ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT OF PRODUCTION DEVELOPMENT IN THE FARMERSLAND AREA IN SURINAME

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by:

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TABLE OF CONTENTS

Table of figures

Table index

Abbreviations

AGAR	Brand name
ATM	Ministry of Labour, Technological Development and Environment of Suriname *(Ministerie van Arbeid, Technologische Ontwikkeling en Milieu)*
BOPD	Barrels Oil per Day
COD	Chemical Oxygen Demand
dB(A)	Decibel using the A-weighting setting
DBK	Soil Survey Department (*Dienst Bodemkartering*)
DC	District Commissioner
DO	Dissolved Oxygen
DS	District Secretary
DWV	Water Supply Service *(Dienst Watervoorziening*)
EC	Electrical Conductivity
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FL	Farmersland
FLE	Farmersland East
FLW	Farmersland West
GLIS	Land Registry and Land Information System *(Grondregistratie en Land Informatie Systeem)*
HDPE	High Density Poly Ethylene
HS	Health and Safety
HSE	Health, Safety and Environment
HV	High Voltage
KCl	Potassium chloride (*kaliumchloride*)
KVA	KiloVolt Ampere
L_1	L_1 is the level exceeded for 1% of the time. For 1% of the time, the sound or noise has a sound pressure level above L_1. For the rest of the time, the sound or noise has a sound pressure level at or below L_1.
L_{10}	See L_1 but read 10% instead of 1%.
L_{90}	See L_1 but read 90% instead of 1%.
LAeq	Equivalent Sound Pressure Level using the A-weighting setting
LV	Low Voltage
LVV	Ministry of Agriculture, Animal Husbandry and Fisheries *(Ministerie van Landbouw, Veeteelt, en Visserij)*
MPFM	Multi Phase Flow Meter
NEC	Noordam Environmental Consultancy

NIMOS	National Institute for Environment and Development in Suriname *(Nationaal Instituut voor Milieu en Ontwikkeling in Suriname)*
NSP	Normaal Surinaams Peil (approximately mean sea level)
OW	Ministry of Public Works *(Ministerie van Openbare Werken)*
PET	Polyethyleentereftalaat
ppg	Pounds per gallon
RO	Ministry of Regional Development *(Ministerie van Regionale Ontwikkeling)*
SWM	Suriname Water Supply Company (*Surinaamsche Waterleiding Maatschappij)*
Tambaredjo NW	Tambaredjo Northwest
TNW	Tambaredjo Northwest
TSS	Total Suspended Solids
WLA	Hydraulic Research Department *(Waterloopkundige Afdeling)*

1 INTRODUCTION

1.1 GENERAL

This report presents the results of the Environmental and Social Impact Assessment (ESIA) for production development by Staatsolie in the Farmersland (FL) area.

Since 2010 plans were prepared to develop the so-called Farmersland West and East areas in the south and southwest of the Tambaredjo oil field. Initial focus was on the Farmersland West area, for which an Environmental and Social Impact Assessment (ESIA) started in 2011. This ESIA for the Farmersland West (FLW) production development project was undertaken by Noordam Environmental Consultancy (NEC) according to the Draft Environmental Act of 2002, the Environmental Assessment Guidelines (March 2005 and 2009) of the Nationaal Instituut voor Milieu en Ontwikkeling in Suriname (NIMOS) as well as international best practices.
Due to various technical and organizational issues, the FLW project has not yet commenced, except for the construction of access roads, for which a separate ESIA report was prepared (Noordam 2013). In the meantime Staatsolie made preparations for a similar production development plan in the Farmersland East (FLE) area, very close to the FLW area. Because both areas and projects are similar, Staatsolie requested to NIMOS whether a combined ESIA could be prepared. This request was granted by NIMOS in its letter dated January 21, 2014.

The production development project entails the construction and implementation of required facilities to accommodate crude oil production from the Farmersland area, drilling and production, and the decommissioning of the area.
Staatsolie Maatschappij Suriname N.V. (hereafter shortly indicated as ‘Staatsolie’) will execute this production development project. The construction in the Farmersland area is planned to start in August 2014 and drilling in 2016. The production development activities will continue till 2019. Crude production from this part of the Tambaredjo oil field is currently foreseen to last 25 years. The company has already constructed the main access roads in the FLW area for which a NIMOS advice with 'no objection' was received on 3 April 2013. However, the construction of access roads will again be included in the current study for the FLE area.

This ESIA for the FL project has been prepared to conform to the guidelines of the National Institute for Environment and Development in Suriname (NIMOS).

1.2 BACKGROUND

Staatsolie has the right to explore for and produce hydrocarbons in Suriname. Currently all crude oil production activities are executed within the Tambaredjo, the Tambaredjo-NW and the Calcutta oil fields (Figure 1).

The Tambaredjo oil field is situated in the district of Saramacca about 55 km west of Paramaribo and about 15 km inland from the coastline. In the Tambaredjo oil field, “dryland operations” are practiced. This type of operations mainly refers to the reclamation of the swamp whereby the area is drained before other construction activities, drilling and production take place.

The Tambaredjo NW and the Calcutta oil fields are situated in the Buru Swamp, west of the Tambaredjo oil field. These oil fields are "wetland operations", which takes place without impoundment of the area.

Temporary storage of the Calcutta crude occurs at Huwelijkszorg from where it is shipped to Josikreek. All produced crude oil is treated and (again) stored at treatment facilities of Josikreek and TA-58. The treated oil is transported by means of a 14-inch pipeline to the refinery and sales terminals at Tout Lui Faut.

In 2005, commercial oil occurrences were encountered in the Farmersland area. One of the strategic upstream goals of Staatsolie is to sustain the Staatsolie crude production level of 17,000 BOPD[1] (Staatsolie Foundation for Transition & Growth 2013-2016). The development of new production areas is required in order to meet this goal.

1.3 THE FARMERSLAND PROJECT AND STUDY AREA

The FL project area is located in the (south) western part of the Tambaredjo oil field (Figure 1).

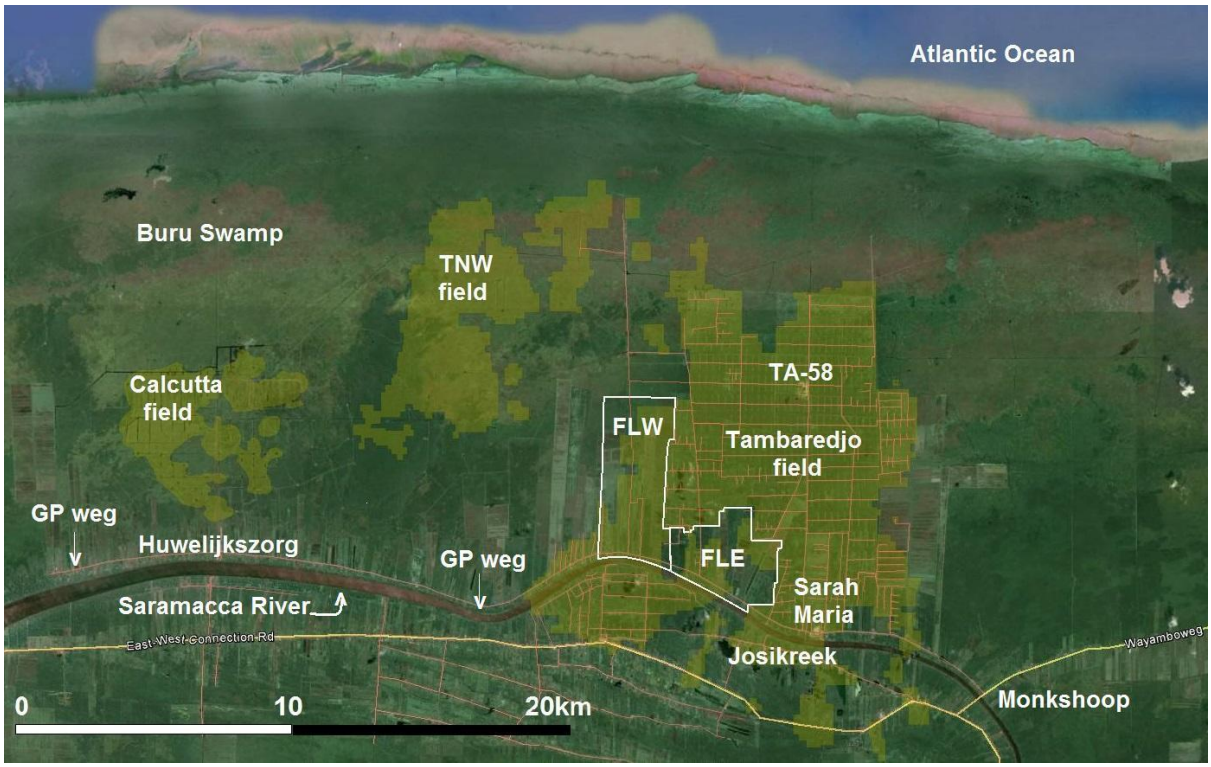

Figure 1: Location of the Farmersland (FLW+FLE) project area relative to other Staatsolie activities in Saramacca (GP weg=Gangaram Pandayweg)

The Farmersland project area covers ~17 sq km. Some more detail of the FL project area is shown in Figure 2 that presents the two main sections (FLW and FLE) and their projected well locations. Agricultural activities are found in part of the polderland, but much land is fallow or abandoned (see further section on landuse, Ch. 4.5.1 in Appendix F).

[1] barrels of oil per day

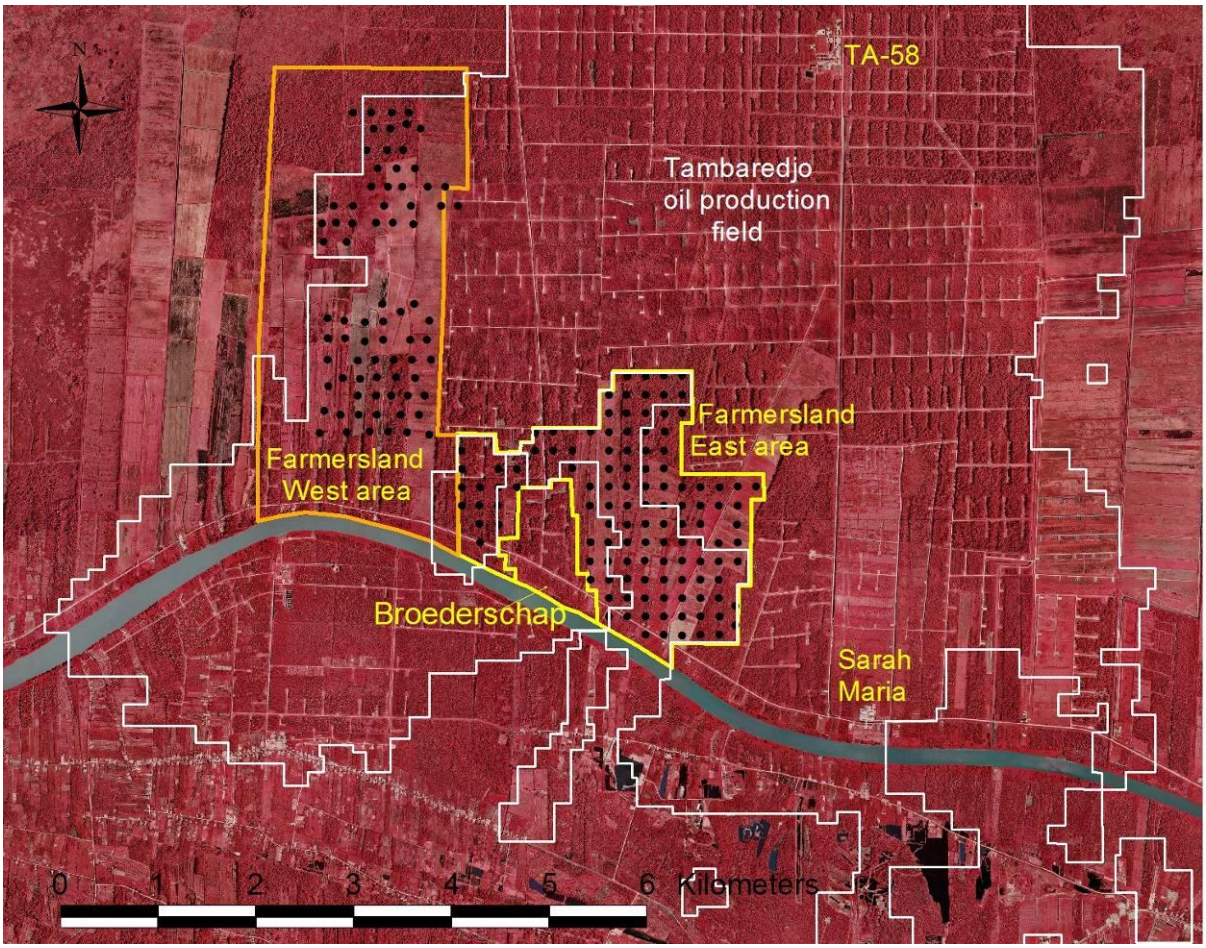

Figure 2: The Farmersland (FLW+FLE) project area relative to the Tambaredjo oil production field; the proposed well locations are shown as black dots.

For most environmental components, the study area will be identical to the combined FLW and FLE project area.
However, certain impacts like noise, air- and water pollution, and hydrology could extend beyond the boundaries of the project area. Impacts for these components may occur along the access routes, including the Gangaram Pandayweg, and in up- and downstream waters, including the Buru Swamp and the Saramacca River, and these have been included within the study area. The study area therefore comprised the project area, the Gangaram Pandayweg (see Social section; Appendix F), the freshwater section of the Buru Swamp as delineated during the ESIA for the Tambaredjo NW production development (Noordam 2010) and the Saramacca River between Monkshoop and Huwelijkszorg (Figure 1).
The extent of an impact will vary per location and was determined during the course of the study.
The project and its activities will be further discussed in below section on project description (Chapter 3).

1.4 APPROACH TO THE STUDY

The project is conducted within the rural Gangaram Panday agricultural community, which is already used to all kind of oil industry activities, and the current production development is already known for the community. In addition to a description and analysis of the social

baseline situation, the social impact assessment assessed the perception of the local population about Staatsolie, and recorded Staatsolie's contributions in community development in the area. This contributed to a further improvement of mitigation measures, and in general improved community relations.

All the proposed drilling sites are inside farmers' land, in an area that is already under cultivation or that has been under cultivation. The area where oil wells will be developed is not inhabited, but people are living along the southern project boundary, the Gangaram Pandayweg.
Existing ecosystems in the area have been removed, or significantly affected, due to the prolonged human presence in the region. Therefore the involved area is considered to have very little biodiversity value, being an already developed area.
No indigenous communities are present in the area, and there also no indications that they have lived there in the past.
There are no significant historical objects in the area.

The project will lead to an increase in traffic intensity along the Gangaram Pandayweg in between Sarah Maria and La Prevoyance/Broederschap, in particular during the construction and the drilling periods. Some degree of nuisance could result from this.

Given the above considerations, the focus of the ESIA study was laid on the local community, and land and water use. The ecological aspects required far less attention.

Relatively many studies have already been conducted in the area, so that field work could remain limited to updating of existing information and filling in gaps.

1.5 ESIA OBJECTIVES

The main objectives of the Farmersland Production Development ESIA are:

1) To inform and obtain contributions from stakeholders, including relevant authorities and the public, and address their relevant issues and concerns;
2) To document the ecological baseline conditions of the study area and the socio-economic conditions of affected communities;
3) to identify potential environmental (bio-physical) and socio-economic impacts associated with production development in the Farmersland area;
4) to provide preventive, mitigation and decommissioning measures for these impacts;
5) to prepare an Environmental and Social Management Plan (ESMP) for the projected activities.

The preparation and acceptance of the ESIA and associated ESMP report should ensure that environmental and social obligations are met, as well as other relevant guidelines and regulations, so that the project will be conducted in an environmentally sustainable manner to meet both national and international accepted standards.
In the absence of national legislation regulations, the "Environmental Assessment Guidelines" set out by NIMOS (National Institute for Environment and Development in Suriname) based on guidelines and standards of the IFC-World Bank are used as guidance documents.

1.6 METHODOLOGY

The current study started with a desk study with collection and analysis of already available information on the study area. Following this, fieldwork was conducted in order to verify the information of the desk study, to collect site specific baseline data and to conduct interviews with stakeholders.
The fieldwork focused on the project area and its direct surroundings.

1.6.1 Baseline

The baseline descriptions are based on literature reviews, existing maps, photographs and images, field observations and interviews. Baseline data also have been acquired from records held by government services and others.
The environmental setting described in this section provides baseline conditions from which an assessment of the potential effects of project development was determined. In addition, the baseline environmental information can be used as a benchmark by which future monitoring results will be compared.

Specific sources of information per component are listed in Table 1.

Regarding water quality it should be noted that sampling was mainly done during the rainy seasons.
During the FLW study, dry season sampling was postponed for various reasons, while during the course of the FL ESIA that started in February 2014, no typical dry season was experienced. The first dry season sampling possibility will be in the coming 2014 long dry season. Baseline water quality sampling will then be conducted by the consultant at all previous locations with parameters according to those in tables 13 and 14. The results will be reported to Staatsolie and NIMOS as an addendum to the ESIA. In the opinion of the consultant, the lack of dry season water quality data does not form a large enough limitation for the advice by NIMOS, because the planned activities for the coming dry season comprise only localized construction activities, for which monitoring is prescribed (see ESMP).

Table 1: Overview of gathered information and information sources

Component	Type of information	Source
Air quality	Expert judgment based on emission sources and prevailing winds	No data available for Suriname
Noise	Measurements and deductions	Field measurements along the Gangaram Pandayweg (see baseline noise below)
Climate	Meteorological data	Meteorological Service and website (www.meteosur.sr); data from Staatsolie
Topography	Aerial Photographs, Satellite imagery, topographical maps; shapefiles	Central Bureau for Aerial Mapping (through GLIS); Google (2009-2013), Landsat; Staatsolie
Hydrology	Observations and deductions; existing reports	Field measurements, reconnaissance; data WLA
Water quality	Publications, observations and deductions, monitoring reports	Field measurements, sampling and analyses; data provided by Staatsolie
Geo(hydro) logy	Reports and personal communication	Suriname Water Company (SWM), Dienst Watervoorziening (DWV)
Land and Soil	Existing soil maps and reports	Soil Survey Department (DBK)
Vegetation and flora	Predominantly rural agricultural and abandoned land along the Gangaram Pandayweg; existing maps and reports	Ecosystem map Teunissen, field observations
Fauna	Predominantly rural agricultural and abandoned land along the Gangaram Pandayweg; existing maps and reports; interviews; deduction	Ecosystems map Teunissen, field observations
Land and water use	Satellite imagery, oblique pictures, field observations, interviews, reports	Landsat, Google; ministry of Agriculture – La Prevoyance, farmers
Socio-economy	Publications; interviews and observations	See references; this study (details in respective chapter)

1.6.2 Impact assessment

The significance of all potential impacts that would result from the proposed project is determined in order to assist managers.
Key potential impacts have been identified in an early stage of the study, based on previous similar studies and on stakeholder consultation. Further studies are required to address these impacts, to determine whether they are likely to occur and to assess how they will manifest themselves.

For key identified potential impacts it will be necessary to determine the significance of each impact, based upon qualitative or quantitative assessment of the following attributes:

- magnitude
- geographical scale
- duration
- probability of occurrence

The resulting impact will be indicated by their significance class, which classes are defined as:

Impact significance
Major (significant) effect: effect expected to be permanent or continuous and nonreversible on a national scale and/or have international significance.
Moderate (significant) effect: long-term or continuous effect, but it is reversible and/or it has regional significance.
Minor (not significant) effect: effect confined to the local area and/or of short duration, and it is reversible.
Negligible (not significant) effect: effect not detectable.
Unknown effect: insufficient data available to assess the significance of the effect.

In addition, impacts have been classified as

- positive: indicating whether the impact will have a positive (beneficial) effect; or
- negative: indicating whether the impact will have a negative (adverse) effect on the environment, including affected people

The degree of detail will enable the determination of required mitigation and possible enhancement measures, respectively to prevent or reduce significant negative impacts and to promote any positive impacts already in the planning phase. The implementation of mitigation measures will reduce negative environmental impacts to an acceptable level.
After implementation of mitigation/enhancement measures, the significance of the impacts will again be determined.

The impact assessment methodology is described below.

The **significance** of an impact is defined as a combination of the **severity** of the impact occurring and the **probability** that the impact will occur. The significance of each identified impact will be rated according to the methodology set out below:

First, the **intensity/magnitude/size, scale** and **duration** of the impacts are determined according to the tables listed below (Table 2, Table 3 and Table 4).

Table 2: Defining the intensity/magnitude/size of the negative impacts

Rating	Description of Rating for		
	Natural environment	Socio-cultural	Health/safety
High	Irreversible damage to highly valued species, habitats or ecosystems	Irreparable damage to highly valued items of cultural significance, or social functions or processes are severely altered	Event resulting in loss of life, serious injuries or chronic illness; hospitalization required
Medium	Reversible damage to species, habitats or ecosystems	Repairable damage to items of cultural significance, or impairment of social functions and processes	Event resulting in moderate injuries or illness; may require hospitalization
Low	Limited damage to biological or physical environment	Low-level damage to cultural items, or social functions and processes are negligibly altered (nuisance)	Event resulting in annoyance, minor injuries or illness, not requiring hospitalization
Negligi-ble	No relevant damage to biological or physical environment	No damage is done to cultural items and social functions and processes are not altered	Event is not experienced by receptors or only occasional minor annoyance

Table 3: Defining the intensity/magnitude/size of the positive impacts

Rating	Description of Rating for		
	Natural environment	Socio-cultural	Health/safety
High	Direct benefits to species, habitats and resources with significant opportunities for sustainability	Benefits to local community and beyond	Health and safety will be significantly improved
Medium	Moderate benefits to species, habitats and resources with some opportunities for sustainability	Benefits to many households or individuals	Health and safety will be improved
Low	Minor benefits to species, habitats and resources with possible opportunities for sustainability	Benefits to few households or individuals	Health and safety will be slightly improved

Table 4: Defining duration and scale of the impact

Rating	Definition of Rating
Duration– the time frame for which the impact will be experienced	
Short-term (ST)	Up to 1 week
Medium-term (MT)	1 week to 3 months
Long-term (LT)	More than 3 months
Scale– the area in which the impact will be experienced	
Small (SS)	Localized spot
Medium (MS)	Part of study area
Large (LS)	Study area or beyond

Then the **Severity Rating** of the impact is determined by combining the **magnitude** of the impact with **duration** and **scale** of the impact as set out below (Table 5).

Table 5: Determination of the Severity Rating of the impact

Magnitude	High	Medium	Low	Negligible
Duration and Scale				
LT-LS, LT-MS or MT-LS	High	High	Medium	Negligible
LT-SS, MT-MS, MT-SS, ST-MS or ST-LS	High	Medium	Low	Negligible
ST-SS	Medium	Low	Negligible	Negligible

The next step is to define the **probability** of an impact to occur, as defined below (Table 6).

Table 6: Defining the probability of the impact

Probability– the likelihood of the impact occurring	
High	Sure to happen, or happens often
Medium	Could happen, and has happened in Suriname
Low	Possible, but only in extreme circumstances

Finally, the overall **significance** of the impact is determined as explained below (Table 7).

Table 7: Determination of the overall Significance of the impact

Severity	High	Medium	Low	Negligible
Probability				
High	Major	Moderate	Minor	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible

2 LEGISLATIVE AND REGULATORY CONSIDERATIONS

Reference is made to the report on legislative and regulatory considerations for the Farmersland Production Development project, which is presented as Appendix A (Del Prado 2014). Below a summary of the findings from above mentioned report is presented.

Suriname's environmental regulatory regime is not yet fully developed and there is no legislation dealing specifically with environmental management. But environmental legislation is currently being developed and draft generic guidelines for environmental and social assessment have been released (NIMOS 2005 and 2009). Legislation regarding environmental and natural resource management is found dispersed between different pieces of legislation. Responsibility for the management of the environment and natural resources resides within different government institutions.
The legal and regulatory framework for environmental impact assessments in Suriname is governed by the Nationaal Instituut voor Milieu en Ontwikkeling in Suriname (NIMOS). The 2002 draft Environmental Act, currently under review by the Council of Ministers, includes Environmental Assessment Guidelines that will be complied with for the ESIA process.

The legal framework in which the Farmersland Production Development project will take place is very broad and this report mainly covers the Environmental, Health and Safety aspects. Special consideration should also be given to the legal aspects of access to land of third parties.

The ESIA will meet the HSE principles as outlined in the Staatsolie HSE policy, which aspires:

- prevention of all incidents;
- compliance with all applicable health, safety and environmental legislative requirements;
- continual improvement of the company's health, safety and environmental performance;
- prevention of environmental pollution.

In order to meet the national requirements, Staatsolie will do the following:

- Comply with the requirements of the Environmental Impact Assessment Guidelines of NIMOS, including the undertaking of an Environmental and Social Impact Assessment and the preparation of an Environmental and Social Management Plan. Project activities can only start, when NIMOS has submitted a positive advice to the permitting agency.
- Comply with the environmental, health and safety stipulations in the Mining Act, Petroleum Act and the Decree giving authorization to Staatsolie to do research and exploit hydrocarbons. Compliance with the aforementioned laws will be achieved when Staatsolie implements the management plan which is one of the outputs of this ESIA and by working in accordance with Staatsolie General Field Instructions.

- Comply with the stipulations regarding the rights of third parties. The landowners are obliged to allow the Mining right holder to carry out activities on their land, but the Company has to timely inform the landowner of the intention of the activities stating the purpose, time and location where the activities will be carried out. Also, it is required by law[2] that the landowners receive compensation or prior assured compensation. Implementation of the company procedure on access to land and acquisition of land enables Staatsolie to comply with the law on this matter.
- Comply with the identified occupational health and safety regulations. The Labor Inspection Division of the Ministry of ATM is the responsible for enforcement. The regulations regarding road safety fall under the responsibility of the Ministry of Justice and Police.
- Comply with the requirements in the Ministerial Order on Issuance of domain land in Estuarine areas.

Beside the national legal regime, there are a number of international Conventions ratified by Suriname, which have to be taken into consideration. However, due to Suriname's law system, these conventions are only enforceable when transformed into national legislation.

[2] Article 47 of the Mining Decree 1986

3 PROJECT DESCRIPTION

3.1 INTRODUCTION

Information about the FLW project was provided by the Terms of Reference for the ESIA (December 2010), the Staatsolie scenario study report of April 13, 2012 and the Engineering study Farmers Land-West of October 15, 2012.
Information about the FLE project was provided by the Terms of Reference for the ESIA (October 2013).
In addition to above information, detailed information was provided by staff members of involved Staatsolie departments.

The initial scenario study for FLW provided four possible development scenarios. In July 2012, two scenarios were selected and some changes were made to well locations and access routes:

- Option 1: Vertical drilling in dry land and vertical drilling in swamp area with dryland operations in the swamp area (Drawing number SMP000131B).
- Option 2: Deviated drilling in dry land and Deviated drilling in swamp area with dryland operations in the swamp area (Drawing number SMP000131D).

Further evaluation and analyses of the drilling options by Staatsolie has resulted in the conclusion that deviated drilling should be the option of choice (study report FL1), but that vertical drilling will still need to be kept as an alternative for situations where deviated drilling would be impossible or impracticable.
For FLE a similar approach will be followed.

The general outline of the area is based on oil occurrences that showed during previous appraisal and strattest drilling. The nature of the oil occurrences in the Tambaredjo field is such that the location of “sweet spots” (concentrated oil occurrences) cannot be determined by appraisal and strattest drilling only. Additional drilling in a more detailed grid is needed to delineate the sweet spots; this is part of the development activities. Based on experiences in existing oil fields, it is assumed that 3 out of 4 drilled wells will become a producer and 1 out of 4 will be a dry well. Based on this success rate of 75%, it is expected that within the Farmersland project area, 147 oil wells will become producers, out of a total of 196 wells to be drilled (76 in FLW and 120 in FLE).

An overview of the FL project area is presented in Figure 2, also showing the projected well locations.
Maps showing planned infrastructure are presented in Appendix B. Map B.1 shows the well locations and the draft design for the deviated drilling in the FLW area. Maps B.2 to B.3 show draft infra design for vertical drilling in both subareas (FLW and FLE) of the Farmersland production development. All detailed design involving farmers' lands will be discussed with concerned farmers and infrastructural works will only be implemented with approval of the concerned farmers.

The ESIA for the Farmersland project will comprise all activities necessary for crude oil production.

Three phases of the project can be distinguished: a construction, an operation and a decommissioning (closure) phase. The operation phase has two parts, which partly overlap: the drilling phase and the production phase. Overlapping occurs between 2016 and 2019, when wells are still being drilled, while the first wells are already in production.
As already indicated, initial construction, being the construction of main access roads in the FLW area was already dealt with in a previous ESIA, but it will again be included in the present study for the FLE section.

The project will be undertaken in two different environments that require a somewhat different approach:

1. Polderland.
   The area is characterized by the presence of dams, canals and ditches, with parcels having a general south-north stretch, but the parceling pattern is irregular. The complete southern FLW section and part of the northern section are located in polderland. It comprises the following subsections:
   a. Active agriculture with wetland rice cultivation, small-scale dryland cultivation or animal husbandry. Considerable parts of this subsection are (temporarily) fallow.
   b. One small housing development project (the Yarah project).
   c. Abandoned polder land with a high (marsh forest) to low (grasses, herbs, shrubs, bushes and small trees) secondary vegetation.
2. The swamp area to the north of the polder land of FLW. In parts of the swamp, initial polder development has already been undertaken by farmers that have constructed an outer dam and associated canals. However, the actual reclamation, being vegetation clearing and establishment of the polder infrastructure, has not yet taken place. Sometimes the dammed land is also used as a water reservoir. Staatsolie has already conducted some wetland appraisal and strattest drilling in this area. As part of the project, the swamp section will be reclaimed by building two east-west dams, following which the production area will be developed as a dryland operation, including the construction of roads and drainage infrastructure. Also here as much as possible use will be made of already existing drainage infrastructure.

3.2 PROJECT PLANNING AND PREPARATION

The development of the Farmersland area is a complex and elaborate task that requires the involvement of many departments within Staatsolie. Planning and execution of activities is conducted by a number of departments. All processes within Staatsolie are owned by a process owner.

The project will start in the FLW area, where main access roads have already been constructed. During construction in the FLW area, also the construction activities in FLE will start. Drilling will follow the same sequence. Specifications about the period of these activities are presented in Table 8. For the FLE project area, the field investigations and detailed design have yet to be undertaken.

As a first step towards fieldwork, the landowners/users have been identified and contacted. During the ESIA study most of these stakeholders have been consulted at least once, although some were not yet identified during this study.

Following this, Staatsolie will undertake steps regarding the permission to drill on a certain piece of land according to the Staatsolie Handbook "Procedure toegang tot gronden & land acquisitie".
After field visits of teams of relevant Staatsolie departments, and discussions with the landowners/users a preliminary approach for the sites will be formulated. This approach is further discussed with respective landowners/users, and a landuse agreement ('Overeenkomst toegang terreinen voor het verrichten van mijnbouwwerkzaamheden') is drawn up between Staatsolie and the landowners/users (see Del Prado 2014). In this agreement, it is stated that for a specified period, the landowner is granting permission to Staatsolie to perform production development at (a) specified location(s) (in this case ~2.500 m2) of his/her land. Staatsolie will compensate the landowner/user for the time during which he will not be able to earn any income due to the Staatsolie activity at the abovementioned location(s). Furthermore arrangements are made for Staatsolie to cover the cost of any damage (caused by its activities) to e.g. the existing farm infrastructure, agricultural activities, other belongings of the landowner/user and finally any environmental and rehabilitation cost.

All activities in the public space will be planned and executed in close cooperation with relevant government representatives. For the Gangaram Pandayweg, the Districts Secretary (DS) has been appointed as liaison between Staatsolie and the districts government. Local managers of the Ministry of Agriculture (LVV), Regional development (RO) and Public Works (OW) will be involved as required. The Ministry of LVV will be involved in case of activities on agricultural land and for their management task for certain waterways, the Ministry of OW is in charge of the main waterways and infrastructure, while the Ministry of RO is in charge of the secondary and tertiary civil facilities in the project area.

The field project has already started with the construction of access routes in the FLW area. The other required roads and associated drainage are still to be installed starting the current phase of the project.
The northern swamp will be reclaimed through the construction of two sections of dams so that dryland drilling can also be undertaken here. The next step will be the preparation of drilling and facility platforms, and the layout of power supply and the header system for the transfer of the crude to the processing areas.

The actual drilling will commence in 2016. The current time schedule for all options up to this point is presented below (Table 8).

Table 8: Preliminary time schedule (May 2014)

Milestone	FLW	FLE
Period Construction	August 2014 - April 2017	August 2015 - April 2019
Period Drilling	2016 - 2019	2017 - 2019
Start crude production	2016	2017

Drilling will be undertaken over a period of 3 years. Following year 2019 no more drilling will be done in the field and from then on the area will only be a crude oil production field (only production operation) and activities will be limited to inspection and maintenance, and optimum producing monitoring of wells, and the transport of produced oil to the treatment plants. Once the oil is depleted, the field will be decommissioned. The decommissioning date cannot be exactly set, because the exact volume of the reservoir is not yet known. Current projections point to an end date around 2040.

3.3 CONSTRUCTION PHASE

During this phase the area will be prepared for crude production activities. The first activity was the construction of access roads within the FLW area that was be finalized in 2013. For the FLE area, these main access roads are still to be constructed. All construction works will be carried out by certified and experienced contractors under supervision of Staatsolie staff.
The combined construction activities will require the input of 15 persons during 2014, and up to 30 persons in the following years. Construction will mainly be undertaken in dry periods.

The following equipment will be used:

- Five excavators
- Seven tractors
- Fifteen Trucks (15 tons)
- One wheel backhoe
- Two Watering trucks
- Two grader tractors

Construction steps are the following:

1. Construction of two diversion dams to reclaim the swamp in the FLW area;
2. Construction of the access roads at FLE area, once activities here are ready for start-up;
3. Construction of side roads (wegvakken/inritten) that will connect the drilling platforms with the main roads;
4. Upgrading and additional construction of drainage canals;
5. Construction of drilling and facility platforms;
6. Layout of power grid and header systems.

Ad 1: Construction of two diversion dams to reclaim the swamp (FLW)

In order to create dryland conditions in the swamp area of FLW, two east-west dams will be constructed in the northern swamp, thus reclaiming ~85 hectare of swamp land. The water from these areas will be drained in order to create the required dryland conditions.
A dam of 235 meter will close an area of ~15 hectare of swamp land between the Soekha Dam and the polder of Abhelakh (Area A; Figure 3), while the second dam will have a length of 795 meter and it will reclaim 70 hectare of land between the Soekha dam and the land of Janki (Area B; Figure 3). The area east of the Soekha Dam is actually already dammed of from the main swamp as a result of the construction of the Soekha Dam, but swamp conditions still pertain in this area, because no drainage of excess water has yet occurred.
In both areas (A and B) farmers already have conducted activities in the form of the construction of canals and associated dams. However, except for the cleared canal trajectories, no further clearing of the remaining area has taken place. Also Staatsolie has been active with wetland appraisal and strattest drilling as can be deduced from the abandoned trails and drill sites.
In area A, the higher vegetation has died off due to prolonged high swamp water levels (see baseline on hydrology).

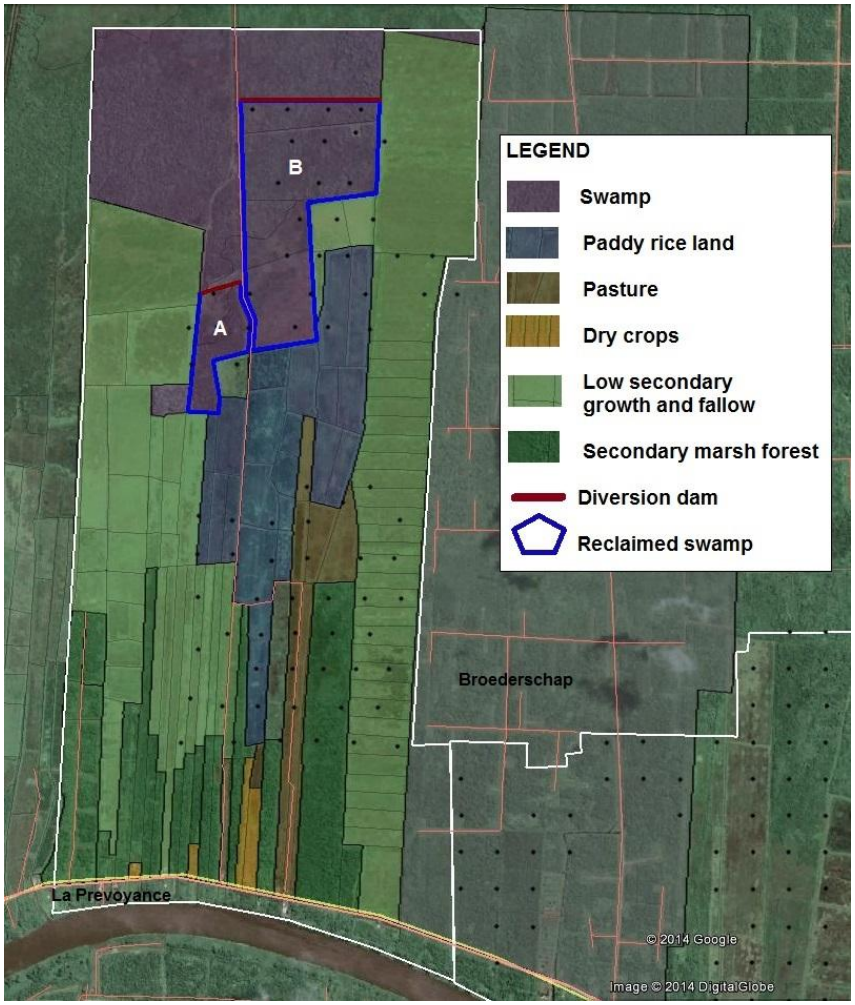

Figure 3: The FLW area with the planned diversion dams to reclaim the northern swamp area.

A cross section of the dams is presented in Figure 4. The dams will have a width of 8 meter with a top of 5 meter wide. It will be 1.5 meter above the surface level of the clay surface in the swamp. The clay to construct the dam will be excavated from the south side of the dam, forming a canal of 9 meter wide and 2 meter deep. This canal will serve as a drainage canal for the newly reclaimed swamp land.
The dam trajectory will be cleared of vegetation and peat, which will be windrowed ("rills" in figure). The cleared trajectory has a width of over 29 meters, excluding the space for the rills (width depending upon the vegetation: 5-10 meter).

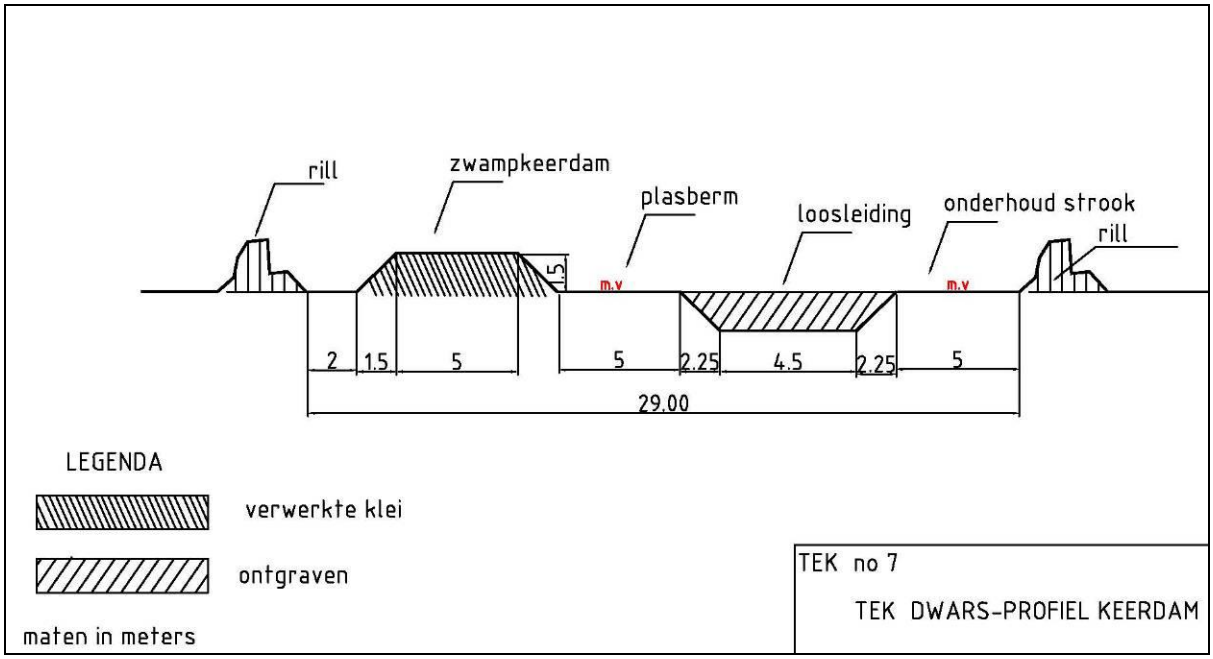

Figure 4: Cross section of the projected swamp dam

Ad 2: Construction of FLE access roads

The first activity to be undertaken for the development of the FLE production field, will be the construction of main access roads. The construction of main roads needs to start at an early stage in order to allow that sufficient settling takes place before the drilling rig could pass.
The areas will be accessed through of system of main roads ('ontsluitingsweg') and side roads (indicated as 'clusterweg' en bron toegangsweg' in Appendix B.3). Figure 5 presents the projected main access roads for FLE. The access road construction will last 120 dry working days and will be undertaken in the period August 2015-August 2016.

Total length of above access roads amounts 5.5 km. Use will be made from existing dams, which will be upgraded to the required dimensions of 4.0 - 4.5 meter wide and an elevation of 2.00-2.50 m+NSP. Figure 6 shows the profiles for the FLW access roads, which are similar to the ones to be constructed for the FLE project.

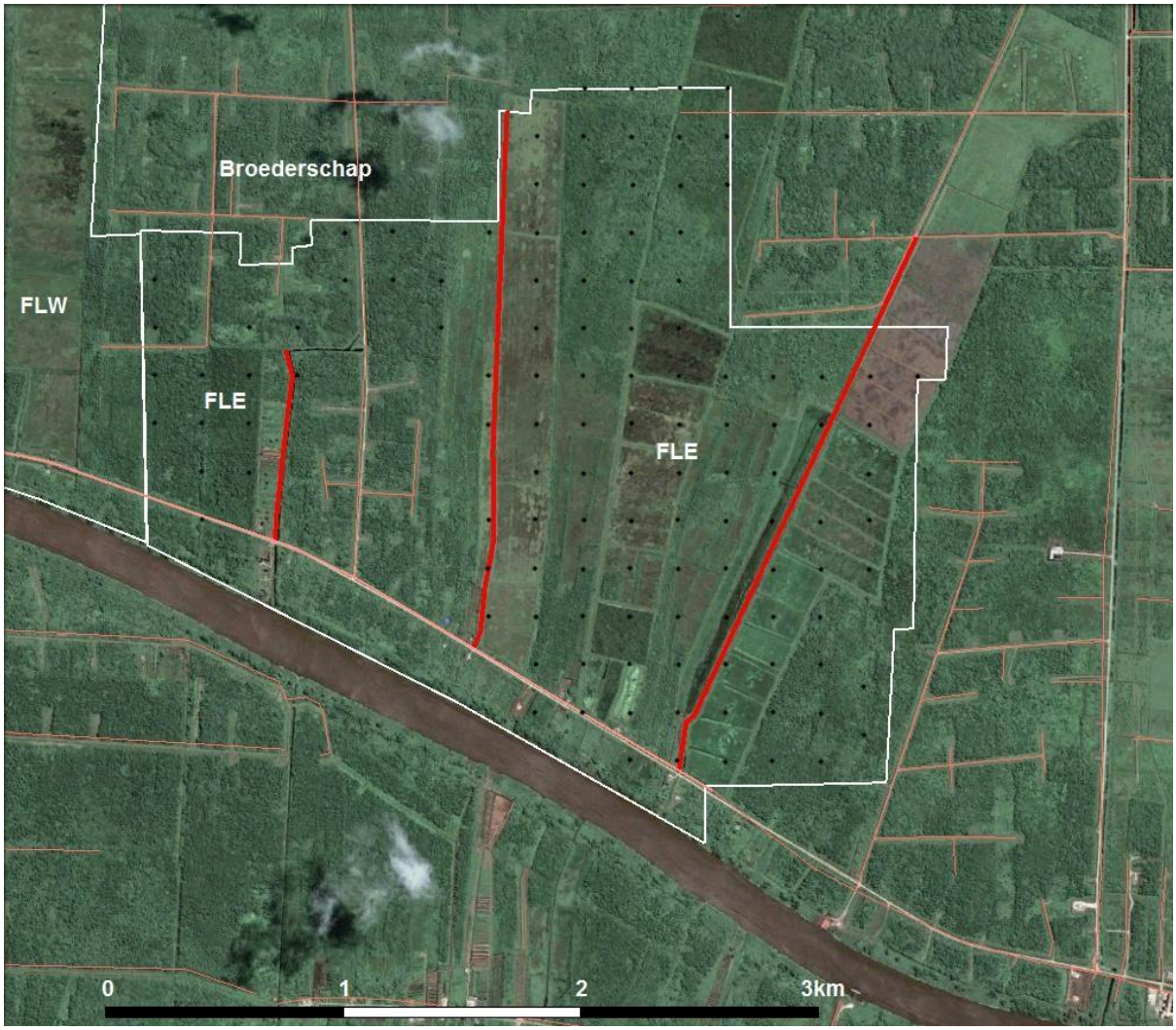

Figure 5: Projected access roads (red lines) for the Farmersland-East project section

Together with the roads, also the associated road drainage infrastructure will be upgraded. Where possible use will be made of existing drainage ditches for area drainage. Culverts (0.5 m ø) will be installed or upgraded, where necessary. All drainage water from the dryland area will be discharged into the Saramacca River through lockable valve culverts. The existing culverts along the Gangaram Pandayweg will be replaced by a culvert of at least 150 cm ø.

Clay for the filling of the dams will be partly obtained from material that comes available from ditch excavation, and partly been delivered by a supplier (yet to be determined). It is estimated that approximately 4,2000 m# m3 of clay will be required. The clay will be carried by 15 ton truck or by tractor with bulkwagen to the required filling locations along the access roads. The mode of transportation will depend upon the field situation. Per working day 700 cub m of clay and sand can be delivered.

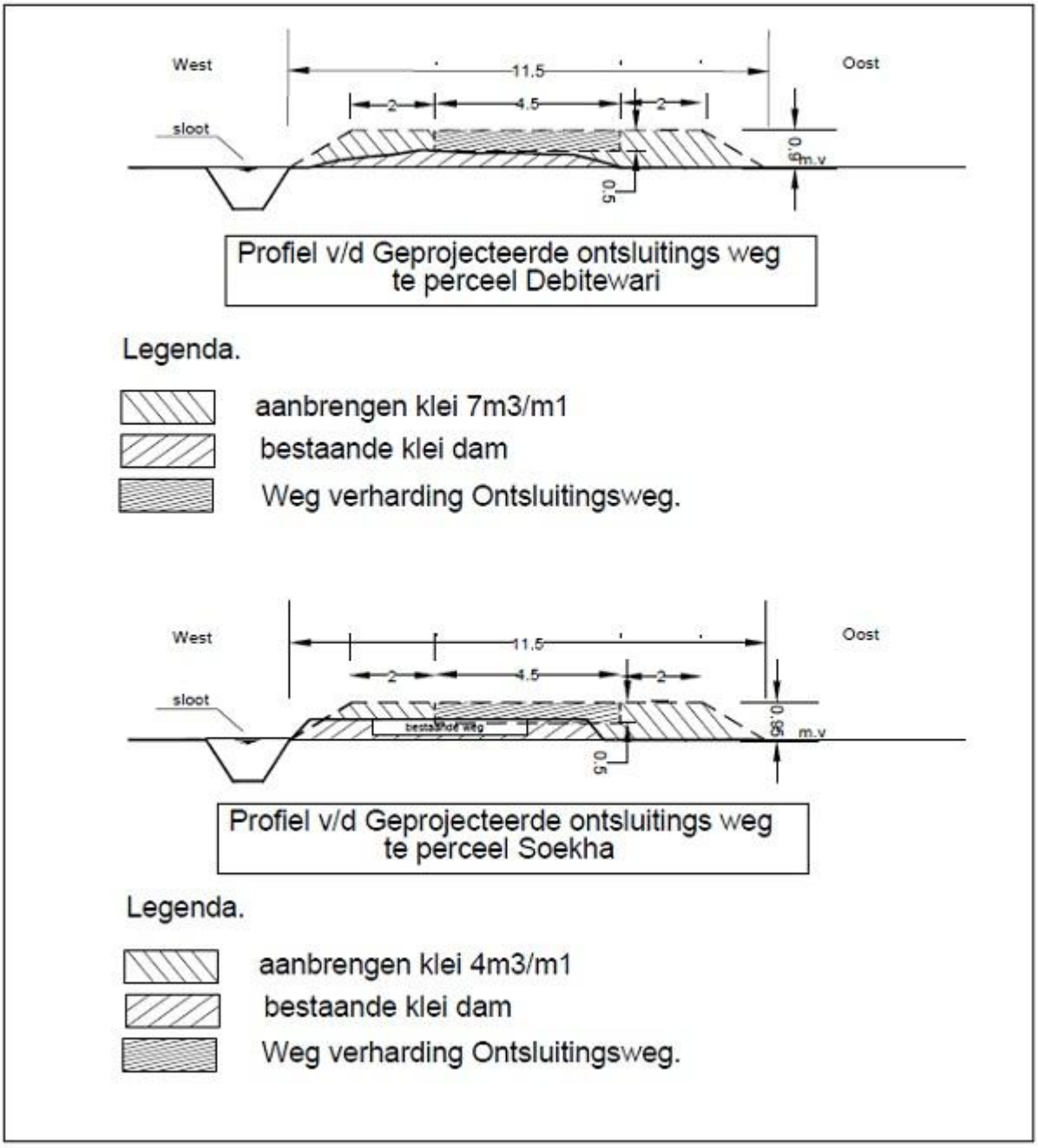

Figure 6: Profiles of main access roads that will be applied for the Farmersland-east (FLE) project

Ad 3: Construction of side roads for FLW and FLE (wegvakken/inritten; indicated as 'clusterweg' en bron toegangsweg' in Appendix B.3)

After demarcating the drilling and facility platforms in the field, they will be connected to the already existing main access roads by side roads. The side roads will as much as possible be constructed on top of existing dams, but many trajectories in FLE will need to be newly constructed. The actual construction will be preceded by clearing of the vegetation, which may include open dams with berm vegetation, low shrubs and bushes to low forest.

The side roads have a width of 4 meter, with shoulders of 2 meter at both sides, bounded by 3.5 meter wide drainage ditches at both sides.

For new dams, a clay subsurface will have to be constructed first, in order to bring the dam at the required elevation of 2.0-2.5 m +NSP. New culverts will be placed at locations where these new dams cross existing drainage ways; the dimensions will be determined during detailed project design.
The earth foundation and the shoulders of the side roads ('cunet') will be formed by clay that will be obtained from material that comes available locally from ditch excavation, and partly be delivered by a supplier.

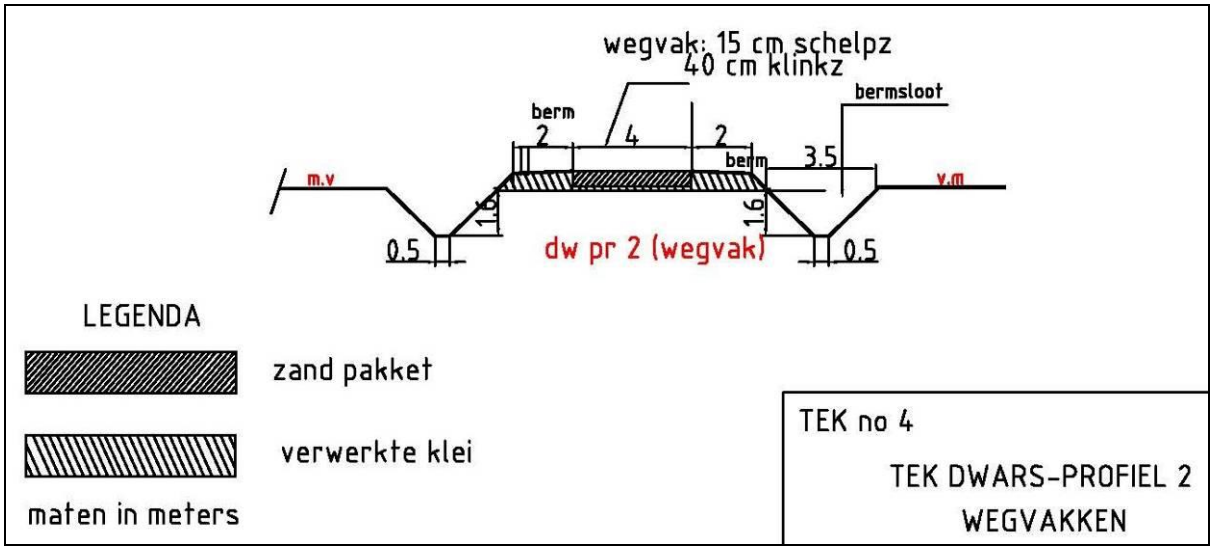

Figure 7: Cross section of the projected side roads

The road base consists of 40 cm of fill sand ('klinkzand'), while the road pavement will be formed by 15 cm of shell sand ('schelpzand').

It is estimated that approximately 40,000 cub m of clay will be required for this area. Between 40 and 70% of the clay necessary for the filling of the dams will be obtained from material that comes available from ditch excavation, while the remainder will be purchased from a Contractor.

The required 75,000 m^3 fill sand and 20,000 m^3 shell sand for the side roads will be obtained from a commercial sand mining concession in the Tambaredjo area, south of the Saramacca River.
The borrowed clay will be carried by 15 ton truck or by tractor with bulkwagen along the Gangaram Pandayweg to the required filling locations along the access roads. The mode of transportation will depend upon the field situation. The sand will also be transported by 15 ton trucks. Daily transported volumes of sand and clay will be the same as for the access roads.

Together with the roads, also the associated road drainage infrastructure will be constructed or upgraded. Where possible use will be made of existing drainage ditches for area drainage. For most of the existing roads, ditches are already present along the full length.

Culverts (0.5 m ø or more) will be installed or upgraded, where necessary. All drainage water from the dryland area will be discharged into the Saramacca River through lockable valve culverts as this is already practiced in the pre-project situation. Existing culverts will be replaced and upgraded to 150 cm ø as required.

Ad 4: Upgrading and additional construction of drainage canals

Drainage infrastructure will be required for dryland operations. Where possible use will be made of existing drainage canals for area drainage. The main drainage canal will have a width of 8 meter. For FLW this is the drainage canal that crosses the Debitewari farm. At different locations within the dryland area culverts (0.5 m ø or larger as required) will be installed. The presence of valve culverts will also allow for oil spill containment. All drainage water from the dryland area will be discharged into the Saramacca River through valve culverts. The existing culvert at Debitewari will be replaced by a 150 cm ø culvert.
As part of the reclamation of the swamp area, culverts or sluice gates will be installed at several locations of the diversion dam to allow water flow from the surrounding swamp into the canals of the reclaimed swamp area and also within the reclaimed swamp area culverts will be installed to allow water flow throughout the total reclaimed area and into the Saramacca River.
For the FLE area no additional drainage ways are required in addition to the (upgraded) roadside ditches. Drainage of excess water from the FLE area will be through the existing Staatsolie drainage system and through existing canals and culverts of landowners. Some upgrading of culverts along the Gangaram Pandayweg may be required (up to 150 cm ø), but exact locations and required culvert diameter will be determined after scouting for this section of the FL project area, and discussions (and agreement) with the land owner.

Ad 5a. Construction of drill sites for dryland operation

Before the start of the construction of drill sites, a decision should have been made about the drilling method, either deviated or vertical. This determines the number and location of the drill sites. The dryland drill sites will be situated either alongside an access road, or at the end of a well access road.

Appendix B.1 and B.2 illustrate the two options from drilling for the FLW project area. Less drill sites are required in case of deviated drilling, because 3-6 well locations can be reached from one platform.
Due to the well configuration, clustering it is not always possible to conduct deviated drilling. It is therefore expected that a mixed approach (vertical and deviated) will be employed.

A drill site can be situated in a farmers field, which may be active, fallow or abandoned, or in secondary forest. In case of farmers fields, the design philosophy is that the drilling site should not block any farm activities. For rice farms for instance, this means that there should be no blockage for irrigation water to reach the rice fields, or for drainage water to be removed from the field. At the same time drainage water from drilling sites should in no way end up in the rice field. It is to be preferred that the drainage is directly into the field drainage, but where this is not possible, a separate, contained ditch will be constructed towards the nearest field drainage. At other agricultural fields the drainage ways should not be obstructed by project infrastructure. As said earlier, all construction works will need the approval of the landowner/user.

A drill site for vertical drilling will cover an area of ~33x51 meter, while locations for deviated drilling measure 48 x 51 meter. Other construction activities for the sites are the same.

Figure 8 shows a picture of a prepared drill site for vertical drilling along the Gangaram Pandayweg.

Figure 8: Drill site, with from left to right, the outer dam, the perimeter ditch, the mud pit, the inner dam and the sandy drill platform.

A ditch will be excavated surrounding the drill location and the clay material from the ditch will be used to build an outer dam. The ditch will be inside this outer dam. Another but smaller inner dam will be build, also surrounding the ditch. The purpose of the smaller dam is to hold the sand (40-60 cm thickness) that will be used to cap the location. The top elevation of the drilling platform will be at 2.0-2.5 meter +NSP.
Depending on the arrangement of the rig with all auxiliary equipment, especially the directions of the flow of cuttings and mud, a pit will be excavated to collect all spent drilling mud and cuttings from the well. This pit measures 40 x 3 meter and is 1.25 meter deep. The cuttings and mud will either be buried on-site, or be excavated and transported to another suitable location after the drilling activity at the location has ended, depending upon the wishes of the land owner. The materials do not pose a risk to the environment (see below).

Ad 5.b. Construction of platforms for test and electrical facilities

Each well will be individually connected on a production and testing manifold. These manifolds are located on centralized facility platforms. The platforms consist of manifolds and provisions for the hook up of multi phase flow meter (AGAR MPFM 50). For the dryland operations AGAR units will be operating in mobile mode.

Also present on some of the platforms are substations that convert the High Voltage into low voltage system, to furnish the wells with power. These substations comprise: Transformer (150 KVA), Disconnect switches, Load center, Area lighting and Grounding.

The terrain for test facility platforms needs to be raised to a design level of 2.0-2.5 meter +NSP. This will be done with clay that will be excavated from the surrounding area (ditches) or that is brought in from elsewhere, depending whether the platform is located in recently reclaimed land or in an agricultural area. The final platforms area will measure 10 x 10 meter. The location of the facility platforms for the two project areas is presented in Appendix B.1 to B.3.

Ad 6a. Construction of the electrical distribution system

An HV (High Voltage) distribution line will be installed running approximately along the main infrastructure of the FLW and FLE production development areas. For FLW this HV line will at one end be hooked up to the Broederschap line and at the other side to the TNW distribution line (at the Noorddamweg). From this main HV line the 5 substations will be connected. The HV lines of FLE will be hooked up to the Broederschap line, the line along the Gangaram Pandayweg and the Kisoensing west line. From the substations a LV (Low Voltage) line will connect the platforms and the wells. Appendix B.4 and B.5 show the lay-out of the electricity grid for FLW and FLE respectively.

Ad 6b. Lay-out of crude transfer system

The total flow of Farmersland will be directed through the 12"HDPE main header and via a tie-in on the Broederschap header and the Gangaram Panday header to a Crude Treatment Plant. Most likely the crude from FLW will be treated at TA-58 and that of FLE at Josi.
Depending upon the type of drilling different crude transfer systems will be used.
In case of vertical drilling, the wells are grouped around a test facility/manifold platform. From the wells 4" HDPE flow lines will be constructed from the well head to the manifold on the test facility location. From the test facility/manifold location a 6"HDPE sub header will be constructed. This sub header will be connected to a 12" HDPE main header that is located on a north-south dam that runs central through the area. This system is illustrated (for FLW) in Appendix B.1.
In case of deviated drilling no flow lines are required, but the well locations will be connected to the 12"HDPE main header by means of a 6" HDPE sub header. The system is illustrated (for FLW) in Appendix B.2.
For FLE the systems will be similar with flow lines and headers be constructed along the roads in the area.
All pipelines will be buried in the berm of the access and side roads at a depth of at least 60cm by means of trenching.

Operation phase

1) Drilling rigs

For vertically drilled wells, the holes will be drilled by a land rig in 200 m spacing. If available, a second land rig will be deployed starting in the second year of drilling.
In case of deviated drilling another type of rig with the same dimensions as the vertical rig will be used, with drill sites located centrally around a number of wells. The rig type and its specifications are not yet known, because the tendering process has yet to be executed.

The rig(s) and ancillary equipment and materials are transported along roads on deep loaders and trucks.

2) Drilling

The well is created by drilling a hole, 9" inches diameter, into the earth with a drilling rig, which rotates a drill string with a bit attached.
In an initial stage of the drilling process, a surface steel pipe casing is pushed down to a depth of about 77 feet. After the surface casing has been put into place, drilling is resumed to the final depth, which is about 1200-1500 feet in the Farmersland area. When oil sands are found, initial well tests are conducted to establish the production capacity of the well (see wireline logging).
If the well is considered to have commercial value, a steel casing will be cemented down the entire length of the well. For extraction of the oil, a second, smaller set of pipes ('tubing') is run down through the well and attached to a flow and production control device on the surface. During the preparation of the hole and the placement of the screen a "completion fluid", in the form of salt water, is present in the hole to remove cuttings residues and to control the pressure (see completion).

In case the well is considered a 'dry hole', meaning not capable of producing commercial amounts of petroleum, the well is plugged with cement and abandoned.
Cementing is done by the cementing unit that is placed on a pontoon. Cement is transported in bulk to the drill site.
Drilling and associated services like logging and cementing will be conducted by contractors, under the supervision of Staatsolie. Drilling will require 15 persons per shift and drilling will be performed on a 24/7 basis for 10 months per year.

3) Drilling fluid

Drilling fluid (also known as "mud") is pumped down the inside of the drill pipe and exits at the drill bit. For the Saramacca Operations water-based drilling mud is used, mainly composed of water, Drispac and clay (Bentonite). These materials are non-hazardous and pose no threat to men or the environment.
Particular functions of the drilling mud include cooling the bit, lifting cuttings to the surface, preventing destabilization of the walls of the well hole and overcoming the pressure of fluids inside the sediment so that these fluids do not enter the well hole.
During drilling "cuttings" are generated, for the Saramacca Operations consisting of clay, sand and shell fragments. These "cuttings" will be brought to surface through the mud circulation system. The cuttings are separated from the mud in the mud treatment system and at regular depth intervals sampled.
The drilling mud will be re-used as much as possible and only minimal amounts will be dumped.
For dryland operations, the excess cuttings and the spent drilling mud are collected in the mud pit (see Figure 8) and normally buried on-site, since no significant impacts are predicted because of this practice, due to the absence of hazardous compounds.
However, when the landowner requests such, the materials will be removed from the site (see section on waste management below).

Per well hole, the following quantities of chemicals are being used on average for drilling:

Bentonite	5,000 kg
Drispac	500 kg

Sodium bicarbonate	25 kg
PH adjuster (Barabuf = magnesium oxide)	25 kg
Calcium carbonates	125 kg

4) Wireline Logging

After completion of the drilling operation, a contractor logs the hole with a variety of logging tools that are lowered into the open well hole. Measurements include electrical properties (resistivity and conductivity at various frequencies), sonic properties, and active and passive nuclear measurements. The equipment is placed on a truck, where also the logging is recorded. No emissions occur during the logging process.

5) Well completion

After drilling and casing the well, it must be 'completed'. Completion is the process in which the well is enabled to produce emulsion (or gas).
In a cased-hole completion, small holes called perforations are made in the portion of the casing that passes through the production zone, to provide a path for the oil to flow from the surrounding rock into the production tubing.
Completion fluid (brine) is made up with potable water and rock salt to weight up from 8.33 ppg to 8.80 ppg with 4% KCl by weight to prevent clay swelling, which may cause the drill string to be stuck in the hole.

For the preparation of the completion fluid on average the following quantities are used per well hole:

NaCl	2,850 kg
KCl	2,000 kg

6) Production

The production hole is first closed with a preliminary 2-3/8" OR 2-7/8" tubing, after which a small electrical pump is placed to bring the crude to the surface.
The produced crude will be transported through a system of flow lines, sub-headers and headers via a tie-in on the Broederschap, Kisoensing-west or the Gangaram Panday header to the TA-58 and Josi Crude Treatment Plants.

7) Well testing

Production data of each producing well is needed for efficient production optimization purposes and for reservoir/geological modeling. Therefore all production needs to be tested. Testing will be done by means of two multiphase flow meters (AGAR MPFM 402-10-10), two mobile test tanks and 15 fixed test tanks (90 bbls). The AGAR units measure the fraction of oil, water and gas from connected wells.

8) Field and well inspection and maintenance of production facilities

Inspections are conducted according to the field and well inspection procedures (Staatsolie 2006). Visual inspections are conducted at least 2 times a day with the objective to identify unsafe and potentially risky situations, and defects and failures of production facilities (including oil spills and leaks). In addition, a periodic maintenance inspection is undertaken, e.g. internal inspection of carbon steel pipes, or of a test tank. Any unsafe and dangerous situation and all defects and failures are reported immediately and prompt action is taken.

During periodic field inspection also corrosion measurements are performed using corrosion coupons. Based on the results pipe replacements can be made timely, thus avoiding spills due to corrosion.
Maintenance of the wells is done according to schedule by a maintenance crew by car or ATV. It includes lubrication and replacement of broken or worn-out parts.
In certain wells a work-over may be necessary, especially in older wells. Such remedial work is performed using a work-over unit on a truck, also known as pulling unit. The activity comprises pulling and replacement of tubing and screens. Work-over jobs on average have to be performed 10 times per year in a field such as the FL field with the projected 147 wells. After the first year this number will increase, due to the increasing number of wells.
Any leaked oil is removed according to the "oil spill clean-up guidelines".
Other maintenance conducted is the regular vegetation control in order to keep the roadsides, including flow line and header trajectories, and platforms free of high vegetation. This is done twice a month. Depending upon the conditions this is done by means of chemical weed control (with Glyphosate or Gramaxone) or by brush cutter weeding. Chemical weed control is mostly limited to locations where other means pose a risk of fire (metal present). Staatsolie will not conduct chemical weed control at farmers' fields and along the Gangaram Pandayweg.

Decommissioning

The current reserves of the Farmersland oil field are estimated to last for 25 years, but part of the wells may start to be closed earlier when they reach their economical limits.
At that point, they will be dismantled and abandoned. In this process, tubing is removed from the well and sections of well bore are filled with cement to isolate the flow path between oil and water zones from each other, as well as the surface. Completely filling the well bore with cement is costly and unnecessary. The casing of the well will be sealed 1.5 meters below ground level to allow agriculture or other activities after terminating the crude production activities. The well location will be leveled and remaining material will be removed as required.
When the economic limit of the field is reached the remaining wells and the supporting facilities will be dismantled.

Buildings, offices, steel and iron hardware and the electrical grid will be removed or demolished and all waste will be removed. Also sand that has been placed on agricultural fields will be removed if the owner indicates such. The field surface will then be leveled so that wetland rice cultivation or other agricultural activity will be possible again.
Dams constructed in the fields will be leveled, and dug ditches will be filled back. This again will be done in close cooperation and with permission of the land owner.

Any contaminated soil will be removed from site for treatment or it will be treated on-site. In case of oil pollution the polluted soil will be transported to Sarah Maria to be treated at the landfarm. In case of increased salt levels in the soil, the soil will be desalinized with fresh water by flooding of the drilling site.
Finally, the involved landowner will sign for proper hand-over.

In the swamp area, any constructed project dams will have to be removed or breached as required in order to allow free flow of water, provided the land will not be used for another purpose that makes use of such structures. The latter should be decided in consultation with, and approval of the appropriate government agencies.

On-site waste management

Solid waste

Solid waste will be generated during all phases of the project, but the composition will vary for each phase.

Waste generated during Construction comprises:
Waste oils, scrap metal, batteries, welding waste and non-hazardous solid waste

Waste generated during Operation (Drilling and Crude production) comprises:
Waste oils, hydraulic fluids, waste drilling chemicals, filters, scrap metal, packaging materials, pallets, drilling waste (see below), cleaning clothes, oily rags, used ear plugs, gloves and non-hazardous solid waste.

Oil spills or leakages could result in:
Oil-polluted soil, water and vegetation (see below).

All solid waste will be managed according to the existing waste handling and treatment / disposal procedure (General Field Instruction (GFI) no. 611). An overview of the current waste management is presented in Appendix C.

All solid waste is collected by a contractor and disposed of at the companies' dumpsite. Collection and disposal of routine waste is the responsibility of the PS&PS (Plant Security and Personnel Services) department, while the waste generator is responsible for non-routine waste collection and removal. The latter will be done in consultation with the PS&PS department.
The Procurement Division handles waste that is identified as recyclable or reusable.

At the drilling sites solid waste will be placed in garbage bags and then placed in metal baskets which will be disposed of at the Sarah Maria dumpsite / landfill.
Separate collection and disposal will be applied for metal scrap and plastic bottles.
Hazardous waste, like batteries and fluorescent tubes will be stored in a separate, secured location.
All waste will be recorded, including its quantity and destination.

Sewage

During construction and drilling, very little grey water (small kitchen, showers and hand washing) will be generated, which water will be released into the drainage system, where it will be quickly broken down.
There will be no release of black water, because portable toilets will be placed at the construction and drilling sites and its contents will be removed and disposed of on regular basis in special septic tanks at Maho.
In the absence of on-site activities during the crude oil production, no waste water will be generated during this phase.

Drainage and storm water

The operations areas (platforms) are bunded in order to avoid any uncontrolled contaminated surface runoff. In case of an oil spill or a chemical spill, this will be cleaned and the contaminated soil material will be removed and treated at the Sarah Maria facilities and no contamination will end up in the drainage system. All water from the area is collected in a drainage system before controlled discharge to the neighboring drainage ditch outside the drilling area.

Drilling waste

Drill cuttings will be collected in the mud pit, together with the spent drilling mud. Because there are no hazardous compounds in the mud, the mud pit does not require liner; it is a hole in the ground that is large enough to hold all the spent drilling mud. Dewatering is done by letting in material dry in the sun, as well as by some drainage to the subsoil.
With consent of the landowner, spent mud and cuttings will be disposed of on-site by burial, but otherwise it will be placed in containers and it will be transported to a dedicated site outside the area (Sarah Maria), where it will be buried.
The spent completion fluid will be collected and transported by a tanker truck to the TA-58 treatment facility. Proper treatment of this waste would involve dilution in order to diminish the salt concentration to a level that is acceptable for discharge into outside surface waters.

Cementing wastes could arise due to washing of equipment, spillage and overflow of the cement tank. These wastes will be released into the drainage system.

Oily waste

At the site, any oily waste will be stored in drums, which will be transported to the Saramacca facilities, either to be land farmed or recycled, depending upon the type of waste.

Non-planned project-related events

The activities that are included in the design and operation of the project were described in the previous paragraphs. Apart from those activities there may be some unforeseen events that could occur in relation to the project. These events can be considered as risks that should be managed through appropriate emergency response procedures in the Staatsolie Emergency Response Plan or other regulations. Notwithstanding that, there could be an environmental impact that should be assessed.

Events that could have an impact on the environmental and social conditions in the study area are:

1. Spills and leakages

Spills and leakages are possible at all project locations and during several project activities:

- Oil spills and leakages from equipment during construction, drilling, production and decommissioning;
- Oil spills or leakages from storage or transfer tanks during construction;

- Oil spills and leakages at well sites and from pipelines during production and decommissioning;
- Spills of drilling chemicals during transportation and use at the rig.

For all oil-related spills, the clean-up procedures are laid down in a guidelines report (Staatsolie 2001). All spills including chemical spills are investigated and monitored. The reports are kept in an Incident Management Database. All chemicals used are evaluated on HSE aspects and approved before purchased.

2. The risk of a blowout during drilling. This risk is minimal; because for shallow gas a diverter system is installed and for a deeper well kick, blow-out preventers (BOPs) are installed and tested at regular intervals. Moreover, the internal pressure of the oil reservoirs is typically low.
3. Fire from burning stubble in neighboring rice fields in the dryland area and possibility of explosion in case gas is leaking or vented.
4. Vegetation fires in vegetated areas.
5. Exposure of personnel to pesticides from spraying in nearby rice fields
6. Airplane collision with beam or with electricity grid.
7. Turnover of truck.

The events are classified as at risks situation, during risk assessment, according to the Staatsolie Risk Management policy. In addition to the identified risks, the register also includes the causes, mitigation measures, risk control action measures and responsibilities. Health, Safety and Environmental risks which have been identified in the Project Risk Register and in this study will be managed by two separate documents. The Health and Safety risks will be managed by the Health and Safety (HS)-plan and the Environmental risks will be managed by the Environmental Management Plan (EMP). The majority of above mentioned events will be managed by the HS plan.

4 DESCRIPTION OF THE IMPACTED ENVIRONMENT

4.1 CLIMATE

4.1.1 General climate conditions

Most of Northern Suriname has a Tropical Rainforest Climate (Af-climate in Köppen's classification). The average rainfall exceeds 60 mm in the driest month(s). A narrow strip along the coast, which has drier conditions, forms an exception. The average annual rainfall in the northern part of Suriname predominantly ranges between 2,000 and 2,500 mm, but in the narrow coastal strip it is between 1,500 and 2,000 mm, and in some parts even less than 1,500 mm.

Like in most parts of Suriname, consistently high temperatures and a high humidity characterize the study area with the main variation being rainfall and the associated cloud cover. The mean annual air temperature at Paramaribo is 27.3 º C, with a daily range of 7-10 ºC and with an annual range of about 2ºC.

The weather of Suriname is dictated mainly by the northeast and southeast trade wind system called the Inter-Tropical Convergence Zone ("ITC" zone also known as the "Equatorial Trough").

The ITC zone passes over Suriname two times per year and results in four seasons based upon rainfall distribution (Scherpenzeel 1977).

- Long Rainy Season End April-Mid August
- Long Dry season Mid August-Early December
- Short Rainy season Early December-Early February
- Short Dry season Early February-End April

Northern Suriname has a northeast to southeast wind direction, with the first dominating in the February-April and the latter during the July-September period. The other months show directions mostly ranging between northeast and southeast.
Along the coast the wind has a strong variation due to the land- and sea breeze. The wind velocities are relatively high at the sea border and decrease further inland. The strongest winds appear to occur in the short dry season, when temperature gradients are highest.

Calm winds, i.e. winds with hourly average speeds less than 0.5 m/s, are very frequent. Velocities at night and in the morning tend to be lower than the rest of the day. This is caused by the southerly land wind, which especially from May to December is well developed during the nights. This land wind dampens the effect of the trade winds, resulting in calm water during the night and the early morning.
During the day, the wind speed may increase to about 5 m/s, and in some seasons to 5-8 m/s, in particular in the February-April and the September-October periods. In the coastal zone, wind speeds are usually higher than further inland.
Wind speeds of 20-30 m/s have been occasionally recorded during thunderstorms, but only for a very short period (locally known as 'sibibusi'). Suriname is free of hurricanes.

4.1.2 Specific conditions for the study area and the study period

Overall, there is no reason to believe that the climatic conditions in the project area differ significantly from the conditions in Northern Suriname.

Figure 9 presents the rainfall during the study period and preceding years, for three stations closest to the zone of the study area. The average total rainfall for this period between these stations ranges between 2018 (Kwatta) and 2186 mm (Groningen). The data for the 2009-May 2014 period are compared with the long-year totals for Cultuurtuin and Groningen, which are almost identical (annual average: 2223 (Groningen) and 2248 mm). Some differences between the recent rainfall and the long-term one are that the December-January, May-June and September months are dryer than normal, while February is much wetter. The clear pattern of rainy and dry seasons is much less pronounced in recent years than it used to be before. It cannot be concluded, however, that this is a trend that will continue in the coming years.

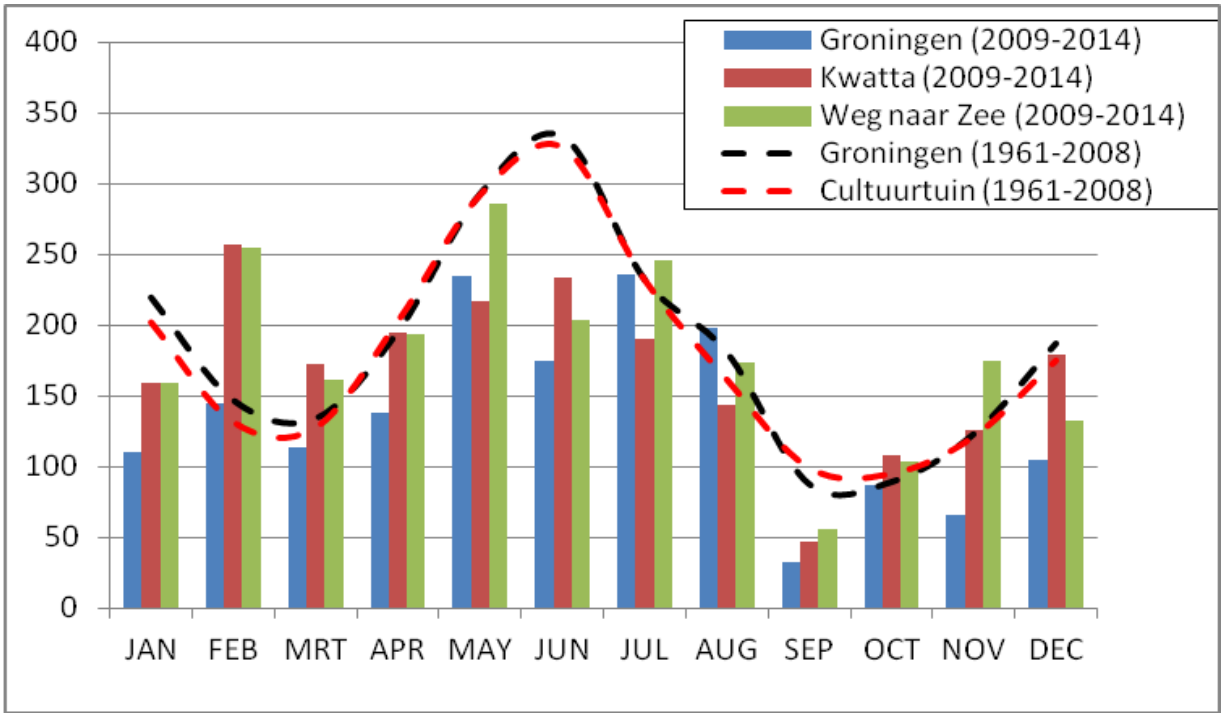

Figure 9: Mean monthly precipitation for the period 2009-May 2014, compared with long-term averages for Groningen and Cultuurtuin (1961-2008)

The consequences of the above will be discussed where relevant, but the overall impact on the results of the study is not considered significant.

Wind speed and direction are available for Calcutta and TA-58 for two short periods only (December 2006 and June 2007). Notwithstanding the brief observation period, the data provided useful information because the only long-term wind data are from Zanderij, some 60 km from the coast.
The course of the mean and maximum wind speed over the day is illustrated in Figure 10 for two stations in the Tambaredjo and Calcutta oil field area. Unfortunately data are only available for a two months in 2007 (Calcutta: June and TA-59: December). However, the data show a consistent pattern and they are in agreement with the above.

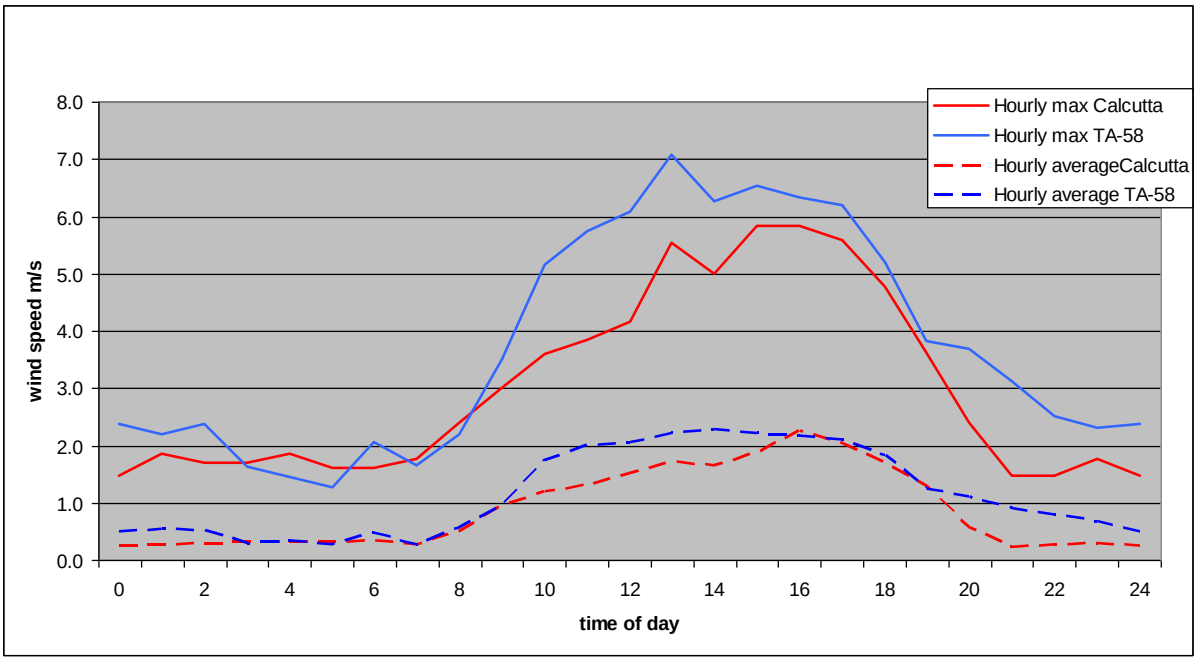

Figure 10: Average mean and maximum hourly wind speed for two stations in the Saramacca oil field area

Comparison of the Staatsolie data with available data from Zanderij (1961-70) indicates that wind directions between the two locations do not significantly differ for the months June and December. June has dominating wind directions between NE and S, while in December NE winds are dominating with a range between NE and SE (Noordam 2010). This is in line with the general picture sketched above.

4.2 AIR QUALITY

There are very few sources of man-made air emissions that affect the air quality of the FL project area. Related to the dominating wind directions the only stationary source of air emissions outside the area is the TA-58 facility at 3.8-6.7 km north-northeast to east-northeast of the Farmersland area.
The total level of emissions at TA-58 are relatively low and emissions will not significantly affect the air quality at Farmersland, also because forest is found in between the two locations and any emissions will quickly be dispersed by the wind.

During southern and southeastern winds, fugitive emissions from the Gangaram Pandayweg could reach the project area, but these winds are predominantly occurring during the night when traffic intensity is very low. In addition the traffic intensity at the Gangaram Pandayweg is low.

Part of the project area is found within or near rice fields. Fugitive emissions from these fields could occur during the periods that certain farm activities take place. Mostly this will involve the period of land preparation, including stubble burning, and the harvesting period, but the overall level of activities will be low. Stubble burning on rice fields is an incidental activity (only one or two periods over the year), while dust and equipment emissions from field activities also are too accidental to have a significant effect.

Sowing, fertilizer and pesticide application are conducted by airplane. Airplane exhaust emissions will be minor during the very brief period that the plane is overhead and most emissions will not reach the ground level.
During pesticide spraying, the air quality will be briefly affected before the spray reaches the ground. Drift of pesticides may also affect the downwind area near the sprayed fields.

Given the location and the scale of existing emissions around and within the project area it can be stated that the air quality in project area is still close to its natural state as very few sources of relevant air emissions affect the air quality in the project area.
Generally speaking, the air quality of the study area is good with no significant air pollution.

An exception is formed for the Gangaram Pandayweg itself, where numerous complaints have been received from local residents about dust nuisance by passing vehicles in particular during dry periods. Notwithstanding the fact that Staatsolie is permanently employing two watering tanker to spray the road during dry periods, this proves to be insufficient as complaints continue to be aired (see further Social Solutions 2014).

4.3 NOISE

No specific noise legislation or guidelines currently exist for Suriname, so international guidelines were considered (WHO, World Bank/IFC) in this study. Noise is recognized as a potential pollutant or nuisance and noise measurements were conducted at all drilling locations.

Noise measurements were performed with a sound level meter and analyzer SVAN 957 (Nr. 15357) mounted on a tripod. The 7052H prepolarised microphone was provided with a SA22 windscreen. The measurements were made with the microphone at 1.5 m above the surface.
The noise measurements were done with Type 1 IEC 61672:2002 accuracy in the frequency range 10 Hz ÷ 20 kHz with ACO 7052H microphone. A FAST detector was used for the measurements with A, C and Z filters. Also an 1/1 OCTAVE analysis with 15 filters with centre frequencies 1 Hz ÷ 16 kHz, Type 1 – IEC 1260 was logged.
Before measuring, a calibration was done with SV 31 Acoustic calibrator (serial No 17687) with IEC 60942:2003 standard, Type 1 accuracy.

Measurements covered the daytime periods and measurements were only undertaken under favorable weather conditions.

Sound levels in the FL area are typical for semi-natural and rural areas, with the southern part being close to a road (the Gangaram Pandayweg) with low-intensity, discontinuous traffic noise during the day, and natural sounds dominating the nightly noise climate. The semi-natural sections comprise primary and secondary vegetation, which may be forest or open vegetation with shrubs and trees. The rural areas are characterized by the presence of scattered houses and agricultural fields, interspersed with semi-natural vegetation.
Noise levels in the Farmersland polders, away from the road, are typical of rural areas, where the natural sounds dominate the noise climate, while only occasionally man-made noises, like distant traffic (including traffic in the Tambaredjo NW oilfield) or farm equipment are heard.

Table 10 presents the average daytime noise levels for the FL area. Data from similar zones have been included. Details about the measurements are presented in Appendix D.

Table 9: Summary of noise levels in the Farmersland area and similar zones

Location #	Environment	Wind speed	Baseline noise level (dB(A))				Distance from road
			L_1	L_{10}	LAeq	L_{90}	
FL, Debitewari farm	Polder, with distant airboat noise	Mod.	54	51	49	44	NA
FL, Debitewari farm	Polder	Low	51	45	41	30	NA
Gangaram Pandayweg, km 1.8	Road in rural area	Mod-Low	53	43	42	35	10 m
FL, Gangaram Pandayweg, km 9.6	Road in rural area	Mod-low	53	44	43	39	10 m
Gangaram Pandayweg, at corner of Wayambo Road	Local center in rural area	Low	74	69	64	47	10 m
Wayambo Road, km 30	Main road in rural area	Low	49	42	40	37	15 m
Along E-W Connection Coronie (NEC 2014)	Rural area	Low-Mod	54-65	46-58	45-55	41-44	10 m
	Semi-natural	Calm-Mod	47-58	45-58	44-56	35-55	10 m
Buru Swamp, daytime (Tan 2009)	Swamp, no manmade noises	Calm-Low	55-50	40-44	38-42	31-37	NA
	Swamp, distant airboat noises	Calm-Low	55-58	52-55	49-54	40-52	NA
Buru Swamp, night time (Tan 2009)	Swamp, no manmade noises	Calm-Low	49-56	42-51	39-49	32-41	NA

The quietest environments within the FL project area are found in the undisturbed Buru Swamp, in undisturbed sections of the polder and along the Gangaram Pandayweg. It should be noted that traffic intensity was low at the moment of measurements. Sound levels (L10-L90) range between 31 and 45 dB(A). The equivalent noise levels (LAeq) here are 38-43 dB(A). Wind speed at these locations was low to moderate.
Somewhat higher levels are found at locations with manmade noises in the distance. The equivalent noise levels (LAeq) here are 49-54 dB(A), with a common range between 40 and 55 dB(A).
It is also apparent that night time noise levels are somewhat higher than the undisturbed daytime noise levels, with LAeq between 39-49 dB(A).
High sound pressure levels were measured at the corner of the Gangaram Pandayweg and the Wayambo Road, where there are shops and a service station. It is also a location where cars are accelerating after having crossed the Monkshoop Bridge. The equivalent noise level (LAeq) here was rather high at 64 dB(A), with a common range between 47 and 69 dB(A).

4.4 GEOLOGY

The description of the geology of the area is entirely based on available publications, maps and reports.

Over 80% of Suriname is part of the Precambrian Guiana Shield, the deeply weathered, rainforest-covered hill and mountain land stretching east and south to the Amazon River in Brazil and west to the Orinoco River in Venezuela. It is referred to as a ‘shield’ area, because

it is rigid and stable (i.e. no earthquakes or volcanoes). The crystalline basement of this shield was formed during the Trans-Amazonian Orogenic Cycle (TAOC) from around 2,000 to 1,800 million years ago. It predominantly consists of igneous and metamorphic rocks.
Deposition of sediments to the north of the Guiana Shield started with the opening of the Atlantic Ocean, some 160 million years ago. The oldest sediments date from the Late Cretaceous and the youngest from the Holocene. The sediments are known as the Corantijn Group (Figure 11).

The study area is located in the Coastal Plain, which together with the Coastal Plains of French Guiana and of Guyana constitutes the margin of the large Guiana Basin. The Coastal Plain can be divided into the Young Coastal Plain and the Old Coastal Plain. The study area is found in the Young Coastal Plain, and has developed on Holocene deposits of the Coronie Formation. According to the classification by Brinkman and Pons (1968), the area is formed on sediments of the Comowine phase, which are not older than 1,000 years. The Comowine phase is characterized by extensive marine clay flats and the presence of relatively few sand ridges. Throughout the study area, predominantly clays have been deposited.
For most of the study area marine clays are found, but in a strip along the river influence of the (tidal) river during deposition was present, and the sediments can be indicated as fluvio-marine, being predominantly marine, but deposited in a fluviatile environment.

4.5 GEO-HYDROLOGY

The description of the geology of the area is entirely based on available publications, maps and reports.

In the coastal plain of Suriname drinking water is withdrawn from three major aquifers within the sediments of the Corantijn Group (Figure 11): the A-sand aquifer, the Coesewijne aquifer and the Zanderij aquifer, found in the formations of the same respective names (note: the A-Sand Formation in which the aquifer is found has been renamed Burnside Formation; Wong, 1989). The oil-bearing reservoir sand is found below these aquifers. It forms the basal unit of the Saramacca Formation, which was deposited on top of an erosional surface that marks the transition from the Cretaceous to the Tertiary (Paleocene).
No water for drinking purposes is extracted from the aquifers present in the area north of the Saramacca River, because their water is brackish. But at Sarah Maria, water from the Zanderij Formation (at about 160 m) is used to feed process water to production activities.
In areas south of the river, such as in Tijgerkreek, Tambaredjo and Groningen, the Coesewijne aquifer is exploited for drinking water supply. The Staatsolie Saramacca Operations, including Sarah Maria and TA-58 emplacements, withdraw their potable water from the water production plant at Tijgerkreek by means of a pipeline across the Saramacca River.

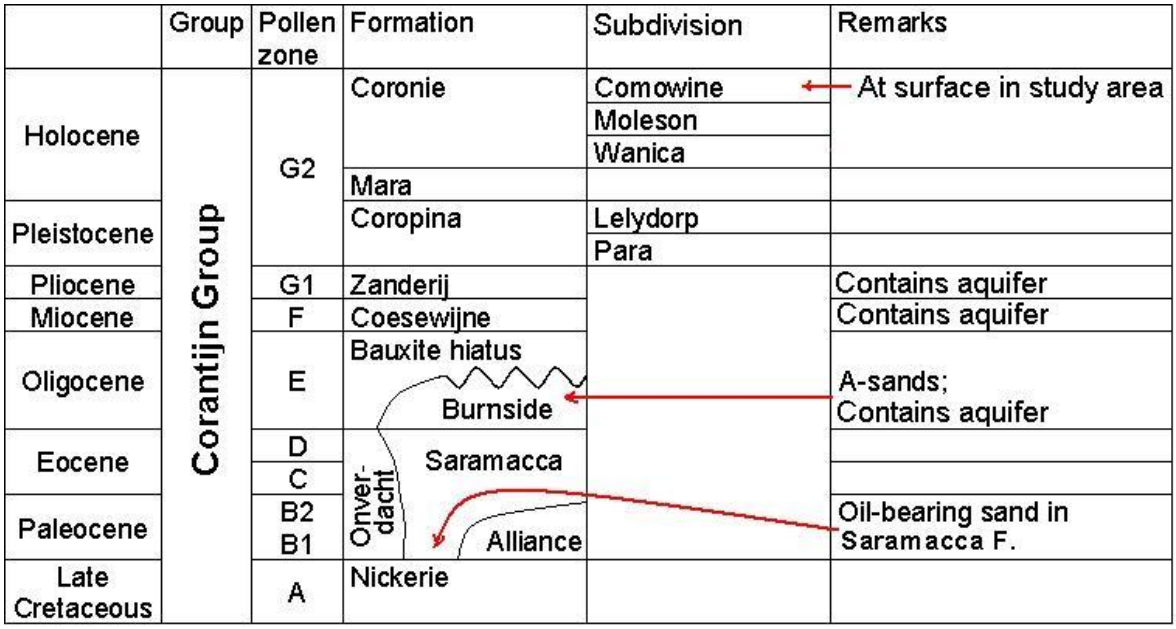

Figure 11: Stratigraphy of the Corantijn Group

4.6 GEOMORPHOLOGY AND SOILS

4.6.1 Landscape and soil conditions in the FL study area

As a basis for the description of landscape and soils of the Farmersland project area the Reconnaissance Soil Map of Northern Suriname, scale 1:100 000 (Soil Survey Department, 1977) is used. In addition to this map, use has been made of field data of seven survey lines of the Soil Survey Department (unpublished data, 1984).

The soils of the wider study area are shown in Figure 12.
The landscape in which the FL project is situated, is dominated by extensive clay flats without any sand or shell ridges. The elevation of the clay flats is estimated at 1.0 -1.5 meters above mean sea level (+MSL), with the lower elevations found in the north and the higher ones in a small zone in the south, along the Saramacca River.
On the lower clayflats, away from the river, freshwater swamps with peat have formed (surface level at around 1.0-1.2 m above mean sea level). They area represented by the unit Np.
The higher land (up to 1.5 m above mean sea level and sometimes higher) with clay soils along rivers is often referred to as 'river levee' or 'river flat'. Contrary to the swamps, these river flats are not, or only incidentally flooded, while no peat formation takes places here. These river flats are not shown in Figure 12, because they are included in the polder landscape (see below).
The majority of the clay soils in the study area is reclaimed for agriculture, and polders were established (P1). The polders are protected to flooding by dams along the river and in the swamp. The polder land is drained by a system of ditches, canals and culverts. No peat is present anymore in the polder land and some settling of the soil has occurred due to the drainage of the soft clay soils.

The soil conditions of the clay soils in the area are rather homogeneous, with slight differences in degree of ripening as the only significant difference between soil mapping units. Main units for the study area are Np3, Np4 and P1 (Table 10).

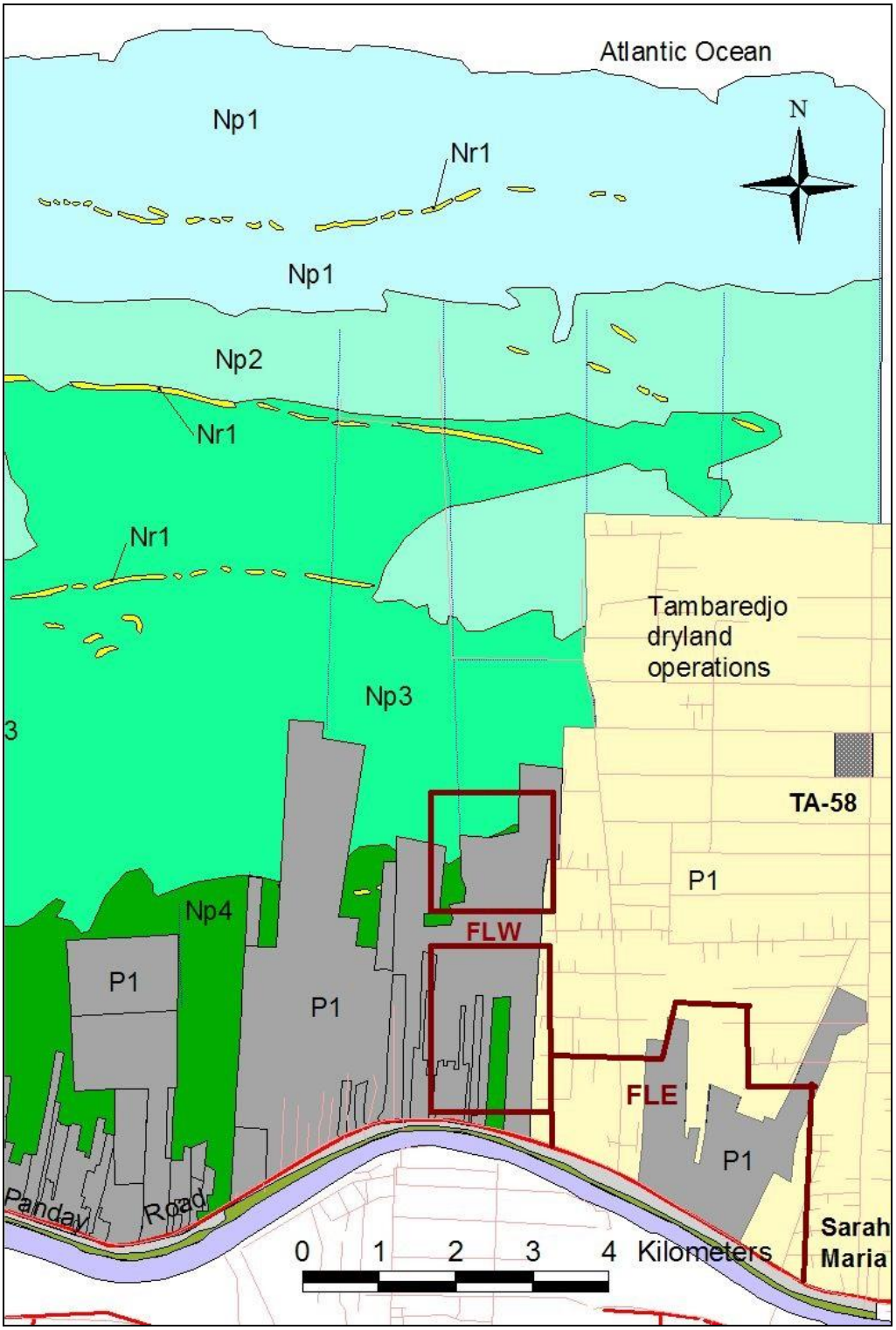

Figure 12: Soil map of the project area (FL) and surroundings (adapted from DBK 1977); for legend see Table 10.

Table 10: Legend of the soil map of the wider Farmersland area

Nickerie landscape

Np *Clayflats*

Np1 Very poorly drained, saline to brackish, nearly unripe clays over saline, nearly unripe clays; without a peat layer, or with a thin to moderately thick peat layer up to 30 cm

Np2 Very poorly drained, brackish, nearly unripe and half ripe clays over brackish to saline, nearly unripe clays; usually with a thick peat layer of about 40-50 cm

Np3 Very poorly drained, nearly fresh to slightly brackish, half ripe clays over brackish, nearly unripe to half ripe clays; usually with a thick peat layer of 50-75 cm

Np4 Very poorly drained, nearly ripe clays over slightly brackish to fresh, half ripe clays; usually with a moderately thick peat layer of 20-40 cm

Nr *Ridges*

Nr1 Imperfectly to very poorly drained, medium and fine sands and shell sands, often over nearly unripe clay within 100 cm; within unit Np1 ridges have brackish groundwater

Polder landscape

P1 Imperfectly drained to poorly drained, nearly ripe and ripe clays, without peat layer, and with (ricefields) or without (dry cropping) a puddled topsoil

4.6.2 Soil properties

The soils of the Young Coastal Plain are the most important resource for development of agriculture, animal husbandry and aquaculture in Suriname.
The clay soils have a high fertility, due to their high mineral (clay soils) or organic (peat soils) reserve, they have a high Cation Exchange Capacity (CEC) and they are normally slightly acid (unit Np1) to acid (unit Np4).
Their physical properties are moderate to poor. Permeability and aeration are usually moderate to low and workability with machines is difficult. The bearing capacity will be a problem on the half ripe to nearly unripe clay soils (Np1-Np3) as well as on the peat soils.

The soils have a decreasing salinity going from north to south. The clay soils in the study area can be classified (Pons, 1964) as non-saline soils with a brackish (southern part of Np3 and Np4) or almost fresh (P1) subsoil.

No ridges are found in the study area.

4.6.3 Soil suitability

The clay soils of the project area are suitable for paddy rice cultivation, cattle grazing and small-scale cultivation of certain dryland crops on cambered beds. Part of the land in the area is currently in use for these purposes (see Section on landuse in Social Solutions 2014).
However, much polderland is currently fallow, sometimes already for a prolonged period of time. This implicates that still much polder land is available for extension of agricultural activities. This not only holds for the study area, but for the region as a whole. Extension of the rice area will depend upon the availability of irrigation water. Water is available from the Saramacca River and from the swamp. The amount of water from the river is limited in dry seasons, when salt intrusion moves further upriver from the sea. The water supply from the swamp is limited by low swamp water levels and slow water supply, due to the high

resistivity of peat ('pegasse') in the swamp. Collectors have been dug to improve water supply from swamps, while wadoeks (water reservoir) have locally be constructed to store water for the dry season.
The project area is located within the North Saramacca MUMA. MUMA's have been established to protect the multiple values and functions of coastal ecosystems. One of the most critical factors to ensure the proper functioning of these ecosystems is the hydrology of an extensive area along the coast. No land allocation is allowed to the north of the "red line" (Figure 13; for explanation see hydrology). The study area is located south of the "red line", but the swamp area from which water can be withdrawn is small.

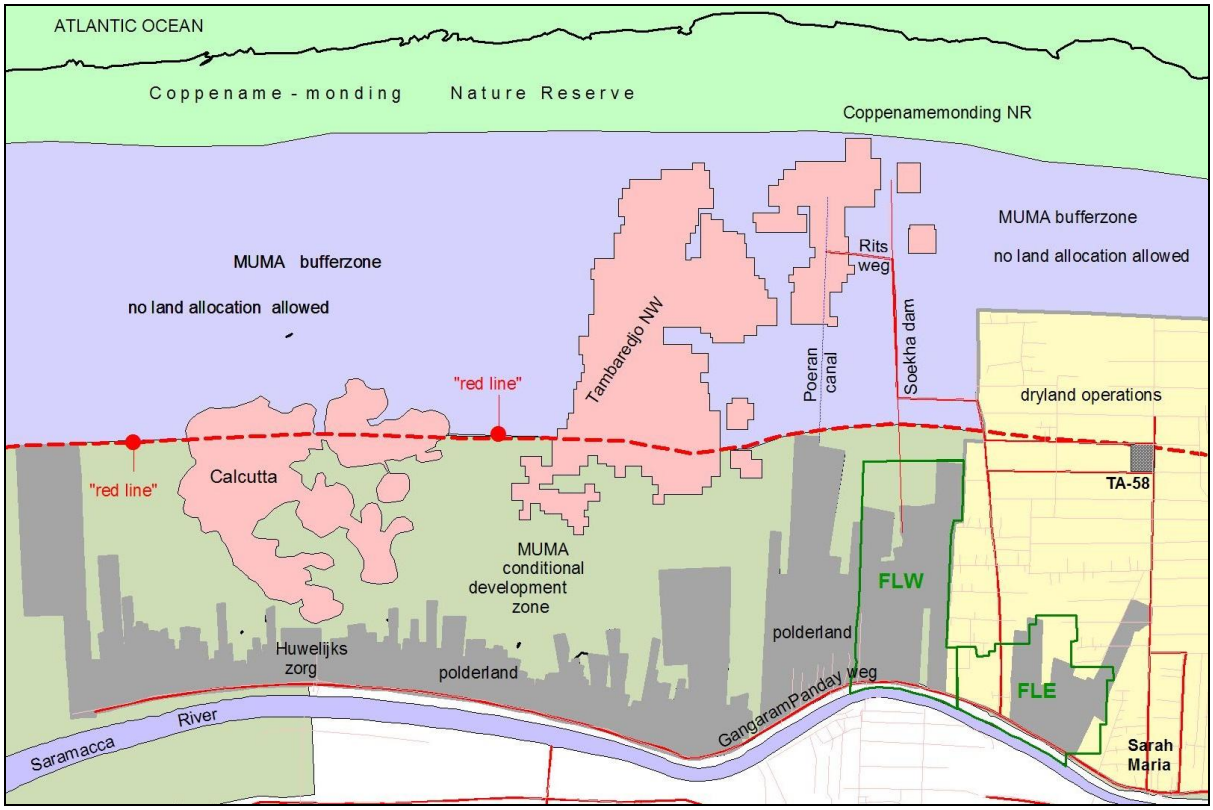

Figure 13: Zones according to the Resolution Land Allocation in Coastal Zone Management Areas (see Del Prado 2014)

Sufficient fallow reclaimed land is still available along the Gangaram Pandayweg for dry cropping and animal husbandry, where access and drainage are optimal. Use of land more to the north, e.g. within the project area would require new access roads and improved drainage facilities. But the reclamation of part of the swamp could be instrumental for development of new agricultural land.

4.7 HYDROLOGY

4.7.1 Historical development

The FL project area is situated in the catchment area of the Saramacca River. All excess water of the study area is draining towards the Saramacca River.
Prior to human developments in the area, there were a number of creeks that drained excess water into the Saramacca River. Figure 14 shows the situation in 1879, when four creeks were identified in the area that is nowadays found along the Gangaram Pandayweg. These creeks are:

1. Kwarrie? Creek, 2.5 km west of plantation De Dankbaarheid
2. Patakka Creek, 2 km west of plantation De Dankbaarheid
3. Lemmetje Creek, opposite the Jossie Creek
4. James Creek, 1.5 km from the beginning of the Gangaram Pandayweg.

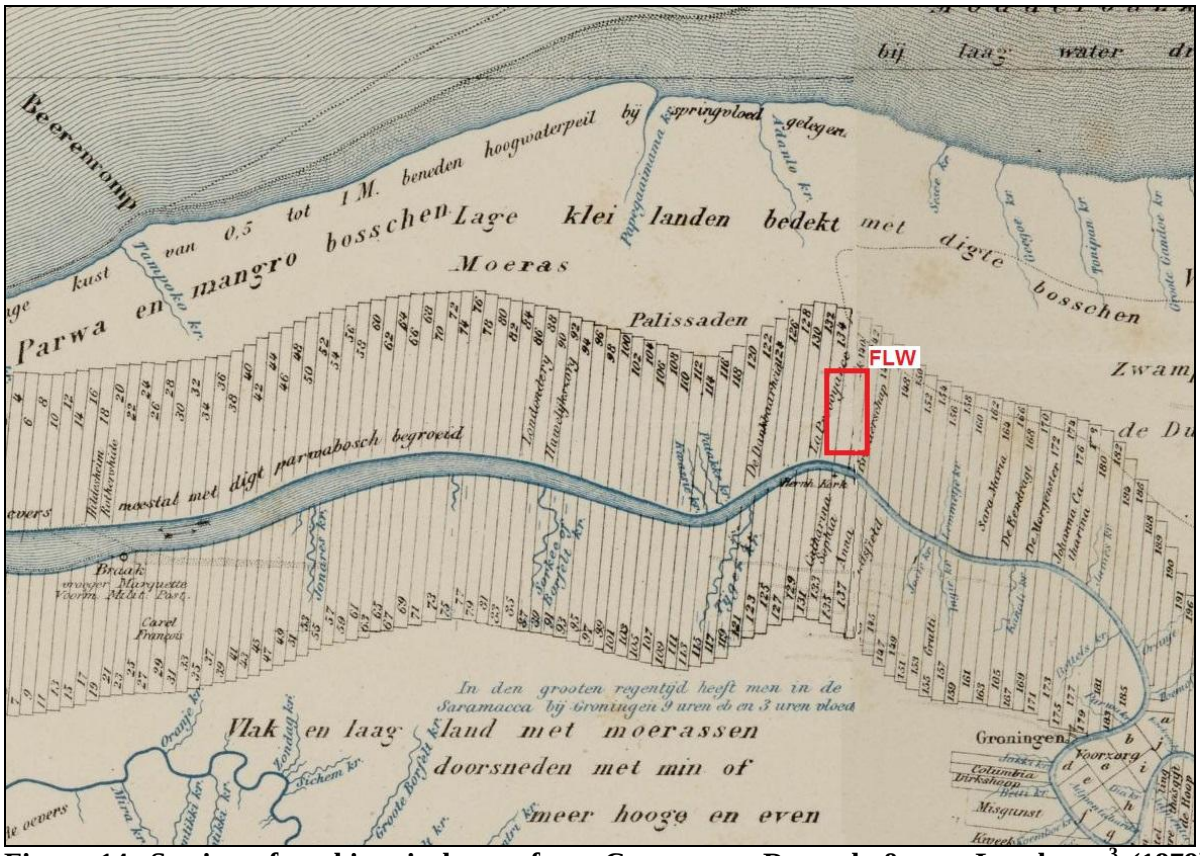

Figure 14: Section of an historical map from Cateau van Rosevelt & van Lansberge[3] (1879) showing North Saramacca and the study area (FL).

The parceling shown in Figure 14 is planned land development, but actually only little land was under cultivation at the time. This becomes clear on the map of Loth (Figure 15), which shows that the land under cultivation (light yellow) was limited to portions along the Saramacca River. The land along the river was protected against flooding from the river by the communication dam, while back dams protected against high swamp water levels.
It is likely that adequate openings were still present for swamp water to drain into the river and that existing creeks were kept up.

[3] Cateau van Rosevelt, J.F.A. & J.F.A.E. van Lansberge. 1879. Kaart van Suriname naar opmetingen gedaan in de jaren 1860-1879. Schaal 1: 200 000.

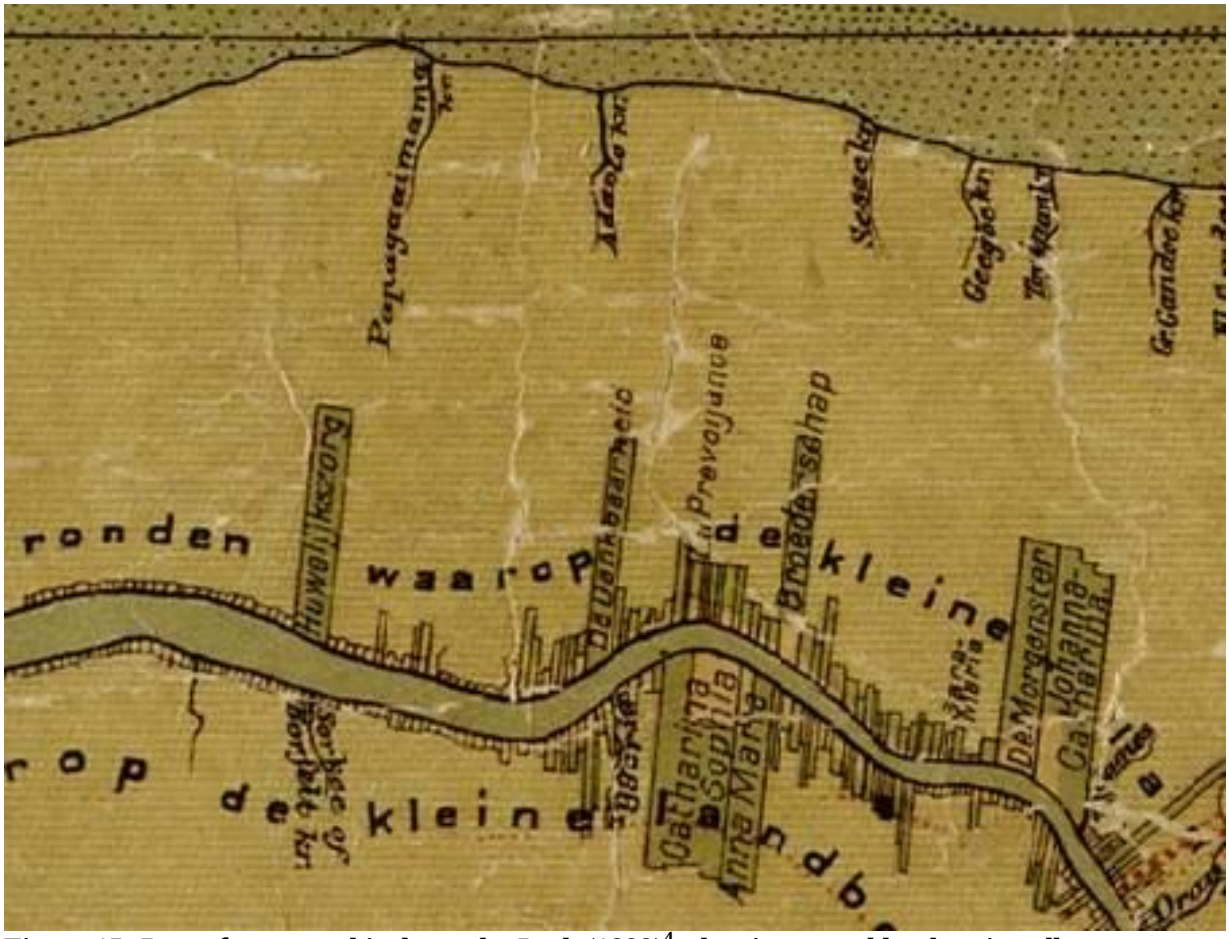

Figure 15: Part of topographical map by Loth (1899)[4], showing actual landuse in yellow.

Figure 16 presents the landuse in 1962. Landuse is then limited to a stretch of 2 km north of the river. Like today, the population is concentrated along the river, and like today, hardly any houses are found in the zone of the plantations 'Mijn Vermaak' en Broederschap'. These plantations are mostly covered with secondary forest.
In the remaining sections, small-scale rice cultivation is practiced on sawahs in the backswamps and some dry cropping and grassland is found on the slightly higher land closer to the river. But in the latter zone also much secondary growth is found, pointing to abandoned land.
From a hydrological point of view it is concluded that it is likely that at the time, sufficient space was present for swamp water to flow to the river. There was no situation of complete blockage of the path towards the river. Older persons from the Gangaram Pandayweg report that bridges were present in the zone of 'Mijn Vermaak' and 'Broederschap', allowing creeks[5] to discharge their water towards the river. With the plantations no longer active, swamp water will have been able to enter the plantations, from where the excess water was discharged by the creeks/canals.
From Figure 16 it can also be concluded that considerable extension of the agricultural area has occurred, while also the complete Tambaredjo oil polder was developed since the 1980s.

[4] Loth, W.L. 1899. Kaart van Suriname naar de opmetingen van J.F.A. Cateau van Rosevelt & J.F.A.E. van Lansberge, aangevuld met die van - en getekend door W.L. Loth, gouvernementale landmeter in Suriname; schaal 1: 500 000.
[5] Meant are probably the plantation canals.

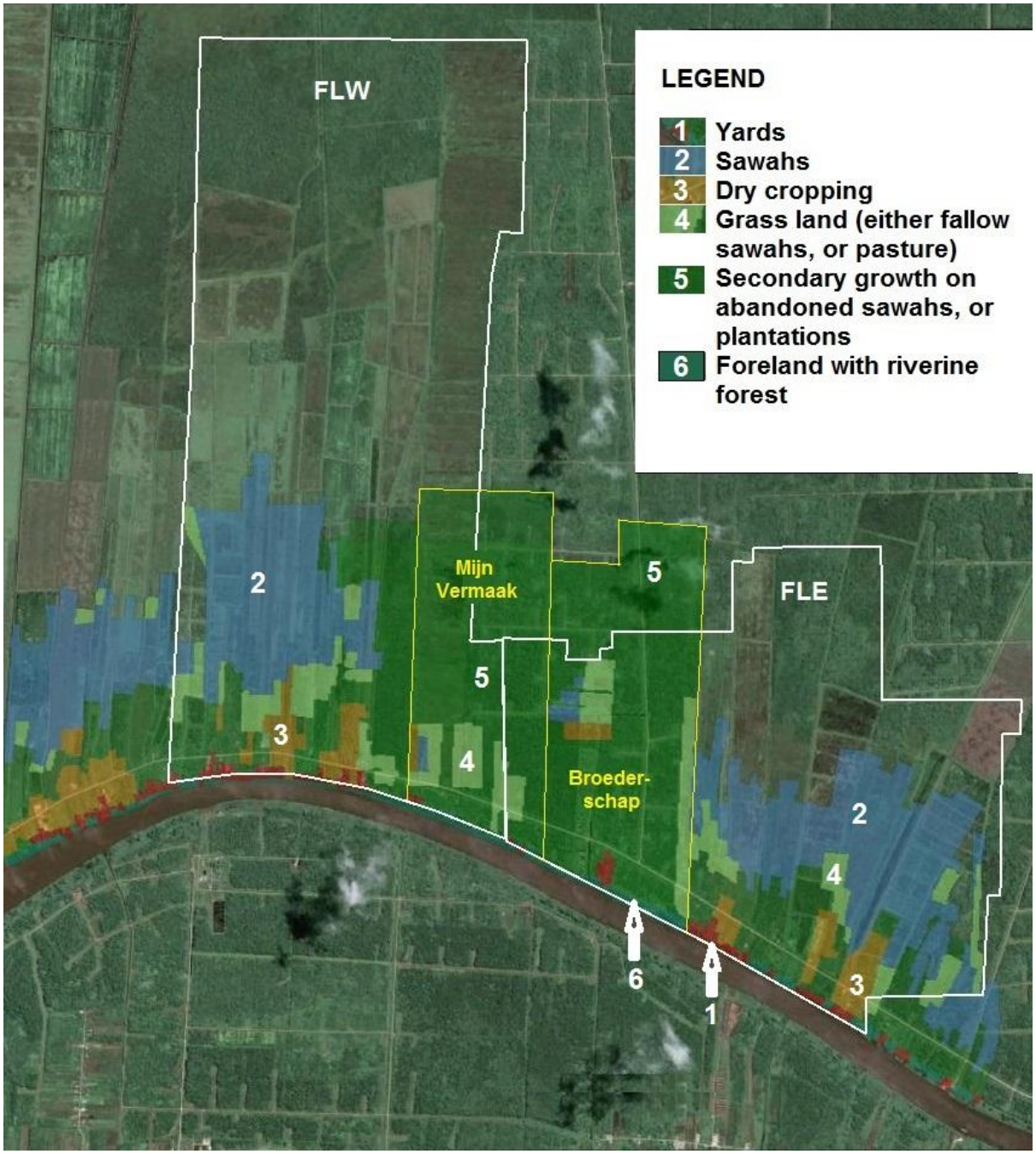

Figure 16: Landuse in 1962 (adapted from CBL 1962)

4.7.2 Current hydrology of the study area

The area is part of the coastal plain and low-lying and flat. Drainage is towards the Saramacca River flowing to the ocean whereas a part is drained directly to the ocean. Along the right bank of the Saramacca River, the Lareco Road is located at a distance of about 50 – 200 meter, running more or less parallel to the Saramacca River. Further inland farms border the grass swamp, which is also located in the study area. Here, dams exist to prevent inundation of the farms by water from the swamp. Some canal-dam systems of existing farms run south-north through the swamp and function mainly as a border to the farm. In one case (Poeran Canal) such a canal-dam system functions to collect water and swamp fish from the swamp. Due to the south-north orientation of above mentioned canal-dam systems, it is likely

that some obstruction occurs in the east-west water flow in the swamp. In this case the water is forced to flow to the north or it will be stagnated.

The current hydrological situation with the main catchments and schematical flow is shown in Figure 17.

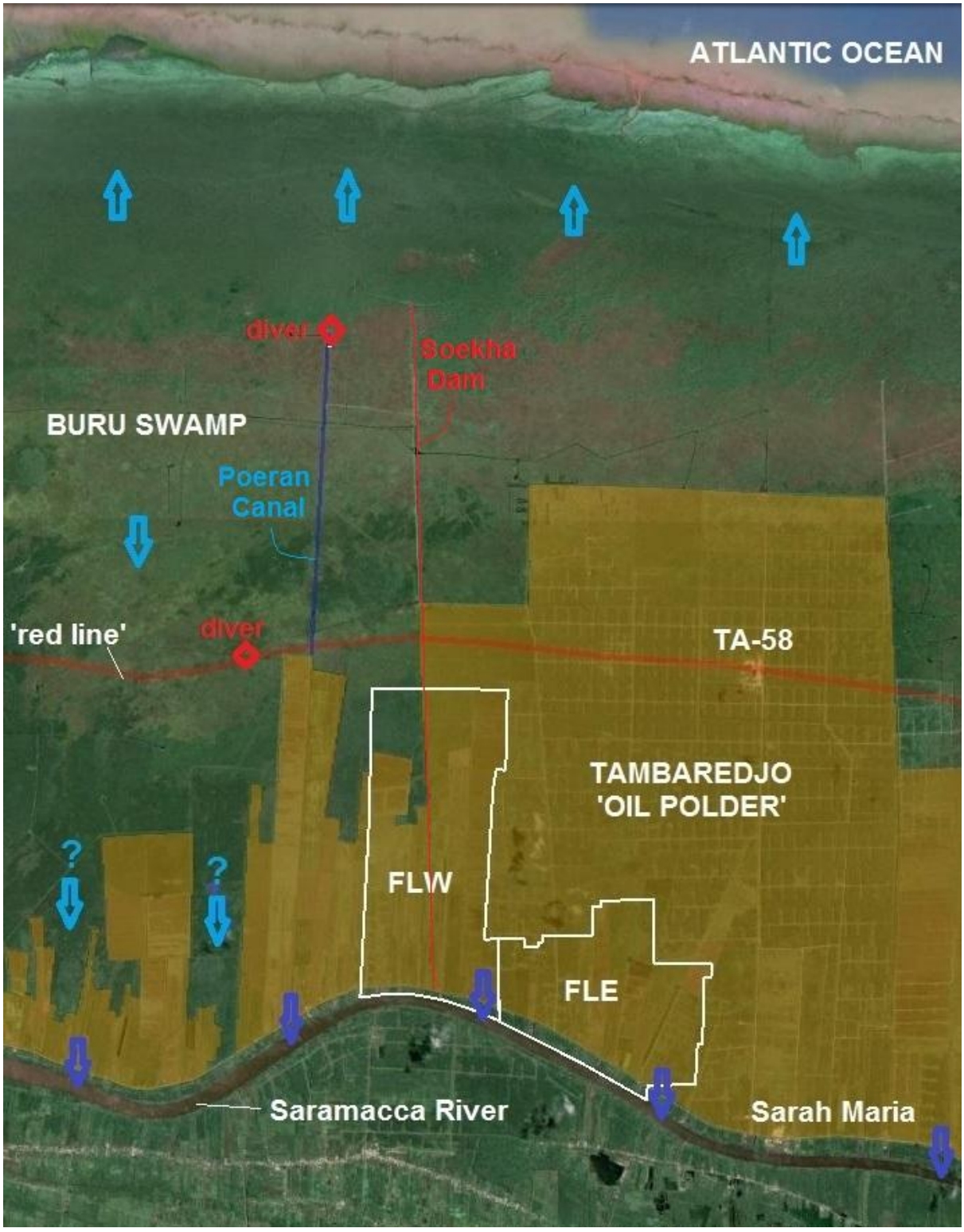

Figure 17: Hydrology of the wider study area and surroundings

Three relevant hydrological components are distinguished:

1. The swamp area (Buru Swamp) that drains towards the south and to the north. The swamp also provides most of the irrigation water for the rice farmers in the polder.
2. The polder area, an area that is completely surrounded by dams and that drains towards the Saramacca River
3. The Saramacca River that receives the drainage water from the polderland and the swamp; occasionally it also provides irrigation water for the rice farmers.

Below these three components will be further discussed. In between the polderland and the river is the so-called Foreland, that is partly protected by dams, but part is occasionally flooded by the river. The protected parts drain towards the river like the polderland.
The project area is predominantly located within the polderland and after the construction of the diversion dams in the north of the FLW area, the complete project area will be within the polderland.

4.7.2.1 The Buru Swamp

The swamp area to north of FLW forms part of the Buru Swamp.
An extensive description of the Buru Swamp was presented in Amatali (2009), to which study is referred for more detailed background information. Here only the essentials for the part relevant for the current study will be discussed.
The swamp part of study area is located south of the "red line" that forms the theoretical boundary between the Ocean and the Saramacca catchment area. From previous studies (Amatali 2009, NEC 2013) it has become clear that the watershed is usually located to the north of the 'red line', so also some excess water north of this line is draining towards the Saramacca River. The flow paths from the swamp to the river have not been identified, but most likely the water is flowing through a number of abandoned locations and its ditches and culverts to end up in the river.

In Figure 18 all available swamp water levels over the period November 2008 - November 2013 are presented for the two divers indicated in Figure 17.

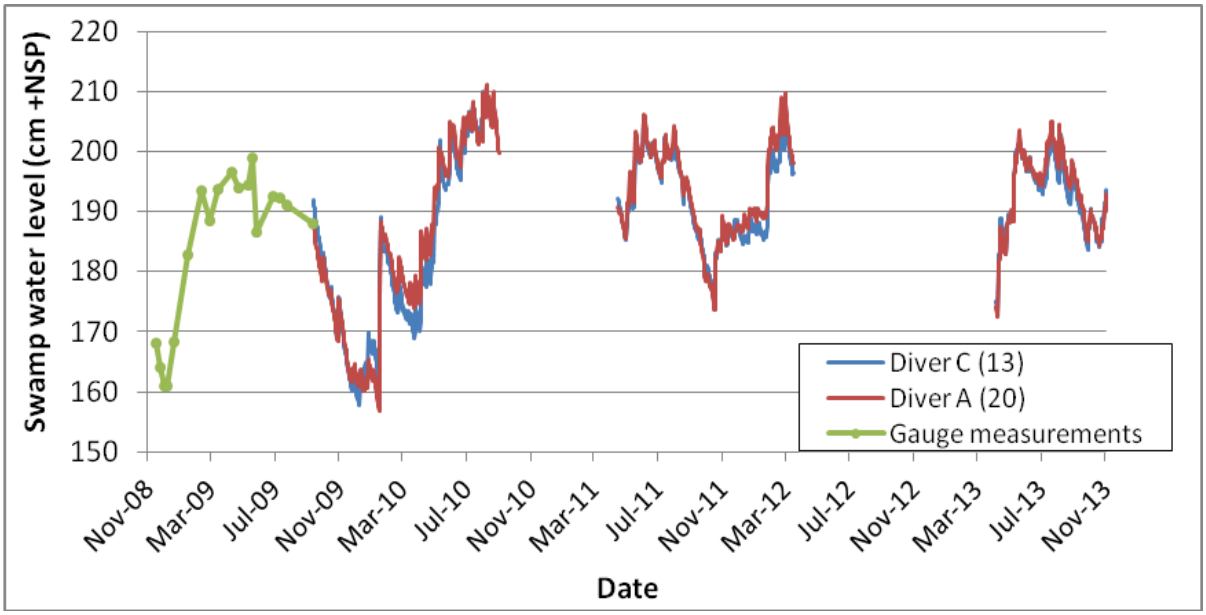

Figure 18: Water levels at locations 13 and 20 as read from divers (continuous recording) and gauges (infrequent readings).

With swamp bottom levels (the mineral clay surface) at 120-125 cm + NSP, the pattern in Figure 18 points to a water depth fluctuation between 35-40 and 85-90 cm within the measuring period. Highest swamp levels are normally encountered at the end of the Long Rainy Season and lowest at the end of the Long Dry Season.
Discharge of excess swamp water only occurs during high swamp levels. At lower levels water is only lost by evapotranspiration. Discharge is most rapid near the outlets and slow in swamp sections that are farthest away from outflow points. Apparently the swamp north of the FLW polder area is such a section, as dieback of shrubs and trees is occurring here. This dieback is only found to the west of the Soekha Dam (Figure 19). During a field trip in 2013 it was also found that the swamp level to the west of the Soekha Dam was clearly higher than to the east of this dam. Die-off is concentrated in the SE corner of the swamp to the west of the Soekha Dam (NEC 2013).

Figure 19: Aerial view of the swamp north of FLW with the Soekha Dam (looking to the east). The vegetation to the west of the Soekha Dam has clearly died off, while hardly any dieback is observed to the east of this dam.

The observations have led to the conclusion that over the years the gradually increasing swamp water levels in the Buru Swamp are primarily caused by the development of infrastructure for agriculture and industry (Tambaredjo 'oil polder') and the replacement, long ago, of some bridges by (smaller) culverts in and near the Broederschap road section. However, in addition to this, it was also made plausible that rainfall in the area has increased over the last 10-20 years, with exceptionally heavy and prolonged rainfall in the period that flooding of polderland occurred (NEC 2013).

Whatever cause, it seems clear that for the swamp section of the study area, the construction of the Soekha Dam - notwithstanding the presence of three culverts - has been virtually blocked the main outlet of swamp water from this section to the Saramacca River (via Broederschap). The water from this section now has to flow to another outlet point that is several kilometers away, so that lagging of drainage occurs during periods of a high swamp water level, with described consequences.
Excess water of the swamp section to the east of the Soekha Dam is drained through the Broederschap Canal to the Saramacca River, so that the swamp water levels in the rainy seasons here are always below those of the swamp to the west of the Dam.

The swamp to the north of FLW is the most important source of irrigation water for the rice fields of FLW. Figure 20 shows the rice polders in the northern FLW area. Irrigation water is taken in from the swamp to the north of these rice fields through a number of intake points. Three culverts (25 cm ø) below the Soekha Dam provide additional swamp water to the swamp east of the Soekha Dam.

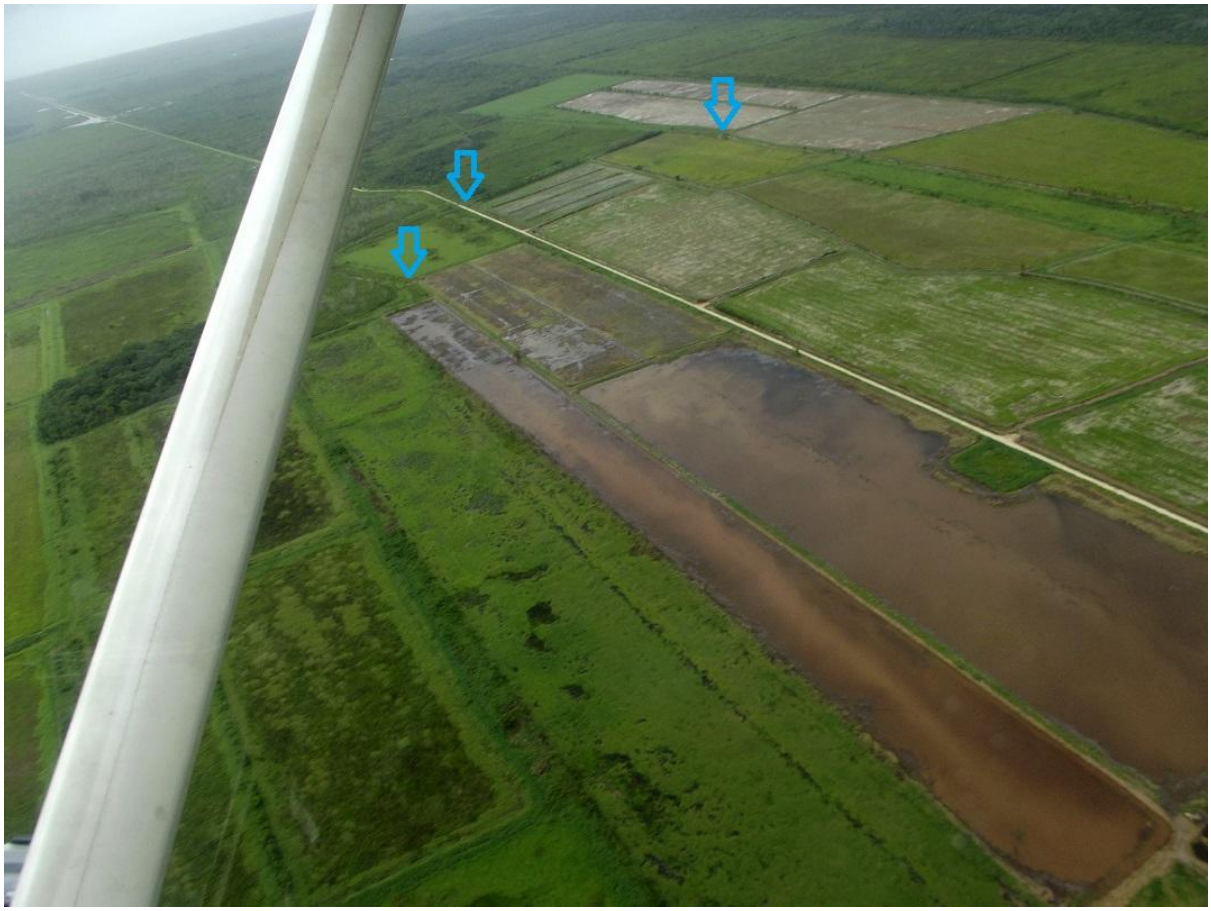

Figure 20: Rice fields of the FLW study area, with irrigation water intake points (blue arrows). The Soekha Dam crosses the area. Landing TNW of Staatsolie can be seen in the back.

4.7.2.2 The polderland

Most of the FL project area is designed for dryland cropping or cattle grazing, so that only drainage is required. Drainage of excess water from this area is done by means of a system of ditches and small canals that all discharge into the Saramacca River at low tide through lockable valve culverts ('klepkoker') that are found along the Gangaram Pandayweg. Each

parcel has its own drainage system and culvert(s). Also excess drainage water from the riceland in the northern FLW area is discharged into the Saramacca River through the same polder canals.
However, many farms in the area are abandoned and drainage infrastructure has fallen into disrepair. For some farms it is said that swamp water enters the terrain, or that river water is free to penetrate the land through open culverts. For other abandoned farms the culverts are blocked and excess water is no longer able to run off from the area (Figure 21).

Irrigation water is usually withdrawn from the swamp area in the north, but very occasionally water is taken from the Saramacca River in the south, provided water quality allows for this. The water should have less than 300 mg chloride/L in order to be suitable for irrigation of rice. According to the estimate of the resort coordinator of the ministry of agriculture, on average 75% of the irrigation water is withdrawn from the swamp and 25% from the river. However, the last couple of years have been relatively wet and swamp water levels have been sufficiently high, so that virtually all irrigation water currently is coming from the swamp.

Figure 21: The FLW area showing canals (blue arrows) that drain into the river through culverts. Also shown are two abandoned farm with dieback of vegetation.

The canal that is used for drainage is also used during the few occasions when irrigation water is taken in from the river at high tide.

Measurements in March 2012 indicate that the water level in the northern swamps was ~ 70-80 cm, which corresponds with a NSP level of ~ 1.8-1.9 m. The water level in the drainage canals and ditches was around 50 cm +NSP, but higher levels can be found at irrigation, when the level is raised in order to inundate the rice land whose surface is at ~ 1 meter +NSP.

Drainage from the polderland occurs at ebb tide when the river water level is as low as 50 cm below NSP. The highest flood water level reaches 2 m +NSP, but this level depends (apart from the sea level) also on the river discharge. When necessary polder drainage through the lockable culverts could be done twice a day for 3-5 hours during the low water period.

4.7.2.3 The Saramacca River

The Saramacca River is one of the main rivers in the country with a drainage area of about 9,000 sq km. The study area is situated at the right bank of the lower Saramacca River, which is affected by the tidal regime of the Atlantic Ocean. The semi-diurnal movement of the Atlantic seawater mainly determines the water level in the estuary of the river. During the dry seasons, especially during the Long Dry Season, seawater penetrates far into the river. In these periods the tidal effect reaches more than 240 km upstream (Amatali 1993).
The study area is about 41-46 from the mouth of the river into the Coppename River, and 67-71 km from the outfall[6].

The mean fresh water discharge at the outfall is estimated at about 225 cub m/sec. The maximum estimated freshwater discharge at the outfall is 1,260 cub m/sec. and the minimum is 4.6 cub m/sec. Peak flow occurs generally during the period May-June, while low flows are in October (Amatali 1993).

According to water level data collected during the period 1962-1965 at Sarah Maria (km 73, measured from the River mouth), the mean high water is 1.23 m NSP (Normal Suriname Level = approx. mean sea level) and the mean low water level is - 0.68 m. NSP (Hydraulic Research Division 1987). Highest water levels may reach a level of 1.90 m+NSP, while lowest water levels may be -0.90 m+NSP.

4.8 WATER QUALITY

Water quality in the study area will be discussed for the three different water environments as distinguished above. Water samples were taken during the first phase of the FLW project (2011 and 2012) and during the FLE project (May 2014). Additional data for the Buru Swamp were received from Staatsolie. As explained in Ch. 1.5.1, most sampling was done during the rainy seasons, so that water quality data on the dry season are still lacking. These will be provided in an addendum which will present all relevant data based on sampling in the 2014 long dry season (September-November).

4.8.1 The Buru Swamp

An extensive discussion about the water quality of the Buru Swamp is presented by Amatali (2009), which is referred to for detailed background information.
Summarizing, the following is concluded.

The water of the Tambaredjo NW area is mostly clear and slightly brownish. Turbidity has only been observed at locations where heavy transport has taken place by means of swamp carriers. No signs of other water pollution have been observed.

[6] An outfall is the discharge point, where it discharges into the sea.

The water of the southern Buru Swamp can be characterized as fresh (<100 mg Cl/l) to oligohalinous (100-1,000 mg Cl/l). Fresh water is found during the rainy season. Only the water of the southern swamp is suitable to be used as irrigation water for wetland rice.
The pH values indicate slightly acid conditions for the freshwater swamps, with lowest values for the high swampwood. In time, lowest values have been measured during the Long Dry Season, with values increasing as soon as rain started falling, but no changes have occurred in the swampwood environment.
The levels of Dissolved Oxygen are low to very low in swamps and medium in canals. Values vary considerably, depending upon sampling location, time of day and weather conditions.
Levels of phosphorus (as PO4), nitrate and ammonium are normal for the swamps of the Young Coastal Plain.
The frequent presence of insect-eating Bladderwort (Blaasjeskruid, *Utricularia foliosa*) in almost all of the airboat trails indicates a non-polluted (oligotrophic = poor in nutrients) aquatic environment (Teunissen, personal communication, 2009).

Water quality at the Calcutta oil field is slightly different from that of the Tambaredjo NW project area.
The water is often turbid due to airboat transport, with the highest turbidity in the main canal. Only very occasionally some minor oil pollution in the form of an oil film has been observed.
The salinity levels of the water of the Calcutta oil field appear to be slightly elevated when compared to the neighboring freshwater swamp. This increase is most pronounced at the inset of the rainy season and is lowering during the rainy season. After ~ 4 rainy months the levels in the oil field is comparable to those in the undisturbed freshwater swamp. Even though the salinity is increased the water is still very suitable for irrigation of rice (150 mg Cl/l) in the irrigation season, where 300 mg Cl/l is the threshold value.

There are no indications that other water quality parameters differ significantly from the undisturbed freshwater swamp, but there appears to be less Bladderwort (Blaasjeskruid, *Utricularia foliosa*). This lower presence is thought to be the result of increased turbidity, where clay and peat particles may clog the submerged insect-catching bladders.

Results of analysis of swamp water samples for the current study are summarized in Table 11. The complete data are presented in Appendix E.

Table 11: Water quality of surface water for the Swamp section of the FLW project area

Season	pH	EC (µS)	TSS (mg/ L)	Dissolved N (mg N/L)	Phos-phorus (mg P/L)	COD (mg/L)	DO %	Temp. degree C
Rainy (non turbid)	6.2	510	57	0.8	0.04	16	8	27.3
Rainy (turbid)	6.3	527	1674	1.6	0.04	18	18	27.7

Like indicated above, swamp water naturally is clear and dark brown. In the swamp to the north of the FLW area, however, locally slightly turbid to turbid water is found, in particular in Staatsolie airboat trails.
The pH in all swamp water samples is slightly acid. The Electrical Conductivity (EC) of the water in the swamp within and near the project area points to fresh water. Dissolved nitrogen of the swamp water is relatively high in all samples, while phosphorus is low. Dissolved Oxygen is low to very low. Higher oxygen saturation is found in flowing waters while the

lowest saturation is found in overgrown waters. The Chemical Oxygen Demand (COD) is low, pointing to the absence of organic pollution. No other visual signs of pollution (e.g. oil slicks) were observed during sampling.

A similar picture emerges from the monthly monitoring data for the freshwater section of the TNW oil field in the period July 2013 - March 2014.

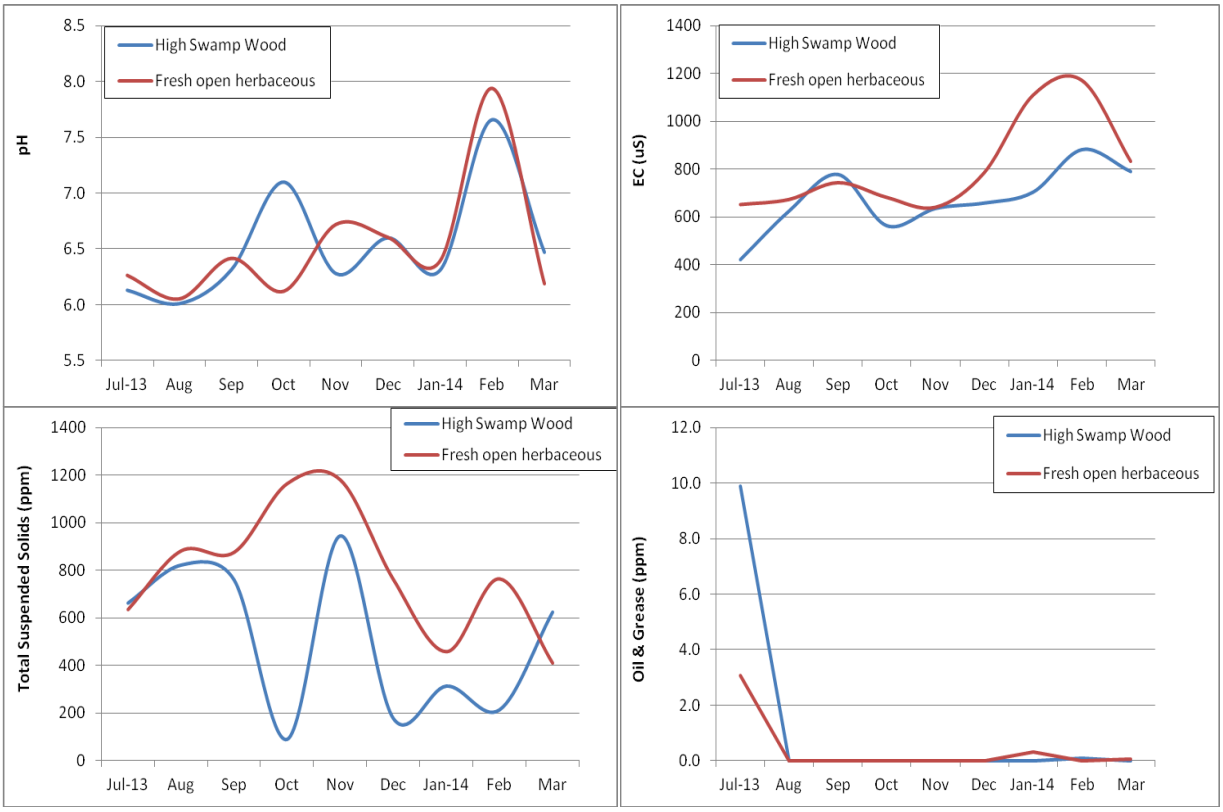

Figure 22: Monitoring results for the Tambaredjo NW oil field (July 2013- March 2014)

The pH is mostly in line with the data collected for this study, except for February 2014 (dry period; see also Electrical Conductivity (EC). Electrical Conductivity is slightly higher, except again in February 2014. Total Suspended Solids show similar ranges for the monitoring data and the current study data, with strong variation which is characteristic for the airboat and equipment trails of an active wetland operation.
Finally, only once high oil & grease was measured; for the remaining period levels are always close to zero.

Based on the above it is concluded that the surface waters in the swamp area near FLW do not show signs of significant pollution and that water quality is relatively good, except for the turbidity in active airboat trails and an incidental near exceedance[7] of the oil content.

4.8.2 Polder canals

Results of analysis of water samples from the FLW study are summarized in Table 12. The complete data set is presented in Appendix E.

[7] Measured was 9.9 ppm, while the guidelines indicate 10 ppm as threshold.

The results of the May 2014 sampling are presented in Table 13 and Table 14.

Table 12: Water quality of canals of the FLW project area (2011-2012)

Season	pH	EC (µS)	TSS (mg/ L)	Dissolved N (mg N/L)	Phos-phorus (mg P/L)	COD (mg/L)	DO %	Temp. degree C
Rainy	6.6	490	32	0.4	0.04	9	33	30.6
Dry	6.3	445	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.

Table 13: Water quality of canals of the FL project area (May 2014) and Staatsolie operations

Location #	pH	EC (uS)	Transparency (Secchi; cm)	Clarity/color	Temp. degree C
Debitewari (farm)	6.5	360	31	Almost clear/ brown	28.9
Broederschap (discharge abandoned plantation with oil production)	6.4	486	n.d.	Slightly turbid/ dark brown	28.3
Volharding/Yarah project (fallow land and some houses)	6.6	110	32	Almost clear/ brown	29.6
Kisoensing-West (discharge Sarah Maria and TA-58)	7.6	6940	43	Slightly turbid/ brownish green	28.3
Kisoensing-East (discharge Sarah Maria east)	6.5	534	n.d.	Clear/ dark brown	30.5

Table 14: Water quality laboratory parameters for canal samples of the wider FL project area (May 2014)

Location #	Total Suspended Solids (mg/L)	Turbidity NTU	Oil & Grease (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Phos-phorus (mg/L)	Chemical Oxygen Demand (mg/L)
Debitewari (farm)	56	86	5.9	3.94	0.23	24
Broederschap (abandoned plantation with oil production)	197	91	8.2	1.50	0.62	53
Yarah project (fallow land and some houses)	71	65	7.0	1.13	0.08	28
Kisoensing-West (discharge Sarah Maria incl. TA-58)	13	28	7.0	0.75	0.30	53
Kisoensing-East (discharge Sarah Maria)	81	138	10.5	1.88	1.01	68

The pH of all samples indicates slightly acid to neutral water, with highest pH at the Kisoensing-West Canal due to the high salinity.

The Electrical Conductivity (EC) of most canal samples is within the same range as those of the swamp, with values between 110 and 534 µS, and thus pointing to fresh to slightly oligohalinous water. Exceptions are the low EC of the 'Volharding' Canal that is caused by

the inflow of river water through an incompletely closed valve culvert (see EC of river water below), and the exceptionally high EC of the Kisoensing-West Canal (mesohalinous; slightly brackish). The latter is the result of the release of produced water at TA-58.

The 2011/2012 samples were taken in the La Prevoyance area, during the growing season of rice and turbidity of the water is low.
Especially during drainage of land with on-going land preparation, the water in the drainage canals may become turbid with solids that have been released during plowing, puddling and balking of the land. Later in the growing season, when the rice crop is growing, the drainage water becomes less turbid to clear.
The 2014 samples in the FLW area (Debitewari) were taken during the land preparation phase, but yet the water is almost clear with a rather low TSS of 56 mg/L, because apparently no water has yet been drained from the fields (see also Figure 20, taken on May 15, 2014).

The other canals of the May 2014 sampling have clear to slightly turbid water, as can be deduced from the visual observations Secchi values. Lowest TSS is measured in the Kisoensing-West canal; this could be attributed to the higher salinity, which makes particles settle more quickly. The Broederschap Canal has unexpectedly high TSS with slightly turbid water. There is no explanation for the source of this high TSS, as no excavation or other soil moving is taking place within the catchment of the canal. Probably part of the suspended solids comprise very fine organic particles, which could also explain the relatively high TSS of the water from the Kisoensing-East Canal, which was characterized as clear. Investigations that will be conducted as part of other monitoring studies could shed more light on this issue that was already identified during the Wageningen sugarcane monitoring program (Noordam 2010-2013).

Nutrients (nitrogen and phosphorus) are normal, when compared with e.g. the undisturbed canals of the Wageningen project (Noordam 2010-14). The latter waters have a typical range of 0.32-4.5 mg/L for Total Kjeldahl Nitrogen (TKN), and between 0.03-0.72 mg/L for Total Phosphorus (TP). The data for the current project are within these ranges, except for the Sarah Maria East Canal that has a slightly increased level of P (1.01 mg/L). However, there are no signs of eutrophication in this canal and the high P is probably to be attributed to the high presence of water plants in this canal.
The Chemical Oxygen Demand (COD) in the sampled canals is in almost exactly the same range as the undisturbed Wageningen canals. The latter typically vary between 31 and 64 mg/L, while the COD of the Saramacca canals range between 28 and 68 mg/L. The generally higher COD of canals compared with the river should be attributed to the presence of more of naturally occurring inorganic or organic compounds, rather than to water pollution.

Oil & Grease levels are mostly below the level of 10 mg/L, which Staatsolie keeps as its limit of oil (& grease) pollution. However, the presence of oil & grease in the samples is unexpected, because no trace of such compounds (e.g. like an oil sheen) was detected while sampling.
The organic solvents that are used in this method have the ability to dissolve not only oil and grease but also other organic substances. Any filterable solvent-soluble substances that are extracted and recovered are defined as oil and grease (APHA et al. 1999). It is known that such organic substances are present in the swamp water, which could be the cause of the elevated O&G levels. Also in the Coronie Swamp, such elevated levels were detected, probably caused by a similar interference.

Summarizing it is concluded that during the rainy season, the majority of canals in the wider study area are slightly turbid, (dark) brown, slightly acid to neutral, fresh, with low to moderate nutrient levels and that they are apparently unpolluted. An exception is formed by the Kisoensing-West Canal which is slightly brackish due to the release of produced water at TA-58.
It is known that in other periods of the year the water become more saline in the dry season, and that turbidity of canals in rice polders will increase when water from recently plowed and puddled land is released into the drainage system.

4.8.3 The Saramacca River

Some historical data for the Saramacca River are presented in Hydraulic Research Division (1987). It is mentioned that the silt content at Uitkijk (km 104), upstream of Sarah Maria (km 73), varies between 0.03 - 0.80 g/l, whilst at Huwelijkszorg (km 53) it varies between 0.03 - 1.30 g/l.
Considering the limit of 300 mg Cl/l (limit of salt intrusion), equivalent to 500 mg salt/l or an approximate EC of 1,000 µS, this limit is located near km 37, about 6 km down-stream of Carl Francois during peak flows, while during low flows it is located near km 89, about 5 km upstream of Groningen. The study area is situated in between these two locations at km 67-71 (numbering from WLA). According to this information, the river water of the dry season (low flows) at the study area is not suitable for irrigation of wetland rice (EC should be below ~1000 µS for that purpose), but water can be taken in during the rainy season (high flow).

Results of analysis of water samples for the FLW study are summarized in Table 15. The complete data are presented in Appendix E.
The results of the May 2014 sampling for the wider Farmersland area, including FLE, are presented in Table 16 and Table 17.

Table 15: Water quality of the Saramacca River near the FLW project area (2011-2012)

Environ-ment	Season	pH	EC (µS)	TSS (mg/ L)	Dissolved N (mg N/L)	Phos-phorus (mg P/L)	COD (mg/L)	DO %	Temp. degree C
River	Rainy	6.5	74		2.2	0.01		38	27.5
River	Dry	6.5	1772						

Table 16: Water quality of the Saramacca River between Monkshoop and Huwelijkszorg (May 2014)

Location #	pH	EC (uS)	Transparency (Secchi; cm)	Clarity/color	Temp. degree C
Bridge Monkshoop	6.0	28	31	Almost clear/ brown	28.7
Jetty SORT near Sarah Maria	7.5	34	43	Almost clear/ brown	29.0
Jetty Huwelijkszorg	6.8	51	27	Slightly turbid/ brown	28.9

Table 17: Water quality laboratory parameters of the Saramacca River between Monkshoop and Huwelijkszorg (May 2014)

Location #	Total Suspended Solids (mg/L)	Turbidity (NTU)	Oil & Grease (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Phosphorus (mg/L)	Chemical Oxygen Demand (mg/L)
Bridge Monkshoop	24	54	2.5	0.75	0.08	11
Jetty SORT near Sarah Maria	31	46	6.9	1.13	0.28	47
Jetty Huwelijkszorg	153	47	5.5	1.50	0.17	9

The pH of all samples indicates slightly acid to neutral water, with highest pH at the jetty of the SORT team (near Sarah Maria).

The Electrical Conductivity (EC) of the river water in the rainy season is generally very low (10-74 µS), pointing to fresh water.
A higher EC is recorded in the dry season (Table 15), when water is slightly brackish, due to the upriver intrusion of the salt limit. This is in line with the general picture. It is noted that the measurements in 2011 and 2012 (Table 15) were made at high tide.

The river has almost clear to slightly turbid water, as can also be deduced from the Secchi and TSS values. The influence of incoming seawater can be deduced from the higher TSS at Huwelijkszorg.

Nutrients (nitrogen and phosphorus) of the river water are low, when compared with e.g. the undisturbed canals of the Wageningen project (Noordam 2010-14). The latter waters have a typical range of 0.32-4.5 mg/L for Total Kjeldahl Nitrogen (TKN), and between 0.03-0.72 mg/L for Total Phosphorus (TP). The data for the current project are within the lower ranges. There are no signs of eutrophication in the sampled river water, which are rather without aquatic plants or algae.
The Chemical Oxygen Demand (COD) in the sampled river water is on lower than those in the undisturbed Wageningen canals. The latter typically vary between 31 and 64 mg/L, while the COD in the river are between 9 and 47 mg/L. These low COD can be attributed to the low salt content (low EC) and the low quantity of organic compounds.

Oil & Grease levels are well below the level of 10 mg/L, which Staatsolie keeps as its limit of oil (& grease) pollution. However, the presence of oil & grease in the samples is unexpected, because no trace of such compounds (e.g. like an oil sheen) was detected while sampling.
The organic solvents that are used in this method have the ability to dissolve not only oil and grease but also other organic substances. Any filterable solvent-soluble substances that are extracted and recovered are defined as oil and grease (APHA et al. 1999). It is known that such organic substances are present in the swamp water, which could be the cause of the elevated O&G levels. Also elsewhere in the coastal plain (e.g. Coronie Swamp), such elevated levels were detected, probably caused by a similar interference.

Summarizing it is concluded that in the rainy season the river water near the study area is slightly turbid, brown, slightly acid to neutral, fresh, with low nutrient levels and a low COD, and that it is apparently unpolluted. In the dry season, with low flows, the river water will become more saline and increasingly turbid as a result of the intrusion of the sea.

4.9 VEGETATION AND FAUNA

In the past the natural swamp and marsh ecosystems in most of the study area was cleared to make way for polder land. Considerable part of the land was again abandoned and secondary vegetation has developed. Secondary marsh forest dominated by Mira Udu (*Triplaris surinamensis*) has developed on land that was abandoned a long time, including at the Broederschap and a number of other parcels in the area. At abandoned plantations, sometimes exotic and formerly cultivated trees such as *Terminalia catappa (*Almond*) Cocos nucifera* (Coconut palm), *Psidium gujave* (Guava) and *Roystonia regia* (Royal Palm) are encountered.
More recent secondary vegetation (less than 10 years abandoned) comprises shrubs and bushes and small trees. Temporary fallow land has low vegetation with grasses, rushes and herbs.

Only to the north of FLW some patches of the original swamp vegetation is still present.
Open swamp and swampwood are encountered in this swamp area.
The Open Swamp is characterized as **Herbaceous freshwater swamp** with scattered shrubs and bushes. This freshwater swamp is richer in species than brackish herbaceous swamp. Several species may dominate.
The Swampwood is low to high. **Low swampwood** is characterized by Swamp Plumb (SD: Zwamppruim; SC: *Chrysobalanus icaco*) and Swamp Soursop (SD: Zwampzuurzak; SC: *Annona glabra*), while **High swampwood is** dominated by Swamp Cork Wood (ST: Watrabebe; SC *Pterocarpus officinalis*) and White Cedar (ST: Swampu-panta; SC: *Tabebuia insignis*).
Also this part is man-affected. For instance, the swampwood to the west of the Soekha Dam shows serious dieback of shrubs and low trees (Figure 19).
Along the river, patches of riverine forest are found, alternating with yards. Because tidal influence is still perceived, Black and/or Red mangrove (*Avicennia germinans and Rhizophora sp.*) forest is met, mixed with ‘pina‘ palms (*Euterpe oleracea*). Part of this forest is again man-affected.
The vegetation distribution is shown in Figure 23.

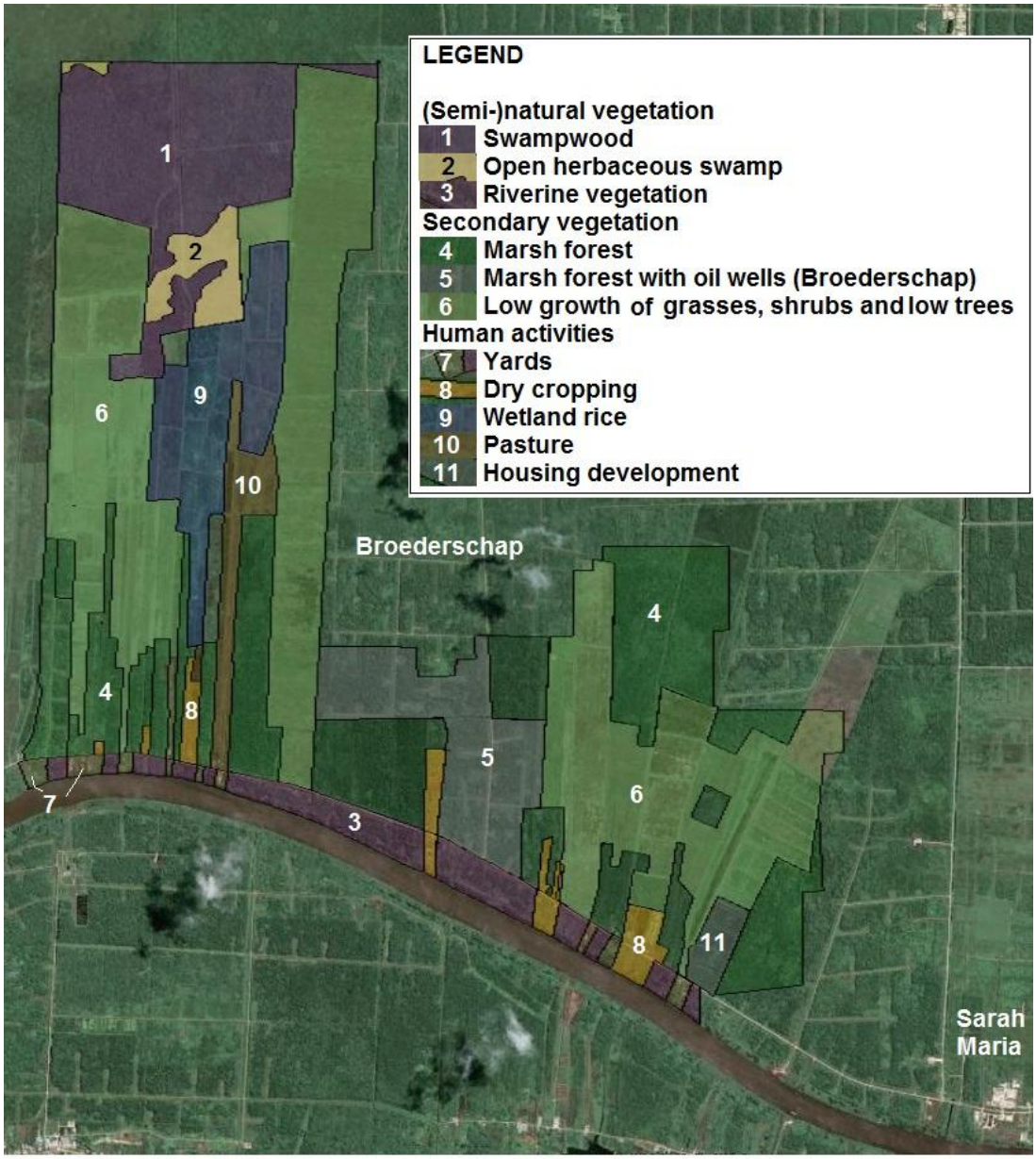

Figure 23: Landuse map of the FL area, also showing the vegetation.

Wildlife will in particular be present in the higher secondary vegetation. Given the relatively small and scattered character of these habitats and the human presence in the area, it is to be expected that total number and diversity of wildlife will be low when compared to similar, more remote, natural ecosystems elsewhere in Suriname. Endangered, threatened, or vulnerable animal or plant species are normally not expected in the project area.
However, recently it was reported in a newspaper (Times March 26) that two 'tigers' (*Jaguar, Panthera onca*) have been seen at the Gangaram Pandayweg. These species is near-threatened according to the IUCN Redlist. 'Tigers' are however, rather common visitors in rural areas, where they area searching for small animals. Often they are hunted down, notwithstanding their protection status.

It should be noted that in Suriname there is not necessarily a considerable threat to the survival of this species and some other protected species that occur in the coastal plain. In contrast, most of meant species face only limited threats in Suriname and neighboring Guiana Shield territories, fundamentally because of low overall human population size. However, in

the coastal zone of Suriname, especially in areas that are converted and have high human population densities, there species are under some pressure, especially the Brazilian Tapir and the Guiana Spider Monkey, which are species that are hunted.

Overall it can be stated that the study area is not sensitive with regard to ecosystems and animal species.

4.10 THE SOCIAL ENVIRONMENT

For the description of the socio-economic environment is referred to Appendix F (Social Solutions 2014), which is part of this ESIA.
This section also includes the public consultation up till now.

5 (POTENTIAL) IMPACTS AND PROPOSED MITIGATION MEASURES

5.1 INTRODUCTION

In this chapter, the actual and potential impacts of the proposed activity and their mitigation measures will be discussed.

The applied methodology is explained in $ 1.5.2.

Mitigation measures are presented for all significant (major or moderate) impacts. In addition to this, recommendations are given for minor impacts. In below discussion of the impacts only the analysis for major, moderate and minor impacts have been included in tables. For negligible impacts, the breakdown has been left out.

5.2 AIR QUALITY

5.2.1 Key considerations

It is expected that the ambient air of the Farmersland is currently almost devoid of any pollution from manmade sources, except for dust generation from the Gangaram Pandayweg. An impact will only occur where receptors are sufficiently close.

Air emissions can broadly be classified into gaseous and particulate emissions. Most of the particulate emissions are due to “fugitive” sources. Within the project area, atmospheric dust arises during dry periods as a result of traffic along the unpaved Gangaram Pandayweg. The latter is a general problem for unpaved roads, and in practice mitigation measures can only be applied for project activities.

Gaseous emissions would mainly originate from vehicle and equipment exhausts and mostly during the construction phase and far less during the production phase. Most vehicles and equipment utilize diesel as fuel. All these sources are mobile and they will be active in different locations of the project area. Only the equipment at the clay borrow location will remain at the same spot during the project.
Above emissions normally occur during working days at working hours (7.30-15.30h; in dry periods till 17.30h). Only drilling is a 24/7 activity. The overall level of activities is moderate.

During drilling exhaust gasses from drilling-related equipment will be released for a short (7-10 days for vertical drilling) to moderate (up to 6 weeks for deviated drilling).
During the production phase the activities will be limited to inspection, maintenance and monitoring, with most of the time only 4WD transport. Trucks and other equipment will only be incidentally employed. The overall level of activities during this phase is low.

5.2.2 Sources of impacts

Table 18 provides a summary of the identified air emission sources for the proposed production development.

Table 18: Source activity and identification

Activity	Identification of Sources
Transportation; exhaust emissions	Trucks and 4W cars
Transportation; dust	Trucks and 4W cars, water tankers (2)
Construction: exhaust emissions	Excavator (5), dragline, tractor (7), 15-ton trucks (15), wheel backhoe (1), tractor grader (2)
Operation phase: Drilling	Drilling equipment and associated equipment.
Operation phase: Production	Mainly 4WD and occasional trucks and equipment

The principal emissions from vehicles and equipment are: Nitrogen oxides (NOx), Carbon monoxide (CO), Sulphur dioxide (SO_2), Diesel particulates and Volatile Organic Compounds (VOC).

The construction activities will take place during road and platform building.
For the FLW project area all drilling locations (platforms) are planned at a distance of at least 750 meter from the Gangaram Pandayweg and nearest houses (Figure 24).

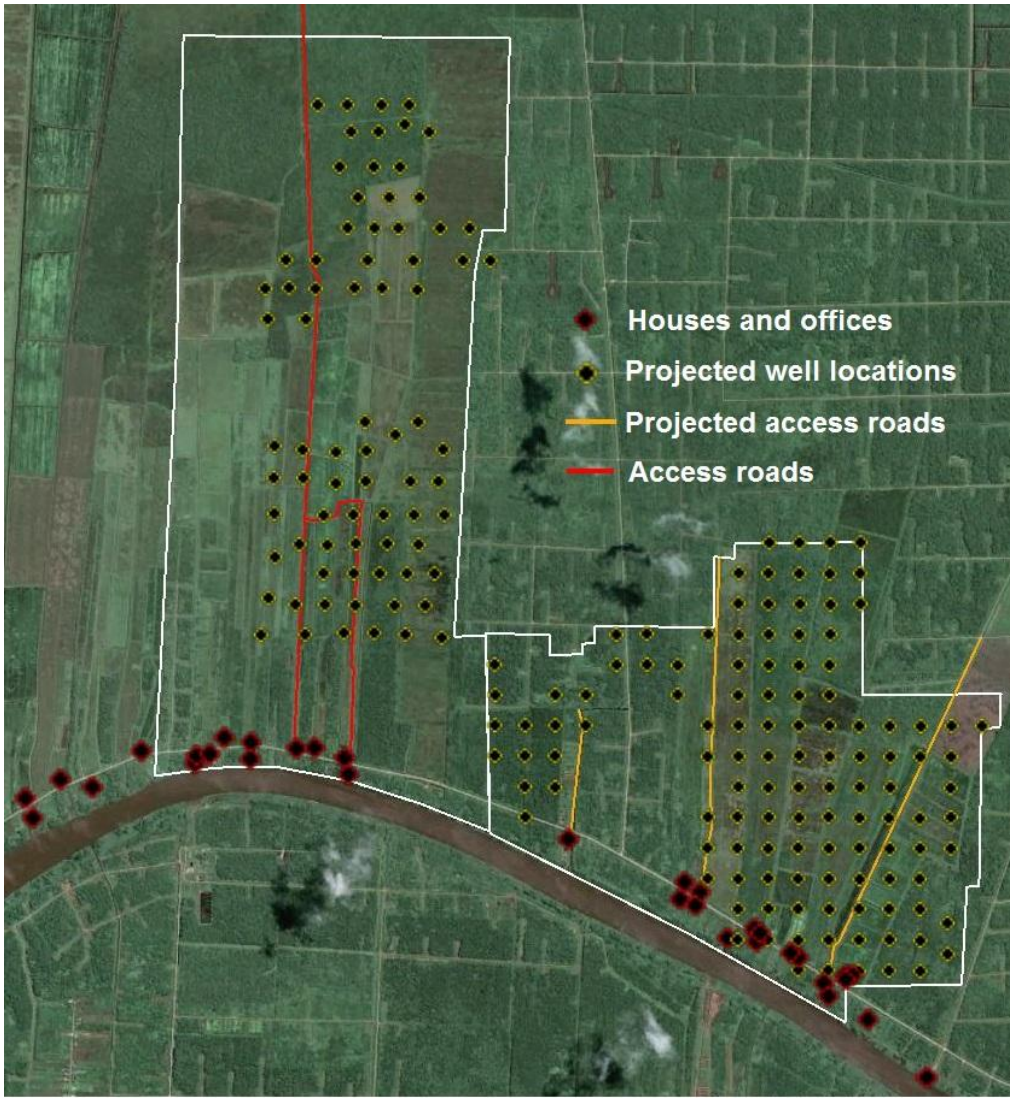

Figure 24: Project activities and local residents

For the FLE project area about 10 projected well locations are found within 250 meter from the Gangaram Pandayweg, in sections where relatively much houses are found.
For access roads, the distance to nearest houses is close at the junction with the Gangaram Pandayweg. Away from the Gangaram Pandayweg, forest or shrub vegetation is present along most of the routes, forming a screen between the houses and the activities.
Road construction activities closest to a single individual house will only take place for a week at most.

During the full construction period, trucks and other traffic and equipment will pass along the Gangaram Pandayweg and the access roads. This will be a daily activity for a period of several weeks along each road, with a total of up to 90 trucks passing every working day along the Gangaram Pandayweg.
In particular dust emissions from the Gangaram Pandayweg may become a problem in the dry period. Trucks with clay and sand for the construction of platforms will follow the Gangaram Pandayweg towards the access roads affecting all receptors along these sections. In most of the remaining project area, virtually no receptors are present.

5.2.3 Impact assessment

Impact AQ1: Impaired human health or nuisance caused by poor air quality during construction

The assessment of the impacts of air emissions from activities in the Farmersland area has been made qualitatively taking into account below considerations.

1. Existing ambient conditions indicate very low levels of pollution, except for regular dust emissions.
2. There will be relatively few emission sources, with relatively low emissions.
3. Emission is spread over a large area (area source).
4. Most emission is from mobile sources and thus temporarily.
5. Most of the project will only last for a short period for a certain location (2-3 weeks).
6. There is already an existing air quality impact from traffic along the Gangaram Pandayweg.

The impact of emissions will be limited to the Gangaram Pandayweg and the first 250 meter (broad estimate) of the access roads, where all permanent receptors are located. Beyond the roads, impacts could arise from the construction of drilling or facility platforms, and from drilling within a distance of 250 meter (again broad estimate) from nearest houses.
On working days, project trucks and other vehicles will be intermittently passing along the indicated road sections for a period of [no.] months. In addition to exhaust emissions dust may be generated along the roads.

During drilling at a certain location exhaust fumes will be generated. The impact from this activity is considered **negligible**, being of low intensity, medium to short-lived and localized.
The potential impact of exhaust fumes and dust from passing traffic to nearby receptors is considered to be **moderate,** being of medium intensity, medium-term and localized. Mitigation measures are presented to reduce the impact to negligible.

Table 19: Significance of impaired human health or nuisance caused by poor air quality

	Intensity	*Duration*	*Scale*	*Severity*	*Probability*	*Significance*	*Status*
Without mitigation	Medium	Medium-term	Small	Medium	High	**MODERATE**	neg
Proposed mitigation measures: • Regularly maintain engines of vehicles and equipment. • Operate and maintain exhaust systems and engines in accordance with the manufacturer's specifications. • Use preventative maintenance and repair programs. • In dry periods: maintain a low speed. • In dry periods: spray the road near houses with water; keep the road as moist as feasible. • In dry periods: keep the sand moist, such that it is not blown from the trucks. • Require above also from Contractors.							
With mitigation	Low	Short-term	Small	Low	High	**NEGLIGIBLE**	neg

5.3 NOISE

5.3.1 Key considerations

Existing noise levels within the farmland area are typical of remote areas, where the natural sounds dominate the noise climate.
Along the Gangaram Pandayweg traffic is passing, including trucks, but traffic intensity is generally low. The busiest hours are in the early morning and in the late afternoon, when Staatsolie workers from Huwelijkszorg pass by.

In the project area only a number of houses with receptors is present and these receptors could be affected by intermittently elevated ambient noise levels due to the Farmersland construction and operation activities.
During construction, noise levels will only be elevated on working days and during working hours and the noise will not be continuous. Drilling will be a continuous operation, but for vertical drilling it will only last for 7-10 days at a certain location. For deviated drilling it will last longer; depending upon the number of connected wells, 4-6 times as long as vertical drilling.
All receptors live along the Gangaram Pandayweg and the noise of the construction and drilling activities will only be heard by receptors in the sections that are populated. Because noise levels will drop till near background levels within 100-300 meter distance (depending upon the vegetation coverage) a maximum distance of 300 meter has been taken for a noise impact to be experienced. Within this range the noise level could pose some degree of nuisance to receptors.
Nighttime noise will be more of a nuisance than daytime noise, because the background levels are generally lower at night and elevated nighttime noise events are much lower or absent.

Drilling noise has been measured during active drilling in the Josikreek area (Noordam 2012). The results are presented in Table 20 together with data that were collected in the

Tambaredjo NW area under conditions that are essentially similar those for the current project.

Table 20: Approximated required distance (m) from main engine at drilling site to meet noise level

Source	Distance m			
	70 dB(A)	**60 dB(A)**	**55 dB(A)**	**50 dB(A)**
Noordam 2012	60	120	190	290
Jabez rig Tambaredjo NW (Tan 2009)	65	80	150	260
Mean for two studies	**62**	**100**	**170**	**285**

A minimum distance to the closest house of 100 meter was selected, which also takes into account the safety requirements. Regarding noise, this means that during drilling the noise standards for residential areas are exceeded. During the drilling period of 7-10 days, nearby receptors could be exposed to moderately increased noise levels. For deviated drilling, which will cover a much longer period, a distance of 285 meter will be recommended.

5.3.2 Sources of impact

Direct impacts on noise levels in the FL project area are likely to result from the project activities, summarized in Table 21:

Table 21: Sources of direct impacts of Farmersland production development on ambient noise levels

Activity	Identification of potential sources
Road and platform construction and lay-out op pipelines and electricity grid - on-site	Excavators, backhoe, tractors and trucks; general construction noise
Transportation during construction	Trucks, 4WD pick-ups, tractors with bulkwagen, water tanker
Drilling - on-site	Drilling equipment, generator
Transportation during drilling	Rig, trucks, bus, pick-ups during all project phases
Transportation during production	4WD pick-ups mostly, incidentally trucks
Decommissioning of site materials, installations and equipment - on-site	Excavators and trucks, other equipment, general construction noise

5.3.3 Impact assessment

Impact N1: Noise impacts during construction and decommissioning

Most construction and decommissioning activities will take place away from the Gangaram Pandayweg where all receptors are found, so the main impact will be from passing project traffic. The potential impact of noise during above project phases is therefore considered **negligible**, because the intensity is low (some nuisance), the duration per event is short and the scale small. Moreover, all receptors are situated along the Gangaram Pandayweg, where existing traffic already generates elevated noise levels.

Impact N2: Noise impacts during drilling

Noise impacts will be experienced at projected locations that are close to existing houses and planned houses, which is the case in the FLE project area. In a number of cases, projected well locations are within 100 meter from houses, while it is to be expected that the number of houses will increase, in particular at the Yarah housing development project. At some of these locations the noise will be attenuated by the presence of vegetation.
The elevated noise levels can be characterized as a nuisance and the potential impact is considered **minor** for vertical drilling, being of medium intensity, short-lived and at a local scale, and **moderate** for deviated drilling, because the period is of medium length (Table 22). Mitigation measures are proposed for vertical and for deviated drilling, considering that drilling will also be undertaken during night-hours. At larger distances from receptors, all noise impacts from drilling will become negligible.

Table 22: Significance of noise impacts from deviated drilling to human receptors (between brackets: vertical drilling)

	Intensity	***Duration***	***Scale***	***Severity***	***Probability***	***Significance***	***Status***
Without mitigation	Medium	Medium (short)-term	Small	Medium (Low)	High	**MODERATE (MINOR)**	neg
Proposed mitigation measures: • See maintenance measures for air quality. • If feasible: apply deviated drilling and select a drilling location that is at least 285 meter away from the nearest house. • In case vertical drilling is done: Keep a minimum distance of 100 meter between the drilling rig and the nearest dwelling. • Truck and other heavy transport should only be operational during daytime. •							
With mitigation	Low	Medium (Short)-term	Small	Low (Negligible)	High	**MINOR (NEGLIGIBLE)**	neg

5.4 SURFACE WATER RESOURCES

5.4.1 Key considerations

The waterways in the farmland of the FL project area are predominantly man-made. As part of the project, also the swamp section of FLW will be reclaimed by the construction of two diversion dams. So ultimately all of the FL production development will be conducted as dryland operations within a polder environment, with drainage of excess water towards the Saramacca River. Within the polder area also some other actors are present, who cultivate rice and dry crops, and who keep cattle. Also these actors make use of the water management system. The farm water management systems comprise field trenches and ditches, canals and lockable culverts below dams and roads. The location of the culverts is known to the farmer. Part of the system has a dual function, meaning that some waterways can be used for irrigation as well as for drainage. Only the farmer is aware about how to operate this system.

Irrigation water for the cultivation of paddy rice in the FLW area is usually withdrawn from the swamp area to the north.

Interruption or disturbance of water ways, blockage of inlet locations or water contamination could have serious impacts for the agricultural activities in the area.

5.4.2 Sources of impacts

Impacts on the surface water resources are likely to result from a number of project activities

Table 23: Sources of impacts to surface water sources

Activity/component/event	Identification of potential sources
Construction of diversion dams	Blockage of irrigation water supply
Road construction and construction of drilling and facility platforms	Blockage or reduction of existing water flows, either directly or through removal of or damage to culverts; or when placement of culverts at critical locations is omitted.
Drilling (operation)	Oil and fuel spills and leakages, and release of brine into the drainage system – impact to water quality
Transportation (construction and drilling-operation)	Overturning of truck with fuel, chemical supplies, and release of content to surface water (in particular during operation: drilling) – impact to water quality
Production (operation)	Oil and fuel spills and leakages – impact to water quality
All project phases	Collapse or clogging of installed culverts results in blockage of water flow. Stormwater runoff - impact to water quality during all project phases.

5.4.3 Impact assessment

Impact WR1: Blockage of irrigation water supply in FLW

As said, the rice farmers depend for 75% on the water that is supplied by the Buru Swamp. The remainder of the time they withdraw their irrigation water from the Saramacca River. This river supply is, however, not reliable due to the intrusion of saline water in the dry season.
The construction of the diversion dam will cut off the direct access of the existing paddy rice area, as well as the potential direct access (no paddy cultivation at this moment; potential paddy rice land indicated in orange in Figure 25; question mark placed because actual area is not exactly known) to swamp water for farms to the west of the current paddy rice area.

This is shown in Figure 25. The actual extent of the potential area is not known, but the land is suitable for paddy rice cultivation.
If the source of irrigation water supply from the swamp is cut off, this will result in an impact of **high** significance, because the intensity and scale are medium, while it will be long-term. The farmers will have no reliable alternative source of irrigation water supply, so the loss will have significant economic consequences for involved farmers. With proper prevention measures the impact will be **negligible** (Table 24).

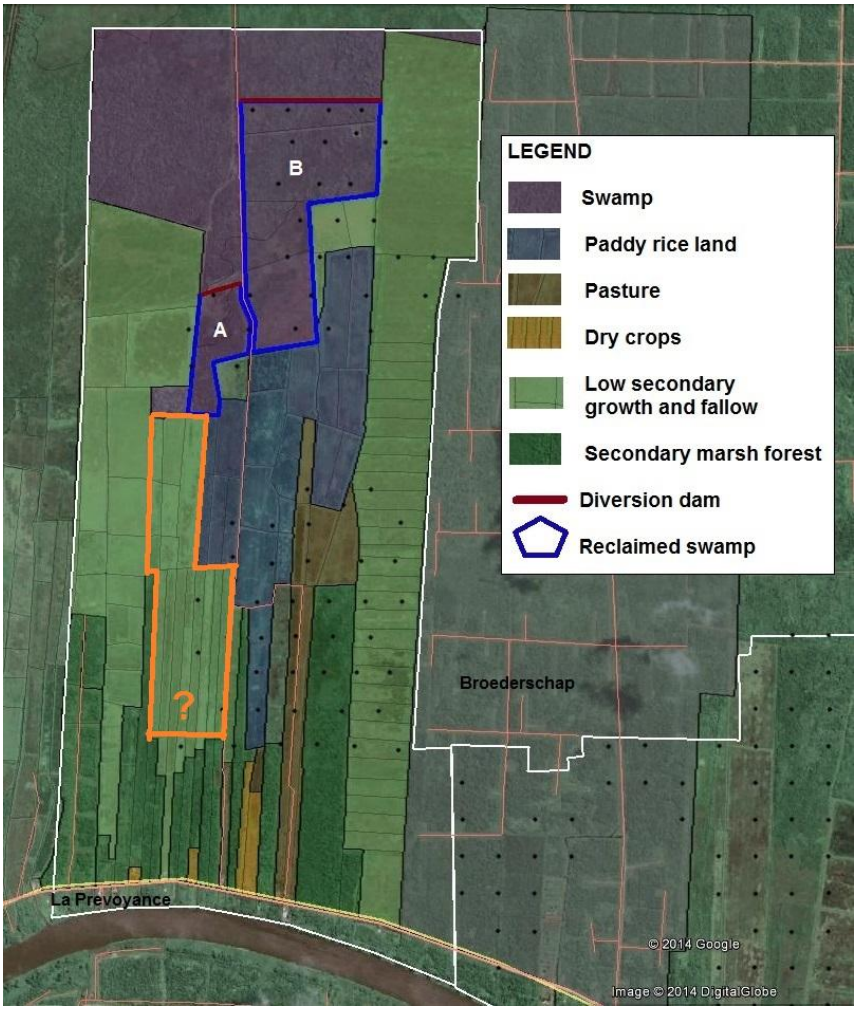

Figure 25: Actual paddy rice area in FLW and potential paddy rice area (orange boundary lines) depending on swamp water from the swamp to be reclaimed.

Table 24: Significance of blockage of irrigation water supply due to the construction of diversion dams

	Intensity	*Duration*	*Scale*	*Severity*	*Probability*	*Significance*	*Status*
Without mitigation	Medium	Long-term	Medium	High	High	**MAJOR**	neg
Proposed prevention measures: • The diversion dams should not completely close off the swamp, but a canal should be constructed that carries water towards the intake points of the southern farms, including the potential farms. • In case culverts will be placed in these canals, these should be wide enough to allow the peak flow of the farms. • The farmer should be fully involved during the planning of the works and all activities should be properly documented, including maps. Possible solutions should be elaborated in close consultation with involved farmers. • The farmer should agree upon the plans (through 'Landuse Agreement').							
With mitigation	Negligible	Short-term	Small	Negligible	Low	**NEGLIGIBLE**	neg

Impact WR2: Changes in the hydrology of the farmland within the FL project area due to blockage of water flow, or reduction of flow as a result of project activities

The road system to be constructed will cross existing waterways at a number of locations. If no culverts are placed, or if the culverts are too small, the water flow will be blocked or slowed down, with consequences for the areas' drainage, or water supply, depending on the type of waterway (drainage or irrigation). The impact will only be of relevance at active farms. On abandoned farms the land drainage is not regulated in the absence of maintenance. The project is likely to improve the drainage of such land by the upgrading of the neglected system, but information on this is lacking, because the land is not yet opened up.
Also during the construction of drilling and facility platforms such events could happen.
Problems could in particular arise when existing culverts would be missed and/or be covered during construction. The potential impact of changes in hydrology is **moderate**, with a medium probability, because such impact is reported to have happened already (see Social specialist report in Appendix F). By implementation of below prevention measures the impact will be negligible (Table 25).

Table 25: Significance of blockage of the water flow during construction

	Intensity	***Duration***	***Scale***	***Severity***	***Probability***	***Significance***	***Status***
Without mitigation	Medium	Medium-term	Medium	Medium	Medium	**MODERATE**	neg
Proposed prevention measures: • Conduct a thorough scouting of farms and identify all culverts and waterways and their function. • The involved farmers should be fully involved during the planning of the works and all activities should be properly documented, including maps ('Landuse Agreement'). • The farmer should agree upon the plans ('Landuse Agreement').							
With mitigation	Negligible	Short-term	Small	Negligible	Low	**NEGLIGIBLE**	neg

Impact WR3: Water pollution with spilled and leaked oil, grease or fuel

During construction small leakages could occur from vehicles and equipment that is used for the project. Being a dryland operation, these leakages are unlikely to end up in the water and the impact of such will be **negligible**.

During drilling small leakages could occur, while minor patches of oil may also come up from the well.
These small amounts are typically dealt with by existing clean-up procedures, and no oil will end up in water. Water pollution with oil during operation is considered **negligible**.

Diesel fuel for the generators, pumps and other engines will have to be transported to the working location by tanker trucks. The fuel will be temporarily stored in a bunded 5,000-gallon diesel fuel tank located at the drilling site. Spills or leaks may occur during transport, handling and storage of fuel. Any pollution with diesel fuel will as soon as possible be contained and cleaned up according to the oil spill clean-up guidelines.

During production, leakages and spill could occur from fixed tanks, from pumps and from pipelines.

In case no proper containment would be present, or no proper clean-up procedures in place, at some locations a potentially **minor** impact from this source to the water resources could occur, when water of the irrigation water supply would be polluted with oil or diesel fuel.

The intensity of such impact would be high, but it will be localized and short-lived, while the probability is low (Table 23). It is considered unlikely, because water flow in the ditches and canals is usually slow or absent, because a spill can easily be contained and because irrigation water is only taken in during a few occasions during the year. It is expected that, in case of the release of minor portions of fuel, oil or grease (below the 10 mg/L threshold), that the micro-organisms in the surface water will rapidly break down these compounds, as has been observed in other oil production areas in Suriname.

Table 26: Significance of water pollution with spilled or leaked oil, grease or fuel

	Intensity	***Duration***	***Scale***	***Severity***	***Probability***	***Significance***	***Status***
Without mitigation	High	Short-term	Small	Medium	Low	**MINOR**	neg
Proposed prevention and mitigation measures: • Provide adequate containment for tanks (bundwalls or containers). • Use drip-pans, leak proof containers and storage tanks. • Follow the Staatsolie guidelines for inspection, maintenance and clean-up. • Conduct frequent visual inspection of pipes and valves for signs of corrosion and replace pipes and valves when corrosion is found. • Check effluent before discharge, in particular after recorded leakage or spill • Do not release in case of exceedance of standards and conduct appropriate required measures till sub- standard water quality is met. • Implement the oil spill contingency for the area under consideration and have the required clean-up materials and equipment on-site. • Involve concerned authorities and land owners within the oil spill contingency planning.							
With mitigation	Low	Short-term	Small	Negligible	Low	**NEGLIGIBLE**	neg

Impact WR4: Water pollution with drilling fluid

During drilling cuttings and spent drilling mud is collected in the mudpit and buried on-site. In the absence of hazardous compounds, no impact will arise from this procedure. However, if the landowner wants the material removed, this will be done (see Waste management).

During completion, a completion fluid is used with a very high salt concentration. Release of this compound into the water would make it unsuitable to use as irrigation water. When this saline water would be brought on the rice land, it would destroy the crop, and make the soil unsuitable for further cultivation for some period of time. Moreover the increased salinity would also affect the aquatic life.
The potential impact of release of completion fluid into the water would be of major significance, but with the implementation of presented prevention measures the impact will be **negligible**.

Table 27: Significance of water pollution due to the release of completion fluid

	Intensity	*Duration*	*Scale*	*Severity*	*Probability*	*Significance*	*Status*
Without mitigation	High	Medium-term	Medium	High	High	**MAJOR**	neg
Proposed prevention measures: • Remove the spent completion fluid directly after finalization of drilling and transport it in a tanker truck or in proper containers. • If possible reuse the completion fluid. • Treat the completion fluid waste at the Sarah Maria Landfarm facility. Treatment of spent completion fluid encompasses the dilution with fresh water till an acceptable salinity level is reached, following which the material can be released into a water environment.							
With mitigation	Low	Short-term	Small	Negligible	Low	**NEGLIGIBLE**	neg

Impact WR5: Water pollution due to the release of harmful compounds because of a road accident

For the project, a number of potentially harmful compounds will be transported to and from the drill sites. These compounds comprise:

- diesel fuel
- compounds for drilling and completion fluids

Most of this transport will follow public roads, but certain sections need to follow project roads. Especially along the latter, there is an increased risk of overturning, or getting stuck in the roadside, because of the potentially soft subsoil of the road, and of the shoulder, while the narrowness poses an increased potential to go off the road. Part of the load may enter up in the roadside waterway. The impact of such could be similar to the other impacts due to water pollution (WR3 and WR4). It is potentially be **moderate**, because it could have a high intensity, but the impact is only for a short time, while the scale will be small due to the virtual absence of flow, so that the spilled materials will probably remain on-site. Prevention and mitigation measures are presented, which will render the impact **negligible** (Table 28).

Table 28: Significance of water pollution as a result of truck overturning (drilling phase)

	Intensity	*Duration*	*Scale*	*Severity*	*Probability*	*Significance*	*Status*
Without mitigation	High	Short	Small	Medium	Medium	**MODERATE**	neg
Proposed prevention and mitigation measures: Prevention • Ensure that all access routes have ample stability and bearing capacity to carry the planned loads, also under wet conditions with a high groundwater level. • Regularly service and maintain transport infrastructure to reduce risks to vehicles • Enforce loading limits to ensure vehicles are not overloaded thereby rendering them less stable. The loading limit must apply to the less stable unpaved road section. • Enforce speed limits for all vehicles to minimise the potential of accidents. Specify for road types. • Guide trucks along narrow sections. • All truck drivers should follow Defensive Drivers training. Mitigation • Have procedures, materials and equipment in place to ensure immediate containment and cleanup by competent personnel, in the event an accident.							
With mitigation	Low	Short-term	Small	Negligible	Low	**NEGLIGIBLE**	neg

5.5 THE BIOLOGICAL ENVIRONMENT

5.5.1 Key considerations

The project is conducted in a predominantly man-made or man-affected environment. Only a smaller part of the project area is currently still under cultivation. The greater part is abandoned and secondary vegetation has developed. The vegetation of non reclaimed parts is affected by human activities (water blockage and probably vegetation fires in the past).

Human presence in the area dates back a few centuries and hunting and fishing are common practice till today.

Given above it is expected that no endangered, threatened or vulnerable animal and plant species are present in the area, except for an occasional jaguar, for which it is known that they venture into rural areas every now and then.

Notwithstanding that, especially the forested parts serve as an important habitat for certain local wildlife, which should be protected as much as possible.

5.5.2 Sources of impact

Impacts to the biological environment could arise from a number of project activities (Table 29).

Table 29: Sources of impacts to surface water sources

Activity/component/event	Identification of potential sources
Construction of diversion dams	Clearing of swamp vegetation
Reclaiming of swamp land	Change in vegetation
Construction of roads and platforms	Clearing of vegetation
All project phases	Disturbance of wild life

5.5.3 Impact assessment

Three impacts have been identified:

- Clearing of vegetation
- Change of vegetation
- Disturbance of wildlife.

Clearing of vegetation will occur at road trajectories and drilling and facility platforms. About 36% of all drilling locations are located in secondary marsh forest and 11% in the swamp north of FLW. The remainder is found in open secondary vegetation (38%) or in farmers' fields or at the housing development project (15%).

Clearing of forest will require that about 1 ha per drilling locations (actual drilling location + roads) is removed in a pattern like shown in Figure 26 .

Figure 26: View on theTambaredjo oil polder

With a total of 70 well locations this could amount to about 70 ha marsh forest to be cleared. The latter is in case of vertical drilling; the acreage will be less in case of deviated drilling.

The impact of the forest clearing is considered to be **minor**, mainly because its concerns an isolated, secondary forest in a rural area. Therefore intensity is considered low. With the application of some recommended mitigation measures, the scale of the impact will become small instead of medium, but the significance remains the same (Table 30).

Table 30: Significance of marsh forest clearing

	Intensity	***Duration***	***Scale***	***Severity***	***Probability***	***Significance***	***Status***
Without mitigation	Low	Long-term	Medium	Low	High	**MINOR**	neg
Recommended mitigation measures: • If feasible, select the deviated drilling method instead of vertical drilling, and situate the platforms as much as possible outside the forest. • Locate roads as much as possible outside forest areas.							
With mitigation	Low	Long-term	Small	Low	High	**MINOR**	neg

Reclamation of the swamp section of FLW will give a change of vegetation. The swamp vegetation will be converted in marsh vegetation as a result of the drainage of the swamp. It is to be expected that in some decades the reclaimed swamp will have a marsh vegetation similar to the one in the Tambaredjo oil polder (see Figure 26), which area used to have a swamp vegetation similar to the current swamp prior to reclamation (which occurred in the 1990s).
The impact of reclamation on the swamp vegetation is considered **minor (**Table 31**)**, because the current vegetation is low value, with degraded sections (dieback and some excavation activities).

Table 31: Significance of swamp vegetation clearing

	Intensity	***Duration***	***Scale***	***Severity***	***Probability***	***Significance***	***Status***
Without mitigation	Low	Long-term	Medium	Low	High	**MINOR**	neg
With mitigation	No mitigation possible						

Only part of the vegetation will be cleared here for the construction of the diversion dams, the roads and the platforms, totaling approximately 25 ha out of 90 ha. Moreover on the long run (10-20 years) the vegetation will be converted to marsh forest which is considered of higher conservation value than the swamp vegetation. The marsh forest has far more plant species and is therefore able to provide a habitat to more varied wildlife.

The disturbance of wildlife is predominantly the result of the construction and drilling activities, and mainly because of the noise that could scare certain animals. On the other hand the area has known human presence for a prolonged period and it is likely that most animals

are to some degree adapted to the presence of humans. In addition it should be stressed that only part of the forest is to be cleared (Figure 26) and that large portion of forest will remain intact, so that animals can move to undisturbed sections of the forest. Based on above considerations the impact of the project on wildlife is considered as **minor (**Table 32**)**.

Table 32: Significance of disturbance of wildlife

	Intensity	***Duration***	***Scale***	***Severity***	***Probability***	***Significance***	***Status***
Without mitigation	Low	Long-term	Medium	Low	High	**MINOR**	neg
With mitigation	No mitigation possible						

5.6 SOCIO-ECONOMIC ISSUES

5.6.1 Population and living conditions

5.6.1.1 Key considerations

At several occasions during the last few years, stakeholders along the Gangaram Pandayweg and beyond repeatedly have aired their discontent about a number of issues that affect their daily living conditions, for which they blame Staatsolie. These issues are:

- dust generation along the Gangaram Pandayweg, with health problems and pollution of rainwater
- flooding of their land
- decrease of fish stock
- increase of snakes and other vermin
- excess noise at night
- inadequate replacement of water infrastructure (culverts)

Although most of the complaints are not or not fully justified, the persistency of these complaints apparently indicates that Staatsolie is not able to adequately address these complaints.

Earlier experiences with projects in inhabited areas have shown that frequent and transparent communication with local stakeholders is of utmost importance to maintaining a good reputation with the local population. Poor or insufficient communication with area inhabitants and local lack of knowledge about project activities, on the other hand, may lead to irritation and thereby harm Staatsolie's social license to operate.

A particularly important part of communication is being reachable for, and responsive to, complaints from landowners and other area inhabitants. The latter implies that Staatsolie must have an adequate functioning grievances mechanism in place, including a complaints log, that shows local stakeholders that their concerns and complaints are taking seriously and effectively dealt with. Landowners on whose land project activities take place should receive particular attention. The presence of discontent land owners and other area inhabitants, who feel they have been deceived or disadvantaged by the company, will incur operational expenses in terms of company funds, time and effort.

5.6.1.2 Sources of impact

Impacts to populations and living conditions are likely to result from below project activities (Table 33).

Table 33: Sources of impacts to population and living conditions

Activity/component/event	Identification of potential sources
General construction activities	Construction, when close to receptors Replacement of culverts along the Gangaram Pandayweg
Transportation	Transport along Gangaram Pandayweg and access routes
All project phases	Non-planned events during project execution Complaints about Staatsolie activities

5.6.1.3 Impact assessment

Impact S1: Loss of social license to operate

The impacts that may lead to loss of social license to operate are:

- Noise impacts to receptors that live close to a drilling location, in particular during the night hours.
- Dust generation along the Gangaram Pandayweg and access routes.
- (Assumed) damage done to public property, like roads, culverts, dams and canals.
- Pollution of water with oil, mud, salts or other harmful compounds.
- Problems of Staatsolie workers or contractors, with local population.

The social impact can be considered **moderate** (Table 34), because nuisances and problems caused by Staatsolie could end up in the local media, thus gaining considerable negative attention, while the events may still be discussed for some time. This could harm the Staatsolie image. With effective implementation of the measures, the impact will be **negligible**.

Table 34: Significance of loss of social license to operate due to project activities

	Intensity	*Duration*	*Scale*	*Severity*	*Probability*	*Significance*	*Status*
Without mitigation	Medium	Long	Medium	Medium	Medium	**MODERATE**	Neg
Proposed prevention and mitigation measures: • Present this ESIA during stakeholder meetings to all involved landowners, including neighbors, and involved authorities like DC, DS and BO, LVV, OW, DWV/SWM, and upon request make the document available to interested parties. • Implement the Communication Plan for which a framework is presented in Ch. 6 of the Social Specialist study (Appendix F; Social Solutions 2014). • Implement a communication and information point for questions and answers in the local area, with a community-based project communication officer to contact. • Install a consulting structure with representatives from the district government, local government and delegates from the local population. • Communicate the occurrence of large transports of equipment, materials and supplies with the local population (through BO or DS). • Restrict heavy transport to daytime only. • Require that trucks are being used in accordance with the maximum allowed wheel load for respective roads in order to avoid damage to the local roads. • Evaluate the dust problem and seek improvement of current solutions. • Make sure that Staatsolie workers and Contractors are aware of the Staatsolie Code of Conduct (as part of project induction talks).							
With mitigation	Low	Short-term	Small	Negligible	Moderate	**NEGLIGIBLE**	Neg

5.6.2 Landuse

5.6.2.1 Key considerations

Land use impacts would occur during production development activities if there are conflicts with existing land use plans and community goals; existing recreational, educational, religious, scientific, or other use areas; or existing commercial land use (e.g., agriculture, grazing). In general, large-scale activities would change the character of the landscape from a rural to a more industrialized setting. Existing land use would be affected by intrusive impacts such as increased traffic, noise, dust, and human activity, as well as by changes in the visual landscape. Ranchers or farmers could be affected by loss of available grazing or croplands.

Overall, land use impacts could range from minimal to significant depending upon both the areal extent of the activities, the density of wells and other ancillary facilities, and the compatibility with the existing land uses. For the current project the impact is in general characterized as minor, because the project activities will predominantly take place outside the inhabited areas. For individual users of the land, however, impacts could be of higher significance.

Most activities for the FL project will take place on private lands and part of the land is being used for agricultural purposes, while a smaller piece is being developed for residential construction.

Production development is planned on:

- Paddy riceland (approximately[8] 14 projected well locations in FLW);
- Land with cattle and patches of fruit trees (approximately 8 projected well locations in FLW);
- Abandoned or fallow pasture/paddy riceland (22 projected well locations in FLW and 49 in FLE);
- Dry cropping land (4 projected wells in FLE);
- Housing project (4 projected wells in FLE).

A total of about 30 well locations (15%) are thus projected in actively used land.
During Staatsolie activities, the user of the land should be able to continue his/her activities as usual.

5.6.2.2 Sources of impact

Impacts to populations and living conditions are likely to result from below project activities (Table 35).

[8] Some well locations are at boundaries and may be shifted to another parcel, depending upon the local conditions.

Table 35: Sources of impacts to population and living conditions

Activity/component/event	Identification of potential sources
Construction of diversion dam	Irrigation water source is affected
Construction	Land take Use of farm roads Construction of new dams Upgrading of canals; (re)placement of divers Project noise Spills and leakages Presence of personnel
Drilling operation	Use of farm roads Project noise Spills and leakages Presence of personnel
Oil production operation	Use of farm roads Project noise Spills and leakages Presence of personnel
All project phases	Non-planned events during project execution

5.6.2.3 Impact assessment

Impact S2: Loss of land or use potential, damage to crops and farm infrastructure, injury or loss of cattle, and interference with farm activities

Land will be required for the construction of roads and platforms. At active farms existing dams will be used, and land take is only required in case widening is required. But most of the land take will involve platforms for drilling and facilities. On average platforms measure 1680 m^2 (vertical drilling) or 2450 m^2 (deviated drilling). This area will be lost for agriculture during the lifetime of the well (projected 25 years). In addition, as result of the use of farmland for oil production it will no longer be possible to allow sport fishermen at that land, with potential loss of income from this activity ('*gelegenheid tot hengelen*') The potential impact of loss of land or use potential is considered to be **major** if no measures would be taken. With application of proposed mitigation measures the impact will become **negligible**.

Table 36: Significance of loss of land during the project period

	Intensity	***Duration***	***Scale***	***Severity***	***Probability***	***Significance***	***Status***
Without mitigation	High	Long	Small	High	High	**MAJOR**	Neg
Proposed mitigation measures: • If feasible, employ deviated drilling in order to reduce the total land take, and consider as much as possible drilling outside actively used land • Compensate for any loss of standing crops at the taken land, or for any loss or damage resulting from the use of his land. • Compensate the farmer for the use of the concerned part of his land. • The latter two issues should be included in the Landuse Agreement (see Appendix A).							
With mitigation	Low	Short-term	Small	Negligible	High	**NEGLIGIBLE**	Neg

During project activities, damage could accidentally be done to crops and farm infrastructure. Also could cattle could be disturbed or it could escape, resulting in injury or loss. Irrigation water could be contaminated, making it unsuitable for application. In addition it could occur that project activities make the delivery of irrigation water problematic or impossible as a result of blockage of irrigation canals.
All these incidents will result in loss of farmers' income. The impact is considered to be moderate, but with the implementation of the proposed mitigation measures, the impact will be negligible (Table 37).

Interference with farm activities could occur during road upgrading, when this activity makes the road inaccessible for farmers' vehicles, so that he cannot reach his land, and has to postpone the planned activity. Especially during critical periods, like land preparation or harvest this could have some consequences if the farmer is not properly informed about the schedule of the works. This could lead to an impact of **moderate** significance. Mitigation measures are included in the mitigation measures for damages (Table 37).

Table 37: Significance of damage to crops and farm infrastructure, injury or loss of cattle, contamination or loss of irrigation water and interference with farm activities

	Intensity	***Duration***	***Scale***	***Severity***	***Probability***	***Significance***	***Status***
Without mitigation	Medium	Medium	Medium	Medium	Medium	**MODERATE**	Neg
Proposed mitigation measures: • All project activities at farms should be documented and described in detail. • A detailed schedule of works should be drawn up; this schedule should be agreed on with the concerned farmer. • Farmers should be informed one week ahead about the actual start of the project activities at his land; any change in program should be communicated one week ahead. • The farmer for his part should make arrangements to ensure that no cattle are present adjacent to work locations, including the transportation route, and that all cattle are kept in properly fenced pastures. • All production facilities should be adequately fenced of, or protected otherwise, so that no damage to these facilities can occur. • Compensation should be given for any other damage due to Staatsolie activities, after that investigation by Staatsolie has justified the claim. • All above issues should be combined into the Landuse agreement with every individual farmer. • The agreement should contain appeal procedures in case of disputes							
With mitigation	Low	Short-term	Small	Negligible	High	**NEGLIGIBLE**	Neg

Impact S3: Potential damage to the Yarah housing development project

A housing development project is present at Gangaram Pandayweg km 7.5, the Yarah project. This project is divided into over 100 individual lots, but current activities are still limited (Figure 27).

Figure 27: The Yarah housing development project at km 7.5 along the Gangaram Pandayweg (May 15, 2014)

Development of wells in this area will pose risks for future inhabitants, in case of oil spills and/or fires (and vice versa in case of house fires), once the project is fully developed with all houses completed. The impact of such event is considered to be **moderate**, being of high intensity, long-term and medium scale, but with a low probability. With the implementation of proposed mitigation measures the impact will be **negligible** (Table 38).

Table 38: Significance of damage to the Yarah housing development project

	Intensity	***Duration***	***Scale***	***Severity***	***Probability***	***Significance***	***Status***
Without mitigation	High	Long-term	Medium	High	Low	**MODERATE**	Neg
Proposed mitigation measures: • If feasible, employ deviated drilling outside the housing project, with the drilling location at least 285 meter away from the nearest house that is present at the moment of drilling (taking into account the potential noise impacts) and at least 100 meter away from the project boundary, or • Shift the well locations outside the housing project and employ vertical drilling, with the drilling location at least 100 meter away from the project boundary.							
With mitigation	Low	Short-term	Small	Negligible	High	**NEGLIGIBLE**	Neg

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5.6.3 Employment and local economy

5.6.3.1 Sources of impact

The production development project could contribute to the local economy by providing employment opportunities, income to local contractors and businesses, and recycled revenues through the local economy.

Direct and indirect social impacts that could result from the project activities are:

Direct: Employment provided by Staatsolie and/or contractors. Increased sales of local businesses Indirect: Creation of opportunities for local entrepreneurs to provide services to the project.

5.6.3.2 Impact assessment

Impact S4: Generation of employment and opportunities for entrepreneurs at a local level

Some jobs are being created at Staatsolie for the project, being two operators for compactor and grader, and eight well operators. Also the Contractors are likely to need more workers for employment within the Farmersland project.

Regarding contractor services use will be made firms that can provide services like:

- Earth moving;
- Sand and clay supply;
- Transportation of sand;
- Bus transport for personnel;
- Security services.

The hiring of contractor services is liable to strict procurement regulations that leave no room for specific preferences. Regarding the hiring of the services of contractors, Staatsolie is likely to work with its known pool of contracting firms, among which are some from the area. No additional firms will be required, so there will be no impact on local entrepreneurs.

The potential positive impact of the project on local employment is considered to be **minor,** when Staatsolie would ignore local workers. However, with implementation of the proposed enhancement measures, the impact can be increased to **moderate** (Table 39).

These measures only apply for Staatsolie jobs, and even in this case the proper recruitment regulations have to be followed, so a job for local people cannot be guaranteed.
Furthermore, Staatsolie works through contractors for low-skilled jobs, and the company cannot influence the recruitment policy of those firms.

Table 39: Significance of generation of employment at a local level

	Intensity	*Duration*	*Scale*	*Severity*	*Probability*	*Significance*	*Status*
Without mitigation	Low	Long-term	Small	Low	Medium	**MINOR**	Pos
Proposed enhancement measures: • Ensure that job opportunities become known in the local community and provide a clear job profile; • When equally qualified, recruit local personnel; • Investigate the potential of job seekers along the Gangaram Pandayweg and where possible provide training or education to promising persons.							
With mitigation	Low	Long-term	Medium	Medium	Medium	**MODERATE**	Pos

5.6.4 Other socio-economic issues

The Farmersland project will also have another positive socio-economic impact. A clear positive impact is the fact that the accessibility of the land of involved land owners will improve due to the construction of access and side roads. Also drainage of that land will improve due to the upgrading of the drainage system (cleaning of canals, ditches and culverts) and maintenance during the project period. The significance of this impact is considered to be moderate (positive). Further enhancement of this project-induced improvement is not possible (Table 40).

Table 40: Significance of improvement of land access and land drainage

	Intensity	*Duration*	*Scale*	*Severity*	*Probability*	*Significance*	*Status*
Without mitigation	Low	Long-term	Medium	Medium	High	**MODERATE**	Pos
No further enhancement possible.							

5.7 CUMULATIVE IMPACTS

Cumulative impacts are defined as “The combination of multiple impacts from existing projects, the proposed project, and/or anticipated future projects that may result in significant adverse and/or beneficial impacts that would not be expected in case of a stand-alone project” (IFC 2006).

There are no significant impacts from existing projects, but recently a study was finalized to control the high swamp and river water levels. This study was commissioned by the Districts Commissioner of Saramacca (ILACO 2014). The study presents a number of options and the DC is currently seeking funding, in first instance for the short-term solutions.

It is not yet clear which option will be selected, so that no cumulative impacts can be predicted. Therefore no analysis of the potential cumulative impacts is made.

Normally an ESIA will be required for such project, seen its magnitude and sensitivity, and impacts of the project should be evaluated for the projected activities.

5.8 CONCLUSION AND OVERALL RECOMMENDATIONS

The results of the above impact analysis are summarized in below table (Table 41) in which also the residual impact after implementation of prevention and mitigation measures is presented.

Table 41: Summary of the significant (including minor) potential impacts and their residual impact upon mitigation

Component	Description	Impact	Residual impact
Negative impacts			
Water resources	Blockage of irrigation water supply in FLW	Major	Negligible
	Water pollution due to the release of completion fluid	Major	Negligible
Social	Loss of land	Major	Negligible
Air	Impaired human health or nuisance caused by poor air quality during construction	Moderate	Negligible
Noise	Noise impacts during drilling	Moderate	Negligible
Water resources	Changes in the hydrology of the farmland within the FL project area due to blockage of water flow, or reduction of flow	Moderate	Negligible
	Water pollution due to the release of harmful compounds because of a road accident	Moderate	Negligible
Social	Loss of social license to operate	Moderate	Negligible
	Damage to crops and farm infrastructure, injury or loss of cattle, contamination or loss of irrigation water and interference with farm activities	Moderate	Negligible
	Potential damage to the Yarah housing development project	Moderate	Negligible
Water resources	Water pollution with spilled and leaked oil, grease or fuel	Minor	Negligible
Vegetation	Marsh forest clearing	Minor	Minor
Positive impacts			
Socio-economy	Generation of employment at a local level	Minor	Moderate
	Improvement of land access and land drainage	Moderate	Moderate

Three major negative impacts are identified, all of which are related to the use of active farmersland. Two are related to water resources in relation to paddy rice cultivation.
One would be caused by inadequate design or execution of the reclamation activities of the swamp area of FLW.

The second one is caused by poor waste management of completion fluid. With proper implementation of the proposed prevention/mitigation measures there will be a negligible impact.
The third major impact could arise when Staatsolie would fail to inform landowners about the use of a certain piece of land for its development activities. Also this impact will be reduced to negligible, if a landuse agreement is closed.

There are seven moderate negative impacts. Noise nuisance and poor air quality for receptors could arise when activities are conducted too close to houses or work locations. With the follow-up of proposed mitigation measures, also these impacts can be reduced to negligible.

There are also two moderate impacts related to water resources. The hydrology of the polder land could be affected in case of an inadequate design or execution of works at the roads and drainage ways. With proper implementation of the mitigation measures also these impacts are reduced to negligible.

There are three moderate impacts to social conditions. The first one is related to the general performance of Staatsolie in the area, and the way that it communicates with the local community.
The second one relates to the project activities on property of land owners.
Problems will arise in case of inadequate agreements, or poor understanding thereof, or in case of poor performance in general and lack of communication.
With the proper realization of the mitigation measures, the impacts will be virtually absent.
The communication plan and the landuse agreement are important instrument to implement these measures.
The construction of well sites in the middle of a (future) housing project (the Yarah project) is thought to pose a high risks related to fires. Measures are proposed to limit these risks to negligible.

Finally two minor negative impacts were identified. The first one regards the potential water pollution due to the spill or leakage to hydrocarbons. The impact is considered minor, because any oil spill is contained and cleaned, following the directions of the Oil Spill Contingency Plan. Any spill or leakage will therefore be short-lived and it will remain contained in a small area. None of the interviewees during the current study and previous studies in the area has ever complained about negative effect of oil spills.

The clearing of marsh forest is considered to also have a minor impact. The forest type is rather common and no clear cutting of large, continuous areas will be undertaken, only relatively small parts, while the surrounding forest remains intact. This impact as such cannot be reduced by mitigation measures, but it could be if deviated drilling could be employed, because then a smaller total area will need to be cleared.

A positive impact will arise due to the increase of employment opportunities in the area. With the implementation of proposed enhancement measures this could have a moderate positive impact for the local community.

Environmental and social project risks and impacts will be managed through an effective Environmental and Social Management Plan (ESMP). An effective EMP must be implemented as part of normal operations by incorporating the key components into daily activities, such as including environmental issues in the decision-making process and

maintaining complete records. Such ESMP was prepared on the basis of above project description and proposed mitigation and prevention measures. A summary of required environmental and social commitments is attached to this report (Appendix H; Table of Commitments).

6 ANALYSIS OF ALTERNATIVES

Two types of drilling are being considered for the FL production development project, vertical drilling and deviated drilling. In below table (Table 42)

Table 42: Analyses and comparison of impacts with vertical versus deviated drilling

Impact	Significance	Discussion
Impaired human health or nuisance caused by poor air quality during construction	Moderate	No difference
Noise impacts during drilling	Moderate	DD requires larger distance to houses, but DD allows for greater flexibility than VD; DD to be preferred.
Blockage of irrigation water supply in FLW	Major	No difference.
Changes in the hydrology of the farmland within the FL project area due to blockage of water flow, or reduction of flow	Moderate	No difference.
Water pollution with spilled and leaked oil, grease or fuel	Minor	No difference.
Water pollution due to the release of completion fluid	Major	No difference, but handling of Completion fluid more flexible with DD.
Water pollution due to the release of harmful compounds because of a road accident	Moderate	No difference.
Marsh forest clearing	Minor	DD requires less forest clearing and is the preferred option.
Loss of social license to operate	Moderate	No difference
Loss of land	Major	DD required less land and is the preferred option.
Damage to crops and farm infrastructure, injury or loss of cattle, contamination or loss of irrigation water and interference with farm activities	Moderate	No difference.
Potential damage to the Yarah housing development project	Moderate	VD is not possible, but DD is, but outside the project. DD is the preferred option.

DD - Deviated Drilling
VD - Vertical Drilling

From the above analysis it is concluded that Deviated Drilling should be the option of choice for the FL project. This option has also preliminary been selected by Staatsolie, but the possibility of DD is still being investigated, because the technical, financial and logistical feasibility are not yet sufficiently clear so that no conclusion can be taken at this point.
When it is decided that DD is a feasible option, it still is to be expected that a mixed approach (DD+VD) will be used, because DD will not be feasible for all locations.
In case DD is found to be unfeasible, the consequence will be that some well locations will have to be shifted, or that these will have to be removed from the drilling program.

7 GENERAL CONCLUSION

Given the already known area characteristics from previous studies, it was clear from the start that the focus of the ESIA study should be laid on the local agricultural community, livelihood and living conditions. Far less attention was required for the natural conditions and none for archaeological and historical issues. The amount of fieldwork was reduced by the availability of data from previous studies in the area.

The FL production development project will result in a number of unavoidable adverse environmental impacts, which is common for such projects. But the project is developed in an area in which oil exploration and production activities are already taking place for a considerable time, and based on lessons-learned, improved mitigation have gradually developed, in particular with respect to public consultation.
Observations in production areas during the current study have indicated that part of the implemented mitigation measures is effective, while others need to be improved (see Social study (Appendix F).
The latter refers especially to the general communication between Staatsolie and the local stakeholders and population in general. At several occasions it became clear that there are some old sores that are still to be resolved. Staatsolie is blamed for several negative events, and notwithstanding the efforts of the company the discontent remains.
Therefore the study lays focus on the implementation of a communication plan and the improvement of community relations.

The ESIA describes the available information on project design and operation. Baseline data of previous studies have been used, but in addition to that, baseline data have been collected in the field. Also extensive public consultation was undertaken, during which local stakeholders, local government representatives, and district authorities were consulted.
The collected data is considered adequate for the analysis of the impacts.

Matching of the project activities with the baseline conditions has enabled the identification and analyses of environmental (biophysical as well as socio-economic) impacts of the proposed production project.
The EIA report presents an impartial and complete evaluation of the possible impacts of the project. Mitigation measures are presented to manage these impacts.

Based on the study it is predicted that very few of the impacts of the project are of concern.
One of the main concerns is associated with the fact that the project will be developed in polderland with active land use in some sections. Interactions between these parties are required and only with a proper strategy and approach the project can be successful.

Staatsolie has committed itself that it will ensure that the project will be conducted to high standards, achieved through implementation of the recommended mitigation measures and by ongoing monitoring of performance.

A Non-Technical Summary (in Dutch) of this report will be distributed to stakeholders are invited for the stakeholders meeting where the findings of the EIA will be discussed with key stakeholders. When relevant for the subject, the comments will be included in the ESIA.

Upon request the Draft ESIA Report will be made available for public comments, and stakeholders are invited to review the report.

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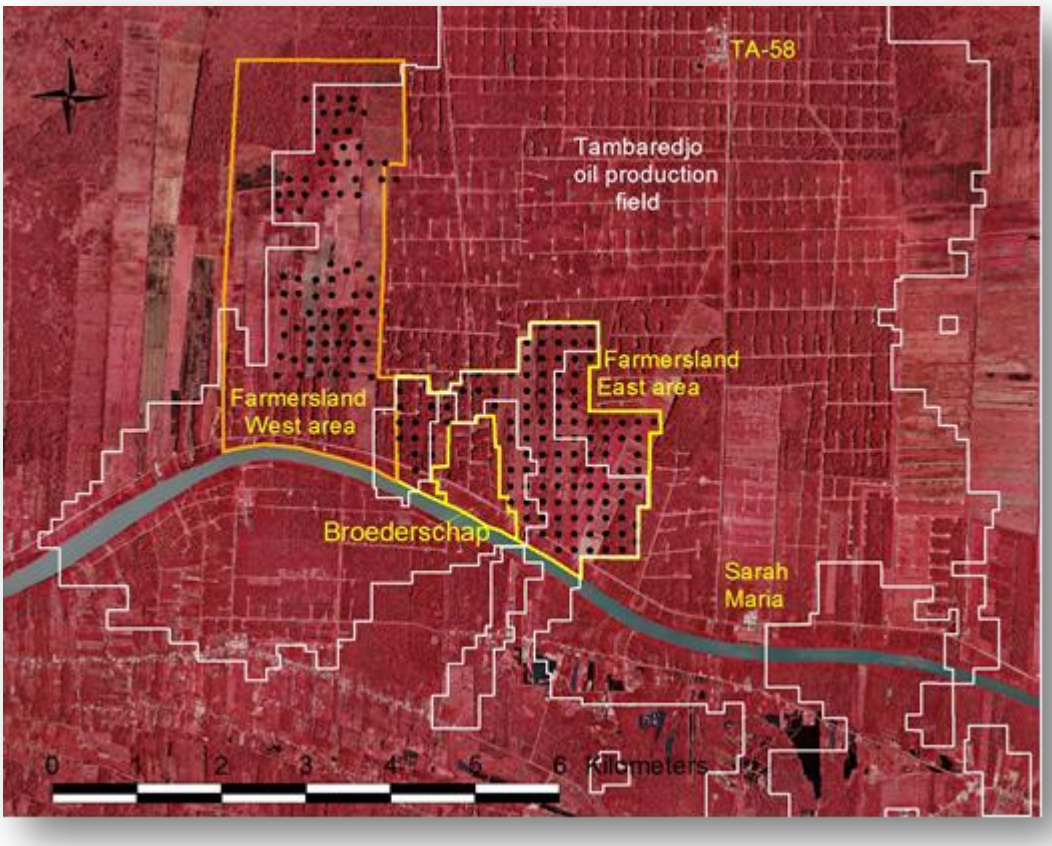
APPENDICES

APPENDIX A: LEGAL AND INSTITUTIONAL CHAPTER

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE FARMERSLAND PRODUCTION DEVELOPMENT PROJECT

DRAFT

LEGAL AND INSTITUTIONAL CHAPTER



Prepared for Noordam Environmental Services

Prepared by Nancy del Prado

June 2014

Table of Content

List of Tables

Table of boxes

Abbreviations

ATM	Ministry of Labour, Technological Development and Environment (*Ministerie van Arbeid, Technologische Ontwikkeling en Milieu)*
BIS	Suriname Bauxite Institute (*Bauxiet Instituut Suriname)*
BOPD	Barrels of Oil Per Day
CBD	Convention on Biological Diversity
DC	District Commissioner (*Districts Commissaris*)
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
FLE	Farmersland East
FLW	Farmersland West
GFI	General Field Instructions
GMD	Geological Mining Service *(Geologische Mijnbouwkundige Dienst)*
LBB	Suriname Forest Service *(Dienst Landsbosbeheer en Bostoezicht)*
LVV	Ministry of Agriculture, Animal Husbandry, and Fisheries *(Ministerie van Landbouw, Veeteelt, en Visserij)*
MUMA	Multiple Use Management Area.
NEC	Noordam Environmental Consultancy
NH	Ministry of Natural Resources *(Ministerie van Natuurlijke Hulpbronnen)*
NIMOS	National Institute for Environment and Development in Suriname (*Nationaal Instituut voor Milieu en Ontwikkeling in Suriname*)
PPE	Personal Protective Equipment
ROGB	Ministry of Physical Planning, Land and Forest Management (*Ministerie van Ruimtelijke Ordening, Land- en Bosbeheer*)
S.B.	Government Gazette *(Staatsblad)*
UNFCCC	United Nation Framework Convention on Climate Change

1 Introduction

1.1 Background

Staatsolie, the State Oil Company of Suriname, was founded in 1980 as a limited liability company under Surinamese Law. One of the strategic upstream goals of Staatsolie is to sustain the Staatsolie crude production level of 17,000 BOPD (Staatsolie Foundation for Transition & Growth 2013-2016). The development of new production areas is required in order to meet this goal.

Since 2010 plans were prepared to develop the so-called Farmersland West and East areas in the south and southwest of the Tambaredjo oil field. Initial focus was on the Farmersland West area, for which an Environmental and Social Impact Assessment (ESIA) started in 2011. This ESIA for the Farmersland West (FLW) production development project is undertaken by Noordam Environmental Consultancy (NEC) according to the Draft Environmental Act of 2002, the Environmental Assessment Guidelines (March 2005 and 2009) of the Nationaal Instituut voor Milieu en Ontwikkeling in Suriname (NIMOS) as well as international best practices. As part of the FLW ESIA process, scoping was conducted, including a scoping meeting. The Final Scoping report was submitted to NIMOS and in its advice on August 15, 2011 the institute indicates that it has no objection against the undertaking of the ESIA as stipulated in the Scoping Report.

Due to various technical and organizational issues, the FLW project has not yet commenced, except for the construction of access roads, for which a separate report was prepared (Noordam 2013). In the meantime preparations were made for a similar production development plan in the Farmersland East (FLE) area, very close to the FLW area. Because both area and project are similar, Staatsolie requested to NIMOS whether a combined ESIA could be prepared. This request was granted by NIMOS in its letter dated January 21, 2014 (Final Draft Scoping Report NEC - February 26, 2014).

The Farmersland West and East areas are situated in the southern and southwestern part of the Tambaredjo oilfield and to the North and East of the La Prevoyance area.

The project encompasses the development of approximately 147 producing oil wells, for which about 196 wells (76 in FLW and 120 in FLE) will be drilled, assuming a success rate of 75%. Drilling will start in 2016 and production will last approximately 25 years. But field construction may already start in August 2014. This latter phase comprises the construction of main project infrastructure, like dams, well sites, trails, headers and electricity grid.

The produced liquids will be transported by pipeline to the TA-58 and Josi processing facilities. The projects' header system will be connected to existing header systems at the Broederschap, the Tambaredjo oil polder and that along the Gangaram Pandayweg

The development drilling will be conducted on:

- Privately owned and (partially) cultivated land. There is no primary vegetation and the water management of the area is controlled by sluice gates, culverts, pumps, canals and dams.
- Swamp area in the north of the FLW area. In this area some dams and canals have already been constructed by Staatsolie and by farmers, and production development is ongoing in the area to the north of it (Tambaredjo NW project).

Development of the Farmersland area will require the construction of access roads to the locations, location construction, drilling, logging and completion, electrical infrastructure, flow-lines and test facilities for the wells to be taken into production and plug and abandon of dry holes.

This legal report is part of the ESIA report for the Farmersland Production Development Project.
It outlines a description of the applicable national legal and institutional framework as well as Staatsolie's Environmental Corporate Policies and standards and international best practices. The Government Policy and the Saramacca districts plan will also be briefly considered in this review.

The ESIA process will be executed in accordance with NIMOS Environmental Assessment Guidelines Volume 1: Generic, 2009. NIMOS determined the proposed development project to be a Category A project. In addition to national regulatory requirements of Suriname, the ESIA is guided by environmental assessment standards and guidelines of the World Bank Group, and the ESIA will be undertaken in a manner consistent with the International Finance Corporation (IFC)'s Environmental and Social Review Procedure.

Suriname's environmental regulatory regime is not yet fully developed and there is no legislation dealing specifically with environmental management. But environmental legislation is currently being developed and draft generic guidelines for environmental and social assessment have been released (NIMOS 2005 and 2009). Legislation regarding environmental and natural resource management is found dispersed between different pieces of legislation.
Suriname is also signatory to a number of international conventions that address environmental issues, which are significant drivers behind the development and implementation of environmental legislation.
Responsibility for the management of the environment and natural resources resides within different ministries and government institutions. Some of the ministries have their departments represented within the districts.

2 Government Policy and Plans

The Suriname Constitution provides the legal basis for development opportunities and the protection of the environment in the country. In accordance with article 6a of the Constitution, the social objectives of the State are to identify the development opportunities of the natural environment and to increase the capacity thereof. With regards to the protection of the environment, the Constitution specifies (article 6g) that the State is responsible for the creation and promotion of the conditions necessary for the protection of the environment and the preservation of the ecological balance.

In accordance with the Development Plan 2012-2016 of the Government of Suriname, the oil exploration program will be continued in the onshore-, near shore and offshore areas, sometimes in collaboration with third parties. The aim is to increase the oil reserves by at least 64 million barrels onshore, near shore 50 million barrels and 100 million barrels offshore. This is primarily for security of oil production onshore of at least 16,000 barrels per day.
In this light, the Government is challenged to increase the number of production fields and increase recoverable reserves by accelerating the implementation of an exploration program on land and in the coastal waters of Suriname.

In accordance with the Act on Regional Bodies (S.B. 1989 No.44, as lastly amended by S.B. 2002 no. 54), it is a responsibility of the Districts Council to develop an annual districts plan in line with the Development Plan of the central government. The Districts Commissioner is the chair of this Council. In line with the Development Plan 2012-2016, the District of Saramacca developed a District Plan. It is worth noting that the District Council has decided not to include regular activities in its plan of 2014. However, these activities have been budgeted in order to present a balanced budget for the fiscal year 2014.The District Plan Saramacca is derived from the Local Plans and contains the wishes and needs of the population of Saramacca by sector.
The study area for the current project is within the Wayamboweg resort. The District Plan Saramacca of 2014 has a listing of development activities for the Wayamboweg resort, categorized under the following sectors:

1 Infrastructure

- Cleaning of channels, discharges and road sides
- Replacement and or construction of culverts
- Construction / renovation of (public) jetty at Huwelijkszorg
- Hardening / Asphalt / sanding of roads
- Placement of traffic signs, footpaths, street lightening
- Improving public transport
- Digging a new channel as a water reservoir for the agricultural sector Wayambo / Northern part of the G.Pandayweg

2 Utilities

- Connection to the drinking water supply (where?)
- Electricity connection (where?)
- Telecommunication and internet facilities (where?)

3 Spatial Planning

- Accelerated process for obtaining land titles
- Extension of the already matured leasehold rights in Wayambo/ Wayamboweg km 17½ -km 23½

4 Education

- Improvement of education accommodation

5 Healthcare

- Primary healthcare
- Availability of weekly physician

6. Public order and safety

- Expansion police station Monkshoop
- Stationing additional staff to expand Police services
- Regular patrols
- Continuous police service vehicle
- Housing for staff

3 National Environmental, Health and Safety Legal Framework

3.1 General

Staatsolie has the right to explore for and produce hydrocarbons in Suriname. The legal basis for Staatsolie to operate in the Farmersland is laid down in Decree E-8B, the Act regarding the authorization of Staatsolie to do research and exploitation of Hydrocarbons *(Decreet van 11 mei 1981, houdende machtiging tot verlening aan Staatsolie Maatschappij Suriname NV van een vergunning tot het doen van onderzoek naar en van een concessie voor de ontginning van koolwaterstof voorkomen, S.B 1981 no. 59)*. The concession area is part of the Onshore area of the Republic of Suriname, as indicated in the map in annex 1 of this Decree.
It is noteworthy mentioning that the study area is situated within the North Saramacca MUMA conditional zone, an area placed at the disposal of the Ministry of ROGB for management of all state-owned land in the area, with the exception of land that has been issued before promulgation of the Ministerial Order establishing this MUMA.

3.2 Access to land of third parties

The proposed drilling area is situated North of the stretch of the Gangaram Panday Road between Km 7.5 and Km 12.5. Sixty- three (63) plots of land are situated along this stretch of road, with the plot numbers 308 to 366. The Social Specialist Study under the ESIA for the Farmersland Production Development project provides in its annex 2 an overview of the landuse of these plots. According to this overview different titles are vested on the plots, varying from Allodial property *(Allodiaal eigendom en erfelijk bezit)* and leasehold right *(erfpacht)* to land lease *(grondhuur)*. Some of the plots are even undivided estates.

It is therefore required that special attention should be given to the relationship with landowners and the rules regarding right of way. Beside the provisions of the Mining decree on the rights of third parties, Staatsolie has a written approved procedure on access to land, and land acquisition*(Handboek Beheer Bedrijfsprocessen: Procedure toegang tot gronden en land aquisitie, versie 1.0, December 2013)*. The aim of the procedure is to obtain in a timely, transparent and structured way, access to private lands and to make reservations or apply for domain land without interruption or against reasonable grounds.
This procedure provides specific work instructions when it regards domain land or private land. In case of domain land a reservation application will be made or an application for land lease at the Government. When it regards private property and the right holders are known, Staatsolie will enter into an agreement for access to the land. When the right holders are not known, the company will start a process to search for them, making use of the official channels and newspaper advertisements. Access to land is requested in accordance with the

Mining decree. The company has to provide information on the project, namely the purpose, the activities, including the possible health, safety and environmental impacts. Depending on the nature, the impact and the duration of the project, different types of agreements will be offered. The procedure is compatible with the relevant laws (Mining Decree, Petroleum Act, Concession Agreement, NIMOS Guidelines).

3.3 Relevant laws and regulations

Suriname's legislation at the national level is exercised through different legislative instruments (acts, State Orders, Ministerial Orders etc.; Table 1).
Environmental issues are regulated on a sectoral basis. (Table 2) provides an overview of the various legal instruments related to the Environmental, Health and Safety aspects of the project. A brief description of the Bills that are relevant to environmental management is also included in the table.

Table 1 Overview of the hierarchy of legal instruments in Suriname

International Treaties (*Verdragen*)	The approval of international treaties should be authorized and if required, approved by the President of the Republic of Suriname. The provisions of the international treaties, which may be directly binding on anyone, shall become effective upon promulgation. Legal regulations in force in the Republic of Suriname shall not apply if such application should be incompatible with provisions of agreements which are directly binding on anyone and which were concluded either before or after the enactment of the regulations.
Constitution of the Republic of Suriname (*Grondwet*)	Highest national law providing for rules regarding the sovereignty, principles for freedom, equity and democracy.
Act of Parliament/Law (*Wet, Landsverordening, Decreet*)[1]	Jointly realized by Government and Parliament. However, some of the primary legislation in force is in the form of decrees, since they date from the period of Military rule
State order (*Staatsbesluit, Landsbesluit*)	A Government Order containing general binding rules, to implement an act or to regulate a subject not reserved to be regulated by an Act.
Presidential Order (*Presidentieel Besluit*)	A decision by the President as executive Head of State by virtue of the Constitution.
Presidential Resolution (Presidentiële Resolutie)	A decision by the President by virtue of a law.
Ministerial Order (*Ministeriële Beschikking*)	A decision by a Minister, in the execution of a Ministerial task.
District Ordinances (*Districtsverordeningen*)	Limited legislative power given by the Constitution to the District Council to regulate their district, in accordance with their task description.

[1]Landsverordening: an act/law approved during Colonial period, before 1975;
Law/act: approved after 1975;
Decreet (Decree): approved in the period of Military rule, 1980-1986.

Table 2 Overview of various legal instruments relevant to Environment, Health and Safety

Title	Objective	Relevant provisions	Findings
ENVIRONMENT			
MINERAL RESOURCES			
THE CONSTITUTION OF SURINAME *(Grondwet van de Republiek Suriname)* S.B. 1987 no.116 last amended by S.B. 1992 no.38.	Provide rules for the sovereignty, principles for freedom, equity and democracy.	Article 6: The social objectives of the State shall aim at: a. The identification of the potentialities for development of the own natural environment and the enlarging of the capacities to ever more expand those potentialities g: the creation and stimulation of conditions necessary for the protection of nature and the maintenance of the ecological balance. Article 41: Natural wealth and resources are property of the nation and need to be devoted to economic, social, and cultural development. The nation has the inalienable right to fully take possession of the natural resources as to use these for the benefit of economic, social, and cultural development of Suriname.	According to the Development Plan 2012-2016 the primary objective of Suriname's environmental policy is to thankful exploit the abundant potential of the country's natural-physical environment for the wealth of the country and for the welfare of the people unto length of days. In this exploitation of the natural potential, the Government will continue to ensure a prudent and sustainable management of the Country's natural environment through protection measures and mitigating environmental damage, without making more compromising than necessary, so that sufficient and healthy living conditions for sustaining life are intact. The Government will fulfill the above by enforcement of the applicable laws and regulations.

Title	Objective	Relevant provisions	Findings
MINING ACT (*Decreet Mijnbouw)* S.B. 1986 no. 28, as most recently amended by S.B. 1997 no. 44	Governs the reconnaissance, exploration and exploitation of all mineral resources	Article 2: all raw material in and above the ground, including the territorial sea are property of the State. Article 4, sub. 1: during the mining operation all mining activities should be carried out ... applying the most modern international techniques ...professionally making use of advanced technology and appropriate materials taking into account current requirements regarding safety and health... including requirements to protect the ecosystems. Article 16, sub 1:after closure of the mining concession the holder of the right will, to the satisfaction of the Minister (of Natural Resources) take all necessary measures in the interest of public safety, the conservation of the deposit, the rehabilitation of the land concerned and the protection of the environment. Article19 A holder of a mining right is obliged to notify the Minister from Natural Resources of each mineral sediment and all available data, within thirty days of the discovery. Article 30 sub 2: the application for a mining concession should be accompanied by a Plan of Operations for the rehabilitation of mined out land. This article is also covered in the Petroleum Act, Article 7 sub 2 (see below).	According to article 2 of the Petroleum Act, the Mining Act is still applicable to petroleum activities as long as it is not contrary to a provision in the Petroleum Act. Article 4 can be interpreted as "to comply, at a minimum, with applicable laws, regulations, standards and guidelines for the protection of the environment and in their absence adopt the best practicable means to prevent or minimize adverse environmental impacts". This will be complied with by implementing the management plan which is one of the outputs of this ESIA and by working in accordance with Staatsolie EHS General Field Instructions[2].

[2] A list of the GFI is presented in ANNEX A

Title	Objective	Relevant provisions	Findings
		Article47 sub 1: Holders and third parties in areas where a mining right is granted shall be obliged to allow the holder of the mining right to carry out activities on these areas under the condition that: a. they have been informed on time of the intention of the activities stating the purpose, time and location where the activities will be carried out by the holder of the mining right; b. they receive compensation or prior assured compensation, all in accordance with the provisions of this decree. Article 47 sub 2: the aforementioned obligation regards the allowance of the mining right holder to set up facilities or carry out all works required for detecting minerals. The mining rights holder has the building and planting right *(recht van opstal)*. Article 48 sub 1: The holder of a mining right, will reasonably take into account the interests of right holders and third parties and will perform its activities in such a way that damage to the right holders and third parties are minimal. sub 2: The holder of a mining right is obliged to compensate the damage caused to the right holders and third parties occurred as a result of the activities. Sub 3: If the parties cannot reach an agreement on the nature and extent of the compensation a court ruling may be requested. Sub 4. The entitlement to compensation payable under the second paragraph of this Article and to the extent it is not based on an agreement is lapsed after five years from the date on which the damage to the beneficiaries or third parties is known.	Article 47 requires for Staatsolie to timely inform the landowners about the activities to be carried out on their land. Also compensation should be agreed upon. Staatsolie's approved procedure on access to land, and land acquisition *(Handboek Beheer Bedrijfsprocessen: Procedure toegang tot gronden en land aquisitie, versie 1.0, December 2013)* is compatible article 47 and 48 of the Mining Decree. If the company complies with their internal procedure, they are in compliance with these articles.

Title	Objective	Relevant provisions	Findings
		Sub 5. The holder of the mining right is not obliged to pay compensation for damage caused by mining activities to buildings and plantations which were established with the aim apparently to receive compensation Article 49: Instead of compensation in money, the right holders and third parties can request compensation by restoration of the land within reasonable time, unless the mining right holder will be hampered in execution of his mining rights. Article 50 sub 1: The holder of a mining right, who will make use of the whole or part of private land for long term, may on request of the right holder rent the land for a rental price fixed by parties. Sub 2: In case the land is being used by the mining right holder for longer than 7 years of abandoned by the miner and in such a state that it cannot be used by the right holder, he can request that mining right holder can purchase the land for a price be fixed by parties. In case no agreement can be reached about the rent and sale price, this can be decided by court. Article 51: The mining right holder will first try to reach an amicable agreement (including previously assured compensation) with right holders and third party. Sub 2: in case they cannot reach an agreement with regards to the compensation, they can request a judgment of court. The holder of the mining right can request for the judge to determine the amount of payment. Sub 3: The claim for determination of the amount of the security will be a separate judgment ruling.	

Title	Objective	Relevant provisions	Findings
		Article 52: Only the actual value of the private land and everything that belongs exclusively to the holders or third parties, as well as the actual costs and damages as provided in Article 48, are eligible. Sub 2: Attention should be paid to the reduction in value , which is the land and all that belongs to it , shall be deemed to have been from the moment that the holder of the mining right has started to use the land to the moment that it was returned to the holders or use third parties. Sub 3: The added value to the land will not be considered when determining the rent or compensation. The calculation of the rent, the price or compensation will consider the depreciation of land. Article 60sub 1: The supervision of mining operations and the compliance with the provisions of this Act rests with the Minister. The Minister may by ministerial order appoint bodies and individuals for effective control. sub 2: The bodies and individuals referred to in the first paragraph may enter any land, buildings and installations where mining activities are carried out for effective control in general, and in particular: a. for sampling; b. for checking of reports, records, accounts and other records; c. in order to obtain or make acquisition of other information. Article. 67 sub 1:"The Minister of Finance may by ministerial order grant full or partial exemption from import duties on a request for the import of equipment, materials, goods or equipment of any kind whatsoever to be used for the mining and purchased up to the moment the commercial production commences.	

Title	Objective	Relevant provisions	Findings
		Article 71: Any person shall be punished by imprisonment and/or a fine when: a. mining activities are undertaken without having been granted mining rights; b. refuse and/or provide no assistance for the facilities referred to in Article60; c. in violation of the truth formatted cards, records, reports, data and samples are provided to the State;	
PETROLEUM ACT *(Petroleum wet 1990)* S.B. 1991 no. 7, as most recently amended by S.B. 2001 no. 58	Rules for the exploitation and exploration of hydrocarbons.	Article 6 e, states; that the petroleum activities should be carried out in such a way, that negative impacts on the environment and natural resources are prevented Article 7, sub 1, states: for the performance of petroleum activities, due account should be given to the prevailing legal regulations, to build, establish, maintain and use all facilities that are necessary or advantageous for the proper performance of the petroleum activities. This suggests, that due account should be given to all the existing regulations dealing with the environmental aspects of building, establishment and maintenance of all such facilities. Article 7, sub 2, states: upon termination of the petroleum activities on state land the land should return to its original condition insofar as reasonably possible. Article 20: Areas where petroleum agreements apply to shall as much as possible be defined in terms of numbered blocks and indicated on a reference map made by or on behalf of the State over which the Republic of Suriname exercises sovereign rights.	By implementing the environmental management plan of this ESIA, and working in accordance with the General Field Instructions Staatsolie demonstrates commitment to comply with article 6.

Title	Objective	Relevant provisions	Findings
		Article 23 sub 1: In the context of a petroleum agreement, a development plan shall be formulated for any petroleum field that will be developed. sub 2: The development plan shall be submitted to the State Company who is granted the rights referred to in Article2, before a start is made with the implementation of this plan. Article28: By State Decree further rules may be laid down for: a. determining standards for petroleum and for the transport thereof. b. the preservation of the oil and preventing un-necessary waste. c. the protection of fisheries, shipping and other activities within or near the areas where petroleum activities are carried out.	According to article 28, sub c, further rules regarding conservation of petroleum, prevention of spilling and protection of the fisheries, shipping and other activities shall be laid down by means of a State Order. However this State Order still does not exist.
ACT REGARDING THE AUTHORIZATION OF STAATSOLIEMAAT-SCHAPPIJ N.V. FOR RESEARCH AND EXPLOITATION OF HYDROCARBONS *(Decreet van 11 mei 1981, houdende machtiging tot verlening aan Staatsolie Maatschappij Suriname NV van een vergunning tot het doen van*	Rules for research and exploitation of hydrocarbons.	Article 3: In case provisions of this Decree are contrary to other laws, and these provisions seem necessary to execute the rights and privileges of Staatsolie, the other laws will be derogated. Except when it regards provisions in the Constitution, the Act on general provisions on law in Suriname, the Penal Code *(Wetboek van Strafrecht)* and the Act on Criminal Procedure *(Wetboek van Strafvordering)* Article 7: the State Oil company is obliged to report to the State complete and accurate records which shall include: specifications on recoverable petroleum and other discovered mineral(s); raw data obtained from geological, geochemical and geophysical survey Article 8: the State Oil company is obliged to give entrance to the competent authorities and individuals to enter any area and building for inspection.	Staatsolie has the obligation to notify right holders and third parties on time before starting the activities. Also compensation should be previously assured. Article 9 can be interpreted as follows: "to comply, at a minimum, with applicable laws, regulations, standards and guidelines for the protection of the environment and in their absence adopt the best practicable means to prevent or minimize adverse environmental impacts".

Title	Objective	Relevant provisions	Findings
onderzoek naar en van een concessie voor de ontginning van koolwaterstof voorkomens) Decreet E-8B S.B. 1981 no. 59		Article 9: All operations shall be carried out according most modern international techniques and methods in general accustomed to in the oil industry and in accordance with "good oilfield practice"; the company is responsible for a safe discharge of water and waste oil Article 13: Right holders and third parties are obliged to permit in and on the land, within the concession area, the search and extraction of hydrocarbons by the concession holder if they are notified on time and against previously assured compensation. Article 25: the drilling act is not applicable on the Petroleum Operations in the Concession area.	Staatsolie must at least comply with the mitigation measures described in the management plan. Staatsolie's approved Procedure on Access to Land, and Land *Acquisition (Handboek Beheer Bedrijfsprocessen: Procedure toegang tot gronden en land aquisitie, versie 1.0, December 2013)* is compatible article 13 of the E-8B Decree. If the company complies with their internal procedure, they are in compliance with this article.
POLICE CRIMINAL ACT *(Politie Strafwet)* G.B. 1915 no. 77, z.l.g. bij S.B. 1990 no. 24		Article 39: It is prohibited to throw waste on public roads, or adjacent footpaths or places accessible to public or into a canal or creek destined for discharge. Article 51: It is prohibited to pollute a water reservoir, or canal used for drinking and washing purposes	Staatsolie should implement GFI 611: "Solid waste handling and disposal". Also the mitigation measures in the EMP to prevent or mitigate water pollution and soil degradation should be implemented
PENAL CODE *(Wetboek van Strafrecht)* G.B. 1911 no.1 z.lg. bij SB 2004 no. 105		Article 224 and 225: Applying a substance in a well, pump, source, snaffle, or in a creek or a water resource that is being used as drinking water supply, which can harm human health is prohibited.	Mitigation measures (EMP) to prevent or mitigate water pollution should be implemented

Title	Objective	Relevant provisions	Findings
LANDMANAGEMENT			
CIVIL CODE *(Burgerlijk Wetboek)* G.B. 1860 no. 4 last amended by S.B. 2004 no. 25.	Provide provisions for civil rights	Art. 625: ownership is the right to have free enjoyment and complete disposal, without impeding other's rights. All this, except for expropriation for public good against prior compensation, pursuant to the Constitution.	The drilling activities will be conducted on privately owned land. The right of owners must be respected by Staatsolie.
DECREE L2: DECREE ISSUANCE DOMAIN LAND *(Decreet uitgifte domeingrond)* S.B. 1982 no. 11	Regulates the issuance of domain land.	Article 1: all land to which others have not proven their right of ownership is domain of the State. Article 31: if the State land (in whole or partial) for which a land lease title has been issued, is needed for public works or in public interest, the Minister can lapse the right of lease. The title holder (land lessee) is entitled to compensation.	Drilling will also take place on plots with land lease title and it is the policy[3] of Staatsolie to rather enter into an agreement[4] to use the land than make use of the option stated in article 31. Staatsolie should implement its internal procedure on access to land, and land acquisition (*Handboek Beheer Bedrijfsprocessen: Procedure toegang tot gronden en land acquisitie, versie 1.0, December* 2013).

[3] Personal Communication with mr. E. Dennen, Company lawyer at Staatsolie.
[4] An standard agreement is attached in ANNEX B

Title	Objective	Relevant provisions	Findings
EXPROPRIATION LAW *(Onteigeningswet)* G.B. 1904 no. 37	Provide provisions for expropriation of land in public interest.	Article 1: Under expropriation is understood: depriving someone from his property, by the Government, in favor of a work for public interest. Article 2: except as provided by Article 3 and 13, expropriation can only take place under an Act which states that the expropriation is in the public interest. In addition the Act must indicate the nature and purpose, as well as the general direction of the work. Article 3: the statement by law mentioned in Art. 2, is not required when the expropriation is necessary in favor of a work ordered to be implemented pursuant to a Government Regulation *(Regerings Reglement)* Article 15: the Government must make an offer for compensation. The expropriated party can accept the offer or decline and start a judicial process for the determination of the compensation.	Drilling will also take place on privately owned land. However, it is the policy to enter into an agreement with the landowners, rather than aiming at expropriation by the Government. Staatsolie should implement its internal procedure on access to land, and land acquisition *(Handboek Beheer Bedrijfsprocessen: Procedure toegang tot gronden en land aquisitie, versie 1.0, December 2013).*
NATIONAL PLANNING ACT *(Planwet)* G.B. 1973 no 89.	Provide provisions for national and regional land use planning	Article 2 the Minister will make the arrangements required for a coherent and sustainable policy for the development of Suriname Article 3: the objective of the land-use policy of the Minister is amongst others the optimal exploitation of the natural resources in the interest of public prosperity and their welfare e.g. for sufficient job security, optimal spreading of welfare and to keep as far as possible a balance between the available space (land) and its development; In general, environmental conditions will have to be created for maintaining a	Although the Planning law is in force, it is not being implemented.

Title	Objective	Relevant provisions	Findings
		healthy environment, among other things, due to safeguarding nature reserves and of recreational space according to the future size of the population, together with keeping the soil, water and air clean. Article 7 stipulates the areas that can be designated on the maps of an National and/or Regional Development Program. These maps can, among other things, designate: *Development areas*, possibly distinguishing production areas, such as forestry, agricultural, mining, and industrial production, mixed and other forms of production; *Residential areas*, these are areas within which the provisions of the Urban Development Act and the Building Act will be applied; *Special controlled* areas are areas for which a special form of management by or due to the government is desired. Management of these areas will be regulated through State Decree.	
MINISTERIAL ORDER FROM 25 MARCH 2001 no. 452/0130, TO DESIGNATE NOORD SARAMACA AS MULTIPLE-USEMANAGEMENT AREA. *(Ministeriële beschikking van 25 maart 2001 no. 452/0130, houdende het*	Designate North-Saramacca as MUMA	Article 1: The North Saramacca MUMA is the coastal strip between the eastern boundary of the district Saramacca and Coppename river in the north of the Wayamboweg, the Saramacca River and Coppenameweg. This coast strip is important: • because of the Mangrove forest that protects the coast and river estuaries against erosion; • as a breeding and feeding area for specified fish; • as spawning and nursery ground for the marine fauna; • because it also serves as an important feeding ground for migratory shorebirds.	The study area (FLE and FLW) is situated in the conditional zone of the MUMA. In this area, land is available for issuance.

Title	Objective	Relevant provisions	Findings
ter beschikking stellen van het Ministerie van Natuurlijke Hulpbronnen van het kustgebied Noord Saramacca (Beschikking Beheersgebied Noord-Saramacca) S.B. 2002 no. 88		• Provides possibilities for apiculture, expansion of large-scale cattle ranching and farming • because the ecosystems and their biodiversity offer a range of eco-touristic activities that should be further developed; This area needs to be protected against threats due to: • disturbance of the fresh water supply to the brackish coastal area by withdrawal of freshwater from the swamps for oil exploitation and agriculture (rice, livestock]), which cause the mangrove forests not to function optimally and eventually may die; • increased risks of polluting the brackish swamps with agricultural chemicals, organic waste and oil; this contamination may strongly threaten the nursery and production function of the coastal brackish waters; • the economic disadvantages from chemicals penetrates the food chain (shrimps, fish, game) making it unsuitable for consumption and export.	

Title	Objective	Relevant provisions	Findings
MINISTERIAL ORDER "GUIDELINES FOR LAND ISSUANCE IN THE ESTUARINE MANAGEMENT AREAS" (*"Richtlijnen Gronduitgifte Estuariene beheersgebieden")* S.B. 2005 no. 16	Guidelines for the issuance and the use of domain land in the Estuarine management area	Article 4: requirements for the issuance of domain land in the estuarine management area: • a strip of 500 meters on both sides of the rivers and a stroke of 200 meters on both sides of creeks is reserved for protection forest or conversion forest; • it is prohibited to extract water from the estuarine swamps; • the discharge of waste water containing chemicals, pesticides is prohibited Article 7: Domainland at the left bank of the Saramacca river, starting from Carl Francois till the east border of Concordia, between the Saramacca river and the east West Connection <u>is not available for issuance</u>. Domainland in the following sections <u>is available</u> for issuance: a. From the district border Wanica –Saramacca to the north-south line pass Monkshoop and in the north of the east-west connection till the northern situated "redline" under the condition for discharge to the Saramacca river. b. From the north-south line pass Monkshoop to the West till Hildesheim and from the right bank of the Saramacca river till the northern situated "redline" as indicated on the land surveyor's map. c. From Boskamp till the west border of Caledonia and in the north of the east-west connection till a depth of 1 km. Article 9: In special cases could be deviated from the guidelines after having consulted the Head of LBB (Nature Conservation Division), the Head of the Department of Ground Inspection, the Head of the Office of State land Records and the District Commissioner.	The drilling area is situated in the area described in article 7 (2)b. Although this Ministerial Order provides guidelines and requirements for issuance of land by the Government, it is recommended that Staatsolie comply with requirements as set in article 4. In addition, Staatsolie should implement GFI 210: "Handling of Hazardous Chemicals in order to manage the discharge. Also the mitigation measures described in the EMP should be implemented by Staatsolie.

Title	Objective	Relevant provisions	Findings
CONSTRUCTION			
BUILDING ACT *(Bouwwet)* G.B. 1956 no. 30, amended by S.B. 2002 no. 72	Provide rules for construction	Article 1: a license from the director of the Ministry of Public Works is required for construction; Definition construction: to place, to entirely or partially set up, rebuild, change or extend buildings or other works Article 3: a request should be send to the director, to obtain for a license; Article 3a: a fee will be charged to obtain a construction license.	
BUILDING STATE ORDER *(Bouwbesluit)* G.B. 1956 no. 108	Provide further rules for construction	Article 4: construction shall only take place according to an approved construction plan by the director;	All building plans are subject to approval and are evaluated in accordance with the rules & regulations specified in this state order.
STATE ORDER FROM 24 FEBRUARY 2010, IMPLEMENTING ARTICLE 10 PARAGRAPH 3 OF THE BUILDING ACT *(Staatsbesluit van 24 februari 2010, ter uitvoering van artikel 10 lid 3 van de Bouwwet)* (S.B. 2010 no. 27)	This state order expands the scope of the Building legislation.	Article 1: the Building act and Building State Order are applicable to the whole territory of the Republic of Suriname, with the exception that the customary laws of tribal communities will be respected. The provisions of the Building Act and building Regulation will be applied if these construction works shall have, measured from the exterior, a bigger size than 15 m2 (square meters) and higher than 2.5 meters.	Since February 2010, the construction of all buildings in Suriname, except buildings of tribal communities with a certain measurement, are subject to the provisions of the Building Act and building state order.

Title	Objective	Relevant provisions	Findings
NATURE PROTECTION			
NATURE PROTECTION ACT (*Natuurbeschermings-wet)* G.B. 1954 no. 26 last amended by S.B. 1992 no. 80	Regulates the designation, protection and maintenance of our Nature Reserves.	Article 1: the President can designate Nature Reserves for the protection and maintenance of our natural resources. Article 2: To be designated as a nature reserve area it must comply with the requirement that the protection by the government is offered under the account of its diverse natural and scenic beauty and / or of its presence of scientific or culturally important flora, fauna and geological objects. Article 3: The general management and control over the nature reserves rest in the hands of the Head of the Suriname Forest Service, who gets advice from the Nature Preservation Commission. This Commission consists of at least 7 members. The Commission consist of the following members: 1° The Director of Agriculture; 2° The Head of the Suriname Forest Service; 3° The Entomologist of the Agricultural experimental station; 4° The Head of the Geological Mining Service. The remaining members, from which at least one is a District Commissioner, are appointed and dismissed by the President. The President chooses the Chairman and the Secretary from among the members. As far as it is needed, a local manager is appointed for every nature reserve. Article 5: It is prohibited to intentionally or due to negligence damage the condition of the soil, the natural beauty, the fauna, and the flora or to perform acts that may impair the value of the reserve as such. It is also	

Title	Objective	Relevant provisions	Findings
		prohibited to hunt and to fish and persons are also not allowed to have with them dogs, firearms, and any hunting or catching device, without the required license thereto. Article 6: The head of LBB may grant a license to persons to undertake business in a not closed part of the nature reserve corresponding with their approved plan with explicit conditions that no damage or detriment whatsoever is done to the nature reserve. Article 7:The Head of the Suriname Forest Service can give written permission to special persons corresponding to a plan approved by him to carry out a business in an area of the nature reserve which is not closed off, or to co-operate with the establishment of a business concern, with explicit conditions that no damage or detriment whatsoever is done to the nature reserve by these people or their businesses. He/she can give a written license to certain persons under certain explicit conditions laid down by him in certain specific areas of the nature reserve to gather forest and forestry by-products, put cattle out to pasture, or to fish.	
OCCUPATIONAL HEALTH AND SAFETY			
SAFETY ACT 1947 *(Veiligheidswet)* G.B. 1947 no. 142 last amended by S.B. 1980 no. 116	Pertains to safety during labor activities.	Article 3: the president can define measurements of safety by regulations for entrepreneurs in the areas of: • The avoidance or limitation of accidents and fires, provision of help during accidents and possibilities of escape during fire; • Stimulation of cleanliness; • Stimulation of bearable temperatures; • To prevent the existence and the spread, or the removal of	Staatsolie has an approved Environmental Health and Safety Policy and by implementing the General Field Instruction Staatsolie shows commitment to pertain safety during labour activities: The following GFI should be

Title	Objective	Relevant provisions	Findings
		detrimental or unpleasant fumes of gases or dust; • The prevention of damage to the health due to labor; • The heights of workrooms and free airspace for everybody ; • The daylight and artificial light ; • Electrical installations; • Locker rooms, break rooms and sleeping accommodations; • Toilets, urinals and washing rooms.	implemented: • GFI 105: "Routine Safety Talk" • GFI 106: "HS and Security Induction for New Arrivals" • GFI 110: "Incident reporting • GFI 119: "Personal protective equipment • GFI 120: "General traffic rules" • GFI 132: "Contractor Health, Safety and Environmental Management • GFI 200: "Permit To Work" • GFI 210: "Handling of Hazardous Chemicals". • GFI 232: "Job Safety Analysis" • GFI 400: "Inspection of Fire Protection and Emergency Equipment • GFI 611: "Solid waste handling and disposal •

Title	Objective	Relevant provisions	Findings
SAFETY REGULATION 1, REGARDING THE PREVENTION AND LIMITATION OF ACCIDENTS IN ALL ENTERPRISES (*Veiligheidsvoorschrift 1)* G.B. 1947 no. 168	Regulates the prevention and limitation of accidents	Article 1: the parts of power tools *(krachtwerktuig)* and instruments *(werktuigen)* must be sheltered in case there is a risk; Article 6: when a machine starts up, persons should not be in touch with that machine; Article 13: lifting material should be well-maintained and when load is lifted, sudden drop should be prevented; when dropping a load the dropping should be slowed down with brakes; Article 17-19: lifting equipment, tackles and the parts should be used in compliance with safety measures; Article 40: Workers should have the disposal over appropriate protective equipment. For this, suitable storage places should be made available at land, in the air and on water.	According to Staatsolie's PPE policy it is the responsibility of supervisory personnel to provide the necessary PPE and instructions for proper use and maintenance to workers who work under his or her supervision. Staatsolie aspires to create a work environment in which working safely has priority and in which risks to the health and safety of workers are minimized and where practicable, eliminated. Thereto the company has implemented various technical and administrative control measures and appropriate Personal Protective Equipment (PPE) are provided to eligible workers. Selection of PPE should be based on a thorough assessment of the health and safety risks associated with the work to be performed. Staatsolie should implement GFI 119: "Personal protective equipment

Title	Objective	Relevant provisions	Findings
SAFETY REGULATION 3 TO PROVIDE FIRST AID (*Veiligheidsvoorschrift 3),* G.B. 1948 no. 183	Provide provisions for enterprises regarding first aid	Article 1: an enterprise in which driving gears or implements are set in motion by power tools it is obliged to provide effective first-aid in case of accidents. Article 7: the first aid person must hold a certificate of competency issued by the Medical Inspector.	Staatsolie should train special dedicated personnel in First Aid.
SAFETY REGULATION 7, WORK CONDITIONS (*veiligheidsvoorschrift 7)* S.B. 1981 no. 72	To promote safe and comfortable working conditions relating to hazardous or disturbing noises and vibrations.	Article 21: machinery, tractors, plants or equipment shall be constructed, equipped or prepared or supported that they do not cause harmful or annoying noise or vibration when in operation, unless it is impossible or cannot be expected reasonably. Article 23:the performance of work shall be such that it does not cause harmful or annoying noise or other harmful or annoying vibrations, unless it is impossible or cannot reasonably be requested.	Staatsolie should avoid or minimize harmful or annoying noise and vibration
LABOUR ACT *Arbeidswet* G.B. 1963 no. 163 last amended by S.B. 2001 no. 71.	Provide rules for safe labour	Article 3: it is prohibited in a company to work longer than 8½ hours per day or 48 hours per week. Article 4: the minister can give permission for longer working hours under special conditions; Article 6: the head of Labour inspection is responsible for the issuance of overtime license. article 8: a worker is not allowed to work on Sunday, or on days that are considered the same as Sunday;	Labour hours should be complied with.

Title	Objective	Relevant provisions	Findings
		Article 10: if in an enterprise, as designated by state order, work must be carried out on Sundays a license should be obtained by the Head of the Labour Inspection. Every working Sunday should be replaced by another rest day of at least 24 hours; Article 12: the employer is responsible for overtime allowance.	
ACT REGARDING THE LIABILITY OF THE EMPLOYER IN CASE OF ACCIDENTS OR OCCUPATIONAL DISEASE OF THE EMPLOYEE AND COMPENSATION (The Accident Regulation) *Ongevallenregeling* G.B. 1947 no. 145 last amended by S.B. 2001 no. 66	Provide rules for the employer for compensation of accidents during work	Article 4: the employer must compensate for accidents from his worker, which has happened in connection with their employment. Article 6: the indemnification in case of accidents exists of: - medical treatment and nursing including medicines, artificial appliances such as artificial arms, legs, funeral costs etc. Article 10: the employer is obliged to insure the risk arising for him from this law to a competent insurance company.	

Title	Objective	Relevant provisions	Findings
STATE ORDER ON DRIVING *(Rijbesluit)* G.B. 1960 no. 105 last amended by S.B. 2005 no. 17	Provide rules for safe driving	Article 16: The load of a vehicle shall be placed in such a manner that no harm or danger can be caused to others. The load may not reduce the safety of the vehicle. Article 22: if the road will be occupied more than usually, authorization from the District Commissioner, in whose resort the road transport will take place is obliged. With more than usually is meant: • if the load is substantially wider than the distance between the wheels; • if the speed is so slow that it can lead to traffic congestion • if it regards special vehicles, which are not intended for road traffic. Article 31c: noise and environmental aspects: the exhaust pipe from vehicles must be sound proofing; the Minister can prescribe allowable noise standards and carbon monoxide standards for exhaust fumes; Article 32a: the wearing of seat / safety belts is compulsory; Article 32b: while driving it is prohibited to make manual calls with a mobile phone.	Road transport will have impacts such as emissions, nuisance, traffic congestions as well as the risks for traffic accidents. Staatsolie should comply with the law and implement the preventive and mitigation measures described in the EMP and GFI 120: "General traffic rules" .

Title	Objective	Relevant provisions	Findings
BILLS			
DRAFT ACT CONTAINING RULES FOR SUSTAINABLE ENVIRONMENTAL MANAGEMENT *(Milieuwet)* and DRAFT ACT ANVIRONMENTAL AUTHORITY (*Ontwerpwet Milieu Autoriteit)* Versie juni 2010	Rules for management of the environment.	Some key provisions in the drafts are: • Transforming of NIMOS into an "Environmental Authority"; • allow for the creation and implementation of a comprehensive environmental policy and planning process; • establish the importance of environmental protection and parity with all other considerations • establish an Environmental Authority, which will become the primary environmental agency in Suriname; NIMOS will be the Environmental Authority; • give effect within Suriname to many internationally-accepted principles of Environmental Law, including the principle of precaution, the polluter pays principle and the concept of environmental impact assessment • introduce and give effect to the Environmental Impact Assessment Guidelines (see below); • enshrine the principles of access to information, participation and legal protection for the Surinamese public; • allow for the introduction of suitable regulations to address specific issues of environmental protection; and establish a framework for enforcement of environmental legislation and regulations, together with penalties.	The National Institute for Environment and Development in Suriname (NIMOS) has prepared draft legislation for the protection and management of the environment namely the draft "Environmental Act" and the draft "Act for the establishment of the Environment Authority". It contains the basic fundamentals of environmental law, such as the "preventive" principle, the principle of "the polluter pays" and the principle of "environmental impact assessment".

Title	Objective	Relevant provisions	Findings
DRAFT ACT CONCERNING THE PROTECTION OF GROUNDWATER EXTRACTION AREAS (*Concept Wet Grondwaterbe-schermingsgebieden*). (Version October 2013)	Rules for the protection of groundwater.	The protection of the catchment is to ensure that no bacteriological contaminated water, hydrocarbons or other toxic substances reach the wells within a period of 60 days.The60 day period is crucial because the germs in the groundwater are naturally degraded within this period. Pollution will be mainly caused by surrounding wells, which are in contact with the aquifer from which water is extracted. The greatest risk of contamination of the groundwater is in many cases because the well is not sealed. Within the catchment is a strict protection regime required. With the ban system the act seeks to prevent that pollutants make the groundwater less suitable and that activities take place that can make harmful substances more easily accessible and that potential sources of contamination are introduced within the zone. Also compensation for damage is regulated by this law. It regards damage that is caused by application of this law will be determined in fairness and paid by the Director of the Ministry responsible for water supply.	It is stated in the Development Plan 2012-2016 that the Draft Acts on groundwater will be sent to parliament for adoption during the current Government term. Approximately 147 wells will be drilled and drilling will start in 2015. Drilling will be conducted by vertical drilling or deviated drilling. The final decision on the drilling techniques will be made during production development. The production liquids will be transported by pipelines.
DRAFT ACT CONCERNING THE EXTRACTION OF GROUNDWATER (*Concept Grondwater wet*).	Provide rules for extraction of groundwater.	According to this act it is prohibited to extract groundwater without a license from the Minister of Natural Resources. A Commission Water management will be established and one of the tasks is to advise the Minister in granting permits for water extraction. The permitting procedures is also regulated through this Act. In addition, the act also sets technical specifications for drilling.	Applicable in case groundwater will be extracted.

Ministry	Responsibilities	Remarks

4 Institutional Framework

4.1 Environmental management structure

Article 6g of the constitution states that the social objective of the State is directed towards the creation and stimulation of conditions necessary for the protection of nature and the maintenance of the ecological balance.

In order to facilitate efficient and effective implementation of environmental policy the Government of Suriname created an environmental management structure that is comprised of the following actors:

- the Ministry of Labor, Technological development and Environment (ATM), responsible for the coordination of the preparation of the environmental policy and the monitoring thereof;
- the National Council for the Environment, responsible for advising the Government of Suriname with regards to environmental policy;
- the National Institute for Environment and Development in Suriname (NIMOS), the technical working arm of the Ministry of ATM and responsible for review of ESIA's, pollution control, monitoring and enforcement.

In absence of a dedicated national environmental law, the responsibility for environmental related issues remains widely spread between a number of agencies and departments in other ministries.

This is reflected in the State Order "Task Descriptions Ministries", (S.B. 1991 no. 58 last amended by S.B. 2010 no. 174) which outlines the tasks and responsibilities of the different Ministries.

Ministry of Natural Resources (NH) <u>Directorate</u> (*Directoraat)*: Energy, Mining and Water Management <u>Divisions</u> (*Afdelingen)*: Geological Mining Service Water Supply Service <u>Parastatal</u> Staatsolie Maatschappij Suriname	The national policy with regard to energy and the natural resources, except the forest policy; The inventory, exploration, optimal exploitation and management of: minerals, water and energy; Monitoring the compliance of the rules and regulations with regard to water management, minerals, the generation, transport and distribution of energy; Water management and water supply	Staatsolie also acts as agent for the State with respect to the petroleum industry. In this capacity, Staatsolie Company is responsible for assessing the hydrocarbon potential of open blocks, offering them to the industry, negotiating petroleum contracts and supervising the execution of these agreements. Open blocks are made available through competitive bidding rounds or direct negotiations The Vision of the Ministry of Natural Resources is to continue to play a leading role in order to contribute to the well-being and prosperity of our nation and contribute to the sustainable development of the natural resources. Specific tasks for the mining sector: • Management of all activities in the mining sector(policy, policy development, policy implementation, monitoring, control and provision of mining rights); • Encourage developments in the mining sector; • Stimulate research, exploration and exploitation activities to map the minerals; • Negotiate with local and international companies for the exploration and exploitation of our mineral resources; • Monitoring and control through its structures of the State Enterprises (Grassalco NV and State Oil Company Suriname NV); • Monitor steering committees, foundations and institutes (Suriname Bauxite Institute(BIS) and the Geological Mining Service(GMD)

Ministry of Labor, Technological Development and Environment (ATM) <u>Directorate</u> (Directoraten): Labor Environment <u>Division</u>: Labor Inspection <u>Institute</u>*(Instituut)*: National Institute for Environment & Development in Suriname (NIMOS)	Coordination of the preparation of environmental policy and monitoring of the implementation Promotion of the implementation of environmental treaties Promotion and realization of environmental legislation Promote the use of environmental sound technologies Identification, preparation and implementation of environmental training and education programs for environmental institutes and organizations Inspection of companies on the use of environmentally harmful materials and technologies Involvement of the public to combat environmental pollution.	ESIA process: guidance, review of ESIA report and monitoring of project is being done by NIMOS.
Ministry of Public Works <u>Directorates:</u> Civil engineering works Engineering works and Spatial Planning Public Green Development Projects	Policy, planning and development of general Architectural structure, and other civil engineering infrastructure in the public interest Flood control and drainage Technical provisions for traffic and public transport	The Ministry of Public Works' responsibilities are the management of all main waterways, roads, bridges, sluices etc. and gives permits in accordance with the construction legislation.

Ministry of Regional Development Sub-directorate*(Onder-Directoraat):* Under Directorate for regional administration, Under Directorate decentralization and Under Directorate for development of the interior	The regional government An integrated government action aimed at regional development and improvement of the living environment of residents in the districts and the interior. A coherent policy aimed at cooperation between the districts, to promote the common interests	The project activities will be executed in District Saramacca. One of the tasks on regional level is to develop administrative procedures to promote participation in decision-making at the level of districts. Within the ESIA process public consultations will be held to inform the public of the proposed activities of Staatsolie, the potential social and environmental impacts and the key findings of the ESIA study. In case the road will be occupied more than usually for transportation, authorization should be requested from the DC.
Ministry of Agriculture, Animal Husbandry and Fisheries Sub-directorate*(Onder-Directoraat):* Agricultural research, Marketing and Processing Fisheries Animal Husbandry Planning	Policy regarding agriculture, animal husbandry, fisheries and beekeeping ; Monitoring of the correct use of land and waters issued for agriculture purposes Research and education in the policy areas	The Ministry of LVV is responsible for the maintenance of the waterways, roads and water structures on agricultural lands.

Ministry of Physical Planning, Land and Forest Management Land Affairs Divisions*(Afdelingen)*: Hypothecator Office, Domain, Land Inspection Sub-directorate*(Onder-Directoraat)*: Forest Management, Divisions *(Afdelingen)*: Forest Management, Nature Conservation Institutes (*Instituten)*: Stinasu	• Land destination, and where necessary in interdepartmental relation; • The control of legitimate and appropriate use of issued land, and where necessary in inter departmental relation; • The inventory, exploration, optimal exploitation and management of the natural resource forest, flora and fauna; • Control on the implementation of laws and regulations with regards to flora and fauna; • Responsible nature management and protection;	Nature reserves and MUMA's are managed by the head of the Surinamese forest service (LBB), while the Nature Conservation Division is entrusted with the daily management of protected areas and wildlife management in Suriname. They supervise that no damage is caused to these areas. It is therefore recommended that all economic activities shall be reported to the head of LBB.

Table 3 presents the Ministries and a description of their tasks relevant to the implementation and management of the present project.

Ministry	Responsibilities	Remarks
Ministry of Natural Resources (NH) <u>Directorate</u> (*Directoraat)*: Energy, Mining and Water Management <u>Divisions</u> (*Afdelingen)*: Geological Mining Service Water Supply Service <u>Parastatal</u> Staatsolie Maatschappij Suriname	The national policy with regard to energy and the natural resources, except the forest policy; The inventory, exploration, optimal exploitation and management of: minerals, water and energy; Monitoring the compliance of the rules and regulations with regard to water management, minerals, the generation, transport and distribution of energy; Water management and water supply	Staatsolie also acts as agent for the State with respect to the petroleum industry. In this capacity, Staatsolie Company is responsible for assessing the hydrocarbon potential of open blocks, offering them to the industry, negotiating petroleum contracts and supervising the execution of these agreements. Open blocks are made available through competitive bidding rounds or direct negotiations The Vision of the Ministry of Natural Resources is to continue to play a leading role in order to contribute to the well-being and prosperity of our nation and contribute to the sustainable development of the natural resources. Specific tasks for the mining sector: • Management of all activities in the mining sector(policy, policy development, policy implementation, monitoring, control and provision of mining rights); • Encourage developments in the mining sector; • Stimulate research, exploration and exploitation activities to map the minerals; • Negotiate with local and international companies for the exploration and exploitation of our mineral resources; • Monitoring and control through its structures of the State Enterprises (Grassalco NV and State Oil Company Suriname NV); • Monitor steering committees, foundations and institutes (Suriname Bauxite Institute(BIS) and the Geological Mining Service(GMD)

Ministry of Labor, Technological Development and Environment (ATM) Directorate (Directoraten): Labor Environment Division: Labor Inspection Institute*(Instituut)*: National Institute for Environment & Development in Suriname (NIMOS)	Coordination of the preparation of environmental policy and monitoring of the implementation Promotion of the implementation of environmental treaties Promotion and realization of environmental legislation Promote the use of environmental sound technologies Identification, preparation and implementation of environmental training and education programs for environmental institutes and organizations Inspection of companies on the use of environmentally harmful materials and technologies Involvement of the public to combat environmental pollution.	ESIA process: guidance, review of ESIA report and monitoring of project is being done by NIMOS.
Ministry of Public Works Directorates: Civil engineering works Engineering works and Spatial Planning Public Green Development Projects	Policy, planning and development of general Architectural structure, and other civil engineering infrastructure in the public interest Flood control and drainage Technical provisions for traffic and public transport	The Ministry of Public Works' responsibilities are the management of all main waterways, roads, bridges, sluices etc. and gives permits in accordance with the construction legislation.

Ministry of Regional Development Sub-directorate*(Onder-Directoraat):* Under Directorate for regional administration, Under Directorate decentralization and Under Directorate for development of the interior	The regional government An integrated government action aimed at regional development and improvement of the living environment of residents in the districts and the interior. A coherent policy aimed at cooperation between the districts, to promote the common interests	The project activities will be executed in District Saramacca. One of the tasks on regional level is to develop administrative procedures to promote participation in decision-making at the level of districts. Within the ESIA process public consultations will be held to inform the public of the proposed activities of Staatsolie, the potential social and environmental impacts and the key findings of the ESIA study. In case the road will be occupied more than usually for transportation, authorization should be requested from the DC.
Ministry of Agriculture, Animal Husbandry and Fisheries Sub-directorate*(Onder-Directoraat):* Agricultural research, Marketing and Processing Fisheries Animal Husbandry Planning	Policy regarding agriculture, animal husbandry, fisheries and beekeeping ; Monitoring of the correct use of land and waters issued for agriculture purposes Research and education in the policy areas	The Ministry of LVV is responsible for the maintenance of the waterways, roads and water structures on agricultural lands.
Ministry of Physical Planning, Land and Forest Management Land Affairs Divisions*(Afdelingen)*: Hypothecator Office, Domain, Land Inspection Sub-directorate*(Onder-Directoraat)*: Forest Management, Divisions *(Afdelingen)*: Forest Management, Nature Conservation Institutes (*Instituten)*: Stinasu	• Land destination, and where necessary in interdepartmental relation; • The control of legitimate and appropriate use of issued land, and where necessary in inter departmental relation; • The inventory, exploration, optimal exploitation and management of the natural resource forest, flora and fauna; • Control on the implementation of laws and regulations with regards to flora and fauna; • Responsible nature management and protection;	Nature reserves and MUMA's are managed by the head of the Surinamese forest service (LBB), while the Nature Conservation Division is entrusted with the daily management of protected areas and wildlife management in Suriname. They supervise that no damage is caused to these areas. It is therefore recommended that all economic activities shall be reported to the head of LBB.

Table 3: Ministries and a description of their tasks relevant to this project

5 Corporate Environmental Policies and Standards of Staatsolie

5.1 Staatsolie Vision 2020

Staatsolie intends that this ESIA reflects its corporate Vision and Values, particularly in regards to sustainability.

Mission

- To develop Suriname's hydrocarbon potential over the full value chain, to generate electricity and to develop renewable sustainable energy resources.
- To secure the energy supply of Suriname and to establish a solid position in the regional market.
- To expand our reputation based on our growth performance, flexibility and corporate social responsibility.

Values

1. **HSEC Focused**: We put ***health*** and ***safety*** first, strive for zero harm to our ***people*** and the ***communities*** around us, and minimize negative impacts upon the ***environment.***
2. **Integrity:** We are honest and do what we say we will do.
3. **People Focused:** We create a supportive and collaborative environment, respect each other, are open to other's ideas and facilitate personal and professional growth.
4. **Excellence:** We set high standards for quality, strive to exceed expectations and do our work with a sense of urgency.
5. **Accountability:** We accept responsibility for our job and actions, are co-operative, and create a non-blaming environment.

Box 1: Staatsolie's Vision and values in regards to sustainability

5.2 Staatsolie Health, Safety and Environmental Policy

Health, Safety & Environmental Policy

Staatsolie is convinced that dedicated care for the safety and health of its employees, contractors, neighbors, and for the environment is essential for a sustainable development of the hydrocarbon industry in Suriname.

It is therefore the policy of Staatsolie to conduct business activities in such a way, as to prevent harm to the safety and health of its employees, contractors, neighbors, and the environments that may be affected by our operations.

The principles of Staatsolie's Health, Safety and Environmental Policy that will guide our daily operations are:

. Prevention of all incidents;

. Compliance with all applicable health, safety and environmental legislative requirements;

. Continual improvement of the company's health, safety and environmental performance;

. Prevention of environmental pollution.

Staatsolie is committed to these principles and will implement a Health, Safety and Environmental Management System that includes the following key-elements:

. Communication of the Health, Safety and Environmental Policy, objectives and targets, and other relevant matters to all employees, contractors and stakeholders;

. Integration of Health, Safety and Environmental management into overall business management;

. Practice of incident management, proactive as well as reactive;

. Programs to ensure the safe and environmentally responsible handling of waste streams;

. Conduct business activities in accordance with applicable health, safety and environmental laws & regulations and relevant international hydrocarbon industry standards;

. Communication of clearly defined and documented responsibilities and accountabilities of all employees with regard to health, safety and environmental performance;

. Training of all employees to perform their jobs in a safe and environmentally responsible manner;

. Annual objectives and targets designed to achieve continual improvement in the health, safety and environmental performance;

To ensure its continuing effectiveness the Health, Safety and Environmental Policy and Management System will be reviewed annually.

M.C.H.Waaldijk
Managing Director
February 2006

Box 2: Staatsolie's Health, Safety and Environmental Policy

MAATSCHAPPIJ SURINAME N.V.

STATE OIL COMPANY SURINAME N.V.

Staatsolie Risk Management Policy

As an integrated oil company, Staatsolie is exposed to a wide range of risks with the potential to impact health, safety, environment, reputation, community, legal and the financial performance of Staatsolie and thereby the achievement of our objectives.

It is therefore the policy of Staatsolie to implement Enterprise Risk Management (ERM) to create a consolidated view of risk throughout our organization.

Risks faced by Staatsolie shall be managed on an enterprise-wide basis which means that we evaluate significant risk exposure related to our corporate goals and that we manage risk at corporate level.

Roles and responsibilities, and accountabilities will be clearly defined in our ERM process, which will contribute to a transparent and clearly understood ERM process. By understanding and managing risk we provide greater assurance and confidence for our shareholders, employees, customers and suppliers, and the community in which we operate. The ERM process consists of the following key steps:

- Risks will be identified, analyzed and scored in a consistent manner for all business processes, projects and functions. Common systems and methodologies will be used.
- Risk controls will be designed and implemented to reasonably assure the achievement of our objectives. The effectiveness of these controls will be systematically reviewed and, where necessary, improved.
- Risks will be monitored, reviewed and reported.

The ERM process will be evaluated on a regular basis to ensure its continuing contribution to the success of our organization achieving its business objectives.

1 April 2013,

M.C.H. Waaldijk
Managing Director

Box 3: Staatsolie Risk Management Policy (April 2013)

STAATSOLIE **MAATSCHAPPIJ SURINAME N.V.**
STATE OIL COMPANY SURINAME N.V.

COMMUNITY RELATIONS POLICY

Staatsolie performs its business activities in such a way that communities' interests and expectations with regard to socio-environmental aspects are properly considered.

Staatsolie is committed to this policy by taking into consideration the following key elements:

1. Establish and encourage relationships of trust with the communities and their representatives, based on continuous dialogue.
2. Conduct business activities in accordance with applicable local laws, regulations and international treaties, ratified by the Government of the Republic of Suriname, with special emphasis on Human Rights and cultural values of a multi-ethnic community.
3. Conduct socio-environmental baselines studies and develop and implement an effective socio-environmental management system to minimize socio–environmental impacts.
4. Maximize positive impacts through initiatives and social alliances aiming at mutual benefits, value creation, and sustainable local development.
5. Ensure community participation and engagement with impacted communities and other stakeholders, during the full lifecycle of projects.
6. Communicate and disseminate the contents of this Community Relations Policy to our various stakeholders, including contractors and suppliers.
7. Communicate and report periodically, publicly the results of community relations management.

To ensure the effectiveness, the Community Relations Policy will be reviewed bi-annually.

December 13, 2011

M.C.H. Waaldijk
Managing Director

Box 4: Staatsolie Community Relations Policy

6 International Best Practice Standards

6.1 Introduction

Staatsolie also intends that the ESIA meets environmental assessment standards of the Government of Suriname and the World Bank Group (World Bank EA Sourcebook) and be undertaken in a manner consistent with the International Finance Corporation's Environmental and Social Review Procedure.

6.2 World Bank Group

Staatsolie has indicated that World Bank Source Book for Environmental Assessment should be used as a guidance document for this study.

The Sourcebook is a reference document that provides practical guidance for identifying and addressing negative environmental impacts of development projects. The Sourcebook aims to collect all of the different World Bank policies, procedures, guidelines, precedents and best practice that reside in different World Bank publications into a single source. The document is continually updated and covers a wide range of subjects. Included are guidelines for addressing specific ecological, socio-economic and other issues that may arise during an environmental assessment process, sectoral guidelines for environmental assessment and guidelines for the involvement of communities and NGOs in the process.

Another publication by the World Bank Environment Department is the Pollution Prevention and Abatement Handbook that focuses specific attention on pollution control (Worldbank 1999). The handbook among others contains General Environmental Guidelines (GEG) used for general applications, but also sector-related guidelines, e.g. for the onshore oil and gas development.

In 2006, the International Finance Corporation (IFC), the private sector arm of the World Bank Group, has developed Performance Standards (PS), which are part of the Sustainability Framework. These have become globally recognized as a benchmark for environmental and social risk management in the private sector. This Sustainability Framework has recently been updated following an 18-month consultation process with stakeholders around the world.

Effective on January 1, 2012, these updates reflect the evolution in good practice for sustainability and risk mitigation over the past five years. They incorporate modifications on challenging issues that are increasingly important to sustainable businesses, including supply-chain management, resource efficiency and climate change, and business and human rights.

The performance standards aim at specific industries or types of projects. They are used by the IFC to monitor a project's performance and set minimal acceptable environmental requirements in the case of IFC financed investment projects. These IFC Performance Standards have become a benchmark for large private sector projects, especially in developing countries.

The Performance Standards (PS) applicable for the current project are:

- PS 1: Assessment and management of Environmental and Social risks and Impacts
- PS 2: Labor and Working Conditions
- PS 3: Resource efficiency and Pollution Prevention
- PS 4: Community Health, Safety, and Security
- PS 6: Biodiversity Conservation and Sustainable management of living natural resources

Corresponding to the Performance Standards IFC has prepared a set of Guidance Notes. These Guidance Notes offer helpful guidance on the requirements contained in the Performance Standards, including reference materials, and on good sustainability practices to improve project performance. These Guidance Notes are not intended to establish policy by themselves; instead, they explain the requirements in the Performance Standards.

The Performance Standards will be read along with their corresponding EHS Guidelines as published by the IFC. The EHS Guidelines contain the performance levels and measures that are normally acceptable to IFC and are generally considered achievable in new facilities at reasonable costs by existing technology.

7 Relevant International Conventions

7.1 Introduction

In the year 1992 in Rio two important documents, the "Rio Declaration on Environment and Development" (the so-called *Rio Declaration*) and "Agenda 21" were adopted by different countries including Suriname. The Rio Declaration contains the basic principles of environmental law, such as the preventive principle, the principle of "the polluter pays" and the principle of environmental impact assessment.
It is stated that, "Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority".

Although the fact that the abovementioned documents are "soft law" (not mandatory), they are considered to be the legal framework for the development of national environmental legislation and policy making.

Through the years Suriname has ratified approximately thirty (30) environmental conventions and below those are listed that are relevant for this project.

Table 4 Overview of relevant international treaties ratified by Suriname

Title	Purpose	Comments
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) Ratification 1985 Focal point: RGB/NB	Provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources and recognizes the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.	The Coppename-monding Nature Reserve is a Ramsar site. However, this area is minimal 7 km from the nearest drilling well and no impacts are expected.
United Nations Convention on Biological Diversity (CBD) Ratification 1996 Focal point: Mrs. E. Naarendorp Environment Coordinator Sr Advisor to the President	Conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.	In 2006 a National Biodiversity Strategy has been approved. The Vision of Suriname's Biodiversity Strategy is to value and protect our biological diversity, including all natural and cultural resources through equitable and sustainable use for present and future generations. Recently the National Biodiversity Action Plan 2012-2016 was published.

Title	Purpose	Comments
Convention on Nature protection and Wildlife Preservation in the Western Hemisphere Ratification 1985 Focal point: RGB/NB	The convention has provisions to establish a set of protected areas: • national parks to provide recreational and educational facilities; strict wilderness areas to be maintained. • co-operation in the field of research between governments; species listed in annex to enjoy special protection and controls to be imposed on trade in protected fauna and flora and any parts thereof.	The Coppename-monding Nature Reserve is a Western hemisphere shorebird Reserve which is situated at least 7 km from the nearest drilling well. No impacts are expected for the nature reserve.
United Nations Framework Convention on Climate Change (UNFCC) Ratification 1997 Focal Point: Mr. J. Goedschalk Office of the President	The treaty is aimed at stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Under the Convention, both developed and developing countries agree to take measures to limit emissions and promote adaptation to future climate change impacts; submit information on their national climate change programs and inventories; promote technology transfer; cooperate on scientific and technical research; and promote public awareness, education, and training.	The most recent publications regarding Climate Change are: 1.Climate Change Action Plan, 2008-2013 prepared for NIMOS 2. Suriname's Second National Communication to the UNFCCC prepared for the Ministry of Labour, Technological Development and Environment
Kyoto Protocol	The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets. Recognizing that developed countries are principally responsible for the current high levels of GHG emissions in the atmosphere as a result of more than 150 years of industrial activity, the Protocol places a heavier burden on developed nations under the principle of "common but differentiated responsibilities."	The Clean Development Mechanism (CDM) is one of the flexible market mechanisms under the Kyoto Protocol, which allows industrialized countries to invest in greenhouse gas mitigation projects in developing countries. The mitigated emissions can be qualified into certified emission reduction credits (CERs). These CERs can be traded and used by industrialized countries to meet a part of their targets under the Kyoto Protocol, while assisting developing countries to achieve sustainable development through reduction of greenhouse gas emission.

Title	Purpose	Comments
		The recovery and utilization of gases produced as a by-product during the oil production activities could qualify as a potential CDM project. The recovered gas can be processed into electric energy. Further research and study is required.

8 Summary

The legal framework in which the Farmersland Production Development project will take place is very broad and this report mainly covers the Environmental, aspects. Special consideration should also be given to the legal aspects of access to land of third parties.

Beside the national legal regime, there are a number of international Conventions ratified by Suriname, which have to be taken into consideration. However, due to our law system, these conventions are only enforceable when transformed into national legislation.

In order to meet the national legal requirements, Staatsolie should consider the following:

- Comply with the requirements of the Environmental Impact Assessment Guidelines of NIMOS, including the undertaking of a Social Impact Assessment and the preparation of an Environmental and Social Management Plan. Project activities can only start, when NIMOS has submitted a positive advice to the permitting agency.
- Comply with the environmental, health and safety stipulations in the Mining Act, Petroleum Act and the Decree giving authorization to Staatsolie to do research and exploit hydrocarbons. Compliance with the aforementioned laws will be achieved when Staatsolie implements the management plan which is one of the outputs of this ESIA and by working in accordance with Staatsolie EHS General Field Instructions.
- Comply with the stipulations regarding the rights of third parties. Not only are landowners obliged to allow the Mining right holder to carry out activities on their land, the Company also has to timely inform the landowner of the intention of the activities stating the purpose, time and location where the activities will be carried out. Also it is required by law[5] that the landowners receive compensation or prior assured compensation. Implementation of the company procedure on access to land and acquisition of land enables Staatsolie to comply with the law on this matter.
- The identified occupational health and safety regulations should be complied with. The Labor Inspection Division of the Ministry of ATM is the responsible for enforcement. The regulations regarding road safety fall under the responsibility of the Ministry of Justice and Police.
- Comply with the requirements in the Ministerial Order on Issuance of domain land in estuarine areas.

  .

[5] Article 47 of the Mining Decree 1986

Annex A Staatsolie General Field Instructions

GFI no	Subject	Scope
	Section 1 **ADMINISTRATIVE**	
104N	**Security Rules for Saramacca Operations** Dutch	This instruction outlines the security rules and regulations applicable to the Saramacca Operations for the different groups concerned.
105(N)	**Routine Safety Talks.** English/Dutch	This instruction formalizes the dissemination of information through regular meetings, approximately ten minutes long, commonly called "Toolbox Meetings" or "Safety Talks".
106	**HSE and Security Induction for New Arrivals.** English	This instruction describes the management of the system that controls HSE and Security Induction through which every new arrival is made familiar with the company's health, safety, environmental and security requirements as they relate to the activity that they are about to undertake.
109(N)	**Code of dress for industrial areas.** English/Dutch	This General Field Instruction outlines the type of clothing and minimum personal protective equipment (PPE) for the employees and visitors present at Staatsolie industrial workplaces.
110	**Incident Reporting.** English	This instruction details the process for the reporting of incidents, which initiate the investigation of these incidents. Incidents are reported and recorded for, Mitigating of consequences; Preventing recurrence; Monitoring performance; Satisfying statutory requirements and for Insurance claims.
119(N)	**Personal protective equipment.** English/Dutch	This GFI identifies the most common types of personal protective equipment for the various locations on the Saramacca Field.
120(N)	**General traffic rules.** English/Dutch	This GFI defines the general traffic rules to guide the performance of company employees, contractor's employees and visitors while on company roads. It also defines rules for the behavior of drivers of company owned and rented vehicles on public roads.
126	**Safe Use of Mobile Communication Devices.** English	This instruction provides guidance to the safe use of mobile Communication Devices in order to minimize hazards that are introduced with it.
130(N)	**Formatting of Work instructions.** English/Dutch	This GFI guides the process of selecting activities for which Work Instructions must be written and the formatting of the instructions.

GFI no	Subject	Scope
131	**Guidelines for Departmental HSE Teams.** English	This GFI outlines the terms of reference and composition of the Departmental HSE Teams which are intended to assist the departmental head in the execution of the departmental HSE program and to achieve workers participation.
132	**Contractor Health, Safety and Environmental Management** English	This GFI provides guidance to Staatsolie staff in promoting and managing HSE performance of Contractors.
Section 2 **JOB SAFETY INSTRUCTIONS**		
200(N)	**Permit to work system - General.** English/Dutch	This GFI provide guidelines to the process of "the Permit to Work system" that is in force at the Saramacca Operations, so designed: That one central authority knows all activities that are intended to take place at any location and, To ensure that adequate precaution is taken and that the condition of the equipment on which the work was done is safe for returning it to service.
201(N)	**Permit to work system - Hot work.** English/Dutch	This GFI covers the aspect of the Permit to Work System that deals with the permitting of Hot Work.
202(N)	**Permit to work system - Confined space entry.** English/Dutch	This GFI covers the aspect of the Permit to Work that covers the special precautions that must be taken to protect workers, required to enter vessels and other confined spaces, from the risks associated with this type of work.
203(N)	**Permit to work system - Excavation.** English/Dutch	The Excavation Certificate controls the special precautions that must be taken when excavating is requested.
210(N)	**Handling of Hazardous Chemicals.** English/Dutch	This instruction describes the management system for the selection, handling and disposal of all hazardous chemicals used by Staatsolie.
214(N)	**Isolation, Lockout and Warning Tags.** English/Dutch	This procedure establishes guidelines to prevent personal injury and property damage due to an unexpected release of energy or hazardous materials.
215	**Management of Change Procedure** English	This General Field Instruction provides guidelines in how to manage division cross-bordering changes at the Saramacca Operations that might create safety hazards for others than the originating division of the intended change.
225(N)	**Storage, Transportation and handling of Compressed, liquefied and pressurized gasses.** English/Dutch	This GFI handles the general guidelines for safe storage, transportation and the handling of gas bottles. The most common industrial gasses, which are used by Staatsolie, are oxygen, acetylene, nitrogen, propane (LPG), butane and carbon dioxide.

GFI no	Subject	Scope
228(N)	**Abrasive Blasting**. English/Dutch	This instruction provides guidelines for the protection of personnel engaged in abrasive blasting and others who may be in the surrounding areas where abrasive blasting is conducted.
229(N)	**Spray painting.** English/Dutch	This instruction provides guidance for the safe use of spray painting whereby care must be taken to protect the workers involved, other personnel in the vicinity, nearby equipment and the environment.
230	**Housekeeping** English	This document provides guidance to employee's to ensure that proper housekeeping is maintained.
232	**Job Safety Analysis** English	Job Safety Analysis is a proven method that evaluates a sequence of job steps or tasks to identify and document potential hazards and to take countermeasures to protect workers' health and safety against those hazards. This instruction provides guidance for conducting a Job Safety Analysis.
233	**Safety Color Codes**	This instruction establishes the requirements for a uniform visual system for marking potential hazards, and provides an effective means of communicating hazard information to the employees & contractors, in order to reduce the likelihood of injury from potential hazards in the work environment. It defines the color codes of signs, tags and barricades to be used in controlling exposure to potential hazards, and specifies requirements for design uniformity to promote employee recognition and avoidance of hazards.
Section 3 **EMERGENCY RESPONSE**		
305(N)	**Emergency Response - Injury / Illness**. English/Dutch	This instruction describes the procedure that needs to be followed when an emergency situation at the Staatsolie Saramacca Location turns up.
Section 4 **EQUIPMENT STANDARDS AND SPECIFICATIONS**		
400	**Inspection of Fire Protection and Emergency Equipment.** English	This GFI provides departments and divisions of the Saramacca Operations with procedures for the inspection of Fire protection and Emergency Equipment, which must be in good condition at all time.
405	**Scaffolding Rules** English	This GFI provides the guidelines of erecting tubular scaffolding.

GFI no	Subject	Scope
408(N)	**Protection from lead in lead-based paints.** English/Dutch	This instruction is intended to curtail the use of and provide protection when there is a possibility of exposure to lead-based paint.
410(N)	**Care of Gas Detection Instruments.** English/Dutch	This instruction provides guidelines for care of gas detection instruments.
Section 6 **ENVIRONMENT PROTECTION**		
611(N)	**Solid waste handling and disposal.** English/Dutch	This instruction provides guidance for solid waste handling and disposal requirements for waste listed in the appendix of this field instruction.
612	**Handling and Disposal of spent dry cell batteries and used toner cartridges.** English	This instruction provides guidance for the reduction and the disposal of spent dry cell batteries and toner cartridges in an effective and responsible manner. This is a way to manage waste, generated in oil exploration, production and refining related activities and processes, properly in order to minimize its potential to cause harm to health and the environment and to minimize the risk of potential liabilities.

Annex B Overeenkomst Toegang terreinen

OVEREENKOMST

TOEGANG TERREINEN VOOR HET VERRICHTEN VAN MIJNBOUWWERKZAAMHEDEN

De ondergetekenden:

Staatsolie Maatschappij Suriname N.V., gevestigd aan de Dr. Ir. H.S. Adhinstraat 21 te Paramaribo, ten deze vertegenwoordigd door haar Algemeen Directeur dhr. M.C.H. Waaldijk, hierna te noemen **"Staatsolie"**

en

, houder van ID kaart nummer en wonende aan de te , hierna te noemen **"Gerechtigde"**

In overweging nemende:

- dat bij Decreet E-8B (S.B. 1981 nr. 59) aan Staatsolie concessie is verleend tot het verrichten van werkzaamheden verbandhoudende met de opsporing en ontginning van koolwaterstoffen,

- dat in gevolge het Decreet Mijnbouw (S.B. 1986 no. 28), Gerechtigde en derdebelanghebbenden werkzaamheden die hiermee verband houden moeten gedogen,

Verklaren het volgende overeen te komen:

Artikel 1
Gerechtigde is de .....van het perceelland, gelegen in het district ..... en nader omschreven op de kaart van landmeter d.d. (bijlage 1). Bijlage 1 maakt integraal deel uit van de overeenkomst. Gerechtigde zal een deel van dit perceelland, groot .....ter beschikking stellen aan Staatsolie voor het verrichten of doen verrichten van werkzaamheden voortvloeiende uit het recht verkregen door Staatsolie vanwege Decreet E-8B, gedurende de periode ..... tot .....

Artikel 2
Staatsolie zal Gerechtigde vergoeden de schade onmiddellijk veroorzaakt door de bovengenoemde werkzaamheden. Deze vergoeding is, afhankelijk van het geval, gebaseerd

op taxatie van LVV of andersoortige uit te voeren taxaties, en zal indien van toepassing in een nadere overeenkomst vastgelegd worden.

Artikel 3
Partijen zullen indien nodig tijdens de uitvoering van de werkzaamheden met elkaar in overleg treden voor nadere afspraken met betrekking tot de uitvoering van bovengenoemde werkzaamheden

Artikel 4
Visuele oriëntatie van de staat van bovengenoemd perceelland vóór de aanvang van de werkzaamheden heeft het navolgende doen constateren:

-
-
-

Artikel 5
Staatsolie zal ten behoeve van de mijnbouwwerkzaamheden de volgende aanpassingen plegen op bovengenoemd perceelland:
-
-
-

Artikel 6
Deze overeenkomst is van kracht jegens Gerechtigde, zijn rechtsverkrijgers en rechtsopvolgers. Gerechtigde is gehouden bij de verkoop en overdracht in eigendom van het geheel of een gedeelte van het in de considerans omschreven perceel, alsmede bij verlening daarop van enig zakelijk genotsrecht, aan de nieuwe eigenaar of zakelijk gerechtigde ten behoeve van Staatsolie, alle de in deze overeenkomst opgenomen verplichtingen, over te dragen.

Artikel 7
Staatsolie is gehouden om conform het door het Nationaal Instituut voor Milieu en Ontwikkeling in Suriname (NIMOS) goedgekeurde Environmental Management Plan bij beëindiging van de mijnbouwwerkzaamheden het perceelland te rehabiliteren, zulks in overleg met Gerechtigde.

Artikel 8
Na het verrichten van de mijnbouwwerkzaamheden door Staatsolie zal het perceel als volgt worden overgedragen:
-
-
-

Aldus overeengekomen en in tweevoud opgemaakt en ondertekend te Paramaribo op …… .....

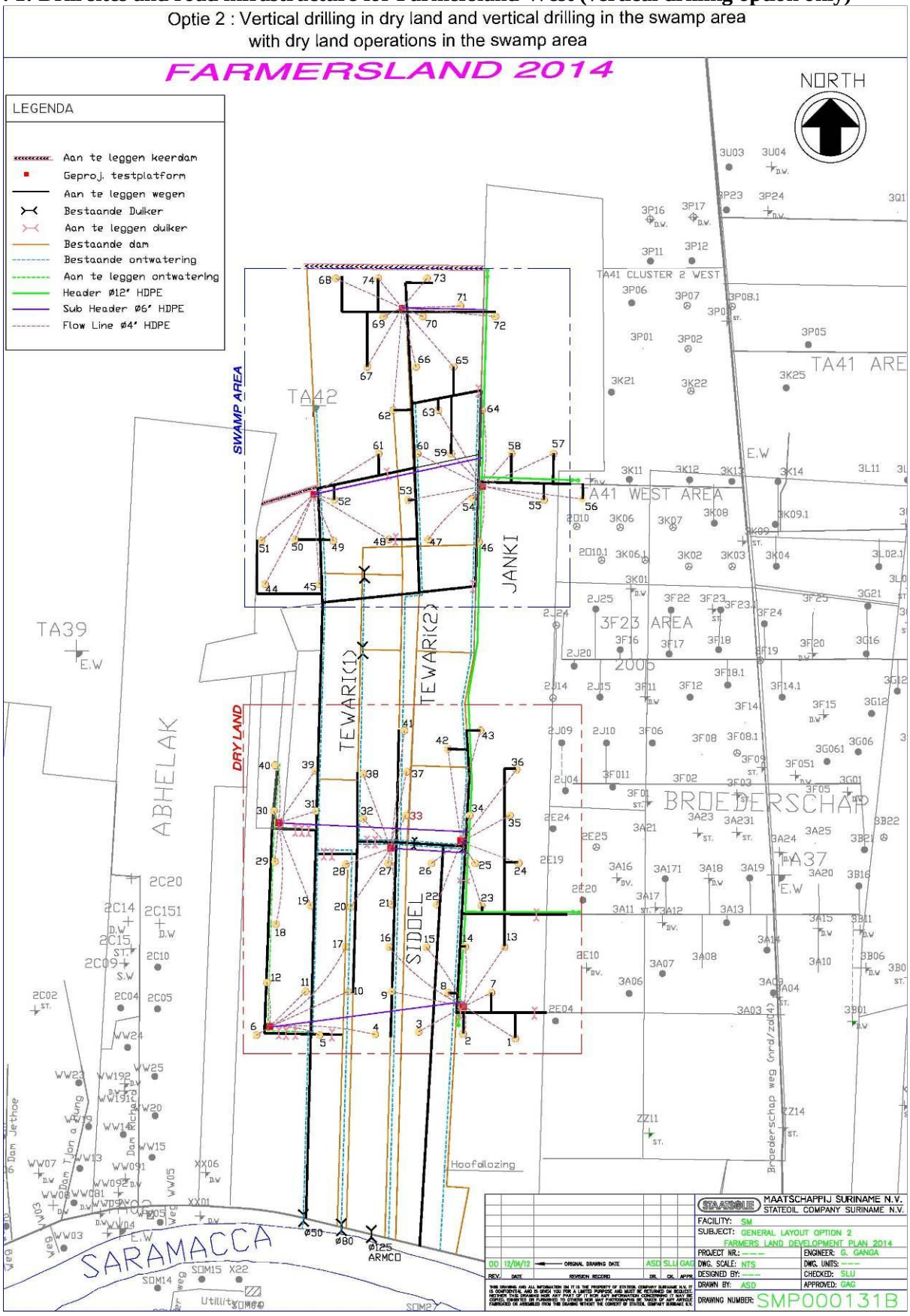
Staatsolie Maatschappij Suriname N.V. Gerechtigde

_____ _____

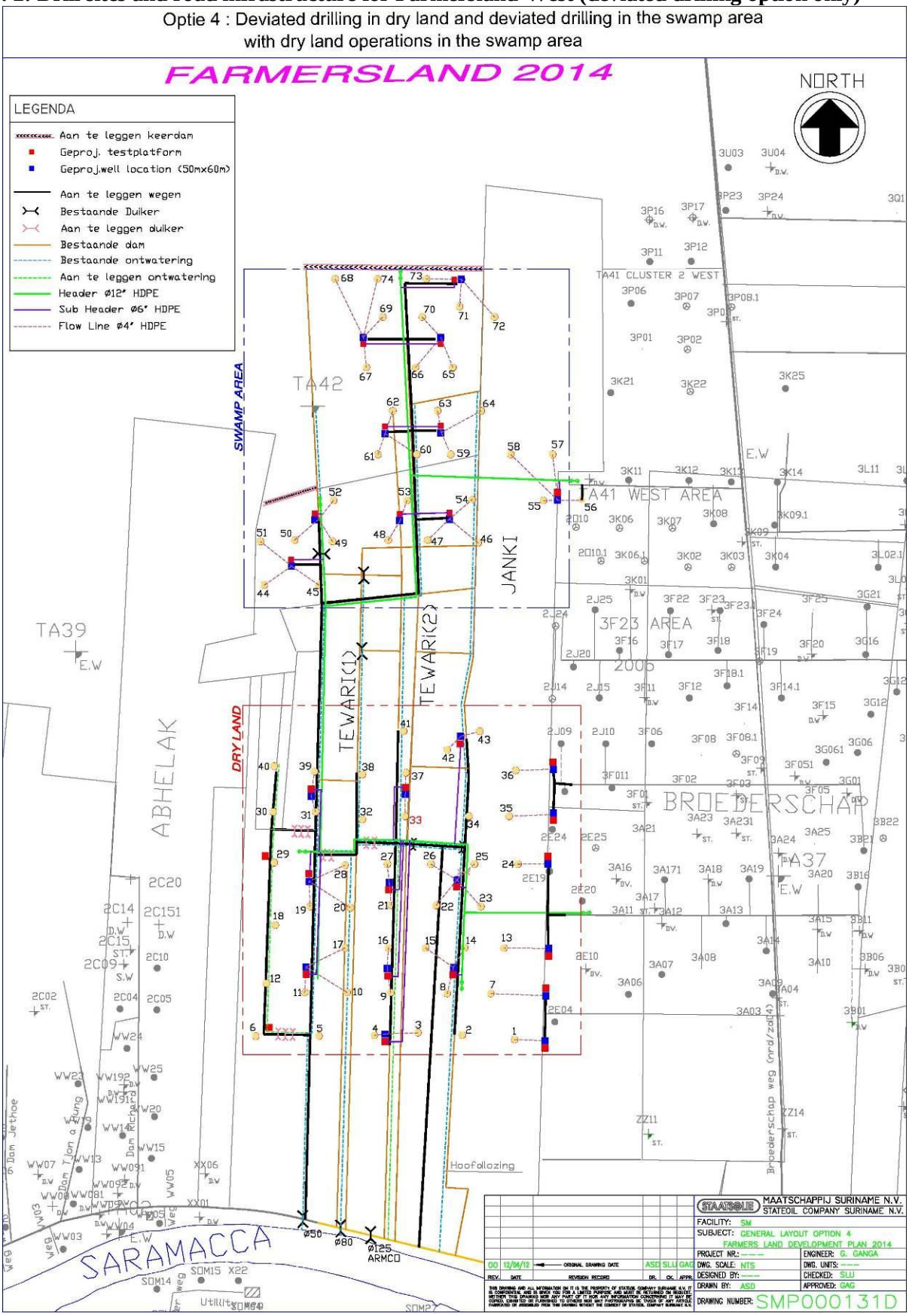
M.C.H. Waaldijk
Managing Director

APPENDIX B: PRELIMINARY LAY-OUT OF INFRASTRUCTURE

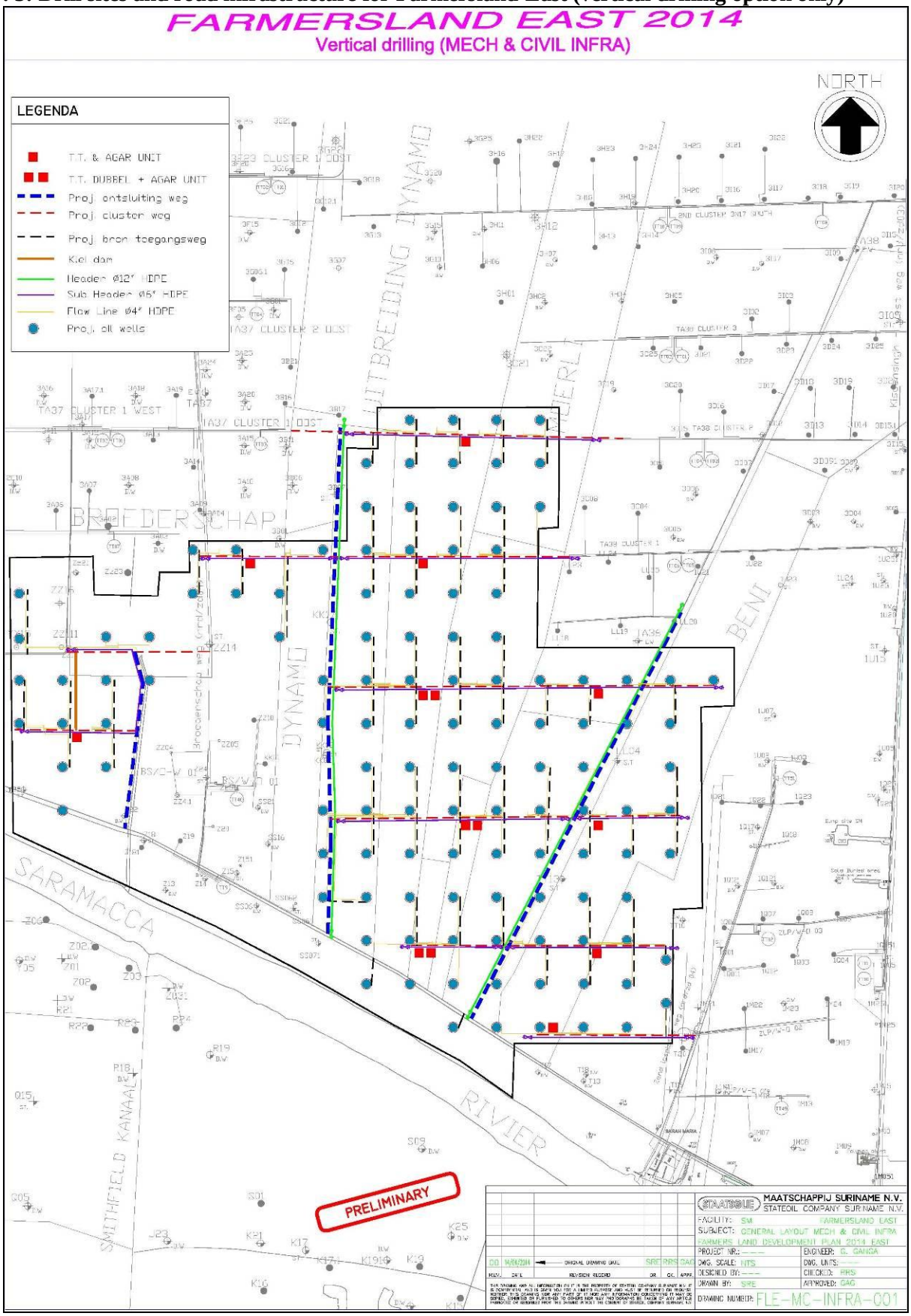
. 1: Drill sites and road infrastructure for Farmersland-West (vertical drilling option only)



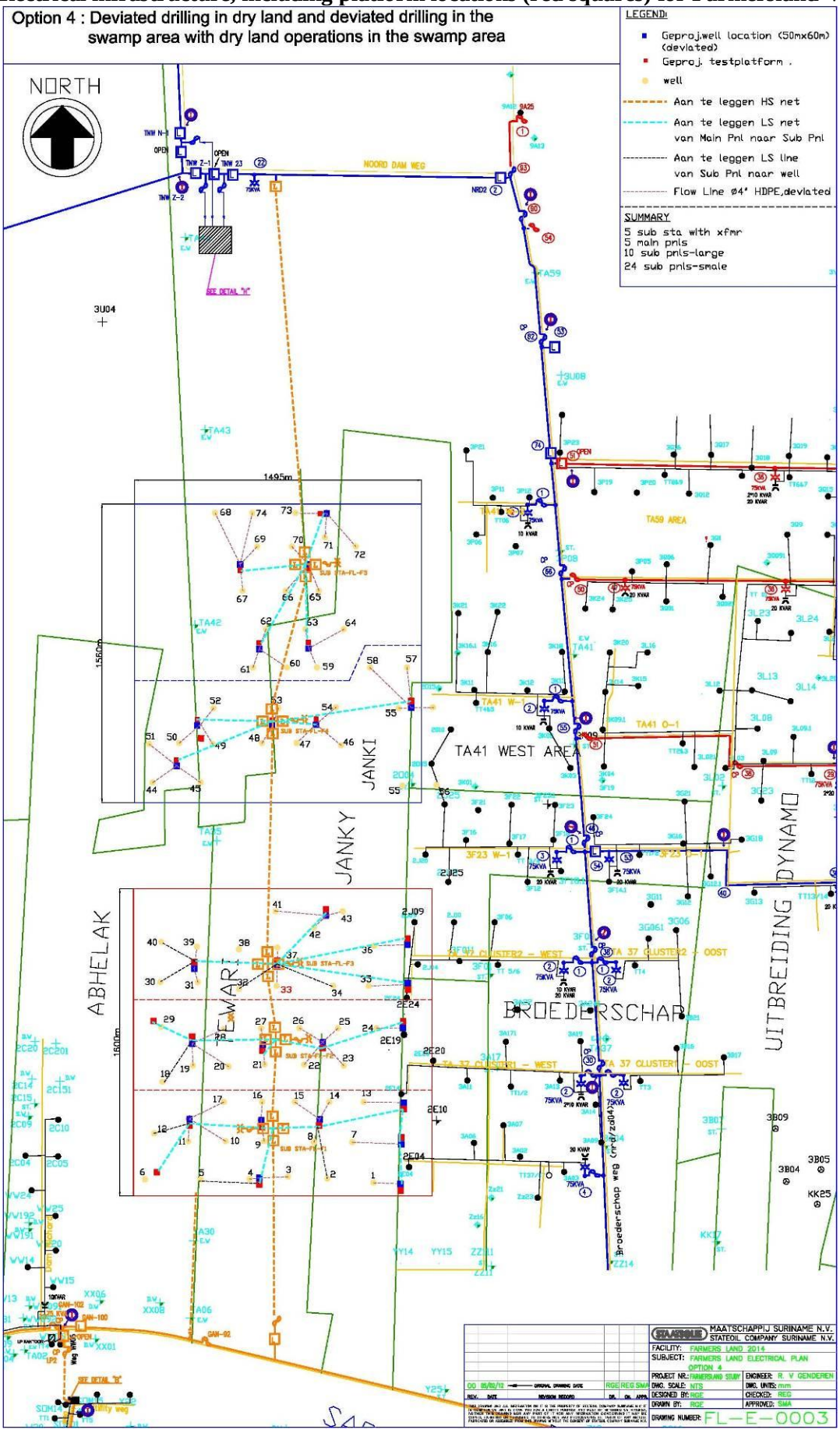
. 2: Drill sites and road infrastructure for Farmersland-West (deviated drilling option only)



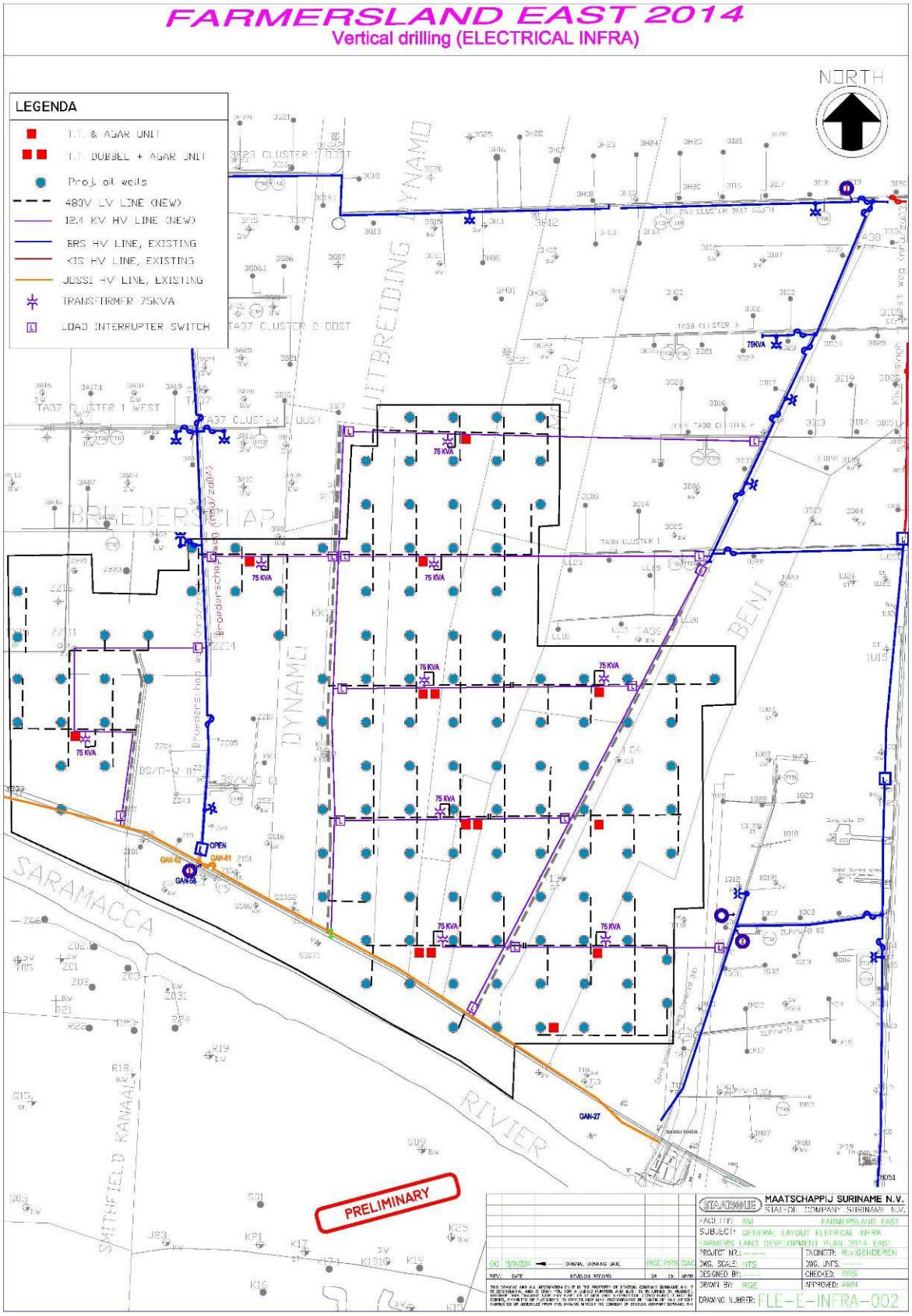
. 3: Drill sites and road infrastructure for Farmersland-East (vertical drilling option only)



. 4: Electrical infrastructure, including platform locations (red squares) for Farmersland-West



. 5: Electrical infrastructure, including platform locations (red squares) for Farmersland-East (vertical drilling option only)



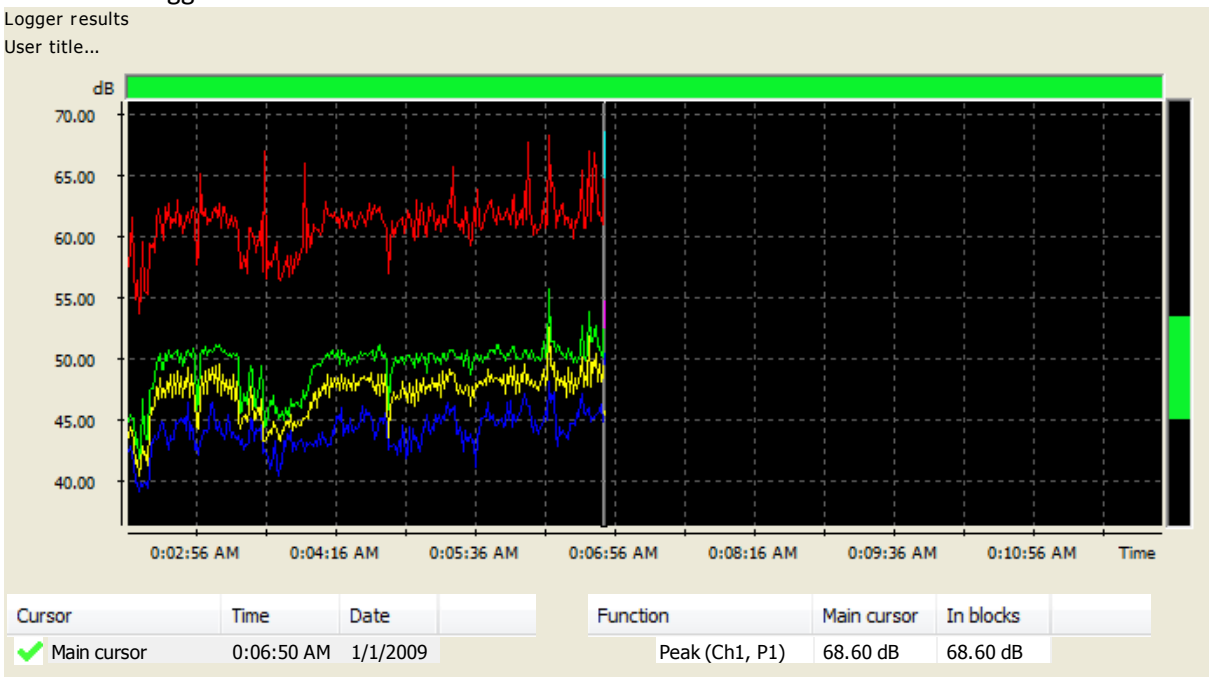
APPENDIX C: CURRENT DISPOSAL WITHIN THE STAATSOLIE WASTE MANAGEMENT

Waste	Disposal
PET/ HDPE	Recycling (RECOMSUR)
Waste paper	Open burning
Concrete	Reused whenever possible
Food waste	Open burning
Grass/branches/trees	Open burning
Scrap Metal	COBO
Drilling waste	Treated (Landfarm)
Packaging material	Open burning
Glass and insulation	Open burning
Tires	Not applicable
Oil contaminated sorbents	Open burning
Paint associated waste	Open burning/ metal scrap
AA batteries	Immobilization
Car batteries	Stored at the Procurement yard. Procurement department is engaged with a provider that will collect used car batteries for
Expired chemicals	Immobilization
Waste oil from sludge	Treated (Landfarm)
Oil contaminated soil/ vegetation	Treated (Landfarm)
Oil-contaminated buckets	Re-use
Oil-contaminated barrels	Re-use
Treated oil	Re-use
Ink cartridges	Recycling (RECOMSUR)
Produced waste and waste water	Treated (Landfarm)
Tank sludge	Treated (Landfarm)
Fluorescent lamps	Crushed/ Immobilization
Fuel and oil filters	Open burning/ metal scrap

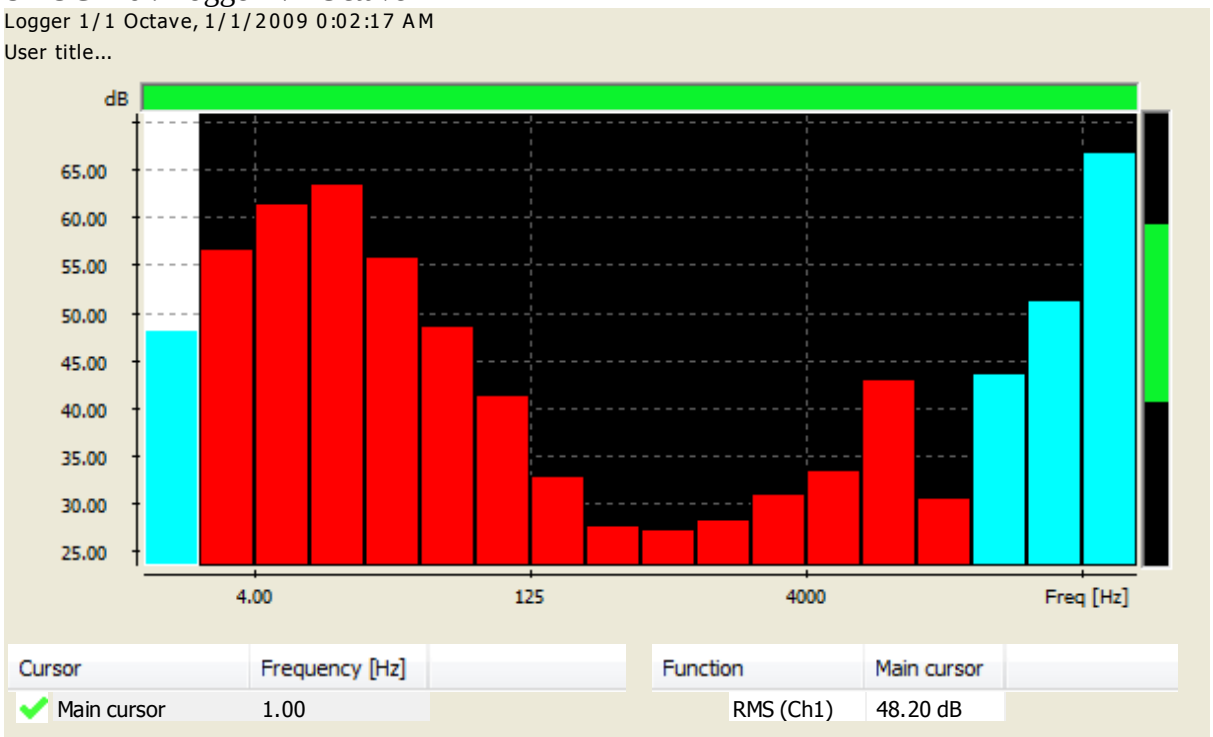
APPENDIX D: RESULTS OF SOUND MEASUREMENTS IN THE FARMERSLAND AREA AND NEIGHBOURING ZONES

Location 01: Paddy rice polder of Debitewari (midway), without human-made noises; birds and some rustling of wind in vegetation; low wind speed. Measurement 19 January 2012.
Start: 9.02:17 AM[9] End: 9.06.50 AM

&LOG176 : Logger results



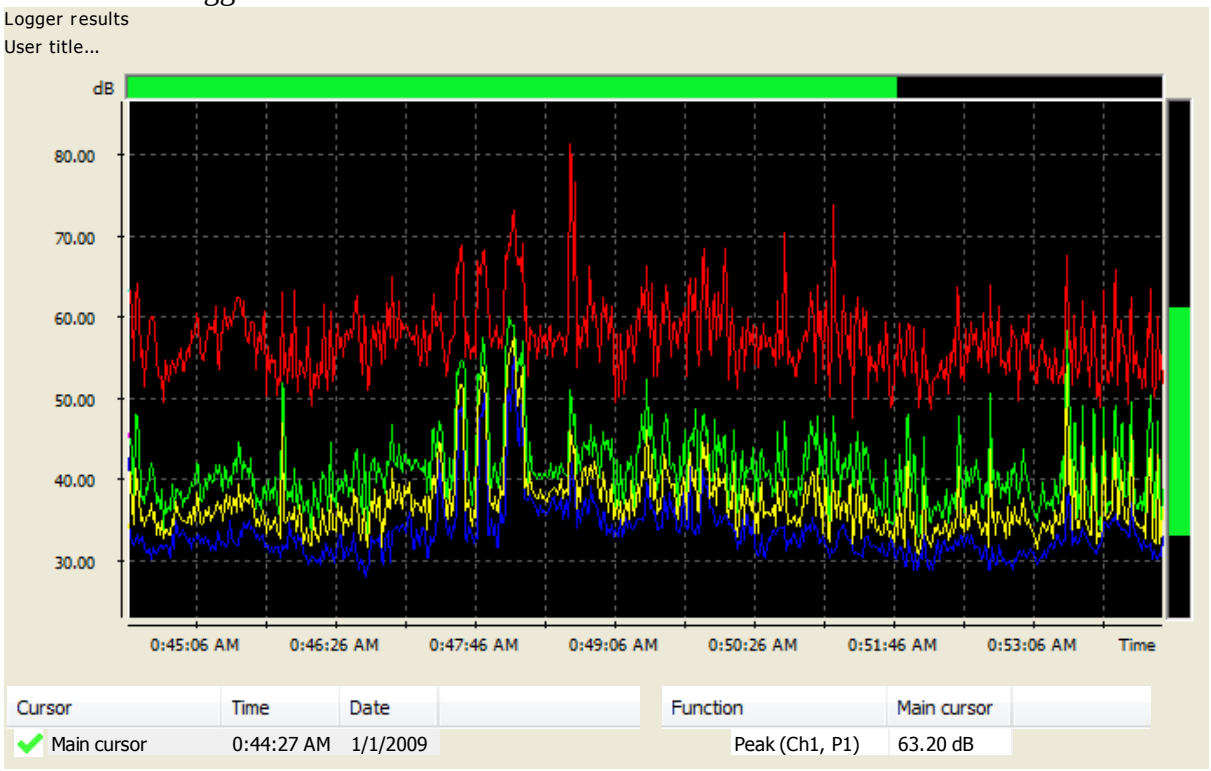
&LOG176 : Logger 1/1 Octave



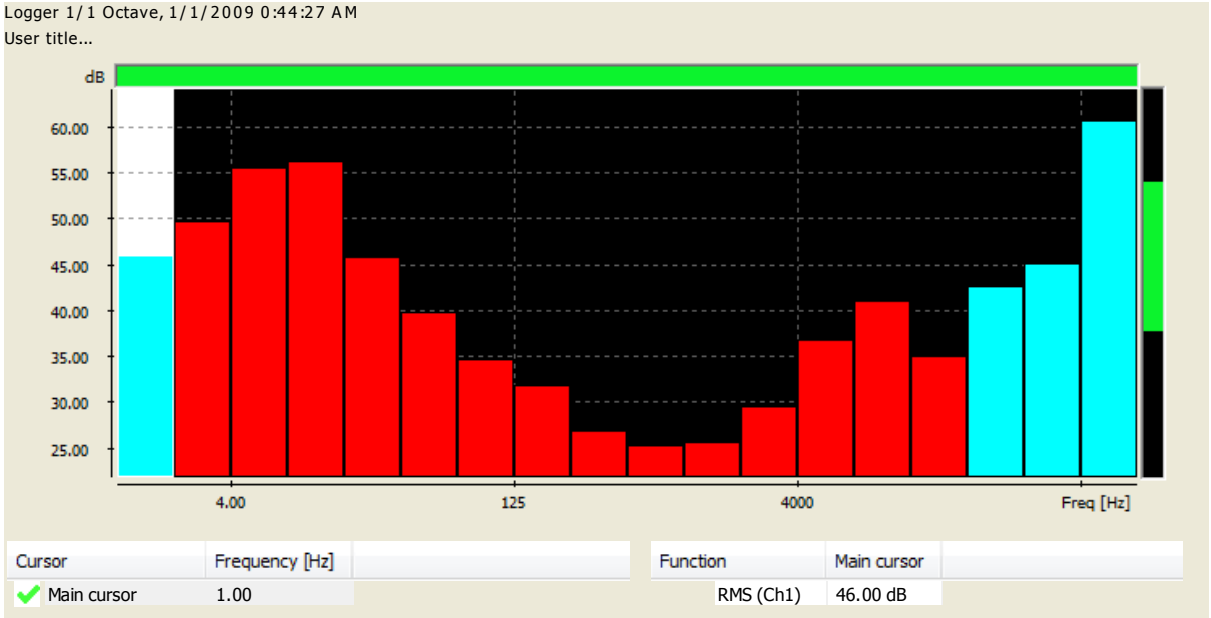
[9] Measuring time was not set correctly, but has been calculated. Therefore, there is a discrepancy between the logger date and times in below graphs and date and time mentioned here.

Location 02: Paddy rice polder of Debitewari (north), incidental airboat noise in the distance; birds and some rustling of wind in vegetation; low wind speed. Measurement 19 January 2012.
Start: 9.44:27 AM End: 9.57.43 AM

&LOG177 : Logger results

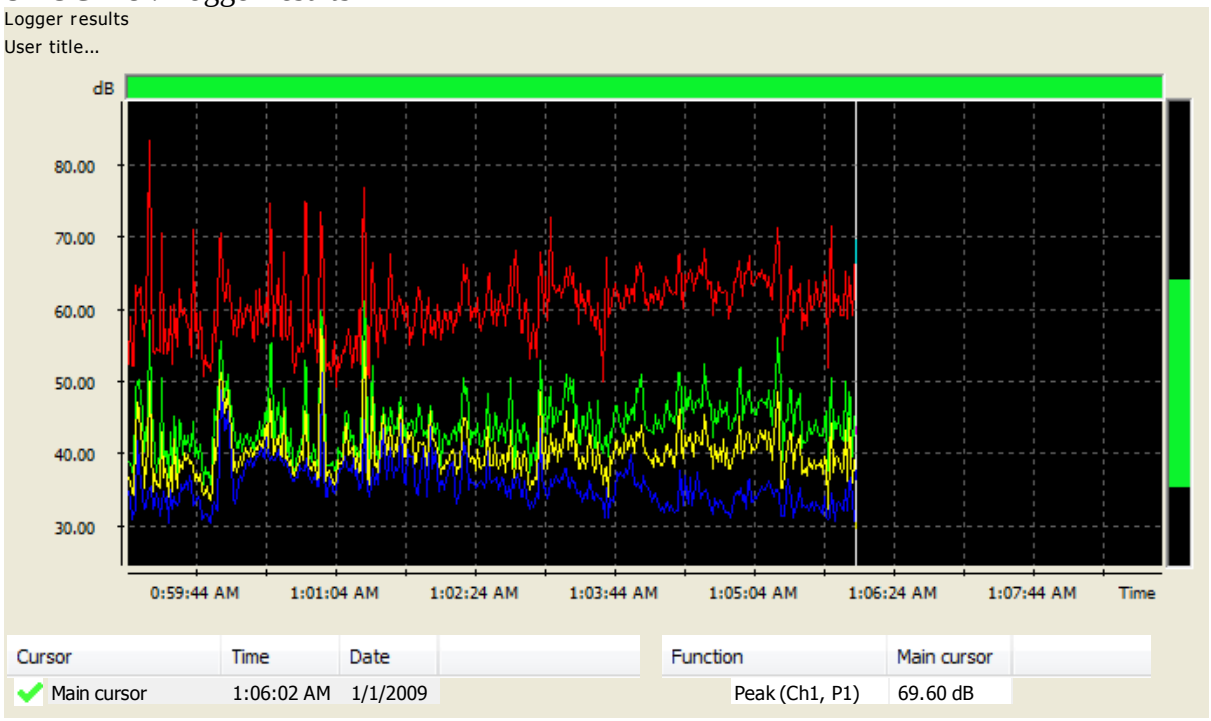


&LOG177 : Logger 1/1 Octave

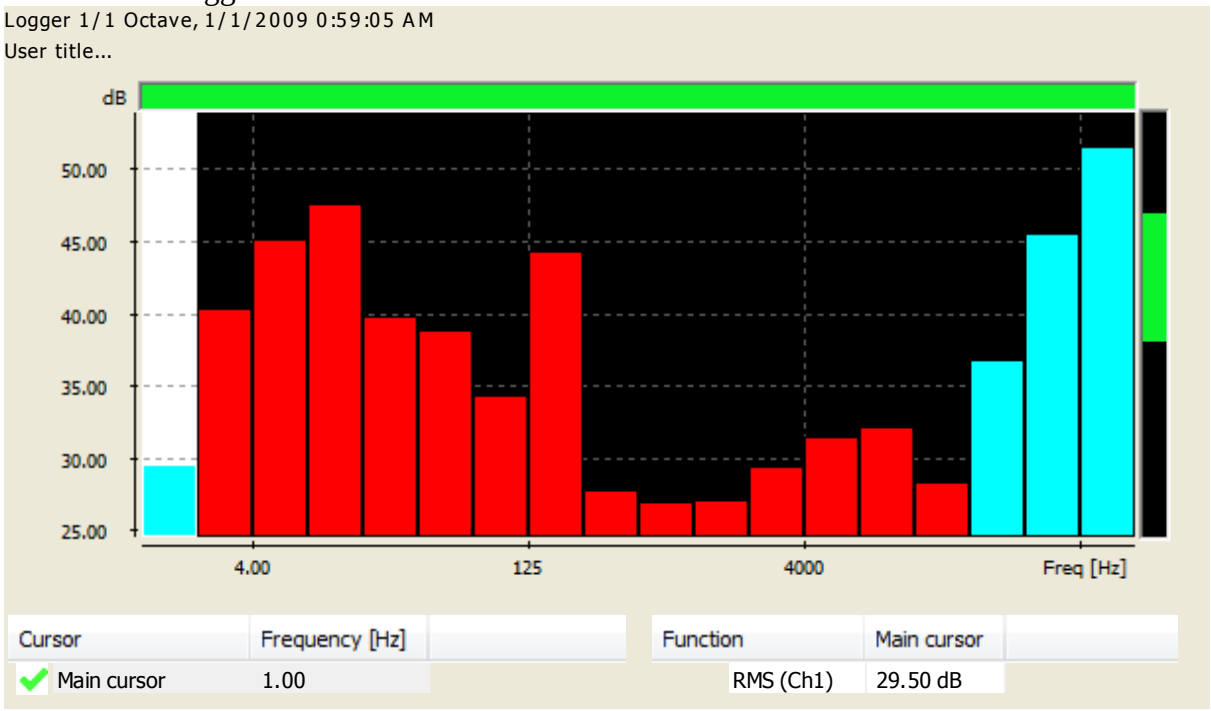


Location 03: Paddy rice polder of Debitewari (north-2), incidental airboat noise in the distance; birds and some rustling of wind in vegetation; low wind speed. Measurement 19 January 2012.
Start: 9.59:07 AM End: 10.06.02 AM

&LOG178 : Logger results

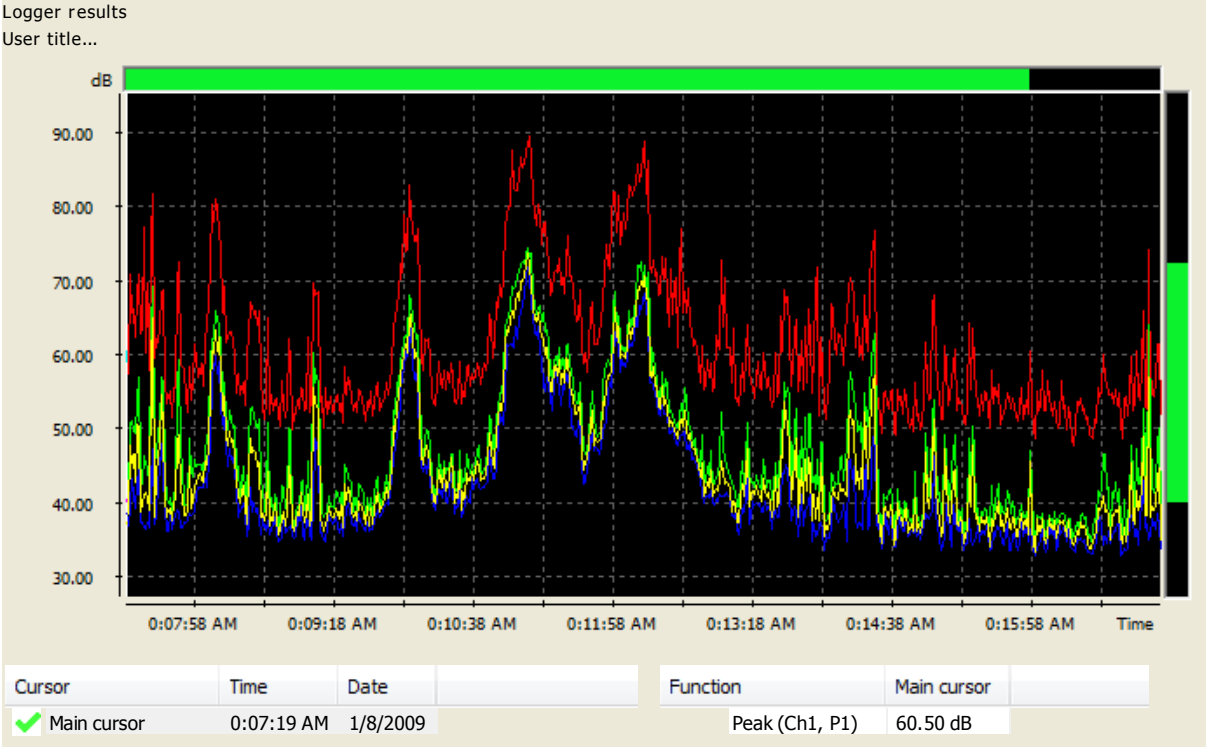


&LOG178 : Logger 1/1 Octave

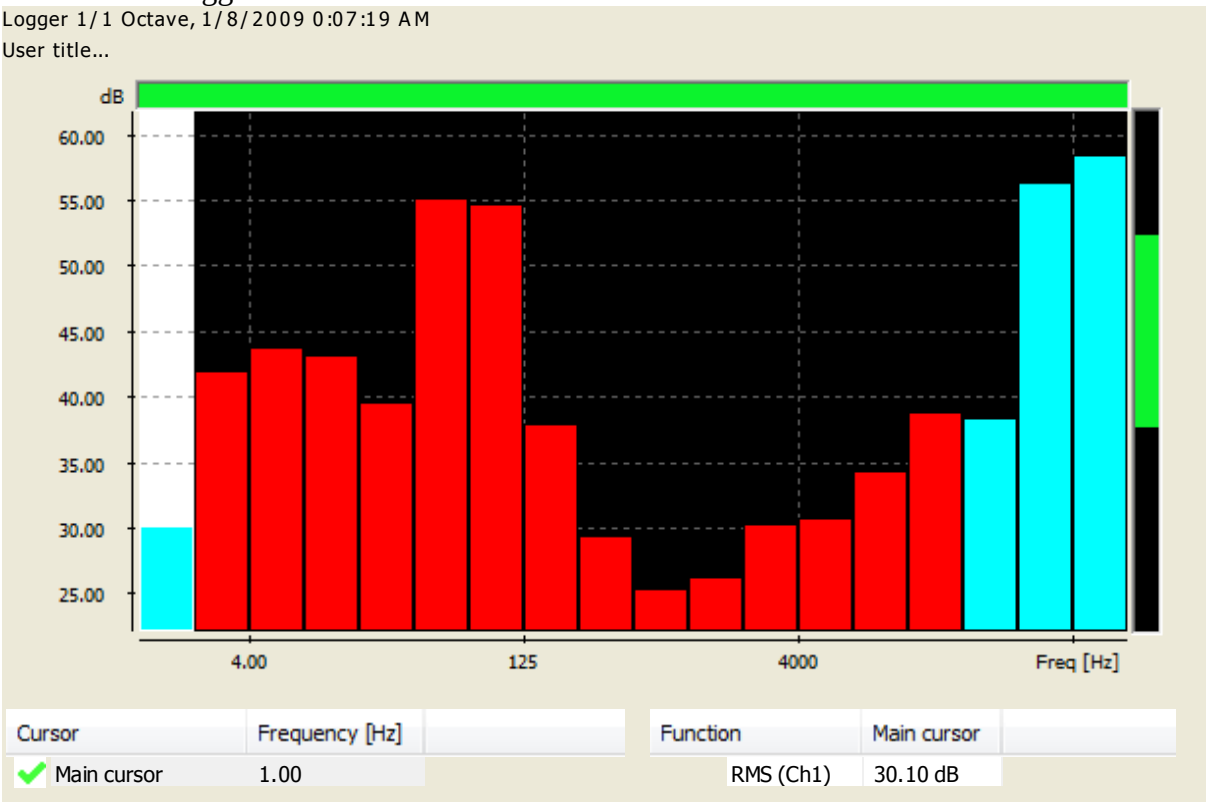


Location 04: Rural area along Gangaram Panday Road (km 2); no man-made noise except for vehicles along the road, including trucks; birds and some rustling of wind in vegetation; low wind speed - 10 meter from edge of road. Measurement 26 January 2012.
Start: 13.07.19 PM End: 13.18.36 PM

&LOG179 : Logger results

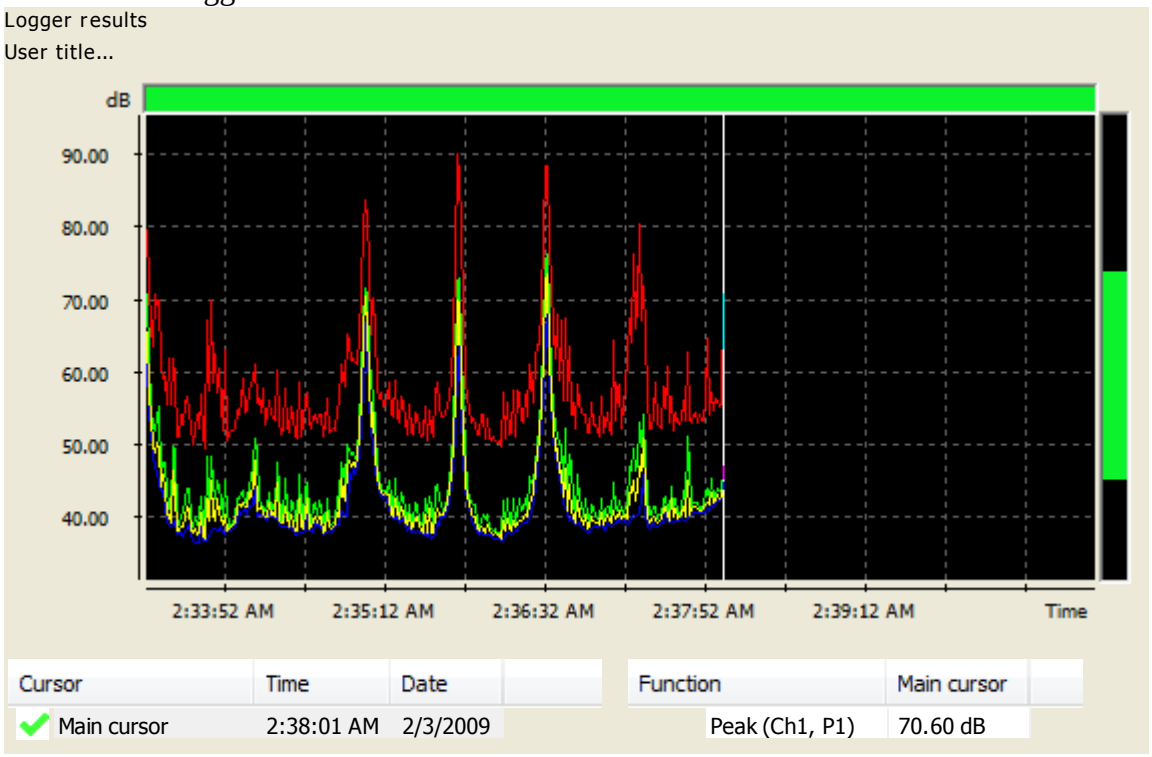


&LOG179 : Logger 1/1 Octave

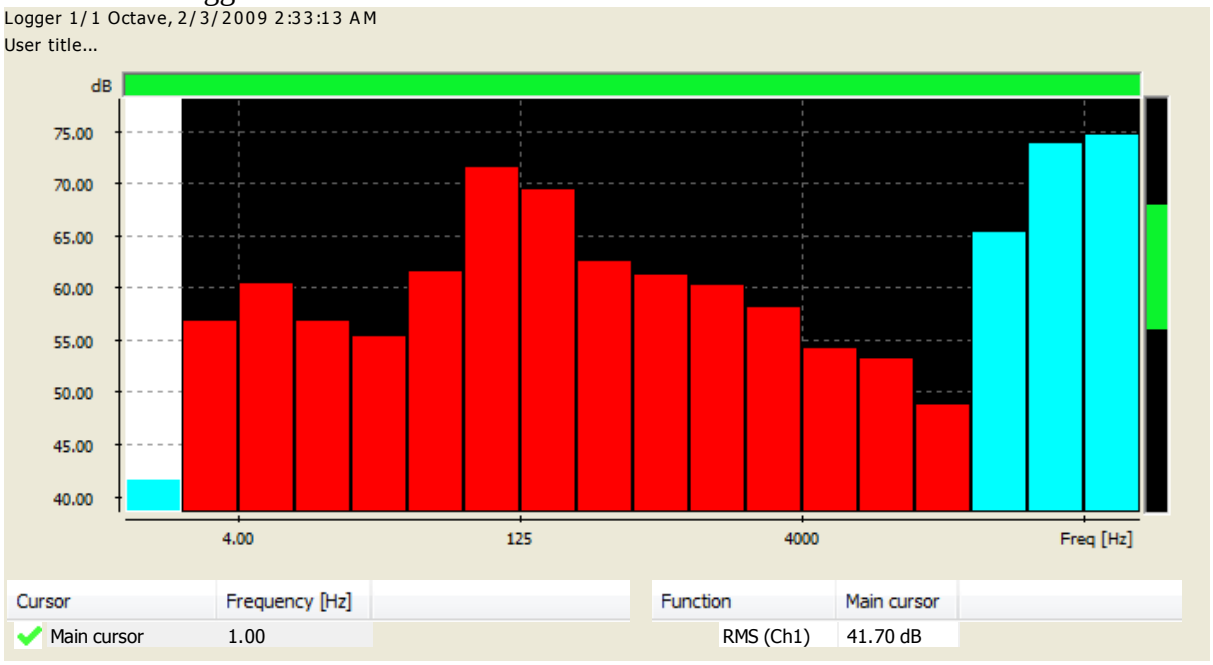


Location 05: Rural area along Gangaram Panday Road (km 10); no man-made noise except for vehicles along the road, including trucks; birds and some rustling of wind in vegetation; moderate wind speed - 10 meter from edge of road. Measurement 21 February 2012.
Start: 14.33.52 PM End: 14.38.01 PM

&LOG182 : Logger results

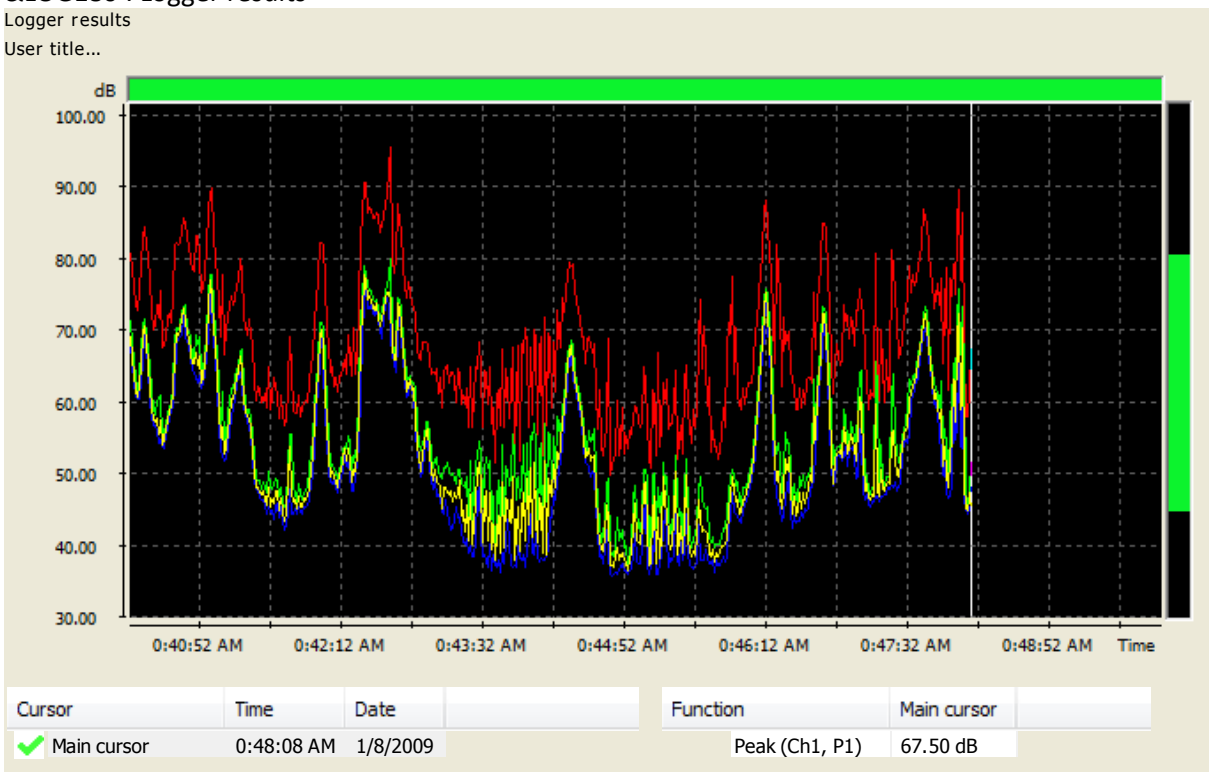


&LOG182 : Logger 1/1 Octave

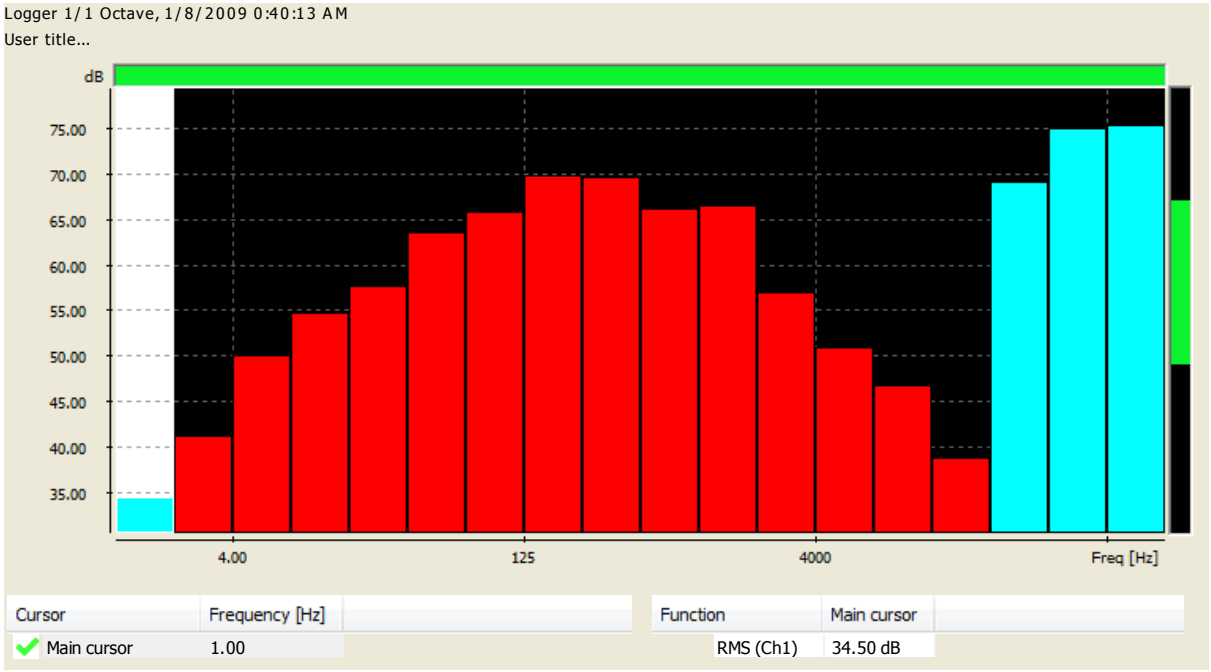


Location 06: Service center in rural area at junction of Gangaram Panday Road and Wayambo Road; many vehicles along the road, including trucks; some other noise (talking, barking dogs, metal clanging); moderate wind speed - 11 meter from edge of road. Measurement 26 January 2012.
Start: 12.40.13 PM End: 12.48.08 PM

&LOG180 : Logger results

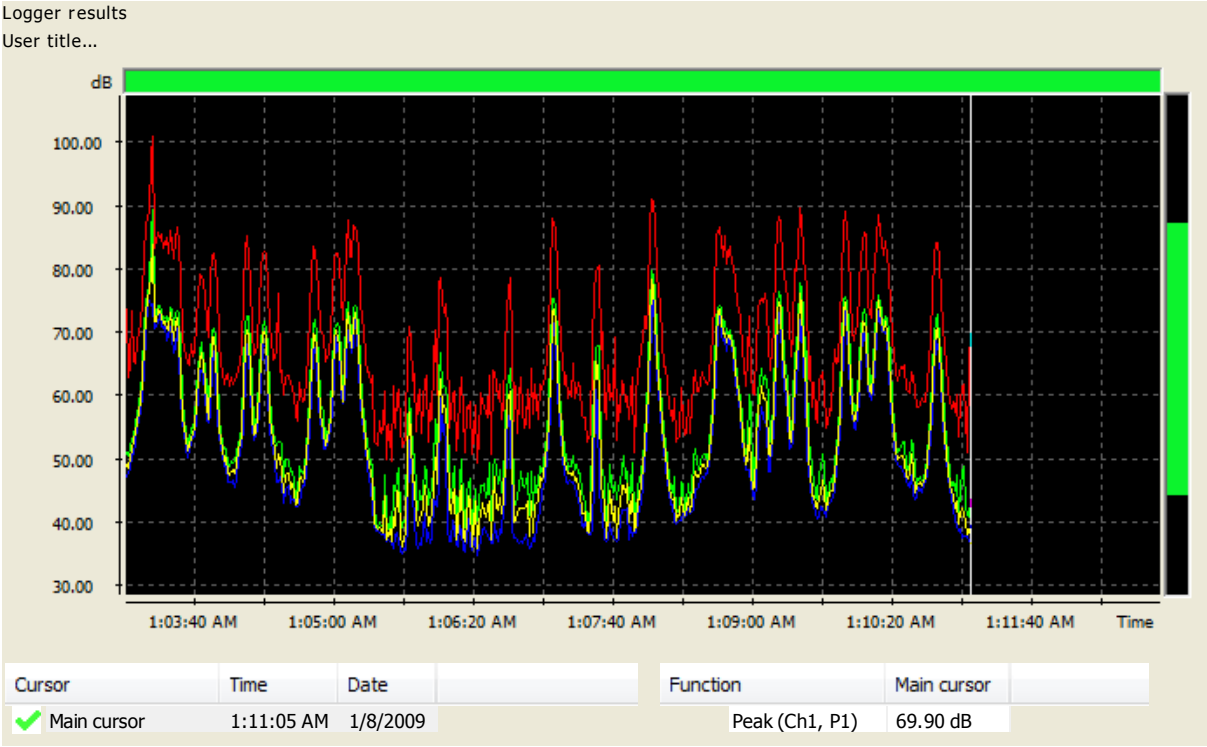


&LOG180 : Logger 1/1 Octave

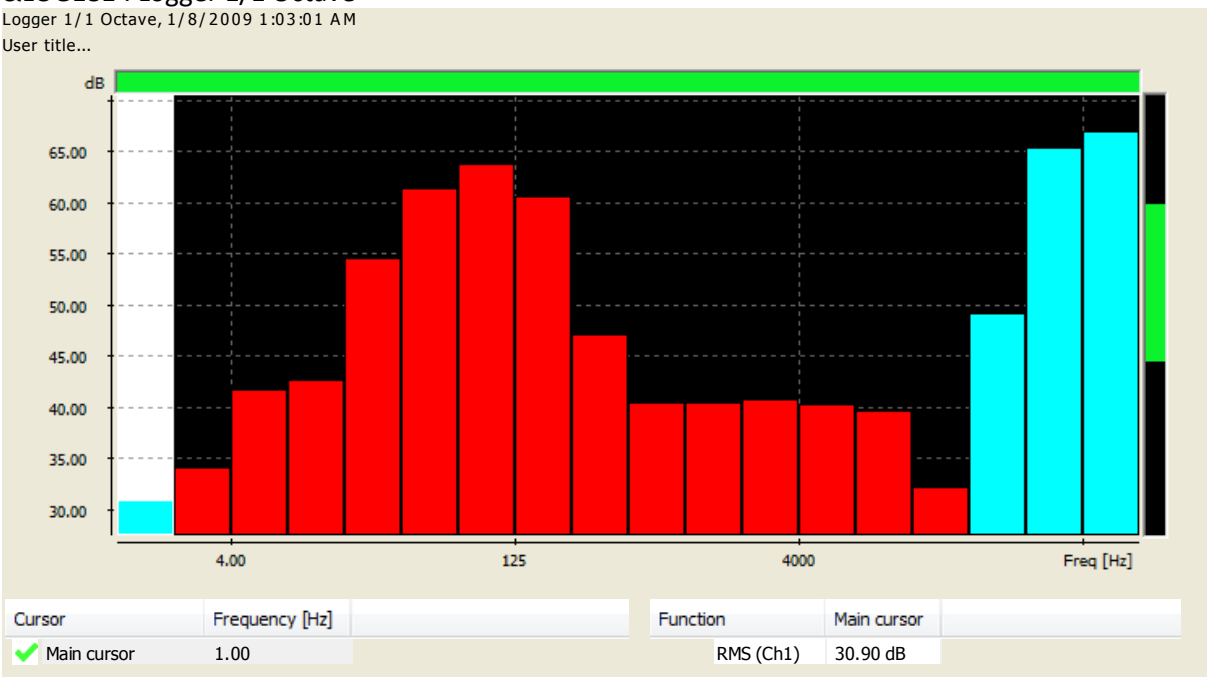


Location 07: Rural area along Wayambo Road (km 30); many vehicles along the road, including trucks; moderate wind speed, birds and some rustling of wind in the trees - 8 meter from edge of road. Measurement 26 January 2012.
Start: 13.03.01 PM End: 13.11.05 PM

&LOG181 : Logger results



&LOG181 : Logger 1/1 Octave



APPENDIX E: RESULTS OF ANALYSES OF WATER SAMPLES IN THE PERIOD AUGUST 2011 TO SEPTEMBER 2012

Sample ID	Location	Date	Season	Type	pH	EC (uS)	TSS (mg/L)	Soluble N (mg/L)	Total N (mg/L)	P (ppm)	COD (mg/L)	Turbidity	DO (mg/L)	DO (%)	Temp
G13	Near location 13 TAM NW	19-Aug-11	R	Z	6.4	516	668	1.2	32.7	0.07	18		0.3	4	28.6
G20	Near location 20 TAM NW	19-Aug-11	R	Z	6.2	689	8	0.9	8.4	0.01	17		0.4	4	27.9
S10	Soekha canal swamp side	19-Aug-11	R	Z	6.2	449	34	0.8	0.0	0.06	17		0.3	4	26.9
S11	Poeran canal swamp side	19-Aug-11	R	Z	6.2	473	86	1.1	1.9	0.04	12				
S12	Irrigation canal Poeran	19-Aug-11	R	C	6.7	419	42	1.0	13.1	0.09	9				
M02	Outlet canal Debitewari river side at high tide	15-Mar-12	R	R	6.5	67		2.7		0.01		18		38	27.5
M03	Soekha canal near TAM NW landing	16-Mar-12	R	Z	6.3	573		2.2		<0.01		89		18	27.0
M04	Poeran canal swamp side; near S11	15-Mar-12	R	Z	6.4	589	238	3.2		0.05		102			
M05	Poeran north: Recently reclaimed swamp	15-Mar-12	R	Z	6.0	496	4115	3.7		<0.01		80			
M06	Recently dug field canal Poeran, near intake point	15-Mar-12	R	C	6.2	1118		0.5		<0.01		16			
M07	Drainage ditch rice area Poeran	15-Mar-12	R	C	6.4	461		0.4		0.11		28			
M08	Drainage canal rice area Poeran	15-Mar-12	R	C	6.6	261		0.4		<0.01		27			
M09	Irrigation canal Debitewari, near intake point	15-Mar-12	R	C	6.3	392	40	0.1		0.02		24	2.58	35	29.8
M1	Outlet canal Debitewari river side at rising tide	15-Mar-12	R	R	6.5	81		1.6		<0.01		17			
M10	Drainage ditch rice area Debitewari	15-Mar-12	R	C	7.0	683		0.1		<0.01		19	3.30		31.8
M11	Drainage canal rice area Debitewari north	15-Mar-12	R	C	6.7	529		0.3		0.05		92	2.14	35	31.0
M12	Drainage canal rice area Debitewari center	15-Mar-12	R	C	6.7	479		0.1		0.03		41	2.17	29	29.6
M13	Drainage canal rice area Debitewari south (near outlet main road)	15-Mar-12	R	C	6.5	64	14	0.8		<0.01		16			
M14	Soekha canal low swampwood	16-Mar-12	R	Z	6.3	535		0.6		<0.01		61		21	27.3
M15	Soekha canal medium high swampwood (die-off)	16-Mar-12	R	Z	6.4	518		0.0		0.04		31		31	27.8
M16	Soekha canal medium high swampwood (die-off); near S10	16-Mar-12	R	Z	6.3	464		0.4		0.02		21		15	27.6

Sample ID	Location	Date	Season	Type	pH	EC (uS)	TSS (mg/L)	Soluble N (mg/L)	Total N (mg/L)	P (ppm)	COD (mg/L)	Turbidity	DO (mg/L)	DO (%)	Temp
M17	Soekha canal high swampwood (die-off); near intake point	16-Mar-12	R	Z	6.2	427	101	0.2		0.03		25		17	27.0
A	Irrigation canal Debitewari, near intake point	19-Sep-12	D	C	6.2	448									
B	Soekha canal in rice area	19-Sep-12	D	C	6.5	518									
I	Outlet canal Debitewari river side at high tide	19-Sep-12	D	R	6.5	1772									
J	Irrigation canal Debitewari, near intake point; close to M09	19-Sep-12	D	C	6.2	370									

Season: R = Rainy; D = Dry
Type: C = Canal; Z = Swamp; R = River

APPENDIX F: SOCIO-ECONOMIC BASELINE STUDY

Environmental and Social Impact Assessment for the

Farmersland Production Development project

Social Specialist Study

Prepared for

Staatsolie Maatschappij Suriname N.V.

Noordam Consultancy

Environmental Services & Support

Compiled by:

C. Duijves and M. Heemskerk

Project consultants

Draft, June 2014

Abbreviations

ABS	Bureau for Statistics *(Algemeen Bureau voor de Statistiek)*
AMTO	Evening Middle Technical Education *(Avond Middelbaar Technisch Onderwijs)*
AOV	Old age pension *(Algemene Oudedagsvoorziening)*
BIC	Citizen's Information Centre *(Burger Informatie Centrum)*
BO	Government Manager *(Bestuursopzichter)*
CR	Community Relations
DC	District Commissioner
DS	Districts Secretary
DWV	Water Supply Service *(Dienst Watervoorziening*)
EBS	Suriname Energy Company *(Energie Bedrijven Suriname)*
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
FLE	Farmersland East
FLW	Farmersland West
HSE	Health, Safety and Environment
ICT	Information and Communication Technology
IDM	Infrastructure Development and Maintenance
ILACO	International Land and Agricultural Consultants
KPS	Police department *(Korps Politie Suriname)*
LBB	National Forest Service *('s Lands Bos Beheer)*
LBO	Lower Vocational Education *(Lager Beroepsgericht Onderwijs)*
LTS	Lower Technical Education *(Lagere Technische School)*
LVV	Ministry of Agriculture, Animal Husbandry, and Fishing *(Ministerie van Landbouw, Veeteelt, en Visserij)*
MULO	More Extended Lower Education *(Meer Uitgebreid Lager Onderwijs)*
NATIN	Nature Technical Institute *(Natuur Technisch Instituut)*
NB	Nature Conservation division (Natuurbeheer)
NEC	Noordam Environmental Consultancy
NH	Ministry of Natural Resources *(Ministerie van Natuurlijke Hulpbronnen)*
NIMOS	National Institute for Environment and Development in Suriname *(Nationaal Instituut voor Milieu en Ontwikkeling in Suriname)*
OW	Ministry of Public Works *(Ministerie van Openbare Werken)*
RGD	Regional Health Services *(Regionale Gezondheidsdienst)*
ROGB	Ministry of Spatial Planning, Land and Forest Management (*Ruimtelijke ordening, Grond- en Bosbeheer)*
SI	Social Investment
SOR	Suriname Accident Insurance *(Surinaamse Ongevallen Regeling)*
SOZAVO	Ministry of Social Affairs and Housing (Ministerie van Sociale Zaken en Volkshuisvesting)
SWM	Suriname Waterworks Company *(Surinaamse Waterleiding Maatschappij)*
SZF	State Insurance Fund *(Staatsziekenfonds)*
TOR	Terms of Reference

Acknowledgements

Compiling the information presented in this report would not have been possible without the help of many people, particularly in the district of Saramacca.

For general information about the district, resort, and situation along the Gangaram Pandayweg we relied on the staff from the District Commissioners office and the Citizens Information Centre (*Burger Informatie Centrum*). We are grateful for their time, information, and assistance in contacting relevant stakeholders.

Various stakeholders shared information and concerns that were relevant to drafting our impact assessment and related recommendations to minimize impacts on people, economic activities, and the natural environment. Of particular relevance in this context were the inhabitants living along the Gangaram Pandayweg.

Opinions expressed in this report are those of the consultant and do not necessarily reflect the views of Staatsolie or other institutions the authors are affiliated with. The consultant is responsible for all errors in translation and interpretation.

Celine Duijves and Marieke Heemskerk

Social Solutions

Paramaribo, Suriname

April 2014

Table of Contents

Table of Tables

Table of Figures

1. Introduction

1.1 Background to the Project

Staatsolie, the State Oil Company of Suriname, was founded in 1980 as a limited liability company under Surinamese Law. One of the strategic upstream goals of Staatsolie is to sustain the Staatsolie crude production level of 17,000 BOPD (Staatsolie Foundation for Transition & Growth 2013-2016). Development of the Farmersland Area will contribute to this goal.

Starting in 2010, plans were prepared to develop the so-called Farmersland West and East areas in the south and southwest of the Tambaredjo oil field. Initial focus was on the Farmersland West area, for which an Environmental and Social Impact Assessment (ESIA) started in 2011. This ESIA for the Farmersland West (FLW) production development project was undertaken by Noordam Environmental Consultancy (NEC) according to the Draft Environmental Act of 2002, the Environmental Assessment Guidelines (2005 and 2009) of the *Nationaal Instituut voor Milieu en Ontwikkeling in Suriname* (NIMOS) as well as international best practices. As part of the FLW ESIA process, scoping was conducted, including a scoping meeting. The Final Scoping report was submitted to NIMOS and in its advice on August 15, 2011 the institute indicated that it had no objection against the undertaking of the ESIA as stipulated in the Scoping Report.

Due to various technical and organizational issues, the FLW project has not yet commenced, except for the construction of access roads, for which a separate report was prepared (Noordam 2013[1]). In the meantime preparations were made for a similar production development plan in the Farmersland East (FLE) area, very close to the FLW area. Because both area and project are similar, Staatsolie requested to NIMOS whether a combined ESIA could be prepared. This request was granted by NIMOS in its letter dated January 21, 2014.

1.2 Project Description

The project encompasses the development of approximately 147 producing oil wells, for which about 196 wells (76 in FLW and 120 in FLE) will be drilled, assuming a success rate of 75%. Drilling will start in 2016 and production will last approximately 25 years. But field construction may already start in August 2014. This latter phase comprises the construction of main project infrastructure, like dams, well sites, trails, headers and electricity grid.

Detailed information on the project will be provided in the ESIA report.

1.3 Report Structure

This report presents the social baseline and impact assessment for the Farmersland Project. It provides a description of the social aspects of the surrounding communities and affected socio-

[1] Noordam, D. 2013. Environmental Impact Assessment Of production development in the Farmersland-West area in Suriname. Part I: construction of access roads. Report prepared for Staatsolie Maatschappij Suriname N.V. February 2013.

economic environment, identifies and assesses potential social impacts of the project and makes recommendations for mitigation measures. The report is structured as follows:

· ***Chapter 1: Introduction***

This section provides an introduction to and description of the proposed project and explains the purpose and structure of this report.

· ***Chapter 2: Approach and Scope***

This section outlines the approach to the study, its scope as defined in the Terms of Reference and presents the limitations of and assumptions made in the study.

· ***Chapter 3: Methodology***

This section provides an overview of methods used to collect and analyse data relating to the social environment of the study area.

· ***Chapter 4: Description of the Social Environment***

This chapter describes the general project area and its population, the area's history and archaeological sites, economic activities, infrastructure and services in the area, government representation, and current and planned developments.

· ***Chapter 5: Relations between Staatsolie and the local community***

In this chapter the Staatsolie community relations strategy and activities are being discussed. The consultant describes issues related to Staatsolie's social licence to operate, social investment, nature compensation, stakeholder concerns and complaints related to the presence of Staatsolie, the relatively recently developed grievance mechanism, and strategies that are applied for communication with project stakeholders.

· ***Chapter 6: Proposed strategies for stakeholder consultation and communication***

This chapter provides suggestions on the most effective ways to inform all relevant area inhabitants and other persons and organizations with an interest in the target area about the project so that no accidents or other adverse incidents will take place. It lists relevant stakeholders, discusses processes of disclosure of information about project activities, and presents a schedule with appropriate communication mechanisms catered to the various stakeholder groups.

· ***Chapter 7: Assessment of Social Impacts***

This section identifies, assesses and rates potential social impacts associated with the proposed project and recommends mitigation measures.

· ***Chapter 8: Conclusions and Recommendations***

This section concludes the report with a summary and discussion of principal findings and recommendations.

2 Approach and Scope

2.1 Scope of the Study

The scope and objectives of the social specialist study were defined by the Term of Reference (ToR) and encompass the following:

- Identify local communities likely to be directly (and indirectly) affected by the proposed production development project.

- Describe the social baseline of the local communities directly (and indirectly) affected by the project.
- Identify and assess potential negative impacts and positive benefits on the social environment resulting from the proposed project.
- Propose practicable measures to mitigate negative impacts and enhance positive benefits resulting from the project.
- Propose methods for monitoring the ongoing effectiveness of mitigation measures.
- Ensure that the specialist study undertaken meets or exceeds any relevant requirements of the World Bank Group Guidelines, IFC Performance Standards and/or Suriname legislation.

2.2 Guiding Principles

In line with Staatsolie demands, the ESIA reflects Staatsolie Corporate Vision and Values, particularly with regard to sustainability, as described in Staatsolie's Annual Report (http://www.staatsolie.com/annual.html). In addition, the ESIA was developed in accordance with environmental assessment standards of the Government of Suriname and the World Bank Group (World Bank EA Sourcebook) and undertaken in a manner consistent with the International Finance Corporation's Environmental and Social Review Procedure.

The legal and regulatory framework for environmental impact assessments in the country of Suriname is governed by NIMOS. The 2002 draft Environmental Act, currently under review by the Council of Ministers, includes Environmental Assessment Guidelines that have been considered when developing the ESI9A. Based on the EA Guidelines of NIMOS, the "Farmersland Production Development"-project is declared as a **Category A project** for which a full ESIA is required. NIMOS defines projects in category A as such:

> Projects likely to have adverse impacts that may be extensive, irreversible, and diverse. The extent and scale of the environmental impacts can only be determined after thorough environmental assessment. Mitigation measures can only be formulated after the results of the assessment are known.
>
> Source: Environmental Assessment Guidelines, NIMOS 2009

2.3 Limitations and Assumptions

Any social specialist study is based on a number of assumptions and subject to certain limitations, which should be borne in mind when considering information presented in this report. NEC is confident that these assumptions and limitations do not compromise the overall findings of the study.

Limitations

The initial focus of the activities was on the Farmersland West area, for which an Environmental and Social Impact Assessment (ESIA) started in 2011. The consultant started to collect data by means of a household survey in 2012. For this reason, some of the data about area inhabitants is slightly outdated. However, given that area inhabitants interviewed in March 2014 gave very similar answers

to those given in 2011, the consulted is convinced that the earlier collected data is still applicable to the current situation and useful for current ESIA.

During field visits, the residents of the main impacted area, the Gangaram Pandayweg, conveyed that they were not yet informed about the projected Farmersland project. In order to facilitate discussions about possible impacts, it would have been good if the consultant study had been performed immediately following the scoping meeting, or if the residents had been visited once more by Staatsolie staff. This would have allowed the residents to be more prepared for the interviews.

Assumptions

In collecting and analysing the interview data, it was assumed that interviewees answered truthfully to the questions and did not wilfully distort or hide information. We reduced bias by cross-checking the information from one person with that provided by others. We also assume that Staatsolie has provided all relevant information and that their reports provide accurate data on, for example, the numbers of spills and accidents.

3 Methodology

3.1 Introduction

This chapter describes the methods that were used for baseline data collection, the projection of possible impacts and the design of mitigation measures to provide a draft ESIA (including an Environmental Management Plan, EMP).

For all report elements, primary and secondary data were collected. Primary data was collected directly from informants, for example through interviews with representatives of local government and local inhabitants. Inhabitants of the Gangaram Pandayweg were interviewed on two instances; in 2012 and in 2014. Some households were interviewed both years, whereas others were only interviewed once. The consultant anticipates that the current project does not encompass extensive stakeholder -engagement, because the project is conducted in a relatively small area, with a low population (~30-40 houses within the project area and along the road between the project area and the Sarah Maria complex). Similar operations as the current project are well-known in the area and previous consultations with local population and local government agencies for past projects (Tambaredjo NW and Calcutta) have provided consistent information to build on for the current ESIA.

The consultant combined primary and secondary information to compile the social specialist report. Both qualitative and quantitative methods were used to collect and analyze primary data.

3.2 Assessment of existing information

Secondary data was obtained from documentary sources, such as existing reports, governmental documents, and expert analyses on the internet.

Staatsolie performed major exploration activities in and around the Farmersland area, including the onshore Tambaredjo, the Calcutta, and the Tambaredjo NW oil field, which fields formed a combined oil reservoir of approximately 700 million barrels (STOIIP=Stock Tank Original Oil in Place); these field were developed in respectively 1982, 2005 and 2007. The Calcutta and Tambaredjo NW oil field were developed as wet operations, while the Tambaredjo oil field was developed as a dryland operation. The Farmersland project is part of the Tambaredjo oil field, but contrary to that oil field, the Farmersland project is developed on private and leased land where agricultural activities take place on part of the area.

The ESIA reports for these earlier projects were used as a source of information about the district of Saramacca and its inhabitants. Other consulted existing sources were:

- Information from the Ministery of Agriculture, Animal Husbandry and Fishing (*Landbouw, Veeteeld en Visserij*-LVV)
- Minutes from stakeholder meetings
- Districtsplan Saramacca 2014
- Resortplan Wayambo 2014

- Online sources, including the *Staatsolie Nieuws*

These documents primarily served to describe social baseline conditions of the communities directly and indirectly affected by the project, to identify stakeholders and to give insight in the planned developments.

3.3 Primary data collection

Household survey

Households were visited and surveyed at two points in time:

- 2012, as part of the ESIA for the Farmersland West area, between km 2.0 and km 12.5, for a total of thirteen households
- 2014, as part of the ESIA for the entire project area (Farmersland West and East), between km 7.5 and km 11.0, for a total of nine households

Six households were interviewed in both years

Because the east and west project areas are very similar, and because the answers provided in both survey years were very similar, the consultant is convinced that that the data collected in 2012 is still of value and useful for current ESIA. Household surveys were done by two professional anthropologists, in 2012 accompanied by a fieldworker.

In the more extensive project area, the Gangaram Pandayweg between the Sarah Maria plant and km 12,5, a total of 17 seemingly inhabited houses were counted. It is possible that some of these houses are weekend and/or holiday residences for people living in Paramaribo or abroad.

In both survey years, the consultant made an effort to interview as many households as possible in the target area and the same general strategy was followed. At each seemingly inhabited house, the researchers looked if someone was at home, and asked the local inhabitant for permission to enter. The researchers introduced themselves, explained the purpose of the visit, and asked for permission to ask some questions about the household. If the household head(s) was or were not at home, the researchers would speak with any capable and knowledgeable member of the household. The team did not encounter any refusals. The survey interview took about 15-20 minutes to complete, but visits to area inhabitants took in some instances up to an hour if people had much to tell.

Surveys focused on the socio-economic conditions of the households on whose land the proposed drilling will most likely take place, and more specifically about commercial, subsistence and recreational activities on this land. Inhabitants were also asked about their past experiences and contacts with Staatsolie, possible concerns about current and planned Staatsolie activities and their perceptions of drilling in the area.

Stakeholders consultations

Stakeholder consultations were also conducted in two periods: between December 2011 and February 2012 and in March-April 2014. Interviews with mostly open ended questions were conducted with:

- Local government officials (e.g. District Commissioner, District Secretaries, Government Supervisors from different Ministries),
- Local entrepreneurs, including contractors working for Staatsolie

- Staatsolie representatives, principally from the Community Relations Department

Local stakeholders were asked to provide general information about the area and to identify the characteristics of the Wayamboweg resort; specifically the Gangaram Pandayweg and its inhabitants. Furthermore, the consultant asked interviewees to reflect on their earlier experiences with Staatsolie and to elaborate on possible concerns in relation to the planned Staatsolie activities. Besides, they were asked to describe their general experiences with Staatsolie and in particular their experiences concerning complaints and communication. Finally, stakeholders were asked to reflect on expected positive and negative impacts, and to help identify possible measures to reduce negative impacts and enhance the positive contributions of the Staatsolie project to the district in general, and to affected parties in particular. Interviews with government representatives also functioned to identify and describe any planned development initiatives in the project areas.

Interviews with Staatsolie representatives mostly focussed on their community relations strategies, including social investment, community projects and its grievance mechanism.

A complete list of interviewees is attached as Annex 1.

3.4 Data analysis

Existing secondary data on environmental, socioeconomic, cultural, and physical conditions relevant to the project were combined with results from qualitative interviews, household surveys and observations and placed in a local and national context. This information allowed the consultant to identify and map local inhabitants likely to be directly (and indirectly) affected by the proposed production development project, including those dependent on the surrounding areas for their livelihoods.

Results from the household survey, interviews with local government officials, minutes from the scoping meeting, and interviews with other stakeholders in the area were used to describe the social baseline conditions of the communities directly (and indirectly) affected by the project, as well as any planned development initiatives in the Farmersland area. These data also provided insight in current community relations between the local population and Staatsolie. Information obtained at the FLW scoping meeting and through qualitative interviews was analyzed to identify project stakeholders and provide input into an appropriate process for consulting and communicating with local population at each stage of project preparation and implementation.

The baseline data served to identify potential negative social impacts and positive benefits of the proposed Farmersland project. These data also formed the basis for recommendations on appropriate and feasible mitigation measures to enhance positive benefits and to avoid negative impacts on the social and economic environment, or where such measures are not feasible, measures to minimise, mitigate or compensate for adverse effects. Where appropriate, the findings of the other specialist studies have been taken into account.

4 Description of the Social Environment

4.1 Introduction

This chapter describes the social baseline of the district, resorts, and local community directly and indirectly affected by the project, including community structure and function, demographic and socio-cultural characteristics, main economic activities, dependencies and interactions of social components. The chapter starts with a brief outline of the history and possible archaeological resources in the proposed drilling area.

4.2 History and archaeology

Archaeological sites have been discovered several km south of the Saramacca River, but not on the northern river bank area where the proposed drilling will take place. The presence of valuable archaeological artefacts in this area is unlikely given that large ridges and mounds, which were favoured as living places by early coastal indigenous populations, are not present here.

No known places of special historical interest are situated within the study area.

4.3 The Study Area

The Farmersland West and East areas are situated in the southern and south-western part of the Tambaredjo oilfield (Figure1).

The development drilling will be conducted on:

1. Privately owned and (partially) cultivated land. There is no primary vegetation and water management of the area is controlled by sluice gates, culverts, pumps, canals and dams. Many land owners have impoldered their lands for so-called *paddy* rice farming.
2. Swamp area in the north of the FLW area. In this area some dams and canals have already been constructed by Staatsolie and by farmers, and production development is ongoing in the area to the north of it (Tambaredjo NW project).

The actual project area (FLW+FLE) within the study area covers approx. 17 sq km. The activity, as the one proposed, has already been undertaken at other rice farms and agricultural land in the wider area.

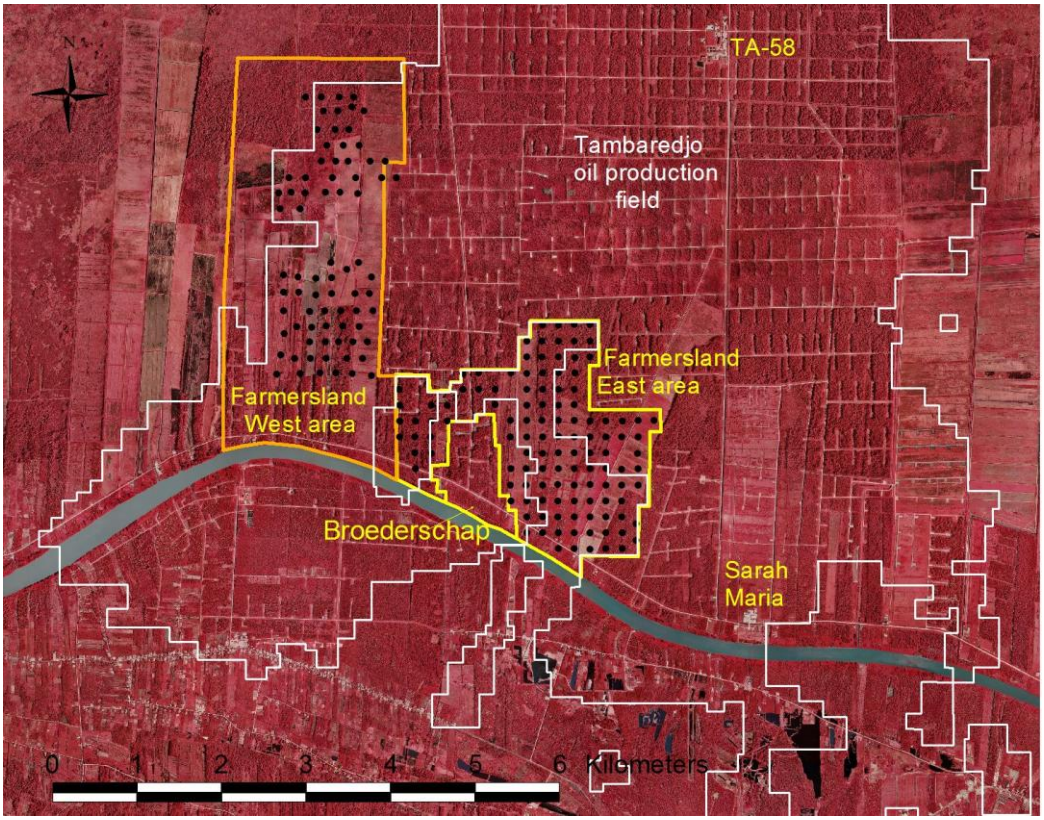


Figure 1: The Farmersland (FLW+FLE) project area relative to the Tambaredjo oil production field; the proposed well locations are shown as black dots.

4.4 Population and demographics

The total population of the Saramacca district is 15,696 persons (Districtsplan 2014), which represents approx. 3 percent of the total population of Suriname. The district has a low population density (4.3 inhabitants/sq. km), with concentrations in Groningen, the Damboengton-Tijgerkreek and the Jarikaba area. Hindustani and Javanese are the dominant ethnic groups in Saramacca District.

The study area falls within the Wayamboweg resort (Figure 2). According to the most recent data (2014) 1,186 people live in this resort 626 of whom are men and 560 are women (Districtsplan 2014; Table 1). The resort has a surface of 872 square km (Ressortplan Wayambo 2014).

The only people living between the Saramacca River and the Tambaredjo NW operation area are those who built their homes along the Gangaram Pandayweg, formerly known as the Lareco Road. According to the local District Secretary and the coordinator BIC (Citizen's Information Centre *(Burger Informatie Centrum)*, about 100-125 households (~600 people) live along the entire road.

The proposed drilling area is situated north of the stretch of the road between Km 7.5 and Km 12.5. 63 plots of land are situated along this stretch of road, with the plot numbers 308 to 366 (Annex 2). Based on field visits the consultant estimates that there are approximately 11 permanently inhabited homes along this stretch of the road. In addition, seven families are having weekend/holiday houses along the road. The majority of the inhabitants is of Hindustani descent.

Resort	Number of inhabitants	Male	Female
Wayamboweg	1186	626	560
Jarikaba	4815	2464	2351
Kampong Baroe	2295	1204	1091
Groningen	2726	1421	1305
Calcutta	1547	828	721
Tijgerkreek	3127	1643	1484
Total	***15696***	***8184***	***7512***

Table 1. Number of inhabitants per resort (Districtsplan 2014)

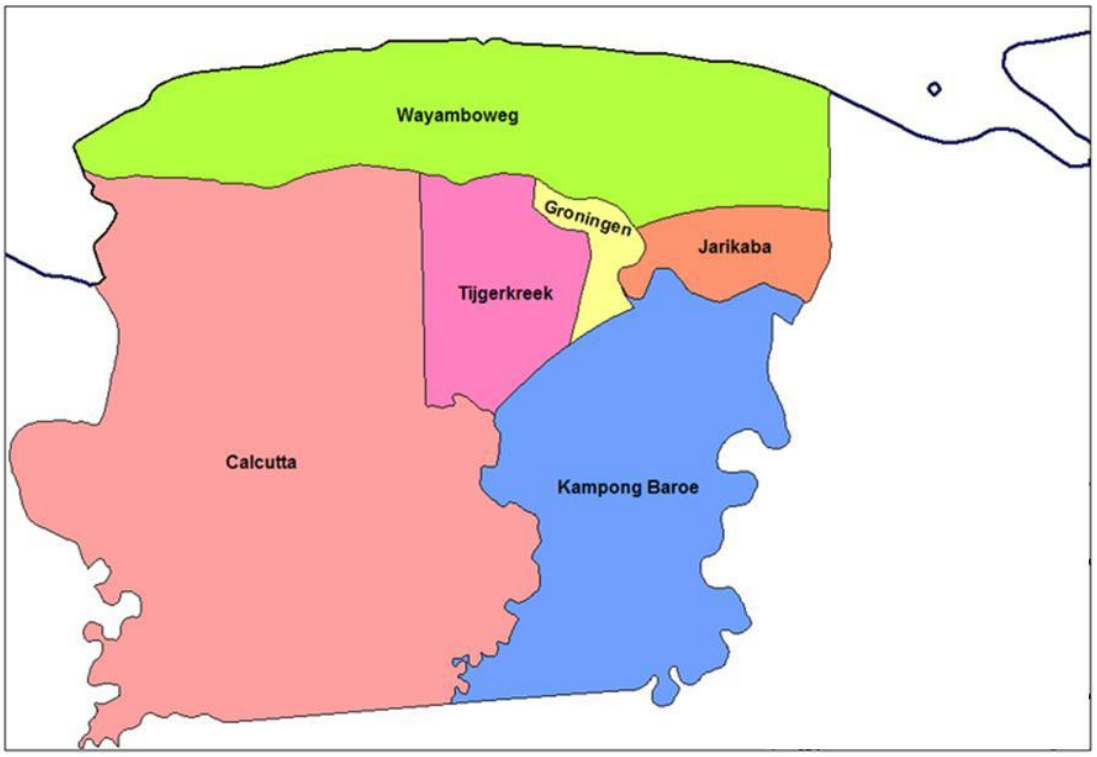


Figure 2. Map of Saramacca district with Wayamboweg resort in the North.

Most families have a long history in the area and most families have ownership on their plot. However, this private ownership is often a family affair where the issue of undivided estates (*boedelprobleem*) can become a problem. This issue is explained in more detail in the legal section of this ESIA.

Before independence (1975) the study area was more densely populated. Many people left in the 1970s and '80's to try their luck in the Netherlands or in the capital city of Paramaribo. Because of a lack of facilities, educational opportunities and employment, out-migration of young people continues and the population along the Gangaram Pandayweg is aging. This situation makes it difficult for farmers to find farm labourers.

The arrival of Staatsolie has not brought new people to the target area and only a few households have benefitted from new labour opportunities. Some area inhabitants believe that better facilities in the area would entice more of these youngsters to stay in or return to the area.

4.5 Economic activities

4.5.1 Agriculture and livestock

The Wayamboweg resort is traditionally a rural agricultural area. Activities include the cultivation of paddy rice, vegetables and bananas as well as animal husbandry. For some of the inhabitants agriculture is a full time job, but most people in the resort derive their income partly from salaried work supplemented with income from growing vegetables. The General Bureau of Statistics gives an overview of the occupational group in the resort. The data is rather outdated but interviews with local stakeholders suggest that the figures are more or the less comparable nowadays.

Occupational Group	# persons
Total	**502**
Legislators, Senior officers and Managers	16
Professionals	17
Technicians and Associate Professionals, and Armed Forces	16
Clerks	9
Service Workers and Shop and Market Sales Workers	24
Skilled Agricultural and Fishery Workers	**273**
Craft and Related Trade Workers	25
Plant and Machine Operators	45
Elementary occupations	76
Unknown	1

Source: ABS 2007

Table 2. Occupational group in the Wayamboweg resort.

Figure 3 presents the land use in the project area. In addition the vegetation of non-used land is shown.

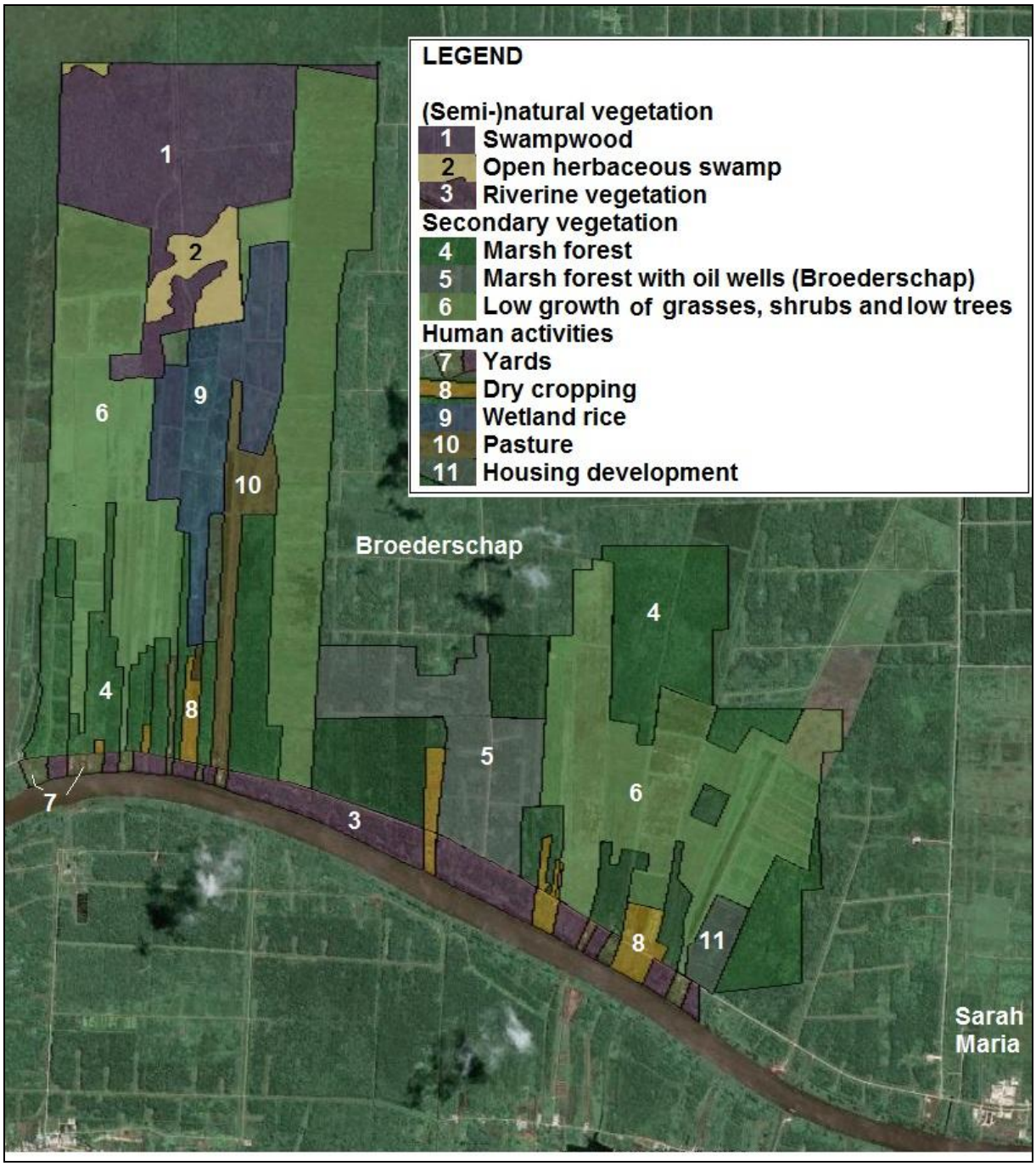


Figure 3: Land use and vegetation in the project area

Only part of the project area is being used. In the southern section some dry cropping is done. Cattle grazing is only found in the FLW area. Many parcels are under secondary marsh forest, including the Broederschap, where oil wells from Staatsolie are found. At the eastern end from the FL area a housing development project - the Yarah project - is found, currently with 3 houses.

In the northern part of the FLW area one relatively large area is used for wetland rice cultivation. The current season is underway in the early growing stages. The required irrigation water is currently withdrawn from the northern swamps and drainage water is discharged through canals that end up into the Saramacca River in the south (see $ 4.7 of the ESIA). The remainder of the northern FL

section is dominated by abandoned and fallow land with a low vegetation of grasses, herbs, shrubs and small trees.

Regarding crops in the area: in addition to paddy rice, people plant plantains, citrus, coconut, cassava, legumes and various vegetables (pepper, eggplant) for own use and for sale. The most planted annual crop is rice, followed by mung beans (SUR: *oerdi*; LAT: *Vigna mungo*). The semi multi-annual crop that is mostly plant in the area is banana and for the multi-annual crops this is citrus.

Paddy is sold to both wholesalers and smaller consumers. Fruits and vegetables are either sold to middlemen driving by, or taken by the farmers themselves to the market in Paramaribo. Several plot owners indicated that in addition to their property, they also use government land that borders their plot in the north. They have cultivated these extensions to their lands for more than thirty years. Some farmers have obtained a land lease title for these domain lands. Others applied but never got a response or just never submitted an application. The legal specialist report provides more detail about the property rights provided by different land titles and land use histories in the project area.

Name	Address: Gangaram Pandayweg nr	Gross area parc. in chain[2]	Area Crops in chain[2]			Area reclaimed fallow and grassland in chain[2]	
			Annual	Semi Multi-annual	Multi-annual	Area fallow	Area grassland
Moerlie, P	320,321a,321b	2000	1875	3		123	
Moerlie, K	323	600		10	10	529	50
Bhawaniebhiekh, S	325	137,5		2		135	
Khemon, W	330	250	1	3		200	
Khemon, S	332	225		6,5	1	192	
Khemon, S	332	25	1	5		8,5	10
Ramdjas, R	334	250		20		209	
Cederburg, I	338	250		2	65	180	
Debitewari, S	354a,356,458	4900	60	10	17	2500	2310
Koenden, S	354b	300			0,5	99	200
Soekha, S	359	200		5	2	167	25
Debitewari, A	362	1000	20	4	0,5	700	

Table 3. Data Ministry of Agriculture, Animal Husbandry and Fisheries about parcels and crops in the project area.

Several farmers along the Gangaram Pandayweg raise cattle. The Ministry of Agriculture, Animal Husbandry and Fisheries indicates that many farmers have poultry, six farmers have cow, and two keep other cattle. The Ministry of Agriculture, Animal Husbandry and Fisheries collects data

[2] A chain is a unit of length. It converts to 66 feet, or 22 yards, or 100 links,[1] or 4 rods (20.1168 m).

concerning crops and cattle on a regular basis[3]. This data gives insight in the gross area of the parcel, the annual, semi-annual and multi-annual crops that are being grown and the amount of fallow- and grassland. An overview of the crops and cattle along the entire right bank of the river can be found in Annex 3. Tables 3 and 4 give summary overviews of the crops and cattle in the project area.

Farmers have not bundled in an association or cooperation because of bad experiences. In 2013 a training 'plant propagation' has been organized by LVV. Approximately 30 farmers participated.

Commercial hunting and fishing do not occur in the swamp area. Relatively near the proposed drilling area, bank net fisheries exploit the mudflats along the Saramacca coast. In addition, a few people living along the Gangaram Pandayweg fish as a hobby on the Saramacca River or in the Coppename Estuary. Plot owners also have fishing holes and some take payment from recreational fishers, most often from Paramaribo.

Name	Address: Gangaram Pandayweg nr	Cattle (poultry, cow, pigs and various cattle-goats, sheep, horses)			
		Number of poultry	Number of cow	Number of pigs	Number of various cattle
Moerlie, P	320,321a,321b	**60**			
Moerlie, K	323	**15**			
Bhawaniebhiekh, S	325				
Khemon, W	330				
Khemon, S	332				
Khemon, S	332		**7**		
Ramdjas, R	334				
Cederburg, I	338				
Debitewari, S	354a,356,458	**700**	**16**		**40**
Koenden, S	354b		**12**		
Soekha, S	359				
Debitewari, A	362		**17**		

Table 4. Data Ministry of Agriculture, Animal Husbandry and Fisheries concerning parcels and cattle in the project area (2013).

Many local farmers believe that ongoing Staatsolie activities have negatively affected their paddy rice harvests. One specific activity that has harmed their production is the replacement of old culverts by narrower culverts. In the perception of the farmers this activity is done by Staatsolie and they have indicated that this intervention has negatively impacted the water management system. When paddy needs to be harvested, the water must be drained one month in advance. Because of the narrower culverts the water does not drain properly and the plots remain under water. One farmer expressed the concern that it will not be possible to combine his paddy activities with the work of Staatsolie on his property. For this reason he decided not to plant rice this year.

[3] It is likely that these figures at present are different from the last count and as a result of mortality and birth. For example, Debitewari, S reported at the time of the field visit (April 2014) that he had 50 cows, mostly newborns.

4.5.2 Employment with Staatsolie

Staatsolie employs 229 people from the Saramacca district; 4 of them are inhabitants of the Gangaram Pandayweg (written comm. Mr. Read April, 4th 2014). There is no database that gives insight in the number of employees that are hired from contractors.

Two contractors are located in the area and provide Staatsolie with employees. Contractor Agash has 17 employees from the Gangaram Pandayweg. Contractor Raghoenath employs a total of 45 persons who are working at the Staatsolie plants. These contract labourers are mostly men but include also some women for cleaning work. Only one employee from this Contractor lives at the Gangaram Pandayweg. Others come from the Saramacca district, and mainly from the community of Catharina Sofia. The main jobs performed by contractors are:

- Maintenance of flow line dams
- Chemical maintenance (removing weeds)
- Weeding/cutting grass
- Clean-up after an oil spill
- Cleaning offices
- Tractor drivers
- Excavator drivers (once in a while)

During consultations in 2012 the consultant found that most of the contractors provide jobs with year-round work. Permanent employees, gardeners, cleaners and warehouse staff are insured by State insurance (*Staatsziekenfonds, SZF*) and the Suriname accident insurance (*Surinaamse Ongevallen Regeling, SOR*). One of the contractors stated that his employees are only SOR insured (written comm. April 3, 2014).

4.5.3 Financial welfare

According to data from the Ministry of Social Affairs 10 persons at the Gangaram Pandayweg are rightful claimants of financial welfare and in total, 13 persons are recipients, meaning that they receive benefits. Free medical assistance is available for 53 recipients. Twelve of them have a card because they are identified as 'very poor' and 41 persons in this group have a card because they are identified as 'poor'. In total, 70 persons related to the 53 recipient who fulfil the criteria make use of the medical assistance card. Besides, 12 persons receive old age state pensions.

	Recipient	Rightful claimant
Financial wellfare	10	13
Free medical assistance card*	53	70
Very poor (*onvermogenden*)	12	
Poor (*minvermogenden*)	41	
AOV (old age state pensions)	12	

*Excluding children under the age of 16 and senior citizens over the age of 60 who are eligible for free medical assistance under the governmental medical coverage program for children and seniors.
Source: Ministry of Social Affairs and Housing (SOZAVO), pers. comm. 14 March 2014

Table 5. Recipients and rightful claimants of government financial assistance at the Gangaram Pandayweg

4.6 Infrastructure and services

Elderly people recall that before construction of the Gangaram Pandayweg (1960s) the area between the Saramacca River and the Buru swamp was much more isolated. To get to Paramaribo one had to walk on the dams, cross the river to the Tijgerkreek in a rowing boat, and next take the bus to town. Construction of the Gangaram Pandayweg and its maintenance by Staatsolie has facilitated access to the nearest urban centres. Nevertheless, the target area remains marginalized, with many basic public and social services lacking.

4.6.1 Houses

Along the Gangaram Pandayweg different house types can be found, ranging from small wooden single storey buildings to large, two storey houses made of stone or of a combination of wood and stone. The houses are typically located on the front side of the land, with often relatively large agricultural land at their back.

Figure 4. Impression of different inhabited houses located along the Gangaram Pandayweg.

4.6.2 Public services

Several families along the Gangaram Pandayweg have a basin to collect rainwater in their backyard. This water is used for washing clothes, washing dishes, etc. For consumption the inhabitants use rainwater that is collected by a so-called *durotank* (large black water bin). The public provision of drinking water in the area falls under the responsibility of the Water Supply Service (*Dienst Watervoorziening – DWV*) of the Ministry of Natural Resources (*Ministerie van Natuurlijke Hulpbronnen – NH*) but the area is not connected to the drinking water network. The lack of access to a reliable source of drinking water is one of the main concerns for area residents.

In the dry seasons DWV-NH delivers water from the water station in Freiburg, but the amount of water that is provided is generally not enough and this water cannot be used as drinking water. Also the water from the nearby Saramacca River is not suitable for drinking and even washing clothes, oneself, or the dishes in this water is not advisable.

Electricity is provided through two power lines; one public EBS (Energie Bedrijven Suriname) power line for the area inhabitants and a separate source for Staatsolie use. In 2007 there were 429 houses in the resort of which 275 (64%) were connected to the electricity grid of the Electricity Company (EBS). All of the currently surveyed households were connected to the EBS. Apart from near the Staatsolie offices, there are no street lights.

Concerning the use of mobile phones, Digicel and Uniqa used to have good coverage, but at this moment all Suriname digital networks have poor coverage which is a structural problem. A landline is only present up to 500 meters from the beginning of the Gangaram Pandayweg. Mail is being delivered only once a month.

4.6.3 Health

There is an RGD (*Regionale Gezondheidsdienst*) clinic at La Prevoyance but medical personnel -a nurse and a doctor from Groningen- is only present twice a month. All other times, one needs to travel to Tijgerkreek, Groningen or Paramaribo for medical help, which may take between half an hour to an hour depending on the state of the road and one's location. A small pharmacy is part of the clinic, but drugs are not always available.

Figure 5. Clinic at La Prevoyance

4.6.4 Education

Within the resort there are two primary schools and a nursery school, but none near the proposed production area. Children from the target area visit the primary school in Huwelijkszorg. Groningen houses a public secondary school (More Extensive Lower Education, MULO). More variety can be found in Freiburg which features a technical secondary school (NATIN) as well as a public secondary school (Lower Vocational Education, LBO & MULO). School buses pick up children along the Gangaram Pandayweg to bring them to Groningen.

For higher education students must travel to Paramaribo. A Staatsolie-sponsored school bus daily drives students from Saramacca to Paramaribo and back, to attend afternoon/evening college. Youth from the Gangaram Pandayweg are served by an additional Staatsolie bus that brings them to the main road, from where they travel on to Paramaribo. Some families moved their children to Paramaribo to live with family. One mother noticed that boarding schools don't except children from Saramacca because there is a lack of space and children from more remote places have priority.

Results from the household survey that was conducted in 2012 illustrate that most of the inhabitants of the target area have limited formal education. About half of the interviewed heads of the households had some years of elementary education but not completed primary school. A few interviewed household heads, mainly women, had completed elementary school but not gone beyond, and a quarter of the male household heads had entered secondary education (LBO/MULO)

but failed to complete. In total only three persons finished secondary education; one with a technical diploma (results from 13 surveyed households).

4.6.5 Transport

The Gangaram Pandayweg starts at its crossing with the Wayambo Road, which is part of the East-West connection. This road connects Paramaribo with Nickerie. The Wayambo Road is a single lane paved road and in relatively good condition (currently being rehabilitated and upgraded to comply with the IIRSA[4] standards). The Gangaram Pandayweg itself is a smaller unpaved road. Public busses pass the target area early in the morning in the direction of Paramaribo and return around 1 pm from the capital city to get back to Saramacca.

The Saramacca River is the district's most important water transportation route. It is being used by pontoons to transport sand and gravel. The river is also used by smaller passenger and fishing boats.

Most consulted families along the Gangaram Pandayweg have a means of transport; a car and/or a pick-up, a small truck, a tractor and/or a moped. Two families had no means of transport at all.

Stakeholders along the Gangaram Pandayweg indicated that there is more intensity of traffic on the Gangaram Pandayweg during the morning (7-9 am) and afternoon (12-3 pm). The main reason for the 'rush hours' is that people come to or leave from their work at Staatsolie. Most traffic is active between Staatsolie at Sarah Maria and the Wayambo Road, less traffic is active between Staatsolie and Huwelijkszorg, the other part of the Gangaram Pandayweg. Traffic consist of private cars, Staatsolie pickups, minivans (8 seats) and small busses (34 seats). At the time of our field visit (9 am-15 pm) no heavy trucks were observed.

4.7 Government representation

The administrative centre of the Saramacca district is at Groningen, where most government services are located. The project area has a small BO ("Bestuursopzichter"= District Supervisor) office, an office of the Ministry of Agriculture, Animal Husbandry and Fisheries and a RGD health clinic along the Gangaram Pandayweg at La Prevoyance (km 12,5).

Figure 6. BO Office at La Prevoyance

[4] IIRSA: Initiative for the Integration of Regional Infrastructure in South America

4.8 Current and Planned Developments

4.8.1 ILACO

Staatsolie funded engineering firm ILACO (International Land and Agricultural Consultants) Suriname NV to execute an independent study on the causes of, and possible solutions for, current water control issues. In March 2014 this study was presented to the local population of Wayamboweg resort and Saramacca district at large. During its presentation, ILACO summarized the causes for water nuisance as being: dams that are too low, poorly functioning culverts, an excess of plants and waste materials in canals (poor maintenance); and poor or no water control on abandoned plots. Short-term solutions include the elevation of road sides, renovation and maintenance of dams, and improvement of the Gangaram Pandayweg as an industrial road. In addition, water management in the swamp should be improved by creating new facilities to enhance the water flow to the river.

Local area inhabitants at the meeting generally supported ILACO's suggestion to start right away with the short-term solutions and subsequently work on a more long-term, durable solution. A Staatsolie board member promised that Staatsolie would look at options for improvement of the water situation in collaboration with the District Commissioner (Mr. W. Dwarkasingh, Staatsolie board member, 27 March 2014).

4.8.2 Allotment projects

At the moment one allotment project is developed within the project area, the Yarah project (also referred to as Ahinsa Project), at approximately km 8 (lot number 320). During the field visit in April 2014 the consultant observed three houses on the Ahinsa Project. One inhabitant, Mr. Wan Soe Moi, is living here permanently. One of the other two houses belongs to his daughter, who stays there frequently. The third house belongs to an older couple in the Netherlands, which visits every six months. Mr. Wan Soe Moi estimated that that the allotment project is 150-200 meters deep and 80 meters wide. He did not expect that the activities of Staatsolie would affect his living conditions.

According to the coordinator of the BIC and the District Secretary most plots are sold to foreigners and citizens from Paramaribo. Most houses will be used as weekend house.

No information according the allotment projects along the Gangaram Pandayweg can be found on the internet. Besides, the District Commissioner and his staff had no information about the Yarah project, permits, the project developer, and the exact location. Mr. T. Abboud, the project developer and owner has not replied to written inquiries and it is unknown whether this developer is in the possession of the required permits for housing development in the area. The legal specialist report provides more information about the juridical requirements for housing development in the project area.

5. Relations between Staatsolie and the local community

Six aspects of community relations will be discussed; social license to operate, social investment, nature compensation, Stakeholder concerns and complaints, the grievance mechanism and communication strategies.

5.1 Social license to operate

Without local support, Staatsolie activities would be unable to proceed, or at best do so after significant delays and disruption. Companies gain and maintain their "social license to operate" – essentially the acceptance or approval granted to a company's operations by local community and other stakeholders – by managing their environmental and social impacts and making sure that communities are able to benefit from opportunities coming from development of the natural resources (Ipieca 2014).

To build credibility and trust, Staatsolie informs communities about the scope of the project and its impacts during scoping and stakeholder meetings. In the words of the Staatsolie CR coordinator, this means that Staatsolie provides timely and accurate information to the public about possible positive and negative impacts and appropriate mitigating measures. Secondly, reported the CR coordinator, Staatsolie provides free and clear information. In addition to investing in communication with stakeholders, Staatsolie also invests in community projects on the request of the local community. These social investments are discussed in the next paragraph. Positive Stakeholder perceptions of the company could be further developed by involving stakeholders in the identification of social investment programs, and making commitments to hire local labor and services.

Social license is monitored by listening to questions and complaints that are brought forward during meetings at the start of the project and during close-out. These questions are written down in meeting minutes. Through frequent interaction (telephone calls, email correspondence, face to face meetings) with the District Commissioner and relevant staff, Staatsolie aims to timely identify any potential issues and keep track of follow up on commitments made.

5.2 Social investment

Social Investment (SI) programs are defined as the voluntary contributions companies make to the communities and broader societies where they operate, with the objective of mutually benefiting external stakeholders, typically through the transfer of skills or resources, and the company (Ipieca.org 2011) .

Staatsolie's Community Relations (CR) program is in the development phase (Alfaisi, pers. comm., 18 February 2014). The aim of this program is to build sustainability and capacity in community projects. However, at this moment there appears to be no clear company view of what Staatsolie aims to achieve in terms of Social Investment or of how Social Investment can be strategically linked to the business case. Neither is there a system in place for measuring or monitoring Social Investment. The 'Guide to successful, sustainable social investment for the oil and gas industry' (Ipieca.org) can be a

useful document in the process of professionalizing the community relations department because it provides guidelines for how to create successful and sustainable community investments and how to measure their success.

To contribute to community development, in 2009 Staatsolie has established the Staatsolie Foundation for Community Development. The foundation supports sustainable development projects for the benefit of the community in the field of education, health and safety, environment, sports, art and culture, energy and entrepreneurship. Local organizations and officials can submit applications for projects but local people often do not know how to write a project proposal. The District Commissioner and his advisor lamented that due to a lack of local capacity, community projects are not submitted in the correct format or not submitted at all (Mr. A. Rhamdani, DC, and Mr. P. Hellendoorn, advisor, pers. com. 11 March 2014). They expressed their frustration about a request for elevation of a soccer field, which had been rejected twice because the project application did not follow the correct formula or format. They suggested that Staatsolie could assist local stakeholders in project design and the project submission procedures.

In a reaction, the Staatsolie Coordinator Community Relations explained that Staatsolie does not have a defined format for project proposals, but proposals do need to include all standard project proposal sections. Staatsolie assists applicants with advice and instructions, including general guidelines about the proposal requirements. In addition, a Staatsolie CR officer can meet with the applicant to discuss the format and content. Generally Staatsolie does not coach the applicant more extensively. Nevertheless, in the case of a relatively simple, non-technical project, the Staatsolie CR department may counsel the applicant throughout the trajectory, especially when it is obvious that the applicant does not have (access to) the capacity to prepare and submit a proposal (S. Alfaisi, e-mail communication 27 May 2014).

Both inhabitants of the Gangaram Pandayweg and district officials were asked what would be the most important thing that could be realized by Staatsolie in the area or what they think has to be done by Staatsolie for the community along the Gangaram Pandayweg. The most common answer is paving of the road, followed by connection of the area to the national water network (*Surinaamse Waterleiding Maatschappij, SWM*), provide local employment, street lighting and providing a solution for the flooding problems. The latter refers to the problem that in periods with heavy rainfall, a large part of the road and some houses get flooded.

The District Commissioner and other local government officials admitted that not Staatsolie but the government is responsible for public works such as paving the road and drinking water provision. Nevertheless, they believed that given Staatsolie's long-term presence in the area and the amount the company earns from the district, the company should help the local populations with the listed matters (Mr. A. Ramdhani, DC, pers.com. 11 March 2014).

Of these suggested projects, the flooding problem and provision of - mostly temporary - local employment presently have particular attention of Staatsolie. With regard to the latter, Staatsolie invests in the local economy by local hiring and contracting. There is no formal written policy that dictates preferential local hiring -when available with equal capacity as 'outsiders'- but it is an unwritten code of conduct, according to a community relations officer (R. Amain, pers. com. 27 May

2014). When working through contractors, Staatsolie recommends to contract local people and services but this advice is not given in writing and noncommittal, and it is up to the contractor to decide whether or not this advice is followed.

For the Farmersland drilling activities it is foreseen that local workers will primarily be hired through contractors. District officials complained that the number of local hires is much too low, and that even people with the required education are not hired by the company (Ms. L. Bhario, government agent, pers. comm. 11 March 2014).

Staatsolie's Community Relations coordinator explained that infrastructural projects on the wish list of inhabitants of the Gangaram Pandayweg, such as paving the road, construction of drinking water piping, and installation of street lights, are not under consideration with Staatsolie. Neither does Staatsolie indirectly support these projects, for example by lobbying with the central government. If the government decides to execute these projects and requests support from Staatsolie, the company will decide about a possible contribution at that moment (S. Alfaisi, pers. com. 29 May 2014).

Table 6 lists the projects that Staatsolie funded in the year 2013 in Saramacca district. Among the main continuous projects are (1) support for the Boskamp soccer club and (2) provision of transport for students from Saramacca who follow continued education in the afternoon/evening (VOJ/VOS). Staatsolie helps students with eight buses of which five go to Paramaribo and two to Freyburg (AMTO/LTS). In addition, one bus brings students from the Gangaram Pandayweg from their homes to the main road to catch one of the other busses.

In addition to funding specific projects, Staatsolie also contributes with funds, equipment and purchasing to local development. In the project area, Staatsolie sprinkles, maintains and levels the Gangaram Pandayweg up to km 30 (the end of the road). At places where the road is caved in (4 locations), Staatsolie has assisted by placing culverts to allow the water to flow through. The District Commissioner complained, however, that the culverts that Staatsolie placed are much too small, and hence the water cannot adequately flow (Mr. A. Ramdhani, DC, pers. com. 11 March 2014). The District Commissioner conveyed that he has stopped the construction activities and has written a letter to Staatsolie to request adequately sized culverts underneath the road. This example suggests that better coordination between the DC office and Staatsolie would benefit the efficiency and local appreciation of community projects. Another request from both the District Commissioner and local farmers was that farmers can buy second hand materials that Staatsolie is no longer using, such as pipes.

Because the Staatsolie plant at Saramacca is close to the proposed oil fields though, it is not expected that the Saramacca economy will benefit from economic spin off activities such as rental of lodging, sale of food, and so forth. Staatsolie will not buy meals for its workers or local produce for its cantina. Staatsolie does buy construction materials such as sand and shells in Saramacca district.

The consultant asked the target group what they experienced as positive aspects of the presence of Staatsolie in their immediate living and working environment. The most mentioned positive contribution of Staatsolie was that the company takes care of the Gangaram Pandayweg. The fact that the company helps when there are problems was also appreciated. A smaller number of area inhabitants indicated that there was nothing positive to mention.

Conversations with local area inhabitants suggested that the local population, and particularly the people living along the Gangaram Pandayweg, are not aware of Staatsolie's social investments in the district. Staatsolie could boost its reputation and strengthen its social license to operate by more explicitly publicizing its support to the local community.

Project	Target group	Applicant	Amount US and SRD
Transport evening students	Students studying in Paramaribo	DC Saramacca	Ongoing
Repair and extension of landing-stage (*steiger*) Huwelijkszorg	Population of Huwelijkszorg	DC Saramacca	SRD 28,832.50
Donation for celebration of 140 years of Hindustani migration	District of Saramacca population	DC Saramacca	SRD 15,000
Donation for schools project	Schools in Saramacca	Mr. I. Fernald	SRD 2,675
Acquisition of puzzles for Saramacca schools	Schools in Saramacca	Afaka International	SRD 1,500
Acquisition articles for sports event	KPS Saramacca	KPS Saramacca	SRD 1,500
Donation for celebration of Keti koti in Saramacca	District of Saramacca population	CIE Keti koti celebration Saramacca	SRD 5,000
Donation for participation in the cyclist spectacle Saramacca to Wageningen	Cyclists in Saramacca	Team Dorp	SRD 3,000
Celebration to honour the Students that performed best in the final grade of school	Students	Cluster head Rayon Saramacca	SRD 3,500
Donation for the school students song festival (singing contest)	Students	Initiatiefgroep Saramacca	SRD. 5,000
Celebration of children's day	Young children	Foundation for woman and child in development	SRD. 10,000
Participation at the Consude Games in Argentina	Athletics in Saramacca	Atletiek Vereniging Saramacca	SRD 1,500
Support soccer club	Soccer players in Boskamp	Sports club Boskamp	USD 180,000 (2011-2013)

Support soccer club	Soccer players Saramacca	Jong Takdier Boys	In process
Construction of 30 bus houses	District of Saramacca population	DC Saramacca	SRD 181,260
Acquisition water transport (Smokers Craft)	District Commissioners' office	DC Saramacca	SRD 45,000
Acquisition 5 computers and 2 laptops	District Commissioners' office	DC Saramacca	USD 4,000
Study on water management issues by ILACO, focussed on Gangaram Pandayweg/Saramacca	Agriculturalists	Staatsolie	USD 107,692.31
Development tourism sector	District of Saramacca population	DC Saramacca	USD 82,075
Study funding tourism college for two students	Saramacca high school graduates	DC Saramacca	In process
Donation of a 4-ton dumping pick-up for garbage collection	District of Saramacca population	DC Saramacca	SRD 81,250

Table 6. Community projects Staatsolie executed in Saramacca in the year 2013

5.3 Nature compensation

HSE personnel at Staatsolie conveyed that Staatsolie makes an effort to cause the minimal amount of damage to the natural environment. However, Staatsolie does not have a specific nature compensation policy, nor are there special projects to work on nature compensation. This situation is equal for all areas where Staatsolie works (Ms. J. Telgt, HSE department, pers. com. 24 March 2014).

5.4 Stakeholder concerns and complaints related to the presence of Staatsolie

Consulted land title holders and district officials listed primary complaints and concerns related to Staatsolie activities in the area:

- Speeding by Staatsolie employees
- Dust generation when Staatsolie vehicles drive on the Gangaram Pandayweg. The dust settles in the houses and contaminates drinking water, which is collected via the roofs when it rains.
- Problems with water control
- Poor communication with the local population/no ear for complaints
- Pollution; regular oil spills and small leakages from oil tanks
- Bad smell at Huwelijkszorg

With regard to speeding, the consulted representative from the Police department (*Korps Politie Suriname – KPS*) in Groningen admitted that also other people speed on the Gangaram Pandayweg, but he could not say whether Staatsolie employees speed more or less than local inhabitants or contractor laborers. Upon the request of Staatsolie, police officers have occasionally posted along the road and fined persons who drove with excessive speed, including Staatsolie employees. The last time that the police controlled traffic at the Gangaram Pandayweg was about one year ago (Mr. F. Vyent, Resort commander, KPS Groningen, pers. com., 11 March 2014).

With regard to problems with local water management, many local area inhabitants believe that Staatsolie can be blamed for the poor water flow and subsequent flooding. They argue that water problems started when Staatsolie started working in the area, and replaced bridges at the Gangaram Pandayweg with culverts that were too narrow. In the opinion of the information officer of LVV Groningen, local harvests have dramatically decreased as a result of disturbed water management and pollution – both produced by Staatsolie. This impression is based on personal observations and has not been substantiated by scientific data.

In order to deliver scientific evidence about the causes of flooding problems, on request of the DC, Staatsolie funded engineering firm ILACO (International Land and Agricultural Consultant) Suriname NV to execute an independent study on the causes of, and possible solutions for, current water control issues. In March 2014 this study was presented to the local population of Wayamboweg resort and Saramacca district at large. During its presentation, ILACO summarized the causes for water problems as being: dams that are too low, poorly functioning culverts, an excess of plants and waste materials in canals; and poor water control on abandoned plots. Short-term solutions include the elevation of road sides, renovation and maintenance of dams, and improvement of the

Gangaram Pandayweg as an industrial road. In addition, water management in the swamp should be improved by creating new facilities to enhance the water flow to the river.

Local area inhabitants at the meeting generally supported ILACO's suggestion to start right away with the short-term solutions and subsequently work on a more long-term, durable solution. A Staatsolie board member promised that Staatsolie would look at options for improvement of the water situation in collaboration with the District Commissioner (Mr. W. Dwarkasingh, Staatsolie board member, 27 March 2014). The new District Commissioner (since April 2014) indicated that he will study the problem and compose a commission of experts to advise him in this matter. Given his recent appointment he was, at the time that this ESIA report was compiled, not able to comment on the flooding problem, the ILACO study, desired interventions, and Staatsolie's possible role therein (Mr. R. Jiawan, pers. com, 27 May 2014).

Also the bad smell at Huwelijkszorg has been investigated by Staatsolie. According to district officials, it was concluded that the smell is annoying but not dangerous. Currently, Staatsolie is in the process of constructing a pipeline between the Calcutta and the Tambaredjo NW oil fields, so that crude oil storage at Huwelijkszorg is no longer required. The transportation of crude oil from Huwelijkszorg to Tambaredjo NW will go in phases. Eventually there should be no more crude oil storage at Huwelijkszorg.

5.5 Grievance mechanism

Staatsolie describes its grievance mechanism in the manual 'management business processes' (*Handboek beheer bedrijfsprocessen*), which was developed by the public relations department in 2009. This manual describes the procedures concerning the registration and monitoring of external complaints. External complaints must be received, registered, processed and evaluated so that:

- There is an adequate and satisfactory response to every complaint
- The chance of repetition of the complaint is minimized.

Since 27 November 2013 Staatsolie uses a new system for complaint registration and management (Mr. R. Amain, CR officer, pers. com. 28 March 2014). The new system was developed by the Information and Communication Technology (ICT) department at the request of, and in cooperation with the CR department. The CR department and the ICT department have both evaluated the system (respectively in December 2013 and January 2014).

All incoming complaints are listed and registered as an incident. Incoming complaints are divided into several categories and their impact is labeled as low, medium or high. A deadline for settlement is added to the complaint and assigned to the responsible Staatsolie official, for example, the CR officer appointed to that specific geographic or subject area. General complaints are centrally recorded and monitored through the Public Relations department. Specific complaints, e.g. about HRM, oil spills, products and marketing, and payments, are immediately redirected to the responsible department and not always directly registered in the complaints log. The responsible departments have their own procedures of dealing with the complaints directed to them. These complaints are typically not registered in the general complaints log.

This procedure allows Staatsolie to more effectively respond to complaints, to resolve issues more rapidly and to better monitor progress (Staatsolie Nieuws 2013). A good response to complaints will benefit the reputation of Staatsolie.

In the case of oil spills special procedures are followed, which are described in the therefore designed handbook, which follows the international Incident Command System (ICS) standards. Incidents that are discovered during office hours are dealt with by the Manager Operations, who is the *de facto* leader of the Spills Oil Response Team (SORT). During these hours the production team is also available to assist with halting spillage and clean up. Small spills (<1 barrel) that do not produce lasting damage are directly addressed and cleaned up by Operations. In the case of larger spills (1-100 barrels), the SORT comes into action to deal with the issue. In the case of very large spills (>100 barrels) or spills that threaten to produce damage to international waters, the international organization Oil Spill Response Limited will be called in.

Spills that are discovered after office hours are first reported to the guard. The guard on duty has a list of SORT representatives and will contact the person who is on call duty during those hours. The SORT representative in question will, on the basis of the hand book, decide what action is needed and assemble a team to address the problem.

The SORT hand book contains a communication plan, which defines among others the procedures for dealing with a possibly affected land owner and other stakeholders. This plan stipulates that agreements will be made with the land owner and that possible damage will be estimated and compensated. In cases where a land owner is dissatisfied with the clean-up and/or compensation measures, the SORT makes an effort to solve the issue through dialogue (Mr. Goerdajal, head SORT, pers.com. 29 May 2014). Oil spills are registered in a special database, and related complaints become part of the regular complaints procedure.

In the case of a regular complaint, the CR department contacts the complainants at least twice. Within 24 hours, a Staatsolie CR representative informs the person about how the case will be dealt with. Once the case is resolved, the aggrieved party is notified once more to inform him or her about the result (Ms. J. Sanches, CR officer, pers. com. 19 March 2014). The CR also keeps track of whether the complaining party is satisfied with the solution, through signing of a document, oral agreement, e-mail, or other form of communication. There is no standard method to record the aggrieved party's reaction to the solution. The CR department was not able to provide figures on the percentage of complaints that had been resolved to the satisfaction of the aggrieved party.

In the complaint log the responsible CR officer can trace the status of the complaint. In the case that a problem takes longer than a month to resolve, it is recommended to keep the submitter updated every month. The consultant is of the opinion that it is advisable to design the system in a way that it automatically notifies the CR department when complaints are not processed in time

The grievance mechanism is a good system but it only works if people indeed voice their complaints or concerns to Staatsolie. However, not everyone approaches Staatsolie when they have a complaint or concern because, according to stakeholders:

- People do not know where to go or who to approach
- Farmers may feel uncomfortable/be timid to approach the company
- Staatsolie does not respond to complaints anyway so there is no point in complaining

With regard to the above; it will be useful to inform area inhabitants about the new complaints mechanism and SO commitment to receive and respond to every complaint from the community.

When people do go to Staatsolie with a complaint, they often approach either the guard of the nearby located Staatsolie Sarah Maria plant, or someone they know within the company. Very few people knew of the existence and function of the CR department. Also no reference was made to the local Staatsolie contact person, who has been appointed since June 2012.

Of those who had gone to the company with a complaint, most persons were satisfied with the settlement. A few stakeholders felt that it had been difficult to reach the correct person of department, and that they had been sent from pillar to post.

5.6 Communication strategies

Staatsolie uses different strategies to communicate with the inhabitants of the Gangaram Pandayweg and other project stakeholders, including personal visits to farmers, use of a local intermediary, and stakeholder meetings (Table 7). Staatsolie representatives occasionally visit farmers in the area, but there is no system for regular communication with individuals. In the vision of an LVV representative, Staatsolie does not (sufficiently) visit these land owners to listen to their concerns (Mr. R. Bhugwansing, assistant information provision LVV Groningen, March 11, 2014). Different stakeholders, including district officials, voiced the opinion that the accessibility of Staatsolie could be improved if company employees were to visit the farmers personally every now and then to explain the project activities and listen to their concerns. When a Staatsolie employee visited all neighborhood homes with reference to an oil spill last year, this gesture was much appreciated.

In June 2012, the District Secretary (DS) of Groningen was appointed as a liaison between Staatsolie and the local population. Among others, the DS coordinates the execution of Staatsolie projects in Groningen and in the project area specifically (Mr. R. Biharie, District Secretary, pers. com. 26 March 2014). In addition, complaints about Staatsolie are first screened by the DS, and valid complaints are sent through to Staatsolie. The DS also assists in the delivery of Staatsolie messages to the local population. He either directly communicates with the local area inhabitants or else advices Staatsolie on who the appropriate people (e.g. land title holders) are. General issues are first discussed at the District Secretary's office, and next presented to the population via stakeholder meetings.

Another communication method that is applied is the organization of stakeholder meetings and smaller meetings with specific target groups (e.g. farmers). Area inhabitants were asked about their participation is such meetings. Almost all surveyed households in the target study area had received an invitation for a stakeholder meeting at some point in time (not necessarily related to the present project). Of those area inhabitants who had attended a meeting, most typified these meetings as useful and important because of the information received. A few interviewees were dissatisfied because they felt that Staatsolie did not respond well to their concerns.

Most interviewed stakeholders were reasonably content with the form and frequency of communication with stakeholders. It was also commented that engagement with the community and dialogue procedures have improved. It was also observed that compensation has been paid to persons who experienced damage due to oil spills (Mr. L. Gangaram Panday and Mr. R. Biharie,

district officials, pers. com. 11 March 2014). Nevertheless, both land title holders and district officials conveyed that there remained much room for improvement of communication to local area inhabitants. For example, the last time that there was an oil spill, Staatsolie staff did not notify the inhabitants of the Gangaram Pandayweg but tried to silently clean it up (area inhabitant, March 2014).

In future communication, people would like to get informed in Dutch or in Sranantongo, both during stakeholder meetings and when communication is written. Respondents emphasized that the information should be understandable, without too many 'expensive words' and technical terms.

Communication strategies	Who, how, when,
Home-to-home visits to farmers living along the Gangaram Pandayweg	Not structurally, only if there is a specific need to discuss SO activities
Appointment of a local person to serve as a liaison person between the area inhabitants and Staatsolie	Yes, the District Secretary of the DC Groningen fulfills this function
Consultations with district functionaries of the District Commissioner's office	At least bi-monthly, and upon request of the DC and/or Staatsolie when the need arises
Meetings with farmers	Different meetings to discuss water management issues
Stakeholder and scoping meetings for Farmersland	May 25, 2011: Scoping meeting December 20, 2012: presentation draft ESIA report for access roads Farmersland West March 27, 2014: Meeting to present study ILACO about water management Gangaram Pandayweg July10, 2014 (planned): Presentation ESIA report in Saramacca
Flyers, posters and media (radio, TV)	To provide the local community with general project information and with information about possible impacts of specific activities.

Source: Mr. S. Alfaisi, CR coordinator (25 March 2014); Mr. R. Wong, HSE (25 March 2014); and ESIA for construction of access roads

Table 7. Communication strategies designed and used by Staatsolie for the Farmersland project

6. Proposed strategies for stakeholder consultation and communication

To ensure that there is a consistent and coordinated approach to the stakeholders of the Farmersland project, it is necessary to have appropriate processes for consultation and communication in place. This chapter first offers suggestions to improve ways to engage with relevant stakeholders.

The chapter provides:

- An identification of the stakeholders for the Farmersland project;

- Recommendations on the most effective ways to reach stakeholders and inform them about the days and times of Staatsolie activities;
- Identification of resources which will be required to implement and monitor the consultation proposals;
- An outline of a grievance mechanism for local stakeholders.

6.1 Stakeholders

Stakeholders can be defined as people and organizations who may affect, be affected by, or perceive themselves to be affected by, a decision or activity. Also persons, organizations and institutions that have an interest in the specific field that will be dealt with, can be seen as a stakeholder. The current ESIA has identified a number of stakeholders:

- Land owners
- Inhabitants of the project areas (within 2 km radius)
- Project developer (Yarah project)
- Farmers and horticulturalists who may be affected by changes in water works
- Other interested Saramacca inhabitants
- Users of the Gangaram Pandayweg
- Districts authorities and representatives (District an d Resort Councils)
- Representatives of Police and Fire Brigade (in cases of oil spills and other emergencies)
- Local representatives of the Ministry of Agriculture, Animal Husbandry and Fishing (*Landbouw, Veeteeld en Visserij*-LVV)
- Local representatives of the Ministry of Public Works (*Openbare Werken*-OW)
- Nature Conservation division (NB) of the National Forest Service *('s Lands Bos Beheer –LBB*), Ministry of Spatial Planning, Land and Forest Management (*Ruimtelijke ordening, Grond- en Bosbeheer – ROGB*)[5]
- Local contracting companies
- NIMOS

A list of all stakeholders who were consulted for the social specialist study is provided in Annex 1. It is acknowledged that, as the project develops more stakeholders may be identified and engaged as the project proceeds.

6.2 Disclosure of information about project activities

The disclosure of Information sets out a suggested policy regarding the way information should be made available to the public. The departing point is that transparency and accountability are fundamental to fulfill Staatsolie's development mandate and to strengthen public trust in Staatsolie and the Suriname government.

[5] Despite repetitive phone calls and e-mails to the Nature Management division, the consultant has not been able to meet with an NB representative or obtain written answers to outstanding questions about the interests of this organization

Land owners

In order to track down the land title holders Staatsolie works with the District Commissioner's office, which assists in assembling a list with land title holder names and contact information. In the case that the property title is unknown, a land surveyor traces missing property owners. In the case that the land title owners or their contact information cannot be traced, Staatsolie places a call in the national newspapers. Once the land title holders have been identified the CR department, in collaboration with the legal department, verifies this information. Subsequently the CR department pays field visits to the land title holders to explain the project. In the case of shared property (*boedel)*, the legal department will make an assessment of the situation and advice on possible measures to proceed.

Land owners on whose land drilling is proposed to take place must be extensively informed about the drilling activities that may take place on their land, and the possible risks and potential benefits that these activities entail. This information should be provided in person by a Staatsolie staff member (e.g. of the CR department), in a language and format that is easily understood by the land owners, and in a setting that allows and encourages them to ask questions.

At present, the procedure to work with land title holders is as follows.

I. A representative from the Staatsolie legal department, a representative from the Staatsolie CR department, and a representative from the project owner visit the property together with the land title holder or his/her representative. In this stage, Staatsolie representatives take images and record information about the land.

II. Staatsolie develops a baseline document[6] or "Agreement access to land for the execution of mining activities" (*Overeenkomst toegang terreinen voor het verrichten van mijnbouwwerkzaamheden*) for the specific location, in part based on standard procedures and in part based on the information gathered about the plot. This baseline document contains:

- The size and location of the area that Staatsolie will use
- State of the land prior to Staatsolie activities (visual inspection)
- Activities that will be execute by Staatsolie, with their approximate duration.
- A statement that compensation will be given in the case of damage to property and/or use of the land[7].
- Possible rehabilitation measures and state in which Staatsolie will leave the location

The document typically contains annexes that contain photographs, a parcel map (*perceelkaart*), land property papers, and a copy of the land title holders' ID card)

For assessment of the value of possible damage Staatsolie relies on Ministry of Agriculture, Animal Husbandry and Fishing (LVV) in the case of crops, animals, trees or other farm resources; the Staatsolie department for Infrastructure Development and Maintenance

[6] This document used to exist in a much simplified version under the name *toestemmingsverklaring* (declaration of agreement)

[7] In the case of short term projects such as the one in Coronie, no compensation will be paid for the use of bare or unused land

(IDM) in the case of private infrastructure (e.g. houses, shacks, private roads and dams); or the Ministry of Public Works (OW) in the case of damage to public infrastructure.

The baseline document is signed by the land title holder and the project director (i.e. director Staatsolie in this case). In relatively straightforward cases the baseline document is typically signed immediately after presentation to the land title holder (Mr. R. Amain, CR department, pers. com. 19 March 2014). In case the land title holder asks to sign on a later date, such suspension is granted.

III. The project is executed. In this case, production development will involve construction or rehabilitation of access roads, drainage structures, drilling and installation of a well pump. Production may take up to 25 years.

IV. Operations Department staff perform weekly on-site inspections, using a check list. The checklists are shared with the HSE department, which conducts random inspections of the sites.

V. After each project phase (construction, drilling, production) the project team will inspect the site with a representative from the Health, Safety and Environment (HSE) department. Possible recommendations will be followed internally in order to leave the location in a good state.

VI. The Staatsolie inspection that concludes a project phase is followed by a close-out procedure, during which the project team inspects the site with an HSE representative, a CR representative with his own check list, and the landowner. This close-out round serves to assure that Staatsolie leaves the property after each phase to the satisfaction of land title holder. When the land title holder is satisfied with rehabilitation of the site for the concerned phase, the land titleholder and the project director sign a close-out document, one for each phase.

With regard to this procedure, the consultant comments that it is important that the various articles of the agreement are explained in lay-man's language to the land title holder prior to signature of the document. Moreover, land owners should not be asked to sign the contract immediately upon their receipt of the document, but should explicitly be told that they have at least one week to look it over and -if necessary- ask a third party for advice.

In order to reduce the chances of misunderstanding between the land title holder and Staatsolie, the baseline document or agreement may also include:

- Specification of compensation measures for damage that will most certainly be produced, such as crops, fences and structures that will be removed, with the general fee or method of determining compensation value.
- Specification of compensation measures in the case of unforeseen damage to land owner properties, such as damage to waterways resulting in flooding, disturbance of cattle and so forth. These measures should include the general fee or method of determining compensation value
- Rights and obligations of the land owner

- Contact information of the responsible Staatsolie department and person

General public

The general public should be made aware of the exploratory drilling activity and be able to find information about it, if desired. Disclosure activities could include:

1. Leave printed copies of the ESIA report, with a non-technical summary in Dutch, in public places and with government offices (i.e. the District Commissioner's office in Groningen, BO office at La Prevoyance).
2. Publish a digital copy of the ESIA report, with a non-technical summary in Dutch, on the Staatsolie website.
3. Publish press releases in the national newspapers and ask the *Burger Informatie Centrum* (BIC) Saramacca to place this notice also on its Facebook page.
4. Broadcast a newsflash about project activities and their dates at national radio (at least three stations) and TV stations (at least two stations).
5. Place billboards (posters) at strategic locations with the following project information:
    a. Locations of Staatsolie activities
    b. Dates of Staatsolie activities
    c. Contact information of the Community Relations department and the responsible CR officer for this project

Communication with specific groups

The specifics about the disclosure of information to defined stakeholder groups are summarized in Table 3. Stakeholders must be timely informed about any changes in Staatsolie's activities schedule for the preparation, implementation and close-out phases.

6.3 Communication

For the Farmersland Drilling Project, the following general communication mechanisms should be in place:

- **A community-based project communication officer**

Community-based project communication officers should be persons who are active and respected in the community, and easy to approach. Staatsolie already appointed the DS as the local official to serve as a contact person between Staatsolie and area inhabitants. This person should regularly receive project updates so that he can adequately respond to questions from the community. The name and contact information of this person should appear on all pamphlets.

- **Appoint a Staatsolie CR officer for this specific project area**

Make one Staatsolie CR staff member primarily responsible for communication with project stakeholders, including area inhabitants and land owners. This person should become personally acquainted with land owners and relevant local government officials in person, and regularly and proactively contact these parties to inform about their experiences and possible complaints. The contact information of this person should appear on project-related pamphlets.

- **Grievance Mechanism**

In line with international best practices, Staatsolie has developed and implemented a formal grievance mechanism. The mechanism provides a structured interface between Staatsolie management and aggrieved parties, and a process to understand and resolve problems. Staatsolie must ensure that local area inhabitants, Staatsolie employees and contractors are aware of this grievance mechanism and know how to use it.

As part of its grievance mechanism Staatsolie manages a complaints log. It is recommended to use this log without exception. In this log every complaint is filed with a tracking number, which is linked to information about actions in response to the complaint. The complaints log also records who is responsible for an individual complaint, and lists dates for the following actions:

- Date the complaint was reported;
- Information on proposed corrective action sent to complainant (if appropriate);
- The date the complaint was closed out; and
- Date response sent to complainant.

It is advisable to give the complainant a personal code that can be used to check the status of the complaint on the CR page of Staatsolie website. Such a system would allow the complainant to follow the complaint on his or her own initiative. In addition, the complainant should always be contacted personally by Staatsolie when feedback concerning the complaint is available.

The complaints processing procedures should be transparent to the stakeholders, for example through explanation of the procedure on the CR page of the Staatsolie website with text and images.

Monitor the process regularly based on input of area inhabitants and employees of Staatsolie, and adjust when necessary.

- **Compensation mechanism**

Stakeholders who run a risk to experience damage include:

1. Land owner(s) on whose land drilling will take place: take into account that damage to the land and infrastructure may occur and that the activities may affect the owner's future uses of this land.
2. Damage could be done to public infrastructure, through certain project activities that are conducted in the public area.

Staatsolie must have a mechanism in place to compensate any proven damage, both foreseen and unexpected, in case Staatsolie responsibility is proven. In the case of land owners, compensation measures must be defined in a contract between the land owner(s) and Staatsolie (see section 6.2).

Who?	How?	When?	Advised specific activities?
All stakeholders	Internet / Website CR department Billboards/ Pamphlets Mass media and social media	Starting 1 month in advance 1 week in advance 1 week in advance	• Place an up-to-date schedule of project activities on the company's website and inform all stakeholders about the website (with a link on posters/pamphlets/newspaper/working-schedules). • Distribute information and schedules directly to stakeholders via internet (taking into account that not all stakeholders have access to internet). • Provide relevant stakeholders with a name and contact information of the responsible person at the Community Relations (CR) department, who should be contacted in the case of questions, concerns or complaints. • Place a Staatsolie billboard along the Gangaram Pandayweg near the project area, with a general phone number and contact information. • Place pamphlets with basic project information and the working schedule at the DC office, the La Prevoyance BO office and other strategic public places.
Local government authorities	Direct approach of stakeholders.	2 weeks in advance	• Inform the District-Commissioner and its staff about the schedule of drilling and related activities with exact dates and locations.
Land owners	Personal contact and mailings Contract	1 month in advance 1 month in advance	• Inform the ask owners about the schedule of construction and drilling activities with exact dates and locations as discussed above. • A contract should be presented to the land owners at least one month prior to initiation of the project, allowing land owners at least one week to respond.
Local inhabitants	Communication through the DC office and local Staatsolie contact person (DS) Stakeholder meeting(s)	1 week in advance 1 month in advance	• Place posters with the operational schedule at District Commissioner's and BO office (as recommended above). • Make sure that local authorities such as the District Commissioner and Secretary, the Government Agents (*Bestuursopzichters*) and District Council (DR) and Resort Council (RR) members are informed about the Staatsolie project activities, their dates and locations, so that they can respond to questions from area residents • Inform local area inhabitants through stakeholder meetings that allow for questions and concerns to be brought forward. • Inform local authorities and inhabitants about the SO complaints procedure, and emphasize SO commitment to address grievances and good neighborly relations

Ministries and government departments incl.: - Min. of RGB, department LBB, division for Nature Conservation (NB); - Min. of Justice and Police, KPS Saramacca and Fore Brigade of Saramacca - Min. of Public Works (OW) - Min. of LVV - NIMOS	(Electronic) mail with project information Stakeholder meeting(s)	2 weeks in advance 1 month in advance	• Inform the staff of the relevant (name) ministries and NIMOS about the operational schedule of Staatsolie as soon as it is known, by mail or e-mail. Provide the various ministries with additional information of special relevance to them, for example: ○ RGB, dep. LBB, division NB: possible environmental impacts and proposed mitigation measures ○ JusPol: Possible project risks and collaboration with KPSA and Fire Brigade in the case of oil spills and other emergencies ○ LVV: information about use agricultural lands ○ OW: Use public infrastructure and compensation measures in case of damage ○ NIMOS: environmental and social impacts and mitigation measures • Invite representatives from relevant Ministries and NIMOS to stakeholder meetings

Table 8. Disclosure of information about Staatsolie drilling in the Farmersland area to different stakeholders

7 Conclusions

The most affected community consists of about eleven permanent resident families living along the Gangaram Pandayweg between Sarah Maria and La Prevoyance (km 12.5), in addition to seven families or extended families with weekend and/or holiday homes in this area. The resident population consists mostly of low-income agricultural families of Hindustani descent. The population is aged and characterized by low educational levels. The families have a long tradition in the area, and most either own their land or else live on family-owned land. The area is marginalized in access to public services. The households are connected to the public electricity net but have no reliable source of drinking water. There is a mobile phone connection but inhabitants of the Gangaram Pandayweg complained that in many places they cannot receive a signal. Neither are these households connected to the national telephone net (land lines). Area residents receive mail only once a month and have no permanent health facilities in their community.

Due to the marginality of the area and lack of employment opportunities, many young people leave the area. The presence of Staatsolie has not changed this. In fact, very few members of households in the possibly most affected community have ever worked for Staatsolie –either as an employee or through a contracting firm. Those who did directly or indirectly work for Staatsolie earned meagre wages of about 250 US$/month.

Most respondents from the most affected community welcomed the presence of Staatsolie and lauded the fact that Staatsolie is maintaining the road and helping out with small community needs (school outings, bus shelters). Nevertheless, many persons were of the opinion that Staatsolie could or should do more for the people who are most affected by its activities. Particularly paving of the Gangaram Pandayweg and helping establish access to a source of reliable drinking water were high on the community wish list.

Commentaries from area inhabitants suggest that there is room for improvement of the communication between Staatsolie and local people. Grievance procedures are unknown or non-transparent for most area inhabitants. Regular (e.g. bi-annual) visits to the houses by community relations representatives would allow area residents to voice their concerns and needs, and would allow Staatsolie to design a community relations program that better responds to community needs.

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Annex 1 Consulted stakeholders

Date	Name	Function	Address/contact	Topics discussed
	Staatsolie			
2 December 2011	W. Jungerman	Manager Corporate Communication Staatsolie	WJungerman@staatsolie.com	Community projects in Saramacca
Various dates	Mr. S. Alfasi	Coordinator Community Relations	SAlfaisi@staatsolie.com	CR activities, incl: communication strategies with local population, grievance mechanism, community projects
Various dates	Ms. Jacintha Sanches	CR officer	JSanches@staatsolie.com	idem
Various dates	Mr. R. Amain	CR officer	RAmain@staatsolie.com	idem
25 March 2014	Mr. R. Wong	HSE department	RWong@staatsolie.com	Frequency and dates of scoping and stakeholder meetings (see table 7)
4 April 2014	Mr. R. Read	Human Resources Management	HRM department	Employment of Saramacca residents at Staatsolie
	Government			
11 March 2014	Mr. A. Ramdhani	District Commissioner (up to April 2014)	DC Office Groningen	Work of SO in the district; relation local population with SO; community projects
27 May 2014	Mr. R. Jiawan	District Commissioner (since April 2014)	DC Office Groningen	Flooding problem and ILACO study

Date	Name	Function	Address/contact	Topics discussed
11 March 2014	Mr. R. Biharie	District Secretary and Staatsolie contact person	DC office Groningen +597 8719706	idem
11 March 2014	Ms. L. Bhario	Government agent and Head environment and health service Groningen	DC office Groningen	Idem
11 March 2014	Mr. L. Gangaram Panday	Government Agent and coordinator BIC Saramacca	DC office Groningen	Idem
11 March 2014	Mr. P. Hellendoorn	Advisor to the District Commissioner	DC Office Groningen	Idem
2012	Mr. P. Gajadhar	Adjunct District Secretary	+597 8508805	Idem
11 March 2014	Mr. Troeno	Director SoZaVo Saramacca, Groningen	+597 327172	Welfare recipients at the Gangaram Pandayweg
2012	J. Ismael	Agricultural extension worker, Ministry of Agriculture, Animal Husbandry, and Fisheries (LVV)	+597 8680019	Economic activities in the Farmersland area; Current and expected impacts of Staatsolie activities on farmers' properties and productive activities
2012	L. Meghoe	Administrative staff Min. Regional Development	District office Prevoyance	Work of SO in the district; relation local population with SO; community projects

Date	Name	Function	Address/contact	Topics discussed
2012	Mr. Ramlal	Government Agent (BO), Ministry of Regional Development	District office Prevoyance	Idem
2012	Mr. R. Biharie	Head field services, Ministry of Regional Development	District office Prevoyance	Idem
2012	Mr. H. Warsodikromo	Coordinator central region and resort head, Ministry of Agriculture, Animal Husbandry, and Fisheries (LVV)	LVV office Kwatta	Economic activities in the Farmersland area; Current and expected impacts of Staatsolie activities on farmers' properties and productive activities;
	Mr. R. Bhugwansing	Assistant information provision LVV	LVV office Groningen	Idem
	Mr. Bachasing	LVV La Prevoyance	LVV office La Prevoyance	Idem
11 March 2014	Mr. F. Vyent	Resort commander, KPS	KPS Groningen office	Speeding at Gangaram Pandayweg
Local entrepreneurs				
23 Feb 2012 & 4 April 2014	M. R. Biharie	Administrative staff contracting company Agash	Office Agash, Huwelijkszorg	Hiring of local inhabitants of Gangaran Panday Road and Saramacca for contracting work
23 Feb 2012 & 3 April 2014	Mr. Raghoenath	Director contracting company Raghoenath	raghoenath@sr.net +597 8649633/ 8730146	Hiring of local inhabitants of Gangaran Panday Road and Saramacca for contracting work

Date	Name	Function	Address/contact	Topics discussed
Various dates March-April 2014	Mr. Abbout	Project developer	Barsa123@hotmail.com	Allotment projects at Gangaram Pandayweg
	Area inhabitants			
23 Feb 2012	**Moerlie**	Area inhabitant	Gangaram Pandayweg 320	Household characteristics, economic activities, experiences with SO, perceptions of planned drilling
1 April 2014	**R. Wansumoi**	Area inhabitant; owner of lot at Yarah project (km 8.5)	Gangaram Pandayweg 320	Allotment project; perceptions of planned drilling
23 Feb 2012 & 1 April 2014	Fam. Moerli	**Area inhabitants**	**Gangaram Pandayweg 321a**	**Household characteristics, economic activities, experiences with SO, perceptions of planned drilling**
23 Feb 2012 & 1 April 2014	**Moerlie Krishnadath**	Area inhabitant	Gangaram Pandayweg 323 & 324	idem
23 Feb 2012	**Bhawanibhik**	Area inhabitant	Gangaram Pandayweg 325	idem
3 April 2014	**Ms. & Mr. Sukhraj**	Lot owners (328, 329, 330, 331)	491241	idem
23 Feb 2012	**Radha-Rambharse**	Area inhabitant	Gangaram Pandayweg 332	idem
23 Feb 2012 & 1 April 2014	**Khemon**	Area inhabitant	Gangaram Pandayweg 332	idem

Date	Name	Function	Address/contact	Topics discussed
1 April 2014	**Fam. Ramjas**	Holiday visitors	Gangaram Pandayweg 334	idem
23 Feb 2012 & 1 April 2014	**Mr. A. Debitewari**	Area inhabitant	Gangaram Pandayweg 354b (owner) and Gangaram Pandayweg 362 (renter)	idem
23 Feb 2012 & 1 April 2014	**Fam. S. Debitewari**	Area inhabitant	Gangaram Pandayweg 354a and 356	idem
23 Feb 2012	**Keizer**	Area inhabitant	Gangaram Pandayweg 367	idem
23 Feb 2012 & 1 April 2014	**Fam. S. Soekha**	Area inhabitant	Gangaram Pandayweg 358 and 359	idem
23 Feb 2012	**Bangoer**	Area inhabitant	Gangaram Pandayweg 463	idem
23 Feb 2012	**Sewtahal**	Area inhabitant	Gangaram Pandayweg 375	idem

Annex 2. Characteristics of plots at the Gangaram Pandayweg between km 7.5 and km 12.5

Permanent resident | Temporary resident (weekend/holiday) | Uncultivated land | Partly cultivated land, not inhabited

Lot nr	Owner(s)	Land use	Land ownership situation	Visited
308	Francker	Not cultivated		
309	Srinam	Not cultivated		
310	M.Naarden	Not cultivated		
311	Madarum e.a.	Not cultivated		
312	Hansil	Not cultivated		
313	M.Meyer	Not cultivated		
314a	R. Manglie	Not cultivated		
314b	R. Manglie	Not cultivated		
315	R. Manglie	Not cultivated		
316	R. Manglie	Not cultivated		
317	D.Tholen	North side not cultivated. South side appears to be a weekend/holiday home named "Christiaan Tholen Kondre"		
318	W. Ritfeld	Not cultivated		
319	O.H. Alberg	Not cultivated		
320 320	W. Moerli (?)/ T. Aboud (project developer)	Housing project. Three lots have houses ; one is inhabited by a permanent resident, one by a frequent resident, and one by a couple who uses the home every 6 months for holidays.	Personal property; terrain has been and parceled out in smaller lots for sale. Ahinsa road is a private road	1-Apr-14
321a	P.Moerli	Inhabited by family of 9. House on south side of the road. North side is used for paddy rice	Personal property; undivided (Boedel)	1-Apr-14
321b	J. Sietaram	Not cultivated		
323 + 324	B.Moerli (1/3 share of land); ?. Moerli (2/3 share of land)	Agricultural production (bananas); entire lot now prepared for paddy rice	From the road, first 70 chain is private property, land further north is erfpacht/grondhuur	1-Apr-14
325	Bhawanibhik	Permanent resident; 2 houses		

326	Mangoesing	Possibly weekend/holiday home; locked gate		
327	W. Khemon	Agricultural production (bananas; oranges)	Private property	
328	B.Sukhraj	Land between the river and the road is used for fruit trees (citrus, banana, soursop, mango etc.). North side of road used to be paddy rice farm. At present the land is not cultivated but one of the sons wants to start again with rice	From river 50 chain (~1km) private property. Land further to the north is land lease (*erfpacht*).	
329				
330				
331	J. Kedhoe, B.Sukhraj		Land between the river and the road is private property of Kedhoe (daughter of Sukhraj). North side of the road is titled to Sukhraj; private property (front) and land lease (back).	
332	S. Khemon	Agricultural production; banana, papaya, pepper; 8 cows in back. 2 houses, son lives on northside of road.	Private property	
333	E.S. Mohamed and others	Not cultivated		
334 + 335	Fam. Ramjas & Djorai	Holiday homes (2 at north and south side of road), shared among various families (mostly in the Netherlands). Fruits and vegetables for own consumption. No commercial production.	Private property, undivided estate	1-Apr-14
336	State	Not cultivated		
337	Broederschap	Not cultivated		
338	G. Cederburg	Holiday home; citrus trees on north side of road		
339	A.M. Ritfeld; A.A. Ritfeld	Not cultivated		
340	Tedji/Djorai	Not cultivated		
341	C.Sh.Veira	Not cultivated		
342	D.H.Lont	Not cultivated		
343	Malikhadew	Not cultivated		
344	N.Issa	Not cultivated		
345	N.Issa	Not cultivated		
346	Bhagawandat Janki	Not cultivated		
347	Hubrajia Hardoar	Not cultivated		

348	Bhagawandat Janki	Not cultivated		
349	E.J.G. Harrevelt	Not cultivated		
350	N.K. Debipersad	Not cultivated		
351	E.A.Sepowikromo	Not cultivated		
352	D.A. McLeod	Not cultivated		
353	S.Sidoel	Not cultivated		
354a	S. Debitewari	Padi rice (in the back), 100 citrus trees, banana trees, 50 cows	Private property	1-Apr-14
354b	A. Debitewari	Shop (closed). One inhabited home	Private property	1-Apr-14
355	E.L.A. Li Fo Sjoe/H.E.R. Li Fo Sjoe	Not cultivated		
356	S. Debitewari	Lot of Debitewari: Padi rice production; about 1000 citrus trees; banana trees	Largest share of lot north of the road is private property of S. Debitewari. Padi rice production partly takes place on domain (state) land. Debitewari has filed requests for title on this land but not received the title. Mausam has bought a small piece of the lot of Debitewari north of the road. Land south of the road belongs to Ms. Van. Sauers.	1 Apr-14
356	R.H. Mausam	Lot of Mausam: Weekend home and cultivation of fruit trees (i.e. citrus)		
	Ms. Van Sauers (south of road)	Lot of Ms. Van Sauers: no cultivation		
357	Stg. SIVALSUR	Not cultivated		
358 + 359	S. Soekha	Agriculture (vegetables and fruits). On the request of Staatsolie, the family is not planting paddy rice for the time being, only dry land crops	Land is 25 chain wide (+- 518m); half is private property; half is undivided estate	1-Apr-14
360	Ramkhelawan	Not cultivated		
361	K.N. Mohan	Not cultivated		
362	Sieuwnarain Ramgolam	Agricultural production; oerdi, banana, pumpkin. 19 cows	Plot rented by A.Debitewari (plot 354b), who lives here with his family	1-Apr-14
363	R. Sewnarain/R. Sewnarain	Not cultivated		

364	R. Debitewari	Not cultivated		
365	R. Jogi	Not cultivated		
366	H. Hardoar	Not cultivated		

*1 **chain** equals 66 Rijnlandse voet (20,72 meter).

Annex 3. Agricultural land use of the Farmersland section (in green) along the Gangaram Pandayweg 2013, as recorded by LVV (Rayon Right bank Saramacca River)

Name	Address: Gangaram Pandayweg parcel nr	Gross area in chain	Area Crops in chain²			Fallow area and grassland in chain²		Number of cattle				Comments	
			Annual	Semi-multi-annual	Multi-annual	Area fallow	Area grass-land	Poultry	Oxes	Pigs	Various cattle	Cultivation in chain²	Forest in chain²
Chottoe, S	245	6,25	0,25	1	0,25	4,25						0,5	
Chottoe, R	245	100	1	10	1	87,5						0,5	
Sookhlall, S	253	12,5		4	0,5	7						1	
Sookhlall, B	254	225		1	25	223						1	
Sookhlall, S	254	25	1	10	3	6	4	**50**			**21**	1	
	447	250		5		245							
Sookhlall, K	255	125	5	6	0,25	113,25						0,5	
Sookhlall, J	256	125		4	3	117,5						0,5	
Baboeram, V	262	125		9		114,5			**1**			0,5	
Ensberg, M	267	12500				6000	6496,5		**612**			3,5	
Doerga, R	269	2500	2	3	2	400	2090					5	
Tjok foek yen, J	293	1500		2	8	700	785	**8023**				5	
Sewgobind, R	299	125		3		100						2	20
Moerlie, P	320,321a,321b	2000	1875	3		123		**60**				2	
Moerlie, K	323	600		10	10	529	50	**15**				1	
Bhawaniebhiekh, S	325	137,5		2		135						0,5	
Khemon, W	330	250	1	3		200						2	44
Khemon, S	332	225		6,5	1	192						0,5	25
Khemon, S	332	25	1	5		8,5	10		**7**			0,5	
Ramdjas, R	334	250		20		209						1	20

Name	Address: Gangaram Pandayweg parcel nr	Gross area in chain	Area Crops in chain²			Fallow area and grassland in chain²		Number of cattle				Comments	
			Annual	Semi-multi-annual	Multi-annual	Area fallow	Area grass-land	Poultry	Oxes	Pigs	Various cattle	Cultivation in chain²	Forest in chain²
Cederburg, I	338	250		2	65	180						3	
Debitewari, S	354a,356,458	4900	60	10	17	2500	2310	**700**	**16**		**40**	3	
Koenden, S	354b	300			0,5	99	200		**12**			0,5	
Soekha, S	359	200		5	2	167	25					1	
Debitewari, A	362	1000	20	4	0,5	700			**17**			0,5	275
Breidel, A	367	250		2		197						1	50
Abhilakh, M	369	250			0,5	147	100					2,5	
Sewtahal, K	375	375	3	3,5		307,5	60	**12**				1	
Jethoe, J	379.380.381	2625		1		1500	1123	**11**				1	
Abhelakh, P	382	125	2	2	6,5	113,5						1	
Poeran, HB	385	2062,5		20	10	31,5	2000	**60**	**250**		**20**	1,5	
Poeran, P	385	3500	2000		15	1483					**72**	2	
Nejal, D	389	5000		6,5	2	2000	2990	**50**	**5**		**2**	1,5	
Tower, E	393	600	5	22,5	1,5	570		**20**		**7**		1	
Tower, A	393	25		6,5		18,5			**21**				
Tower, R	393	387,5	140	4	1	242						0,5	
Premsoekh, S	394	500	450	2,5	1	45						1,5	
Banwarie, A	395	10000	3750			6240						10	
Binda, H	403	75	25	5	1	43						1	
Kasi, S	404	50	1	1	0,5	47						0,5	
Kasi, J	404	125	3	5	1	115						1	
Bachasingh, CH	408	250	100	7	1	140		**30**				2	
Bachasingh, W	408												

Name	Address: Gangaram Pandayweg parcel nr	Gross area in chain	Area Crops in chain²			Fallow area and grassland in chain²		Number of cattle				Comments	
			Annual	Semi-multi-annual	Multi-annual	Area fallow	Area grass-land	Poultry	Oxes	Pigs	Various cattle	Cultivation in chain²	Forest in chain²
	461	250	240	10									
Choennie, A	409	200	75	10	1	113						1	
Hanoeman, R	412	175				174,5						0,5	
Chuttoo, M	416	525		5		520						0,5	
Bhola, S	418	500	1,5	1	1	495						1,5	
Bhola, K	420	250	200	5	0,5	43,5						1	
Gonesh, J	421	1000	3	2		994						1	
Nyhors, J	425	125	1	5,5		118						0,5	
Van Emden, A	437	187,5		9	0,5	177,5						0,5	
Ellis, P	443	487,5		10	3	473,5						1	
Chotoe, Tj	449	250		1		248,5						0,5	
Bhola, S	450	75		1		73,5						0,5	
Moelchand, B	451	150	148	1				**10**				1	
Moelchand, S	451	150	150										
Bachasingh, D	452	150	62,5	1		86		**8**				0,5	
Moelchand, D	452	150	148	1,5								0,5	
Badal, I	458i	200	75	7,5		117,5							
Bangoer, M	463	250	50	0,5		199		**4**				0,5	
Bachasingh, O	458e	100	3	1	1	94		**8**				1	
Rosheuvel, R	465	250				250							
Karansingh, K	466	250	246	3,5				**6**				0,5	
Karansingh, A	466	250	247	2,5				**9**				0,5	
Sankar, D	482	250		22,5	5	222		**15**				0,5	
Meghoe, R	483	225	224	0,5								0,5	

Name	Address: Gangaram Pandayweg parcel nr	Gross area in chain	Area Crops in chain²			Fallow area and grassland in chain²		Number of cattle				Comments	
			Annual	Semi-multi-annual	Multi-annual	Area fallow	Area grass-land	Poultry	Oxes	Pigs	Various cattle	Cultivation in chain²	Forest in chain²
Sumther, K	484	250		2		247						1	
Biharie, G	485	125	75	5,5	1	43		**5**				0,5	
Ramlal, R	488	125		1		123,5						0,5	
Ramdjas, H	489	50	34	15	0,5			**6**				0,5	
Mohabier, N	491	250		5,5		244						0,5	
Sewnandan, S	493	125		3,5		121		**8**				0,5	
Sewnandan, B	493	125	50	2,5		72		**4**				0,5	
Sewnandan, D	493	50		3,5		46		**5**				0,5	
Ramlal, S	494	62,5				62						0,5	
Ramlal, R	494	250		5,5		244		**6**				0,5	
Goeptar, R	496	125		3		120						2	
Ramdjas, H	498	250		10		239						1	
Sewnandan, R	499	250	1,5	2		246						0,5	
Sankar, R	500	125	1	4,5		119						0,5	
Harkoe, R	502	125		10	1	113						1	
Bechoe, R	511	125		3,5		121						0,5	
Ramkhelawan, R	512	500	0,5	3	0,5	495						1	
Ramkhelawan, M	520	500		1		498			**16**			1	
Doerbali, S	535	125	1	1	0,5	122		**12**				0,5	
Biharie, D	536	250	175	2	0,5	71		**8**				1,5	
Biharie, DS	537	250	62,5	3,5		183		**10**				1	
Ramlal, R	539.540	625	250			374		**7**				1	
Biharie, K	541	125	75			49		**9**				1	
Biharie, R	541	125	5	7		113							

Name	Address: Gangaram Pandayweg parcel nr	Gross area in chain	Area Crops in chain²			Fallow area and grassland in chain²		Number of cattle				Comments	
			Annual	Semi-multi-annual	Multi-annual	Area fallow	Area grass-land	Poultry	Oxes	Pigs	Various cattle	Cultivation in chain²	Forest in chain²
Ramlal, R	551	250		7,5	0,5	241,5						0,5	
Harinandansingh, B	553	750	100	15	0,5	634						0,5	
Ramlal, N	554	250	150	5,5		94						0,5	
Boedoe, S	557	125		2,5		122						0,5	
Boedoe, S	557	125		5,5		119						0,5	
Gobind, S	558	250		20	0,5	229						0,5	
Gobind, H	576	300		3,5	1	295						0,5	
Rusveld, D	581	125		5,5	0,5	119							
	583	125		5	0,5	119						0,5	
Ghiraw, R	585	750		1,5		747,5						1	
Gajadien,N	589	350		3,5	3,5	342		**15**			**5**	1	
Ramkhelawan, B	591	750		15		734,5						0,5	
Moniz, A	600	12500				12494						6	

APPENDIX G: RESULTS OF THE STAKEHOLDERS MEETING

STAATSOLIE **MAATSCHAPPIJ SURINAME N.V.**
STATE OIL COMPANY SURINAME N.V.

P.O.Box 4069 Flora, Dr. Ir. H.S. Adhinstraat 21, Paramaribo-Suriname Tel.: 499649 Fax: 491105

Onderwerp : Stakeholders meeting Farmerlands
Subject Production Development Project
Kenmerk :
Our reference
Bijlage :
Enclosure

Noordam Environmental Consultancy
T.a.v.: Dhr. D. Noordam

Paramaribo, 3 juli 2014

Geachte heer/mevrouw,

Staatsolie Maatschappij Suriname N.V. heeft het genoegen u hierbij uit te nodigen voor een Stakeholders meeting, waarop de voorgenomen activiteiten in het kader van het 'Farmerslands Production Development Project' in het district Saramacca zullen worden belicht.
Tijdens de presentatie zullen de aspecten van het project en de resultaten van de uitgevoerde Milieu en Sociale Effecten Rapportage Studie, alsmede de te implementeren mitigerende maatregelen met u worden besproken.

Datum: **donderdag 10 juli 2014**
Tijd: **18:00 u – 20:30 u**
Plaats: **Staatsolie Sarah Maria, Conference Room 4**
Adres: **Gangaram Pandayweg, Saramacca**

Er zullen bussen ter beschikking zijn om u te vervoeren naar de vergadering te Sarah Maria. De bussen vertrekken om 17:30 u vanuit het Staatsolie Catharina Sophia complex, winkel Gangaram Panday aan de Wayamboweg, Gangaram Pandayweg km 30 ten huize van familie Moniz en winkel Koendjbiharie aan de Gangaram Pandayweg.

Uw aanwezigheid wordt zeer op prijs gesteld.

Hoogachtend,

Dhr. S. Alfaisi
Wnd. Manager Corporate Communication

MAATSCHAPPIJ SURINAME N.V.
STATE OIL COMPANY SURINAME N.V.

P.O.Box 4069 Flora, Dr. Ir. H.S. Adhinstraat 21, Paramaribo-Suriname Tel.: 499649 Fax: 491105

Agenda stakeholders meeting
Farmersland Production Development Project

Datum: Donderdag 10 Juli 2014
Tijd : 18.00u – 20.30 u.
Plaats : Staatsolie Sarah Maria – Conference room 4
Adres : Gangaram Pandayweg

18.00 u – 18.10 u	Welkom en korte introductie Dhr. R Amain, Community Relations Officer
18.10 u – 18.30 u	Overzicht van geplande activiteiten in het kader van Farmersland Project Dhr. G. Ganga, Sr. Mechanical Engineer
18.30 u – 18.40 u	HSE beleid Staatsolie en verkrijgen van NIMOS advies Mej. S. Mangalsing, Jr. Environmental Engineer
18.40 u – 19.15 u	Milieu en Sociale Effecten Studie en de mitigatie maatregelen Dhr. D. Noordam, ESIA Consultant
19.15 u – 20.00 u	Gelegenheid tot het stellen van vragen
20.00u – 20.30u	Afsluiting en informeel samenzijn

STAATSOLIE MAATSCHAPPIJ SURINAME N.V.
STATE OIL COMPANY SURINAME N.V.

Presentielijst
Stakeholdersmeeting
Farmerslands Production Development Project

Datum: Donderdag 10 juli 2014
Tijd: 18:00 uur – 20:00 uur
Plaats: Staatsolie Sarah Maria
Adres: Gangaram Pandayweg, Saramacca

Naam	Instantié	Telefoon	E-mail	Paraaf
Pawirosoredjo-Yorks G	Legal Affairs - Som			[signature]
Sanchit P	IAM / SOM			[signature]
Bhajan R.	Drilling / SOM			[signature]
Gangaram Panday L.	BIC. Saramacca	8772832	bicsaramacca@gmail.com	[signature]
Deki Peniseno	R.A.	6801721		[signature]
SADAL. S	CELOS.	08669003.		[signature]
Dupak Chitan	DNA lid	8653563	d.chitan@dna.sr	[signature]
Dirk Noorden	NEC	8186986	dino@sr.net	[signature]
Soeraya Mangalsing	SOM / HSE	8710554	sMangalsing@staatsolie.com	[signature]
Henk Chin A lie	SOM / POG			[signature]
Johan Ramadhin	SOM / DRL			[signature]
Atwalupedile-Aroon	SOM / [illegible]	# 66590		

STAATSOLIE **MAATSCHAPPIJ SURINAME N.V.**
STATE OIL COMPANY SURINAME N.V.

Presentielijst
Stakeholdersmeeting
Farmerslands Production Development Project

Datum: Donderdag 10 juli 2014
Tijd: 18:00 uur – 20:00 uur
Plaats: Staatsolie Sarah Maria
Adres: Gangaram Pandayweg, Saramacca

Naam	Instantie	Telefoon	E-mail	Paraaf
G. Ganga	EPC	# 66269	gganga@...	[signature]
A. Schuitemaker	TNW Oper	# 68848		[signature]
G. Wagimin	Staatsolie	# 66 558		[signature]
GAJ RADJ R	Wayambo 90	8883134		[signature]
V. Sukhraj	Bewoner	8674414		[signature]
S. Sukhraj	Waiyambo 120	8672745		[signature]
[illegible]	Bewoner [illegible]	886281		[signature]
K. Sukul	Pricusa N.V	7100836	gobinda@sr.net	[signature]
R. Bihoerie	Comm. Service	8719706		[signature]
R. Bhola	R.R. [illegible]	8724760		R.Bhola
M. Kasi	Buurtbewoner			M Kasi

STAATSOLIE MAATSCHAPPIJ SURINAME N.V.

STATE OIL COMPANY SURINAME N.V.

Presentielijst
Stakeholdersmeeting
Farmerslands Production Development Project

Datum: Donderdag 10 juli 2014
Tijd: 18:00 uur – 20:00 uur
Plaats: Staatsolie Sarah Maria
Adres: Gangaram Pandayweg, Saramacca

Naam	Instantie	Telefoon	E-mail	Paraaf
Sewtahal.				K.S
Moerlie				A. moerlie
Moerlie				K. moerlie
Bachasingh. O				Bach.
Towek. E				Towe.
Punwasi P	SMNR	8[illegible]		P[illegible]
Seiras, C	SMNR	8[illegible]		[illegible]
Raghoebarsing A	"	8587271		[illegible]
Ramkhassoon P	"	8[illegible]061	p.ramkhassoon@gmail[illegible]	[illegible]
Sookhlall. S		8185043		Sookhlall
SCh				SCh
Bangoer M	"			BM

MAATSCHAPPIJ SURINAME N.V.
STATE OIL COMPANY SURINAME N.V.

Presentielijst
Stakeholdersmeeting
Farmerslands Production Development Project

Datum: Donderdag 10 juli 2014
Tijd: 18:00 uur – 20:00 uur
Plaats: Staatsolie Sarah Maria
Adres: Gangaram Pandayweg, Saramacca

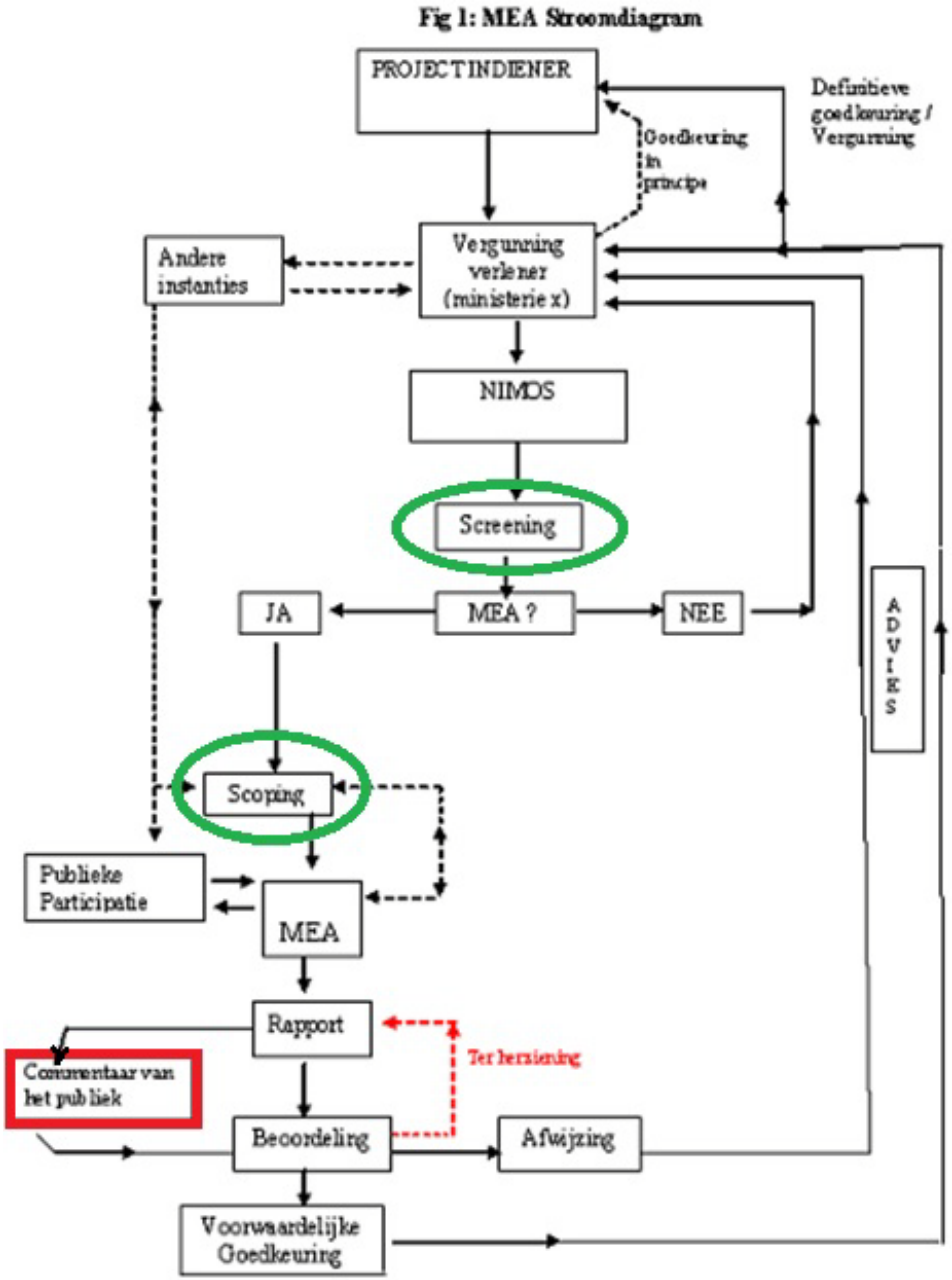
Naam	Instantie	Telefoon	E-mail	Paraaf
Joh. [illegible]	DTM Ltd	8630374		
Sardjoe R.	landbouwer	328495		
Bakker. F	melkboer.	320123		

Milieu en Sociale effecten rapportage productie ontwikkeling Farmersland

Staatsolie Maatschappij Suriname N.V.

Stakeholder presentatie
10 juli 2014 – Gangaram Pandayweg

NEC met bijdragen van: Marieke Heemskerk, Celine Duijves, Nancy del Prado en Dirk Noordam,

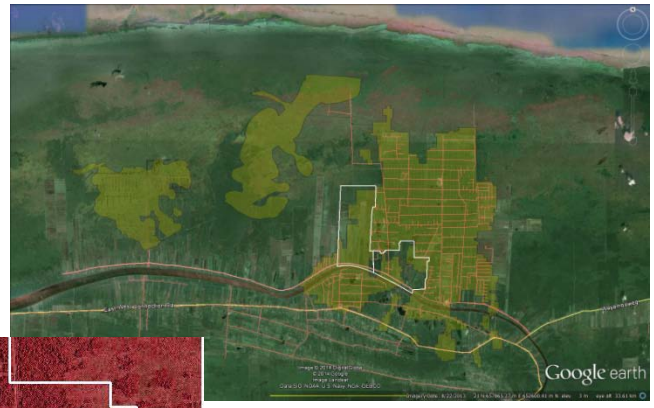


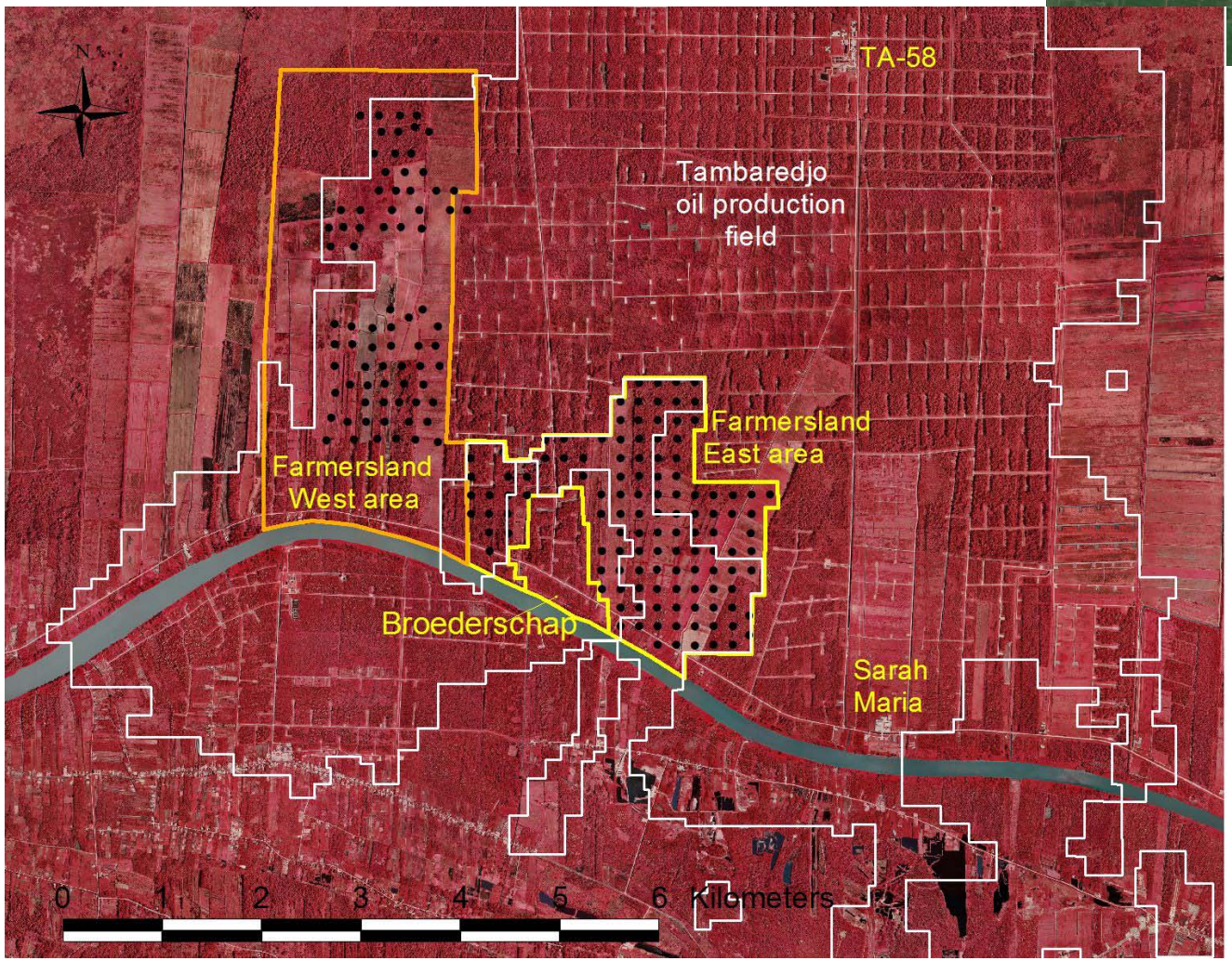
MILIEU EFFECTEN ANALYSE (MEA) PROCES NIMOS

Uitvoering Milieu effecten studie (MEA)

- Gebaseerd op de richtlijnen van NIMOS:
- Stap 1: Baseline studie (wat is de huidige situatie)
  - Wet- en regelgeving
  - Fysisch
  - Biologisch
  - Sociaal
- Stap 2: Gedetailleerde beschrijving van het project en de verschillende projectactiviteiten
- Stap 3: Vergelijking bestaande milieu en project → potentiële effecten
- Stap 4: Mitigerende maatregelen ter voorkoming of beperking, of juist ter versterking van het effect

STUDIEGEBIED

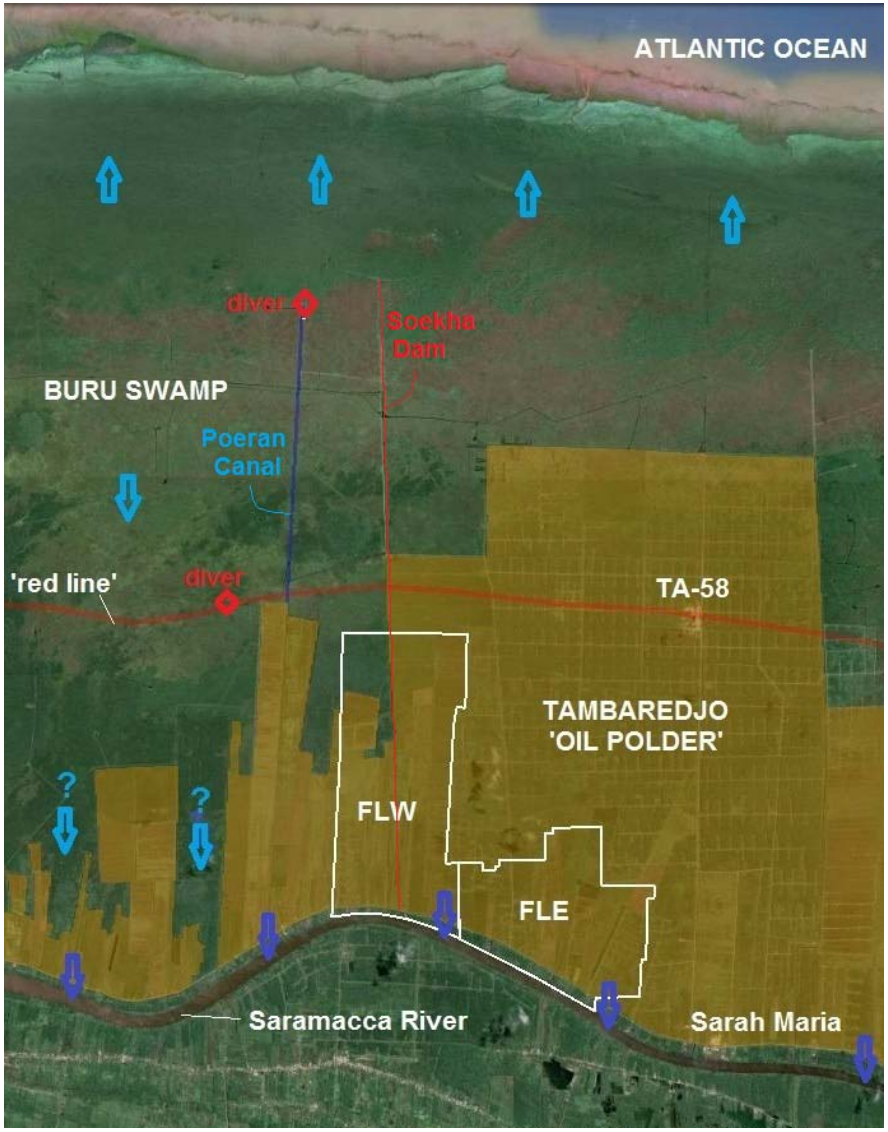




METHODIEK BASELINESTUDIE (UITGANGSSITUATIE)

- Uitvoering d.m.v.:
  - Verzamelen van bestaande informatie (kantoor):
  - Veldonderzoek
- Rapportage bio-fysische en sociale milieu
  - Klimaat
  - Luchtkwaliteit
  - Geluid
  - Geologie
  - Geohydrologie
  - Landschap en bodem
  - **Hydrologie**
  - Waterkwaliteit
  - Vegetatie en fauna
  - **Sociaal milieu:** bevolking, voorzieningen, middelen van bestaan, landgebruik

Baseline: Hydrologie



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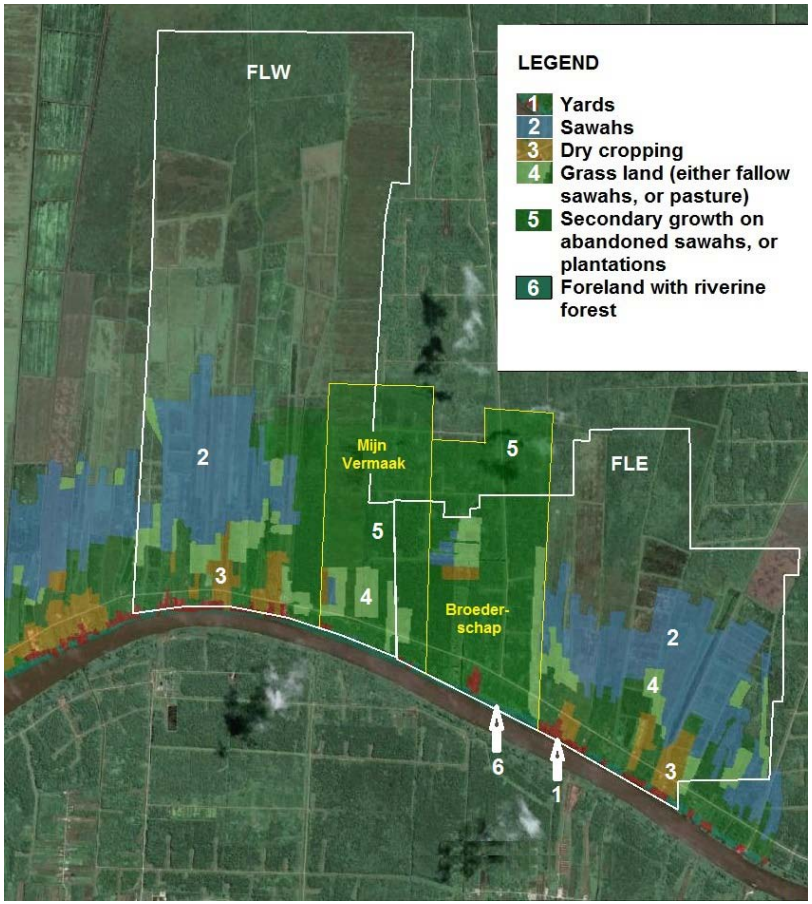
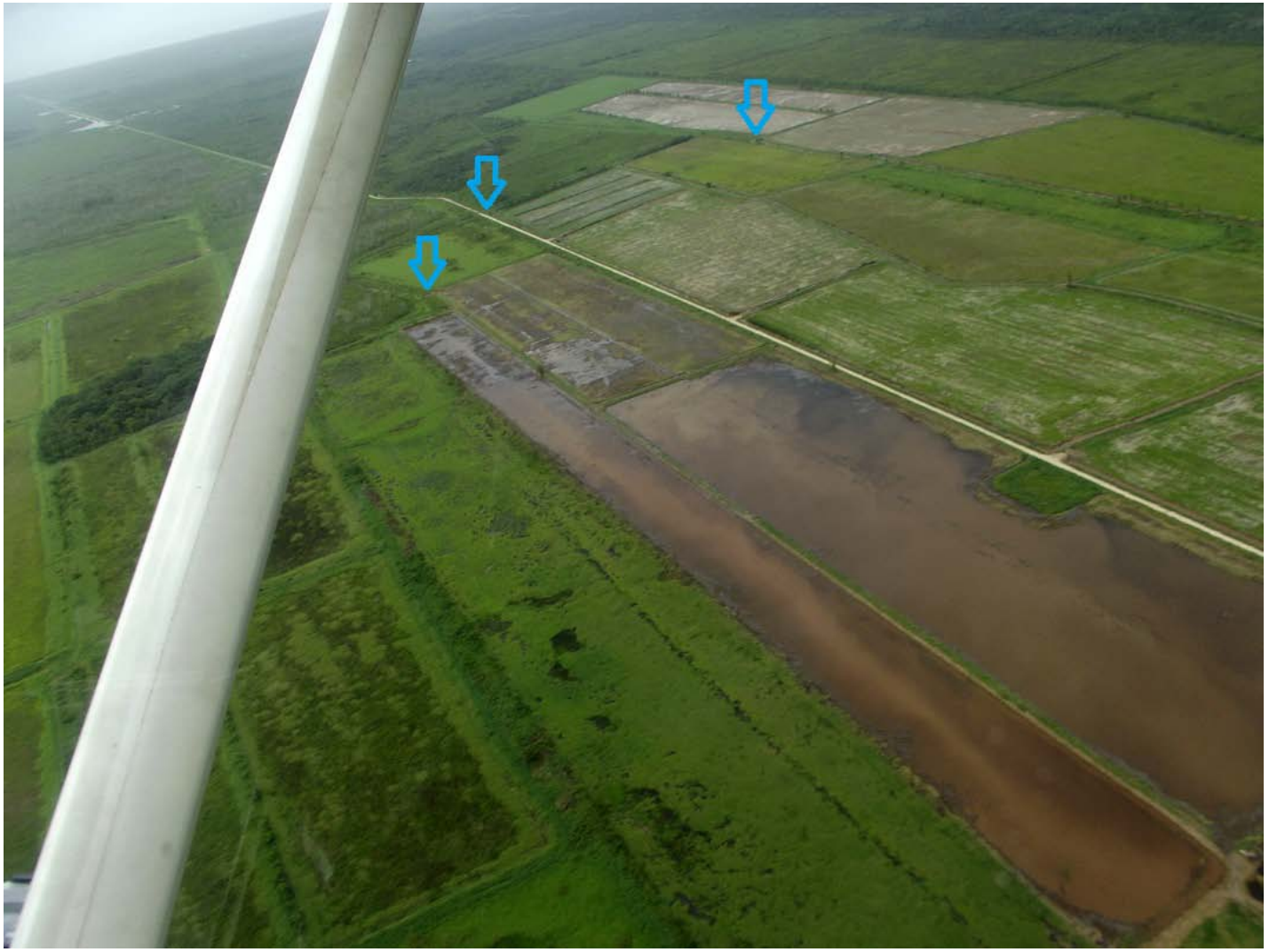


1962

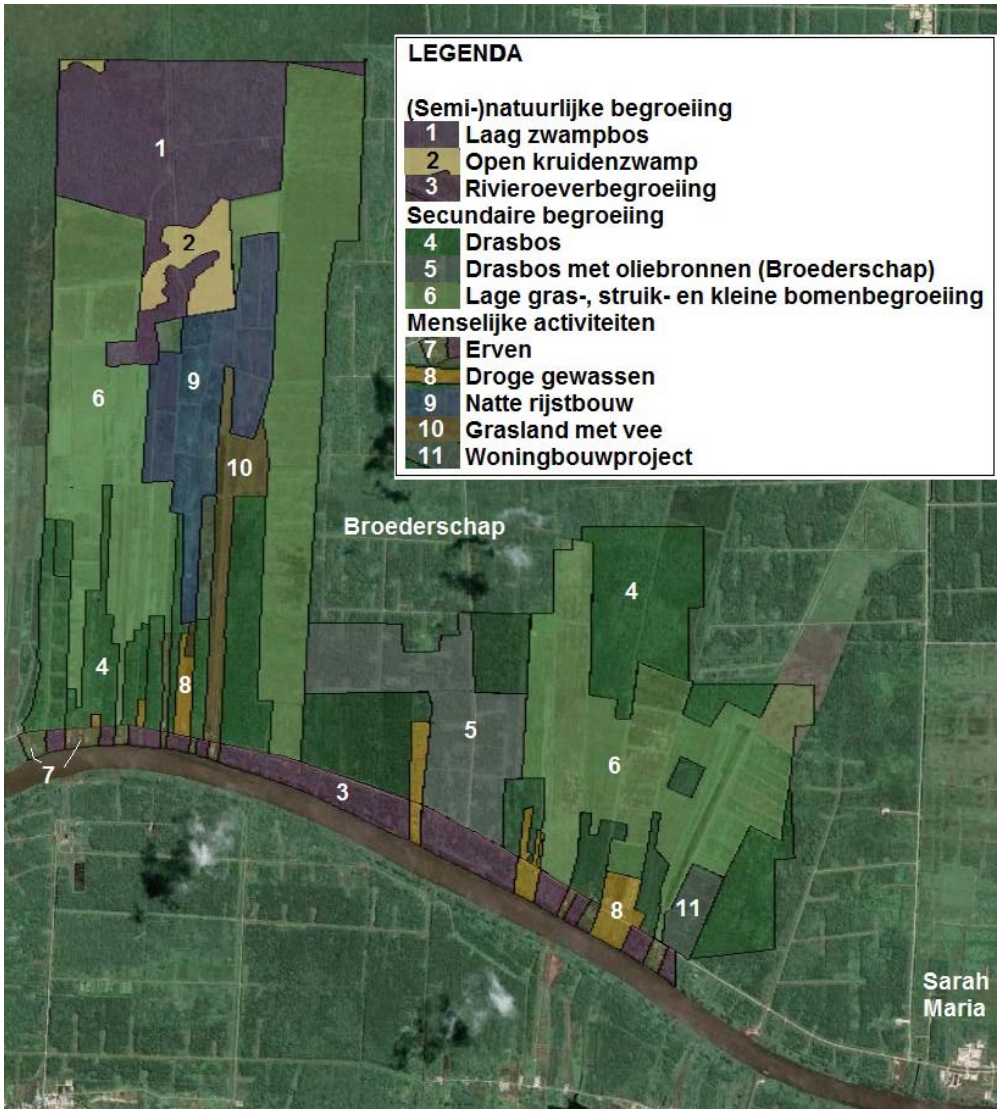
Hydrologie (2)

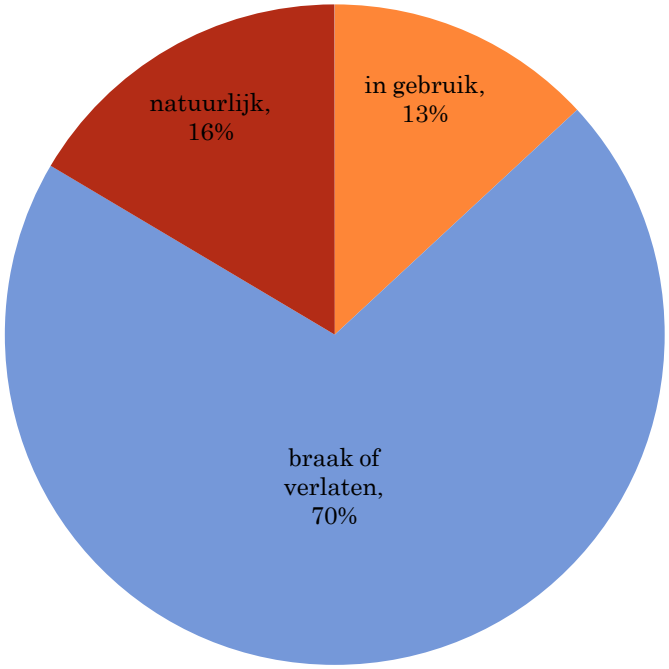


BASELINE: SOCIAAL-ECONOMISCH (1)

- Farmersland project beslaat Gangaram Pandayweg perceelnummer 308 t/m 366 en gebied ten noorden.
- Deel eigendomsgrond.
- Van oudsher agrarische gebied.
- Nu veel verlaten of ongebruikte percelen.
- Voltijd en deeltijdboeren.
- Werkgevers: Overheid en bedrijven (Staatsolie, Contractors).

LANDGEBRUIK





Baseline: sociaal-economisch (2) (Belanghebbenden)

- Landeigenaren en -gebruikers.
- Inwoners langs de Gangaram Pandayweg (km 7.5-12.5 (omgeving Volharding - La Prevoyance).
- Overige bewoners van de Gangaram Pandayweg en gebruikers van deze weg.
- Lokale autoriteiten en volksvertegenwoordigers.
- Vertegenwoordigers van diverse ministeries (o.a. LVV, OW, SOZAVO, ROGB/LBB/NB).
- Ondernemers zoals verkavelaars, contractors
- Staatsolie

Bestaande milieu effecten

- Verkeer (GP weg: geluidsoverlast en uitlaatgassen, stof).
- Bewoning (GP weg: afval, afvalwater; minimaal).
- Landbouwactiviteiten (geluidsoverlast en waterverontreiniging; minimaal).
- Wateroverlast door achterstallig onderhoud en andere factoren.
- Waterverontreiniging (lekkage benzine, diesel, olie; en afval, andere stoffen; meestal minimaal).

ANALYSE VAN MILIEU EFFECTEN
CRITERIA VOOR HET VASTSTELLEN VAN DE SIGNIFICANTIE VAN EEN POTENTIEEL EFFECT

- ERNST – hoe sterk of hoe ernstig is het effect?
- VERBREIDING – over welk gebied is het effect merkbaar?
- DUUR - hoe lang duurt het effect?
- WAARSCHIJNLIJKHEID – wat is de kans dat het effect optreedt?

Potentiële milieu effecten (negatief)

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Water	Blokkering van aanvoer van irrigatiewater uit de zwamp	Groot	Verwaarloosbaar
	Waterverontreiniging als gevolg van het lozen van afwerkvloeistof ('completion fluid')	Groot	Verwaarloosbaar
Soc.eco-nomisch	Gebruik van landbouwgrond, en diverse schade aan particulier eigendom	Groot	Verwaarloosbaar
Water	Waterverontreiniging met olie	Matig	Verwaarloosbaar
	Blokkering van de drainage	Matig	Verwaarloosbaar
Sociaal	Overlast of ergernis als gevolg van projectactiviteiten	Matig	Verwaarloosbaar
	Schade aan huizen op het woningbouwproject	Matig	Verwaarloosbaar
Lucht-kwaliteit	Uitstoot van gassen door voertuigen en machines, stofoverlast.	Matig	Verwaarloosbaar
Geluid	Geluidsoverlast van constructie- en boorwerkzaamheden	Matig	Verwaarloosbaar
Vegetatie	Kappen van secundair drasbos	Klein	Klein

Potentiële milieu effecten (positief)

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Sociaal economisch	Toename werkgelegenheid voor lokale bevolking.	Klein (pos)	Matig (pos)
	Verbetering toegang percelen		Matig (pos)

WATER

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Water	Blokkering van aanvoer van irrigatiewater uit de zwamp	Groot (neg)	Verwaarloosbaar

Mitigatie maatregelen

- Opening in zwampkerende dam.
- Voldoende grote duikers.
- Goede afstemming met boeren tijdens planning en uitvoering.
- Instemming boeren.

WATER

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Water	Verontreiniging met 'completion fluid' (completeringsvloeistof)	Groot (neg)	Verwaarloosbaar

Mitigatie maatregelen

•Voer de resterende afwerkvloeistof direct na gebruik af naar verwerkingsplaats.

SCHADE EN OVERLAST OP PERCELEN

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Sociaal	Gebruik van landbouwgrond en schade aan of verlies van particulier eigendom	Groot (neg)	Verwaarloosbaar

Mitigatiemaatregelen

- Landgebruikovereenkomst.
- Goede afstemming en communicatie.
- Bescherming van alle productiefaciliteiten (SO).
- Voorzorgmaatregelen door landeigenaar/gebruiker.

Water

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Water	Waterverontreiniging als gevolg van lekkage en morsen	Matig	Verwaarloosbaar

Mitigatiemaatregelen

- Voldoende opvang bij tanks
- Lekvrije containers en opslagtanks
- Regelmatige controle
- Voldoende grote opvang voor afvalwater
- Olierampenplan
- Betrek stakeholders bij rampenplan

WATER

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Water	Waterverontreiniging als gevolg ongeluk	Matig	Verwaarloosbaar

<u>Mitigatiemaatregelen</u>

- Goede staat van onderhoud
- Maximum laadvermogen
- Maximum snelheid
- ”Defensief rijden”
- Procedures, middelen en materialen bij de hand

WATER

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Water	Blokkering van de drainage	Matig	Verwaarloosbaar

Mitigatiemaatregelen

- Bestaande drainagesysteem goed in kaart brengen.
- Goede afstemming en communicatie.
- Instemming landeigenaar / gebruiker.

SCHADE, OVERLAST EN HINDER

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Sociaal	Overlast of ergernis als gevolg van project en/of beroering in gemeenschap.	Matig	Verwaarloosbaar

Mitigatiemaatregelen

- Communicatie Plan.
- Tijdig op de hoogte stellen van alle activiteiten.
- Communicatie- en informatiepunt en contactpersoon.
- Overleggroep.
- Betere aanpak stofprobleem.
- Geen verkeershinder.
- Staatsolie gedragsregels voor werkers

Schade

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Sociaal	Schade aan woningbouwproject.	Matig (neg)	Verwaarloosbaar

Mitigatie maatregelen

- Indien mogelijk: schuin boren, of verschuif de bronnen.
- Vereiste afstanden i.v.m. geluidsoverlast.

LUCHTVERONTREINIGING

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Lucht-kwaliteit	Uitlaatgassen van voertuigen en machines en stofoverlast	Matig	Verwaarloosbaar

Mitigatie maatregelen

- Goed onderhoud.
- Afstand houden van huizen en werkplaatsen.
- Lage snelheid.
- Sproeien van zandwegen.
- Zand op trucks nat houden of afdekken.

GELUIDSOVERLAST

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Geluid	Geluidsoverlast van boor- en constructieactiviteiten en transport	Matig (neg)	Verwaarloosbaar

Mitigatie maatregelen

- Minimumafstand 100 meter (verticaal) of 285 meter (schuin) bij boren.
- Geluidsschermen waar nodig.
- s' Nachts geen zwaar transport.
- Optimale staat van onderhoud machines en transport

KAPPEN VAN BOS

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na mitigatie
Vegetatie	Verlies van secundair drasbos	Klein	Klein

Mitigatie maatregelen

- Indien mogelijk: schuin boren.
- Wegen zo veel als mogelijk buiten bosgebieden.

Toename werkgelegenheid

Aspect	Beschrijving	Potentiële impact	Overblijvende impact na bevordering
Sociaal econo-misch	Toename lokale werkgelegenheid	Klein (pos)	Matig (pos)

<u>Bevorderingsmaatregelen</u>

- Bekendheid van mogelijkheden voor werkgelegenheid bij lokale bevolking.
- Selecteer lokale mensen in geval van gelijke geschiktheid voor een betrekking.
- Waar mogelijk: trainingen of opleidingen.

Milieubeheerplan

- “Handboek”
- Specificatie maatregelen
- Dagelijkse operatie
- Aansprakelijkheid en verantwoordelijkheid
- Interne monitoring en inspectie
- Trainingen
- Rapportage

Gerelateerde plannen

- Afvalbeheersplan
- Spill Response Plan
- Health and Safety (HS) Plan
- Rampenplan

Externe controle

- Periodieke veldinspectie door NIMOS

NIMOS
Nationaal Instituut voor Milieu en Ontwikkeling in Suriname

- De stakeholders, via directe communicatie, of via het klachtenregister

Conclusies

- Het aantal nadelige effecten als gevolg van het project is gering en met toepassing van de voorgeschreven beheersmaatregelen zijn er slechts verwaarloosbare impacts.
- Er zijn geen grootschalige en/of langdurige effecten voorzien.
- De meeste potentiële effecten kunnen optreden bij de constructie, waarbij de landbouwgebieden en de bewoners van de Gangaram Pandayweg de meest gevoelige gebieden zijn.
- Goede communicatie, en een nauwe samenwerking met de landeigenaren/gebruikers en de lokale bevolking is van groot belang.
- Het aantrekken van gekwalificeerde lokale werknemers zal een positief effect hebben.

Vragen, opmerkingen, suggesties??

Stakeholder meeting Farmersland production development project, Sarah Maria, 10 juli 2014
Begin: 18.00 u
Einde: 21.00 u

Vraag/opmerking:	Gesteld door:	Antwoord:	Gegeven door:
Ik ben het niet eens met de statement dat wateroverlast alleen wordt veroorzaakt door achterstallig onderhoud. Ook door andere factoren waaronder ingrijpen van Staatsolie.	Dhr. Jogi	Het onderdeel wateroverlast gaan we parkeren. Er is een studie uitgevoerd door ILACO en men is bezig met de financiering.	Dhr. Amain
Als Dhr. Noordam zegt dat wateroverlast niet besproken wordt slaan we een milieueffect over.	Dhr. Sukul (vertegenwoordiger Ricusa N.V.)	Het gaat nu over het Farmersland gebied en voor dit project is potentiële wateroverlast niet als impact geïdentificeerd; het gaat om een drooglandproject, waarbij geen zwampwaterwegen worden geblokkeerd. Wel mogelijk effect op waterhuishouding droogland geïdentificeerd en geanalyseerd; de zwamp heeft daar echter niets mee te maken. Is het eens met de statement, van de heer Jogi dat er ook andere factoren in het spel zijn als het gaat over wateroverlast.	Dhr. Noordam
Het probleem van wateroverlast is nog in de onderzoeksfase zegt dhr. Amain, maar ik heb een brief gehad van dhr. Waaldijk waarin staat dat de studie is afgerond en dat wateroverlast niet de schuld is van Staatsolie.	Dhr. Sukhradj, Wayamboweg 122	Is niet bekend met de brief van de heer Waaldijk, maar zoals eerder gezegd is de wateroverlast geen issue. Dit probleem zal op een ander manier moeten worden besproken. Er is hiervoor een voorstel gedaan (Overleggroep).	Dhr. Noordam
Als we dieren hebben op bepaalde plaatsen, wanneer verplaatsen die zich?	Dhr. Sukhradj, Wayamboweg 122	In het bos zijn veel dieren. Voor deze studie is vooral de eventuele aanwezigheid van beschermde soorten van belang, maar deze zijn niet aangetroffen.	Dhr. Noordam

Ik heb 210 ha in het gebied. We moeten een systeem bedenken om samen te kunnen werken. We hebben veel last van vogels (Skurki's) die padizaden aanvreten. Ze zijn uit de zwampen verhuisd naar de rijstpercelen. Staatsolie heeft mijn terrein nu overgeslagen maar ik hinder Staatsolie niet.	Dhr. Abhelakh		
De kaart van 1962: TA 58 is nu ingepolderd, was dat in 1962 ook al het geval?	Dhr. Pitamber (student)	Nog niet ingepolderd. Ik weet niet precies wanneer dat gebeurd is, maar ergens in de jaren 90 van de vorige eeuw.	Dhr. Noordam
Wordt de zwamp ingepolderd?	Dhr. Pitamber (student)	Er zullen twee gebieden worden ingepolderd met een totaal oppervlak van ongeveer 85ha.	Dhr. Noordam
Zijn er verzakkingen mogelijk?	Dhr. Pitamber (student)	Het gaat om kleine bronnen. Er zit zand tussen, als olie weggaat komt er water voor in de plaats waardoor er geen verzakkingen zullen plaatsvinden. Er zijn in de praktijk in Suriname nooit verzakkingen geconstateerd (na meer dan 30 jaar olie productie).	Dhr. Noordam
Ik heb Staatsolie op mijn perceel toegestaan. Er is een weg naar binnen. Is de studie gericht op Wayambo en Gangaram Pandayweg of alleen op de plekken waar activiteiten plaatsvinden?	Dhr. Debitewari	De studie is gericht op het gebied waar impacts kunnen plaatsvinden. Het grootste deel van de studie is gericht op Farmersland gebied maar er wordt ook gekeken naar omliggende gebieden. Bijvoorbeeld als impacts verder komen via waterlopen.	Dhr. Noordam
Er is weinig gedaan in het gebied door Staatsolie. Dit zorgt voor tegenwerking. Er worden beloftes gedaan. Er moet op directieniveau gepraat worden en er moeten beloftes worden gedaan. De activiteiten van Staatsolie moeten sowieso doorgaan. De activiteiten van de rijstsector en agrariërs moeten ook doorgaan. Bij mij gaan we samenwerken. Ik heb dat initiatief genomen. Bijvoorbeeld tussen de oliebronnen sinasbomen planten.	Dhr. Debitewari	Zie aanbeveling voor Overleggroep.	Dhr. Noordam

Ik stel voor dat we niet meer via stakeholdersmeetings communiceren maar dat we met de directie praten hoe we rijst en olie kunnen harmoniseren.	Dhr. Sukul (vertegenwoordiger Ricusa N.V.)	Stakeholdersmeetings zijn vereist voor project. Het voorstel tot breder overleg is opgenomen in de ESIA.	Dhr. Amain, dhr. Noordam
Het rapport van ILACO is ontvangen. Ik heb affiniteit met de rijstsector. U moet de gevoelens van de boeren begrijpen. Ik heb de studie gezien. De ringdam 32 km. 4 kanalen, inspectiepunten, duikersysteem met kleppendeksel. Nu zie ik dat zwamp moet worden ingedamd. Het probleem is dat u nu in plaats van dat u nu voor een oplossing zorgt u gaat indammen. Het probleem wordt nu erger.	Dhr. Jiawan (District Commissaris)	Staatsolie gaat het bestaande drainage systeem binnen het projectgebied bekijken. Dit systeem moet water uit het hele productiegebied afvoeren, er zal dus geen effect zijn op de zwamp.	Dhr. Noordam
Staatsolie moet met locale bevolking de gebieden ingaan en adviezen opnemen. Stakeholders moeten onderdeel zijn van het proces.	Dhr. Jiawan (District Commissaris)	Dit is opgenomen in de ESIA.	Dhr. Noordam

APPENDIX H: TABLE OF COMMITMENTS

APPENDIX H: TABLE OF COMMITTMENTS

Type of Commitment	Description of Commitment	Reference of Commitment
Surinamese Law and Regulations	Staatsolie is committed to complying with the laws and regulations of Suriname at the time of project permitting.	ESIA: Appendix A – Chapter 3
International standards	The Project will be developed in a manner consistent with all relevant international agreements and treaties to which Suriname is signatory at the time of project permitting.	ESIA: Appendix A – Chapter 7
	The Project will use industry best practice as resources for social and environmental risk management. This will include the IFC ESH General Guidelines, the IFC EHS Guidelines for Onshore Oil and Gas Development, and the Performance Standards and their corresponding Guidance Notes published by the IFC.	ESIA: Appendix A – Chapter 6.2
Corporate Standards	Staatsolie will comply with the provisions of Staatsolie documents that address Health, Safety, Environmental and Community Relations (HSEC), principally: ➢ The Health, Safety & Environmental (HSE) Policy. ➢ The Community Relations (CR) Policy. ➢ The Risk Management Policy.	ESMP – Chapter 1.1 and Appendix A, B, C and D.
Environmental and Social Management	Staatsolie has developed an Environmental and Social Management Plan (ESMP), based upon the impact assessment of the ESIA. This ESMP presents the required commitments of Staatsolie and its contractors, details roles and responsibilities; in addition the monitoring requirements for different project phases are presented.	ESMP report
Environmental and Social Monitoring	Regular site inspections will be undertaken to determine compliance with the ESMP and to monitor the activities on site with regard to the requirements outlined in the ESMP. Weekly HSE Checklists and Weekly Waste Registrations will be submitted. Action items to rectify non-compliance will be closed out in a timely and satisfactory manner. Areas of non-compliance will be identified through environmental audits and spot HSE inspections and corrective measures will be proposed in consultation with the concerning process owner delegate. It will be alerted when action items intended to remedy non-compliance are not closed out in a timely and satisfactory manner.	ESMP - Chapter 2.1.1

Type of Commitment	Description of Commitment	Reference of Commitment
	Method statements for tasks requiring such will be monitored, Weekly HSE checklists and Weekly Waste Registrations will be submitted accordingly. A post-decommissioning inspection will be undertaken upon completion of each location; this may result in recommendations for additional clean-up and rehabilitation measures as required.	
	A framework for physical monitoring was developed, showing parameters, frequency, monitoring locations and responsibilities.	ESMP - Chapter 2.7.5 and table 5
Organizational structure and staffing	Staatsolie has defined an accountability process to make certain that responsibilities are performed effectively. The organizational structure focusing on those personnel with environmental and community relations responsibilities/accountabilities, is outlined in the ESMP.	ESMP –Chapter 2.1
Training and Awareness Raising	Staatsolie will convey the objectives of the ESMP and the specific provisions of the ESMP to all personnel involved in construction, drilling, production and decommissioning activities of the Farmersland Project prior to commencement of the project. Environmental induction will cover the specific environmental and community relations management requirements as set out in the ESMP, but will also ensure that all on-site staff are aware of and familiar with the relevant requirements and principles/objectives of the HSE and CR Policies and applicable procedures (GFIs).	ESMP - Chapter 2.4
Documentation	Environmental and Social reporting requirements are defined.	ESMP - Chapter 2.7.3 and table 4.
Reporting	Quarterly compliance and monitoring reports will be submitted to NIMOS	ESMP – Chapter 2, table 4
Air quality		
Equipment inspection/maintenance	• Regularly maintain engines of vehicles and equipment. • Operate and maintain exhaust systems and engines in accordance with the manufacturer's specifications. • Use preventative maintenance and repair programs.	ESIA – Chapter 5, table 19
Dust suppression	• In dry periods: maintain a low speed. • In dry periods: spray the road near houses with water; keep the road as moist as feasible.	ESIA – Chapter 5, table 19

Type of Commitment	Description of Commitment	Reference of Commitment
	• In dry periods: keep the sand moist, such that it is not blown from the trucks. • Evaluate the dust problem and seek improvement of current solutions.	
Noise		
Reduction Noise Nuisance	• If feasible: apply deviated drilling and select a drilling location that is at least 285 meter away from the nearest house. • In case vertical drilling is done: Keep a minimum distance of 100 meter between the drilling rig and the nearest dwelling. • Truck and other heavy transport should only be operational during daytime.	ESIA – Chapter 5, table 22
Traffic and Transportation Safety		
Fuel and materials delivery and spill response	• Ensure that all access routes have ample stability and bearing capacity to carry the planned loads, also under wet conditions with a high groundwater level. • Regularly service and maintain transport infrastructure to reduce risks to vehicles • Enforce loading limits to ensure vehicles are not overloaded thereby rendering them less stable. The loading limit must apply to the less stable unpaved road section. • Enforce speed limits for all vehicles to minimise the potential of accidents. Specify for road types. • Guide trucks along narrow sections. • All truck drivers should follow a Defensive Drivers training. • Restrict heavy transport to daytime only. • Require that trucks are being used in accordance with the maximum allowed wheel load for respective roads in order to avoid damage to the local roads.	ESIA – Chapter 5, table 28 ESIA – Chapter 5, table 34
Landuse and Disturbance		
Access to land	Staatsolie has developed the format document 'Agreement access to land for the execution of mining activities' ('Overeenkomst toegang terreinen voor het verrichten van mijnbouwwerkzaamheden'). This agreement will be made between Staatsolie and all respective owners. In addition to the permission to conduct activities at the respective lands, it addresses all issues and concerns of the owner regarding the use.	ESMP - Chapter 2.2
Use of third party land	• If feasible, employ deviated drilling in order to reduce the total land take, and consider as much as possible drilling outside actively used land	ESIA – Chapter 5, table 36

Type of Commitment	Description of Commitment	Reference of Commitment
	• Compensate for any loss of standing crops at the taken land, or for any loss or damage resulting from the use of his land. • Compensate the farmer for the use of the concerned part of his land. • No drilling will be undertaken within the limits of the Yarah housing project.	ESIA – Chapter 5, table 38
Project activities on third party land	• All project activities at farms should be documented and described in detail. • A detailed schedule of works should be drawn up; this schedule should be agreed on with the concerned farmer. • Farmers should be informed one week ahead about the actual start of the project activities at his land; any change in program should be communicated one week ahead. • The farmer for his part should make arrangements to ensure that no cattle are present adjacent to work locations, including the transportation route, and that all cattle are kept in properly fenced pastures. • All production facilities should be adequately fenced of, or protected otherwise, so that no damage to these facilities can occur. • Compensation should be given for any other damage due to Staatsolie activities, after that investigation by Staatsolie has justified the claim. • All above issues should be combined into the Landuse agreement with every individual farmer. • The agreement should contain appeal procedures in case of disputes.	ESIA – Chapter 5, Table 37

Type of Commitment	Description of Commitment	Reference of Commitment
Surface water resources		
Prevent blockage of irrigation water supply	• The diversion dams should not completely close off the swamp, but a canal should be constructed that carries water towards the intake points of the southern farms, including the potential farms. • In case culverts will be placed in these canals, these should be wide enough to allow the peak flow of the farms. • The farmer should be fully involved during the planning of the works and all activities should be properly documented, including maps. Possible solutions should be elaborated in close consultation with involved farmers. • The farmer should agree upon the plans (through 'Landuse Agreement'). • Conduct a thorough scouting of farms and identify all culverts and waterways and their function.	ESIA – Chapter 5, table 24 & 25
Spill prevention and control	• Provide adequate containment for tanks (bundwalls or containers). • Use drip-pans, leak proof containers and storage tanks. • Conduct frequent visual inspection of pipes and valves for signs of corrosion and replace pipes and valves when corrosion is found. • Check effluent from well sites before discharge, in particular after recorded leakage or spill • Do not release from well sites in case of exceedance of standards and conduct appropriate required measures till sub- standard water quality is met. • Have procedures, materials and equipment in place to ensure immediate containment and cleanup by competent personnel, in the event an accident. • Involve concerned authorities and land owners within the spill contingency planning.	ESIA – Chapter 5, table 26
Terrestrial habitats		
Vegetation Management	• If feasible, select the deviated drilling method instead of vertical drilling, and situate the platforms as much as possible outside the forest. • Locate roads as much as possible outside forest areas.	ESIA – Chapter 5, table 30

Type of Commitment	Description of Commitment	Reference of Commitment
Waste management		
Waste Management Plan	• All solid waste will be managed according to the existing waste handling and treatment / disposal procedure (General Field Instruction (GFI) no. 611).	ESIA – Chapter 3, on-site waste management and Appendix C.
Drilling mud and cuttings management	• With permission of the landowner, drilling mud and cuttings are buried on-site with the following conditions: o The pit contents should be dried out as far as possible. o If necessary, the waste should be mixed with an appropriate quantity of subsoil (typically three parts of subsoil to one part of waste by volume). o A minimum of one meter of clean subsoil should be placed over the mix. o Topsoil should not be used as fill, but it should be placed over the subsoil to fully reinstate the area. • If no permission is obtained: remove the drilling mud and cuttings from the site and bury it at a suitable location at Sarah Maria.	ESIA – Chapter 3, on-site waste management
Completion fluid management	• Remove the spent completion fluid directly after finalization of drilling and transport it in a tanker truck or in proper containers. • If possible reuse the completion fluid. • Treat the completion fluid waste at the Sarah Maria Landfarm facility. Treatment of spent completion fluid encompasses the dilution with fresh water till an acceptable salinity level is reached, following which the material can be released into a water environment.	ESIA – Chapter 5, table 27
Social and Community		
Disclosure of information about project activities	• Inform local inhabitants, land owners, relevant government departments about project related activities/issues.	ESMP – chapter 2, table 3
Community Engagement	• Implement the Communication Plan. • Install a consulting structure with representatives from the district government, local government and delegates from the local population.	ESIA – Chapter 5, table 34, and Ch. 6 of the Social

Type of Commitment	Description of Commitment	Reference of Commitment
	• Communicate the occurrence of large transports of equipment, materials and supplies with the local population (through BO or DS). • Make sure that Staatsolie workers and Contractors are aware of the Staatsolie Code of Conduct (as part of project induction talks).	Specialist study (ESIA : Appendix F).
Labor Recruitment	• Ensure that job opportunities become known in the local community and provide a clear job profile. • When equally qualified, recruit local personnel. • Investigate the potential of job seekers along the Gangaram Pandayweg and where possible provide training or education to promising persons.	ESIA – Chapter 5, table 39