 | 1,372 | 1,812 | 2,228 | 3,169 |
| 12 | 1,088 | 1,363 | 1,796 | 2,201 | 3,106 |
| 13 | 1,083 | 1,356 | 1,782 | 2,179 | 3,055 |
| 14 | 1,079 | 1,350 | 1,771 | 2,160 | 3,012 |
| 15 | 1,076 | 1,345 | 1,761 | 2,145 | 2,977 |
| 16 | 1,074 | 1,341 | 1,753 | 2,131 | 2,947 |
| 17 | 1,071 | 1,337 | 1,746 | 2,120 | 2,921 |
| 18 | 1,069 | 1,333 | 1,740 | 2,110 | 2,898 |
| 19 | 1,067 | 1,330 | 1,734 | 2,103 | 2,878 |
| 20 | 1,066 | 1,328 | 1,729 | 2,093 | 2,861 |
| 21 | 1,064 | 1,325 | 1,725 | 2,086 | 2,845 |
| 22 | 1,063 | 1,323 | 1,721 | 2,080 | 2,831 |
| 23 | 1,061 | 1,321 | 1,717 | 2,074 | 2,819 |
| 24 | 1,060 | 1,319 | 1,714 | 2,069 | 2,807 |
| 25 | 1,059 | 1,318 | 1,711 | 2,064 | 2,797 |

| Data | The value $t_\gamma$ for confidence intervals $\gamma$ for bilateral | | | | |
|---|---|---|---|---|---|
| | 0,70 | 0,80 | 0,90 | 0,95 | 0,99 |
| 26 | 1,058 | 1,316 | 1,708 | 2,060 | 2,787 |
| 27 | 1,058 | 1,315 | 1,706 | 2,056 | 2,779 |
| 28 | 1,057 | 1,314 | 1,703 | 2,052 | 2,771 |
| 29 | 1,056 | 1,313 | 1,701 | 2,048 | 2,763 |
| 30 | 1,055 | 1,311 | 1,699 | 2,045 | 2,756 |
| 31 | 1,055 | 1,310 | 1,697 | 2,042 | 2,750 |
| >31 | 1,036 | 1,282 | 1,645 | 1,960 | 2,576 |

Application found 14 trial areas on the forest:

statement(statement)


A trial area is a concentric circular area of constant radius. The spatial location of trial areas was chosen in accordance with the Guidelines, in which as a basis was taken a principle of combining both systematic and random sampling to ensure a statistically representative data with planned accuracy of determination of total stock of wood. The trial areas were located randomly seeking for its more even placement throughout the area of works. The scheme of the research area and photos of trial areas are given in the appendix.

Forest valuation characteristics were determined using the method of measuring by eye, as the most accurate method according to the forest management instruction (hereinafter - Instruction) approved by the Order № 31 from 06.02.2008 Ministry of Natural Resources of Russia[14]. At the same time the ground circular enumeration of constant radius were laid. The use of circular areas of constant radius was caused by the presence of thick undergrowth, where the use of relascopic methods is difficult.

Annex 4 of the forest management instruction shows that relaskopic number of sites (we have a constant radius), and in Annex 5 is no differentiation of the diameter of trees less than 16 cm and the fullness of the trees is limited to 1.0 (we have more). Therefore, the calculation of the number of sites and their radii are determined in accordance with the Guidance for the State Forest Inventory (Appendix 6). The radius and the area of sample plots determined in accordance with paragraph 3 of Annex 6. Methodical recommendations to increase the area up to 40m2 and accordingly the radius to 3.57 m (2.82m in Appendix 25).

The increase was necessary to increase the accuracy and greater number of trial area in the end. This only improve the accuracy of the results to determine carbon stocks.

In order to determine the average height of the most common tree species represented in the forest valuation instrumental measurements of the trees the height of which was close to average were made. In order to determine the age of these same trees cores of wood were taken by age auger. The average height and average diameter of the stand were determined as the arithmetic means of sizes of average trees.

Timber stock of forest plantation on 1 hectare was determined in accordance with paragraph 107 of the Instruction.

## SURVEY RESULTS

On the basis of the results obtained were the number of plots (5) on which the survey will be conducted on the basis of which will be calculated amount of carbon stocks

As a result of the survey of the land overgrowing with forest in district Zalesovo were identified **14 concentric circular**[15] trial areas were identified with radius of 3.57 m and an area of 40 m2, see Table 2 below. Inside each trial area a complete enumeration of trees (undergrowth) with their division according to species and groups of heights: small (up to 0.5 m tall), medium (0.6-1.5 m) and large (more than 1.5 m) was made. The obtained data was recorded in a special register (Instruction).

## PROCESSING OF SURVEY

After the enumeration in the trial areas the number of undergrowth (units / ha), basal area ($m^2$/ha), stock ($m^3$/ha), changes in the stock for 5 years ($m^3$/ha in 5 year), the change in the mass of wood for 5 years (t / ha) were determined (Table № 2).

Table №2

[14] http://zakonprost.ru/content/base/part/568591/

[15] Please see attached files/

| № trial area | Average height of trees, m | Average diameter of trees, cm | Basal area, $m^2$/ha | Stock, $m^3$/ha | Change in the stock (average for 5 years), $m^3$/ha | Change in the mass of wood (average for 5 years), t/ha |
|---|---|---|---|---|---|---|
| 1 | 10,1 | 8,5 | 52,2 | 273,5 | 136,8 | 87,3 |
| 2 | 8,1 | 6,5 | 69,6 | 307,8 | 153,9 | 98,2 |
| 3 | 7,8 | 6,5 | 109,4 | 472,8 | 236,4 | 117,0 |
| 4 | 11,7 | 11,1 | 78,0 | 458,9 | 153,0 | 97,6 |
| 5 | 4,0 | 4,4 | 68,7 | 192,4 | 137,4 | 87,7 |
| 6 | 7,9 | 5,1 | 77,6 | 336,8 | 168,4 | 107,5 |
| 7 | 6,0 | 4,5 | 86,3 | 197,8 | 172,2 | 109,9 |
| 8 | 9,1 | 8,6 | 109,6 | 532,8 | 177,6 | 113,3 |
| 9 | 7,0 | 6,5 | 86,2 | 344,9 | 143,7 | 91,7 |
| 10 | 9,5 | 8,3 | 107,9 | 538,8 | 168,4 | 107,4 |
| 11 | 7,5 | 5,7 | 99,6 | 418,2 | 174,2 | 111,2 |
| 12 | 6,5 | 4,4 | 72,4 | 275,0 | 137,5 | 87,7 |
| 13 | 8,3 | 7,4 | 114,2 | 516,2 | 172,1 | 109,8 |
| 14 | 5,0 | 4,2 | 66,8 | 213,8 | 133,6 | 85,2 |

**D.1.2. Monitoring of the anthropogenic emissions by sources and removals by sinks in the project and baseline scenarios:**

**D.1.2.1. Data to be collected in order to monitor the changes in carbon stocks in the carbon pools within the project boundary in the project scenario, and how these data will be archived (for each carbon pool and in units of $CO_2$ equivalent):**

| ID number *(Please use numbers to ease cross-referencing to D.2.)* | Data variable | Source of data | Data unit | Measured (m), calculated (c), estimated (e) | Recording frequency | Proportion of data to be monitored | How will the data be archived? (electronic/ paper) | Comment |
|---|---|---|---|---|---|---|---|---|
| *di* | *trunk diameter of i tree* | *Report on measurements by y year on i trial area* | *m* | *c* | *Once in 5 year* | *100%* | *paper* | - |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *Gi* | *cross sectional area of the i trunk of the tree* | *Report on measurements by y year on i trial area* | *m2* | *c* | *Once in 5 year* | *100%* | *paper* | - |
| *l* | *number of trees in the trial area* | *Report on measurements by y year on i trial area* | *pc* | *c* | *Once in 5 year* | *100%* | *paper* | - |
| $h_i$ | *height of the i tree in the trial area* | *Report on measurements by y year on i trial area* | *m* | *c* | *Once in 5 year* | *100%* | *paper* | - |

**D.1.2.2. Data to be collected in order to monitor the greenhouse gas emissions by sources within the project boundary in the project scenario, and how these data will be archived (for each gas, source, etc.; in units of $CO_2$ equivalent):**

| ID number *(Please use numbers to ease cross-referencing to D.3)* | Data variable | Source of data | Data unit | Measured (m), calculated (c) or estimated (e) | Recording frequency | Proportion of data to be monitored | How will the data be archived? (electronic/ paper) | Comment |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |

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**D.1.2.3. Description of formulae and/or models used to estimate the changes in carbon stocks in the carbon pools within the project boundary in the project scenario (for each carbon pool and in units of $CO_2$ equivalent):**

>>

**Carbon absorption by soils**

As regards the soil used in the own approach based on the principles of the IPCC2006 chapter 4 tom 2&4, offering to assess changes in carbon stocks in the pool during the transition from one control mode to another.

In our case the transition from the agricultural land of tillage to carbon depositing forest plantations is considered. The process of replenishment of soil by carbon is complex and depends on the time passed since the cessation of tillage. To identify the values of absorption the information of studies was used in own

approach (Kurganova .IN., Lopez de Guerenu V.O. Shvidenko A.Z., Sapozhnikov P.M. Changing in the total pool of organic carbon in fallow soil of Russia in 1990-2004. Soil Science, 2010, № 3, pp. 361-368)[16]. The budget of the soil carbon pool was estimated if the plantation was produced on arable land, otherwise the soil carbon absorption is assumed to be zero.

***For the calculation information on soil type and time passed since the termination of arable soil is required. The basis of calculation of soil carbon for the gray forest soil was based on the formula (Table 1, str.364, Kurganov et al, 2010[17]):***

(D.1) $BS = -60\ln(Y) + 261$

where

$BS$ - rate of carbon accumulation in the soil layer 0-20cm, gC/m2 year

$Y$ – duration of the recovery of vegetation year.

This formula was obtained by the authors on the basis of their own studies and literature data (second paragraph, str.363, Kurganov et al, 2010)[18].

**D.1.2.4. Description of formulae and/or models used to estimate the greenhouse gas emissions by sources within the project boundary in the project scenario (for each gas, source, etc.; in units of $CO_2$ equivalent):**

>>

**Forest absorption by project areas**

***Timber stock of forest plantation on 1 hectare determined in accordance with paragraph 107 Regulations, as follows:***

(D.2) $$M = K \cdot G \cdot (3 + H),$$

in which:

[16] http://144.206.159.178/ft/7949/712033/13725465.pdf

[17] http://144.206.159.178/ft/7949/712033/13725465.pdf

[18] http://144.206.159.178/ft/7949/712033/13725465.pdf

*M* - timber stock for 1 hectare, $m^3$;

*K* – coefficient, that for pine, larch, birch, aspen, gray alder, linden, oak and hornbeam equals 0.4, for the remaining trees - 0.44;

*G* - arithmetic mean of the basal area (the sum of cross-sectional areas of trunks of trees) on one hectare of measurements on circular areas, $m^2$;

*H* - average by the coefficients of composition of the height of the trees in a forest plantation, m.

(D.3) $$G = J \cdot \sum_{i=1}^{l} G_i = J \cdot \sum_{i=1}^{l} \frac{\pi \cdot (d_i)^2}{4} = \frac{\pi \cdot J}{4} \sum_{i=1}^{l} (d_i)^2$$

(D.4) $$H = \frac{1}{l} \cdot \sum_{i=1}^{l} h_i$$

where:

*J=250* - conversion factor of the basal area at one site in the basal area per 1 ha. (10000m2/40m2)

*l* - the number of trees in the trial area, pc;

$G_i$ - cross sectional area of the i trunk of the tree, m2;

$d_i$ - trunk diameter of i tree, m;

$h_i$ - height of the i tree, m.

The wood density was determined in accordance with State Standard Specification 16483.1-84 (Wood. Method of determining the density). Specimen preparation, selection of the required number and statistical processing of measurements were made in accordance with State Standard Specification 16483.0-89[19] (Wood. General requirements for the physical and mechanical tests). The conservative values of the density, representing the difference between the mean

[19] http://vsegost.com/Catalog/11/11348.shtml

and standard deviation, calculated using the methods of mathematical statistics, were taken for calculation of the mass of wood. The derived conservative values of the density: birch - 638 kg/$m^3$ , aspen - 495 kg/$m^3$.

The age was determined by the total number of annual layers in accordance with State Standard Specification 16483.18-72[20] (The method of determining the number of annual rings in 1 cm and the content of late wood in annual layers).

The change of stock of wood was determined in accordance with Standard Specification 56-73-84[21] (Forest valuation and management. Growth of wood in the forest. Classification and symbols, basic formulas, terms and definitions).

***The calculation of the average change in wood stock*** $\overline{\Delta}M$ ***for one year of its life*** :

(D.5) $$\overline{\Delta}M = \frac{M_A}{A}$$

where

$M_A$ - stock of wood in age A.

***The average growing stock of forest in 5 years (*** $M_5^j$ ***), data*** $\overline{\Delta}M^j$ ***for each trial area is multiplied by 5:***

(D.6) $$\overline{\Delta}M_5^j = 5 \cdot \overline{\Delta}M^j$$

***The values of the mass of the stand (wood)*** $MF_5^j$ :

(D.7) $$MF_5^j = \overline{\Delta}M_5^j \cdot \rho_к$$

where

[20] http://vsegost.com/Catalog/42/42203.shtml

[21] Please see attached file OCT 56-73-84

$\overline{\Delta M}_5^j$ - growing stock of forest (wood stock)

$\rho_к$ - wood density in accordance with the definition of wood density in accordance with GOST 23431-79[22]) for each test site, assumed to be constant for birch: = 638 kg/m3 for aspen = 495 kg/m3 based on actual measurements.

***The mass of the absorbed carbon ( $BFS_5$) of project forest stands over 5 years per 1 ha:***

(D.8) $$BFS_5 = MFк_5 \cdot Cк$$

where

*Ck*=0,481

***For all hectares (Sq) the absolute mass of the absorbed carbon ( $BF_5$) of project forest stands over 5 years:***

(D.9) $$BF_5 = BFS_5 \cdot Sq$$

where

$BFS_5$-the mass of the absorbed carbon

*Sq*= square project areas -9489,37 hectares

| **D.1.2.5. Data necessary for determining the changes in carbon stocks in the carbon pools within the project boundary in the baseline scenario, and how these data will be collected and archived (for each carbon pool and in units of $CO_2$ equivalent):** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ID number *(Please use numbers to ease cross-referencing to D.2.)* | Data variable | Source of data | Data unit | Measured (m), calculated (c), estimated (e) | Recording frequency | Proportion of data to be monitored | How will the data be archived? (electronic/ paper) | Comment |
| | | | | | | | | |

[22] http://www.gosthelp.ru/gost/gost14709.html

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

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| **D.1.2.6. Data necessary for determining the greenhouse gas emissions by sources within the project boundary in the baseline scenario, and how these data will be collected and archived (for each gas, source, etc.; in units of $CO_2$ equivalent):** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ID number *(Please use numbers to ease cross-referencing to D.3)* | Data variable | Source of data | Data unit | Measured (m), calculated (c) or estimated (e) | Recording frequency | Proportion of data to be monitored | How will the data be archived? (electronic/ paper) | Comment |
| | | | | | | | | |

Table is left blank on purpose.

**D.1.2.7. Description of formulae and/or models used to estimate the changes in carbon stocks in the carbon pools within the project boundary in the baseline scenario (for each carbon pool and in units of $CO_2$ equivalent):**

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**D.1.2.8. Description of formulae and/or models used to estimate the greenhouse gas emissions by sources within the project boundary in the baseline scenario (for each gas, source, etc.; in units of CO2 equivalent):**

>>

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**D.1.3. Treatment of leakage in the monitoring plan:**

Main potential emissions that could be treated as leakage under the project – emissions due to oil extraction and refining for diesel fuel manufacturing.
By taking account that under the baseline the area would be used as agricultural land, in other words would be mechanically impacted many times per year and annually, it can be concluded that emissions from diesel fuel combustion by agricultural mechanisms would be higher than in the process of forestry machines treatment. In other words under the project activity is the reduction of fuel consumption (and its production), whence there is emission reduction outside the project boundaries. However, they won't be considered for conservativeness.

| **D.1.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage (for each gas, source, carbon pool, etc.; in units of $CO_2$ equivalent):** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ID number *(Please use numbers to ease cross-referencing to D.2.)* | Data variable | Source of data | Data unit | Measured (m), calculated (c), estimated (e) | Recording frequency | Proportion of data to be monitored | How will the data be archived? (electronic/ paper) | Comment |
| | | | | | | | | |
| | | | | | | | | |

Table is left blank on purpose.

**D.1.3.2. Description of formulae and/or models used to estimate leakage (for each gas, source, carbon pool, etc.; in units of $CO_2$ equivalent):**

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**D.1.4. Description of formulae/and or models used to estimate the enhancements of net anthropogenic removals by sinks by the LULUCF project (for each gas, carbon pool, source, etc.; in units of $CO_2$ equivalent):**

***The total carbon absorption by soil and tree stand in the project areas for 5 years:***

(D.10) $$BC_5 = BF_5 + BS_5,$$

where

$BC_5$ – the total carbon absorption in the whole area of plantations, t;

$BF_5$ – carbon sequestration by forest plantations for 5 years, t;

$BS_5$ – soil carbon absorption for 5 years, t

***The total carbon absorption by soil and tree stand in the project areas for 5 years in CO2e:***

(D.11) $$BCO2_5 = BC_5 \cdot \frac{44}{12}$$

where

44/11-conversion factor from C to CO2

**D.1.5. Where applicable, in accordance with procedures as required by the host Party, information on the collection and archiving of information on the environmental impacts of the LULUCF project:**

>>

In accordance with the legislation in the field of environmental protection, the company must control emissions, wastewater discharges, organize and ensure the management of waste production and consumption, established to provide accountability in public authorities (Federal Service for Ecological, Technological and Atomic Supervision).
The project activity is a natural afforestation and therefore does not provide statements.

When the data regarding the monitored parameters are not available because of the measuring failure, the gap will be bridged by the analogue average data for the similar nearby sampling plots. Moreover, the trees will be on place and all the failed measurements can be carried out one more time.

All monitored data will be stored in paper form for 5 years after the last transfer of ERUs.

**D.2. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:**

| Data *(Indicate table and ID number)* | Uncertainty level of data (high/medium/low) | Explain QA/QC procedures planned for these data, or why such procedures are not necessary. |
|---|---|---|
| *di* | *low* | *based on actual measurements* |
| *Gi* | *low* | *based on actual measurements* |
| *l* | *low* | *based on actual measurements* |
| *hi* | *low* | *based on actual measurements* |

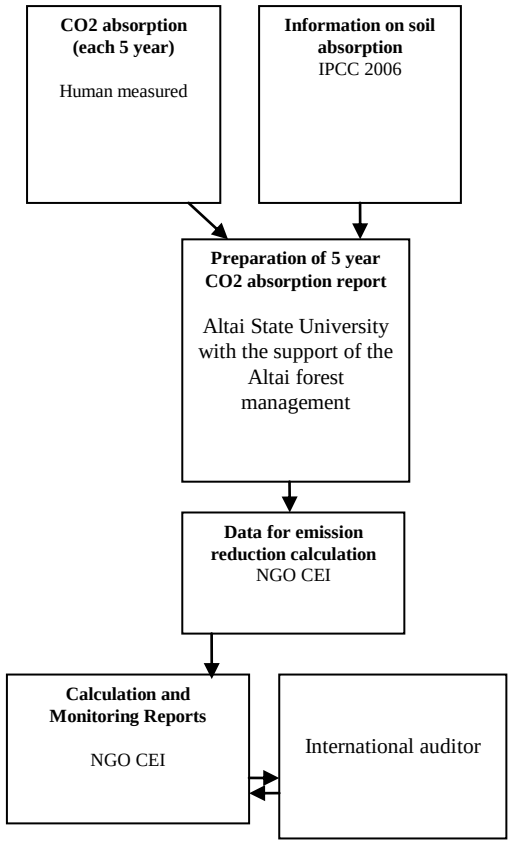
**D.3. Please describe the operational and management structure that the LULUCF project operator will apply in implementing the monitoring plan:**

>>

Scheme operational and management structure will be based on the interaction of NGO CEI with the Altai Agrarian University. University staff will be every 5 years to carry out activities to collect information on the basis of actual measurements. Based on this information NGO CEI will make monitoring reports.

When the data regarding the monitored parameters are not available because of the measuring failure, the gap will be bridged by the analogue average data for the similar nearby sampling plots. Moreover, the trees will be on place and all the failed measurements can be carried out one more time.
The data on the emission reductions achieved, and the original data will be available for project participants 2 years after the last transfer of ERUs.
Below is a schematic diagram of the organization of monitoring reductions in greenhouse gases.

Figure D.3 scheme of monitoring at the project forest



**D.4. Name of person(s)/entity(ies) establishing the monitoring plan:**

>>

Date of monitoring setting: 25/03/2012

The developer of the baseline: Nonprofit Organization Center for Environmental Innovation, Moscow, Lobachevsky 46-17

Contact: Andrey Stetsenko, president.

Tel.: +7-926-911-05-14

Fax: +7-499-431-47-57

Email: abc@ngo-cei.ru

## SECTION E. Estimation of enhancements of net anthropogenic removals by sinks

### E.1. Estimated project net anthropogenic removals by sinks:

>>

*Table E.1.1. The absorption of CO2 from the design of soil during the period* 2008-2012

| Year | Absorption of CO2 |
|---|---|
| 2008 | 61872 |
| 2009 | 57214 |
| 2010 | 53407 |
| 2011 | 50189 |
| 2012 | 47402 |
| All | 270084 |

*Table E.1.2. The absorption of CO2 from the design of forest during the period* 2008-2012

| Year | Absorption of CO2 |
|---|---|
| 2008 | 299 762 |
| 2009 | 299 762 |
| 2010 | 299 762 |
| 2011 | 299 762 |
| 2012 | 299 762 |
| All | 1 498 810 |

*Table E.1.3. The absorption of CO2 from the design of soil and forest during the period* 2008-2012

| Year | Absorption of CO2 |
|---|---|
| 2008 | 361 634 |
| 2009 | 356 976 |
| 2010 | 353 169 |
| 2011 | 349 951 |
| 2012 | 347 164 |
| All | 1 768 894 |

### E.2. Estimated baseline net anthropogenic removals by sinks:

>>

For the initial conditions of the absorption is not assumed. Therefore it is not filled.

### E.3. The difference between E.1. and E.2.:

>>

No difference

### E.4. Estimated leakage:

>>

The main potential emissions that are related to leaks in the context of the project - it is emissions that occur during oil production and processing to produce diesel fuel.

Taking into account that according to initial conditions, such land would be used for agriculture, ie subjected to mechanical treatment several times a year and every year, it can be concluded that emissions from the combustion of diesel agricultural equipment would be higher than the one-time processing of forestry machinery of firebreaks. That is, the project activity is the reduction of fuel consumption (and production), it can be argued that there is a reduction of GHG emissions outside the project. However, for conservatism, they will not be taken into account.

**E.5. The difference between E.3. and E.4 representing the estimated enhancements of net anthropogenic removals by sinks:**

>>

No difference

**E.6. Table providing values obtained when applying formulae above:**

>>

| Years | Estimated project net anthropogenic removals by sinks (tonnes of CO2 equivalent) | Estimated baseline net anthropogenic removals by sinks (tonnes of CO2 equivalent) | Estimated leakage (tonnes of CO2 equivalent) | Estimated enhancements of net anthropogenic removals by sinks (tonnes of CO2 equivalent) |
|---|---|---|---|---|
| 2008 | 361 634 | - | - | 361 634 |
| 2009 | 356 976 | - | - | 356 976 |
| 2010 | 353 169 | - | - | 353 169 |
| 2011 | 349 951 | - | - | 349 951 |
| 2012 | 347 164 | - | - | 347 164 |
| Total (tonnes of CO2 equivalent | 1 768 894 | - | - | 1 768 894 |

## SECTION F. Environmental impacts

**F.1. Documentation on the analysis of the environmental impacts of the LULUCF project, including transboundary impacts, in accordance with procedures as determined by the host Party:**

>>

Changes in the project activities which increase the area planted, do not fall under the "Regulations for the assessment of environmental impacts (planned commercial and other activities in the Russian Federation", approved by order of the National Commission for the Protection of the Environment of the Russian Federation № 372 of May 16, 2000. Main goal of the project is voluntary absorption of GHG emissions (CO2) emissions from the atmosphere, which means that the project can not harm the environment and, on the contrary, it helps to reduce pollutant emissions.

**F.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to supporting documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:**

>>

The project activity does not adversely impact on the environment, as is aimed at reducing CO2 emissions, by means of their absorption. This leads to significant reductions in CO2 emissions in the amount of 1 768 894 tCO2e the period 2008 - 2012.

## SECTION G. Stakeholders' comments

**G.1. Information on stakeholders' comments on the LULUCF project, as appropriate:**

>>

Consultations with stakeholders on the project activity is not carried out because this is not a requirement of the Russian legislation.
The project activity improves the ecological environment, as it reduces the implementation of pollution by harmful substances.

Annex 1

## CONTACT INFORMATION ON PROJECT PARTICIPANTS

| | |
|---|---|
| Organisation: | Autonomous Noncommercial Organization "Center for Environmental Innovation" (NGO CEI) |
| Street/P.O.Box: | Lobachevskiy street / 119415 |
| Building: | 46 - 17. |
| City: | Moscow |
| State/Region: | Moscow |
| Postal code: | 119415 |
| Country: | Russia |
| Phone: | +79269110514 |
| Fax: | +74994314757 |
| E-mail: | abc@ngo-cei.ru |
| URL: | www.ngo-cei.ru |
| Represented by: | Stetsenko Andrey Vladimirovich |
| Title: | Presedent |
| Salutation: | Mr. |
| Last name: | Stetsenko |
| Middle name: | Vladimirovich |
| First name: | Andrey |
| Department: | Non-Government Organization Center for Environmental Innovation |
| Phone (direct): | +79269110514 |
| Fax (direct): | +74994314757 |
| Mobile: | +79269110514 |
| Personal e-mail: | astetsenko@mail.ru |

Annex 2

**BASELINE INFORMATION**

Annex 3

## MONITORING PLAN

The objects of research were the lands of redistribution fund that are overgrowing with forests in the Altaiskij Krai district Zalesovo. The total area - 9489,37 hectares.

The method of research was chosen in accordance with the defines objectives and goals.

Formation of the forest occurs on gray forest postagrogenic soils of Ob-Chumyshskoe interfluve as a result of termination of agricultural activity. In order to determine stock of timber in forest that grows on the project areas and to evaluate the changes in it, the NGO “Center for Environmental Innovation" with Federal state budgetary educational institution of Higher Education "Altai State Agricultural University" have organized by field expeditions (Agreement № 54 from 12.12.2011). The law does not require licensing of the foregoing type of activity (Federal law from 04.05.2011 N 99-ФЗ (reduction from 19.10.2011, with changes from 21.11.2011) "On Licensing Certain Types of Activities"). The Researched projected areas with plantations of trees fall under the concept of "Kyoto forest" means an area of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30% of trees able to reach a minimum height of 2-5 meters at maturation (Decision of the Meeting of the Parties to the Kyoto Protocol 16/CMP.1).

Ascertainment of boundaries of the ground plots was produced by LLC "Geos" with specified regulatory accuracy in accordance with the Methodological recommendations for land surveying object (in the red. Of Roszemkadastr’s letter from 04/18/2003). Quantitative and qualitative characteristics of the forests were determined on trial areas based on the sampling method of observation, in full compliance with the laws of probability theory, math statistics and using the regular links between forest valuations parameters of plantations of trees. Frequency of repeated observations on the trial areas is 10 years (Guidelines for the State Forest Inventory (Approved by order of the Federal Forestry Agency of 10.11.2011 № 472), hereinafter Guidelines).

A trial area is a concentric circular area of constant radius. The spatial location of trial areas was chosen in accordance with the Guidelines, in which as a basis was taken a principle of combining both systematic and random sampling to ensure a statistically representative data with planned accuracy of determination of total stock of wood. The trial areas were located randomly seeking for its more even placement throughout the area of works. The scheme of the research area and photos of trial areas are given in the appendix.

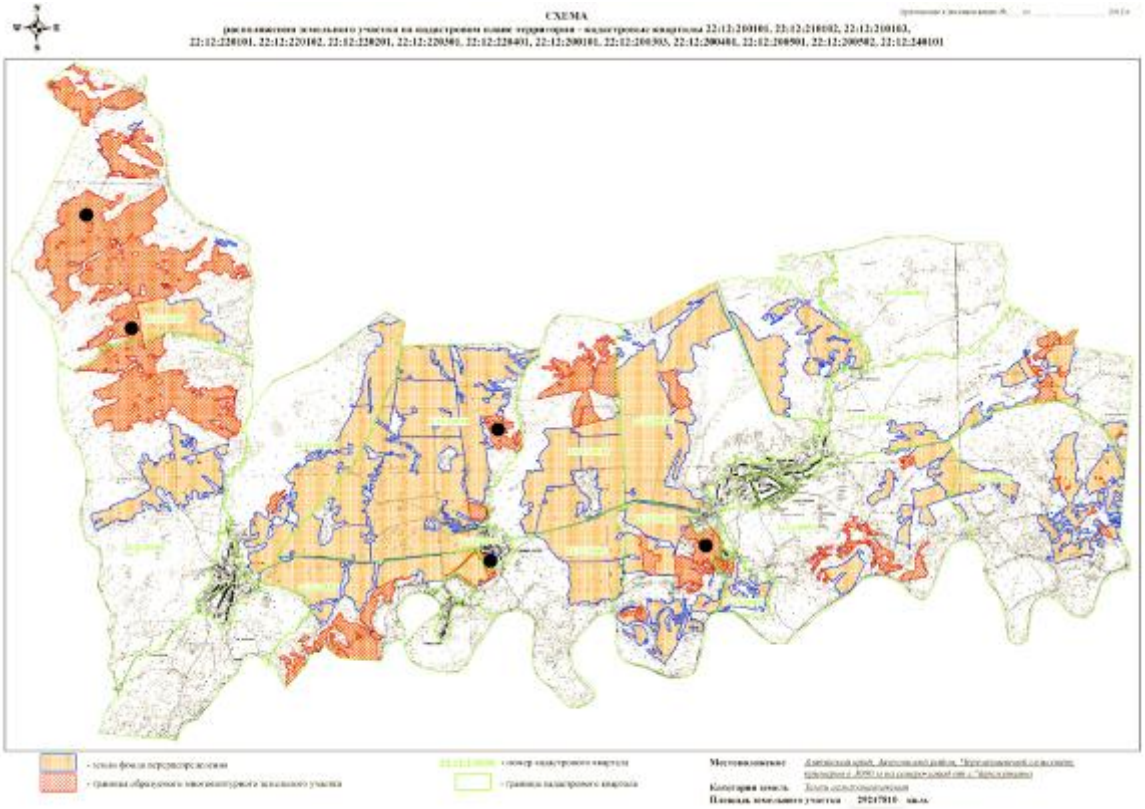
Forest valuation characteristics were determined using the method of measuring by eye, as the most accurate method according to the forest management instruction (hereinafter - Instruction) approved by the Order № 31 from 06.02.2008 Ministry of Natural Resources of Russia. At the same time the ground circular enumeration of constant radius were laid. The use of circular areas of constant radius was caused by the presence of thick undergrowth, where the use of relascopic methods is difficult.

To calculate the number of pledged plots need to know the estimated value of the arithmetic mean and variance changes in the stock of wood for 5 years. For this was a preliminary survey of the project area in December 2011. At this stage, conducted a visual inspection of about 2,000 hectares are available at the time of land overgrown with forest.

Inspected the area with woody vegetation fall under the concept of "Kyoto forest" means an area of 0.05-1.0 hectares with tree crown cover (or equivalent stocking level) of more than 10-30% of trees able to reach a minimum height of 2-5 meters at maturity (Decision of the Meeting of the Parties to the Kyoto Protocol 16/CMP.1) To determine the changes in the stock of wood for 5 years and its variance were identified five areas (rather 3), which laid the circular sample plots with a radius of 3.57 m and an area of 40 m2. The radius and the area of sample plots determined in accordance with paragraph 3 of Annex 6. Methodical recommendations to increase the area up to 40m2 and accordingly the radius to 3.57 m (2.82m in Appendix 25). The increase was necessary to increase the accuracy and greater number of trial area in the end. This only improve the accuracy of the results to determine carbon stocks.

Taxation characteristics were determined by measuring by eye, the method according to the forest management instruction approved by the Order № 31 from 06.02.2008 Russian Ministry of Natural Resources.
Materials and tools: tape measure 50 m, 5 m measuring tape, measuring fork, pendulum altimeter, an ax, a saw hand, enumeration lists, Digital Cameras Canon EOS 50D, Canon Power Shot A570 IS, GPS-Navigation Garmin Etrex Venture HC and Garmin GPS Map62s .

Preliminary surveys point to calculate the number of sample plots




After the enumeration was determined by the number of saplings (units / ha), basal area (m2/ha), stock (m3/ha), changes in the stock for 1 year and 5 years (m3 /ha) (Table 1).
Table1 with results of surveys point

| № areas | Age plot number, y | Average height of trees, m | Average diameter of trees, sm | Basal area, m2/ha | Stock, m3/ha | Changes in the stock (average for 1 year), m3/ha | Changes in the stock (for 5 years), m3/ha |
|---|---|---|---|---|---|---|---|
| 1 | 8 | 5,1 | 5,5 | 96,2 | 311,6 | 38,9 | 194,8 |
| 2 | 7 | 4,8 | 4,6 | 61,9 | 193,0 | 27,6 | 137,9 |
| 3 | 8 | 5,1 | 3,8 | 65,5 | 212,1 | 26,5 | 132,6 |
| 4 | 10 | 6,1 | 5,8 | 82,5 | 300,4 | 30,0 | 150,2 |
| 5 | 9 | 5,7 | 5,4 | 69,8 | 243,0 | 27,0 | 135,0 |

In order to determine the average height of the most common tree species represented in the forest valuation instrumental measurements of the trees the height of which was close to average were made. In order to determine the age of these same trees cores of wood were taken by age auger. The

average height and average diameter of the stand were determined as the arithmetic means of sizes of average trees. The radius of circular enumeration areas was determined in accordance with appendix 5 of the Instruction.

Timber stock of forest plantation on 1 hectare was determined in accordance with paragraph 107 of the Instruction.

In order to determine the average height of the most common tree species represented in the forest valuation instrumental measurements of the trees the height of which was close to average were made. In order to determine the age of these same trees cores of wood were taken by age auger. The average height and average diameter of the stand were determined as the arithmetic means of sizes of average trees. The radius of circular enumeration areas was determined in accordance with appendix 5 of the Instruction.

Timber stock of forest plantation on 1 hectare was determined in accordance with paragraph 107 of the Instruction.

**SURVEY RESULTS**

As a result of the survey of the land overgrowing with forest in district Zalesovo were identified 14 concentric circular trial areas were identified with radius of 3.57 m and an area of 40 m2, see Table 2 below. Inside each trial area a complete enumeration of trees (undergrowth) with their division according to species and groups of heights: small (up to 0.5 m tall), medium (0.6-1.5 m) and large (more than 1.5 m) was made. The obtained data was recorded in a special register (Instruction).

**PROCESSING OF SURVEY**

After the enumeration in the trial areas the number of undergrowth (units / ha), the sum of section areas (m2/ha), stock (m3/ha), changes in the stock for 5 years (m3 / year), the change in the mass of wood for 5 years (t / ha) were determined (Table № 2).

Table №2

| № trial area | Average height of trees, m | Average diameter of trees, cm | Basal area, $m^2$/ha | Stock, $m^3$/ha | Changes in the stock (for 5 years), $m^3$/ha | Changes in the mass of wood (for 5 years), t/ha |
|---|---|---|---|---|---|---|
| 1 | 10,1 | 8,5 | 52,2 | 273,5 | 136,8 | 87,3 |
| 2 | 8,1 | 6,5 | 69,6 | 307,8 | 153,9 | 98,2 |
| 3 | 7,8 | 6,5 | 109,4 | 472,8 | 236,4 | 117,0 |
| 4 | 11,7 | 11,1 | 78,0 | 458,9 | 153,0 | 97,6 |
| 5 | 4,0 | 4,4 | 68,7 | 192,4 | 137,4 | 87,7 |
| 6 | 7,9 | 5,1 | 77,6 | 336,8 | 168,4 | 107,5 |
| 7 | 6,0 | 4,5 | 86,3 | 197,8 | 172,2 | 109,9 |
| 8 | 9,1 | 8,6 | 109,6 | 532,8 | 177,6 | 113,3 |
| 9 | 7,0 | 6,5 | 86,2 | 344,9 | 143,7 | 91,7 |
| 10 | 9,5 | 8,3 | 107,9 | 538,8 | 168,4 | 107,4 |
| 11 | 7,5 | 5,7 | 99,6 | 418,2 | 174,2 | 111,2 |
| 12 | 6,5 | 4,4 | 72,4 | 275,0 | 137,5 | 87,7 |
| 13 | 8,3 | 7,4 | 114,2 | 516,2 | 172,1 | 109,8 |
| 14 | 5,0 | 4,2 | 66,8 | 213,8 | 133,6 | 85,2 |

Table №1

| № trial area | Predominant type | Coordinates |
|---|---|---|
| 01 | Birch | 54 03.792 084 35.524 |
| 02 | Birch | 54 04.158 084 35.579 |
| 03 | Aspen | 54 06.496 084 34.985 |
| 04 | Birch | 54 06.678 084 45.561 |
| 05 | Birch | 54 03.825 084 16.080 |

| | | |
|---|---|---|
| 06 | Birch | 54 03.198 084 13.634 |
| 07 | Birch | 54 05.126 084 15.961 |
| 08 | Birch | 54 05.605 084 20.720 |
| 09 | Birch | 54 02.822 084 13.301 |
| 10 | Birch | 54 08.676 084 20.141 |
| 11 | Birch | 54 08.139 084 07.749 |
| 12 | Birch | 54 08.359 084 07.792 |
| 13 | Birch | 54 08.171 084 05.721 |
| 14 | Birch | 54 03.224 084 00.916 |

Timber stock of forest plantation on 1 hectare determined in accordance with paragraph 107 Regulations, as follows:

$$M = K \cdot G \cdot (3 + H),$$

in which:

*M* - timber stock for 1 hectare, $m^3$;

*K* – coefficient, that for pine, larch, birch, aspen, gray alder, linden, oak and hornbeam equals 0.4, for the remaining trees - 0.44;

*G* - arithmetic mean of the basal areas on one hectare of measurements on circular areas, $m^2$;

*H* - average by the coefficients of composition of the height of the trees in a forest plantation, m.

$$G = J \cdot \sum_{i=1}^{l} G_i = J \cdot \sum_{i=1}^{l} \frac{\pi \cdot (d_i)^2}{4} = \frac{\pi \cdot J}{4} \sum_{i=1}^{l} (d_i)^2$$

$$H = \frac{1}{l} \cdot \sum_{i=1}^{l} h_i$$

where:

*J=250* - conversion factor of the basal area at one site in the basal area per 1 ha (10000 $m^2$/40 $m^2$);

*l* - the number of trees in the trial area, pc;

$G_i$ - cross sectional area of the i trunk of the tree, $m^2$;

$d_i$ - trunk diameter of i tree, m;

$h_i$ - height of the i tree, m.

For example, the value of the timber stock in the trial area №1:

$$M = 0{,}4 \cdot 52{,}2 \cdot (3 + 10{,}1) = 273{,}5 m^3 / ha$$

The wood density was determined in accordance with State Standard Specification 16483.1-84 (Wood. Method of determining the density). Specimen preparation, selection of the required number and statistical processing of measurements were made in accordance with State Standard Specification 16483.0-89 (Wood. General requirements for the physical and mechanical tests). The conservative values of the density, representing the difference between the mean and standard deviation, calculated using the methods of mathematical statistics, were taken for calculation of the mass of wood. The derived conservative values of the density: birch - 638 kg/m$^3$ , aspen - 495 kg/m$^3$.

The age was determined by the total number of annual layers in accordance with State Standard Specification 16483.18-72 (The method of determining the number of annual rings in 1 cm and the content of late wood in annual layers).

The change of stock of wood was determined in accordance with Standard Specification 56-73-84 (Forest valuation and management. Growth of wood in the forest. Classification and symbols, basic formulas, terms and definitions).

The minimal quantity of tested specimens ($n_{min}$) for the one-step selection is calculated according to the formula:

$$n_{\min} = \frac{V^2 t_\gamma^2}{P_\gamma^2}$$

In which $V$ - coefficient of variation of the properties of wood, %;
$\gamma$ - required confidence probability;
$t_\gamma$ - reciprocal distribution of Student
$P_\gamma$ - relative precision of determination of selective average with confidence probability $\gamma$.
The coefficient of variation of the properties of wood $V$ was assumed to be 10%, indicated in the table of density.

| Characteristic of wood | Coefficient of variation, % |
|---|---|
| Number of annual ring in 1cm | 37 |
| The percentage of late wood | 28 |
| Density | 10 |
| Normalized humidity | 5 |
| Loss of weight: | |
| Linear | 28 |
| Extensional | 16 |
| Ultimate strength parallel to grain | 13 |
| Ultimate strength in static bending | 15 |
| Ultimate shear strength along the grain | 20 |
| Modulus of elasticity in static bending | 20 |
| Yield Strength | 20 |
| The tensile strength: | |
| along the grain | 20 |
| across the grain | 20 |

| Characteristic of wood | Coefficient of variation, % |
|---|---|
| Impact strength in bending | 32 |
| Hardness | 17 |

The relative precision of determination of the selective average was assumed to be 5% with confidence probability – 0,95. The reciprocal distribution of Student ($t_\gamma$) was assumed taking into account the estimate quantity of the units of the selection (18) under the appendix 1 (GOST 16483.0-89), so $t_\gamma$ = 2,11. The calculation was repeated until the value *n* differed by no more than one from the estimate one.

$$n_{\min} = \frac{V^2 t_\gamma^2}{P_\gamma^2} = \frac{(10\%)^2 \cdot (2{,}11)^2}{(5\%)^2} = 18$$

The result is rounded up to whole numbers.

The specimens for determination of the density were made as rectangular prisms with the base of 20X20 mm and the length of 30 mm along the grains under the GOST 16483.1-84. The density $(\rho_0)$ of each specimen was calculated in totally dry condition according to the formula in g/cm$^3$ (GOST 16483.1-84):

$$\rho_0 = \frac{m_0}{a_0 \cdot b_0 \cdot c_0} = \frac{m_0}{V_0}$$

In which $m_0$ - mass of the specimen in totally dry condition, g;

$a_0, b_0, c_0$ - dimensions of the specimen in totally dry condition, cm;

$V_0$ - volume of the specimen in totally dry condition, cm$^3$.

This result was transferred from g/cm$^3$ to kg/m$^3$. The report on the determination of the density of birch and aspen is given in Appendixes № 2 and № 3, respectively.

The statistical processing of the results was carried out in accordance with GOST 16483.0-89.

In one-step selection the following indicators were calculated: selective arithmetic mean *( $\overline{X}$ )* using the formula:

$$\overline{X} = \frac{\sum_{i=1}^{n} X_i}{n},$$

In which $X_i$ – value of the test characteristic;

*n*- quantity of the specimens;

selective average quadratic deviation *(S)* by the formula:

$$S = \pm\sqrt{\frac{\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2}{n-1}},$$

average error *($S_r$)* of the selective arithmetic mean by formula:

$$S_r = \frac{S}{\sqrt{n}},$$

selective coefficient of variation (*V) %* by formula:

$$V = \frac{S}{\overline{X}} \cdot 100,$$

relative precision *($P_\gamma$)* of determination of selective average by formula:

$$P_\gamma = \frac{S_r \cdot t_\gamma}{\overline{X}} \cdot 100.$$

Statistical indicators of the density of birch in a completely dry condition (n=18)

$\overline{\rho}_0$ = 655 kg/m$^3$

$S_r$ = 4 kg/m$^3$

*S* = 17 kg/m$^3$

*V* = 2,6 %

*P* = 1,3 %

Statistical indicators of the density of aspen in a completely dry condition (n=18)

$\overline{\rho}_0$ = 504 kg/m$^3$

$S_r$ = 2 kg/m$^3$

*S* = 9 kg/m$^3$

*V* = 1,9 %

*P* = 0,9 %

The conservative values of the density, representing the difference between the mean and standard deviation, calculated using the methods of mathematical statistics, were taken for calculation of the mass of wood. The derived conservative values of the density:

birch - $\rho_0$ = 655 kg/m$^3$ - 17 kg/m$^3$ = 638 kg/m$^3$ ,

aspen - $\rho_0$ = 504 kg/m$^3$ - 9 kg/m$^3$ = 495 kg/m$^3$.

The age was determined by the total number of annual layers in accordance with State Standard Specification 16483.18-72.

The change of stock of wood was determined in accordance with Standard Specification 56-73-84.

According to the classification (Standard Specification 56-73-84) the change in wood stock divides on the average change in wood stock and on the current change in wood stock. For calculation we use the average change in wood stock as a more conservative option than the current change in wood stock. The calculation of the average change in wood stock $\overline{\Delta M}$ for one year of its life is made by the formula:

$\overline{\Delta M} = \frac{M_A}{A}$, in which $M_A$ - stock of wood in age A.

In order to receive the average stock of wood for 5 years we multiply $\overline{\Delta M}$ for each trial area by 5.

The example of calculation for the trial area №1:

$$\overline{\Delta M}_5 = \frac{M_A}{A} = \frac{273{,}5\ м^3/\text{ha}}{10\ year} = 27{,}35\ м^3/ha*year\ 5\ years = 136{,}8\ м^3/ha$$

The values of the mass of the wood we get by multiplying the stock of wood by its density (GOST 23431-79).

Calculate the arithmetic value of the weight change of the wood for 5 years $\Delta\overline{M}_5$, average error $S_r$, average quadratic deviation *S*, coefficient of variation *V* relative precision of the average *P* for the entire area, we obtain:

$\Delta\overline{M}_5 = (100{,}8 \pm 11{,}3)$ m3/ha

$S_r$ = 3,0 t/ha

*S* = 11,3 t/ha

*V* = 11,2 %

*P* = 6,3 %

We take a conservative value for calculation

$\Delta\bar{M}_5$ = 99,1 – 13,5 = 89,5 m3/ha

The carbon content of wood is defined by the Center for Collective Use "The Arctic" of Northern (Arctic) Federal University named after M.V.Lomonosov. for birch $C = (51{,}7 \pm 3{,}6)\%$ (Report №33-11).

We take a conservative value for calculation:

$C = 51{,}7 - 3{,}6 = 48{,}1\%$

The mass of deposited carbon for 5 years on 1 ha:

$M_{C5}$ = 89, 4(m3/ha) · 0,481 = 43,1 m3/ha

For the whole area for 5 years:

$M_C$ = 43, 1 (m3/ha) *9489,37 ha = 408 766,4 t C

**Carbon absorption by soils**

As regards the soil used in the own approach based on the principles of the IPCC2006 chapter 4 tom 2&4, offering to assess changes in carbon stocks in the pool during the transition from one control mode to another.

In our case the transition from the agricultural land of tillage to carbon depositing forest plantations is considered. The process of replenishment of soil by carbon is complex and depends on the time passed since the cessation of tillage. To identify the values of absorption the information of studies was used in own approach (Kurganova .IN., Lopez de Guerenu V.O. Shvidenko A.Z., Sapozhnikov P.M. Changing in the total pool of organic carbon in fallow soil of Russia in 1990-2004. Soil Science, 2010, № 3, pp. 361-368)[23]. The budget of the soil carbon pool was estimated if the plantation was produced on arable land, otherwise the soil carbon absorption is assumed to be zero.

***For the calculation information on soil type and time passed since the termination of arable soil is required. The basis of calculation of soil carbon for the gray forest soil was based on the formula (Table 1, str.364, Kurganov et al, 2010[24]):***

$$BS = -60\ln(Y) + 261$$

where

$BS$ - rate of carbon accumulation in the soil layer 0-20cm, gC/m2 year

$Y$ – duration of the recovery of vegetation year.

This formula was obtained by the authors on the basis of their own studies and literature data (second paragraph, str.363, Kurganov et al, 2010)[25].

On the territory of the district Zalesovo are predominant gray forest soils. The average age of forest stands surveyed sites is (11 ± 3) years. We take a conservative value calculated for 8 years. We calculate the absorption of carbon gray forest soil under the age of 8 years of forest plantations in the last 5 years:

| Y, year | **4** | **5** | **6** | **7** | **8** |
|---|---|---|---|---|---|
| *BS*, gC/ m$^2$ year | 177,8223 | 164,4337 | 153,4944 | 144,2454 | 136,2335 |
| *BS*, t C/ha year | 1,778223 | 1,644337 | 1,534944 | 1,442454 | 1,362335 |
| Square, ha | 9489,4 | | | | |
| *BS*, tC / year | 16874,22 | 15603,72 | 14565,65 | 13687,98 | 12927,7 |
| $BS_5$, t C for 5 years | **73 659,3** | | | | |

[23] http://144.206.159.178/ft/7949/712033/13725465.pdf

[24] http://144.206.159.178/ft/7949/712033/13725465.pdf

[25] http://144.206.159.178/ft/7949/712033/13725465.pdf

$BS$ in sq/m2 obtained in the year transferred to t C / ha per year as follows::

$$\frac{g}{m^2 \cdot year} = \frac{10^{-6}\ t}{10^{-4}\ ha \cdot year} = \frac{10^{-2}\ t}{ha \cdot year} = \frac{t}{100 \cdot ha \cdot year}$$

***The total carbon absorption by soil and tree stand in the project areas for 5 years:***

$$BC_5 = BF_5 + BS_5,$$

where

$BC_5$ – the total carbon absorption in the whole area of plantations, t;

$BF_5$ – carbon sequestration by forest plantations for 5 years, t;

$BS_5$ – soil carbon absorption for 5 years, t

***The total carbon absorption by soil and tree stand in the project areas for 5 years in CO2e:***

$$BCO2_5 = BC_5 \cdot \frac{44}{12}$$

where

44/11-conversion factor from C to CO2

$$BCO_5 = 482425,7 \cdot \frac{44}{12} = 1768894,2m$$

$BCO2_5$ = 1 768 894,2 tCO2

Visual information about the pilot areas

*TRIAL AREA 01 54 03.792 084 35.524*

*TRIAL AREA 02 54 04.158 084 35.579*

*TRIAL AREA03 54 06.496 084 34.985*

*TRIAL AREA04 54 06.678 084 45.561*

*TRIAL AREA05 54 03.825 084 16.080*

*TRIAL AREA06 54 03.198 084 13.634*

*TRIAL AREA07 54 05.126 084 15.961*

*TRIAL AREA08 54 05.605  084 20.720*

*TRIAL AREA09 54 02.822  084 13.301*

*TRIAL AREA10 54 08.676 084 20.141*

*TRIAL AREA11 54 08.139 084 07.749*

*TRIAL AREA12 54 08.359 084 07.792*

*TRIAL AREA13 54 08.171 084 05.721*

*TRIAL AREA14 54 03.224  084 00.916*