7.2 AGRICULTURAL DEVELOPMENT PLAN – ARAGUAÍNA

7.2.1 Land Use Plan

(1) Legal Reservation Area

This municipal district is included in the Amazônia Legal region. The current areas destined to Legal Reservation in comparison to the Federal and State Environmental Laws are presented in the following table.

Area	Area (km^2)	% Occupation
Total Area	(3,920)	
Amazon Rain Forest Region	2,956	75.4%
Cerrado Region	964	24.6%
Reservation Area		
Federal law	2,702	68.9%
State law	1,960	50%
Reservation according to the current use	1,241	31%
Deficit		
Federal law	1,461	37.3%
State law	719	18.3%

Source: GIS for Amazon Rain Forest and Cerrado regions. Conservation Area according to the Federal Law – 80% for the Amazon Rain Forest and 30% for the Cerrado. State Law – 50% for both.

According to the above data, the land use in this municipal district in order to fulfill the requirements of the Federal Law, at the short term, is too difficult due to the lack of funds and technology. Therefore, the plan shall be elaborated based on the requirements of the State Laws. The Federal rules shall be fulfilled at the long term.

(2) Land Use Potential

The Land Use potential in the municipal district of Araguaína represents approximately 55% of its area. This potential is represented in the Figure 7.2.1.

Land Use Potential - Araguaína

Items	Area	% participation
Municipal district total area	3,920.0 km2	
Agriculture / Livestock I	817.2 km2	20.8 %
Agriculture / Livestock II	1,344.3 km2	34.3%
Sub total	2,161.5 km2	55.1%
Reforestation	192.9 km2	4.9%
Silvi-pastoral	136.0 km2	3.5%
Forest Management	14.6 km2	0.4%
Reservations	980.7 km2	25.0%
Riverside Forests	378.5 km2	9.7%
Others	55.8 km2	1.4%
Sub total	1,758.5 km2	

Source: Data calculated through GIS and SEPLAN.

The above Land Use Potential adjusted to the Environmental Conservation program results in the Land Use Potential presented in the following table.

	Land Use Potential		Area according to Conservation Laws	
	Area (km^2)	Participation (%)	Federal	State
Municipal district area	3,920.0		3,920.0	3,920.0
Development area	2,354.4	60.0	1,218.0	1,960.0
Agriculture and Livestock I	817.2	20.8	817.2	817.2
Agriculture and Livestock II	1,344.3	34.3	207.9	949.9
Reforestation	192.9	4.9	192.9	192.9
Reservation				
Forest	957.0	24.4	957.0	957.0
Agro-forestry / Silvi-pastoral			1,136.4	394.4
Silvi-pastoral	136.0	3.5	136.0	136.0
Forest Management	14.6	0.4	14.6	14.6
Land with declivity	23.7	0.6	23.7	23.7
Riverside forest	378.5	9.7	378.5	378.5
Others	55.8	1.4	55.8	55.8
Sub-total	1,565.6	40.0	2,702.0	1,960.0

In Araguaína, due to the existence of 75% of the municipal area within the Amazon forest thus with a large area destined to reservation, the current land use shall be drastically reduced. For this purpose, the introduction of intensive production activities becomes necessary both in agriculture and livestock husbandry.

(3) Global Land Use Plan

The maximum utilization of land use potential shall be carried out through the promotion of the gradual introduction of intensive production in such a way that the plan allows the gradual fulfillment of the environmental rules in force. The existing forest areas shall be preserved. The areas with low agricultural potential shall be gradually destined to reservation. The remaining lacking areas to attain the reservation targets shall be the object of a long term plan of 35 years.

The areas destined to the potential Agriculture and Livestock I and II, distributed among small-, medium- and large-scale producers, are presented in the following table.

Item	Producers	Area
Agriculture and Livestock I		81,720.0
Agriculture and Livestock II		134,430.0
Total		216,150.0
Land owners (with Registration)	1,017.0	
Mini	311.0	12,573.0
Small	320.0	56,221.0
Medium	266.0	160,076.0
Large	120.0	320,895.0
Mini- and small-scale land owners		
Agriculture and Livestock I	17.5%	14,341.4
Agriculture and Livestock II	17.5%	23,591.8
Medium- and large-scale land owners		
Agriculture and Livestock I	82.5%	67,378.6
Agriculture and Livestock II	82.5%	110,838.2

The classification of the Production Potential according to the land size and to the implementation period is represented in the following table.

Area (ha)

	Current	Short term	Medium term	Long term	Final
Municipal area	392,000.0	392,000.0	392,000.0	392,000.0	392,000.0
Medium- and large-scale land owner	262,040.0	259,437.1	248,742.8	240,754.2	107,310.0
Existing pasture	262,000.0	251,669.7	190,629.2	103,862.8	0.0
Improved pasture		752.8	30,245.5	81,732.9	52,151.5
Grains production	40.0	4,704.9	23,702.8	47,762.1	47,762.1
Mini- and small-scale land owner		2,309.7	4,165.4	7,396.4	7,396.4
Conservation	95,700.0	99,500.3	118,502.0	137,503.7	279,110.0
Plantation		643.0	3,858.0	7,073.0	19,290.0
Agro-forestry		1,314.7	7,888.0	14,461.3	108,840.0
Silvi-pastoral		453.3	2,720.0	4,986.7	13,600.0
Forest Management		48.7	292.0	535.3	1,460.0
Forest	95,700.0	95,700.0	95,700.0	95,700.0	95,700.0
Riverside Forest		1,261.7	7,570.0	13,878.3	37,850.0
Areas with declivity		79.0	474.0	869.0	2,370.0
Cerrado	28,400.0	27,202.6	18,895.1	7,882.2	0.0
Others	5,860.0	5,860.0	5,860.0	5,860.0	5,580.0

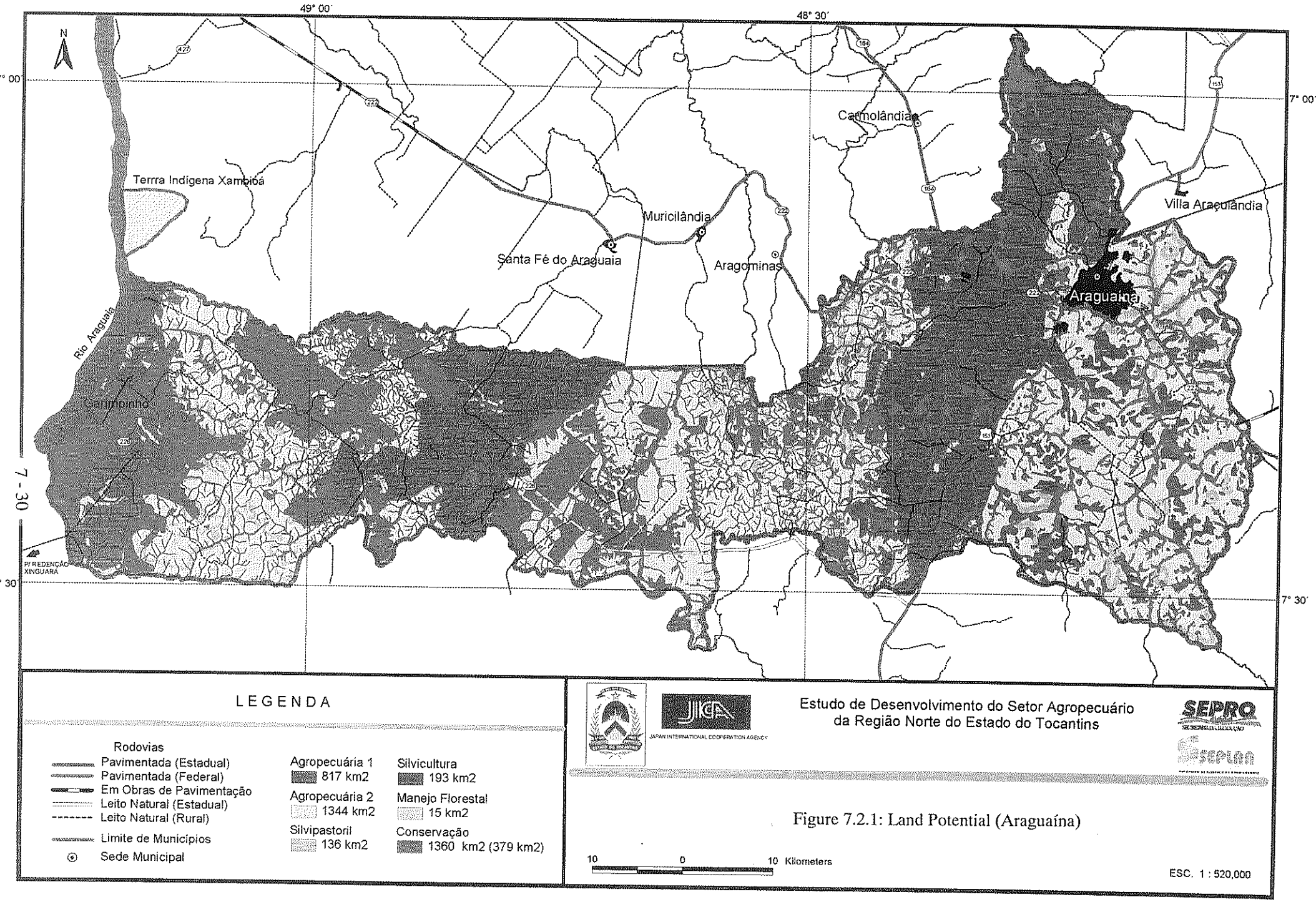


Figure 7.2.1: Land Potential (Araguaína)

7.2.2 Agricultural Development Plan

(1) Summary of the Plan

The agricultural development plan of the region is oriented towards the introduction of the agricultural activity, the diversification of the cattle husbandry activity, and to the practice of intensive agriculture through the production nucleuses. The plan encompasses the development of 49,000 ha apt for agricultural production. As for the meat cattle production, through the promotion of a more intensive land utilization, the present bovine herd of 210,000 heads shall increase to 570,000 heads. As for milk, the production shall be increased from the current 1,000 m^3 to 2,600 m^3 of milk. The substitution of part of the current herd of bovine cows by buffaloes shall promote the production of 3,6 thousand m^3 of bubaline milk.

The medium- and large-scale producers shall go on producing meat cattle.

The mini- and small-scale producers shall become bovine and bubaline milk producers, besides starting the breeding of swine aiming at the increase of the household income, at long term, to a minimum income of 3 minimum wages per month by household.

Activities by Property Size

Types of Production	Activity
Introduction of grains (Large- and medium-scale producer)	• Soybean production (own land and rental) • Maize production (own land and rental)
Livestock husbandry diversification (all producers)	• Pastures improvement • Feeding improvement (silage for the dry season, production of sugar cane, pastures rotation, confinement, zero grading system) • Genetic improvement (AI and estrus synchronization) • Castration and removal of horns • Introduction of buffaloes breeding (exchange system with the present animals) • Swine breeding
Production nucleus (mini- and small-scale producer)	• Grains type (grains + buffalo + swine) • Fruits type (fruits + buffalo + swine) • Greenery type (greenery + buffalo + swine)

Activities by Type of Production

Products	Activities
General	• Accessibility to funds – institution of the "FUNDO de AVAL" • Development of roads • Development of commercialization infrastructure
Introduction of grains (large- and medium scale producer)	• Assistance to beginners • Distribution of lime to producers who start the activity at the short term • Establishment of a services renderer company for agricultural mechanization and start of its operation • Strengthening of technical assistance to producers
Livestock husbandry diversification (all cattle raisers)	• Technical assistance about livestock husbandry (silage, removal of horns, etc.) • Assistance for the substitution of milking bovine cattle by bubaline cattle • Development of the buffaloes matrices distribution system – short term • Prevention against swine diseases

	• Structuring of meat processing plants and slaughterhouses
Production nucleuses (mini- and small-scale producers)	• Strengthening of the cooperative activity (sale, technical assistance to producers) • Producers training program (forms of financing and improvement of the producers activity level) • Program for production incentive (lime, etc)

(2) Plan of Grains Introduction

a. Production Plan and Forecast of Funds Requirements

Production Plan (ha)

	Short			Medium			Long		
	Pot. I	Pot. II	Total	Pot. I	Pot. II	total	Pot. I	Pot. II	Total
Soybean	1,233	2,028	3,261	6,131	10,086	16,218	12,196	20,062	32,257
Maize	546	898	1,444	2,830	4,655	7,485	5,862	9,643	15,505
Total	1,779	2,926	4,705	8,961	14,741	23,703	18,057	29,705	47,762
Own production	1,245	2,048	3,293	7,169	11,793	18,962	16,252	26,734	42,986
Rental	534	878	1,411	1,792	2,948	4,741	1,806	2,970	4,776
Production area	1,779	2,926	4,705	8,961	14,741	23,703	18,057	29,705	47,762
Pasture	1,601	2,634	4,234	8,065	13,267	21,333	16,252	26,734	42,986
Cerrado	178	293	470	896	1,474	2,370	1,806	2,970	4,776

According to the previous table, in the potential I area, the soybean production area is of 1,200 ha and the maize one is of 550 ha. In the potential II area, the soybean production is of 2,000 ha and the maize one is of 900 ha. In 2015, the possible area for agricultural production within the total area will represent 25%, equivalent to the production of 32,000 ha and 15,000 ha of soybean and maize, respectively.

The most serious problem for the agricultural production is the veranico phenomenon. In order to prevent it, the EMBRAPA guidance as for the ideal cultivation period shall be followed, and this information is already available in the form of a table per municipal district. This table indicates that in Araguaína, for the potential I areas, from November 1 to December 10, and for the potential II areas, from October 2 to November 10 are the ideal periods for soybean cultivation. As for maize, from October 1 to January 20, and from October 1 to January 10 are the ideal periods for the cultivation in the potential I and II areas, respectively.

The areas for grains production are presented in Table 7.2.2 (1) for potential I areas and in Table 7.2.2 (2) for potential II areas.

b. Requirement of Inputs for the Introduction of Grains Production

In cerrado areas, lime and phosphorus supplement are essential. At the short time, the requirement of these inputs is 8,000 t of lime and 460 t of phosphate, besides 11 machinery sets which are also necessary. At the long term, 82,000 t of lime and 5,000 t of phosphate, 2,000 t of soybean seeds, 400 t of maize seeds, 16,000 t of fertilizers, besides 108 machinery sets are necessary.

Requirement of Production Inputs

	Short	Medium	Long	Total
Production Inputs				
Average soybean area (ha)	1,631	9,740	24,237	

Average maize area (ha)	722	4,464	11,495	
Area prepared for production				
Total grains production (ha)	4,705	23,703	47,762	
Pasture area (ha)	4,234	21,333	42,986	
Cerrados area (ha)	470	2,370	4,776	
Soil improvement area				
Lime (t)	7,699	39,824	82,304	129,827
Phosphate (t)	457	2,362	4,881	7,699
Machinery sets	11	54	108	108

In the potential II areas utilized for pasture, due to the soil characteristic and to the high acidity, the lime and phosphate utilization costs are quite high.

c. Plan of Introduction of Other Regions' Producers

Due to the region's cattle husbandry tradition, the technological knowledge necessary for the grains production is deficient. Therefore, it is necessary to bring experienced producers in grains cultivation to assure the start of the production development. At the short term, the introduction of 30% of producers from outside is expected with this plan.

We know that the cooperatives and independent producers of the Country's southern region have much interest in the grains production in the Cerrados region considering that there are large areas appropriate for agriculture there compared to the limited area (average of 60/70 ha for each producer for the cultivation of coffee, soybean, maize, cotton, etc.) in their hometown. This producers' introduction plan aims at allowing their arrival and, through their experience, promoting the production development at the region. These producers long for having their own land for cultivation and using the extra capacity of the existing machinery they can rent new areas for additional production.

1) Production Plan by the Tenant

The present plan encompasses the recuperation of degraded pasture through the land utilization planning for the production of soybean by the tenant. The correction of acidity, fertilization and incorporation of organic matter, besides the improvement of pasture are the advantages of the cattle raiser on one side, and on the other side the utilization of the extra machinery capacity for the production is the advantage for the tenant.

In order to assure the mutual benefits between the parties, a rental contract shall be elaborated, with the follow-up and occasional interference of the Municipal Development Commission in such a way to avoid future problems for both parties or for the established program.

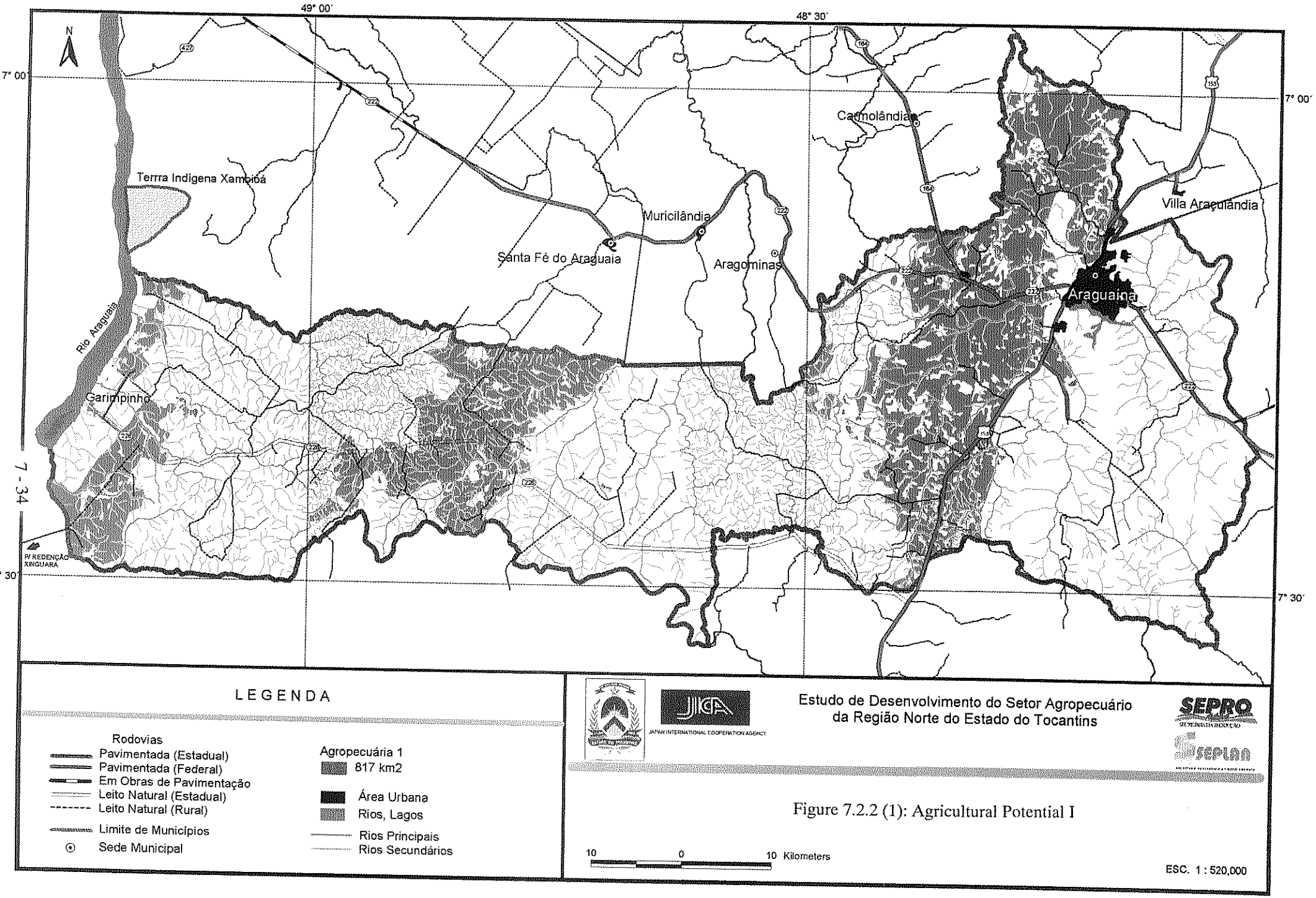


Figure 7.2.2 (1): Agricultural Potential I

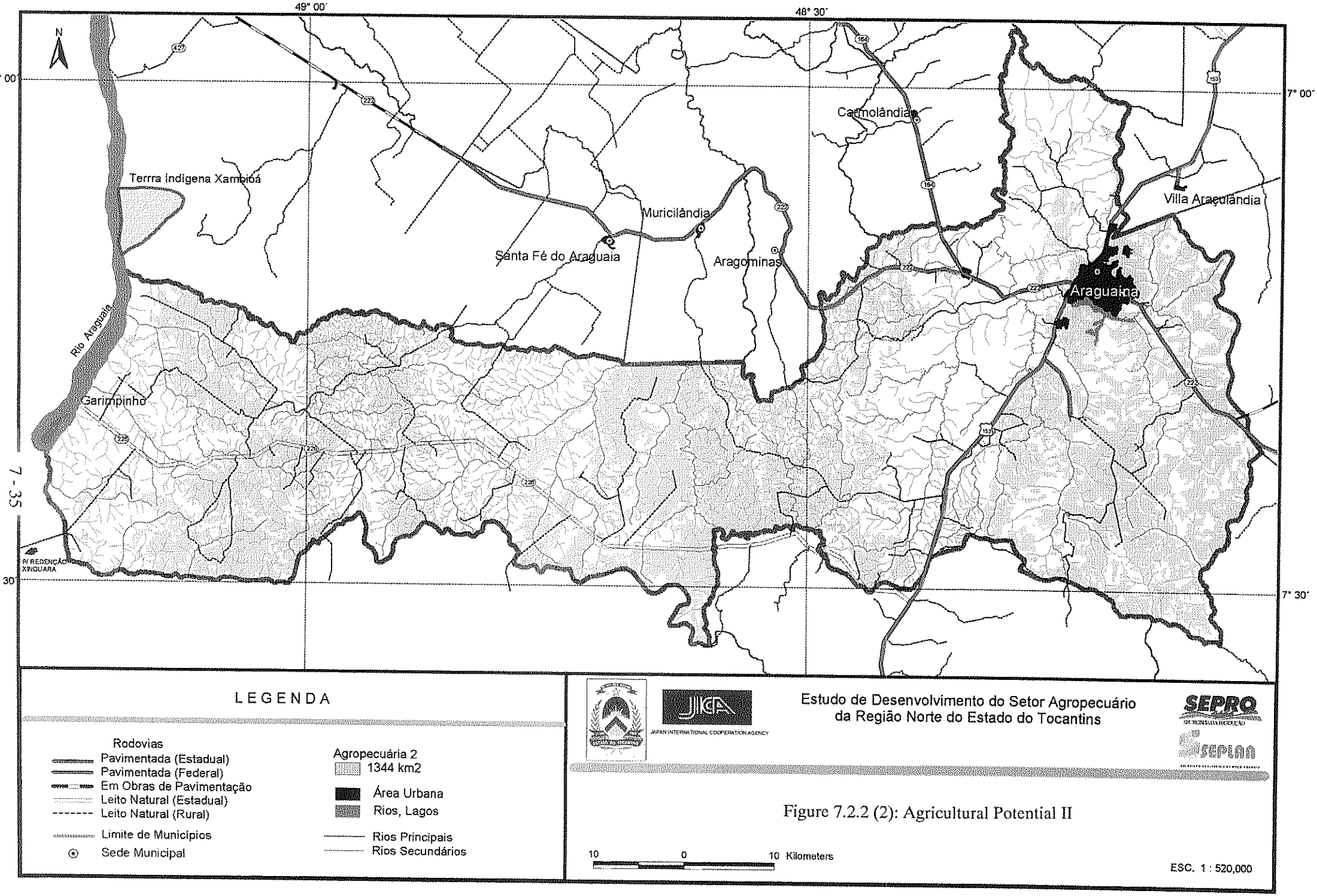


Figure 7.2.2 (2): Agricultural Potential II

2) Necessity of Governmental Incentive

The environmental preservation program and the sustainability of the activity through the integration agriculture and cattle husbandry, thus the introduction of grains, are being proposed by the Federal government. However, this program is not being duly applied, thus being necessary an assistance from the State government, mainly in regard to financial resources. For such a purpose, the following items are necessary:

- Maintenance of access roads during the rainy season, storage silos, seeds, fertilizers and agro-chemicals. Production machinery maintained by the State with the participation of the local Prefecture in the conservation and maintenance of this equipment.
- At the short term, necessity of lime supply to the producers for soil correction.
- Soil analysis, selection of variety, guidance as for cultivation and technical assistance shall be carried out by RURALTINS, duly supported by EMBRAPA, UNITINS, etc.

d. Necessity of Financial Resources for Production

For the large-scale producers, considering the necessary scale, the production in modules with 450 ha is recommended, with a necessary investment of R$ 220,000. As a consequence, at the short term, incentives for lime and phosphate become necessary.

Necessary Financial Resources for Grains

	Short	Medium	Long	Total
Production area				
Average production area of soybean (ha)	1,631	9,740	24,237	
Area at the end of each 5 years (ha)	8,153	48,698	121,187	178,039
Resources for production (R$ 1,000)	3,903	23,311	58,011	85,225
Annual average area for maize (ha)	722	4,464	11,495	
Area at the end of each 5 years (ha)	3,609	22,322	57,475	83,405
Resources for maize production (R$ 1,000)	1,528	9,451	24,335	35,314
Total production cost in the period (R$1,000)	5,431	32,762	82,346	120,539
New production area				
Grains production	4,705	23,703	47,762	
Pasture	4,234	21,333	42,986	
Cerrado	470	2,370	4,776	
Cost of transformation of pasture into production area (R$1,000)	212	1,067	2,149	3,428
Cost of transformation of cerrado into production area (R$1,000)	240	1,209	2,436	3,885
Total (R$1,000)	452	2,275	4,585	7,312
Soil improvement				
Lime per period (t)	7,699	39,824	82,304	129,827
Necessary resources (R$1,000)	139	717	1,481	2,337
Phosphate per period (t)	457	2,362	4,881	7,699
Necessary resources (R$1,000)	183	945	1,952	3,080
Total per period (R$1,000)	321	1,661	3,434	5,416
Total Cost for soybean and maize (R$1,000)	6,204	36,698	90,365	133,267

Remark: The machinery acquisition cost is not included, only its repayment cost.

The quantity (t) and the production value (R$ 1,000) in relation to the cost (balance) are presented in the following table.

Item	Short	Medium	Long	Total
Total cost – maize and soybean	5,752	34,424	85,780	125,956
Soybean production	24,460	146,093	363,562	534,116
Production value	6,971	41,637	103,615	152,223
Maize production	19,849	122,769	316,112	458,730
Production value	3,652	22,590	58,165	84,406
Total production value	10,623	64,226	161,780	236,629
Balance – soybean and maize	4,871	29,802	76,000	110,674

According to the above data, the grains introduction plan has economic feasibility, thus being recommended. Therefore, the following measures shall be taken in order to assure the necessary financial resources to the production:

- Financing lines for the opening of new production areas.
- At the short term, subsidy for the soil correction cost – subsidy for lime (total within the average recommended quantity in the region).
- Creation of mechanisms for the access to the production cost financing by the producers. Necessity of the global value availability. At the short term, study about the possibility of subsidizing the interest rates.
- After the production establishment, financing through soybean traders is viable.
- Establishment of the company for mechanization services rendering to the producers in such a way that this cost does not affect their normal production cost.

The necessary funds for the implementation of the above mentioned measures are presented in the following table.

Funds per Period (R$ 1000)

	Short	Medium	Long	Total
Introduction of grains				
Total cost	5,752	34,424	85,780	125,956
Governmental support	1,726	0	0	1,395
Financing	2,013	9,294	22,303	40,480
Necessary own funds	2,013	25,130	63,477	108,975
Total producer revenue	10,623	64,226	161,780	236,629

At the short term, the governmental support represents R$ 170 millions. The soybean production value in the period of 15 years shall reach an accumulated value of R$ 220 millions (after the year 2015, R$ 2.2 millions per year). Therefore, this State government's support represents an important strategic support for the State economy.

(3) Plan of Livestock Husbandry Diversification

According to the global plan, improvement in the feeding, genetic improvement, castration

and removal of horns of the bovine cattle shall be introduced, besides the intensive production through bubaline and swine cattle husbandry as alternatives for the increase of income for the mini- and small-scale producers.

a. Bovine cattle husbandry

1) Pasture area

The pasture area classified according to the land use plan is presented in the following table.

	un.	Current	Potential	Short	Medium	Long
Pasture Area (km^2)		262,000.0	216,150.0	252,875.8	223,594.6	190,582.4
Without improvement	ha			251,669.7	190,629.2	103,862.8
With improvement	ha			752.8	30,245.5	81,732.9
Silvi-pastoral	ha		13,600.0	453.3	2,720.0	4,986.7
Medium- / Large-scale		216,020.3		209,592.3	186,874.7	165,987.0
Without improvement	ha			208,465.7	154,386.6	80,142.6
With improvement	ha			752.8	30,245.5	81,732.9
Silvi-pastoral	ha		11,213.3	373.8	2,242.7	4,111.5
Small-scale	ha	45,979.7		43,283.5	36,719.9	24,595.4
Without improvement	ha			43,203.9	36,242.6	23,720.2
With improvement	ha					
Silvi-pastoral			2,386.7	79.6	477.3	875.1

2) Potential of the Pasture Supporting Capacity

The potential of the pasture supporting capacity according to the above data is presented in the following table.

Supporting Capacity (heads/ha)

	Animal	Short	Medium	Long
Medium- / Large-scale				
Without improvement	bovine	0.7	1.2	1.5
With improvement	bovine	1.0	2.0	3.0
Silvi-pastoral	buffalo	1.0	1.0	1.0
Mini- / Small-scale				
Without improvement	cow	90%	60%	20%
	buffalo	10%	40%	80%
With improvement	cow	1.0	1.0	1.0

Remarks.: The current average is of 0.48 heads/ha

3) Productivity Goals

According to the above data, the following goals were established.

Number of Animals (heads)

	Current	Short	Medium	Long
Meat bovine cattle	200,562	224,419	376,005	559,081
Without improvement		223,267	283,454	183,927
With improvement		1,152	92,551	375,154
Milking bovine cattle	35,963	41,644	39,925	10,888
Buffalo	55	7,182	30,778	51,180
Total	236,580	273,245	446,708	621,149

4) Necessity of Structure due to the Pasture Productivity Increase

In order to promote the plan of production increase, the use of silage shall be necessary by the large- and medium-scale producers, as well as the supplementation of sugar cane to the animals by the mini- and small-scale producers shall be necessary during the dry period.

The necessary structure for such activities are presented in the following table.

	Current	Short	Medium	Long
Proposed number of animals (heads)	236,580	273,245	446,708	621,149
Pasture supporting capacity without additional feeding (heads)	235,800	227,588	201,235	171,524
Balance (heads)	-	45,657	245,473	449,625
Silage need (heads)		36,525	196,378	359,700
Number of forage choppers			311	320
Need of additional forage (heads)		9,131	49,095	89,925
Need of silage (m^3/year)		73,051	392,756	719,399
Number of necessary silos		365	1,964	3,597
Necessary production area for the dry period (ha)		457	2,455	4,496
Area for integration (ha)			30,245	81,733

5) Necessary Financial Resources

The necessary financial resources for the meat cattle husbandry were calculated and are presented in the following table.

Necessary Funds (R$ 1000)

	un. (R$)	Short	Medium	Long	Total
Cost with pasture improvement					
Silage set	2,000	731	3,928	7,194	11,852
	2,000	146	786	1,439	2,370
Cost of hay production (1000 t)	1,600	0	498	512	1,010
Cost of forage chopper	400	183	982	1,798	2,963
Cost of supplementary food production					
Cost of pasture rotation	300	0	9,074	24,520	33,594
Electric fence					
zero grading	2,000	0	622	640	1,262
Ordinary corral					
Total Cost		1,059	15,888	36,103	53,051

b. Swine Husbandry

The swine husbandry activity shall be introduced for the mini- and small-scale producers. The short-term objective is to reach 10% of these producers, 50% at the medium term, and most of them at the long term. Although the hypothesis of purchasing food outside the region is taken into consideration, as much as possible incentive shall be given for the utilization of sub-products of the property such as cassava, grains and remains of fruits and vegetables, besides the use of milk serum. The necessary resources for this activity are presented in the following

table.

Necessary Resources

	Short	Medium	Long	Total
Pigsty (quantity)	63	252	316	631
Female matrices (heads)	631	3,155	6,310	6,310
Cost of pigsties (R$ 1000)	50	202	252	505
Cost of feeding (R$1000)	1,034	10,340	20,681	32,055
Total (R$1000)	1,085	10,542	20,933	32,560

c. Livestock Husbandry – Necessary Funds and Production Quantification

1) Necessary Funds

The necessary funds for the improvement of the livestock husbandry activity are presented in the following table.

Necessary Funds (R$ 1000)

	Short	Medium	Long	Total
Pasture improvement	113	4,537	12,260	16,910
Management improvement	776	14,777	35,525	51,078
Genetic improvement	691	1,000	878	2,570
Castration and removal of horns	2,805	4,700	6,989	14,494
Introduction of buffaloes	800	0	0	800
Swine husbandry	1,085	10,542	20,933	32,560
Total	6,270	35,557	76,585	118,411

2) Quantification of the Livestock Husbandry Improvement Plan

In the case of the meat bovine cattle husbandry, the estimate of production increase due to the pasture improvement through the integration agriculture-livestock is high. Increase of 6%, 50% and 56% at short, medium and long terms, respectively, are expected as presented in the following table.

	Un.	Current	Short	Medium	Long
Total herd	head	200,562	224,419	376,005	559,081
Slaughter of animals	head	57,162	63,962	107,165	159,344
Annual production of meat	t	12,004	13,432	22,505	33,462
Total production value / period	R$ 1000	120,040	127,180	179,683	279,834

Remark: The above presented value represents the 5 years period, thus the annual value represents 1/5 of this value.

In case of the milking bovine cattle husbandry, with the AI (Artificial Insemination), the productivity improvement is expected. The zero-grading system besides the substitution of part of the milking bovine herd by milking buffaloes shall be implemented at the long term. Despite the reduction of the herd, a compensation is expected in the production due to the increase of productivity as presented in the following table.

	Un.	Current	Short	Medium	Long
Herd		35,963	41,644	39,925	10,888
Milking cows	heads	10,178	11,785	11,299	3,081
Productivity rate	l/year	1,000	1,000	2,000	3,000
Production	m^3/year	10,178	11,785	22,597	9,244
Production value in the period	R$ 1000	10,178	10,893	17,191	15,921
Total		11,089	12,841	12,311	3,357
Annual production of meat	t	2,329	2,697	2,585	705
Value of the meat production	R$ 1000	16,644	25,127	26,409	16,451
Total value in the period	R$ 1000	26,821	36,020	43,601	32,372

As for buffaloes husbandry, according to the plan of distribution of milking buffaloes matrices in substitution of the current milking bovine cattle husbandry, the estimate buffaloes milk production shall be higher than the bovine milk production.

	Un.	Current	Short	Medium	Long
Herd		55	7,182	30,778	51,180
Females	head	15	2,033	8,710	14,484
Productivity rate	l/year	2,000	2,000	2,000	2,000
Buffaloes milk production	m^3	30	4,065	17,420	28,968
Production value per period	R$ 1000	69	4,608	24,171	52,187
Production of male buffaloes	head	14	1,796	7,695	12,795
Meat production	t	3	377	1,616	2,687
Production value per period	R$ 1000	14	1,885	9,965	21,514
Total Value	R$ 1000		6,493	34,136	73,701

As for swine husbandry, the production increase plan is presented in the following table.

	unit	Short	Medium	Long
Females for reproduction	head	631	3,155	6,310
Meat production	head	10,096	50,480	100,960
Production per period	head	31,235	187,407	468,518
Production value per period	R$ 1000	5,622	33,733	84,333

3) Cost and Revenue of the Cattle Husbandry Activity

As for the cattle husbandry activity, the revenue and expenses per period present the following balance:

Balance (R$ 1000)

	Current	Short	Medium	Long
Value of meat production	120,040	127,180	179,683	279,834
Value of milk production	26,821	36,020	43,601	32,372
Value of buffalos production	83	6,493	34,136	73,701
Total production of swine	0	5,622	33,733	84,333
Total value of livestock husbandry production	146,945	175,314	291,153	470,240
Balance	0	6,270	35,557	76,585

The increase of the balance between revenue and expense is remarkable at the medium and long terms, showing that this activity presents high feasibility. This activity also presents the advantage of not requiring high investment since the cattle raisers already possess a certain patrimony represented by the currently raised cows. However, the introduction of grains for the pasture improvement is the foundation for the implementation of the present plan. Without it, the pasture improvement will have to be carried out with investment in soil correction, incorporation in organic matter and fertilization of pastures done by the cattle raisers.

(4) Production Nucleus

a. Production Area

In Araguaína, there are 631 mini- and small-scale producers, most of them living in poverty conditions. This plan's proposal is to allow these producers to upgrade their condition increasing their income at the minimum level of 3 minimum wages per month. For that, the necessary cultivation areas are presented in the following table.

	Producers		Necessary Area (ha)		
	Mini	Small	Short term	Medium term	Long term
Total	311	320	2,310	4,619	7,396
Grains type	62	64	1,582	3,164	5,066
Fruits type	93	96	95	190	304
Greenery type	156	160	633	1,266	2,026

In order to attain the above mentioned goal, the plan shall be carried out according to the following table.

	Proportion	Number of Producers		Short term		Medium term		Long term	
		Short / Medium	Long	Area	Production	Area	Production	Area	Production
				(ha)	(ton)	(ha)	(ton)	(ha)	(ton)
Grains type				1,582		3,164		5,066	
Rice	5	2.4	4.0	791	1,898	1,582	3,797	2,533	10,132
Feijão bean	1	1.5	2.4	158	237	316	475	507	1,216
Maize	2	5.0	7.0	316	1,582	633	3,164	1,013	7,092
Soybean	2	2.4	3.5	316	759	633	1,519	1,013	3,546
Total				1,582	4,477	3,164	8,954	5,066	21,986
Fruits type				95		190		304	
Pineapple	3	30.0		28	854	57	1,709	91	2,736
Banana	3	25.0		28	712	57	1,424	91	2,280
Passion fruit	2	12.0		19	228	38	456	61	730
Cashew	2	1.0		19	19	38	38	61	61
Total				95	1,813	190	3,626	304	5,806
Greenery type				633		1,266		2,026	
Industrial tomato	1	60.0		63	3,797	127	7,594	203	12,158
Cassava	9	27.0		570	15,377	1,139	30,754	1,824	49,242
Total				633	19,174	1,266	38,348	2,026	61,400

The necessary inputs in order to attain the above mentioned objective is presented as follows.

Necessary Inputs (R$ 1000)

	Short	Medium	Long	Total
Necessary resources				
Grains type	2,007	6,021	10,442	18,470
Fruits type	736	2,209	3,830	6,775
Greenery type	2,389	7,168	12,430	21,987
Total	5,133	15,398	26,702	47,233
Resources for inputs				
Grains type	1,104	3,311	5,742	10,157
Fruits type	484	1,453	2,519	4,456
Greenery type	985	2,955	5,124	9,064
Total	2,573	7,719	13,385	23,677

The production values, costs and financial balance are presented in the following table.

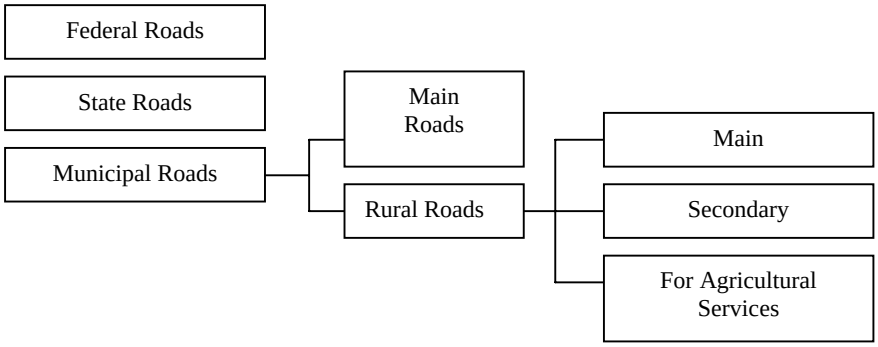
(R$ 1000)

	Un. (R$/ha)	Short	Medium	Long	Total
Grains type					
Rice	337.5	3,204	4,805	11,752	19,761
Feijão bean	750.0	890	1,335	3,170	5,394
Maize	193.5	1,531	2,296	4,962	8,788
Soybean	278.5	1,057	1,586	3,526	6,170
Total		6,681	10,022	23,410	40,114
Fruits type					
Pineapple	266.7	1,139	1,709	2,963	5,810
Banana	230.0	819	1,228	2,130	4,176
Passion fruit	500.0	570	854	1,481	2,905
Cashew	2,000.0	190	285	494	968
Total		2,717	4,076	7,068	13,860
Greenery type					
Industrial tomato	100.0	1,898	2,848	4,938	9,684
Cassava	80.0	6,151	9,226	15,999	31,376
Total		8,049	12,074	20,937	41,060
Total value of production		17,448	26,172	51,415	95,034
Total cost of production		5,133	15,398	26,702	47,233
Balance		12,315	10,773	24,713	47,801

7.3 Plan of Infrastructure Improvement

(1) Roads included in the Plan

The roads included in the plan are the basic roads above the municipal roads. The maintenance of in-farm roads shall be carried out by the owners themselves and by the producers associations. For the execution of an efficient plan, the existing roads shall be utilized as much as possible.



The basic infrastructure of this plan shall be prepared at short term, while at medium and long terms the necessary infrastructure for the increase of agricultural production shall be prepared.

(2) Plan of Roads Improvement at Short Term

Since Araguaína has an elongate shape in the east-west direction and its center is located more to the east, the traffic in the east-west direction shall be more important than the north-south one. The road in this direction is the TO-226, and in the north-south direction, the BR-153. During the rainy season, the traffic is difficult since this State road TO-226 is still not paved.

This road shall be the most important one for the traffic and channeling of the agricultural production since it is horizontally aligned with the 3 blocks of the Agriculture and Livestock Potential I and II, concentrated more to the west and with areas of 490.7 km^2, 731.3 km^2 and 930.9 km^2.

The perspectives of soybean production volume and of the quantity of necessary trucks for transportation in case this crop is introduced in these blocks is presented as follows.

Soybean Production (Estimate)

Potential		Block 1		Block 2		Block 3	
		Agric. and Livestock I	Agric. and Livestock II	Agric. and Livestock I	Agric. and Livestock II	Agric. and Livestock I	Agric. and Livestock II
Area	(km^2)	114.4	376.3	220.6	510.7	473.9	457.0
Total	(ha)	49,070		73,130		93,090	
33% of the usable area	(ha)	16,357		24,377		31,030	
Soybean production	(t)	49,070		73,130		93,090	
Necessary trucks (30t)	(no.)	1,636		2,438		3,103	
	(no./day)	54.5		81.3		103.4	
Necessary trucks (20t)	(no.)	2,454		3,657		4,655	
	(no./day)	81.8		121.9		155.2	

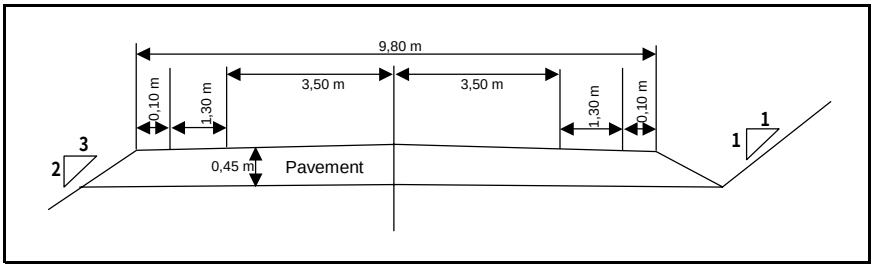
Remark: The soybean harvest period shall be of 30 days.

The number of 30 t capacity trucks that shall transit in 1 day shall be 55 in the Area 1, 135 in the Area 2 and 240 in the Area 3. These figures are for 30 t capacity trucks, and for the lower capacity trucks of 20 t, the traffic shall be more intense. This data is only concerning to soybean production. Considering the increase in meat production, these figures shall be higher. In order the traffic is carried out smoothly, 102.6 km of roads shall be paved. The figures for Araguaína as for paving are presented in the following table.

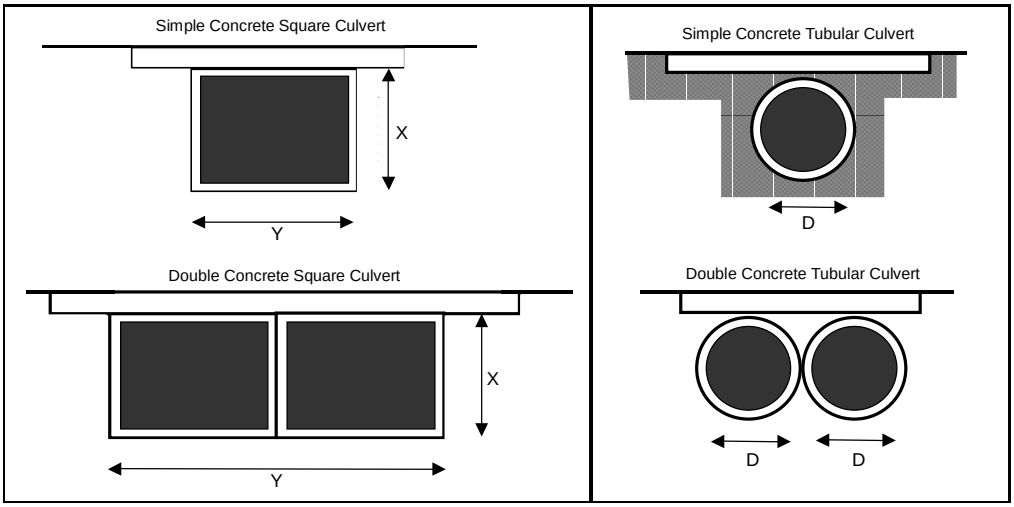
Plan of Roads Improvement (Short Term)

Type	km	km/km^2
Paved Federal Roads	50.7	0.013
Paved State Roads	165.0	0.042
Unpaved Roads (Municipal)	572.4	0.146
Total	788.1	0.201

The roads structure shall be the basic structure utilized by DERTINS.



Considering the existence of several brooks crossing the TO-226, the culverts to be utilized shall be executed as follows:



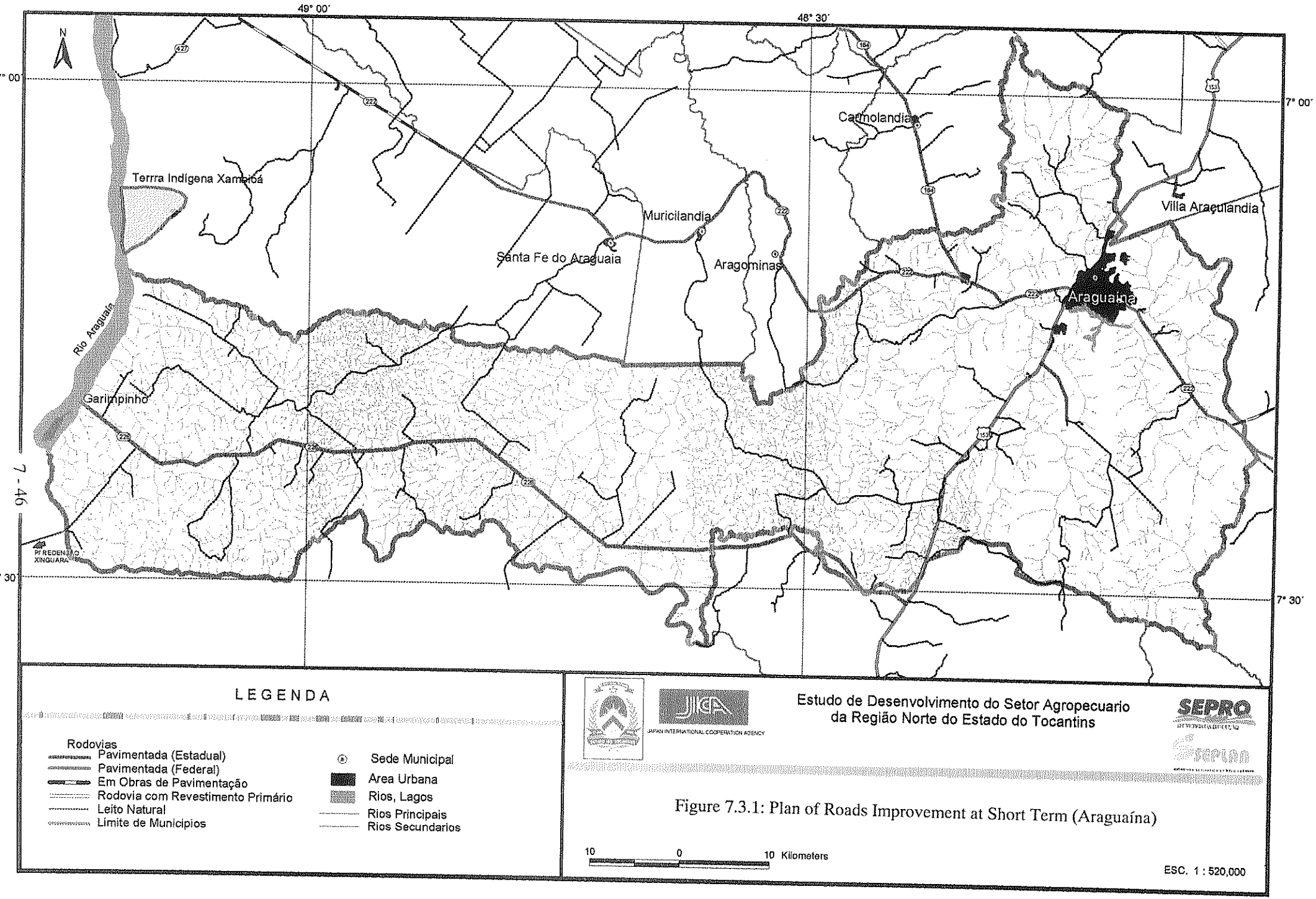


Figure 7.3.1: Plan of Roads Improvement at Short Term (Araguaína)

(3) Plan of Roads Improvement at Medium Term

After the improvement of the east-west direction traffic, the next important item to be improved are the existing secondary roads. The traffic increase is expected due to the transportation of inputs, of production and of agricultural machinery as the result of the agriculture and livestock husbandry promotion in the Region. For this purpose, the roads improvement is vital. Through this improvement, the effective work with the consequent reduction of production costs is expected. Therefore, at the medium term, the secondary roads giving access to the TO-226 and that are also utilized for the traffic in the north-south direction shall be improved. The conditions for this improvement at the medium term are presented in the following table and the map of roads is presented in Figure 7.3.4.

Plano of Roads Improvement (Medium Term)

Type	km	km/km^2
Paved Federal Roads	50.7	0.013
Paved State Roads	165.0	0.042
Unpaved Roads (Municipal)	868.5	0.222
Total	1,084.2	0.277

Through this medium term plan, the connections between roads shall be improved and these shall be uniformly distributed within the municipal district of Araguaína.

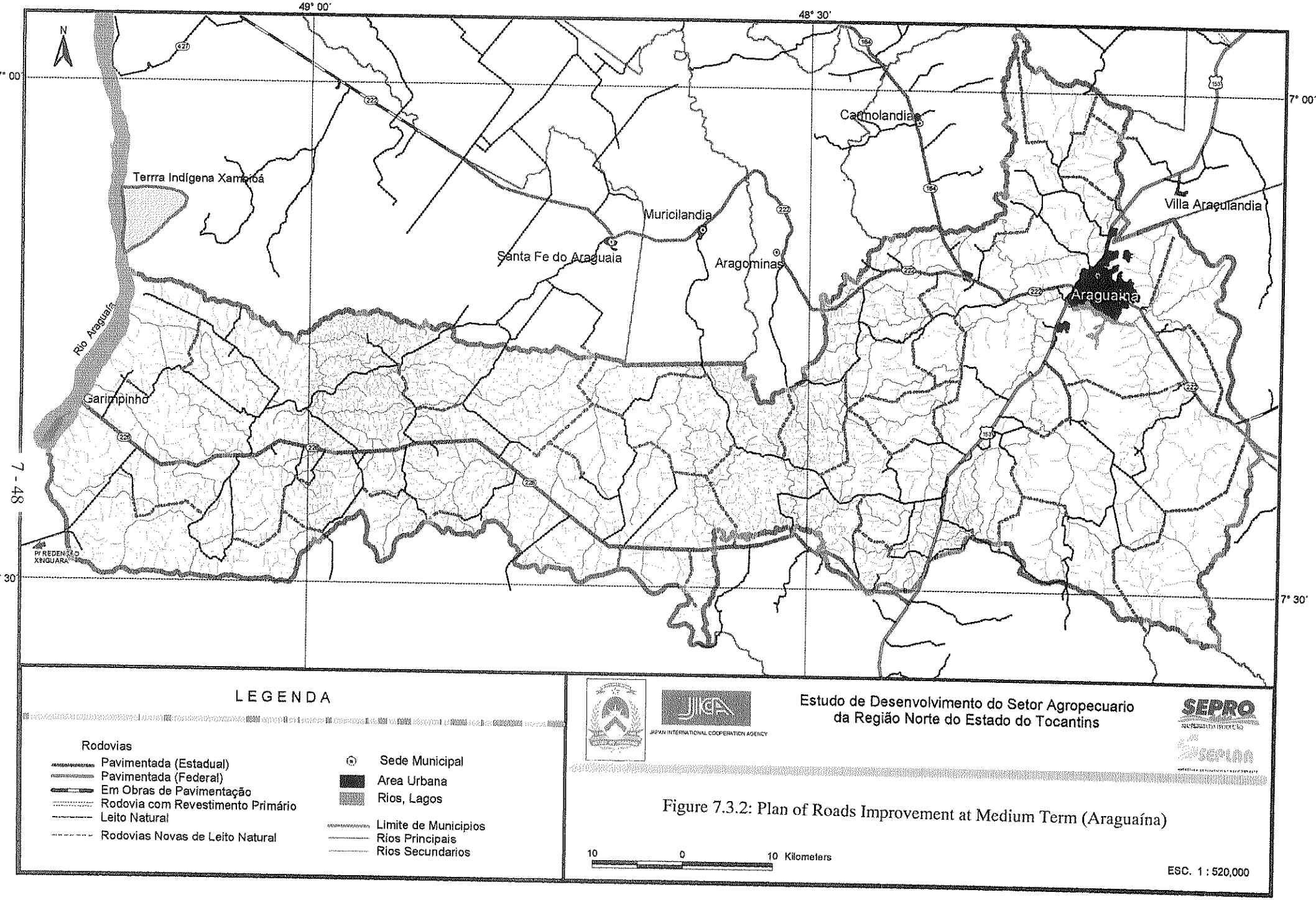


Figure 7.3.2: Plan of Roads Improvement at Medium Term (Araguaína)

7.3.4 Plan of Roads Improvement at Long Term

With the improvement of the TO-226 and the uniform distribution of secondary roads, at the long term the main secondary roads traffic conditions shall be improved through paving works, while the conditions of local roads (rural) shall be improved through gravelling. The plan encompasses 537.5 km of gravelled roads and 179.5 km of paved roads.

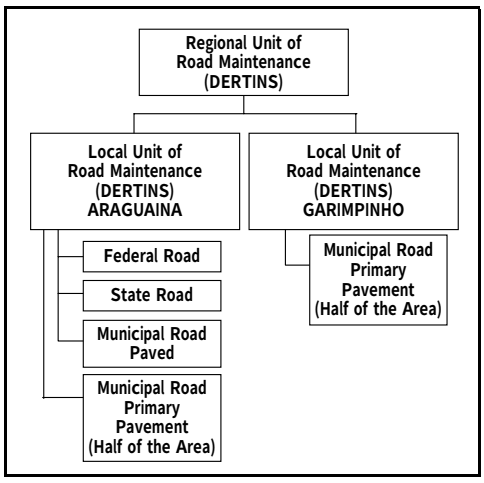
The improvement conditions at long term are presented in the following table and the map of roads is presented in Figure 7.3.5.

Plan of Roads Improvement (Long Term)

Type	km	km/km^2
Paved Federal Roads	50.7	0.013
Paved State Roads	165.0	0.042
Paved Municipal Roads	179.5	0.046
Gravelled Roads	537.5	0.138
Unpaved Roads	151.5	0.039
Total	1,084.2	0.278

7.3.5 System of Roads Conservation and Maintenance

The conservation and maintenance of roads shall be carried out periodically or according to the necessity in order to assure a smooth traffic. The periodic maintenance shall be carried out once a year for the gravelled roads, and each 5 years for the paved ones. The repairs shall be carried out according to the necessity through information from users or from periodic inspections. The local office of DERTINS in Araguaína shall be in charge of this maintenance, and for so it shall provide an information/complains desk for the local population.



Local offices shall be installed in Garimpinho and Araguaína. The Garimpinho local office shall be in charge of the gravelled roads of the western half of the region, and the Araguaína local office shall be in charge of the Federal, State, Municipal paved and gravelled roads of the eastern half of the region. The Federal roads shall be the object of mere inspection, and when the need of repairs is observed, the responsible agency shall be informed.

7.3.6 Necessary Resources

The necessary resources for the improvement and maintenance of roads in the municipal district of Araguaína are presented as follows.

Municipal District		Short Term			Medium Term			Long Term		
		km	Type	R$	km	Type	R$	km	Type	R$
Araguaína	Municipal				296.1	Gravel	17,766,000	179.5	Asphalt	53,853,000
	State	102.6	Asphalt	30,771,000				537.5	Gravel	32,250,000
Total		100,6		30.770.000	296,1		17.766.000	717,0		86,103.000

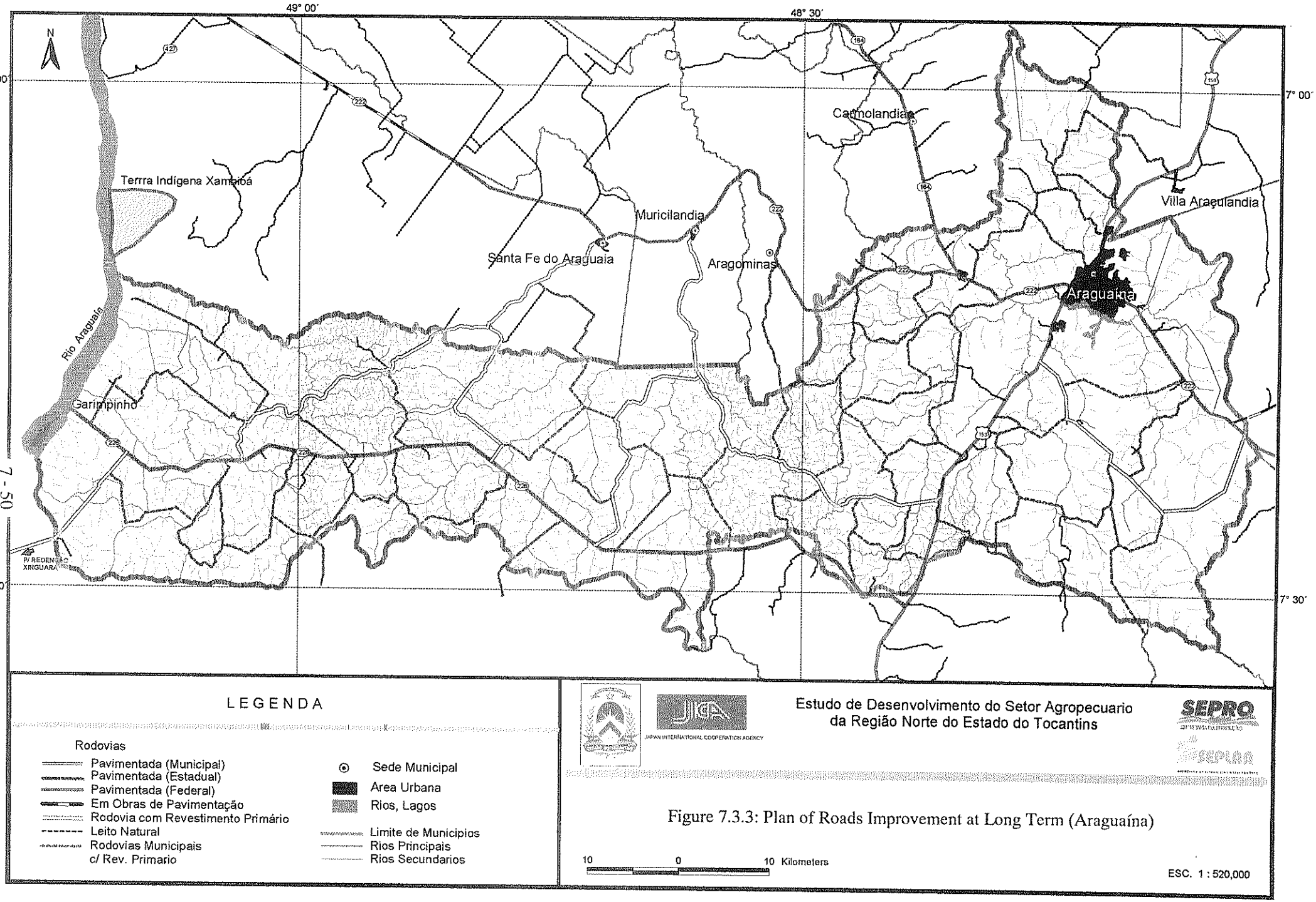


Figure 7.3.3: Plan of Roads Improvement at Long Term (Araguaína)

7.4 Investment in Silos

(1) Objective

For the accomplishment of soybean and maize harvest operation, the vital structure is represented by reception, drying and storage facilities. This is vital until the establishment of a significant production pole, when the main investors in this field (traders / private investors) shall be attracted.

(2) Production Estimate

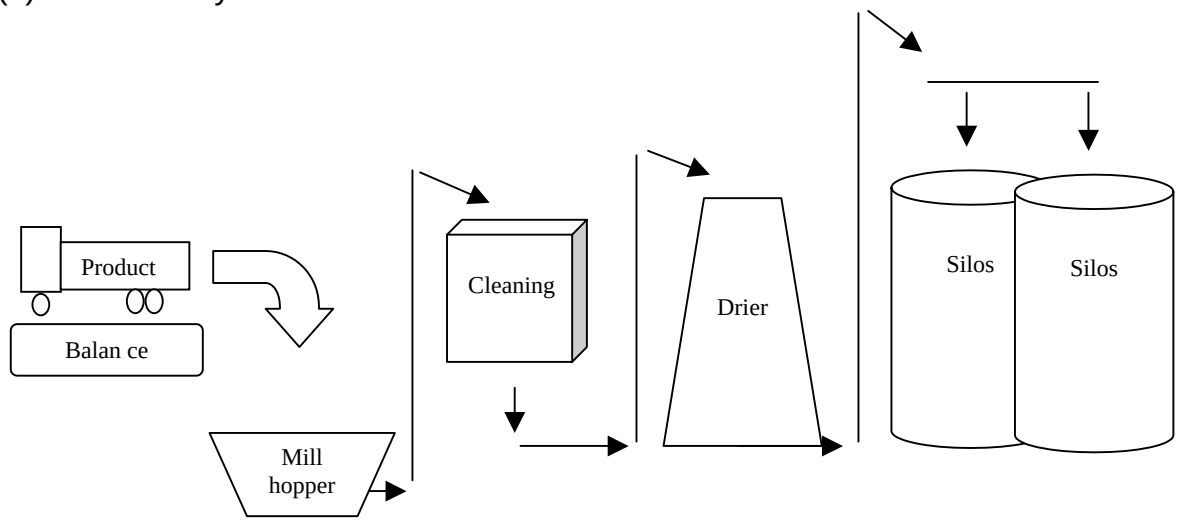
Product	Short Term (2005)		Medium Term (2010)		Long Term (2015)	
	Area (ha)	Production (t)	Area (ha)	Production (t)	Area (ha)	Production (t)
Soybean	3,424	8,560	17,026	51,078	33,865	118,527
Maize	1,515	6,820	7,858	43,220	16,278	97,666

Part of the maize harvested at the northern region shall be produced during the period between harvests of the main producing states, thus the “safrinha” maize, in such a manner that the soybean and maize storage periods do not coincide.

The product harvested at the field shall be transported to the silos to be constructed where this product is to be cleaned, dried and stored for a relatively short time, since the product shall be afterwards transported to the larger capacity silos along the North-South Railway, with destination to exportation.

The investment in the Araguaína structure is planned for two stages as follows: at the short term, 6,000 t covering approximately 70% of the demand; at the medium term, 30,000 t covering 60% of the demand at the medium term and 25%, at the long term. Thus, the structure should be used with 2 rotations during the short and medium terms, and 4 rotations at the long term (when there shall probably be investment in storage made by the private sector).

(3) Basic Layout



(4) Necessary Investment

Period		Value in R$1.00
Short Term	1. Land of 20,000 m^2 2. Civil work and electric facilities 3. Equipment (capacity of 40 t/h) • Balance for trucks 60 t - Toledo • Pre-cleaning machine PPLC160/SP • Continuous drier of mixed flow KW215R • Lung silos and discharge • 02 metallic silos with 3,000 t of capacity • Horizontal and vertical transporters • Total equipment	300,000 120,000 480,000
	Total cost in the period	900,0000
Medium Term	1. Civil work and electric facilities 2. Equipment (capacity of 60 t/h): • Pre-cleaning machine MPL60 • Continuous drier of mixed flow KW 215R • 04 metallic silos with 6,000 t of capacity • Horizontal and vertical transporters • Total equipment	360,000 2,040,000
	Total investment in the period	2,400,000
Total Investment Cost in Silos		3,300,000

Remark: Basis of equipment price - Kepler Weber. Rio Grande do Sul.

(5) Source of Funds for Investment and Actuation Manner

The investment in structure shall be carried out by the State through transference of funds to the Storage Company.

At the short term, due to the demonstrative objective of the whole Program, the charges for drying and storage to be charged to the producers shall be compatible with the market prices.

The historical experience of most of the production poles in Brazil shows that, after the establishment of the main market traders with investment in their own grains reception infrastructure, the official facilities loose their competitiveness, becoming under utilized by the producers. Therefore, it is important to think in such a structure that, once finished its role of establishing the production pole, can be privatized. This privatization shall take place thus at the long term.

(6) Storage Company

A mixed economy company shall be formed with the State as the main stockholder, similarly to those companies in most of the grains producing states of Brazil.

The administrative and operational structure of the company shall be duly detailed in the statute of the company foundation.

7.5 Project Evaluation

The production and investment estimate of the agricultural sector is presented as follows

Investment Efficiency of the Agricultural Sector

	Short Term	Medium Term	Long Term	Total
Introduction of Grains				
Production (thousand Reais)	6,607	61,955	161,780	230,342
Investment (thousand Reais)	4,623	41,501	104,727	150,851
Investment Efficiency	1.43	1.49	1.54	1.53
Livestock Husbandry Diversification				
Production (thousand Reais)	28,370	115,235	178,494	322,099
Investment (thousand Reais)	6,270	35,538	76,579	118,387
Investment Efficiency	4.52	3.24	2.33	2.72
Production Nucleus				
Production (thousand Reais)	24,063	37,486	79,109	140,658
Investment (thousand Reais)	5,133	15,398	26,702	47,233
Investment Efficiency	4.69	2.43	2.96	2.98
Total				
Production (thousand Reais)	59,040	214,676	419,383	693,099
Investment (thousand Reais)	16,025	92,436	208,008	316,469
Investment Efficiency	3.68	2.79	2.73	2.73

If we evaluate the investment efficiency of each enterprise, we observe that the production nucleus present the higher efficiency, followed by livestock husbandry diversification and by the introduction of grains. On the other hand, if we evaluate from the view point of the total value, we have the livestock husbandry diversification and the introduction of grains coming first. Considering that all the enterprises present high investment efficiency, this means that all of them are adequate for investment.

This municipal district has as main strategies the introduction of grains and the livestock husbandry intensification, thus the evaluation of these 2 items shall be carried out.

- Only the introduction of grains (production of grains by tenants): in the case of the grains production in 400 ha out of 1,600 ha of cultivated area;
- Introduction of grains and intensive livestock husbandry (in the case the producer purchase the machinery and carry out the grains introduction and the intensive livestock husbandry): in case the grains production is carried out in 450 ha out of 1,650 ha of pastures, together with the intensive livestock husbandry;
- Only the livestock husbandry intensification (in the case the producer intensifies the livestock husbandry through pasture improvement without the introduction of grains): in case of the execution of intensive livestock husbandry in 1,650 ha.

(1) Only Introduction of Grains

The economic balance of grains cultivation in 1,600 ha, with rotation in 4 years, is presented in the following table. However, in this balance the price of land is not included.

A deficit is forecast to occur only in the first year if the machinery is purchased, but afterwards there would be surplus. The internal rate of return is estimated in 50%.

Balance in the case of Grains Introduction

	New Areas		Soil Improvement		Cultivated Area		Production Cost	Mechanization Cost	Total Production Cost	Gross Income	Net Income
	Area	Cost	Area	Cost	Soybean	Maize					
	ha	R$	ha	R$	ha	ha	R$	R$	R$	R$	R$
1	100	5,000	100	7,200		100	32,340	304,000	348,540	92,000	-256,540
2	100	5,000	100	7,200	100	100	70,209		82,409	163,250	80,841
3	100	5,000	100	7,200	200	100	108,078		120,278	234,500	114,222
4	100	5,000	100	7,200	300	100	145,947		158,147	305,750	147,603
5	100	5,000	100	7,200	300	100	145,947		158,147	305,750	147,603
6	100	5,000	100	7,200	300	100	145,947		158,147	305,750	147,603
7	100	5,000	100	7,200	300	100	145,947		158,147	357,700	199,553
8	100	5,000	100	7,200	300	100	145,947		158,147	357,700	199,553
9	100	5,000	100	7,200	300	100	145,947		158,147	357,700	199,553
10	100	5,000	100	7,200	300	100	145,947		158,147	357,700	199,553
11	100	5,000	100	7,200	300	100	145,947		158,147	409,650	251,503
12	100	5,000	100	7,200	300	100	145,947		158,147	409,650	251,503
13	100	5,000	100	7,200	300	100	145,947		158,147	409,650	251,503
14	100	5,000	100	7,200	300	100	145,947		158,147	409,650	251,503
15	100	5,000	100	7,200	300	100	145,947		158,147	409,650	251,503
16	100	5,000	100	7,200	300	100	145,947		158,147	409,650	251,503
17			0		300	100	145,947		145,947	409,650	263,703
18			0		300	100	145,947		145,947	409,650	263,703
19			0		300	100	145,947		145,947	409,650	263,703
20			0		300	100	145,947		145,947	409,650	263,703

(2) Introduction of Grains and Intensive Livestock Husbandry

The enterprise benefits in case of the introduction of grains in 3,300 ha with the intensive production of meat cattle is presented in the following table. The benefits are high, being possible to transform extensive pasture areas into conservation areas.

Balance of Grains Introduction and Intensive Livestock Husbandry

	Pasture	Improved Pasture	No. of heads	Conversion for Meat	Production of Meat	Purchase of Calves	Other Costs	Total Production Cost	Livestock Husbandry Balance	Grains Production Balance	Total Balance
	ha	ha	heads	heads	R$	R$	R$	R$	R$	R$	R$
1	2,690	0	1,291	398	167,188	48,948	11,174	60,122	107,067	-232,810	-125,743
2	2,355	0	1,130	349	146,386	20,732	6,833	27,565	118,821	121,262	240,083
3	2,170	0	1,137	351	147,276	801	4,201	5,002	142,274	171,333	313,607
4	1,986	150	1,278	394	165,487	5,946	9,893	15,839	149,648	171,333	320,981
5	1,801	300	1,402	432	226,992	109	14,062	14,172	212,820	171,333	384,153
6	1,616	450	1,581	488	256,008	0	17,574	17,574	238,434	171,333	409,767
7	1,432	600	1,865	575	301,971	0	23,364	23,364	278,608	227,883	506,491
8	1,247	750	2,172	670	351,670	0	29,295	29,295	322,374	227,883	550,257
9	1,062	900	2,502	772	405,103	0	51,069	51,069	354,034	227,883	581,917
10	878	1,050	2,856	881	554,726	0	80,831	80,831	473,896	227,883	701,779
11	693	1,200	3,232	997	627,811	26,527	115,807	142,335	485,476	284,433	769,909
12	659	1,200	3,470	1,070	674,036	31,732	138,888	170,620	503,416	284,433	787,849
13	624	1,200	3,704	1,142	719,453	36,857	161,610	198,467	520,987	284,433	805,420
14	589	1,200	3,933	1,213	764,063	41,901	183,974	225,875	538,188	284,433	822,621
15	555	1,200	4,159	1,282	807,866	46,866	205,980	252,846	555,020	284,433	839,453
16	520	1,200	4,380	1,351	850,861	92,118	233,010	325,129	525,732	302,733	828,465
17	485	1,200	4,328	1,335	840,769	91,118	231,028	322,146	518,623	302,733	821,356
18	3,300	451	4,276	1,319	830,677	90,118	229,045	319,163	511,514	302,733	814,247
19	3,300	416	4,224	1,303	820,585	89,118	227,062	316,180	504,405	302,733	807,138
20	3,300	381	4,172	1,286	810,494	80,355	224,044	304,400	506,094	302,733	808,827

(3) Only Intensive Livestock Husbandry

The following table presents the balance in case of the introduction of intensive livestock husbandry, gradually transforming the current pastures into improved pastures.

	Pasture	Improved Pasture	No. of heads	Conversion for Meat	Production of Meat	Purchase of Calves	Other Costs	Total Production Cost	Livestock Husbandry Balance	Grains Production Balance	Total Balance
	ha	ha	cb	cb	R$	R$	R$	R$	R$	R$	R$
1	2,690	150	1,363	420	176,513	16,134	52,058	68,192	108,321	-172,300	-63,979
2	2,355	300	1,430	441	185,239	4,008	50,684	54,691	130,547	-18,300	112,247
3	2,170	450	1,587	489	205,554	9,465	51,976	61,441	144,113	-18,300	125,813
4	1,986	600	1,728	533	223,765	14,609	53,168	67,777	155,988	-18,300	137,688
5	1,801	750	1,852	571	299,840	0	97,838	97,838	202,002	-18,300	183,702
6	1,616	900	2,031	626	328,856	0	95,049	95,049	233,807	-18,300	215,507
7	1,432	1,050	2,405	742	389,389	0	96,894	96,894	292,495	-18,300	274,195
8	1,247	1,200	2,802	864	453,657	0	98,881	98,881	354,776	-18,300	336,476
9	1,062	1,350	3,222	994	521,660	0	120,309	120,309	401,350	-18,300	383,050
10	878	1,500	3,666	1,130	712,077	0	153,326	153,326	558,751	-18,300	540,451
11	693	1,650	4,132	1,274	802,646	30,355	236,558	266,912	535,733	-18,300	517,433
12	659	1,650	4,460	1,375	866,354	37,292	267,393	304,685	561,669	-18,300	543,369
13	624	1,650	4,784	1,475	929,254	44,149	297,870	342,020	587,235	-18,300	568,935
14	589	1,650	5,103	1,574	991,348	50,927	327,990	378,916	612,432	-18,300	594,132
15	555	1,650	5,419	1,671	1,052,634	57,624	357,751	415,374	637,260	-18,300	618,960
16	520	1,650	5,730	1,767	1,113,113	118,109	394,336	512,445	600,667	0	600,667
17	485	1,650	5,678	1,751	1,103,021	117,109	392,353	509,462	593,559	0	593,559
18	451	1,650	5,626	1,735	1,092,929	116,109	390,370	506,479	586,450	0	586,450
19	416	1,650	5,574	1,719	1,082,837	115,109	388,388	503,496	579,341	0	579,341
20	381	1,650	5,522	1,703	1,072,745	106,316	385,366	491,682	581,063	0	581,063

(4) Economicity in case of No Assistance

In the present study, the technical assistance, assistance for production inputs and financial assistance are planned. The technical assistance aims at the production of grains and the intensification of livestock husbandry. In order an economically feasible production of grains takes place, it would be necessary to attain a productivity of 2 t/ha of soybean and 3 t/ha of maize. The livestock husbandry productivity shall also be increased. A delay in the enterprise execution is forecasted if there is no assistance for production inputs. The financial assistance is vital for the enterprise due to its high demand of resources.

7.6 Preliminary Environmental Assessment

The items to be carried out in the future and the respective environmental impact assessment are presented as follows.

	Items which are not subjected to the environmental impact assessment	Items which must be assessed in terms of environmental impact
General	• Execution of a special agricultural credit for the region; • Establishment of the FUNDO DE AVAL.	• Paving works for the TO-226; • Installation of silos for grains.
Introduction of Grains	• Transformation of pastures into grains production areas; • Cultivation and harvest; • Agricultural mechanization; • Arrival of new producers from outside the region; • Distribution of material for soil improvement (lime); • Concretization of the assistance structure for the grains production.	• Enterprises with more than 1,000 ha; • Enterprises in which the cut of trees is carried out.
Livestock Husbandry Diversification	• Pasture improvement; • Silage for the dry season; • Cultivation of sugar cane; • Pastures rotation; • Early castration and removal of horns of meat cattle.	• Enterprises with more than 1,000 ha.
Production Nucleus	• Improvement of grains production; • Fruits cultivation improvement; • Greenery cultivation improvement; • Establishment of the buffaloes raising and distribution system; • Improvement of swine husbandry (facilities and raising method); • Communitarian mechanization; • Strengthening of associations' activities (sale, assistance, etc.); • Execution of a program for producers' training.	• Installation of water catchment facilities for irrigation.

The items such as fauna, flora and inhabitants, which shall also be considered in the execution of enterprises and in relation to the environment, are presented as follows.

(1) Flora

Araguaína has a vegetation between the tropical rain forest and the cerrado. However, only few of the dense forest was left due to the deforestation carried out until now. These forests are important for the existing fauna and flora, thus their preservation is very important.

(2) Fauna

The region's fauna suffered a reduction in number due to the transformation of forests into pastures. The main animals to be preserved are presented as follows:

- Monkey *(Alouatta caraya)*
- Deer "Veado mateiro" *(Mazama americana)*
- Paca *(Agouti paca)*
- There are Suçuarana *(Felis concolor*), Capivara *(Hydrochaeris hydrochaeris)*, Jaguatirica

(Leopardus pardalis) and *Euphractus sexcintus* although subject to extinction hazard.

- Common species include Ema *(Rhea americana)*, Jaó (*Tinamus gutattus*), Quero-quero *(Vanellus chilensis)*, Rolinha *(Columbina minuta)*, Tucano (*Ramphastos vitellinus)*, Anu *(Crotophaga ani)* and Seriema *(Cariama cristata)*.
- Cayman *(Caiman crocodilus)*
- Fresh water Turtle *(Podocnemis expansa)*
- Boa constrictor (Boa constrictor) and Jibóia (Eunetes murinus)

(3) Inhabitants

Araguaína is located in the Amazônia Legal region, with a high population concentration and 94% of its population is urban. Since the rural population is small, it is necessary to improve the life conditions in the rural zone in order to promote the occupation of this zone.

The environmental assessment from the general point of view of the enterprise is presented as follows.

Items to be Considered from the Environment View Point in Araguaína

Assessment Items	Items necessary to be taken into consideration
1. Sociology	
Inhabitants' Life	• The arrival of new producers from other regions after the execution of this enterprise is expected. The possibility of disputes between the inhabitants and the new producers, similarly to what occurs in Balsas, shall be taken into consideration.
Population Problems	• The possibility of a migratory flow shall be considered, in special in Araguaína what would increase the population concentration after the introduction of intensive agriculture.
Economic Activity	• The possibility of increase of economic differences between the social classes with the introduction of grains and the strengthening of meat production shall be taken into consideration.
2. Health	
	• The influences on the water quality due to the utilization of agro-chemicals for the agriculture intensification shall be avoided; • Education shall be carried out about the utilization method of agro-chemicals; • The storage and cleaning methods of the equipment utilized for spraying these agro-chemicals shall be taught.
3. Important Beings and Resources	
Changes in Vegetation	• The existing forests deforestation, mainly along the Araguaia river, shall be avoided as much as possible; • The cut of existing trees in pastures during their transformation into agriculture areas shall be avoided as much as possible; • Conservation of Babaçu shall be promoted.
Influence on rare and important species	• There is the possibility of total cleaning of the land where the grains cultivation is introduced. In such case, a land use plan in order the transit of animals is possible shall be elaborated.
Preservation of Alive Beings	• The existing vegetation shall be preserved in order to be used as food source for the existing fauna, avoiding the extinction of these animals due to development.
Introduction and increase of plagues	• According to the present study, the introduction of plagues is not expected.
Reduction of floodable areas alongside the rivers	• The small floodable areas alongside the rivers existing in the region shall be preserved.
4. Soil / Land	
Soils	• Conservation methods to avoid the occurrence of erosion in bare land due to the introduction of grains cultivation shall be introduced; • Trees shall be planted for the protection against the aeolic erosion; • Soil compacting with machinery shall be avoided.
Land	• The utilization of an area for conservation can cause its abandonment. Therefore, measures shall be taken in order to recuperate the nature where this is difficult.
5. Hydrology	
Changes in the discharge and in the level of the superficial water	• It is possible to occur changes in the conditions of water bodies due to the changes in the land use and due to the water catchment for irrigation. Thus it is necessary that measures are taken to avoid such situation; • The water catchment for irrigation shall be planned taken into consideration the downstream inhabitants rights.
Changes in the discharge and in the level of groundwater	• The strengthening of monitoring shall be carried out in order to avoid the effect of the groundwater level reduction due to water catchment for irrigation.
Occurrence of floods	• The occurrence of floods is possible due to the construction of roads, and a sound evaluation of the matter is necessary.
Reduction of water quality	• Proper management to avoid water pollution shall be carried out; • Care shall be taken to avoid water pollution due to swine husbandry.