Updated Environmental and Social Impact Assessment (ESIA)
for
the Uitkijk Appraisal Drilling Program
(ADP) 2018

Prepared for:

Staatsolie Maatschappij Suriname N.V.

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ILACO

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Contents

Abbreviations

ADP	Appraisal Drilling Program
DO	Dissolved Oxygen
EBS	Energy Company of Suriname
EC	Electrical Conductivity
EIS	Environmental Impact Statement
ELC	Ecological Land Classification
EMP	Environmental Management Plan
ENSO	El Niño-Southern Oscillation
EPA	Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
HDPE	High-Density Polyethylene
IFC	International Finance Corporation
KCl	Potassium chloride
NaCl	Sodium chloride
NIMOS	National Institute for Environment and Development in Suriname
POC	Paradise Oil Company N.V.
ToR	Terms of Reference

List of Tables

List of Figures

Executive Summary

This document presents the results of the updated Environmental and Social Impact Assessment (ESIA) for the Uitkijk Appraisal Drilling Program (ADP) 2018. The updated ESIA has been prepared conform the EA guidelines of the National Institute for Environment and Development in Suriname (NIMOS, 2009), as well as international best practice. The assessment and this report were prepared according to the approved Staatsolie Terms of Reference (ToR) and the screening results by the National Institute for Environment and Development in Suriname (NIMOS). A similar project was undertaken in 2013 and the results of the ESIA and EMP of that project will be updated for the current project. The current project area and the project activities are basically the same as those for the 2013 appraisal drilling project.

The project is located in the Uitkijk North Block Concession, about 15-25 km west of the western boundary of Paramaribo and immediately east of the Tambaredjo Oil Field operated by Staatsolie.
The appraisal drilling project area comprises the actual well locations, any additional wells, transport and service trails, dams and pads. Furthermore, the routes that will be used to transport crude oil from the project area to TA-58 are also included in the project area.

The current study has predominantly been conducted as a desk study, supplemented by limited field reconnaissance and measurements, and stakeholder consultation. The reason for the limited amount of field work is related to the fact that only revising/update of the existing ESIA report is required for which already much data has been collected.

As part of the update of the previous study, water quality and noise data were collected. Hydrology data from another study done for Staatsolie by ILACO, “Study Water Management Buru and Wayambo Swamp District Saramacca” has been used to update the hydrology.

Conclusions drawn from this study include:
The update resulted in two additional potential impacts, related to noise and hydrology. These impacts were analyzed and mitigation measures have been presented. The Environmental and Social Management Plan for the current Appraisal Drilling is in principle the same as that for the previous operation (NEC 2013), but measures regarding mitigation of noise impacts from airboats and hydrology were added.

No additional impacts for the social environment were identified, but attention is asked for the contracts with the landowners. More landowners could become involved, in case additional wells are projected on private land.

1 Introduction

1.1 This document

This document presents the results of the updated Environmental and Social Impact Assessment (ESIA) for the Uitkijk Appraisal Drilling Program (ADP) 2018.

One of the strategic goals of the Staatsolie is to sustain the annual average daily production of 16,250 BOPD (Staatsolie Strategic Plan). Future oil production from the Uitkijk Block will compensate for the decline in oil production rate. Appraisal activities will be carried out to establish the presence of producible reservoirs, find more reserves, minimize geological risks present in this area, secure future development drilling programs and upgrade contingent reserves in to prove reserves. After exploration programs between 2001 and 2014, the Staatsolie is planning to further appraise the Uitkijk Block in order to increase the reserve base. The appraisal drilling program (ADP) for the Uitkijk Block consists of at least four (4) wells.

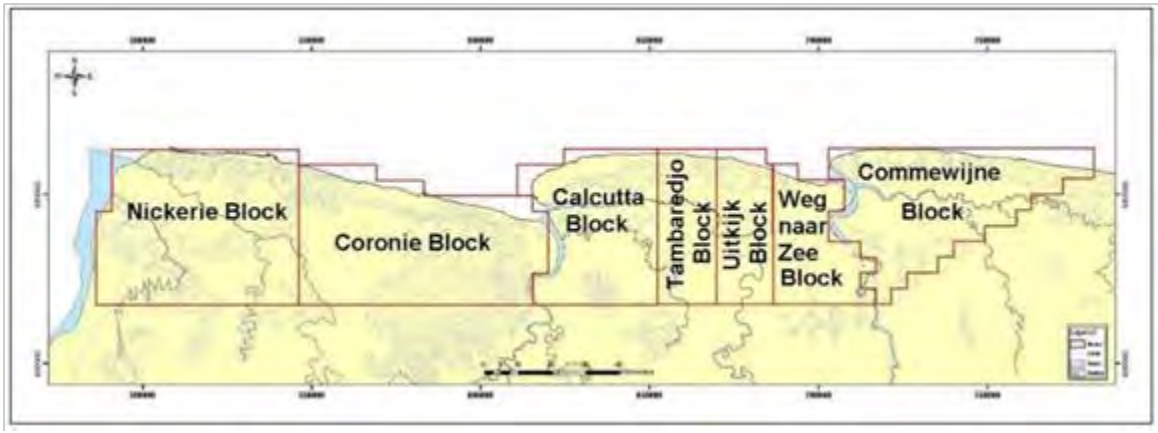

Figure 1: Overview of the onshore concessions blocks

The updated ESIA has been prepared conform the EA guidelines of the National Institute for Environment and Development in Suriname (NIMOS, 2009), as well as international best practice.
The assessment and this report were prepared according to the approved Staatsolie Terms of Reference (ToR) and the screening results by the National Institute for Environment and Development in Suriname (NIMOS).

1.2 Project background and scope

The project is located in the Uitkijk Block Concession, about 15-25 km west of the western boundary of Paramaribo and immediately east of the Tambaredjo Oil Field operated by Staatsolie. The Uitkijk Block is divided into two parts (North and South) by the 'Oost-Westverbinding', which is a primary road connecting east and west Suriname. The project activities will be executed in the northern part of the Concession area, known as the Uitkijk North area (Figure 1 and Figure 2).

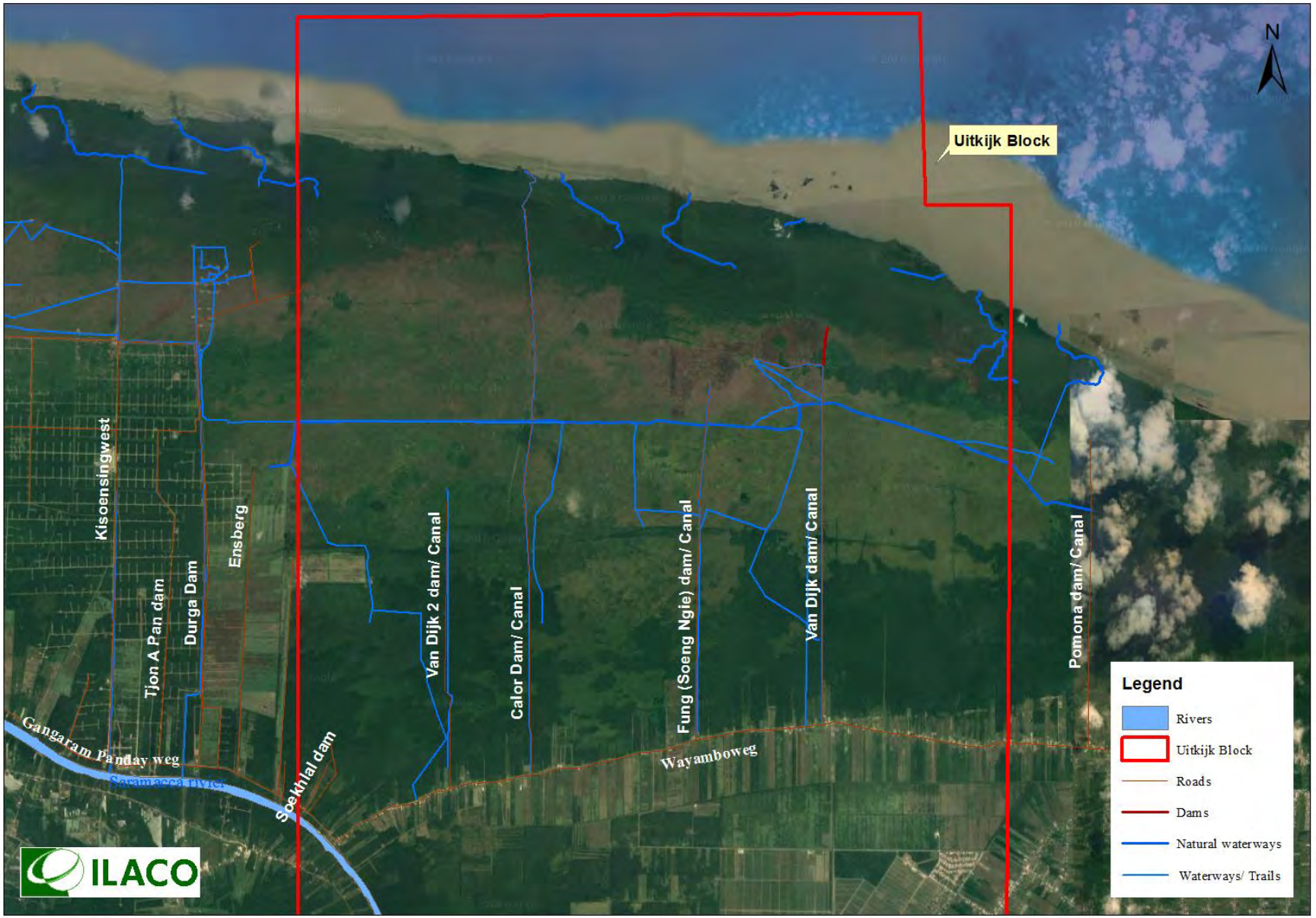

Figure 2: Uitkijk Concession Block with roads, dams and canals

Between 1999 and 2013 several studies have already been carried out in the Uitkijk-North Block (see references).
A gap analysis has been carried out of the existing data and current project scope. An overview of the gap analysis can be found in **Appendix 1**.

Since November 1999 a large number of studies for petroleum exploration programs were conducted in the swamps of northern Saramacca. The most relevant for the current study are those that were undertaken in the Wayambo Swamp, in which the project area is situated. However, also information about the biodiversity, swamp hydrology, noise and traffic could be obtained from studies in the Buru Swamp.

In 2000, an Environmental Impact Statement (EIS) for a seismic exploration and drilling program was prepared by E2 Environmental Alliance from Calgary, Canada (E2 Environmental Alliance Inc. 2000). Furthermore, an Environmental Management Plan (EMP) was included.
The exploration program was carried out by KOCH in 2001.

Since 2008, Paradise Oil Company N.V. (hereafter shortly indicated as POC) has undertaken the drilling of 23 exploration wells in the Uitkijk-North Block. Production testing was done for 6 wells, while swab tests were conducted in three wells.

Similar exploration projects that were undertaken in 2011 and 2012 and environmental assessments were conducted as respectively a review of the 2000 EIS, and an addendum to the latter review.

The 2011 review (NEC 2011a) concludes that much of the 2000 report was still applicable for the proposed exploration activities, and additions have been made where necessary. An Environmental Management Plan (EMP) has been prepared for the proposed 2011 activity.

The addendum (NEC 2011b) concluded that the same set of potential impacts was applicable as those identified for previous studies, and that the EMP for the additional drillings was in principle the same as that for the operation earlier in 2011, except for some minor issues that were added in order to prevent complaints about project activities on private land. Because the project entailed activities on private property, the stakeholders were consulted again but no new insight regarding the potential impacts were listed. Because the project was undertaken in the same area as the previous appraisal testing and because the project activities were similar, the same set of potential impacts were found to be applicable. The Environmental Management Plan (EMP) for the additional drillings was not revised, but a small addition regarding locations of operation, viz. the Van Dijk (2) Canal was included since that was not included in the previous study. Moreover some additional measures were also included in the EMP based on complaints about POC on private land.

In 2013 an addendum was prepared for 10 additional wells in the Uitkijk North Block (NEC 2013). This addendum also concluded that the same set of potential impacts was applicable as those identified for previous studies, and that the EMP for the additional drillings was in principle the same as that for the 2011 operation with some additions and modifications with respect to monitoring and fire hazards.
Project activities would be carried out on private property, therefore stakeholders were consulted again. The interviews with these stakeholders did not result in new insights regarding the potential impacts, but some of the complaints that were received indicate that the Environmental Management Plan and other mechanisms were not adequately functioning. The implementation of the EMP showed significant short-comings and stricter enforcement of the regulations and instructions were required for quite a number of issues, and this is supposed to be verifiable from compliance reporting.

In September of 2013 an Environmental Compliance Report was produced for the Uitkijk North Appraisal Project. During the execution of this project there was about 95% compliance to the implementation of the mitigation measures as indicated in the EMP for this project. Only two non-compliances were found: with regards to availability of spill response equipment and the signing of land use agreements. The signing of the land use agreements was supposed to be finalized before the end of Q4 2013. The results of the physical monitoring of the project indicated that the activities of the project had a temporary effect on the water quality of the swamp. After the execution and also with the help of the rainfall the measured parameters returned to the baseline values.

The scope of the current additional review and update of the ESIA includes:

- To present the additional project activities
- To identify and consult new and already known stakeholders about the current activities.
- To detail certain sections of the baseline based on findings of past monitoring as required.
- To check whether the previous impact assessments also apply to the current four drilling locations, and to any additional drilling locations (up to 10 for the area), and if not so, to make additional assessments.
- To validate that the existing EMP is also applicable for the current and additional drillings, and if necessary to modify or include additional issues.

1.3 Project and study area

The area in which the project activities will take place is shown in Figure 3. The project area comprises the actual well locations, any additional wells, transport and service trails, dams and pads. Furthermore, the routes that will be used to transport crude oil from the project area to TA-58 are also included in the project area. Reference is made to the project description for details. The current project area is basically the same as the project area for the 2013 appraisal drilling project.

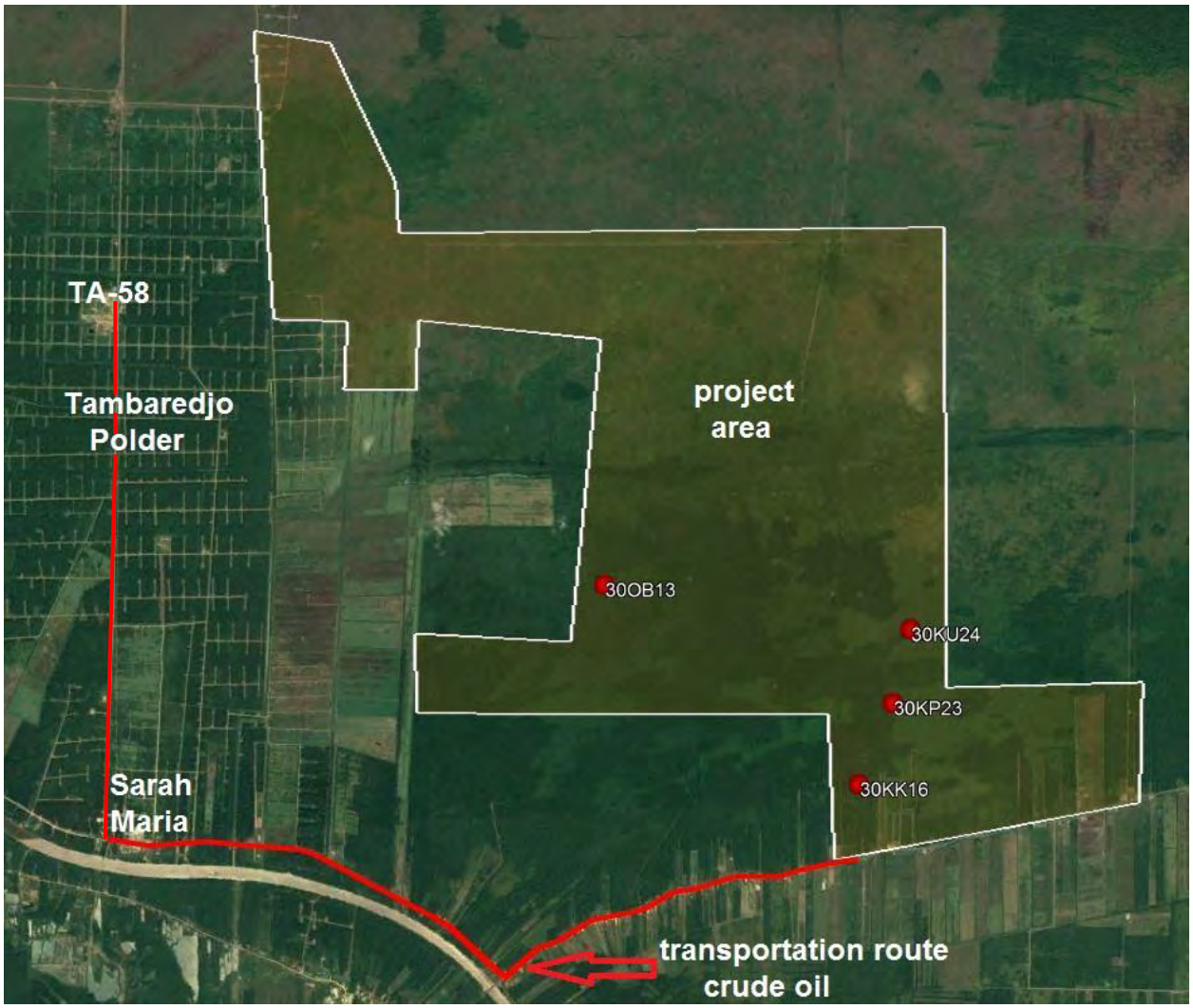

Figure 3: Project area of the Uitkijk Appraisal Drilling project and surroundings

For most environmental and social aspects, the study area is identical to the project area. However, impacts for some aspects, e.g. like noise, can reach outside the project area. The study area for these aspects stretches beyond the project area as will be indicated where appropriate.

1.4 Methodology

The current study has predominantly been conducted as a desk study, supplemented by limited field reconnaissance and measurements, and stakeholder consultation. The results of the stakeholder consultations are included in **Appendix 3.** The reason for the limited amount of field work is related to the fact that only revising/update of an existing ESIA report is required for which already much data has been collected.

1.5 Team of experts

The update of the ESIA for the Uitkijk Appraisal Drilling Program (ADP) 2018 has been undertaken by ILACO Suriname N.V, appointed by the Staatsolie as independent consultant. The team of experts includes:

1. Koenjbiharie S, B.Sc. as Team Leader/Environmental Specialist;

2. Noordam D, M.Sc. as senior ESIA Expert;
3. Bong A Jan R, M.Sc. as Social Expert

2 Project Description

2.1 Project site and Planning

The project site is located in the Uitkijk Block (formerly the Wayambo Block), about 15-25 km west of western boundary of Paramaribo and immediately east of the Tambaredjo Oil Field operated by Staatsolie. The Uitkijk Block is divided into two parts (North and South) by the 'Oost-West Verbinding' which is a main public road connecting east and west Suriname (Noordam, 2013)[1]. The project activities will be executed in the northern part of the Concession area, known as the Uitkijk North area.
The project site can be reached through a trail from the existing Tambaredjo oilfield of Staatsolie and via the Oost-West verbinding.

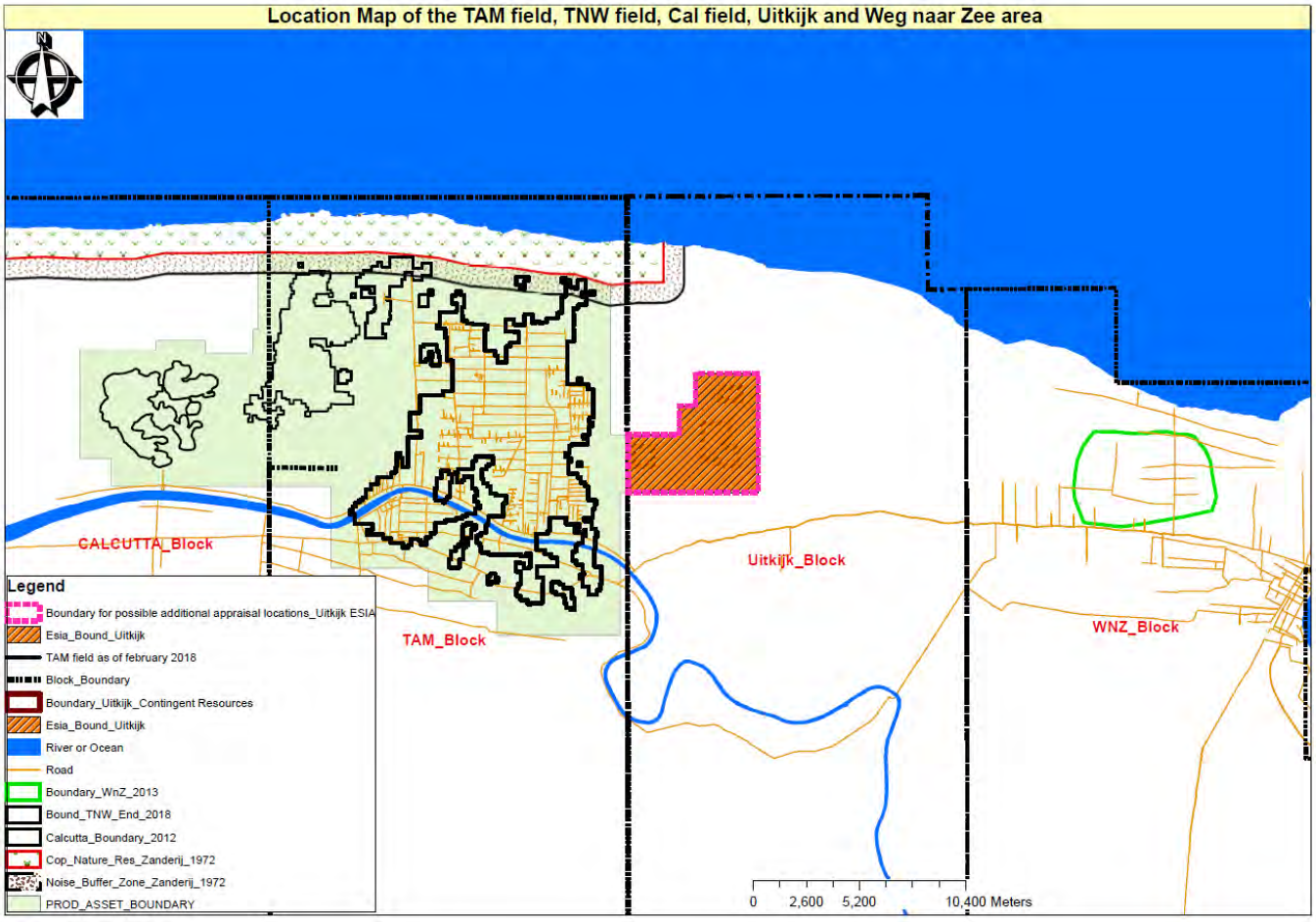

Figure 4: Overview map of the Uitkijk North Area in the Uitkijk Block

Staatsolie is planning to carry out an appraisal drilling program consisting of at least four (4) locations from 2018 until 2021 in the Uitkijk area. Wells with producible oil will be selected for testing purposes for a period of one year. Table 1 presents the wells to be drilled. However, the location of the wells can be changed based on the results of the wells that will be drilled first.

The results of the four wells will be integrated with old wells in order to evaluate the geological data. If needed, approximately 10 additional appraisal wells can be added to the program after evaluation of the

[1] Noordam Environmental Consultancy. 2013. Environmental Impact Assessment for the proposed appraisal drilling project in the Uitkijk-North Block: Addendum for ten additional wells.

study area. These wells will be proposed within the ESIA boundary, provided in Figure 4. The coordinates of these wells are not known yet.
Table 2 provides an overview of the timeline of the project, while the information on planned resources is provided in Table 3.

Table 1: Overview of the coordinates of the appraisal wells in the Uitkijk North Area

Location	WGS 84		Well Depth (Ft.)
	Latitude	Longitude	
30KK16	5°52'26.4720"N	55°24'50.2925"W	1100'-1200' SSTVD
30KP23	5°51'53.5812"N	55°24'58.0902"W	1100'-1200' SSTVD
30KU24	5°51'17.4230"N	55°25'13.2113"W	1100'-1200' SSTVD
30OB13	5°52'46.2593"N	55°27'7.3003"W	1100'-1200' SSTVD

Table 2: Planning of the ADP Uitkijk Project (based on four wells)

Activities	Timeline	
Project planning (including consultations with landowners)	1 month	
Construction of trails	1 month	mid December 2018 – mid January 2019
Rig move to first well location	1 week	End-January 2019
Drilling	5 weeks	End-January – mid March 2019
Completion of wells to be taken into test production	4 months	March – End June 2019
Construction of facilities (test tanks, flowlines and header) [2]	4 months	End February – June 2019
Testing	13 months	July 2019 – August 2020
Decommissioning	6 months	September 2020 – March 2021

Table 3: Planning of the ADP Uitkijk Project (based on 10 additional wells – depends on results of the first wells)

Activities	Timeline	
Construction of trails for additional wells	2.5 months	February 2019 – Mid April 2019
Drilling, completion of additional wells	4.5 months	March 2019 – mid July 2019
Additional construction of facilities	6 months	June 2019 – Dec 2019
Testing additional wells	13 months	December 2019 – January 2021
Decommissioning additional wells	1 year	January 2021 – January 2022

Drilling and testing of four wells requires:

- Landing stages: for transportation of personnel and materials.
- Collection and loading site: to collect the crude oil from the wells in storage tanks and load the oil in vacuum trucks.
- Trails and drilling locations: for rig and equipment move, material transportation, construction, drilling and testing activities.
- Transportation of personnel and materials for drilling and construction of the facilities.
- Dams: for installation of electrical poles, flow lines and headers.

[2] The test facilities will eventually be constructed after the analyzing the results of the wells.

- Flow line: for transportation of crude oil from the wells to the test facilities.
- Test facility site: for accommodation of the test tanks and generator.
- Header: for transportation of crude oil from the test facilities to the collection site.

2.2 Construction phase

Landing stages and collection & loading site

The project area can be reached via 2 locations: the POC landing stage and the Calor landing stage (Figure 4). The POC landing stage is an existing location within the Tambaredjo Oilfield, while the Calor Landing stage has to be constructed. A new entrance will be made along the Oost-West verbinding to enter the terrain of Mr. Calor. Staatsolie will place a culvert (diameter = 1.50 m) underneath the entrance to prevent blockage of water in the channel along the Oost-West Verbinding. Figure 5 illustrates the layout of the Calor landing stage that has to be constructed for mooring of airboats and carriers and for crude oil collection and loading facilities.

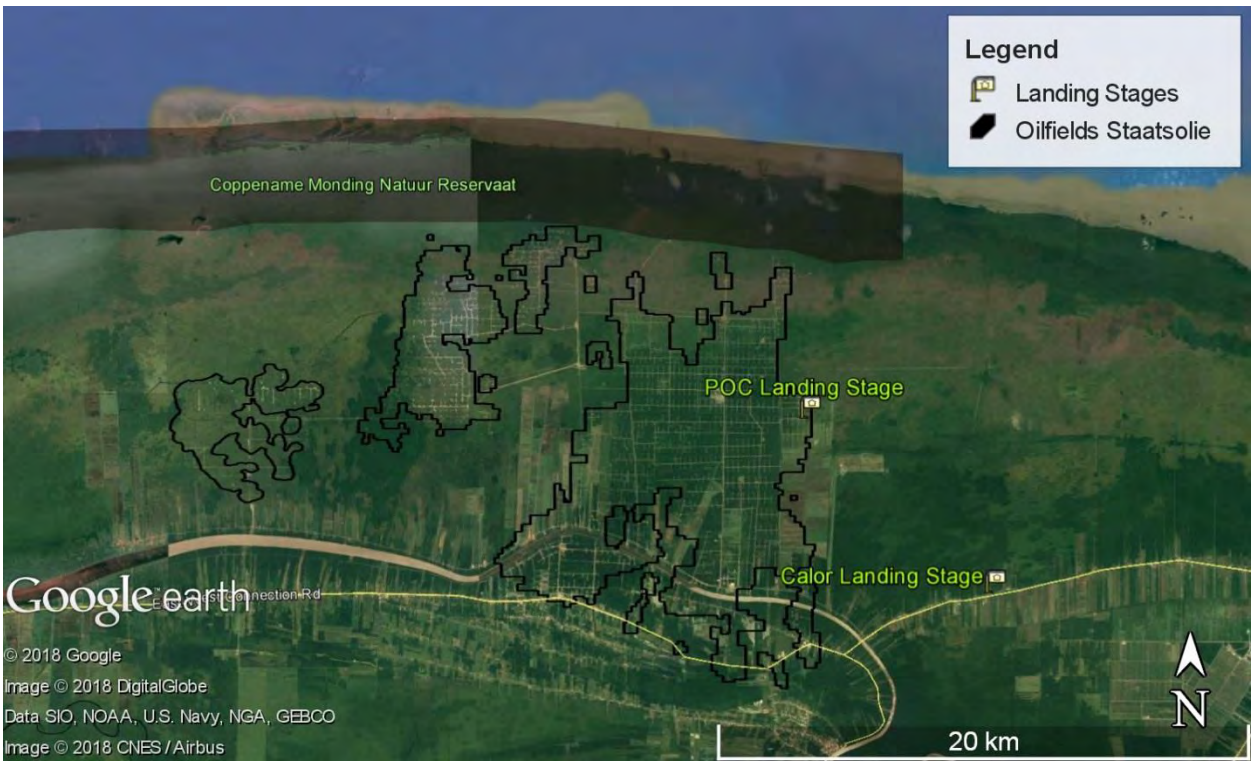

Figure 5: Landing stages

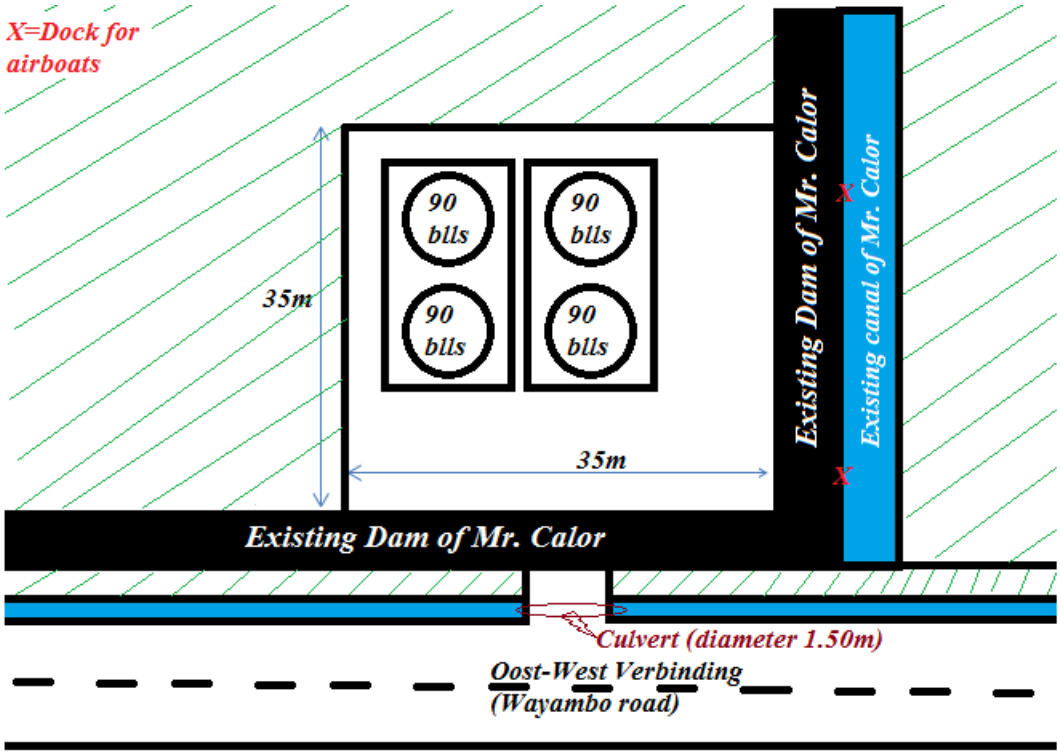

Figure 6: Overview Calor Landing stage to be constructed, within the collection and loading facilities

Trails and drilling locations

Two types of trails can be distinguished: access and service trails. Access trails are used for rig move and also for transportation of personnel and materials during each phase of the project. Service trails are not used for rig move. Furthermore, the existing trails from previous projects in the Uitkijk area are distinguished from new trails to be constructed for this project.

To execute the drilling program, existing and new trails will be constructed. The clearing of the new access and service trails (10 – 12 meters wide) and the drilling locations (60m x 70m) will be done with maximum two swamp excavators.

Figure 6 provides an overview of the trails to be cleared. A service trail from Soeng Ngie dam is projected for possible additional wells. This service trail will, however, not be constructed for the four well operations.

The planned route may change if deep spots identified during clearance of the waterways, especially within the Typha ecosystem where the deepest swamps are found (Noordam 2010). Deep spots are not favorable for the traction of the excavator that pulls the rig forward. A cutting will be made in the Calor dam in order to allow passage of the rig. The cutting will again be closed upon finalization of drilling and return of the rig in such a way that an airboat can pass over the dam, unless Mr. Calor requires another procedure.

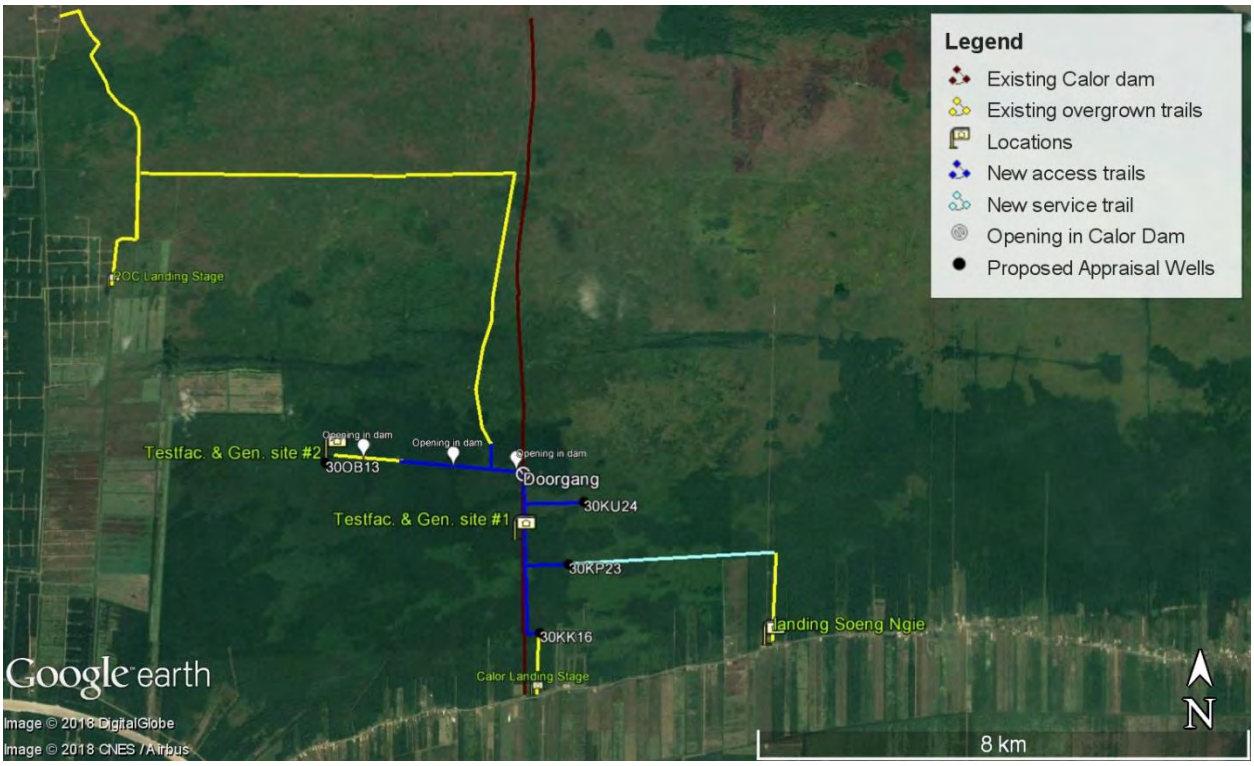

Figure 7: Existing and new trails

Transportation

The transportation of materials for the construction phase (including utility poles, HDPE (high-density polyethylene) pipelines and electrical cables) will preferably be transported via the Calor dam with a tractor. Otherwise it will be transported with a carrier through the waterways.

Transportation of personnel will be done with vehicles along the Oost-West Verbinding on land and airboats in the swamp area through the projected trails.

Dams

Dams will be constructed along the trails, with clay excavated from the surrounding area/trail. Figure 8 provides an overview of the existing dam and new dams to be constructed.
New dams will be constructed for the 4" flow lines and 6" header (to be buried in the dam at a depth of 60 cm) to facilitate crude oil transportation from the well locations to the test facilities and the collection and loading facilities at the Calor landing stage (Figure 5).

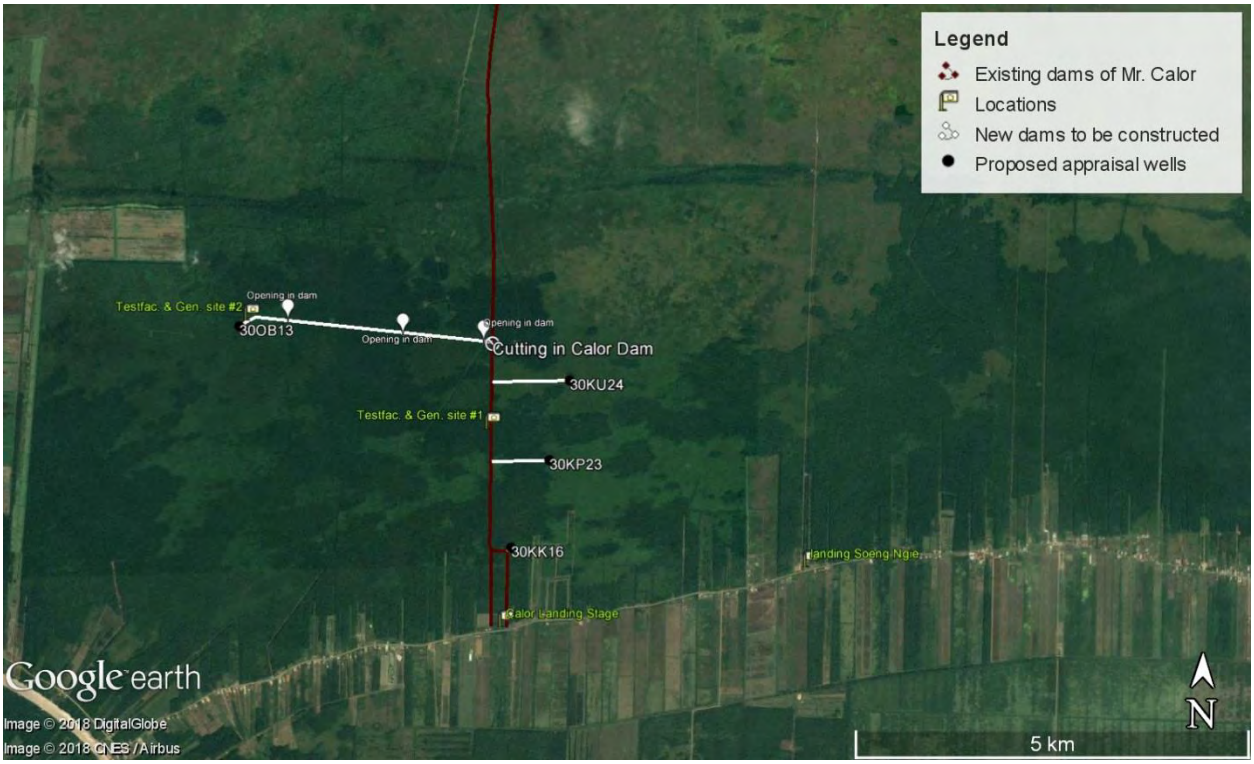

Figure 8: Overview of existing dams and new dams to be constructed

Flow lines

For the transportation of crude oil (produced from the oil well) to the test facilities, flow lines will be constructed by fusing HDPE pipes together in which the crude oil will flow from the well to the test tank. A swamp-excavator will be used to assist the contractor with the construction.
See Figure 9 for the routes of the flow lines.

Test facility site

For testing purposes test tanks of 60 barrels will be installed on 2 locations (testing and generator facilities in Figure 7). The test tanks will be pre-fabricated transported on carriers to the sites. A platform will be constructed using clay, piles and concrete plates. The test tank and manifold system will be constructed on the platform. Carbon steel pipes and appendages will be used to connect the flow lines through the manifold to the test tank. A bund wall will be constructed around the test tank as barrier in case of an oil spill.

Header

From the test tank and flow lines, the crude will be transported by means of a 6" header (buried at a depth of 60 cm in the dam –Figure 9) to the site with the collection/buffer tanks (4 tanks with a capacity of 90 barrels each) along the Oost-West verbinding.

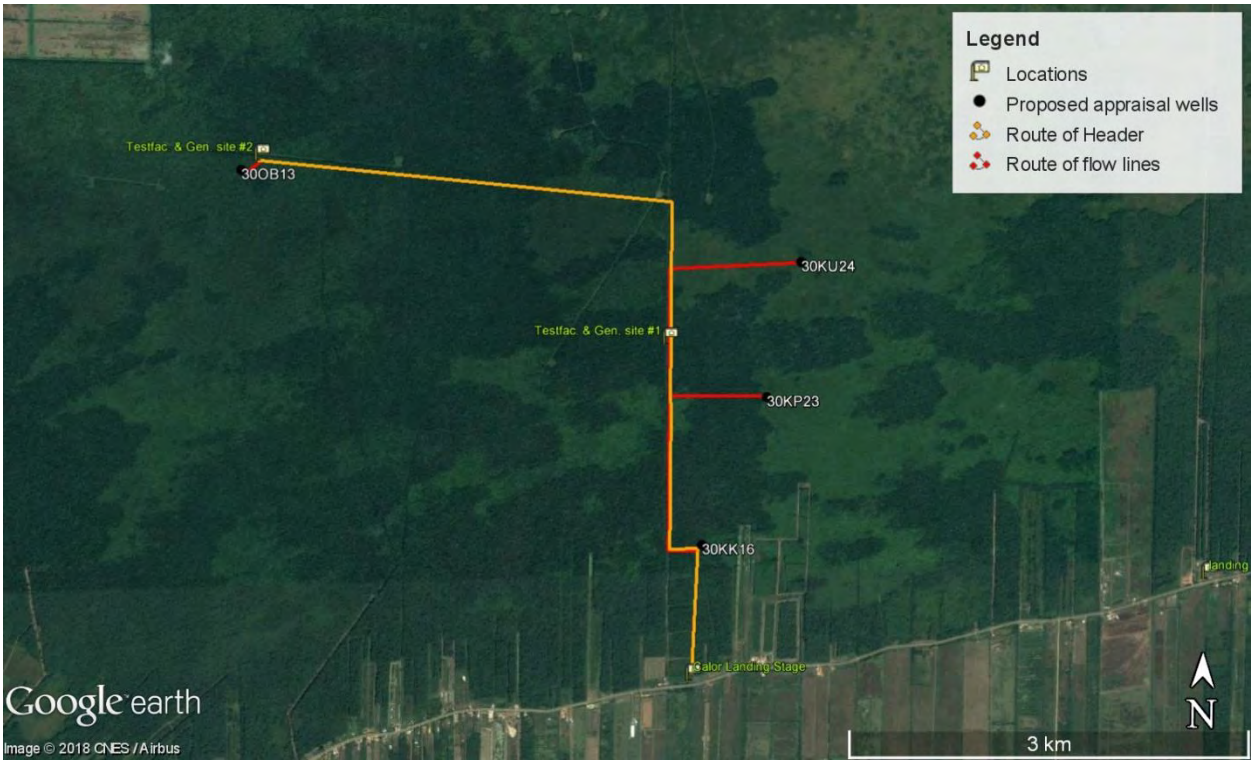

Figure 9: Overview of the route of the header to transport the crude oil from the test facilities to the collection tanks at the loading site

Power line and generators.

Low- voltage line and generators will be installed to electrically connect the oil wells.

Poles, generators and other electrical materials will be transported through the Calor dam with a tractor during the dry season and with a carrier during the wet season through the trails.

The electrical poles and low-voltage cables will be installed on the dams. The low-voltage line will connect the oil wells with the generators at the test facility sites.

If needed, a high-voltage line will be constructed along the same dam that is used for crude oil transportation. The high-voltage line will be hooked-up on the power line of Energy Company of Suriname (EBS) with a transformer. The high voltage line will be constructed from EBS-line to the test tanks.

2.3 Operation Phase

2.3.1 Drilling Operations

Drilling

A Failing 2500 Rig on a self-propelled carrier (20'' by 40'') will be utilized to drill the wells. The auxiliary equipment will be installed on barges (20'' by 40'') and will be pulled with swamp excavators or carriers to the location. Drilling is a cutting process that uses a drill bit to cut a hole of circular cross-section in the earth. The drill bit is usually a rotary cutting tool, attached on steel pipes. In an initial stage of the drilling process, a surface steel pipe (casing) is pressed down to a depth of about 80 feet. After the surface casing has been set, drilling is resumed to the planned total depth. When the oil sands are found, well tests are conducted to gather the required reservoir information (see wireline logging) (Noordam, 2010).

Drilling fluid
During the drilling process, drilling fluid (also known as "mud") is pumped down through the drill pipe and exits at the drill bit (Noordam, 2010). For the Saramacca Operations water-based drilling mud is used, mainly composed of water, clay (Bentonite – 5500 kg), Sodium Bicarbonate (85 kg), Barite (1818 kg), Pack LV (568 kg) and calcium carbonate (909 kg) to drill a well. The required materials for the drilling process and personnel will be transported via the formal POC (Durga) landing site to the well locations.
"Cuttings", consisting of clay, sand and shell fragments generated during drilling, and the remaining mud, will be dumped at the drill site, since no significant impacts were predicted and observed up to now.

Wireline Logging
After finalization of the drilling, the hole is logged 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 logging cabin, equipment and tool is placed on a pontoon to log the well. No emissions occur during the logging process.

Well completion
In case of a discovery in one of the appraisal wells it will be 'completed'. Completion is the process in which the well is enabled to produce hydrocarbons.
Wells will be completed with 7" production casing in order to test the production capacity. The production casing of these wells will be installed and cemented to surface to protect all water aquifers.
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 formation into the production tubing.
Completion fluid (brine) is made up with water and rock salt to weight up from 8.4 ppg to 8.7 ppg with 4% KCl by weight to prevent clay swelling.
For the preparation of the completion fluid on average the following quantities are used per well:
NaCl 3,200 kg
KCl 2,000 kg

Logistics
The required materials for the drilling process and personnel will be transported via the formal POC and/ or Durga landing site to the well locations.

2.3.2 Well testing
In case of an oil discovery in the appraisal wells, production tests will be performed. The oil will be produced by means of a Moyno Pump to the surface. The oil will be transported from the well locations to the test facilities and/or buffer tanks through 4" HDPE flow lines. From the test facility the fluid will be transported in a 6" flow line (header) to the site along the Oost-West verbinding and afterwards to the TA58 treatment by means of vacuum trucks (capacity of 62 or 94 barrels). The trucking will be done twice a day (daylight – 12 hours operations). Figure 10 provides an overview of the transportation route.

Electricity for the testing operations will be provided by a generator, which will be installed at the test facility sites and distributed to the well locations.
The lay-out of the test tank and collection/ storage facility is schematically shown in Figure 11.
Daily monitoring will be conducted by 2-3 well operators and all the risk and failures of the well will be taken in consideration. In case of a mechanical or electrical failure the maintenance group will be notified. Vehicles will be used for transportation on land, while airboats will be used for the testing activities and

daily inspections of the facilities in the swamp area. Depending on the state of the Calor dam, an UTV/ATV can be used for inspection of the 6" header for alternative T1 during the dry season. However, the well locations still has to be inspected with an airboat.
The Calor dam will be maintained with a mower once per month.

Figure 10: Route transportation of crude oil from the collection and loading site (Calor landing stage) to the TA58 crude treatment plant of Staatsolie

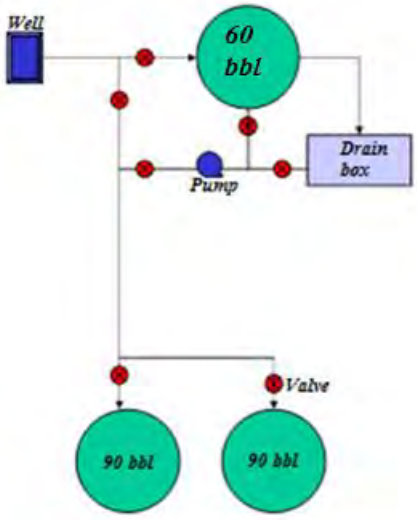

Figure 11: Schematic overview of a test tank and collection/ storage facility

2.4 Decommissioning

In the decommissioning phase of the project, the tubing of the well will be removed and the sections of the well bore will be filled with cement to isolate the flow path between oil and water zones from each

other, as well as the surface. Afterwards the flow lines and test facilities will be dismantled. The project area will be abandoned and left without any obstacles, unless Staatsolie decides to proceed with development of the Uitkijk area after acquiring a permit from NIMOS.

2.5 Equipment and manpower input

Below table provides an overview of the equipment that will be employed for the various project activities. In addition, an overview of personnel is presented

Table 4: information on planned resources for this project

Equipment	#	Deployment	Activity	Personnel
CONSTRUCTION				
Airboat	2	Daily-workdays	Personnel transport and well monitoring	8
Carrier	1	Daily-workdays	Transport supplies and materials	
Excavator	2	Daily – workdays	Clearing and earth moving	
Pontoon	1	Daily-workdays	Transport supplies and materials	
DRILLING OPERATIONS				
Airboats	2	Per tour of 8 hrs.	Transport personnel	50 (total)/ per shift 16
Carrier	4	Per tour of 8 hrs.	Transport supplies and materials	
Pontoon	4	Per well	Transport supplies	
Rig	1	Per well	Drilling of wells	
Pulling Unit	2	Per well per day	Well completion	9
FIELD PRODUCTION (TESTING PHASE)				
Airboats	1	Daily	Personnel transport and well monitoring	3
Vacuum trucks	2	Daily	Transport of crude oil from the storage location to the treatment plant	
DECOMISSIONING PHASE				
Airboats	4	Daily	Personnel transport and well monitoring	8
Excavator	2	Daily – workdays	Transport, earth moving	
Carrier	5	Daily – workdays	Transport of materials	
Pontoon	5	Daily – workdays	Transport of materials	
Rig	1	Per well	Abandonment of wells	50 (total)/ per shift 16
Pulling Unit (1)	2	Per well per day	Abandonment of wells	9

3 Updated information

Based on the review of the last updated ESIA for the Uitkijk North Block, dating May 2013 (NEC 2013) and the other existing data, the data in this report will be updated. The sections to be updated will be shown in the sub paragraphs below, following with the updates. Preferably this chapter should be read in combination with the original reports.

3.1 The biophysical environment

3.1.1 Hydrology

The project area is situated in a swamp area with N-S canals and dams. The planned boreholes are between the Ensberg and the Soeng Ngie dam/ Canal in the Uitkijk Block (Figure 12). The northern part of the Uitkijk Block is situated in the Wayambo Swamp.

Regarding hydrology it is important to mention that starting last year; Staatsolie initiated the "Study Water Management Buru and Wayambo Swamp District Saramacca". One of the objectives of the study is to investigate the hydrology of the swamp. The study is conducted by ILACO. Final results of this study are not yet available at this moment, but are expected in by the beginning of 2019.

Preliminary results of this study indicate that there are no significant changes regarding hydrological conditions, so that the descriptions in earlier reports are still applicable. Important for the current project is the finding that the Calor Dam forms a barrier for water flow to the west, so that water is dammed up at the eastern side of the dam. Measurements made during the above-mentioned study indicate that the difference in water level is 20-30 cm. The higher difference is observed during dry months (February-March 2018), when the difference amounts to 30 cm. Upon the start of the rainfall in April the water level difference decreases to about 20 cm.

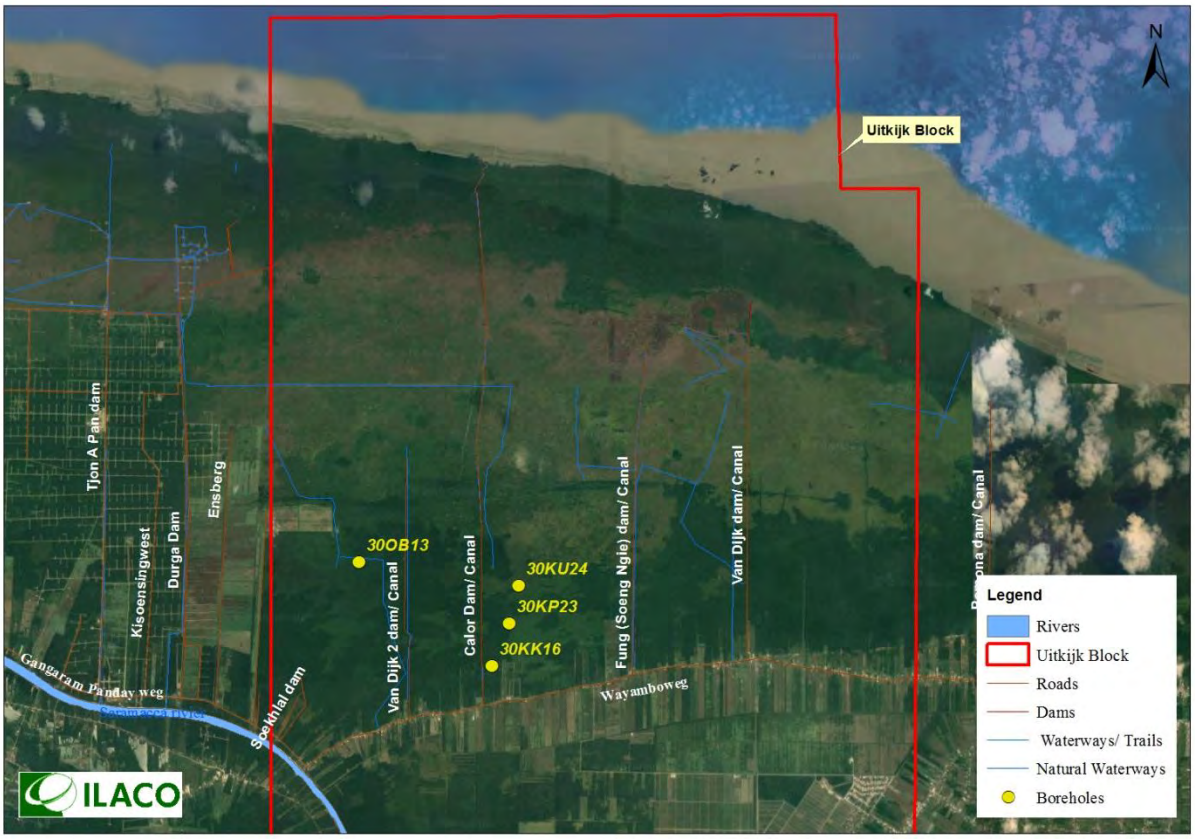

Figure 12: Project area with the planned boreholes in the Uitkijk block

3.1.2 Water Quality

In the Uitkijk Block four main ecosystems can be distinguished from south (Wayambo road) to north (Altantic Ocean) in the following order:

- Swamp forest and swampwood
- Freshwater mixed herbaceous swamp (open swamp)
- Brackish water Typha (Langa grasi) swamp
- Mangrove zone

In the study area all these ecosystems, except the mangrove zone, are encountered, with most activities planned in the Swamp forest/ swampwood zone.

To determine the quality of the swamp water, in-situ measurements have been conducted, while also two water samples have been collected.
Selection of locations for sampling and testing have been based on:

- The presence of historical data of the project area;
- The project description with proposed activities and locations of the drillings;
- The identified main ecosystems.

In total 13 locations were selected for in-situ measurements, which took place along the full length of the Calor Canal. At four locations measurements were done in the canal, as well as in the neighboring swamp. Of the other five locations, two were measured in the canal and three in the swamp.
The two surface water samples were taken in the swamp in the area of the four well locations. An overview of the locations is shown in Figure 13.

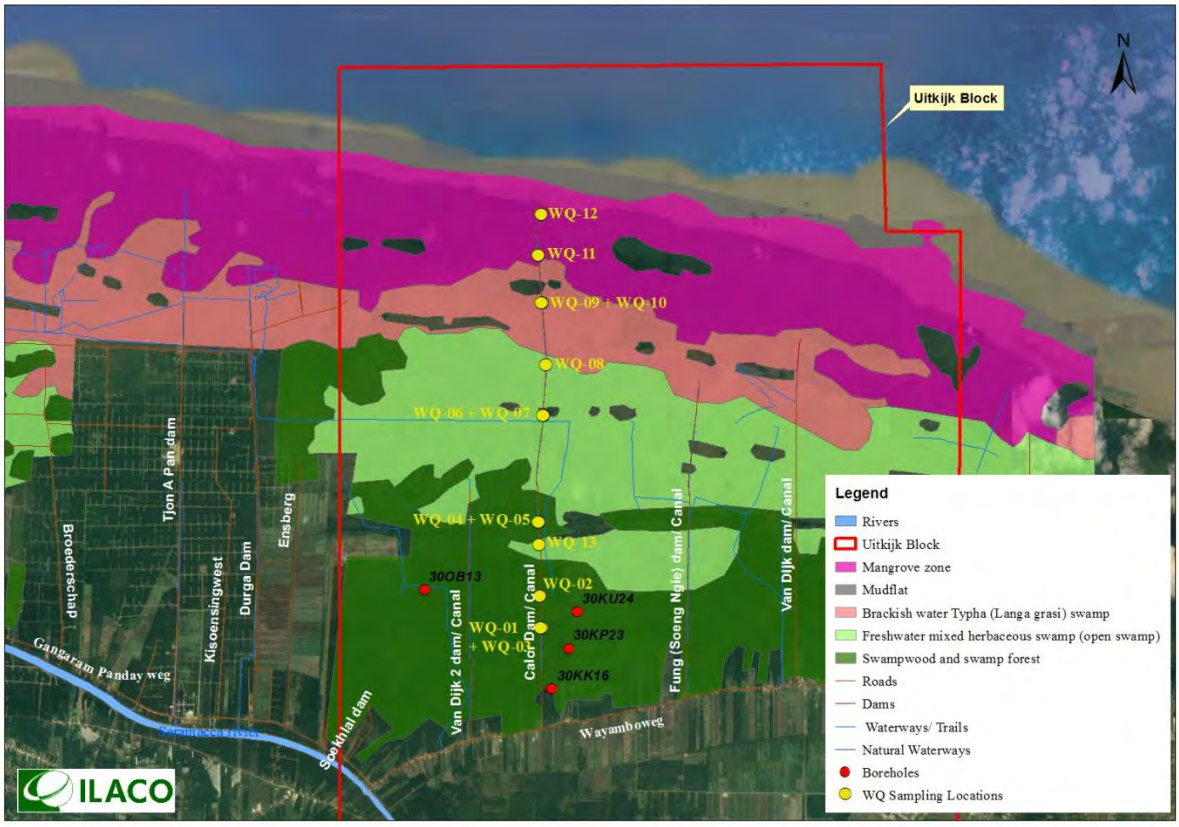

Figure 13: Overview of locations for sampling and testing

The field works were carried out on the 26th of September and 3rd of October 2018:

- 26th of September 2018: on-site measurements of the locations WQ-01 up to WQ-12 and surface water sampling of WQ-01.
- 3rd of October 2018: on-site measurements and surface water sampling of WQ-13.

A total of two (2) samples were collected.

The results of the in-situ measurements are presented in a separate report and summarized in below table. The presented data comprise the averages per ecosystem and their range.

Table 5: Summary of results of water quality measurements

Ecosystem	pH	Electrical Conductivity (EC) (µS/cm)	Dissolved Oxygen (DO) mg/l	Turbidity (NTU)	Secchi (cm)	N
Swampwood and swamp forest	**5.5** (5.0-5.9)	**209** (84-334)	**2.2** (1.4-3.1)	**31** (12-62)	**23** (19-28)	**3***
Open freshwater swamp	**5.7** (5.3-6.6)	**357** (253-499)	**2.1** (0.5-3.3)	**60** (20-107)	**16** (10-25)	**5**
Open Typha (tall grass) swamp	**5.7** (5.5-5.8)	**434** (273-546)	**2.3** (1.1-3.8)	**62** (29-102)	**20** (15-27)	**3**
Mangrove forest	**5.9** (5.8-5.9)	**1138** (515-1760)	**2.4** (0.6-4.1)	**1089** (785-1392)	**8** (7-8)	**2**

* Two samples for EC

The main conclusions for the in-situ measurements are:

- pH indicates acid water (5.0-5.9), except for a sample that was taken near a shell sand ridge (WQ-13) which has a pH of 6.6. The pH is lower than measured during the 2000 baseline study (6.0-6.9). The data are in line with data for the rainy season by Mol (1993), who indicates that pH in the Young Coastal Plain is then 5.9 ± 0.17.
- Electrical Conductivity (EC) varies between 84 and 1760 µS/cm. This implies that the swamp water is fresh to slightly brackish. There is a trend of increasing EC towards the Ocean, which is in line with earlier measurements. The EC levels are more or less similar to rainy season levels (NEC 2012). Dissolved Oxygen (DO) is on average 2.1 - 2.4 mg/l, with no clear differences between ecosystems. There is also no clear difference between samples in the canal and samples in the swamp. The locations show a considerable variation, in particular in samples measured in the open swamp and in the mangrove. DO strongly depends on local conditions, which are variable in time, while also wind, water flow and rainfall will impact the DO content of the water. The majority of DO (60%) varies between 1.2 and 3.2mg/l. The data show a wider higher range than data by Mol (1993), who indicates that DO for standing waters in the Young Coastal Plain in the rainy season is 2.0 ± 0.59 mg/l. However, the measurements in the Wayambo Swamp have been made in open water subjected to the influence of wind, flow and rainfall.
- The water in most of the swamp, except in the mangrove zone, is light brown, clear to slightly turbid, and it has a low turbidity, with values between 12 and 107 NTU. In the mangrove zone canal water was measured, which is subjected to tidal movements. Therefore it is dark brown and turbid, while its turbidity is high (785-1392 NTU).

- The surface water in the project area can be characterized as acid, fresh, clear to slightly turbid, with a low to fair Dissolved Oxygen content. The water has a light brown color as a result of the presence of organic matter (in the form of peat (local name '*pegasse*').

From the analysis of surface water from two locations within the project area it is concluded that the water is not polluted. A very slight exceedance of the USEPA criteria is recorded for Diazinon, which is related to pesticides. It should, however, be noted that elevated Diazinon levels have also been recorded in river water from undisturbed areas in Suriname. The source of these levels has not yet be determined. It is also not ruled out that the elevated levels are the result of some kind of interference due to certain organic compounds that are present in tropical waters.
Detailed information about the water quality sampling and the results can be found in **Appendix 2A.**

3.1.3 Noise

Noise is recognized as a potential pollutant or nuisance during the planned activities in the project area.
A noise study has been conducted as part of this assignment. The results are presented in a separate report (ILACO 2018 of **Appendix 2B**).

The main findings are:
During daytime, the houses along the Wayamboweg experience noise levels (LAeq) that are above the WHO/IFC standard of 55 dBA for residential areas, due to relatively high traffic intensity and higher speed limits (80km/h).
During daytime, the houses along the Gangaram Pandayweg experience noise levels (LAeq) that are below the WHO/IFC standard of 55 dBA for residential areas, due to low traffic intensity and lower speed limits (40km/h).
No nighttime measurements were carried out along the Wayamboweg and the Gangaram Pandayweg. However, nighttime measurements at the Tambaredjo Northwest landing indicate natural nighttime levels of 46-47 dBA.
Daytime measurements were, among others, carried out at the Tambaredjo Northwest (TNW) landing, in order to determine the noise level of airboats at different distances. Close to the airboats, the noise level of a stationary airboat exceeds 90 dBA, while it can rise to almost 100 dBA when on full power. But already at a distance of 250 meter this is diminished to 70 dBA and at 750 meter it hardly exceeds the background level.
Nighttime measurements at the TNW landing show that at a distance of 750 meter from the active airboat landing, the exceedance of the WHO/IFC nighttime standard of 45dBA for residential areas was only 3.8 dBA, while exceedance of the natural background level is only 1.8 dBA.
Under daytime as well as under nighttime conditions, a distance of 750 meter from an airboat landing is sufficient to avoid nuisance from airboat noise.

Ecological conditions

From recent Google images it can be concluded that no significant changes in the vegetation have occurred since 2013.
The area of impact comprises the Wayamboweg (km 26-36) and the first 5km of the Gangaram Pandayweg.

3.2 The social environment

The social environment has again been described in full. The results are presented in **Appendix 2C.**

From the report it can be concluded that there are no significant changes in the social environment in which the project will be undertaken. The impacts identified in this report, are already addressed by the 2013 report or the current upgrade.

In the study area, people are only found along the two roads that will be used by project traffic. The Wayamboweg is paved, while the Gangaram Pandayweg is unpaved. Along the 15 km transportation route between the Calor site and TA-58, most houses are observed along the Wayamboweg within the last 4-5 km towards the Saramacca Bridge (Monkshoop). Along other road sections, houses are scattered. The majority of houses along the Wayamboweg is found at the south side of the road, where the land is better drained. Most of the houses along the transport route have agricultural fields, varying between small and medium sizes. Agricultural activities comprise dry-cropping, horticulture and animal husbandry (Figure 14).

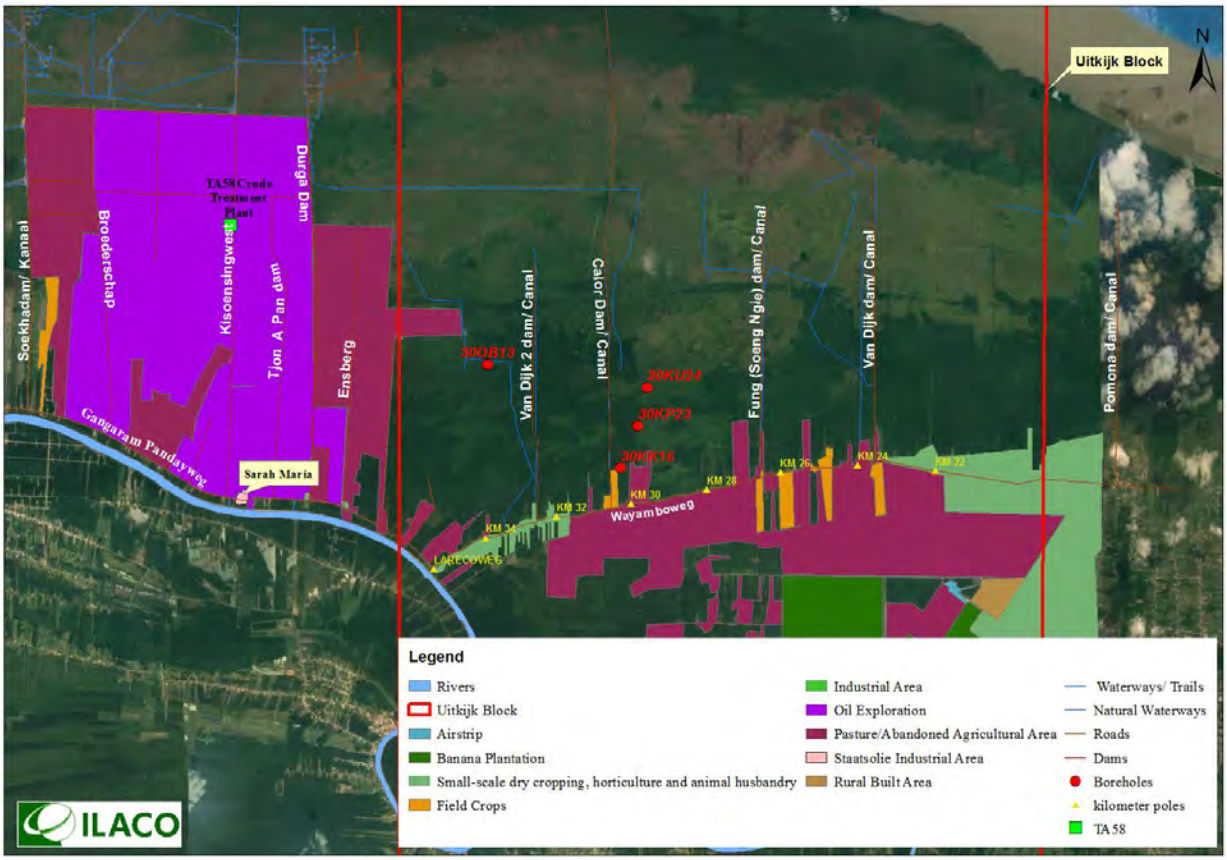

Figure 14: Land use along the Wayamboweg and the Gangaram Pandayweg

Development projects

In the development plan for Saramacca (Distriktsplan Saramacca 2018, 2017) the local community expressed a great need for: (1) improvement of the drainage system of the Wayambo resort, (2) enhancement of public transport, and (3) the paving of roads. Residents living along the Gangaram Pandayweg specifically requested access to the public water distribution network and improvement of telecommunication services.

According to the Districtsplan Saramacca 2018 (2017), the Ministry of LVV has expressed its intention to construct a drainage canal extending from Pomona towards the Saramacca River to allow proper drainage of the area situated to the north of the Wayamboweg. This project is still in its pre-feasibility stage and is currently put on hold. Furthermore, the Ministry of Public Works, Transport and Communication (Openbare Werken, Transport en Communicatie - OWTC) is committed to paving the Gangaram Pandayweg and rehabilitation of the dam situated on the right bank of the Saramacca River.

3.3 Stakeholders Sessions

For the social part of this study, several stakeholders were consulted. During the consultation an introduction was given about the project and several questions were asked to each stakeholder. This information is described below. In **Appendix 3** the Minutes of Meeting can be found.
The consulted stakeholders are:

- Mr. Calor (owner of the Calor Canal/Dam),
- Mr. Timmer (caretaker of the land of Mr. Fung You Kee)
- National Institute for Environment and Development in Suriname (NIMOS),
- District Commissioner Saramacca,
- Nature Conservation Division (NB) of the Forest Service (LBB),
- Department sub-directorate of the ministry of Agriculture, Animal Husbandry and Fisheries (LVV),
- Residents living along the GP road and Wayambo road,
- Representatives of local government institutions,
- A representative of the Foundation Redevelopment Rice Culture Saramacca (*Stichting Wederopbouw Rijstcultuur Saramacca*) and the Farmers Collective Wayambo and GP road (*Boerencollectief Wayambo- en Gangaram Pandayweg*),
- A representative of the Wayambo Green Growers Organization,
- Owners of the land where project activities are proposed, and
- A representative from Staatsolie in the function of Community Relations Officer from the Corporate Communication Upstream Department (one person).

Table 6: Description of engaged stakeholders and their concerns

Nr.	Name stakeholder group – Function/ occupation	Interest / position	Stakeholder concerns about the project
1	Government representatives - Assistant Government Managers and Government Managers of the Wayambo resort	Tasks include: • Support government policy at the local level. • Communicate or engage with inhabitants/residents of the area under their responsibility. • Act as intermediary between the residents/inhabitants and third parties. • Deliver or transfer important issues brought forward by the residents to the DC.	• Appropriate road safety measures must be taken (road signs, control on speeding etc.), particularly near dangerous road curves right before and after the Calor property. • New infrastructural works in the Project area (dams etc.) may possibly adversely affect the hydrology of the area. Proper research of the area must be conducted prior to construction to avoid conflicts with the area users (farmers). • Certain residents complain that Staatsolie does very little for them in the area. • Concern that oil spills are not properly dealt with (clean up according to industry standards). • Staatsolie maintains the Gangaram Pandayweg, however only 25 % of total (300) culverts are operational. This presents problems. • Dust: many cars of Staatsolie drive on the Gangaram Pandayweg. The residents use rainwater in the household and the dust that is blown up comes into the rainwater through the roof gutters. • Flooding: There is a perception among farmers that Staatsolie is responsible for flooding,
	Government representatives – Ministry of LVV	• Conduct agricultural extension work (provide information, organize training sessions for farmers). • Collect agricultural data/statistics for analysis and policy formulation.	• LVV is not aware of the complaints registration system of Staatsolie. • Main concern: Staatsolie indicates that they will not drill in agricultural areas, yet they still do it. • Farmers Collective of the Wayambo and the Gangaram Pandayweg has an issue with the pipelines of Staatsolie, which are not located at a recommended distance from the road.

	Government representatives – Nature Conservation Division of the Forestry Service (NB-LBB)	• Execute nature protection and conservation activities. • Perform law enforcement tasks. • Formally in charge of the overall management of Protected Areas on behalf of the Government.	• Most common complaint received from area residents in the past 5 years is illegal hunting. Violation of the Nature Conservation Law in the Wayambo area includes illegal sport hunting by local residents. • LBB is not aware of the complaints registration system of Staatsolie. • Concern related to the planned Project: increased hunting (on iguanas), poaching and fishing activities in the area due to increased accessibility.
	Government representatives – NIMOS	NIMOS' mission statement: To initiate the development of a national legal and institutional framework for environmental policy and management in the interest of sustainable development in the Republic of Suriname.	No concerns were listed
2	Inhabitants /residents – Residents of the Gangaram Pandayweg and Wayamboweg	Stakeholders interviewed work in agriculture and/or animal husbandry, for the government, or for Staatsolie.	• Some stakeholders had no complaints about Staatsolie. • Sometimes Staatsolie assists farmers with infrastructural works in case of flooding on their land. • Some persons living along the Wayambo and Gangaram Pandayweg are employed by Staatsolie. • Issues/complaints are directly communicated with the Staatsolie CRO or through the BOs/OBOs/DC. • Many people moved away from the Gangaram Pandayweg due to difficult living conditions, poor infrastructure and lack of services. • Nuisances experienced due to traffic on the Gangaram Pandayweg include: (1) The dust generated by speeding trucks. (2) Road safety (allowed speed limit is exceeded). (3) Noise produced by the trucks.

3	Representatives of farmer organizations – Chairman of the Board of the Farmers Collective Wayambo and Gangaram Pandayweg (Boerencollectief Wayambo- en Gangaram Pandayweg), also Chairman of the Board of the Foundation Redevelopment Rice Culture Saramacca (Stichting Wederopbouw Rijstcultuur Saramacca) Chairman of the Board of the Wayambo Green Growers Organization	• Both organizations represent the interests of farmers. • Both stakeholders are very familiar and knowledgeable about the study area and with its users as they have lived in and/or worked at this area for decades. • The Farmers Collective (around 30 members) aims to fulfill the needs of rice farmers located at the Gangaram Pandayweg and the Wayamboweg; the cooperation works to benefit the rice farmers' community, which consists of around 20 active members. • The Wayambo Green Growers Organization represents the interests of about 115 members (vegetable farmers) located along the Wayamboweg, and the Gangaram Pandayweg.	• Staatsolie is not interested in or does not care for the issues that are affecting the farmers in the study area. • People move away because the rice sector and their livelihoods are destroyed as a result of water management and hydrology issues. A thorough study needs to be conducted to determine the root cause(s) of these problems. • Staatsolie is currently involved in a conflict with two stakeholders. • Staatsolie has not spent enough towards giving back to the community; there is dissatisfaction. • Studies are only conducted as a formality; many reports are written, but nothing is implemented. • Stakeholders were aware of the complaints mechanism; one person thinks it only works on paper, while the other stakeholder does not utilize the complaints mechanism to register his complaints. • Since the arrival of Staatsolie in the area many disruptions in the social and ecological environment came about.

4	Land owners – Landowner / area user of private property referred to as the Calor dam Area user / caretaker of the property and authorized representative of family that owns the private property referred to as Soeng Ngie dam	• The properties are for private use (used as a weekend home for leisure) • Some low intensity agriculture is practiced (fruit trees) in the front, and recreational fishing in the back of the Calor property. • Currently no activities occur at the Soeng Ngie property. Only a little bit of recreational fishing in the canal during the fishing season.	• In the past there were some issues with Staatsolie, but the communication has improved. CCU regularly makes phone contact and issues are immediately discussed and addressed by Staatsolie. • The representative of the Soeng Ngie property (owner: Mr. Fung You Kee) had no complaints; collaboration with Staatsolie went well in the past and agreements were kept. At the moment no land use activities are carried out at the Soeng Ngie property. • The collaboration is good between the land owners and Staatsolie. • Illegal hunting activities are not taking place anymore in the swamp, because (1) the deer population has been decimated, and (2) no ease of access of the area (trails are overgrown).

Note: We cannot judge in the context of this project whether these perceptions are justified. Staatsolie's retort to the perceptions raised by stakeholders has not been sought and is not documented in this report.

4 Impact Assessment

Table 7: Identified potential impacts for the ESIA for the Uitkijk ADP project (adapted from NEC 2013)

Impacts	Description	Comment regarding proposed current activity	Update Status
Air quality	No significant impacts identified.	The project includes the trucking of crude oil from the collection area at the Calor site to the TA-58 processing facility (2 trucks a day). The route follows the Gangaram Pandayweg that is not paved. Dust impacts could arise, in particular during dry periods.	This is an existing impact from general traffic along the road. Routine watering is already included in the Staatsolie - Sarah Maria procedures; this may be intensified especially during the dryer season. Also speed limits are implemented and enforced (for Staatsolie traffic, 40 km/h). Also implement efficient management of logistics to minimize traffic on the Gangaram Pandayweg.
Noise (airboats, and construction activities), vibrations and air quality	Biophysical: The mudflats, mangrove areas and the lagoons serve as habitat for wildlife species that have very high potential sensitivities to noise, vibrations and reduced air quality during certain life cycle periods. This is especially important for the Wayambo area during the colony breeding season (March/April-August/September). Minor noise impacts will occur to wildlife that lives in the project area. Social: During all phases of the proposed project, transport of personnel, materials and supplies will be necessary. Transportation of personnel will be done with vehicles on land and airboats in the swamp area. Airboats will be deployed on	Biophysical: Not an issue for breeding colonies: the activities will be conducted at least 2 km away from the southernmost boundary of the Parwa zone. Social: Noise impacts to human receptors living near the planned landing stages	Still applicable for wildlife. The activities will be conducted at least 9 km away from the southernmost boundary of the Parwa zone. This is an existing impact. Additionally it is proposed to: 1. Efficient management of logistics to minimize traffic and shorten construction time. 2. Inform nearby residents and businesses in a timely manner of anticipated airboat traffic schedules. 3. Try to avoid or minimize airboat traffic at night. 4. Limit construction activities conducted at nighttime hours.

	a daily basis. This may lead to locally increased noise levels which may disturb local area users, including the residents living along the Wayambo and Gangaram Pandayweg. However, the disturbance of local people is anticipated to be minimal, as noise levels at the residences are usually exceeded by noise generated by passing traffic on the Wayamboweg and Gangaram Pandayweg. The project site itself that is located in the Uitkijk Block is uninhabited hence no human receptors are to be found there.		
Soil disturbance	Within the Wayambo area, the cultivated and abandoned lands may have a high sensitivity to soil disturbance.	Not an issue: No activities will be conducted on agricultural land; all activities will be undertaken in the fresh water swamp	Still applicable.
Increasing salinity	Within the Uitkijk North Concession, increasing salinity is in general not applicable to the natural ecosystems that are *south of the halfway ridge*. The cultivated lands can be sensitive to increasing salinity if the northern waters are used to irrigate this land.	Not an issue	Still applicable
Decreasing salinity	The mangroves are sensitive to changes in salinity. Decreasing salinity is in general not applicable to areas south of the halfway ridge which includes the proposed project location, see Figure 3.	Not an issue: All activities will be conducted in freshwater swamps.	Still applicable

Damming, increasing water levels, flooding	Obstruction of the existing drainage patterns by damming or preventing natural water movements within the Wayambo area can create potential environmental problems. The older mangroves, as well as the Chrysobalanus and Pterocarpus swamp wood and the ridge forests, are very sensitive to changes in the water drainage patterns.	The proposed project will require a cutting (opening/passage) of the Calor Dam at one location (for passage of the rig). A dam will also be constructed by Staatsolie (See Figure 8) along the trail to well no. 30OB13. This dam will connect the Calor Dam with well no. 30OB1.The opening in the Calor Dam will allow water to flow from east to west, thus changing the current hydrology or eventually blockage of water flow.	Still applicable, but in addition, the E-W flowline dam to well 30OB13 could obstruct the N-S or S-N water flow, with possible damming up of water at one side of the dam.Therefore it is proposed to:. • Limit the width of the cutting (opening/passage) to a minimum (for example: 15-20m depending on the distance required for passage of the rig). • Keep the opening open for as short as possible, and close it directly after passage/return of the rig. • Conduct frequent monitoring on the temporary closing, and prevent any collapse. • Restore the dam in its original state upon finalization of the project unless Mr. Calor requires another procedure and this does not cause any environmental impacts.
Impound-ment	All wetland habitats are very sensitive to impoundment (i.e. creation of polders). Impoundment can result in the disappearance of the existing wetland ecosystems. In Staatsolie Tambaredjo Polder (over 20 years old) the impact of impoundment on soil and vegetation was studied by comparing the swamp soil, surface water and vegetation outside of the polder with the soil, surface water quality and vegetation inside the polder and drastic changes were observed.	Not an issue: All main activities will be conducted as a wetland operation. The landing (storage of collection tanks) at the Calor site will be on the reclaimed land of Mr. Calor	Still applicable
Water Pollution/Water quality	Water pollution could result from the project activities. Any spills are likely to be small, localized spills of fuels, drilling fluids and oil. The mud flats, mangrove forests, lagoons and canals have the highest sensitivity to	Existing impact for the current activity, but impacts limited to impact to vegetation and aquatic life	Still applicable.

	water pollution. In particular, the mangrove pneumatophores are sensitive to oil spills. The crops that need irrigation water such as rice and bananas would have a high sensitivity to water pollution while dry crops may have a very low sensitivity. It is also possible that release of fuels or petroleum could taint the flesh of fish living in the vicinity (impact on fish holes).		
Vegetation clearing	All of the forested area would be sensitive to clearing.	Existing impact for the swamp area, but no sensitive ecosystems will be affected	Still applicable. Clearing of the trace for access routes (including existing traces) and drilling locations will be done.
Fire	Fires occur naturally within the Wayambo area. The swamp wood areas are most sensitive to fire. Fire does significantly alter ecosystems and project-induced fires could have significant negative impacts on sensitive habitats.	Existing impact for the current activity	Still applicable
Access by third parties	The trails provide access to third parties, who could undertake all kind of (unwanted and possibly illegal) activities in the area, like fishing, hunting and bird trapping, also on land that is privately owned. In addition these parties could (also unintentionally) set fire to the vegetation and cause large-scale vegetation fires or damage the property of the land owner	Existing impact for the current activity	Still applicable. In addition it is proposed: 1. Project proponent must take care to block all entrances to the premises e.g. fence off the entrance location to the landing stage to avoid third party entry. 2. Put up clearly marked signs indicating 'No entry allowed/ trespassing on private land'.

Social in general	Social unrest may develop when people have the feeling that nuisances they experience, or the problems they believe to have been caused by the project, are not properly addressed. Such a reaction, whether justified or not, could result in a significant negative impact.	Existing impact for the current activity	Still applicable
Additional impacts during this study			
Traffic	During the execution of the project material will be transported by road, which will cause that the traffic intensity is increased on the Wayamboweg and the Gangaram Pandayweg. From the Calor property located along the Wayamboweg, where the collection/buffer tanks (4 tanks with a capacity of 90 barrels each) are situated, vacuum trucks (capacity of 62 or 94 barrels) will transport the crude oil to the TA-58 treatment plant. The trucking will be done twice a day (daylight – 12 hours operations). Residents living along the Gangaram Pandayweg have complained about the speed limit (40 km) being exceeded by motorists on a regular basis. Road safety on the Wayamboweg and Gangaram Pandayweg is a major concern expressed by stakeholders. Staatsolie (Plant Security and Personnel Services department) is regularly conducting speed control on the Gangaram Pandayweg and Wayamboweg targeted at Staatsolie Personnel and Contractors. Defensive Driving Training is	Existing impact for the current activity	Impacts to be assessed as part of the air quality and noise impact. In addition safety measures are proposed: 1. Project proponent must organize road safety awareness campaigns for own personnel, contractor personnel, and area users (residents and other frequent users of the area). 2. To improve road safety: increase the frequency of speed control activities to record and monitor vehicle speed.

	compulsory for all Staatsolie and contractor employees.		
Land use conflict	The planned boreholes are on private or privately owned land. The property of the landowner (existing infrastructure) can be impacted as a result of the project activities.	Not an issue for the current projected 4 boreholes: The currently involved landowners (Mr. Calor and Fung You Kee) have been consulted and have already given their verbal permission/commitment that they do not have any problem with the execution of the project.	Still applicable. But more landowners may need to be included when also boreholes will be made on land of others (additional wells - location not yet known). Also a written permission should be obtained for the currently involved landowners (Mr. Calor and Mr. Fung You Kee).

Additional issues Bio-physical

Noise

Noise was not considered an issue for the 2013 update (NEC, 2013) because all activities were undertaken at a considerable distance from human receptors. For the current project, however, noise has been identified as a potential impact that could affect people living near airboat landing stages or along the Wayamboweg and the Gangaram Pandayweg that will be used for transporting material and employees, as well as trucking of crude oil. The noise impact from transportation of materials, employees and crude oil along is along the Wayamboweg and the Gangaram Pandayweg is considered **negligible**, because the intensity is low (only nuisance), localized and short-term.

The impact of airboat noise is considered **minor** for receptors living near the landing stages along the Wayamboweg. The nearest residence at the Calor landing stage is at a distance of 150 meters, while for the Soeng Ngie landing this is 220 m. The intensity of the impact is medium, but the impact is short-lived (only during take-off) and small-scale (very few receptors within 750 m). Notwithstanding the minor impact, some mitigation measures are presented to limit the nuisance to the minimum:

- Locate the landing as far as is feasible away from the road;
- When using airboats: operate at a moderate speed (2500 RPM) during the first 500 meters in order to reduce noise levels, provided that conditions allow such.

Hydrology

Although the 2013 project also included the opening of the Calor Dam, this was then - in the absence of sufficient details about the swamp hydrology - not identified as the cause for a potential impact. An opening has been made in the northern part and it has remained open for quite a while. No impact on hydrology was reported. However, from the currently undertaken swamp study, it has become clear that the swamp water level to the west of the Calor Dam is most of the time lower than that to the east of the dam.

For the current project a cutting (opening/passage) of the Calor Dam will be made. This cutting is required for the transportation of materials during the construction and operation (drilling) phase of the project (August 2019). The Calor Dam forms a barrier for water flow to the west, so that water is dammed up at the eastern side of the dam. The cutting could result in excess water flowing into the relatively small catchment found to the west of the Calor Dam which could eventually result in flooding of agricultural land along the Wayamboweg. Because the effect of the opening cannot be assessed in sufficient detail, it is rated as 'unknown'. Applying the precautionary principle, the effect on hydrology is considered to have a **moderate negative** impact. With the implementation of the below mitigation measures the impact is reduced to **negligible (**Table 8**)**.

Table 8: Significance of the presence of an opening of the Calor Dam on swamp hydrology during construction, operation and after closure

	Intensity	***Duration***	***Scale***	***Severity***	***Probability***	***Significance***	***Status***
Without mitigation	Medium	Medium-term	Medium	Medium	Medium	**MODERATE**	neg
Limit the width of the opening to the minimum. Keep the opening open for as short as possible, and close it directly after passage of the rig. Conduct frequent monitoring on the temporary closing, and prevent any collapse. Restore the dam in its original state upon finalization of the project.							
With mitigation	Low	Short-term	Small	Low	Low	**NEGLIGIBLE**	neg

Staatsolie will provide a lower dam (after August 2019) at the location of the opening so that airboats can still pass by for borehole inspections.

For the flow line header dam, it is advise to make openings every 500-1000m distance to allow undisturbed water flow north-south.

Above measures for noise and hydrology have been added to the 2013 Environmental and Social Management Plan.

Summary and Conclusion

Results of the exploration and appraisal activities in the Uitkijk-North Block of past years are such that a follow-up program in the same area is required. This follow-up entails the appraisal drilling of four (to additionally 10 wells) wells within the geographical limits of previous wells.

Because the project is undertaken in the same area as the previous exploration drilling, and because the project activities are similar, the same set of potential impacts is found to be applicable.

Because the project entails activities on private property, the stakeholders have been consulted. The interviews with these stakeholders did not result in new insights regarding the potential impacts, but some of the complaints that were received indicate that the Environmental and Social Management Plan and other mechanisms like the Complaints Register are not adequately functioning.

We cannot judge in the context of this project whether these concerns/complaints are justified. Staatsolie's retort to the concerns raised by the stakeholders has not been sought and is not documented in this report.

Staatsolie needs to make a conscious effort to find out why there are still concerns. An improved grievances mechanism can be an important instrument to build a healthy relationship with the local community.The Environmental and Social Management Plan for the current Appraisal Drilling is in principle the same as that for the previous operation (NEC 2013), but a few additions are added with respect to mitigation of noise impacts from airboats and hydrology.

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Appendix 1 Existing data analysis and scope for the current study

Appendix 2 Baseline Reports
2A Water Quality

2B Noise

2C Social Baseline

Appendix 3 Stakeholders Consultation

Date	Stakeholder
August 23, 2018	Mr. Calor
August 24, 2018	NIMOS
August 28, 2018	Mr. Calor
	Mr. Timmer
September 19, 2018	Nature Conservation Division (NB) of the Forest Service (LBB)
September 20, 2018	Department sub-directorate of the ministry of Agriculture, Animal Husbandry and Fisheries (LVV)
October 2, 2018	District Commissioner (DC) Saramacca

Appendices

Updated Environmental and Social Impact Assessment (ESIA)
for
the Uitkijk Appraisal Drilling Program
(ADP) 2018

Prepared for:

Staatsolie Maatschappij Suriname N.V.

15 November 2018

Appendix 1 Existing data analysis and scope for the current study

Appendix 1 Existing data analysis and scope for the current study

Table 9: Overview of gap analysis

Section	Description/Aspects	Required updating and/or addition
Introduction	n.a	Will be written for the current project
Project background and scope	n.a	Will be written for the current project
Project Description	n.a	Will be written for the current project
Legal Framework		
Existing laws and resolutions governing environmental protection	Legislation and guideline onshore petroleum activities • Mining decree E58 • Petroleum act 1980 • Service contract guidelines	No update. Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc 2000)
	Other laws protection of environment and biological resources • Hindrance act • Nature conservation act • Forest management act • Game act • Fish protection act	No update. Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc 2000)
	Environmental standards (international) • Air quality (WHO) • Noise (WHO/IFC) • Water quality (Dutch guidelines)	The water quality standards will be updated for the current project with the EPA standards
	Wetland convention and Western Hemisphere Shorebird Reserve Network • RAMSAR convention • Western Hemisphere Shorebird Reserve Network	No update. Last update in the Review of the Environmental and Social Impact Statement prepared in 2000 for the Uitkijk/ Wayambo Exploration Drilling and Validation with respect to proposed exploration drilling and testing in the Uitkijk-North Block (NEC 2011).
Legislation governing land allocation	Land's law (Decree L-2)	No update. Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc 2000)
Legislation governing regional administration	Regional administration law	No update. Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc 2000)

Environmental approval process	Draft environmental act and EIA guidelines NIMOS	No update. Last update in the Review of the Environmental and Social Impact Statement prepared in 2000 for the Uitkijk/ Wayambo Exploration Drilling and Validation with respect to proposed exploration drilling and testing in the Uitkijk-North Block (NEC 2011).
Organizational framework and responsibilities	Ministry of Natural Resources: • Nature Conservation Division • STINASU • Bureau of Lands	No update Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc 2000)
Potential for future change in environmental regulations	National Environmental Action Plan	No update. Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc 2000)
	Institutes for National Environmental Management • National Environmental Council (NMR) • National Institute for Environment and Development in Suriname (NIMOS) • Inter-ministerial Advisory Commission of NIMOS • Inter-ministerial EIA Commission of NIMOS	No update Last update in the Review of the Environmental and Social Impact Statement prepared in 2000 for the Uitkijk/ Wayambo Exploration Drilling and Validation with respect to proposed exploration drilling and testing in the Uitkijk-North Block (NEC 2011).
	Possible future changes in legislation governing regional administration • Decentralization and local government strengthening program	No update Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc 2000)
	Further development of coastal wetland management • MUMA establishment	No update. Last update in the Review of the Environmental and Social Impact Statement prepared in 2000 for the Uitkijk/ Wayambo Exploration Drilling and Validation with respect to proposed exploration drilling and testing in the Uitkijk-North Block (NEC 2011).
	International conventions	No update Last update in the Review of the Environmental and Social Impact Statement prepared in 2000 for the Uitkijk/ Wayambo Exploration Drilling and Validation with respect to proposed exploration drilling and testing in the Uitkijk-North Block (NEC 2011).
Bio-physical baseline		

Climate	Regional data Local data and conditions during study period	No update Last update in the Review of the Environmental and Social Impact Statement prepared in 2000 for the Uitkijk/ Wayambo Exploration Drilling and Validation with respect to proposed exploration drilling and testing in the Uitkijk-North Block (NEC 2011).
Air quality	No air quality data available for the study area. Due to the limited amount of air pollution that will be caused by the project, no baseline data on air quality was collected	No update Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc. 2000)
Noise	Noise from proposed project activities and from local traffic	To be updated for the current study
Hydrology	Hydrology within the study area	To be updated with information from the current ongoing study within the Wayambo and Buruswamp
	Hydrology of the Saramacca River	No update Last update in the Review of the Environmental and Social Impact Statement prepared in 2000 for the Uitkijk/ Wayambo Exploration Drilling and Validation with respect to proposed exploration drilling and testing in the Uitkijk-North Block (NEC 2011).
Water quality	Water quality within the study area, swamps and canals	To be updated with recent observations
Groundwater	n.a	No update Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc 2000)
Geology	n.a	No update Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc. 2000)
Terrain and soils	Terrains and soils within the study area	No update Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc. 2000)
	Current geomorphological processes	No update Last update in the Review of the Environmental and Social Impact Statement prepared in 2000 for the Uitkijk/ Wayambo Exploration Drilling and Validation with respect to proposed exploration drilling and testing in the Uitkijk-North Block (NEC 2011).
	Soil physical conditions	No update

	Soil chemical parameters Description of the soil mapping units	Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc. 2000)
Flora and ecological land classification mapping	Introduction Vegetation within the study area Ecological land classification mapping	No update Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc. 2000)
	Vegetation types within the study area	No update Last update in the Review of the Environmental and Social Impact Statement prepared in 2000 for the Uitkijk/ Wayambo Exploration Drilling and Validation with respect to proposed exploration drilling and testing in the Uitkijk-North Block (NEC 2011).
Fauna	Mammals Birds Reptiles and amphibians Fish and shellfish	No update Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc. 2000)
Biodiversity		No update Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc. 2000)
Socio-cultural assessment		
Archaeology and historical resources	Kwatta Amerindians Koriabo Amerindians Saramacca Plantations	No update; not relevant Last update in the Environmental Impact Statement Wayombo Concession Seismic Delineation Program (E2 Environmental Alliance Inc 2000)
Present human habitation	Introduction	To be updated for the current study
	Population	To be updated for the current study
Land and water use	Shell and Sand Excavation	To be updated for the current study
	Wetland Rice Horticulture Other Dry Crops Animal Husbandry Fisheries Hunting Tourism and Recreation	
Traffic	Increase in traffic intensity, due to transport of material and employees via public roads.	To be updated for the current study
Environmental values and sensitivities		

Environmental values *Environmental sensitivities*	An Ecological Land Classification (ELC) has been developed for the Wayombo site. Each Ecological Land Type (ELT) can then be described in turns of its site-specific environmental values and potential environmental issues. The principal use of the ELC will be in planning for the management of environmental impacts from future production activities, should they occur. Within the scope of the exploration program, the ELC provides input into identifying potentially sensitive areas. The sensitivities provide an indication of existing issues that need to be addressed in the exploration program and in any future development plans. They form the basis for any future additional environmental programs that may be undertaken for the Wayombo site.	No update; information elaborated in previous studies
Environmental and Social Management Plan		
Primary environmental sensitivities *Project activities WITH major impacts* *Environmental* *Impact mitigation and avoidance*	Environmental risks and impacts can be reduced and managed through an effective Environmental Protection Plan (EPP). An effective EPP 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. Environmental responsibility must be incorporated into the EPP to assure implementation of environmentally responsible operating practices. Environmental management should include the following: • Communicate environmental, health and safety policies and commitment to those involved. • Provide financial and personnel resources. • Assign environmental accountability to all relevant parties and personnel for: o Operating procedures, o Training of affected personnel, o Monitoring and auditing systems, and o Emergency response planning.	The E2 Environmental Alliance Inc (2000) only provides a framework for an Environmental Management Plan (EMP). However, for the following studies an EMP has been prepared. The last version (NEC 2013) will be checked in order to determine whether it conforms to the NIMOS (2017) guidelines for an Environmental Management Plan

	The key to the success of the EPP is that it must be practical and relatively easy to implement. All personnel must understand their roles and responsibilities. An environmental specialist must be assigned to conduct on-site inspection throughout the project and to provide guidance on the appropriate application of the mitigation measures. This specialist may also be responsible for briefing the other project personnel on the EPP and on the environmental sensitivities of the area. He/she must have the full support of management.	

Appendix 2 Baseline Reports
2A Water Quality

Updated Environmental and Social Impact Assessment (ESIA) for the Uitkijk Appraisal Drilling Program (ADP) 2018

Water Quality Investigation

Draft Report

13th of November 2018

by

ILACO

kiwa certified ISO 9001

Project Title : Updated Environmental and Social Impact Assessment (ESIA) for the Uitkijk Appraisal Drilling Program (ADP) 2018
Project Number : IS-344
Document : Water Quality Investigation Report

Version	Status	Compiled by	Validated by	Signature	Date
1.0	First Draft	Punwasi S.	Noordam D./ Koenjbiharie S.		16th of October 2018
1.0	Final Draft	Punwasi S./ Narain S.	Noordam D./ Koenjbiharie S.		13th of November 2018

Table of Contents

List of Figures

List of Tables

Executive Summary

ILACO Suriname N.V has been awarded the contract for the updated ESIA (Environmental Social Impact Assessment) and ESMP (Environmental and Social Management Plan). As part of baseline update under the ESIA, a water quality investigation has been undertaken in the project area. The investigation has been carried out on the 26th of September 2018 and 3rd of October 2018.

This document reports about the methodology and presents the results and findings of the field measurements, observations as well as lab testing and analysis.

The field works were carried out on the 26th of September and 3rd of October 2018:
- 26th of September 2018: in-situ measurements of the locations WQ-01-WQ-12 and sampling of location WQ-01.
- 3rd of October 2018:in-situ measurements and sampling of location WQ-13.
  In total two (2) samples have been collected and submitted to the Eurofins Analytico Laboratory in the Netherlands for lab analysis.

The main conclusions for the in-situ measurements are:
- The sampled water is described as clear to turbid with a light to dark brown color.
- Pegasus observed in the swamp at the locations WQ-01, WQ-02, WQ-04 and WQ-13.
- pH is almost slightly acid (mostly between 5.01 and 5.91); Only WQ-13 has a pH of 6.58, which is near neutral. The pH tends to be lower depending upon the amount of rainfall in the season of great dry time during the sampling period and probable due to the presence of organic material such as pegasus.
- Electrical Conductivity (EC) varies between 0 and 1760 µS. The EC at location WQ-01 up to WQ-11 and WQ-13 varied from 0-546 µS, which is low, indicating almost fresh water. Only at location WQ-12 the EC value is high (1760 µS), which is high, indicating high salt content in the Calor Canal.
- Dissolved Oxygen (DO) varies between 0.53 and 4.07 mg/L (average 2.3 mg/L); there is no significant difference between the four (4) identified main zones (swamp forest, open freshwater swamp, brackish water swamp and the mangrove zone).
- Turbidity is generally low, with measurements between 11.6 and 1392 NTU. At WQ-13 the water meter indicated an error while measuring the turbidity.

The main conclusions of the laboratory results are:
- For sample WQ-01, the level of Diazinon exceeds the criterion for Aquatic Life. The source of Diazinon is pesticides in the swamp water. There are small farms and individual residences within the polders along the road, that probably use pesticides. All other values are below the criteria.

1 Introduction and Background

1.1 Introduction

ILACO Suriname N.V has been awarded the contract for the updated ESIA (Environmental Social Impact Assessment) and ESMP (Environmental and Social Management Plan) for the Uitkijk Appraisal Drilling Program (ADP 2018). As part of baseline update under the ESIA, a water quality investigation has been undertaken in the project area. The investigation has been carried out on the 26th of September 2018 and 3rd of October 2018.

This document reports about the methodology and presents the results and findings of the field measurements, observations as well as lab testing and analysis.

1.2 Background

The project is located in the Uitkijk Block Concession (formerly the Wayambo Block), about 15 km west of Paramaribo and immediately east of the Tambaredjo Oil Field operated by Staatsolie.

Staatsolie is planning to carry out an appraisal drilling program consisting of at least four (4) locations in 2018 in the Uitkijk Area. The 4 appraisal drilling holes are projected east and west of the Calor dam, near the Wayambo road, in the Uitkijk Block of the district of Saramacca.
Wells with producible oil will be selected for testing purposes.

The concession is divided into two parts (North and South) by the East-West Corridor, which is a main public road connecting east and west Suriname. The Northern area comprises of an extensive wetland including coastal mudflats and mangrove swamps, sand/shell beach ridges, open grass swamp and swamp wood forest and is sparsely populated. There are small farms and individual residences within the polders along the road. The identified main zones in the swamp are: swamp forest, open freshwater swamp, brackish water swamp and the mangrove zone.

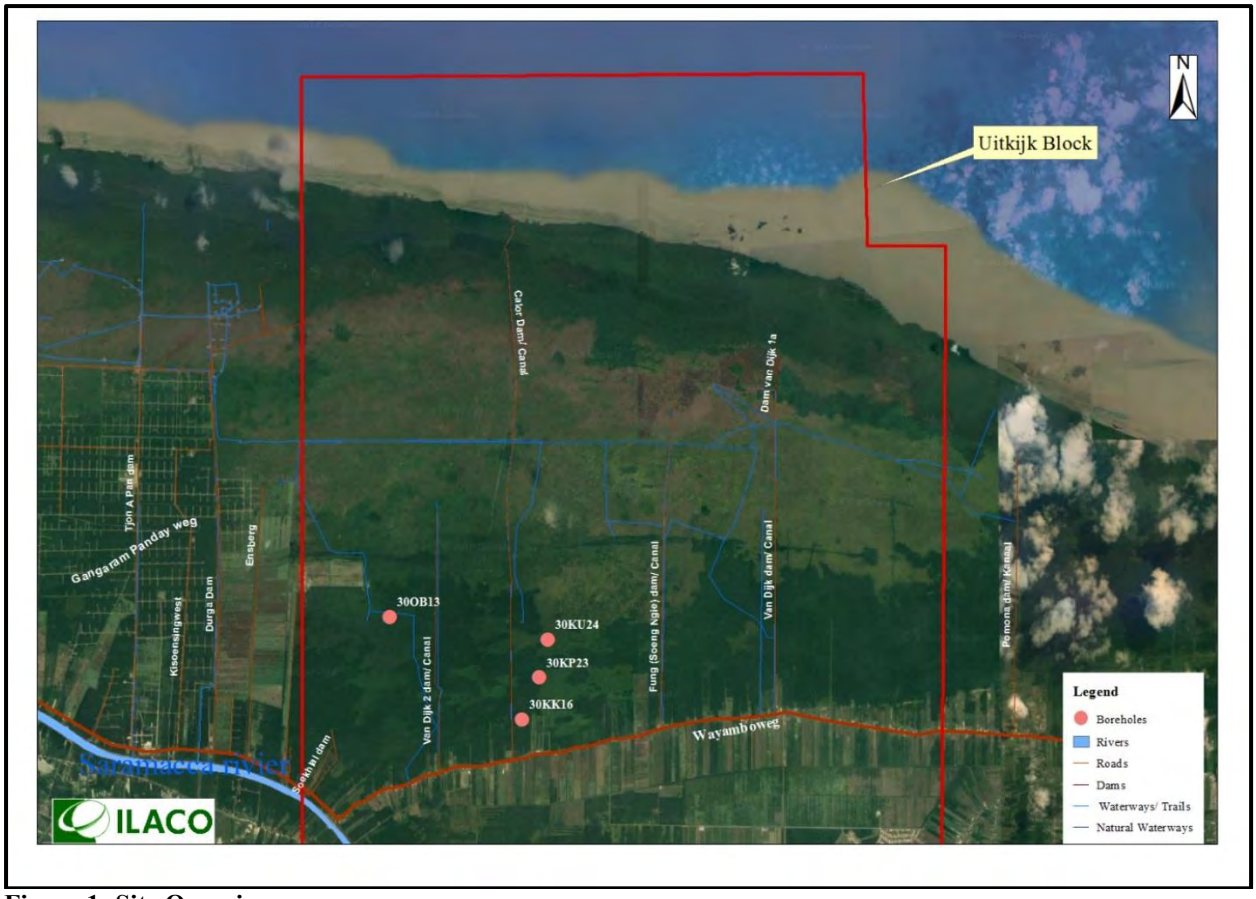


Figure 1: Site Overview

2 Methodology

2.1 Sampling Plan and Locations

Selection of locations for sampling and testing have been based on:

- The presence of historical data of the project area;
- The project description with proposed activities and locations of the drillings
- The identified main zones: swamp forest, open freshwater swamp, brackish water swamp and the mangrove zone

In total 13 locations were selected for in-situ measurements and 2 for sampling.

Table 1: Overview of proposed sampling and testing locations

Sample ID	Location Description	GPS #	Type of Measurement *	Reason for Sampling
WQ-01	In the swamp, 33 meters away from the Calor Canal (east side). Swamp forest	21 N 674624 649103	In-situ measurement + water sample	WQ-01 was chosen for sampling, because it exists within the area of the drilling locations

WQ-02	In the swamp, 27 meters away from the Calor Canal (west side). Swamp forest	21 N 674555 649973	In-situ measurement	No sampling
WQ-03	In the Calor Canal (east side). Swamp forest	21 N 674592 649105		
WQ-04	In the swamp, 15 meters away from the Calor Canal (east side). Swamp forest	21 N 674536 652009		
WQ-05	In the Calor Canal. Swamp forest	21 N 674520 652007		
WQ-06	In the swamp, 15 meters away from the Calor Canal (east side). Swamp forest	21 N 674648 654931		
WQ-07	In the Calor Canal (west side). Swamp forest	21 N 674632 654932		
WQ-08	In the Calor Canal (east side). Swamp forest	21 N 674718 656330		
WQ-09	In the swamp, 9 meters away from the Calor Canal (east side). Open freshwater swamp	21 N 674598 658032		
WQ-10	In the Calor Canal (west side). Open freshwater swamp	21 N 674584 658038		
WQ-11	In the Calor Canal (west side). Brackish water swamp	21 N 674485 659331		
WQ-12	In the Calor Canal (east side). Mangrove zone	21 N 674582 660458		
WQ-13	In the swamp, 16 meters away from the Calor Canal (west side). Swamp forest	21 N 674541 651383	In-situ measurement + water sample	WQ-13 was chosen for sampling, because it exists within the area of the drilling locations

Note: All measurements are executed as proposed

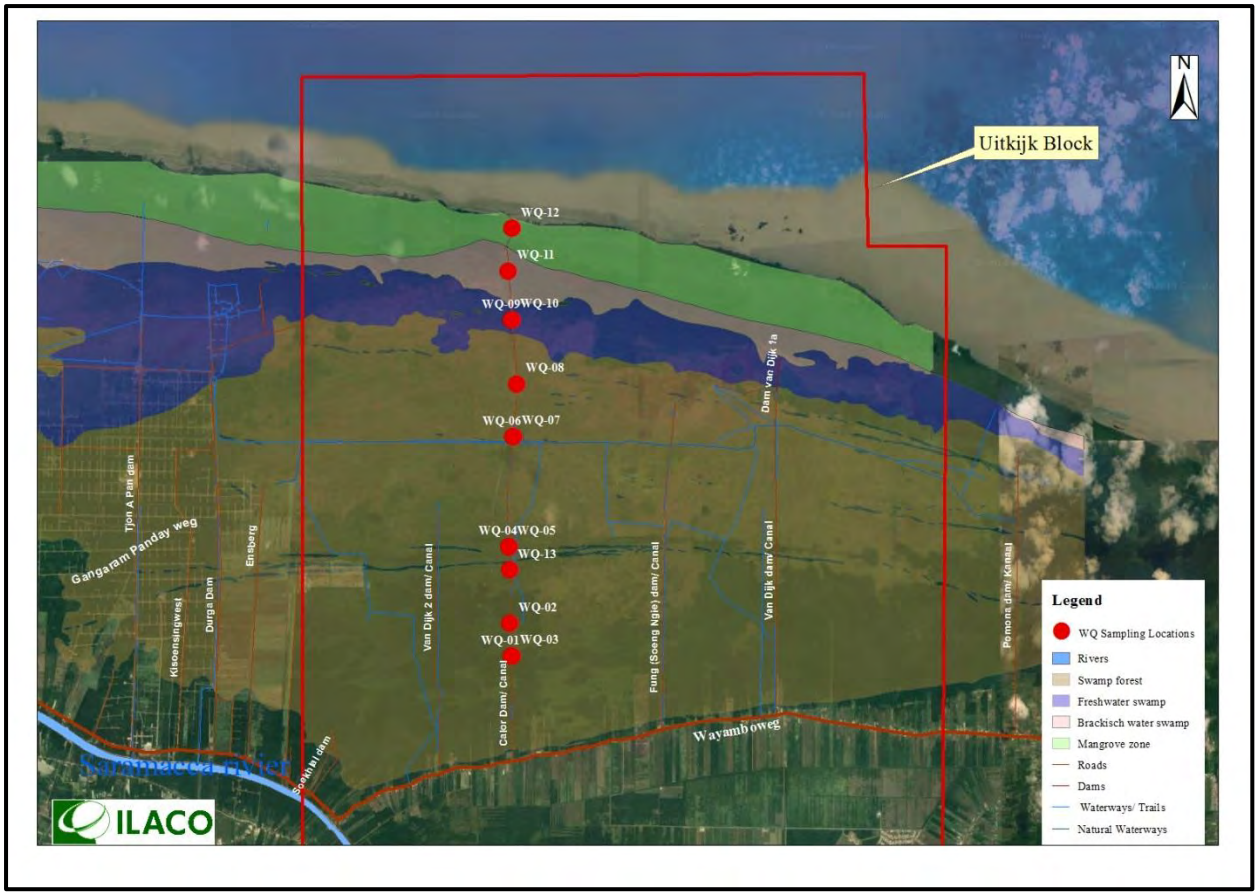


Figure 2: Overview of locations for sampling and testing

At all locations, standard water quality in-situ measurements have been conducted on the 26th of September and 3rd of October 2018.

2.2 Fieldworks

The field works were carried out on the 26th of September and 3rd of October 2018:

- 26th of September 2018: on-site measurements of the locations WQ-01 up to WQ-12 and surface water sampling of WQ-01.
- 3rd of October 2018: on-site measurements and surface water sampling of WQ-13.
  A total of 2 samples were collected.

Table 2: Overview of surface water samples

Surface water sampling locations			
#	**Sample ID**	**Location Description**	**Date of sampling**
1.	WQ-01	In the swamp, 33 meters away from the Calor Canal (east side). Swamp forest	26th of September 2018
2.	WQ-13	In the swamp, 16 meters away from the Calor Canal (west side). Swamp forest	3rd of October 2018

For each in-situ measurement and the sampling round, the following procedures[1] have been followed:

1. Sampling and testing have been done with a team of 2 persons (buddy system) of which one member took all the notes and photographs, filled out tags and labels, kept the records while the other member collected the samples.
2. General observations of the weather, water level, depth, flow direction of the water, visual characteristics of the collected water and the environment (visible pollution, waste material, odor, etc.) are included in field sheets and by means of a camera and GPS.
3. A clean pair of new, non-powdered, disposable gloves was worn at each sampling location.
4. Sample water was collected either directly or in a bucket. This bucket is pre-rinsed three times before collecting the water for each sampling.
   The samples were collected in pre-treated bottles as provided by the laboratory and filled till the head of the bottle (no head space present).
5. On-site measurement including pH, Electrical Conductivity (EC;µs), Temperature (° C), Total Dissolved Salts (ppt), Dissolved Oxygen (DO; mg / l), Turbidity (NTU) and Salinity (ppt) were carried out with a hand held water quality meter (Aquaprobe® AP-2000Multiparameter Water Quality Probe and associated Aquameter®, Utilities & Accessories), calibrated according to the factory manual and prior to the field works, on the 25th of September and 2nd of October 2018) and transparency was measured with a Secchi Disk. Field equipment was cleaned (using demi water) each time prior to the sampling.
6. The water samples have been filled in special pre-treated bottles for the Terratest analysis (from Eurofins):
   40 ml amber glass vial with $NaHSO_4$ (volatile & TPH analyses).
   40 ml amber glass vial (semi volatile analyses).
   30 ml PE vial (pH & conductivity).
   12 ml round bottom vial with HNO_3 (metals analyses).
   A syringe with filter (0.45u) is included to filter certain samples.
7. The samples have been stored at a temperature of 2-4 °C in an ice box.
8. All samples have been delivered to DHL. A properly filled in Chain –of –Custody document has been sent to Eurofins Analytico, the Netherlands.

[1] [1] Surface Water Sampling Protocols, EPA, 28 February 2013

The following photos give an illustration of the observations at the sampling locations.

Location WQ-01: Sampling in the swamp, 33 meters away from the Calor Canal (east side). Pegasus observed in the swamp. Vegetation has been observed. No fish observed.

Location WQ-01: A syringe with filter (0.45u) used to filter the water sample for dissolved metal analysis

Location WQ-01: Filling the filtered water sample in a special pre-treated bottle for the Terratest analysis.

Location WQ-01: On the way to the sampling location.

Location WQ-08: In the Calor Canal (east side). Vegetation and horse grass observed in the canal. Fish observed.	Location WQ-08: The Calor Canal. Swamp forest. Clarity- Clear
 Location WQ-09: Overgrown area, in the swamp, 9 meters away from the Calor Canal (east side). Horse grass and ferns observed. No fish observed in the swamp.	 Location WQ-12: In the Calor Canal (east side). Close to the coast. Mangrove forest zone. No fish observed.
 Location WQ-13: In the swamp, 16 meters away from the Calor Canal (west side). Pegasus and Moko Moko vegetation observed in swamp. Fish observed in water.	 Location WQ-13: In the swamp. Swamp forest. Clarity- Slightly turbid.

2.3 Laboratory Analysis

All analytical methods used by Eurofins Analytico are based on national and international standards. The performance characteristics are carefully established and are continuously tested by means of first, second and third line controls. Eurofins Analytico is accredited against ISO/IEC 17025 by the Dutch Accreditation Council RvA, as is evident from the accreditation certificate. This means that both its management system and its technical competence have been audited by independent experts and that they satisfy the requirements of ISO/IEC 17025. The scope of the technical competence is listed in the accreditation certificate, showing precisely for which analyses Eurofins Analytico is accredited.

Analysis certificates bearing the accreditation mark are usually accepted without reservation by public authorities, but also in (inter)national trade. Agreements hereabout are set out in a Mutual Recognition Arrangement (MRA).

The Eurofins laboratory received all samples by the 2nd and the 5th of October 2018 and receipt for the box has been confirmed by email. In the period of 2nd-12th of October 2018 samples have been analyzed according to the TerraTest® analysis, which includes some 200-industrial common industrial contaminants (See **Annex 2**). Below the groups of the contaminants are summarized:

- Selected inorganics (As, Sb, Ba, Be, Cd, Cr, Co, Cu, Hg, Pb, Mo, Ni, Se, Sn, V)
- Total Petroleum Hydrocarbons (C10-C40);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Poly Chlorinated Biphenyl (PCB);

The results have been received on the 9th and the 12th of October 2018. The laboratory reports are presented in the **Annex 2**.

2.4 Assessment Criteria

Human health ambient water quality criteria represent specific levels of chemicals or conditions in a water body that are not expected to cause adverse effects to human health. USEPA provides recommendations for “water and organism” and “organism only” human health criteria for states and authorized tribes to consider when adopting criteria into their water quality standards. These human health criteria are developed by USEPA under Section 304 (a) of the Clean Water Act. Aquatic life criteria for toxic chemicals are the highest concentration of specific pollutants or parameters in water that are not expected to pose a significant risk to the majority of species in a given environment or a narrative description of the desired conditions of a water body being "free from" certain negative conditions. The table below lists USEPA's recommended aquatic life criteria.

The surface water guidelines for the main determinants together with the analytical results are presented in **Table 4.**

3 Results

3.1 Field measurement and observations

Field observations and measurements are presented in **Table 3**.

The main conclusions for the in-situ measurements are:

- The sampled water is described as clear to turbid with a light to dark brown color.
- Pegasus observed in the swamp at the locations WQ-01, WQ-02, WQ-04 and WQ-13.
- pH is almost slightly acid (mostly between 5.01 and 5.91); Only WQ-13 has a pH of 6.58, which is near neutral. The pH tends to be lower depending upon the amount of rainfall in the season of great dry time during the sampling period and probable due to the presence of organic material such as pegasus.
- Electrical Conductivity (EC) varies between 0 and 1760 µS. The EC at location WQ-01 up to WQ-11 and WQ-13 varied from 0-546 µS, which is low, indicating almost fresh water. Only at location WQ-12 the EC value is high (1760 µS), which is high, indicating high salt content in the Calor Canal.
- Dissolved Oxygen (DO) varies between 0.53 and 4.07 mg/L (average 2.3 mg/L); there is no significant difference between the four (4) identified main zones (swamp forest, open freshwater swamp, brackish water swamp and the mangrove zone).

- Turbidity is generally low, with measurements between 11.6 and 1392 NTU. At WQ-13 the water meter indicated an error while measuring the turbidity.

3.2 Analytical Results

In **Table 4** the surface water guidelines are presented for the main determinants, together with the analytical results. Other determinants that are below the detection limit are not summarized in the table. The results will be discussed below.

The main conclusions of the surface water analyses from table 4 are:

- For sample WQ-01, the level of Diazinon exceeds the criterion for Aquatic Life. The source of Diazinon is pesticides in the swamp water. There are small farms and individual residences within the polders along the road, that probably use pesticides. All other values are below the criteri

Table 3: Water Quality Observation Sheet

General		Comments	
Request nr.:		1	Surface water samples have been taken at only 2 locations: WQ-01 and WQ-13.
Requester:	Staatsolie Maatschappij Suriname N.V		In-situ measurements have been done at all the locations.
Sampling date:	26-09-2018 / 03-10-2018	2	
Number of samples:	2		
Type of water body:	Canal / Swamp	3	
Sampled by:	Kasanradjie C.		
Sampling locations:	See below	4	
Weather:	Sunny		

Sample ID/ Barcode	Location Description	Coordinates (UTM/WGS84)		Date	Sampling time	pH	EC (µS/cm)	Temp gr C	TDS mg/L	DO mg/l	Turbi-dity (NTU)	Salinity (ppt)	Secchi (cm)	Color	Clarity	Depth (cm)	Flow rate m/s	Other remarks
		Easting	Northing															
Sample ID: WQ-01 Barcode: W00035170	In the swamp, 33 meters away from the Calor Canal (east side). Swamp forest	674624	649103	26-09-2018	11:30 AM	5.01	0	31.8	0	2.06	62.3	0	19	Light brown	Clear	19	NA	Pegasus observed in the swamp. Vegetation has been observed. At the time of sampling no fish was observed. Drilling location.
Sample ID: WQ-02	In the swamp, 27 meters away from the Calor Canal (west side). Swamp forest	674555	649973	26-09-2018	12:30 PM	5.68	84	30.43	54	1.41	19.6	0.03	28	Light brown	Clear	29	NA	Pegasus observed in the swamp. At the time of sampling no fish observed. No active drilling activities.
Sample ID: WQ-03	In the Calor Canal (east side). Swamp forest	674592	649105	26-09-2018	11:50 AM	5.91	334	30.8	217	3.08	11.6	0.11	22	Light brown	Clear	89	NA	Duckweed, spinach and fish observed in the canal at the time of sampling.
Sample ID: WQ-04	In the swamp, 15 meters away from the Calor Canal (east side). Swamp forest	674536	652009	26-09-2018	12:50 PM	5.57	315	27.63	204	2.53	40.4	0.1	11	Light brown	Clear	12	NA	Pegasus observed in swamp.
Sample ID: WQ-05	In the Calor Canal. Swamp forest	674520	652007	26-09-2018	12:47 PM	5.69	384	29.78	249	3.25	19.7	0.12	25	Light brown	Clear	94	NA	No vegetation observed. At the time of sampling fish was observed in the canal.
Sample ID: WQ-06	In the swamp, 15 meters away from the Calor Canal (east side). Swamp forest	674648	654931	26-09-2018	13:51 PM	5.33	334	30.5	217	2.46	107	0.11	21	Light brown	Clear	22	NA	Vegetation and horse grass observed. At the time of sampling fish was observed in the swamp.

General		Comments	
Request nr.:		1	Surface water samples have been taken at only 2 locations: WQ-01 and WQ-13.
Requester:	Staatsolie Maatschappij Suriname N.V		In-situ measurements have been done at all the locations.
Sampling date:	26-09-2018 / 03-10-2018	2	
Number of samples:	2		
Type of water body:	Canal / Swamp	3	
Sampled by:	Kasanradjie C.		
Sampling locations:	See below	4	
Weather:	Sunny		

Sample ID/ Barcode	Location Description	Coordinates (UTM/WGS84)		Date	Sampling time	pH	EC (µS/cm)	Temp gr C	TDS mg/L	DO mg/l	Turbi-dity (NTU)	Salinity (ppt)	Secchi (cm)	Color	Clarity	Depth (cm)	Flow rate m/s	Other remarks
		Easting	Northing															
Sample ID: WQ-07	In the Calor Canal (west side). Swamp forest	674632	654932	26-09-2018	13:55 PM	5.31	253	31.5	164	1.97	78.4	0.08	12	Light brown	Clear	128	NA	Vegetation and horse grass observed in the canal. At the time of sampling fish was observed.
Sample ID: WQ-08	In the Calor Canal (east side). Swamp forest	674718	656330	26-09-2018	15:25 PM	5.67	483	30.05	313	3.82	28.6	0.15	27	Light brown	Clear	130	NA	Vegetation and horse grass observed in the canal. Fish was observed at the time of sampling.
Sample ID: WQ-09	in the swamp, 9 meters away from the Calor Canal (east side). Open freshwater swamp	674598	658032	26-09-2018	14:20 PM	5.78	546	31	354	1.82	45.4	0.23	19	Light brown	Slightly turbid	20	NA	Overgrown area. Horse grass and ferns observed. At the time of sampling no fish was observed in the swamp.
Sample ID: WQ-10	In the Calor Canal (west side). Open freshwater swamp	674584	658038	26-09-2018	14:30 PM	5.5	273	31.23	177	1.11	102	0.09	15	Light brown	Slightly turbid	76	0.33	Vegetation and fish observed in the canal at the time of sampling. Horse grass observed.
Sample ID: WQ-11	In the Calor Canal (west side). Brackish water swamp	674485	659331	26-09-2018	14:50 PM	5.88	515	31.5	334	0.63	1392	0.22	8	Dark brown	Turbid	51	0.33	Mangrove forest zone. Vegetation and fish observed in the canal at the time of sampling.
Sample ID: WQ-12	In the Calor Canal (east side). Mangrove zone	674582	660458	26-09-2018	15:10 PM	5.83	1760	32.43	1144	4.07	785	0.87	7	Light brown	Turbid	60	NA	Close to the coast. Cantering in the Atlantic Ocean. Mangrove forest zone. At the time of sampling no fish was observed.
Sample ID: WQ-13 Barcode: W00035172	In the swamp, 16 meters away from the Calor Canal (west side). Swamp forest	674541	651383	3-10-2018	11:48 AM	6.58	499	28.3	324	0.53	NA	0.16	10	Light brown	Slightly turbid	20	NA	Pegasus and Moko Moko vegetation observed in swamp. At the time of sampling fish was observed. The water meter indicated an error while measuring the turbidity.

Table 4: Analytical results for surface water and testing against the USEPA 2016 guidelines

USEPA (2016)			Surface water samples	
	Human Health for the consumption of Organisms (µg/L)	**Aquatic Life Criteria Freshwater CCC (µg/L)**	**WQ-01**	**WQ-13**
Metals				
Barium	1000	-	3.7	7.2
Zinc	7400	120	54	30
Volatile Organic Hydrocarbons				
Toluene	57	-	2.8	
Volatile Halogenated Hydrocarbons				
Chloromethane	-	-		0.80
Phenols				
Phenol	4000	-	1.5	
p-Cresol	-	-	0.99	
Cresols (sum)	-	-	0.99	
Phosphor Pesticides				
Diazinon	-	0.17	**0.2**	0.06
Miscellaneous Organic compounds				
Biphenyl	-			0.04
Petroleum Hydrocarbons				
TPH sum	-		180	

CCC: Criteria Continuous Concentration

All analytical results for surface water samples that exceeded the USEPA 2016 guidelines are bolded, underlined and indicated in red.

Annexes

Annex 1

General	
Request nr.:	
Requester:	**Staatsolie Maatschappij Suriname N.V**
Sampling date:	**26-09-2018 / 03-10-2018**
Number of samples:	**2**
Type of water body:	**Canal / Swamp**
Sampled by:	**Kasanradjie C.**
Sampling locations:	**See below**
Weather:	**Sunny**

Comments	
1	Surface water samples have been taken at only 2 locations: WQ-01 and WQ-13. In-situ measurements have been done at all the locations.
2	
3	
4	

Sample ID/ Barcode	Location Description	Coordinates (UTM/WGS84)		Date	Sampling time	pH	EC (µS/cm)	Temp gr C	TDS mg/L	DO mg/l	Turbi-dity (NTU)	Salinity (ppt)	Secchi (cm)	Color	Clarity	Depth (cm)	Flow rate m/s	Other remarks
		Easting	Northing															
Sample ID: WQ-01 Barcode: W00035170	In the swamp, 33 meters away from the Calor Canal (east side). Swamp forest	674624	649103	26-09-2018	11:30 AM	5.01	0	31.8	0	2.06	62.3	0	19	Light brown	Clear	19	NA	Pegasus observed in the swamp. Vegetation has been observed. At the time of sampling no fish was observed. Drilling location.
Sample ID: WQ-02	In the swamp, 27 meters away from the Calor Canal (west side). Swamp forest	674555	649973	26-09-2018	12:30 PM	5.68	84	30.43	54	1.41	19.6	0.03	28	Light brown	Clear	29	NA	Pegasus observed in the swamp. At the time of sampling no fish observed. No active drilling activities.
Sample ID: WQ-03	In the Calor Canal (east side). Swamp forest	674592	649105	26-09-2018	11:50 AM	5.91	334	30.8	217	3.08	11.6	0.11	22	Light brown	Clear	89	NA	Duckweed, spinach and fish observed in the canal at the time of sampling.
Sample ID: WQ-04	In the swamp, 15 meters away from the Calor Canal (east side). Swamp forest	674536	652009	26-09-2018	12:50 PM	5.57	315	27.63	204	2.53	40.4	0.1	11	Light brown	Clear	12	NA	Pegasus observed in swamp.
Sample ID: WQ-05	In the Calor Canal. Swamp forest	674520	652007	26-09-2018	12:47 PM	5.69	384	29.78	249	3.25	19.7	0.12	25	Light brown	Clear	94	NA	No vegetation observed. At the time of sampling fish was observed in the canal.
Sample ID: WQ-06	In the swamp, 15 meters away from the Calor Canal (east side). Swamp forest	674648	654931	26-09-2018	13:51 PM	5.33	334	30.5	217	2.46	107	0.11	21	Light brown	Clear	22	NA	Vegetation and horse grass observed. At the time of sampling fish was observed in the swamp.
Sample ID: WQ-07	In the Calor Canal (west side). Swamp forest	674632	654932	26-09-2018	13:55 PM	5.31	253	31.5	164	1.97	78.4	0.08	12	Light brown	Clear	128	NA	Vegetation and horse grass observed in the canal. At the time of sampling fish was observed.
Sample ID: WQ-08	In the Calor Canal (east side). Swamp forest	674718	656330	26-09-2018	15:25 PM	5.67	483	30.05	313	3.82	28.6	0.15	27	Light brown	Clear	130	NA	Vegetation and horse grass observed in the canal. Fish was observed at the time of sampling.
Sample ID: WQ-09	in the swamp, 9 meters away from the Calor Canal (east side). Open freshwater swamp	674598	658032	26-09-2018	14:20 PM	5.78	546	31	354	1.82	45.4	0.23	19	Light brown	Slightly turbid	20	NA	Overgrown area. Horse grass and ferns observed. At the time of sampling no fish was observed in the swamp.
Sample ID: WQ-10	In the Calor Canal (west side). Open freshwater swamp	674584	658038	26-09-2018	14:30 PM	5.5	273	31.23	177	1.11	102	0.09	15	Light brown	Slightly turbid	76	0.33	Vegetation and fish observed in the canal at the time of sampling. Horse grass observed.
Sample ID: WQ-11	In the Calor Canal (west side). Brackish water swamp	674485	659331	26-09-2018	14:50 PM	5.88	515	31.5	334	0.63	1392	0.22	8	Dark brown	Turbid	51	0.33	Mangrove forest zone. Vegetation and fish observed in the canal at the time of sampling.
Sample ID: WQ-12	In the Calor Canal (east side). Mangrove zone	674582	660458	26-09-2018	15:10 PM	5.83	1760	32.43	1144	4.07	785	0.87	7	Light brown	Turbid	60	NA	Close to the coast. Cantering in the Atlantic Ocean. Mangrove forest zone. At the time of sampling no fish was observed.
Sample ID: WQ-13 Barcode: W00035172	In the swamp, 16 meters away from the Calor Canal (west side). Swamp forest	674541	651383	3-10-2018	11:48 AM	6.58	499	28.3	324	0.53	NA	0.16	10	Light brown	Slightly turbid	20	NA	Pegasus and Moko Moko vegetation observed in swamp. At the time of sampling fish was observed. The water meter indicated an error while measuring the turbidity.

Annex 2

ILACO Suriname N.V.
Att. Shastria Narain
SV Voorwaartslaan 18
not applic PARAMARIBO
SURINAME

Certificate of analysis

Date: 08-Oct-2018

Please find enclosed the analytical results of the test carried out for the project.

Certificate number/Version	2018143371/1
Your project number	WQ1
Your project name	
Your order number	
Samples received on	02-Oct-2018

This Certificate of Analysis shall not be reproduced except in full, without written approval of the laboratory. Interpretations and opinions are outside the scope of our accreditation, and all results relate only to samples supplied.

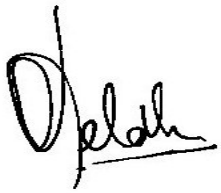
Soil samples will be stored for a period of 4 weeks and water samples for a period of 2 weeks after receipt of the samples at our laboratory. Without any additional request, samples will be disposed when the above mentioned periods have expired. If you require Eurofins Analytico to store the samples for a longer period, please complete this page and return it to Eurofins Analytico at least one businessday before the period is due to expire.
The costs of prolonged storage periods may be found in our pricelist.

Storage period:
Date: Name: Signature:

We are confident that we have performed the order in accordance with your expectations. If you have any remaining questions concerning this Certificate of Analysis, please don't hesitate to contact our Customer Service.

Yours sincerely,

Eurofins Analytico B.V.



Ing. A. Veldhuizen
Technical Manager

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Certificate of analysis

Your project number	W01	Certificate number/Version	2018143371/1
Your project name		Start date	03-Oct-2018
Your order number		Report date	08-Oct-2018/17:56
		Annex	A,B,C,D
Sampled by		Page	1/2
Sample matrix	Surface water		

	Analysis	Unit	1
	Sample Pre-treatment		
	Physical and chemical analyses		
	EC-temp. corr. factor (mathematical)		1.129
Q	Electric conductivity 25 °C	µS/cm	400
Q	Electric conductivity 25 °C	mS/m	40
Q	Electric conductivity 20°C	mS/m	36
	Measuring temperature (EC)	°C	19.5
	Measuring temperature (pH)	°C	19.8
Q	pH		5.7
	Metals		
Q	Barium (Ba)	µg/L	3.7
Q	Zinc (Zn)	µg/L	54
	Volatile Organic Hydrocarbons		
Q	Toluene	µg/L	2.8
	Phenols		
Q	Phenol	µg/L	1.5
Q	p-Cresol	µg/L	0.99
Q	Cresols (sum)	µg/L	0.99
	Polycyclic Aromatic Hydrocarbons		
	Chlorobenzenes		
	Chlorophenols		
	PolyChlorinated Biphenyl (PCB)		
	Organic Chlorinated Pesticides		
	Phosphor pesticides		
Q	Diazinone	µg/L	0.2
	Miscellaneous Organic compounds		
	Petroleum Hydrocarbons		
	TPH C16-C21	µg/L	16

No.	Sample description	Date sampling	Sample nr.
1	WQ-01	02-Oct-2018	10334432

Q: Dutch Accreditation Council (RvA) accredited test
A: AP04 accredited test
S: AS SIKB recognized test
V: VLAREL recognized test
M: MCERTS accredited

Eurofins Analytico B.V. is ISO 14001: 2004 certified by TÜV and qualified by the Flemish Region (OVAM and Dep. Environment), the Brussels Region (IBGE/BIM), the Walloon Region (DGRNE-OWD) and by the Government of Luxembourg (MEV).

TESTING
RvA L010

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BIC: BNPANL2A
KvK/CoC No. 09088623
BTW/VAT No. NL 8043.14.883.B01

Certificate of analysis

Your project number	W01	Certificate number/Version	2018143371/1
Your project name		Start date	03-Oct-2018
Your order number		Report date	08-Oct-2018/17:56
		Annex	A,B,C,D
Sampled by		Page	2/2
Sample matrix	Surface water		

	Analysis	Unit	1
	TPH C21-C30	µg/l	79
	TPH C30-C35	µg/l	45
	TPH C35-C40	µg/l	26
Q	TPH (sum C10-C40)	µg/l	180

No.	Sample description	Date sampling	Sample nr.
1	WQ-01	02-Oct-2018	10334432

Q: Dutch Accreditation Council (RvA) accredited test
A: AP04 accredited test
S: AS SIKB recognized test
V: VLAREL recognized test
M: MCERTS accredited

Verified
ASM

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TESTING
RvA L010

Annex (A) concerning subsample information referring to certificate of analysis 2018143371/1

Sample nr.	Drill-#	Description	From	To	Barcode	Sampling ID / Sample descriptio
10334432					W00035170	WQ-01

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Annex (B) concerning remarks referring to certificate of analysis 2018143371/1

General remark referring to certificate of analysis

Other components are possibly present at concentrations below the reporting limit

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Annex (C): method references belonging to certificate of analysis 2018143371/1

Analysis	Method	Technique	Method reference
Phenoles	W6336	GC-MS	TerrAttesT
TPH fractioned (TAT)	W0215	GC/FID	TerrAttesT
Conductivity	W0506	Conductometry	I.a.w. NEN-ISO 7888
Acidity (pH)	W0524	Potentiometry	I.a.w. EN-ISO 10523
TerrAttesT metals	W0421	ICP-MS	Acc. NEN-EN-ISO 17294-2 / CMA2/I/B.5
Toluene (TAT)	W0254	HS-GC/MS	TerrAttesT
Phosphorpesticides (TAT)	W6336	GC-MS	TerrAttesT

Additional information about the applied methods as well as the classification of the accuracy, are listed in our supplement: "Specification of methods of analyses", version June 2016.

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KvK/CoC No. 09088623
BTW/VAT No. NL 8043.14.883.B01

Annex (D) remarks concerning the sampling and preservation period 2018143371/1

Non compliance(s) of the criteria is(are) observed that may have influenced the accuracy of the test results of samples mentioned below.

Analysis	Sample nr.
The preservation term for this parameter has been expired.	
pH	10334432
Electric conductivity 25 °C	10334432

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BTW/VAT No. NL 8043.14.883.B01

Certificate number/Version 2018143371/1
Your project number WQ1
Your project name
Your order number

Informative Annex :

Below the calculated measurement uncertainty of the individual analyses is given. The expanded measurement uncertainty is given as an interval within which the value obtained with the method applied is expected to lie with a certainty of 95%. The expanded uncertainty is expressed as a percentage (Urel).

On an international level there is as yet no final consensus as to how measured uncertainty should be calculated. Listed values are calculated against currently most up-to-date definition:
Urel = 2*sqrt(CVRw2 + drel2)

CVRw = within-laboratory reproducibility coefficient of variation.
drel (%) = relative bias

NOTE 1: The influence of sample inhomogeneity on the measurement uncertainty cannot be quantified in general terms. Therefore possible influences of sample inhomogeneity on individual samples is not incorporated in the below listed values.

Version : 05 Dec 2017

Analysis	CVRw (%)	drel (%)	Urel (%)
Physical and chemical analyses			
Electric conductivity 25 °C	0.50	-2.5	5.1
pH	0.080	-0.10	0.26
Metals			
Arsenic (As)	2.6		5.2
Antimony (Sb)	7.3		15
Barium (Ba)	1.7		3.4
Beryllium (Be)	3.7		7.4
Cadmium (Cd)	2.3		4.6
Chromium (Cr)	2.5		5.0
Cobalt (Co)	2.5		5.0
Copper (Cu)	2.2		4.4
Mercury (Hg)	7.5		15
Lead (Pb)	2.0		4.0
Molybdenum (Mo)	2.3		4.6
Nickel (Ni)	2.3		4.6
Selenium (Se)	4.9		9.8
Tin (Sn)	3.3		6.6
Vanadium (V)	2.9		5.8
Zinc (Zn)	2.0		4.0

Analysis	CVRw (%)	drel (%)	Urel (%)
Volatile Organic Hydrocarbons			
Benzene	2.6	-8.2	17
Ethylbenzene	3.1	-2.0	7.4
Toluene	1.9	-15	30
o-Xylene	4.3	-1.0	8.8
m,p-Xylene	3.8	-6.0	14
Styrene	4.3	-8.0	18
1,2,4-Trimethylbenzene	5.8	-12	27
1,3,5-Trimethylbenzene	7.1	-13	30
n-Propylbenzene	3.7	-5.0	12
Isopropylbenzene	2.9	-3.0	8.3
n-Butylbenzene	4.4	-8.0	18
sec-Butylbenzene	4.3	-8.0	18
tert-Butylbenzene	4.9	-8.0	19
p-Cymene	6.0	-11	25
Phenols			
Phenol	7.6	-0.80	15
o-Cresol	12	6.3	27
m-Cresol	7.5	10	25
p-Cresol	5.7	11	25
Cresols (sum)	7.6	9.1	24
2,4-Dimethylphenol	12	9.2	29
2,5-Dimethylphenol	11	-0.50	23
2,6-Dimethylphenol	19	3.5	38
3,4-Dimethylphenol	5.5	5.7	16
o-Ethylphenol	11	2.5	22
m-Ethylphenol	10	1.8	21
Thymol	7.6	6.1	19
2,3/3,5-Dimethylphenol + 4-Ethylphenol	8.2	6.3	21
Polycyclic Aromatic Hydrocarbons			
Naphtalene	11	0.0	22
Acenaphtylene	6.0	3.8	14
Acenaphtene	5.7	7.8	19
Fluorene	3.8	12	25
Phenanthrene	6.7	-2.6	14
Anthracene	9.2	-17	39

Certificate number/Version 2018143371/1
Your project number WQ1
Your project name
Your order number

Analysis	CVRw (%)	drel (%)	Urel (%)
Fluoranthene	12	-0.20	24
Pyrene	3.8	4.4	12
Benzo(a)anthracene	11	-4.0	24
Chrysene	6.1	3.2	14
Benzo(b+k)fluoranthene	9.8	0.0	20
Benzo(a)pyrene	11	0.0	22
Dibenzo(ah)anthracene	8.1	0.0	16
Benzo(ghi)perylene	7.5	0.0	15
Indeno(123cd)pyrene	5.0	0.0	10
Volatile halogenated Hydrocarbons			
Chloromethane	8.0	1.0	16
Dichloromethane	7.4	0.0	15
Vinyl chloride	6.5	0.0	13
1,1-Dichloroethene	3.1	0.0	6.2
trans 1,2-Dichloroethene	3.6	6.0	14
cis1,2-Dichloroethene	3.4	4.0	10
Chloroethane	5.6	0.0	11
Trichlorofluoromethane	5.6	3.0	13
Trichloromethane	5.0	6.0	16
Tetrachloromethane	5.5	6.0	16
1,1-Dichloroethane	3.6	4.0	11
1,2-Dichloroethane	5.8	1.0	12
1,1,1-Trichloroethane	4.6	3.0	11
1,1,2-Trichloroethane	4.1	1.0	8.4
1,1,1,2-Tetrachloroethane	5.2	3.0	12
1,1,2,2-Tetrachloorethane	12	14	36
Trichloroethene	13	3.0	26
Tetrachloroethene	3.2	4.0	10
2,2-Dichloropropane	10	6.0	24
1,2-Dichloropropane	5.3	0.0	11
1,3-Dichloropropane	6.4	4.0	15
1,2,3-Trichloropropane	6.5	2.0	14
1,1-Dichloro-1-propene	4.2	1.0	8.6
cis1,3-Dichloropropene	3.8	-1.0	7.9
trans1,3-Dichloropropene	3.2	0.0	6.4
Bromomethane	12	0.0	23
Bromochloromethane	3.9	1.0	8.1
Dibromomethane	4.9	2.0	11

Certificate number/Version 2018143371/1
Your project number WQ1
Your project name
Your order number

Analysis	CVRw (%)	drel (%)	Urel (%)
1,2-Dibromoethane	5.4	0.0	11
Tribromomethane	5.0	2.0	11
Bromodichloromethane	5.3	2.0	11
Dibromochloromethane	3.8	2.0	8.6
1,2-Dibromo-3-chloropropane	11	0.0	22
Bromobenzene	4.8	-2.0	10
Chlorobenzenes			
Monochlorobenzene	2.5	6.0	13
1,2,3-Trichlorobenzene	3.9	0.0	7.8
1,2,4-Trichlorobenzene	3.7	1.0	7.7
1,3,5-Trichlorobenzene	9.1	-15	35
1,2,3,4-Tetrachlorobenzene	8.9	-15	35
1245&1235 Tetrachlorobenzene	5.7	-15	32
Pentachlorobenzene	3.5	-15	31
Hexachlorobenzene	6.7	-14	31
1,2-Dichlorobenzene	3.9	0.0	7.8
1,3-Dichlorobenzene	4.1	-3.0	10
1,4-Dichlorobenzene	4.5	-4.0	12
Chlorophenols			
o-Chlorophenol	9.0	-1.6	18
m-Chlorophenol	12	-8.1	29
p-Chlorophenol	10	-18	41
Monochlorophenols (sum)	10	-9.3	28
2,3-Dichlorophenol	9.8	-4.4	21
2,4/2,5-Dichlorophenol	4.0	-4.4	12
2,6-Dichlorophenol	9.4	6.3	23
3,4-Dichlorophenol	9.2	-2.5	19
3,5-Dichlorophenol	14	-3.7	29
Dichlorophenols (sum)	9.7	-1.7	20
2,3,4-Trichlorophenol	9.6	-1.5	19
2,3,5-/2,4,5-Trichlorophenol	6.5	-0.10	13
2,3,6-Trichlorophenol	5.7	0.70	11
2,4,6-Trichlorophenol	6.0	-3.4	14
3,4,5-Trichlorophenol	6.7	-1.7	14
Trichlorophenols (sum)	7.0	-1.2	14
2,3,4,5-Tetrachlorophenol	6.0	-4.4	15
2,3,4,6 / 2,3,5,6-Tetrachlorophenol	6.0	-4.4	15

Certificate number/Version 2018143371/1
Your project number WQ1
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Analysis	CVRw (%)	drel (%)	Urel (%)
Tetrachlorophenols (sum)	6.0	-1.7	12
Pentachlorophenol	4.5	-28	57
4-Chloro-3-methylphenol	8.9	-4.4	20
PolyChlorinated Biphenyl (PCB)			
PCB 28	5.4	-13	28
PCB 52	3.5	-15	31
PCB 101	6.3	-23	48
PCB 118	7.0	-18	39
PCB 138	4.1	-32	65
PCB 153	5.1	-29	59
PCB 180	5.7	-37	75
Chloronitrobenzenes			
o/p-Chloronitrobenzene	14	2.6	29
m-Chloronitrobenzene	14	3.1	29
2,3-Dichloronitrobenzene	7.1	0.50	14
2,4-Dichloronitrobenzene	7.1	-0.60	14
2,5-Dichloronitrobenzene	7.0	2.5	15
3,4-Dichloronitrobenzene	7.1	-3.8	16
3,5-Dichloronitrobenzene	8.6	3.4	18
Miscellaneous Chlor. HCs			
2-Chlorotoluene	4.4	-6.0	15
4-Chlorotoluene	5.0	-8.0	19
1-Chloronaphtalene	6.3	2.1	13
Organic Chlorinated Pesticides			
4,4 -DDE	4.5	-16	33
2,4 -DDE	5.7	-11	25
4,4 -DDT	8.5	-15	34
4,4 -DDD + 2,4 -DDT	4.1	-8.1	18
2,4 -DDD	5.1	-6.5	17
Aldrin	5.1	-8.3	19
Dieldrin	6.3	-2.1	13
Endrin	12	-6.7	27
alfa-HCH	5.1	2.5	11
beta-HCH	4.7	-11	24
gamma-HCH	6.3	-1.2	13

Certificate number/Version 2018143371/1
Your project number WQ1
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Analysis	CVRw (%)	drel (%)	Urel (%)
delta-HCH	3.5	-4.4	11
a-Endosulfan	6.3	-3.1	14
a-Endosulfansulphate	6.7	-9.0	22
a-Chlordan	5.1	-9.0	21
y-Chlordan	6.3	-9.0	22
Heptachlor	6.3	-25	52
Heptachloroepoxide	10	-5.3	23
Hexachlorobutadiene	12	5.1	26
Isodrin	6.3	-11	25
Telodrin	5.5	-26	53
Tedion	4.7	-9.0	20
Phosphor pesticides			
Azinphos-ethyl	7.9	-40	82
Azinphos-methyl	10	-32	67
Bromophos-ethyl	4.1	-14	29
Bromophos-methyl	4.5	-14	29
Chloropyriphos-ethyl	4.0	-13	27
Chloropyriphos-methyl	5.4	-14	30
Cumaphos	6.5	-38	77
Demeton-S/Demeton-O-ethyl	11	-14	36
Diazinone	3.0	5.0	12
Dichlorovos	6.5	-7.8	20
Disulphotone	15	-87	180
Fenitrothion	11	-13	34
Fenthion	5.7	-11	25
Malathion	5.4	-7.8	19
Parathion-ethyl	13	-24	55
Parathion-methyl	11	-6.0	25
Pyrazophos	11	-21	48
Triazophos	8.5	-20	43
Nitrogen pesticides			
Ametryn	6.7	7.8	21
Atrazin	4.5	-17	35
Cyanazine	6.3	7.8	20
Desmetryn	6.4	7.8	20
Prometryn	6.7	-34	69
Propazine	5.4	1.7	11

Analysis	CVRw (%)	drel (%)	Urel (%)
Simazine	12	16	40
Terbuthylazine	3.2	0.50	6.5
Terbutryn	6.0	-23	48
Miscellaneous pesticides			
Bifenthrine	5.5	-7.8	19
Carbaryl	7.1	-1.3	14
Cypermethrin A,B, C and D	8.9	5.2	21
Deltamethrin	14	7.4	31
Linuron	11	3.2	23
Permethrin A	5.1	-4.8	14
Permethrin B	5.1	-4.8	14
Permethrins (sum)	5.1	-4.2	13
Propachlor	5.1	-1.9	11
Trifluralin	11	0.70	21
Miscellaneous Organic compounds			
Biphenyl	6.7	8.0	21
Nitrobenzene	6.7	4.6	16
Dibenzofurane	7.3	4.4	17
Petroleum Hydrocarbons			
TPH (sum C10-C40)	4.3	-14	29

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BNP Paribas S.A. 227 9245 25
IBAN: NL71BNPA0227924525
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KvK/CoC No. 09088623
BTW/VAT No. NL 8043.14.883.B01

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Certificate of analysis

Your project number	W01	Certificate number/Version	2018143371/1
Your project name		Start date	03-Oct-2018
Your order number		Report date	08-Oct-2018/17:56
		Annex	A,B,C,D
Sampled by		Page	1/9
Sample matrix	Surface water		

	Analysis	Unit	1
	Sample Pre-treatment		
Q	Version number		7.23
	Physical and chemical analyses		
	EC-temp. corr. factor (mathematical)		1.129
Q	Electric conductivity 25 °C	µS/cm	400
Q	Electric conductivity 25 °C	mS/m	40
Q	Electric conductivity 20°C	mS/m	36
	Measuring temperature (EC)	°C	19.5
	Measuring temperature (pH)	°C	19.8
Q	pH		5.7
	Metals		
Q	Arsenic (As)	µg/L	<3.0
Q	Antimony (Sb)	µg/L	<5.0
Q	Barium (Ba)	µg/L	3.7
Q	Beryllium (Be)	µg/L	<1.0
Q	Cadmium (Cd)	µg/L	<0.40
Q	Chromium (Cr)	µg/L	<2.0
Q	Cobalt (Co)	µg/L	<1.0
Q	Copper (Cu)	µg/L	<3.0
Q	Mercury (Hg)	µg/L	<0.040
Q	Lead (Pb)	µg/L	<3.0
Q	Molybdenum (Mo)	µg/L	<2.0
Q	Nickel (Ni)	µg/L	<2.0
Q	Selenium (Se)	µg/L	<5.0
Q	Tin (Sn)	µg/L	<5.0
Q	Vanadium (V)	µg/L	<2.0
Q	Zinc (Zn)	µg/L	54
	Volatile Organic Hydrocarbons		
Q	Benzene	µg/L	<0.10
Q	Ethylbenzene	µg/L	<0.10

No.	Sample description	Date sampling	Sample nr.
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Your order number		Report date	08-Oct-2018/17:56
		Annex	A,B,C,D
Sampled by		Page	2/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	Toluene	µg/L	2.8
Q	o-Xylene	µg/L	<0.10
Q	m,p-Xylene	µg/L	<0.10
Q	Xylenes (sum)	µg/L	<0.20
Q	Styrene	µg/L	<0.10
Q	1,2,4-Trimethylbenzene	µg/L	<0.10
Q	1,3,5-Trimethylbenzene	µg/L	<0.10
Q	n-Propylbenzene	µg/L	<0.10
Q	Isopropylbenzene	µg/L	<0.10
Q	n-Butylbenzene	µg/L	<0.10
Q	sec-Butylbenzene	µg/L	<0.10
Q	tert-Butylbenzene	µg/L	<0.10
Q	p-Cymene	µg/L	<0.10
	Phenols		
Q	Phenol	µg/L	1.5
Q	o-Cresol	µg/L	<0.30
Q	m-Cresol	µg/L	<0.30
Q	p-Cresol	µg/L	0.99
Q	Cresols (sum)	µg/L	0.99
Q	2,4-Dimethylphenol	µg/L	<0.02
Q	2,5-Dimethylphenol	µg/L	<0.02
Q	2,6-Dimethylphenol	µg/L	<0.03
Q	3,4-Dimethylphenol	µg/L	<0.02
Q	o-Ethylphenol	µg/L	<0.03
Q	m-Ethylphenol	µg/L	<0.02
Q	Thymol	µg/L	<0.01
Q	2,3/3,5-Dimethylphenol + 4-Ethylphenol	µg/L	<0.02
	Polycyclic Aromatic Hydrocarbons		
Q	Naphtalene	µg/L	<0.4
Q	Acenaphtylene	µg/L	<0.04
Q	Acenaphtene	µg/L	<0.1

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Certificate of analysis

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Your project name		Start date	03-Oct-2018
Your order number		Report date	08-Oct-2018/17:56
		Annex	A,B,C,D
Sampled by		Page	3/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	Fluorene	µg/L	<0.01
Q	Phenanthrene	µg/L	<0.02
Q	Anthracene	µg/L	<0.01
Q	Fluoranthene	µg/L	<0.02
Q	Pyrene	µg/L	<0.06
Q	Benzo(a)anthracene	µg/L	<0.04
Q	Chrysene	µg/L	<0.02
Q	Benzo(b+k)fluoranthene	µg/L	<0.06
Q	Benzo(a)pyrene	µg/L	<0.1
Q	Dibenzo(ah)anthracene	µg/L	<0.08
Q	Benzo(ghi)perylene	µg/L	<0.1
Q	Indeno(123cd)pyrene	µg/L	<0.06
Q	PAH 16 EPA (sum)	µg/L	<1.1
	Volatile halogenated Hydrocarbons		
Q	Chloromethane	µg/L	<0.20
Q	Dichloromethane	µg/L	<0.20
Q	Vinyl chloride	µg/L	<0.20
Q	1,1-Dichloroethene	µg/L	<0.10
Q	trans 1,2-Dichloroethene	µg/L	<0.10
Q	cis1,2-Dichloroethene	µg/L	<0.10
Q	Chloroethane	µg/L	<0.10
Q	Trichlorofluoromethane	µg/L	<0.10
Q	Trichloromethane	µg/L	<0.20
Q	Tetrachloromethane	µg/L	<0.20
Q	1,1-Dichloroethane	µg/L	<0.10
Q	1,2-Dichloroethane	µg/L	<0.10
Q	1,1,1-Trichloroethane	µg/L	<0.10
Q	1,1,2-Trichloroethane	µg/L	<0.10
Q	Trichloroethane (sum)	µg/L	<0.20
Q	1,1,1,2-Tetrachloroethane	µg/L	<0.10
Q	1,1,2,2-Tetrachloorethane	µg/L	<0.10

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Certificate of analysis

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Your project name		Start date	03-Oct-2018
Your order number		Report date	08-Oct-2018/17:56
		Annex	A,B,C,D
Sampled by		Page	4/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	Tetrachloorethane (sum)	µg/L	<0.20
Q	Trichloroethene	µg/L	<0.10
Q	Tetrachloroethene	µg/L	<0.10
Q	2,2-Dichloropropane	µg/L	<0.10
Q	1,2-Dichloropropane	µg/L	<0.10
Q	1,3-Dichloropropane	µg/L	<0.10
Q	1,2,3-Trichloropropane	µg/L	<0.10
Q	1,1-Dichloro-1-propene	µg/L	<0.10
Q	cis1,3-Dichloropropene	µg/L	<0.10
Q	trans1,3-Dichloropropene	µg/L	<0.10
Q	1,3-Dichloropropene (sum)	µg/L	<0.20
Q	Bromomethane	µg/L	<0.10
Q	Bromochloromethane	µg/L	<0.10
Q	Dibromomethane	µg/L	<0.10
Q	1,2-Dibromoethane	µg/L	<0.10
Q	Tribromomethane	µg/L	<0.10
Q	Bromodichloromethane	µg/L	<0.10
Q	Dibromochloromethane	µg/L	<0.10
Q	1,2-Dibromo-3-chloropropane	µg/L	<0.10
Q	Bromobenzene	µg/L	<0.10
	Chlorobenzenes		
Q	Monochlorobenzene	µg/L	<0.050
Q	1,2,3-Trichlorobenzene	µg/L	<0.10
Q	1,2,4-Trichlorobenzene	µg/L	<0.10
Q	1,3,5-Trichlorobenzene	µg/L	<0.010
Q	Trichlorobenzenes (sum)	µg/L	<0.21
	1,2,3,4-Tetrachlorobenzene	µg/L	<0.020
Q	1245&1235 Tetrachlorobenzene	µg/L	<0.020
Q	Tetrachlorobenzenes (sum)	µg/L	<0.040
Q	Pentachlorobenzene	µg/L	<0.010
Q	Hexachlorobenzene	µg/L	<0.030

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Certificate of analysis

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Your project name		Start date	03-Oct-2018
Your order number		Report date	08-Oct-2018/17:56
		Annex	A,B,C,D
Sampled by		Page	5/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	1,2-Dichlorobenzene	µg/L	<0.10
Q	1,3-Dichlorobenzene	µg/L	<0.10
Q	1,4-Dichlorobenzene	µg/L	<0.10
Q	Dichlorobenzenes (sum)	µg/L	<0.30
	Chlorophenols		
Q	o-Chlorophenol	µg/L	<0.1
Q	m-Chlorophenol	µg/L	<0.02
Q	p-Chlorophenol	µg/L	<0.02
Q	Monochlorophenols (sum)	µg/L	<0.14
Q	2,3-Dichlorophenol	µg/L	<0.02
Q	2,4/2,5-Dichlorophenol	µg/L	<0.01
Q	2,6-Dichlorophenol	µg/L	<0.03
Q	3,4-Dichlorophenol	µg/L	<0.02
Q	3,5-Dichlorophenol	µg/L	<0.03
Q	Dichlorophenols (sum)	µg/L	<0.11
Q	2,3,4-Trichlorophenol	µg/L	<0.02
Q	2,3,5-/2,4,5-Trichlorophenol	µg/L	<0.02
Q	2,3,6-Trichlorophenol	µg/L	<0.01
Q	2,4,6-Trichlorophenol	µg/L	<0.05
Q	3,4,5-Trichlorophenol	µg/L	<0.01
Q	Trichlorophenols (sum)	µg/L	<0.11
Q	2,3,4,5-Tetrachlorophenol	µg/L	<0.01
Q	2,3,4,6 / 2,3,5,6-Tetrachlorophenol	µg/L	<0.020
Q	Tetrachlorophenols (sum)	µg/L	<0.03
Q	Pentachlorophenol	µg/L	<0.010
Q	4-Chloro-3-methylphenol	µg/L	<0.02
	PolyChlorinated Biphenyl (PCB)		
Q	PCB 28	µg/L	<0.01
Q	PCB 52	µg/L	<0.01
Q	PCB 101	µg/L	<0.01
Q	PCB 118	µg/L	<0.01

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Your project name		Start date	03-Oct-2018
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		Annex	A,B,C,D
Sampled by		Page	6/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	PCB 138	µg/L	<0.01
Q	PCB 153	µg/L	<0.01
Q	PCB 180	µg/L	<0.01
Q	PCB (6) (sum)	µg/L	<0.06
Q	PCB (7) (sum)	µg/L	<0.07
	Chloronitrobenzenes		
Q	o/p-Chloronitrobenzene	µg/L	<0.20
Q	m-Chloronitrobenzene	µg/L	<0.20
Q	Monochloronitrobenzenes (sum)	µg/L	<0.40
Q	2,3-Dichloronitrobenzene	µg/L	<0.1
Q	2,4-Dichloronitrobenzene	µg/L	<0.1
Q	2,5-Dichloronitrobenzene	µg/L	<0.1
Q	3,4-Dichloronitrobenzene	µg/L	<0.1
Q	3,5-Dichloronitrobenzene	µg/L	<0.06
Q	Dichloronitrobenzenes (sum)	µg/L	<0.46
	Miscellaneous Chlor. HCs		
Q	2-Chlorotoluene	µg/L	<0.1
Q	4-Chlorotoluene	µg/L	<0.1
Q	Chlorotoluenes (sum)	µg/L	<0.2
Q	1-Chloronaphtalene	µg/L	<0.02
	Organic Chlorinated Pesticides		
Q	4,4 -DDE	µg/L	<0.01
Q	2,4 -DDE	µg/L	<0.01
Q	4,4 -DDT	µg/L	<0.20
Q	4,4 -DDD + 2,4 -DDT	µg/L	<0.02
Q	2,4 -DDD	µg/L	<0.01
Q	DDT/DDE/DDD (sum)	µg/L	<0.25
Q	Aldrin	µg/L	<0.02
Q	Dieldrin	µg/L	<0.02
Q	Endrin	µg/L	<0.02

No.	Sample description	Date sampling	Sample nr.
1	WQ-01	02-Oct-2018	10334432

Q: Dutch Accreditation Council (RvA) accredited test
A: AP04 accredited test
S: AS SIKB recognized test
V: VLAREL recognized test
M: MCERTS accredited

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BNP Paribas S.A. 227 9245 25
IBAN: NL71BNPA0227924525
BIC: BNPANL2A
KvK/CoC No. 09088623
BTW/VAT No. NL 8043.14.883.B01

Certificate of analysis

Your project number	W01	Certificate number/Version	2018143371/1
Your project name		Start date	03-Oct-2018
Your order number		Report date	08-Oct-2018/17:56
		Annex	A,B,C,D
Sampled by		Page	7/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	Sum Drins	µg/L	<0.06
Q	alfa-HCH	µg/L	<0.08
Q	beta-HCH	µg/L	<0.07
Q	gamma-HCH	µg/L	<0.10
Q	delta-HCH	µg/L	<0.04
Q	Sum 4 HCH-compounds	µg/L	<0.29
Q	a-Endosulfan	µg/L	<0.05
Q	a-Endosulfansulphate	µg/L	<0.03
Q	a-Chlordan	µg/L	<0.01
Q	y-Chlordan	µg/L	<0.01
Q	Chlordans (sum)	µg/L	<0.02
Q	Heptachlor	µg/L	<0.01
Q	Heptachloroepoxide	µg/L	<0.03
Q	Hexachlorobutadiene	µg/L	<0.10
Q	Isodrin	µg/L	<0.10
Q	Telodrin	µg/L	<0.07
Q	Tedion	µg/L	<0.07
	Phosphor pesticides		
Q	Azinphos-ethyl	µg/L	<0.1
Q	Azinphos-methyl	µg/L	<0.07
Q	Bromophos-ethyl	µg/L	<0.07
Q	Bromophos-methyl	µg/L	<0.06
Q	Chloropyriphos-ethyl	µg/L	<0.06
Q	Chloropyriphos-methyl	µg/L	<0.1
Q	Cumaphos	µg/L	<0.02
Q	Demeton-S/Demeton-O-ethyl	µg/L	<0.1
Q	Diazinone	µg/L	0.2
Q	Dichlorovos	µg/L	<0.1
Q	Disulphotone	µg/L	<0.04
Q	Fenitrothion	µg/L	<0.1
Q	Fenthion	µg/L	<0.1

No.	Sample description	Date sampling	Sample nr.
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TESTING
RvA L010

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Certificate of analysis

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Your order number		Report date	08-Oct-2018/17:56
		Annex	A,B,C,D
Sampled by		Page	8/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	Malathion	µg/L	<0.1
Q	Parathion-ethyl	µg/L	<0.2
Q	Parathion-methyl	µg/L	<0.2
Q	Pyrazophos	µg/L	<0.2
Q	Triazophos	µg/L	<0.2
	Nitrogen pesticides		
Q	Ametryn	µg/L	<0.10
Q	Atrazin	µg/L	<0.08
Q	Cyanazine	µg/L	<0.1
Q	Desmetryn	µg/L	<0.10
Q	Prometryn	µg/L	<0.10
Q	Propazine	µg/L	<0.08
Q	Simazine	µg/L	<0.20
Q	Terbuthylazine	µg/L	<0.06
Q	Terbutryn	µg/L	<0.10
	Miscellaneous pesticides		
Q	Bifenthrine	µg/L	<0.08
Q	Carbaryl	µg/L	<0.10
Q	Cypermethrin A,B, C and D	µg/L	<0.20
Q	Deltamethrin	µg/L	<0.20
Q	Linuron	µg/L	<0.10
Q	Permethrin A	µg/L	<0.06
Q	Permethrin B	µg/L	<0.06
Q	Permethrins (sum)	µg/L	<0.12
Q	Propachlor	µg/L	<0.02
Q	Trifluralin	µg/L	<0.02
	Miscellaneous Organic compounds		
Q	Biphenyl	µg/L	<0.01
Q	Nitrobenzene	µg/L	<0.3
Q	Dibenzofurane	µg/L	<0.1

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Certificate of analysis

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		Annex	A,B,C,D
Sampled by		Page	9/9
Sample matrix	Surface water		

	Analysis	Unit	1
	Petroleum Hydrocarbons		
	TPH C10-C12	µg/L	<10
	TPH C12-C16	µg/L	<15
	TPH C16-C21	µg/L	16
	TPH C21-C30	µg/L	79
	TPH C30-C35	µg/L	45
	TPH C35-C40	µg/L	26
Q	TPH (sum C10-C40)	µg/L	180

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RvA L010

TERRATTEST® INTEGRAL SOILANALYSIS

TERRATTEST SPECTRUM SHEET 7.23

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ACC. S	ACC. W		TERRATTEST 7.23 REPORTING LIMIT soil mg/kg d.w.	ground water µg/l
		Characteristics		
Q		Dry weight (% m/m)	0,5	-
Q		Clay content (% m/m)	2	-
Q		Organic matter	0,5	-
	Q	pH	-	02-12
	Q	Conductivity (mS/m)	-	10
		Metals		
Q	Q	Arsenic	3	3
Q	Q	Antimony	3	5
Q	Q	Barium	2	1
Q	Q	Beryllium	1	1
Q	Q	Cadmium	0,3	0,4
Q	Q	Chromium	3	2
Q	Q	Cobalt	2	1
Q	Q	Copper	3	3
Q	Q	Mercury	0,05	0,04
Q	Q	Lead	3	3
Q	Q	Molybdenum	1	2
Q	Q	Nickel	2	2
Q	Q	Selenium	5	5
Q	Q	Tin	5	5
Q	Q	Vanadium	2	2
Q	Q	Zinc	10	5
		Aromatic compounds		
		Mono Aromatic Hydrocarbons		
Q	Q	Benzene	0,1	0,1
Q	Q	Ethylbenzene	0,2	0,1
Q	Q	Toluene	0,2	0,1
Q	Q	o-Xylene	0,2	0,1
Q	Q	m/p-Xylene	0,1	0,1
Q	Q	Xylenes (sum)	Σ	Σ
Q	Q	Styrene	0,2	0,1
Q	Q	1,2,4-Trimethylbenzene	0,05	0,1
Q	Q	1,3,5-Trimethylbenzene	0,05	0,1
Q	Q	n-Propylbenzene	0,05	0,1
Q	Q	Isopropylbenzene	0,05	0,1
Q	Q	n-Butylbenzene	0,05	0,1
Q	Q	sec-Butylbenzene	0,05	0,1
Q	Q	tert-Butylbenzene	0,05	0,1
Q	Q	p-Isopropyltoluene	0,05	0,1
		Phenols		
Q	Q	Phenol	0,01	0,5
Q	Q	o-Cresol	0,01	0,3
Q	Q	m-Cresol	0,01	0,3
Q	Q	p-Cresol	0,01	0,2
Q	Q	Cresoles (sum)	Σ	Σ
Q	Q	2,4-Dimethylphenol	0,01	0,02
Q	Q	2,5-Dimethylphenol	0,01	0,02
Q	Q	2,6-Dimethylphenol	0,01	0,03
Q	Q	3,4-Dimethylphenol	0,01	0,02
Q	Q	o-Ethylphenol	0,02	0,03
Q	Q	m-Ethylphenol	0,01	0,02
Q	Q	Thymol	0,01	0,01
Q	Q	4-Ethyl/2,3 ; 3,5 Dimethylphenol	0,01	0,02
		PAH		
Q	Q	Naphthalene	0,01	0,4
Q	Q	Acenaphthylene	0,01	0,04
Q	Q	Acenaphthene	0,01	0,1
Q	Q	Fluorene	0,01	0,01
Q	Q	Phenanthrene	0,01	0,02
Q	Q	Anthracene	0,01	0,01
Q	Q	Fluoranthene	0,01	0,02
Q	Q	Pyrene	0,01	0,06
Q	Q	Benzo(a)anthracene	0,01	0,04
Q	Q	Chrysene	0,01	0,02
	Q	Benzo(b/k)fluoranthene	-	0,06
Q		Benzo(b)fluoranthene	0,01	-
Q		Benzo(k)fluoranthene	0,01	-
Q	Q	Benzo(a)pyrene	0,01	0,1
Q	Q	Benzo(ghi)perylene	0,01	0,1
Q	Q	Dibenzo(ah)anthracene	0,01	0,08
Q	Q	Indeno(123cd)pyrene	0,01	0,06
Q	Q	PAHs (sum 10 Dutch VROM)	Σ	Σ
Q	Q	PAHs (sum 16 US EPA)	Σ	Σ
		Halogenated hydrocarbons		
		Volatile halogenated HC's		
	Q	Chloromethane	-	0,2
	Q	Dichloromethane	-	0,2
	Q	Vinylchlorine	-	0,2
	Q	1,1 Dichloroethene	-	0,1
	Q	tr-1,2 Dichloroethene	-	0,1
	Q	cis -1,2 Dichloroethene	-	0,1
	Q	Chloroethane	-	0,1
	Q	Trichlorofluoromethane	-	0,1
	Q	Trichloromethane (chloroform)	-	0,2
Q	Q	Tetrachloromethane (tetra)	0,05	0,1
	Q	1,1 Dichloroethane	-	0,1
Q	Q	1,2 Dichloroethane	0,1	0,1
Q	Q	1,1,1-Trichloroethan	0,05	0,1
Q	Q	1,1,2-Trichloroethane	0,05	0,1
Q	Q	Trichloroethanes (sum)	Σ	Σ
Q	Q	1,1,1,2-Tetrachloroethane	0,05	0,1
Q	Q	1,1,2,2-Tetrachloroethane	0,05	0,1
Q	Q	Tetrachloroethanes (sum)	Σ	Σ
Q	Q	Trichloroethene	0,2	0,1
Q	Q	Tetrachloroethene	0,2	0,1
	Q	2,2-Dichloropropane	-	0,1
Q	Q	1,2-Dichloropropane	0,05	0,1
Q	Q	1,3-Dichloropropane	0,05	0,1
Q	Q	1,2,3-Trichloropropane	0,05	0,1
Q	Q	1,1-Dichloropropylene	0,1	0,1
Q	Q	cis 1,3-Dichloropropylene	0,05	0,1
Q	Q	trans 1,3-Dichloropropylene	0,05	0,1
Q	Q	1,3-Dichloropropylenes (sum)	Σ	Σ
	Q	Bromomethane	-	0,1
	Q	Bromochloromethane	-	0,1
Q	Q	Dibromomethane	0,05	0,1
Q	Q	1,2-Dibromoethane	0,05	0,1
Q	Q	Tribromomethane (Bromoform)	0,05	0,1
Q	Q	Bromodichloromethane	0,1	0,1
Q	Q	Dibromochloromethane	0,05	0,1
Q	Q	1,2-Dibromo-3-chloropropane	0,05	0,1
Q	Q	Bromobenzene	0,05	0,1
		Chlorinated Benzenes		
Q	Q	Monochlorbenzene	0,01	0,05
Q	Q	1,2-Dichlorobenzene	0,01	0,1
Q	Q	1,3-Dichlorobenzene	0,01	0,1
Q	Q	1,4-Dichlorobenzene	0,01	0,1
Q	Q	Dichlorobenzenes (sum)	Σ	Σ
Q	Q	1,2,3-Trichlorobenzene	0,01	0,1
Q	Q	1,2,4-Trichlorobenzene	0,01	0,1
Q	Q	1,3,5-Trichlorobenzene	0,003	0,01
Q	Q	Trichloorbenzene (sum)	Σ	Σ
Q	Q	1,2,3,4-Tetrachlorobenzene	0,003	0,02
Q	Q	1,2,3,5/1,2,4,5-Tetrachlorobenzene	0,002	0,02
Q	Q	Tetrachlorobenzenes (sum)	Σ	Σ
Q	Q	Pentachlorobenzene	0,002	0,01
Q	Q	Hexachlorobenzene	0,002	0,03
		Chlorinated Phenols		
Q	Q	o-Chlorophenol	0,01	0,1
Q	Q	m-Chlorophenol	0,01	0,02
Q	Q	p-Chlorophenol	0,01	0,02
Q	Q	Monochlorophenols (sum)	Σ	Σ
Q	Q	2,3-Dichlorophenol	0,002	0,02
Q	Q	2,4/2,5-Dichlorophenol	0,001	0,01
Q	Q	2,6-Dichlorophenol	0,001	0,03
Q	Q	3,4-Dichlorophenol	0,002	0,02
Q	Q	3,5-Dichlorophenol	0,001	0,03
Q	Q	Dichlorophenols (sum)	Σ	Σ
Q	Q	2,3,4-Trichlorophenol	0,01	0,02
	Q	2,3,5 / 2,4,5-Trichlorophenol	-	0,02
Q		2,3,5-Trichlorophenol	0,001	-
Q	Q	2,3,6-Trichlorophenol	0,001	0,01
Q		2,4,5-Trichlorophenol	0,001	-
Q	Q	2,4,6-Trichlorophenol	0,001	0,05
Q	Q	3,4,5-Trichlorophenol	0,002	0,01
Q	Q	Trichlorophenols (sum)	Σ	Σ
Q	Q	2,3,4,5-Tetrachlorophenol	0,002	0,01
Q	Q	2,3,4,6/2,3,5,6-Tetrachlorophenol	0,01	0,02
Q	Q	Tetrachlorophenols (sum)	Σ	Σ
Q	Q	Pentachlorophenol	0,001	0,01
Q	Q	4-Chloro-3-methylphenol	0,001	0,02
		PCB		
Q	Q	PCB 28	0,002	0,01
Q	Q	PCB 52	0,002	0,01
Q	Q	PCB 101	0,002	0,01
Q	Q	PCB 118	0,002	0,01
Q	Q	PCB 138	0,005	0,01
Q	Q	PCB 153	0,005	0,01
Q	Q	PCB 180	0,002	0,01
Q	Q	PCB (sum 6)	Σ	Σ
Q	Q	PCB (sum 7)	Σ	Σ
		Chloronitrobenzenes		
Q	Q	o/p-Chloronitrobenzene	0,01	0,2
Q	Q	m-Chloronitrobenzene	0,01	0,2
Q	Q	Monochloronitrobenzenes (sum)	Σ	Σ
Q		2,3 / 3,4-Dichloronitrobenzene	0,01	-
Q	Q	2,3-Dichloronitrobenzene	-	0,1
Q	Q	2,4-Dichloronitrobenzene	0,02	0,1
Q	Q	2,5-Dichloronitrobenzene	0,01	0,1
Q	Q	3,4-Dichloronitrobenzene	-	0,1
Q	Q	3,5-Dichloronitrobenzene	0,02	0,06
Q	Q	Dichloronitrobenzenes (sum)	Σ	Σ
		Miscellaneous Chlor. HCs		
Q	Q	2-Chlorotoluene	0,01	0,1
Q	Q	4-Chlorotoluene	0,01	0,1
Q	Q	Chlorotoluenes (sum)	Σ	Σ
Q	Q	1-Chloronaphthalene	0,005	0,02
		Pesticides		
		Chlorine pesticides		
Q	Q	4,4-DDE	0,001	0,01
Q	Q	2,4-DDE	0,001	0,01
Q	Q	4,4-DDT	0,002	0,2
Q	Q	4,4-DDD/2,4-DDT	0,001	0,02
Q	Q	2,4-DDD	0,001	0,01
Q	Q	DDT/DDE/DDD (sum)	Σ	Σ
Q	Q	Aldrin	0,002	0,02
Q	Q	Dieldrin	0,002	0,02
Q	Q	Endrin	0,005	0,02
Q	Q	Drins (sum)	Σ	Σ
Q	Q	alfa-HCH	0,05	0,08
Q	Q	beta-HCH	0,005	0,07
Q	Q	gamma-HCH	0,005	0,1
	Q	delta-HCH	0,02	0,04
Q	Q	HCH (sum)	Σ	Σ
	Q	Alfa-endosulfan	0,01	0,05
Q	Q	Alfa-endosulfansulphate	0,02	0,03
Q	Q	Alfa-chlordane	0,002	0,01
Q	Q	Gamma-chlordane	0,002	0,01
Q	Q	Chlordanes (sum)	Σ	Σ
Q	Q	Heptachlor	0,002	0,01
Q	Q	Heptachloroepoxide	0,005	0,03
Q	Q	Isodrin	0,005	0,1
Q	Q	Hexachlorobutadiene	0,002	0,1
Q	Q	Telodrin	0,005	0,07
Q	Q	Tedion	0,005	0,07
		Phosphor pesticides		
Q	Q	Azinphos-ethyl	0,005	0,1
Q	Q	Azinphos-methyl	0,005	0,07
Q	Q	Bromophos-ethyl	0,02	0,07
Q	Q	Bromophos-methyl	0,02	0,06
Q	Q	Chloropyrophos-ethyl	0,01	0,06
Q	Q	Chloropyrophos-methyl	0,01	0,1
Q	Q	Cumaphos	0,005	0,02
Q	Q	Demeton-S /Demeton-O (ethyl)	0,02	0,1
Q	Q	Diazinon	0,005	0,04
	Q	Dichlorovos	-	0,1
Q	Q	Disulfoton	0,02	0,04
Q	Q	Fenitrothion	0,005	0,1
Q	Q	Fenthion	0,002	0,1
Q	Q	Malathion	0,005	0,1
Q	Q	Parathion-ethyl	0,005	0,2
Q	Q	Parathion-methyl	0,01	0,2
Q	Q	Pyrazophos	0,005	0,2
Q	Q	Triazophos	0,02	0,2
		Nitrogen pesticides		
Q	Q	Ametryne	0,01	0,1
Q	Q	Atrazine	0,02	0,08
Q	Q	Cyanazine	0,02	0,1
Q	Q	Desmetryne	0,005	0,1
Q	Q	Prometryne	0,02	0,1
Q	Q	Propazine	0,02	0,08
Q	Q	Simazine	0,02	0,2
Q	Q	Terbuthylazine	0,02	0,06
Q	Q	Terbutryne	0,05	0,1
		Miscellaneous pesticides		
Q	Q	Bifenthrin	0,005	0,08
	Q	Carbaryl	-	0,1
Q	Q	Cypermethrin (A,B,C,D)	0,05	0,2
Q	Q	Deltamethrin	0,01	0,2
	Q	Linuron	-	0,1
	Q	Permethrin A	-	0,06
	Q	Permethrin B	-	0,06
Q	Q	Permethrin (sum A+B)	0,01	Σ
Q	Q	Propachloor	0,02	0,02
Q	Q	Trifluralin	0,005	0,02
		Miscellaneous HCs		
Q	Q	Biphenyl	0,005	0,01
Q	Q	Nitrobenzene	0,1	0,3
Q	Q	Dibenzofurane	0,01	0,1
		Phthalates		
Q		Dimethylphthalate	0,2	-
Q		Diethylphthalate	0,2	-
Q		Di-isobutylphthalate	0,5	-
Q		Dibutylphthalate	0,5	-
Q		Butylbenzylphthalate	0,2	-
Q		Bis(ethylhexyl)phthalate	0,2	-
Q		Di-n-octylphthalate	0,2	-
Q		Phthalates (sum)	Σ	-
		Total Petroleum Hydrocarbons		
		C10-C12	3	10
		C12-C16	5	15
		C16-C21	6	15
		C21-C30	12	20
		C30-C35	6	20
		C35-C40	6	20
Q	Q	TPH (sum C10-C40)	38	100

ILACO Suriname N.V.
Att. Shastria Narain
SV Voorwaartslaan 18
not applic PARAMARIBO
SURINAME

Certificate of analysis

Date: 12-Oct-2018

Please find enclosed the analytical results of the test carried out for the project.

Certificate number/Version	2018145465/1
Your project number	ESIA of the uitkijk ADP 2
Your project name	IS-344
Your order number	
Samples received on	05-Oct-2018

This Certificate of Analysis shall not be reproduced except in full, without written approval of the laboratory. Interpretations and opinions are outside the scope of our accreditation, and all results relate only to samples supplied.

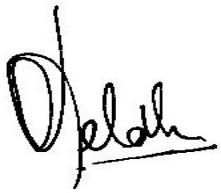
Soil samples will be stored for a period of 4 weeks and water samples for a period of 2 weeks after receipt of the samples at our laboratory. Without any additional request, samples will be disposed when the above mentioned periods have expired. If you require Eurofins Analytico to store the samples for a longer period, please complete this page and return it to Eurofins Analytico at least one businessday before the period is due to expire.
The costs of prolonged storage periods may be found in our pricelist.

Storage period:
Date: Name: Signature:

We are confident that we have performed the order in accordance with your expectations. If you have any remaining questions concerning this Certificate of Analysis, please don't hesitate to contact our Customer Service.

Yours sincerely,

Eurofins Analytico B.V.



Ing. A. Veldhuizen
Technical Manager

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Certificate of analysis

Your project number	ESIA of the uitkiik ADP 2	Certificate number/Version	2018145465/1
Your project name	IS-344	Start date	09-Oct-2018
Your order number		Report date	12-Oct-2018/13:53
		Annex	A,B,C,D
Sampled by		Page	1/1
Sample matrix	Surface water		

	Analysis	Unit	1
	Sample Pre-treatment		
	Physical and chemical analyses		
	EC-temp. corr. factor (mathematical)		1.096
Q	Electric conductivity 25 °C	µS/cm	460
Q	Electric conductivity 25 °C	mS/m	46
Q	Electric conductivity 20°C	mS/m	41
	Measuring temperature (EC)	°C	20.8
	Measuring temperature (pH)	°C	19.4
Q	pH		5.7
	Metals		
Q	Barium (Ba)	µg/L	7.2
Q	Zinc (Zn)	µg/L	30
	Volatile Organic Hydrocarbons		
	Phenols		
	Polycyclic Aromatic Hydrocarbons		
	Volatile halogenated Hydrocarbons		
Q	Chloromethane	µg/L	0.80
	Chlorobenzenes		
	Chlorophenols		
	PolyChlorinated Biphenyl (PCB)		
	Organic Chlorinated Pesticides		
	Phosphor pesticides		
Q	Diazinone	µg/L	0.06
	Miscellaneous Organic compounds		
Q	Biphenyl	µg/L	0.04
	Petroleum Hydrocarbons		

No.	Sample description	Date sampling	Sample nr.
1	WQ-13	05-Oct-2018	10340841

Q: Dutch Accreditation Council (RvA) accredited test
A: AP04 accredited test
S: AS SIKB recognized test
V: VLAREL recognized test
M: MCERTS accredited

Verified
ASM

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KvK/CoC No. 09088623
BTW/VAT No. NL 8043.14.883.B01

TESTING
RvA L010

Annex (A) concerning subsample information referring to certificate of analysis 2018145465/1

Sample nr.	Drill-#	Description	From	To	Barcode	Sampling ID / Sample descriptio
10340841					W00035172	WQ-13

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Annex (B) concerning remarks referring to certificate of analysis 2018145465/1

General remark referring to certificate of analysis

Other components are possibly present at concentrations below the reporting limit

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Annex (C): method references belonging to certificate of analysis 2018145465/1

Analysis	Method	Technique	Method reference
Conductivity	W0506	Conductometry	I.a.w. NEN-ISO 7888
Acidity (pH)	W0524	Potentiometry	I.a.w. EN-ISO 10523
TerrAttesT metals	W0421	ICP-MS	Acc. NEN-EN-ISO 17294-2 / CMA2/I/B.5
Chloromethane (TAT)	W0254	HS-GC/MS	TerrAttesT
Phosphorpesticides (TAT)	W6336	GC-MS	TerrAttesT
Other organic pollutants (TAT)	W6336	GC-MS	TerrAttesT

Additional information about the applied methods as well as the classification of the accuracy, are listed in our supplement: "Specification of methods of analyses", version June 2016.

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Annex (D) remarks concerning the sampling and preservation period 2018145465/1

Non compliance(s) of the criteria is(are) observed that may have influenced the accuracy of the test results of samples mentioned below.

	Sample nr.
The temperature of the samples received at the laboratory, exceeded the limit.	10340841

Analysis	Sample nr.
The preservation term for this parameter has been expired.	
pH	10340841
Electric conductivity 25 °C	10340841

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BTW/VAT No. NL 8043.14.883.B01

Certificate number/Version	2018145465/1
Your project number	ESIA of the uitkijk ADP 2
Your project name	IS-344
Your order number	

Informative Annex :

Below the calculated measurement uncertainty of the individual analyses is given. The expanded measurement uncertainty is given as an interval within which the value obtained with the method applied is expected to lie with a certainty of 95%. The expanded uncertainty is expressed as a percentage (Urel).

On an international level there is as yet no final consensus as to how measured uncertainty should be calculated. Listed values are calculated against currently most up-to-date definition:
Urel = 2*sqrt(CVRw2 + drel2)

CVRw = within-laboratory reproducibility coefficient of variation.
drel (%) = relative bias

NOTE 1: The influence of sample inhomogeneity on the measurement uncertainty cannot be quantified in general terms. Therefore possible influences of sample inhomogeneity on individual samples is not incorporated in the below listed values.

Version : 05 Dec 2017

Analysis	CVRw (%)	drel (%)	Urel (%)
Physical and chemical analyses			
Electric conductivity 25 °C	0.50	-2.5	5.1
pH	0.080	-0.10	0.26
Metals			
Arsenic (As)	2.6		5.2
Antimony (Sb)	7.3		15
Barium (Ba)	1.7		3.4
Beryllium (Be)	3.7		7.4
Cadmium (Cd)	2.3		4.6
Chromium (Cr)	2.5		5.0
Cobalt (Co)	2.5		5.0
Copper (Cu)	2.2		4.4
Mercury (Hg)	7.5		15
Lead (Pb)	2.0		4.0
Molybdenum (Mo)	2.3		4.6
Nickel (Ni)	2.3		4.6
Selenium (Se)	4.9		9.8
Tin (Sn)	3.3		6.6
Vanadium (V)	2.9		5.8
Zinc (Zn)	2.0		4.0

Analysis	CVRw (%)	drel (%)	Urel (%)
Volatile Organic Hydrocarbons			
Benzene	2.6	-8.2	17
Ethylbenzene	3.1	-2.0	7.4
Toluene	1.9	-15	30
o-Xylene	4.3	-1.0	8.8
m,p-Xylene	3.8	-6.0	14
Styrene	4.3	-8.0	18
1,2,4-Trimethylbenzene	5.8	-12	27
1,3,5-Trimethylbenzene	7.1	-13	30
n-Propylbenzene	3.7	-5.0	12
Isopropylbenzene	2.9	-3.0	8.3
n-Butylbenzene	4.4	-8.0	18
sec-Butylbenzene	4.3	-8.0	18
tert-Butylbenzene	4.9	-8.0	19
p-Cymene	6.0	-11	25
Phenols			
Phenol	7.6	-0.80	15
o-Cresol	12	6.3	27
m-Cresol	7.5	10	25
p-Cresol	5.7	11	25
Cresols (sum)	7.6	9.1	24
2,4-Dimethylphenol	12	9.2	29
2,5-Dimethylphenol	11	-0.50	23
2,6-Dimethylphenol	19	3.5	38
3,4-Dimethylphenol	5.5	5.7	16
o-Ethylphenol	11	2.5	22
m-Ethylphenol	10	1.8	21
Thymol	7.6	6.1	19
2,3/3,5-Dimethylphenol + 4-Ethylphenol	8.2	6.3	21
Polycyclic Aromatic Hydrocarbons			
Naphtalene	11	0.0	22
Acenaphtylene	6.0	3.8	14
Acenaphtene	5.7	7.8	19
Fluorene	3.8	12	25
Phenanthrene	6.7	-2.6	14
Anthracene	9.2	-17	39

Certificate number/Version 2018145465/1
Your project number ESIA of the uitkijk ADP 2
Your project name IS-344
Your order number

Analysis	CVRw (%)	drel (%)	Urel (%)
Fluoranthene	12	-0.20	24
Pyrene	3.8	4.4	12
Benzo(a)anthracene	11	-4.0	24
Chrysene	6.1	3.2	14
Benzo(b+k)fluoranthene	9.8	0.0	20
Benzo(a)pyrene	11	0.0	22
Dibenzo(ah)anthracene	8.1	0.0	16
Benzo(ghi)perylene	7.5	0.0	15
Indeno(123cd)pyrene	5.0	0.0	10
Volatile halogenated Hydrocarbons			
Chloromethane	8.0	1.0	16
Dichloromethane	7.4	0.0	15
Vinyl chloride	6.5	0.0	13
1,1-Dichloroethene	3.1	0.0	6.2
trans 1,2-Dichloroethene	3.6	6.0	14
cis1,2-Dichloroethene	3.4	4.0	10
Chloroethane	5.6	0.0	11
Trichlorofluoromethane	5.6	3.0	13
Trichloromethane	5.0	6.0	16
Tetrachloromethane	5.5	6.0	16
1,1-Dichloroethane	3.6	4.0	11
1,2-Dichloroethane	5.8	1.0	12
1,1,1-Trichloroethane	4.6	3.0	11
1,1,2-Trichloroethane	4.1	1.0	8.4
1,1,1,2-Tetrachloroethane	5.2	3.0	12
1,1,2,2-Tetrachloorethane	12	14	36
Trichloroethene	13	3.0	26
Tetrachloroethene	3.2	4.0	10
2,2-Dichloropropane	10	6.0	24
1,2-Dichloropropane	5.3	0.0	11
1,3-Dichloropropane	6.4	4.0	15
1,2,3-Trichloropropane	6.5	2.0	14
1,1-Dichloro-1-propene	4.2	1.0	8.6
cis1,3-Dichloropropene	3.8	-1.0	7.9
trans1,3-Dichloropropene	3.2	0.0	6.4
Bromomethane	12	0.0	23
Bromochloromethane	3.9	1.0	8.1
Dibromomethane	4.9	2.0	11

Analysis	CVRw (%)	drel (%)	Urel (%)
1,2-Dibromoethane	5.4	0.0	11
Tribromomethane	5.0	2.0	11
Bromodichloromethane	5.3	2.0	11
Dibromochloromethane	3.8	2.0	8.6
1,2-Dibromo-3-chloropropane	11	0.0	22
Bromobenzene	4.8	-2.0	10
Chlorobenzenes			
Monochlorobenzene	2.5	6.0	13
1,2,3-Trichlorobenzene	3.9	0.0	7.8
1,2,4-Trichlorobenzene	3.7	1.0	7.7
1,3,5-Trichlorobenzene	9.1	-15	35
1,2,3,4-Tetrachlorobenzene	8.9	-15	35
1245&1235 Tetrachlorobenzene	5.7	-15	32
Pentachlorobenzene	3.5	-15	31
Hexachlorobenzene	6.7	-14	31
1,2-Dichlorobenzene	3.9	0.0	7.8
1,3-Dichlorobenzene	4.1	-3.0	10
1,4-Dichlorobenzene	4.5	-4.0	12
Chlorophenols			
o-Chlorophenol	9.0	-1.6	18
m-Chlorophenol	12	-8.1	29
p-Chlorophenol	10	-18	41
Monochlorophenols (sum)	10	-9.3	28
2,3-Dichlorophenol	9.8	-4.4	21
2,4/2,5-Dichlorophenol	4.0	-4.4	12
2,6-Dichlorophenol	9.4	6.3	23
3,4-Dichlorophenol	9.2	-2.5	19
3,5-Dichlorophenol	14	-3.7	29
Dichlorophenols (sum)	9.7	-1.7	20
2,3,4-Trichlorophenol	9.6	-1.5	19
2,3,5-/2,4,5-Trichlorophenol	6.5	-0.10	13
2,3,6-Trichlorophenol	5.7	0.70	11
2,4,6-Trichlorophenol	6.0	-3.4	14
3,4,5-Trichlorophenol	6.7	-1.7	14
Trichlorophenols (sum)	7.0	-1.2	14
2,3,4,5-Tetrachlorophenol	6.0	-4.4	15
2,3,4,6 / 2,3,5,6-Tetrachlorophenol	6.0	-4.4	15

Analysis	CVRw (%)	drel (%)	Urel (%)
Tetrachlorophenols (sum)	6.0	-1.7	12
Pentachlorophenol	4.5	-28	57
4-Chloro-3-methylphenol	8.9	-4.4	20
PolyChlorinated Biphenyl (PCB)			
PCB 28	5.4	-13	28
PCB 52	3.5	-15	31
PCB 101	6.3	-23	48
PCB 118	7.0	-18	39
PCB 138	4.1	-32	65
PCB 153	5.1	-29	59
PCB 180	5.7	-37	75
Chloronitrobenzenes			
o/p-Chloronitrobenzene	14	2.6	29
m-Chloronitrobenzene	14	3.1	29
2,3-Dichloronitrobenzene	7.1	0.50	14
2,4-Dichloronitrobenzene	7.1	-0.60	14
2,5-Dichloronitrobenzene	7.0	2.5	15
3,4-Dichloronitrobenzene	7.1	-3.8	16
3,5-Dichloronitrobenzene	8.6	3.4	18
Miscellaneous Chlor. HCs			
2-Chlorotoluene	4.4	-6.0	15
4-Chlorotoluene	5.0	-8.0	19
1-Chloronaphtalene	6.3	2.1	13
Organic Chlorinated Pesticides			
4,4 -DDE	4.5	-16	33
2,4 -DDE	5.7	-11	25
4,4 -DDT	8.5	-15	34
4,4 -DDD + 2,4 -DDT	4.1	-8.1	18
2,4 -DDD	5.1	-6.5	17
Aldrin	5.1	-8.3	19
Dieldrin	6.3	-2.1	13
Endrin	12	-6.7	27
alfa-HCH	5.1	2.5	11
beta-HCH	4.7	-11	24
gamma-HCH	6.3	-1.2	13

Analysis	CVRw (%)	drel (%)	Urel (%)
delta-HCH	3.5	-4.4	11
a-Endosulfan	6.3	-3.1	14
a-Endosulfansulphate	6.7	-9.0	22
a-Chlordan	5.1	-9.0	21
y-Chlordan	6.3	-9.0	22
Heptachlor	6.3	-25	52
Heptachloroepoxide	10	-5.3	23
Hexachlorobutadiene	12	5.1	26
Isodrin	6.3	-11	25
Telodrin	5.5	-26	53
Tedion	4.7	-9.0	20
Phosphor pesticides			
Azinphos-ethyl	7.9	-40	82
Azinphos-methyl	10	-32	67
Bromophos-ethyl	4.1	-14	29
Bromophos-methyl	4.5	-14	29
Chloropyriphos-ethyl	4.0	-13	27
Chloropyriphos-methyl	5.4	-14	30
Cumaphos	6.5	-38	77
Demeton-S/Demeton-O-ethyl	11	-14	36
Diazinone	3.0	5.0	12
Dichlorovos	6.5	-7.8	20
Disulphotone	15	-87	180
Fenitrothion	11	-13	34
Fenthion	5.7	-11	25
Malathion	5.4	-7.8	19
Parathion-ethyl	13	-24	55
Parathion-methyl	11	-6.0	25
Pyrazophos	11	-21	48
Triazophos	8.5	-20	43
Nitrogen pesticides			
Ametryn	6.7	7.8	21
Atrazin	4.5	-17	35
Cyanazine	6.3	7.8	20
Desmetryn	6.4	7.8	20
Prometryn	6.7	-34	69
Propazine	5.4	1.7	11

Analysis	CVRw (%)	drel (%)	Urel (%)
Simazine	12	16	40
Terbuthylazine	3.2	0.50	6.5
Terbutryn	6.0	-23	48
Miscellaneous pesticides			
Bifenthrine	5.5	-7.8	19
Carbaryl	7.1	-1.3	14
Cypermethrin A,B, C and D	8.9	5.2	21
Deltamethrin	14	7.4	31
Linuron	11	3.2	23
Permethrin A	5.1	-4.8	14
Permethrin B	5.1	-4.8	14
Permethrins (sum)	5.1	-4.2	13
Propachlor	5.1	-1.9	11
Trifluralin	11	0.70	21
Miscellaneous Organic compounds			
Biphenyl	6.7	8.0	21
Nitrobenzene	6.7	4.6	16
Dibenzofurane	7.3	4.4	17
Petroleum Hydrocarbons			
TPH (sum C10-C40)	4.3	-14	29

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Certificate of analysis

Your project number	ESIA of the uitkiik ADP 2	Certificate number/Version	2018145465/1
Your project name	IS-344	Start date	09-Oct-2018
Your order number		Report date	12-Oct-2018/13:54
		Annex	A,B,C,D
Sampled by		Page	1/9
Sample matrix	Surface water		

	Analysis	Unit	1
	Sample Pre-treatment		
Q	Version number		7.23
	Physical and chemical analyses		
	EC-temp. corr. factor (mathematical)		1.096
Q	Electric conductivity 25 °C	µS/cm	460
Q	Electric conductivity 25 °C	mS/m	46
Q	Electric conductivity 20°C	mS/m	41
	Measuring temperature (EC)	°C	20.8
	Measuring temperature (pH)	°C	19.4
Q	pH		5.7
	Metals		
Q	Arsenic (As)	µg/L	<3.0
Q	Antimony (Sb)	µg/L	<5.0
Q	Barium (Ba)	µg/L	7.2
Q	Beryllium (Be)	µg/L	<1.0
Q	Cadmium (Cd)	µg/L	<0.40
Q	Chromium (Cr)	µg/L	<2.0
Q	Cobalt (Co)	µg/L	<1.0
Q	Copper (Cu)	µg/L	<3.0
Q	Mercury (Hg)	µg/L	<0.040
Q	Lead (Pb)	µg/L	<3.0
Q	Molybdenum (Mo)	µg/L	<2.0
Q	Nickel (Ni)	µg/L	<2.0
Q	Selenium (Se)	µg/L	<5.0
Q	Tin (Sn)	µg/L	<5.0
Q	Vanadium (V)	µg/L	<2.0
Q	Zinc (Zn)	µg/L	30
	Volatile Organic Hydrocarbons		
Q	Benzene	µg/L	<0.10
Q	Ethylbenzene	µg/L	<0.10

No.	Sample description	Date sampling	Sample nr.
1	WQ-13	05-Oct-2018	10340841

Q: Dutch Accreditation Council (RvA) accredited test
A: AP04 accredited test
S: AS SIKB recognized test
V: VLAREL recognized test
M: MCERTS accredited

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IBAN: NL71BNPA0227924525
BIC: BNPANL2A
KvK/CoC No. 09088623
BTW/VAT No. NL 8043.14.883.B01

Certificate of analysis

Your project number	ESIA of the uitkiik ADP 2	Certificate number/Version	2018145465/1
Your project name	IS-344	Start date	09-Oct-2018
Your order number		Report date	12-Oct-2018/13:54
		Annex	A,B,C,D
Sampled by		Page	2/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	Toluene	µg/L	<0.10
Q	o-Xylene	µg/L	<0.10
Q	m,p-Xylene	µg/L	<0.10
Q	Xylenes (sum)	µg/L	<0.20
Q	Styrene	µg/L	<0.10
Q	1,2,4-Trimethylbenzene	µg/L	<0.10
Q	1,3,5-Trimethylbenzene	µg/L	<0.10
Q	n-Propylbenzene	µg/L	<0.10
Q	Isopropylbenzene	µg/L	<0.10
Q	n-Butylbenzene	µg/L	<0.10
Q	sec-Butylbenzene	µg/L	<0.10
Q	tert-Butylbenzene	µg/L	<0.10
Q	p-Cymene	µg/L	<0.10
	Phenols		
Q	Phenol	µg/L	<0.5
Q	o-Cresol	µg/L	<0.30
Q	m-Cresol	µg/L	<0.30
Q	p-Cresol	µg/L	<0.20
Q	Cresols (sum)	µg/L	<0.80
Q	2,4-Dimethylphenol	µg/L	<0.02
Q	2,5-Dimethylphenol	µg/L	<0.02
Q	2,6-Dimethylphenol	µg/L	<0.03
Q	3,4-Dimethylphenol	µg/L	<0.02
Q	o-Ethylphenol	µg/L	<0.03
Q	m-Ethylphenol	µg/L	<0.02
Q	Thymol	µg/L	<0.01
Q	2,3/3,5-Dimethylphenol + 4-Ethylphenol	µg/L	<0.02
	Polycyclic Aromatic Hydrocarbons		
Q	Naphtalene	µg/L	<0.4
Q	Acenaphtylene	µg/L	<0.04
Q	Acenaphtene	µg/L	<0.1

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BNP Paribas S.A. 227 9245 25
IBAN: NL71BNPA0227924525
BIC: BNPANL2A
KvK/CoC No. 09088623
BTW/VAT No. NL 8043.14.883.B01

Certificate of analysis

Your project number	ESIA of the uitkiik ADP 2	Certificate number/Version	2018145465/1
Your project name	IS-344	Start date	09-Oct-2018
Your order number		Report date	12-Oct-2018/13:54
		Annex	A,B,C,D
Sampled by		Page	3/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	Fluorene	µg/L	<0.01
Q	Phenanthrene	µg/L	<0.02
Q	Anthracene	µg/L	<0.01
Q	Fluoranthene	µg/L	<0.02
Q	Pyrene	µg/L	<0.06
Q	Benzo(a)anthracene	µg/L	<0.04
Q	Chrysene	µg/L	<0.02
Q	Benzo(b+k)fluoranthene	µg/L	<0.06
Q	Benzo(a)pyrene	µg/L	<0.1
Q	Dibenzo(ah)anthracene	µg/L	<0.08
Q	Benzo(ghi)perylene	µg/L	<0.1
Q	Indeno(123cd)pyrene	µg/L	<0.06
Q	PAH 16 EPA (sum)	µg/L	<1.1
	Volatile halogenated Hydrocarbons		
Q	Chloromethane	µg/L	0.80
Q	Dichloromethane	µg/L	<0.20
Q	Vinyl chloride	µg/L	<0.20
Q	1,1-Dichloroethene	µg/L	<0.10
Q	trans 1,2-Dichloroethene	µg/L	<0.10
Q	cis1,2-Dichloroethene	µg/L	<0.10
Q	Chloroethane	µg/L	<0.10
Q	Trichlorofluoromethane	µg/L	<0.10
Q	Trichloromethane	µg/L	<0.20
Q	Tetrachloromethane	µg/L	<0.20
Q	1,1-Dichloroethane	µg/L	<0.10
Q	1,2-Dichloroethane	µg/L	<0.10
Q	1,1,1-Trichloroethane	µg/L	<0.10
Q	1,1,2-Trichloroethane	µg/L	<0.10
Q	Trichloroethane (sum)	µg/L	<0.20
Q	1,1,1,2-Tetrachloroethane	µg/L	<0.10
Q	1,1,2,2-Tetrachloorethane	µg/L	<0.10

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		Annex	A,B,C,D
Sampled by		Page	4/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	Tetrachloorethane (sum)	µg/L	<0.20
Q	Trichloroethene	µg/L	<0.10
Q	Tetrachloroethene	µg/L	<0.10
Q	2,2-Dichloropropane	µg/L	<0.10
Q	1,2-Dichloropropane	µg/L	<0.10
Q	1,3-Dichloropropane	µg/L	<0.10
Q	1,2,3-Trichloropropane	µg/L	<0.10
Q	1,1-Dichloro-1-propene	µg/L	<0.10
Q	cis1,3-Dichloropropene	µg/L	<0.10
Q	trans1,3-Dichloropropene	µg/L	<0.10
Q	1,3-Dichloropropene (sum)	µg/L	<0.20
Q	Bromomethane	µg/L	<0.10
Q	Bromochloromethane	µg/L	<0.10
Q	Dibromomethane	µg/L	<0.10
Q	1,2-Dibromoethane	µg/L	<0.10
Q	Tribromomethane	µg/L	<0.10
Q	Bromodichloromethane	µg/L	<0.10
Q	Dibromochloromethane	µg/L	<0.10
Q	1,2-Dibromo-3-chloropropane	µg/L	<0.10
Q	Bromobenzene	µg/L	<0.10
	Chlorobenzenes		
Q	Monochlorobenzene	µg/L	<0.050
Q	1,2,3-Trichlorobenzene	µg/L	<0.10
Q	1,2,4-Trichlorobenzene	µg/L	<0.10
Q	1,3,5-Trichlorobenzene	µg/L	<0.010
Q	Trichlorobenzenes (sum)	µg/L	<0.21
	1,2,3,4-Tetrachlorobenzene	µg/L	<0.020
Q	1245&1235 Tetrachlorobenzene	µg/L	<0.020
Q	Tetrachlorobenzenes (sum)	µg/L	<0.040
Q	Pentachlorobenzene	µg/L	<0.010
Q	Hexachlorobenzene	µg/L	<0.030

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Your project name	IS-344	Start date	09-Oct-2018
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		Annex	A,B,C,D
Sampled by		Page	5/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	1,2-Dichlorobenzene	µg/L	<0.10
Q	1,3-Dichlorobenzene	µg/L	<0.10
Q	1,4-Dichlorobenzene	µg/L	<0.10
Q	Dichlorobenzenes (sum)	µg/L	<0.30
	Chlorophenols		
Q	o-Chlorophenol	µg/L	<0.1
Q	m-Chlorophenol	µg/L	<0.02
Q	p-Chlorophenol	µg/L	<0.02
Q	Monochlorophenols (sum)	µg/L	<0.14
Q	2,3-Dichlorophenol	µg/L	<0.02
Q	2,4/2,5-Dichlorophenol	µg/L	<0.01
Q	2,6-Dichlorophenol	µg/L	<0.03
Q	3,4-Dichlorophenol	µg/L	<0.02
Q	3,5-Dichlorophenol	µg/L	<0.03
Q	Dichlorophenols (sum)	µg/L	<0.11
Q	2,3,4-Trichlorophenol	µg/L	<0.02
Q	2,3,5-/2,4,5-Trichlorophenol	µg/L	<0.02
Q	2,3,6-Trichlorophenol	µg/L	<0.01
Q	2,4,6-Trichlorophenol	µg/L	<0.05
Q	3,4,5-Trichlorophenol	µg/L	<0.01
Q	Trichlorophenols (sum)	µg/L	<0.11
Q	2,3,4,5-Tetrachlorophenol	µg/L	<0.01
Q	2,3,4,6 / 2,3,5,6-Tetrachlorophenol	µg/L	<0.020
Q	Tetrachlorophenols (sum)	µg/L	<0.03
Q	Pentachlorophenol	µg/L	<0.010
Q	4-Chloro-3-methylphenol	µg/L	<0.02
	PolyChlorinated Biphenyl (PCB)		
Q	PCB 28	µg/L	<0.01
Q	PCB 52	µg/L	<0.01
Q	PCB 101	µg/L	<0.01
Q	PCB 118	µg/L	<0.01

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		Annex	A,B,C,D
Sampled by		Page	6/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	PCB 138	µg/L	<0.01
Q	PCB 153	µg/L	<0.01
Q	PCB 180	µg/L	<0.01
Q	PCB (6) (sum)	µg/L	<0.06
Q	PCB (7) (sum)	µg/L	<0.07
	Chloronitrobenzenes		
Q	o/p-Chloronitrobenzene	µg/L	<0.20
Q	m-Chloronitrobenzene	µg/L	<0.20
Q	Monochloronitrobenzenes (sum)	µg/L	<0.40
Q	2,3-Dichloronitrobenzene	µg/L	<0.1
Q	2,4-Dichloronitrobenzene	µg/L	<0.1
Q	2,5-Dichloronitrobenzene	µg/L	<0.1
Q	3,4-Dichloronitrobenzene	µg/L	<0.1
Q	3,5-Dichloronitrobenzene	µg/L	<0.06
Q	Dichloronitrobenzenes (sum)	µg/L	<0.46
	Miscellaneous Chlor. HCs		
Q	2-Chlorotoluene	µg/L	<0.1
Q	4-Chlorotoluene	µg/L	<0.1
Q	Chlorotoluenes (sum)	µg/L	<0.2
Q	1-Chloronaphtalene	µg/L	<0.02
	Organic Chlorinated Pesticides		
Q	4,4 -DDE	µg/L	<0.01
Q	2,4 -DDE	µg/L	<0.01
Q	4,4 -DDT	µg/L	<0.20
Q	4,4 -DDD + 2,4 -DDT	µg/L	<0.02
Q	2,4 -DDD	µg/L	<0.01
Q	DDT/DDE/DDD (sum)	µg/L	<0.25
Q	Aldrin	µg/L	<0.02
Q	Dieldrin	µg/L	<0.02
Q	Endrin	µg/L	<0.02

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		Annex	A,B,C,D
Sampled by		Page	7/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	Sum Drins	µg/L	<0.06
Q	alfa-HCH	µg/L	<0.08
Q	beta-HCH	µg/L	<0.07
Q	gamma-HCH	µg/L	<0.10
Q	delta-HCH	µg/L	<0.04
Q	Sum 4 HCH-compounds	µg/L	<0.29
Q	a-Endosulfan	µg/L	<0.05
Q	a-Endosulfansulphate	µg/L	<0.03
Q	a-Chlordan	µg/L	<0.01
Q	y-Chlordan	µg/L	<0.01
Q	Chlordans (sum)	µg/L	<0.02
Q	Heptachlor	µg/L	<0.01
Q	Heptachloroepoxide	µg/L	<0.03
Q	Hexachlorobutadiene	µg/L	<0.10
Q	Isodrin	µg/L	<0.10
Q	Telodrin	µg/L	<0.07
Q	Tedion	µg/L	<0.07
	Phosphor pesticides		
Q	Azinphos-ethyl	µg/L	<0.1
Q	Azinphos-methyl	µg/L	<0.07
Q	Bromophos-ethyl	µg/L	<0.07
Q	Bromophos-methyl	µg/L	<0.06
Q	Chloropyriphos-ethyl	µg/L	<0.06
Q	Chloropyriphos-methyl	µg/L	<0.1
Q	Cumaphos	µg/L	<0.02
Q	Demeton-S/Demeton-O-ethyl	µg/L	<0.1
Q	Diazinone	µg/L	0.06
Q	Dichlorovos	µg/L	<0.1
Q	Disulphotone	µg/L	<0.04
Q	Fenitrothion	µg/L	<0.1
Q	Fenthion	µg/L	<0.1

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Sampled by		Page	8/9
Sample matrix	Surface water		

	Analysis	Unit	1
Q	Malathion	µg/L	<0.1
Q	Parathion-ethyl	µg/L	<0.2
Q	Parathion-methyl	µg/L	<0.2
Q	Pyrazophos	µg/L	<0.2
Q	Triazophos	µg/L	<0.2
	Nitrogen pesticides		
Q	Ametryn	µg/L	<0.10
Q	Atrazin	µg/L	<0.08
Q	Cyanazine	µg/L	<0.1
Q	Desmetryn	µg/L	<0.10
Q	Prometryn	µg/L	<0.10
Q	Propazine	µg/L	<0.08
Q	Simazine	µg/L	<0.20
Q	Terbuthylazine	µg/L	<0.06
Q	Terbutryn	µg/L	<0.10
	Miscellaneous pesticides		
Q	Bifenthrine	µg/L	<0.08
Q	Carbaryl	µg/L	<0.10
Q	Cypermethrin A,B, C and D	µg/L	<0.20
Q	Deltamethrin	µg/L	<0.20
Q	Linuron	µg/L	<0.10
Q	Permethrin A	µg/L	<0.06
Q	Permethrin B	µg/L	<0.06
Q	Permethrins (sum)	µg/L	<0.12
Q	Propachlor	µg/L	<0.02
Q	Trifluralin	µg/L	<0.02
	Miscellaneous Organic compounds		
Q	Biphenyl	µg/L	0.04
Q	Nitrobenzene	µg/L	<0.3
Q	Dibenzofurane	µg/L	<0.1

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Sampled by		Page	9/9
Sample matrix	Surface water		

	Analysis	Unit	1
	Petroleum Hydrocarbons		
	TPH C10-C12	µg/L	<10
	TPH C12-C16	µg/L	<15
	TPH C16-C21	µg/L	<15
	TPH C21-C30	µg/L	<20
	TPH C30-C35	µg/L	<20
	TPH C35-C40	µg/L	<20
Q	TPH (sum C10-C40)	µg/L	<100

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TERRATTEST® INTEGRAL SOILANALYSIS

TERRATTEST SPECTRUM SHEET 7.23

eurofins | analytico®

ACC. S	ACC. W		TERRATTEST 7.23 REPORTING LIMIT soil mg/kg d.w.	ground water µg/l
		Characteristics		
Q		Dry weight (% m/m)	0,5	-
Q		Clay content (% m/m)	2	-
Q		Organic matter	0,5	-
	Q	pH	-	02-12
	Q	Conductivity (mS/m)	-	10
		Metals		
Q	Q	Arsenic	3	3
Q	Q	Antimony	3	5
Q	Q	Barium	2	1
Q	Q	Beryllium	1	1
Q	Q	Cadmium	0,3	0,4
Q	Q	Chromium	3	2
Q	Q	Cobalt	2	1
Q	Q	Copper	3	3
Q	Q	Mercury	0,05	0,04
Q	Q	Lead	3	3
Q	Q	Molybdenum	1	2
Q	Q	Nickel	2	2
Q	Q	Selenium	5	5
Q	Q	Tin	5	5
Q	Q	Vanadium	2	2
Q	Q	Zinc	10	5
		Aromatic compounds		
		Mono Aromatic Hydrocarbons		
Q	Q	Benzene	0,1	0,1
Q	Q	Ethylbenzene	0,2	0,1
Q	Q	Toluene	0,2	0,1
Q	Q	o-Xylene	0,2	0,1
Q	Q	m/p-Xylene	0,1	0,1
Q	Q	Xylenes (sum)	Σ	Σ
Q	Q	Styrene	0,2	0,1
Q	Q	1,2,4-Trimethylbenzene	0,05	0,1
Q	Q	1,3,5-Trimethylbenzene	0,05	0,1
Q	Q	n-Propylbenzene	0,05	0,1
Q	Q	Isopropylbenzene	0,05	0,1
Q	Q	n-Butylbenzene	0,05	0,1
Q	Q	sec-Butylbenzene	0,05	0,1
Q	Q	tert-Butylbenzene	0,05	0,1
Q	Q	p-Isopropyltoluene	0,05	0,1
		Phenols		
Q	Q	Phenol	0,01	0,5
Q	Q	o-Cresol	0,01	0,3
Q	Q	m-Cresol	0,01	0,3
Q	Q	p-Cresol	0,01	0,2
Q	Q	Cresoles (sum)	Σ	Σ
Q	Q	2,4-Dimethylphenol	0,01	0,02
Q	Q	2,5-Dimethylphenol	0,01	0,02
Q	Q	2,6-Dimethylphenol	0,01	0,03
Q	Q	3,4-Dimethylphenol	0,01	0,02
Q	Q	o-Ethylphenol	0,02	0,03
Q	Q	m-Ethylphenol	0,01	0,02
Q	Q	Thymol	0,01	0,01
Q	Q	4-Ethyl/2,3 ; 3,5 Dimethylphenol	0,01	0,02
		PAH		
Q	Q	Naphthalene	0,01	0,4
Q	Q	Acenaphthylene	0,01	0,04
Q	Q	Acenaphthene	0,01	0,1
Q	Q	Fluorene	0,01	0,01
Q	Q	Phenanthrene	0,01	0,02
Q	Q	Anthracene	0,01	0,01
Q	Q	Fluoranthene	0,01	0,02
Q	Q	Pyrene	0,01	0,06
Q	Q	Benzo(a)anthracene	0,01	0,04
Q	Q	Chrysene	0,01	0,02
	Q	Benzo(b/k)fluoranthene	-	0,06
Q		Benzo(b)fluoranthene	0,01	-
Q		Benzo(k)fluoranthene	0,01	-
Q	Q	Benzo(a)pyrene	0,01	0,1
Q	Q	Benzo(ghi)perylene	0,01	0,1
Q	Q	Dibenzo(ah)anthracene	0,01	0,08
Q	Q	Indeno(123cd)pyrene	0,01	0,06
Q	Q	PAHs (sum 10 Dutch VROM)	Σ	Σ
Q	Q	PAHs (sum 16 US EPA)	Σ	Σ
		Halogenated hydrocarbons		
		Volatile halogenated HC's		
	Q	Chloromethane	-	0,2
	Q	Dichloromethane	-	0,2
	Q	Vinylchlorine	-	0,2
	Q	1,1 Dichloroethene	-	0,1
	Q	tr-1,2 Dichloroethene	-	0,1
	Q	cis -1,2 Dichloroethene	-	0,1
	Q	Chloroethane	-	0,1
	Q	Trichlorofluoromethane	-	0,1
	Q	Trichloromethane (chloroform)	-	0,2
Q	Q	Tetrachloromethane (tetra)	0,05	0,1
	Q	1,1 Dichloroethane	-	0,1
Q	Q	1,2 Dichloroethane	0,1	0,1
Q	Q	1,1,1-Trichloroethan	0,05	0,1
Q	Q	1,1,2-Trichloroethane	0,05	0,1
Q	Q	Trichloroethanes (sum)	Σ	Σ
Q	Q	1,1,1,2-Tetrachloroethane	0,05	0,1
Q	Q	1,1,2,2-Tetrachloroethane	0,05	0,1
Q	Q	Tetrachloroethanes (sum)	Σ	Σ
Q	Q	Trichloroethene	0,2	0,1
Q	Q	Tetrachloroethene	0,2	0,1
	Q	2,2-Dichloropropane	-	0,1
Q	Q	1,2-Dichloropropane	0,05	0,1
Q	Q	1,3-Dichloropropane	0,05	0,1
Q	Q	1,2,3-Trichloropropane	0,05	0,1
Q	Q	1,1-Dichloropropylene	0,1	0,1
Q	Q	cis 1,3-Dichloropropylene	0,05	0,1
Q	Q	trans 1,3-Dichloropropylene	0,05	0,1
Q	Q	1,3-Dichloropropylenes (sum)	Σ	Σ
	Q	Bromomethane	-	0,1
	Q	Bromochloromethane	-	0,1
Q	Q	Dibromomethane	0,05	0,1
Q	Q	1,2-Dibromoethane	0,05	0,1
Q	Q	Tribromomethane (Bromoform)	0,05	0,1
Q	Q	Bromodichloromethane	0,1	0,1
Q	Q	Dibromochloromethane	0,05	0,1
Q	Q	1,2-Dibromo-3-chloropropane	0,05	0,1
Q	Q	Bromobenzene	0,05	0,1
		Chlorinated Benzenes		
Q	Q	Monochlorbenzene	0,01	0,05
Q	Q	1,2-Dichlorobenzene	0,01	0,1
Q	Q	1,3-Dichlorobenzene	0,01	0,1
Q	Q	1,4-Dichlorobenzene	0,01	0,1
Q	Q	Dichlorobenzenes (sum)	Σ	Σ
Q	Q	1,2,3-Trichlorobenzene	0,01	0,1
Q	Q	1,2,4-Trichlorobenzene	0,01	0,1
Q	Q	1,3,5-Trichlorobenzene	0,003	0,01
Q	Q	Trichloorbenzene (sum)	Σ	Σ
Q	Q	1,2,3,4-Tetrachlorobenzene	0,003	0,02
Q	Q	1,2,3,5/1,2,4,5-Tetrachlorobenzene	0,002	0,02
Q	Q	Tetrachlorobenzenes (sum)	Σ	Σ
Q	Q	Pentachlorobenzene	0,002	0,01
Q	Q	Hexachlorobenzene	0,002	0,03
		Chlorinated Phenols		
Q	Q	o-Chlorophenol	0,01	0,1
Q	Q	m-Chlorophenol	0,01	0,02
Q	Q	p-Chlorophenol	0,01	0,02
Q	Q	Monochlorophenols (sum)	Σ	Σ
Q	Q	2,3-Dichlorophenol	0,002	0,02
Q	Q	2,4/2,5-Dichlorophenol	0,001	0,01
Q	Q	2,6-Dichlorophenol	0,001	0,03
Q	Q	3,4-Dichlorophenol	0,002	0,02
Q	Q	3,5-Dichlorophenol	0,001	0,03
Q	Q	Dichlorophenols (sum)	Σ	Σ
Q	Q	2,3,4-Trichlorophenol	0,01	0,02
	Q	2,3,5 / 2,4,5-Trichlorophenol	-	0,02
Q		2,3,5-Trichlorophenol	0,001	-
Q	Q	2,3,6-Trichlorophenol	0,001	0,01
Q		2,4,5-Trichlorophenol	0,001	-
Q	Q	2,4,6-Trichlorophenol	0,001	0,05
Q	Q	3,4,5-Trichlorophenol	0,002	0,01
Q	Q	Trichlorophenols (sum)	Σ	Σ
Q	Q	2,3,4,5-Tetrachlorophenol	0,002	0,01
Q	Q	2,3,4,6/2,3,5,6-Tetrachlorophenol	0,01	0,02
Q	Q	Tetrachlorophenols (sum)	Σ	Σ
Q	Q	Pentachlorophenol	0,001	0,01
Q	Q	4-Chloro-3-methylphenol	0,001	0,02
		PCB		
Q	Q	PCB 28	0,002	0,01
Q	Q	PCB 52	0,002	0,01
Q	Q	PCB 101	0,002	0,01
Q	Q	PCB 118	0,002	0,01
Q	Q	PCB 138	0,005	0,01
Q	Q	PCB 153	0,005	0,01
Q	Q	PCB 180	0,002	0,01
Q	Q	PCB (sum 6)	Σ	Σ
Q	Q	PCB (sum 7)	Σ	Σ
		Chloronitrobenzenes		
Q	Q	o/p-Chloronitrobenzene	0,01	0,2
Q	Q	m-Chloronitrobenzene	0,01	0,2
Q	Q	Monochloronitrobenzenes (sum)	Σ	Σ
Q		2,3 / 3,4-Dichloronitrobenzene	0,01	-
Q	Q	2,3-Dichloronitrobenzene	-	0,1
Q	Q	2,4-Dichloronitrobenzene	0,02	0,1
Q	Q	2,5-Dichloronitrobenzene	0,01	0,1
Q	Q	3,4-Dichloronitrobenzene	-	0,1
Q	Q	3,5-Dichloronitrobenzene	0,02	0,06
Q	Q	Dichloronitrobenzenes (sum)	Σ	Σ
		Miscellaneous Chlor. HCs		
Q	Q	2-Chlorotoluene	0,01	0,1
Q	Q	4-Chlorotoluene	0,01	0,1
Q	Q	Chlorotoluenes (sum)	Σ	Σ
Q	Q	1-Chloronaphthalene	0,005	0,02
		Pesticides		
		Chlorine pesticides		
Q	Q	4,4-DDE	0,001	0,01
Q	Q	2,4-DDE	0,001	0,01
Q	Q	4,4-DDT	0,002	0,2
Q	Q	4,4-DDD/2,4-DDT	0,001	0,02
Q	Q	2,4-DDD	0,001	0,01
Q	Q	DDT/DDE/DDD (sum)	Σ	Σ
Q	Q	Aldrin	0,002	0,02
Q	Q	Dieldrin	0,002	0,02
Q	Q	Endrin	0,005	0,02
Q	Q	Drins (sum)	Σ	Σ
Q	Q	alfa-HCH	0,05	0,08
Q	Q	beta-HCH	0,005	0,07
Q	Q	gamma-HCH	0,005	0,1
	Q	delta-HCH	0,02	0,04
Q	Q	HCH (sum)	Σ	Σ
	Q	Alfa-endosulfan	0,01	0,05
Q	Q	Alfa-endosulfansulphate	0,02	0,03
Q	Q	Alfa-chlordane	0,002	0,01
Q	Q	Gamma-chlordane	0,002	0,01
Q	Q	Chlordanes (sum)	Σ	Σ
Q	Q	Heptachlor	0,002	0,01
Q	Q	Heptachloroepoxide	0,005	0,03
Q	Q	Isodrin	0,005	0,1
Q	Q	Hexachlorobutadiene	0,002	0,1
Q	Q	Telodrin	0,005	0,07
Q	Q	Tedion	0,005	0,07
		Phosphor pesticides		
Q	Q	Azinphos-ethyl	0,005	0,1
Q	Q	Azinphos-methyl	0,005	0,07
Q	Q	Bromophos-ethyl	0,02	0,07
Q	Q	Bromophos-methyl	0,02	0,06
Q	Q	Chloropyrophos-ethyl	0,01	0,06
Q	Q	Chloropyrophos-methyl	0,01	0,1
Q	Q	Cumaphos	0,005	0,02
Q	Q	Demeton-S /Demeton-O (ethyl)	0,02	0,1
Q	Q	Diazinon	0,005	0,04
	Q	Dichlorovos	-	0,1
Q	Q	Disulfoton	0,02	0,04
Q	Q	Fenitrothion	0,005	0,1
Q	Q	Fenthion	0,002	0,1
Q	Q	Malathion	0,005	0,1
Q	Q	Parathion-ethyl	0,005	0,2
Q	Q	Parathion-methyl	0,01	0,2
Q	Q	Pyrazophos	0,005	0,2
Q	Q	Triazophos	0,02	0,2
		Nitrogen pesticides		
Q	Q	Ametryne	0,01	0,1
Q	Q	Atrazine	0,02	0,08
Q	Q	Cyanazine	0,02	0,1
Q	Q	Desmetryne	0,005	0,1
Q	Q	Prometryne	0,02	0,1
Q	Q	Propazine	0,02	0,08
Q	Q	Simazine	0,02	0,2
Q	Q	Terbuthylazine	0,02	0,06
Q	Q	Terbutryne	0,05	0,1
		Miscellaneous pesticides		
Q	Q	Bifenthrin	0,005	0,08
	Q	Carbaryl	-	0,1
Q	Q	Cypermethrin (A,B,C,D)	0,05	0,2
Q	Q	Deltamethrin	0,01	0,2
	Q	Linuron	-	0,1
	Q	Permethrin A	-	0,06
	Q	Permethrin B	-	0,06
Q	Q	Permethrin (sum A+B)	0,01	Σ
Q	Q	Propachloor	0,02	0,02
Q	Q	Trifluralin	0,005	0,02
		Miscellaneous HCs		
Q	Q	Biphenyl	0,005	0,01
Q	Q	Nitrobenzene	0,1	0,3
Q	Q	Dibenzofurane	0,01	0,1
		Phthalates		
Q		Dimethylphthalate	0,2	-
Q		Diethylphthalate	0,2	-
Q		Di-isobutylphthalate	0,5	-
Q		Dibutylphthalate	0,5	-
Q		Butylbenzylphthalate	0,2	-
Q		Bis(ethylhexyl)phthalate	0,2	-
Q		Di-n-octylphthalate	0,2	-
Q		Phthalates (sum)	Σ	-
		Total Petroleum Hydrocarbons		
		C10-C12	3	10
		C12-C16	5	15
		C16-C21	6	15
		C21-C30	12	20
		C30-C35	6	20
		C35-C40	6	20
Q	Q	TPH (sum C10-C40)	38	100

2B Noise

Updated Environmental and Social Impact Assessment (ESIA) for the Uitkijk Appraisal Drilling Program (ADP) 2018

Draft

Baseline Noise Report

Paramaribo, 13 November 2018

ISO 9001: 2015 certified

Project title : Updated Environmental and Social Impact Assessment (ESIA) for the Uitkijk Appraisal Drilling Program (ADP) 2018
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1.0	First Draft	Punwasi S./ Narain S.	Koenjbiharie S. /Noordam D.		19th of October 2018
1.0	Final Draft	Punwasi S./ Narain S.	Koenjbiharie S. /Noordam D.		13th of November 2018

Contents

Abbreviations

Abbreviation	Definition
ADP	Appraisal Drilling Program
A-weighted sound level	A measure of sound pressure level designed to reflect the acuity of the human ear, which does not respond equally to all frequencies.
dBA	Decibel using the A-weighting setting
EHS	Environmental Health and Safety
ESIA	Environmental Social Impact Assessment
ESMP	Environmental and Social Management Plan
IFC	International Finance Corporation
L_{10}	L_{10} is the level exceeded for 10% of the time. For 10% of the time, the sound or noise has a sound pressure level above L_{10}. For the rest of the time, the sound or noise has a sound pressure level at or below L_{10}.
L_{90}	See L_{10} but read 90% instead of 10% and L_{90} instead of L_{10}.
LAeq	Equivalent Sound Pressure Level using the A-weighting setting
NIMOS	Nationaal Instituut voor Milieu en Ontwikkeling in Suriname
WHO	World Health Organization

List of Figures

List of Tables

1. Introduction

ILACO Suriname N.V has been awarded the contract for the update of the Environmental and Social Impact Assessment (ESIA) and Environmental and Social Management Plan (ESMP) for the Uitkijk Appraisal Drilling Program 2018. As part of the baseline study for the update of the ESIA and ESMP, the noise baseline conditions of the activities in the Uitkijk area and surroundings have been determined. This report presents the methodology and results of the noise baseline study.

2. Background and Scope

One of the strategic goals of Staatsolie is to sustain the annual average daily production of 16,250 BOPD (Staatsolie Strategic Plan). Future oil production from the Uitkijk project area will compensate for the decline in oil production rate. Appraisal activities will be carried out in the area, to establish the presence of producible reservoirs, find more reserves, minimize geological risks present in this area, secure future development drilling programs and upgrade contingent reserves in to prove reserves. The appraisal drilling program (ADP) for the Uitkijk Block consists of at least four (4) wells and a possibility for ten (10) wells in addition.

The project is located in the Uitkijk Concession (formerly the Wayambo Block), about 15 km west of Paramaribo and immediately east of the Tambaredjo Oil Field operated by Staatsolie.
The concession is divided into two parts (North and South) by the Oost-West Verbinding (East-West Corridor), which is a main public road connecting east and west of Suriname. The project activities will be carried out in the northern part of the Uitkijk Concession. The northern area comprises of an extensive wetland including coastal mudflats and mangrove swamps, sand/shell beach ridges, open grass swamp and swamp wood forest and is sparsely populated. An overview of the area with the main roads and existing dams is presented in Figure 1.

Figure 1: Study Area Uitkijk Concession

The Uitkijk concession is located in a rural area with the presence of sensitive receptors such as small farms and individual residences within the polders along the road. Agricultural land-use along the Wayambo- and Gangaram Pandayweg include stock breeding (cattle and chicken farming), field crops (banana plantation) and rice paddy cultivation. The total area used for agricultural activities is approximately 50-60 ha (Figure 2).

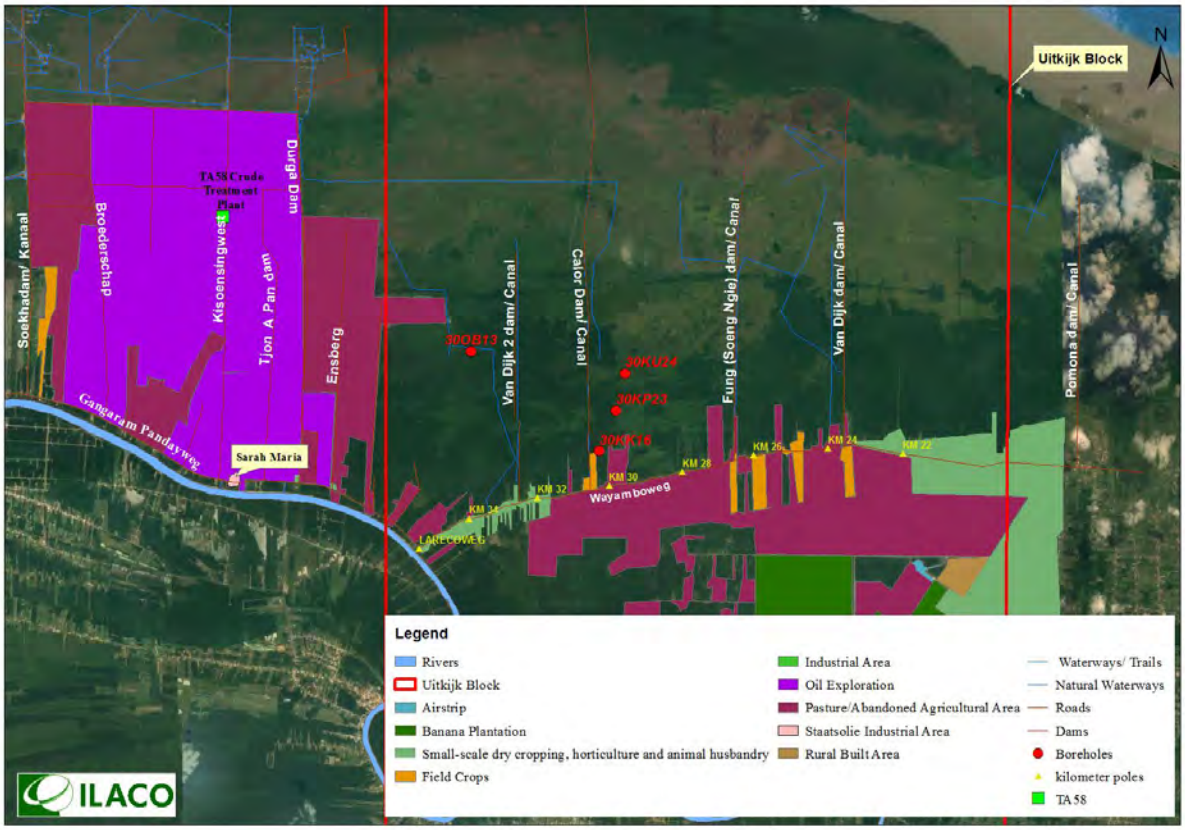

Figure 2: Overview of Land Use along the main roads

The purpose of this study has been to determine the baseline noise levels in the Uitkijk Block area and surroundings.

The scope of the study comprises of:

- Determination and assessment of Community Noise Limits at the Uitkijk Concession and immediate surroundings;
- Execution of noise measurements/baseline noise levels based on the present environmental & social components (sensitive receptors at location) of the community, undertaken according to the General EHS Guidelines of the IFC for Noise Monitoring (April 2007);
- Conduct noise measurements at locations with similar project activities as under the current project;
- Description of the methodology including a brief description of baseline conditions.

Prior to the fieldworks, a methodology based on above listed starting points has been developed in consultation with the Client. This has been presented in a Noise Field Plan that will be discussed in the following chapter.

3. Methodology

3.1 Measurement instrument

Noise measurements were performed with a sound level meter and analyzer, the SVAN 957 (#15357) mounted on a tripod. The 7052H pre-polarized microphone is provided with a SA22 windscreen, through which the measurements are performed. The noise measurements were done with Type 1 IEC 61672:2002 accuracy in the frequency range of 10Hz ÷ 20kHz with an 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 center frequencies 1 Hz ÷ 16 kHz, Type 1- IEC 1260 were logged. Before each measuring period, the meter is calibrated with an SV 31 Acoustic Calibrator (serial # 17687) with IEC 60942:2003 standard, Type 1 accuracy. No deviations were detected. The logged data was analyzed with the software SVANPC+ version 1.0.14a. All measured noise levels have been corrected for the sensitivity of human hearing or A-weighted, in the meter reading. This instrument is intended to general acoustic and vibration measurements, environmental monitoring, occupational health and safety monitoring. Technical specifications are added in **Appendix 1**.

3.2 Measurement parameters

At every measurement the following has been recorded:

- Time and date;
- Location and GPS;
- Name of person carrying out the monitoring;
- Serial number of equipment used;
- Noted noise sources and noise levels, direction and frequency from source of interest;
- Duration of monitoring;
- Weather conditions such as wind speed, wind direction, cloud cover etc. and
- Measured noise levels in Leq, L10, L50, L90, Lmax and Lmin, all provided in dBA.

The LAeq provides information on the nature and extent of the noise sources. The L10 represents the higher noise levels during the measurement period and together with L50 and L90 are generally utilized for traffic noise levels. The L90 gives an indication of the underlying noise level or the noise level that is present 90% of the measurement time. It is generally used to represent background noise levels i.e. the noise levels without the influence of infrequent transient sources.

3.3 Measurement locations

Reference or baseline noise levels have been measured on specific time periods and at specific locations based on:

1. The project activities including use of airboats and other heavy equipment,
2. The presence of sensitive receptors such as residents,
3. Operational hours during day and night time, and
4. The IFC requirements for measurements during daytime and nighttime.

The project activities at the Uitkijk Concession include use of airboats and other heavy equipment, therefore noise measurement locations are chosen such that representative background noise levels (including the identification of noise contributors) of the study and project area are collected.
For noise measurements a total of 13 locations have been selected (figure 3):

- At and near the transfer station (5 locations) (Associated with existing operations)
- Pick-up point Tambaredjo North West (TNW) (2 locations) (Associated with existing operations)
- Gangaram Pandayweg (2 locations) (Associated with transport route along the Gangaram Pandayweg)
- On the Calor dam (1 location)
- Wayamboweg-residents (4 locations) (Associated with transport route along the Wayamboweg)

Figure 3: Overview of Noise Measurement Locations

3.4 Measurement Procedure

The noise measurements have been carried out by a survey team of two persons within a period of two days during day-and nighttime, namely:

- Day 1- Friday 14th of September 2018 (Daytime measurements)
- Day 2- Wednesday 26th of September 2018 (Nighttime measurements)

The noise meter was calibrated on the 13th and 25th of September 2018, before carrying out the noise measurements.The measurements have been carried out 20 minutes continuously during daytime (7:00-22:00h) and nighttime (22:00-7:00h) when there was airboat activity. One additional measurement has been done for 1 minute on location NU01 when only one airboat was in operation during daytime (7:00 – 22:00h). This was done to determine the amount of noise produced by one airboat. Because no airboat activities were expected and observed during nighttime at NU01, more representative locations NU13 and NU14 have been selected.

In total thirteen measurements have been carried out during daytime and three during nighttime (Table 1).

Table 1: Measurement schedule

Location	Date	Day	Night
		Measurement	
At the quay near the transfer station (90 m from the pump station). (NU01)	14th and 26th of September 2018	•	•
Along the road to the emplacement, near the transfer station at a distance of 100 m from location NU01. (NU02)		•	
Along the road to the emplacement, between a T-junction, near the transfer station at a distance of 250 m from location NU01. (NU03)		•	
Along the road to the emplacement, near the transfer station at a distance of 500 m from location NU01. (NU04)		•	
Along the road to the emplacement, near the transfer station at a distance of 750 m from location NU01. (NU05)		•	

Uninhabited area along the Gangaram Pandayweg. 1.94 km away north west site from the Staatolie headquarters. (NU06)		●	
Residential area. In front of a residence, along the Gangaram Pandayweg and 1.09 km away from the Wayamboweg. (NU07)		●	
Calor residence. Overgrown area, on the Calor Dam. Average grass height of 0.3 meter. Distance from the axis of the road to the position of the noise meter is 45 m. (NU08)		●	
Driveway of the residence at the Wayamboweg. Nearest residence on the east side of the Calor property. (NU09)		●	
Driveway of the residence at the Wayamboweg. Nearest residence on the west side of the Calor property. (NU10)		●	
Driveway of the residence at the Wayamboweg. Nearest residence on the west side of the Soengie property. (NU11)		●	
Driveway of the residence at the Wayamboweg. Nearest residence on the east side of the Soengie property. (NU12)		●	
Near the pick-up point TNW (swamp). 1.5 km away on the north side of location NU01 and 2 m away from the quay. (NU13)			●
Along the road, near the pick-up point TNW at a distance of 750 m from location NU13. (NU14)			●

All measurements have been carried out with the meter at approximately 1.5 m above the surface level, and at least 3 m away from obstacles or reflecting surfaces, using a tripod for the sound meter. Audio recordings have also been made of all measurements by attaching an audio recorder to the sound meter. No measurement was done during the rain.

The pictures below give an illustration of the measurements carried out.

Daytime Measurements (07:00 a.m-22:00)

Location NU01: At the quay near the transfer station (90 m from the pump station). Airboats/boats are starting and arriving on spot. Material is being loaded on the airboats.

Location NU01: Airboat departured. Hard wind produced by the windmill of the airboat.

Location NU01: Small boat departures. Waves are produced by the boat.

Location NU02: Along the road to the emplacement, near the pump station at a distance of 100 m from location NU01.

Location NU03: Along the road to the emplacement, between a T-junction, near the transfer station at a distance of 250 m from location NU01.

Location NU04: Along the road to the emplacement, near the transfer station
at a distance of 500 m from location NU01. Vegetation observed on both sides of the road.

Location NU05: Along the road to the emplacement, near the transfer station
at a distance of 750 m from location NU01. Vegetation observed on both sides of the road.

Location NU06: Uninhabited area along the Gangaram Pandayweg. 1.94 km away north-west side from the Staatolie headquarters. Vegetation observed on both sides of the road.

Location NU07: Residential area. In front of the residence, along the Gangaram Pandayweg and 1.09 km away from the axis of the Wayamboweg.

Location NU08: Calor residence. Overgrown area, on the Calor Dam. Average grass height of 0.3 meter. Distance from the axis of the road to the position of the noise meter is 200 m.

Location NU09: Driveway of the residence at the Wayamboweg. Nearest residence on the east side of the Calor property. Distance from the axis of the road to the position of the noise meter is 8 m.

Location NU10: Driveway of the residence at the Wayamboweg. Nearest residence on the west side of the Calor property. Distance from the axis of the road to the position of the noise meter is 8 m.

Location NU11: Driveway of the residence at the Wayamboweg. Nearest residence on the west side of the Soengie property. Distance from the axis of the road to the position of the noise meter is 8 m.

Location NU12: Driveway of the residence at the Wayamboweg. Nearest residence on the east side of the Soengie property. Distance from the axis of the road to the position of the noise meter is 8 m.

Nighttime Measurements (22:00 - 07:00)

Location NU01: At the quay near the transfer station (90 m from the transfer station). All airboats are ashore.

Location NU13: Near the pick-up point TNW (swamp). 1.5 km away on the north site of location NU01 and 2 m away from the quay.

Location NU14: Along the road, near the pick-up point TNW at a distance of 750 m from location NU13.

3.5 Weather conditions

On the 14th of September 2018, the weather during daytime measurements in general varied from sunny to sunny/cloudy with a light to gentle breeze on the Beaufort wind scale. The wind direction was predominantly from the North-East.
On the 26th of September 2018, the weather during nighttime measurements in general was clear. The stars and full moon were visible and the wind was calm on the Beaufort wind scale. The wind direction could not be determined.

4 Baseline Results and Discussion: Noise Sources and Noise Levels

4.1 Introduction

The noise measurements were performed at and near the pick-up point TNW (seven locations), in the uninhabited- and residential area on the Gangaram Pandayweg (two locations), on the Calor dam (one location) and at the nearest residents of the Calor and Soengnie property East and West on the Wayamboweg (four locations), to collect real-time information about the baseline noise.

The land use is agricultural, with farmers living near their fields and therefore the study area is classified as rural residential for the noise study. During measurements all noise sources were recorded and passing airboats, boats and vehicles if any, were counted **(Appendix 2).** The logger results of all measurements are presented in **Appendix 3A and Appendix 3B**, together with general information.

Applicable Noise Standards

In the absence of specific national guidelines for noise levels, the international standards (WHO/IFC) for Community- based noise limits, also used by NIMOS, are applied.

Table 2: Applicable Outdoor Noise Standards for Community-based noise (WHO/IFC).

	Maximum Allowable Ambient Noise Levels 1-hour LAeq (dBA)	
Receptor	**Daytime 07:00-22:00**	**Nighttime 22:00-07:00**
Residential; institutional; educational	55	45
Industrial; commercial	70	70

The IFC states that noise impacts should not result in a maximum increase above background levels of 3 dBA at the nearest receptor location off-site (IFC 2007). For a person with average hearing acuity an increase of less than 3 dBA in the general ambient noise level is not detectable.

4.2 Daytime Measurements

Tambaredjo NW (TNW) landing stage (NU01-NU05)

TNW landing is the base for all water transport that is active within the Tambaredjo NW oil field. Two landing stages are present, the main landing at the western end of the Noorddamweg and another one along the north-south road to Ritsweg, about 1500 m north of the main landing(see Figure 4). All personnel and supplies are brought in through these roads and further transported by airboats, carriers and small boats. At TNW landing a parking area, offices and a transfer station are found. The transfer station is used for transferring oil from the TNW oilfield to the TA58 Crude Treatment Plant.

Figure 4: Overview of the landing stages and the noise locations

Measurements were done between 9 and 11AM, which are the busiest hours. However, most airboat traffic was recorded between 9AM and 9.30AM (total of 20 movements), while in the remaining one-and-half hour only 6 airboats were recorded. On the other hand, the road traffic was busier between 9.30 and 11AM (10 vehicles between 9-9.30AM and 24 between 9.30 and 11AM).
Measurements were made alongside of the Noorddamweg, starting near the landing and ending at 1000 m to the east. The results are presented in Table 3.

Highest LAeq is found near the landing stage, where airboats are present. Lmax here is very high, representing the departure of airboats, which need maximum power at that stage. At locations NU01 and 02, L90 is relatively high because of the permanent noise of the transfer station. However it should be noted that there will be no transfer station for the current project. NU03, which is at 250 meter from the landing stage, shows a higher LAeq than NU02, because three trucks passed this point during measurement. The impact of the trucks at NU03 on the noise level can also be concluded from the high Lmax.
The low L50 and L90 values at NU04 and 05 indicate a basically quiet environment, which is occasionally disturbed by the transport noises.

Table 3: Daytime noise measurements at and near the Tambaredjo Northwest landing stage (all noise levels in dBA).

ID #	Location	LAeq	L10	L50	L90	Lmax	Lmin
NU01	At the quay near the transfer station (90 m from the transfer station). Airboats/boats are leaving from and arriving on this spot. Material is being loaded on the airboats.	74.5	75.9	60.4	57.1	97.5	53.4
NU02	Along the road to the emplacement, near the transfer station at a distance of 100 m from location NU01.	64.8	64.9	63.0	61.3	80.3	58.8

NU03	Along the road to emplacement, between a T-junction, near the transfer station at a distance of 250 m from location NU01.	69.5	60.0	44.3	39.2	92.4	36.6
NU04	Along the road to the emplacement, near the transfer station at a distance of 500 m from location NU01. Vegetation observed on both sides of the road.	57.9	47.6	38.0	34.2	82.5	31.8
NU05	Along the road to the emplacement, near the transfer station at a distance of 750 m from location NU01. Vegetation observed on both sides of the road.	56.0	48.8	37.9	33.9	82.9	30.4

A noise level above the WHO/IFC standard of 70 dBA for industrial/commercial sites is only exceeded at location NU01, near the airboats. It should be noted that the measurements at this location were carried out for 20 minutes during the busiest period. So it is to be expected that the noise levels at this location will also comply with above standard, when taken over the whole day.

Gangaram Pandayweg and Wayamboweg

Two measurements were carried out along the Gangaram Pandayweg and five along the Wayamboweg. Most were made in front of a house, with only one in an uninhabited road stretch. During measurements, the meter was positioned at 8 meter from the axis of the road, except for NU08 that is 45 meter from the road. The results are presented in Table 4.

There is a clear correlation between the LAeq and the traffic intensity (Figure 5 ().
The low traffic intensity was measured along the Gangaram Pandayweg. The LAeq level complies with the WHO/IFC daytime standard of 55 dBA for residential areas.

The Wayamboweg has much higher traffic intensity and thus also the noise level is higher. It exceeds the WHO/IFC daytime standard for residential areas. It should, however, be noted that the measurements were made at 8 m from the axis of the roads. Houses are at a larger distance (typically 20-30 meter from the axis), and at the front of the houses noise levels will be lower. As a rule of the thumb, the noise level is diminishing 5-6dBA with every doubling of the distance (assuming a discontinuous traffic flow). This distance effect is illustrated by the results of NU08, which was measured at 45 m from the road. Depending upon the distance of a house to the road, the measured LAeq values can be subtracted by 5-10 dBA. Also in this case the LAeq at the front of the houses will still be above the WHO/IFC level.

Table 4: Daytime noise measurements along the Gangaram Pandayweg and the Wayamboweg (all noise levels in dBA).

ID #	Location	LAeq	L10	L50	L90	Lmax	Lmin
NU06	Uninhabited area along the Gangaram Pandayweg. 1.94 km away north west site from the Staatsolie headquarters. Vegetation observed on both sides of the road.	48.1	42.4	38.7	36.0	73.4	33.3
NU07	Residential area. In front of the residence, along the Gangaram Pandayweg and 1.09 km away from the Wayamboweg.	54.7	50.5	39.8	36.0	79.3	33.6
NU08	Calor residence. Overgrown area, at the Calor Dam. Average grass height of 0.3 meter. Distance from the axis of the road to the position of the noise meter is 45 m.	52.8	56.5	47.3	39.7	68.8	33.6

NU09	Driveway of the residence at the Wayamboweg. Nearest residence on the East site of the Calor property. Distance from the axis of the road to the position of the noise meter is 8 m.	65.9	68.1	49.1	36.4	85.7	30.3
NU10	Driveway of the residence at the Wayamboweg. Nearest residence on the West site of the Calor property. Distance from the axis of the road to the position of the noise meter is 8 m.	70.6	74.3	54.3	42.2	87.7	37.7
NU11	Driveway of the residence at the Wayamboweg. Nearest residence on the West site of the Soengnie property. Distance from the axis of the road to the position of the noise meter is 8 m.	68.3	73.1	54.4	41.2	84.1	34.4
NU12	Driveway of the residence at the Wayamboweg. Nearest residence on the East site of the Soengnie property. Distance from the axis of the road to the position of the noise meter is 8 m.	69.4	73.6	55.1	43.8	87.3	34.8

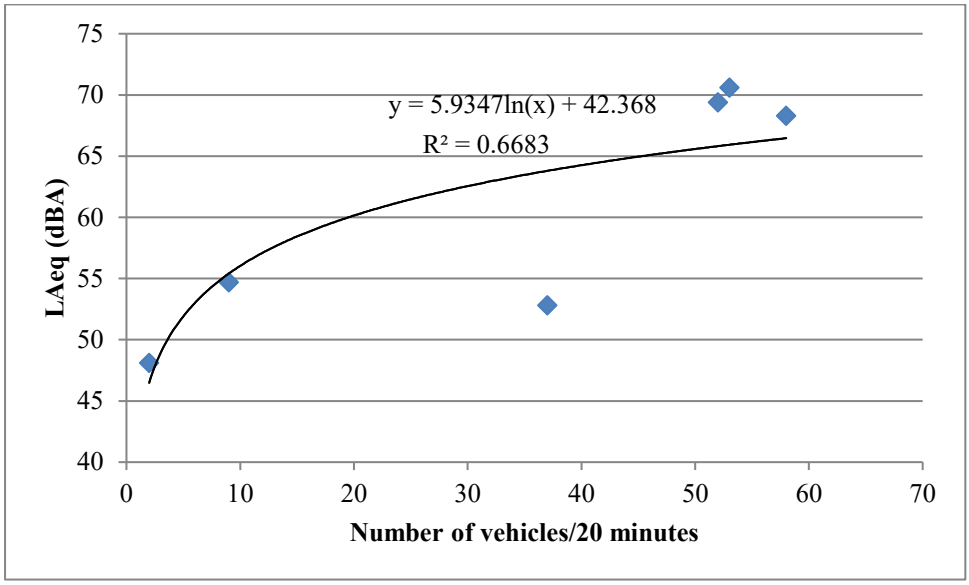

Figure 5: Relationship between noise level and traffic intensity

Background levels (L90) for these areas can be estimated at about 36dBA (locations NU06, 07 and 09). These are the noise levels without the influence of infrequent transient sources, such as vehicles in the distance. These levels are considered representative for the natural environment. The L90 levels of the other locations show the effect of manmade noises in the distance (most likely traffic) with levels between 39.7 and 43.8 dBA.

4.2.2 Nighttime Measurements

Nighttime measurements were only carried out at the TNW landing. One measurement was made at the mean landing (NU01), one at the pick-up point along the N-S road towards Ritsweg, about 1500 m north of the main landing (NU13), and one halfway between these two points (NU14).
Measurements were done between approximately 22.30PM and 00.45AM. Airboat traffic was only recorded for locations NU13 and 14. The results are presented in below table.

Table 5: Nighttime noise measurements at and near the Tambaredjo Northwest landing stage (all noise levels in dBA).

ID #	Location	LAeq	L10	L50	L90	Lmax	Lmin
NU01	At the quay near the transfer station (90 m from the transfer station).	56.1	57.8	55.7	54.1	64.0	51.1
NU13	Near the pick-up point TNW (swamp). 1500 m away from the north site of location NU01 and 2 m away from the quay.	71.2	68.2	49.5	47.2	94.6	45.1
NU14	Along the road, near the pick-up point TNW at a distance of 750 m from location NU13.	48.8	50.9	48.2	46.2	60.5	43.8

Noise levels at NU01are around 56 dBA and show very little difference between L10 and L90. This points to a constant noise source with a homogeneous sound profile. For the current location this is the transformer. The Lmax is the result of the passing of two cars, but no airboats were recorded.

Locations NU13 and 14 are predominantly quiet for most of the time, with a L10 of 46-47 and a L50 of 48-49 dBA. The quiet conditions are only disturbed by airboats at the pick-up point. At this point (NU13) an Lmax of 94.6 dBA is recorded and a LAeq of 71.2 dBA. At a distance of 750 m from the pick-up pint the LAeq level is reduced to 48.8 dBA, which is still exceeding the WHO/IFC nighttime standard of 45 dBA for residential areas. However, given the background level (L90) of about 47 dBA, this exceedance is acceptable.

5 Conclusions

During daytime, the houses along the Wayamboweg experience noise levels (LAeq) that are above the WHO/IFC standard of 55 dBA for residential areas, due to relatively high traffic intensity.
During daytime, the houses along the Gangaram Pandayweg experience noise levels (LAeq) that are below the WHO/IFC standard of 55 dBA for residential areas, due to low traffic intensity.
No nighttime measurements were carried out along the Wayamboweg and the Gangaram Pandayweg. However, nighttime measurements at the Tambaredjo Northwest landing indicate natural nighttime levels of 46-47 dBA.

Daytime measurements were, among others, carried out at the Tambaredjo Northwest (TNW) landing, in order to determine the noise level of airboats at different distances. Close to the airboats, the noise level of a stationary airboat exceeds 90 dBA, while it can rise to almost 100 dBA when on full power. But already at a distance of 250 meter this is diminished to 70 dBA and at 750 meter it hardly exceeds the background level.
Nighttime measurements at the TNW landing show that at a distance of 750 meter from the active airboat landing, the exceedance of the WHO/IFC nighttime standard of 45dBA for residential areas was only 3.8 dBA, while exceedance of the natural background level is only 1.8 dBA.
Under daytime as well as under nighttime conditions, a distance of 750 meter from an airboat landing is sufficient to avoid nuisance from airboat noise.

References

- IFC 2007. Environmental, Health, and Safety (EHS) Guidelines. General EHS Guidelines. International Finance Corporation / World Bank Group, April 30, 2007.

Appendices

Appendix 1 SVAN 957 Sound & Vibration Analyser

SVAN 957
Sound & Vibration Analyser

The SVAN 957 is all digital, Type 1 sound & vibration level meter along with analyser. Instrument is intended to general acoustic and vibration measurements, environmental monitoring, occupational health and safety monitoring.
Three profiles allow parallel acoustic or vibration measurements with independently defined filters and RMS detector time-constants. Each profile provides significant number of results (e.g. for sound: L_{eq}, L_{Max}, L_{Min}, L_{Peak}, Spl, SEL or for vibration: RMS, PEAK, VDV, MTVV). Advanced time-history logging for each profile provides complete information about measured signal in non-volatile 32 MB internal memory or external USB memory stick. All required weighting filters (e.g.: A, C, W_k, W_c, W_b) including the latest ISO 2631-1 & 2 standard are available with this instrument. RMQ detector enables direct measurement of the Vibration Dose Value (VDV). Using computational power of its digital signal processor the SVAN 957 instrument can, simultaneously to the meter mode, perform real-time 1/1 or 1/3 octave analysis including statistical calculations, acoustic dose measurements, FFT analysis and Reverberation Time measurements. The time-history logging of 1/1 octave, 1/3 octave and FFT analysis is provided. The time-domain signal recording on the external USB memory stick is also available.
Fast USB 1.1 interface (12 MHz) creates real-time link for the PC "front-end" application of the SVAN 957. Instrument can be remotely controlled and measurement results can be downloaded to PC using the RS 232 (GPRS) or IrDA interfaces. It can be offered with GPRS modem, LAN & WLAN connection module. Together with SvanPC+_RC remote communication software, these interfaces provide easy remote access to instrument settings & data over internet and local area network.
Instrument is powered from four AA standard or rechargeable batteries (separate charger is required). The external DC power source or USB interface can be also used for its powering.
Robust, hand held case and light weight design accomplish the exceptional features of this new unusual instrument.

FEATURES

- Type 1 sound level measurements meeting IEC 61672:2002
- General vibration measurements (acceleration, velocity and displacement) and HVM meeting ISO 8041:2005 standard
- Three parallel independent profiles
- 1/1 and 1/3 octave real-time analysis
- Time-domain signal recording
- FFT real-time analysis (1600 lines in up to 20.0 kHz band)
- All weather measurements with SA 203 microphone protection kit
- Reverberation Time measurements
- Advanced data logger including spectra logging
- USB memory stick providing almost unlimited logging capacity
- Acoustic dose meter function
- Advanced trigger and alarm functions
- USB 1.1 Host & Client interfaces (real-time PC "front end" application supported)
- RS 232 for modems support (GPRS, Ethernet, WLAN)
- Integration time programmable up to 24 h
- Power supply by four AA rechargeable or standard batteries
- Hand held, light weight and robust case
- Easy in use

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INSTRUMENTATION FOR SOUND & VIBRATION MEASUREMENTS

TECHNICAL SPECIFICATIONS

SOUND LEVEL METER & ANALYSER

Standards	Type 1: IEC 61672-1:2002
Meter Mode	SPL, L_{eq}, SEL, L_{dem}, L_{m3}, L_{m5}, Statistics - L_n (L_1-L_{99}), L_{Max}, L_{Min}, L_{Peak} Simultaneous measurement in three profiles with independent set of filters and detector time-constants
Analyser	1/1 octave* real-time analysis, Type 1, IEC 61260 1/3 octave* real-time analysis, Type 1, IEC 61260 (option) Acoustic dosimeter* meeting IEC 61252 with SV 25_2 microphone (option) FFT* real-time analysis, 1600 lines, up to 20.0 kHz band (option) Reverberation Time analysis in 1/3 octave bands (RT 60 option)
Weighting Filters	A, C and Z
RMS Detector	Digital True RMS detector with Peak detection, resolution 0.1 dB Time constants: Slow, Fast, Impulse
Microphone	7052H, 20 mV/Pa, prepolarised 1/2" condenser microphone with SV 12L IEPE preamplifier
Sound Field	Free-field or diffuse-field selectable (digital filter)
Measurement Range	Total Dynamic Range: 15 dBA RMS ÷ 140 dBA Peak Linearity Range: 25 dBA RMS ÷ 140 dBA Peak
Dynamic Range	100 dB (both in Low and High ranges)
Internal Noise Level	Less than 15 dBA RMS
Frequency Range	0.5 Hz ÷ 20 kHz; microphone dependent, with 7052H microphone: 10 Hz ÷ 20 kHz

VIBRATION LEVEL METER & ANALYSER

Standards	ISO 8041:2005 and ISO 10816-1
Meter mode	RMS, VDV, MTVV or Max, Peak, Peak-Peak Simultaneous measurement in three profiles with independent set of filters and detector time-constants
Analyser	1/1 octave* real-time analysis, Type 1, IEC 61260 1/3 octave* real-time analysis, Type 1, IEC 61260 (option) FFT* real-time analysis, 1600 lines, up to 20.0 kHz band (option) RPM* rotation speed measurement parallel to the vibration measurement (option)
Filters	HP1, HP3, HP10, Vel1, Vel3, Vel10, VelMF, Dil1, Dil3, Dil10, KB, W_k, W_c, W_d, W_j, W_m, W_b, W_g (ISO 2631), W_h (ISO 5349) (option)
RMS & RMQ Detectors	Digital True RMS & RMQ detectors with Peak detection, resolution 0.1 dB Time constants: from 100 ms to 10 s
Accelerometer (option)	Dytran 3185D general purpose accelerometer with 100 mV/g sensitivity
Measurement Range	Accelerometer dependent, with Dytran 3185D accelerometer: 0.003 ms^{-2} RMS ÷ 500 ms^{-2} Peak
Frequency Range	0.5 Hz ÷ 20 kHz; accelerometer dependent, with Dytran 3185D accelerometer: 2 Hz ÷ 10 kHz

BASIC DATA

Input	IEPE type (TNC connector)	
Frequency Range	0.5 Hz ÷ 20 kHz, sampling rate 48 kHz	
Data Logger*	Time-history logging to internal memory or USB memory stick Time-domain signal recording on USB memory stick (option)	
Display	LCD 128 x 64 pixels plus icons with backlighting	
Memory	32 MB non-volatile flash type, external USB memory stick (not included)	
Interfaces	USB 1.1 Client, USB 1.1 Host, RS 232 (with SV 55 option), IrDA (option) Extended I/O - AC output (1 V Peak) or Digital Input/Output (Trigger - Pulse)	
Power Supply	Four AA batteries (alkaline)	operation time > 12 h (6.0 V / 1.6 Ah)**
	Four AA rechargeable batteries (not included)	operation time > 16 h (4.8 V / 2.6 Ah)**
	SA 17A external battery pack (option)	operation time > 24 h**
	External power supply	6 V DC ÷ 24 V DC (1.5 W)
	USB interface	500 mA HUB
Environmental Conditions	Temperature	from -10 °C to 50 °C
	Humidity	up to 90 % RH, non-condensed
Dimensions	338 x 82 x 42 mm (with microphone and preamplifier)	
Weight	0.6 kg with batteries, microphone and preamplifier	

*each function parallel to the meter mode **with USB 1.1 Host function not active and backlight off

Continuous product development and innovation are the policy of our company. Therefore, we reserve the right to change the specifications without prior notice.

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Appendix 2 Field Observation Sheet

General Daytime Measurements

Measuring date:	**14-9-2018**
Number of measurements:	**13**
Measured by:	**Narain S. /Nakchedi A. /Bharosa V.**
Noise measurement locations:	**See below**
Weather:	**Sunny/ Cloudy**

					Provide numbers						Estimate										See wind tab	Estimate	
ID #	**Locations**	**GPS no.**	**Date**	**Time**	**Small boats**	**Airboats**	**Type I (Cars)**	**Type II (Light Trucks)**	**Type III (Bus and Heavy Trucks**	**Type III (Pedest/Moped/ Bike)**	**Avg speed**	**Overfly**	**Birds**	**Insects**	**Leaves**	**Dogs**	**Music**	**Claxon**	**Alarm**	**Talking**	**Wind speed**	**Wind direction**	**Remarks**
NU01	At the quay near the pump station (90 m from the pump station).	21N 659196 654920	14-09-2018	9:06 AM		1x															3.3–5.5 m/s	North-East	Constant noise of airboats, loading of material on airboat, constant noise of pumping station.
NU01	At the quay near the pump station (90 m from the pump station).	21N 659196 654920	14-09-2018	9:10 AM	1x	11x		2x										x		x	3.3–5.5 m/s	North-East	Noise of airboats, loading of material on airboat, sound of waves produced by airboat, talking persons. Noise of light trucks, claxon.
NU02	Along the road, near the pump station at a distance of 100 m from location NU01.	21N 659287 654946	14-09-2018	9:37 AM		9x		8x					x	x	x						3.3–5.5 m/s	North-East	Constant noise of pumping station, noise of airboats; noise of leaves of coconut trees rustling, noise of birds and grasshoppers
NU03	Along the road, between a T-junction, near the pump station at a distance of 250 m from location NU01.	21N 659437 654944	14-09-2018	10:10 AM		3x		6x	3x				x	x	x						3.3–5.5 m/s	North-East	Constant noise of pumping station and machines from a distance, leaves and small twigs rustling. Noise of heavy trucks; noise of light trucks; noise of tractor. Noise of birds.
NU04	Along the road, near the pump station at a distance of 500 m from location NU01.	21N 659689 654940	14-09-2018	10:40 AM	2x	1x		4x	1x				x		x						1.5–3.3 m/s	North-East	Noise of airboat; noise of small boats. Noise of heavy truck and light trucks. Noise of birds, leaves and small twigs rustling.
NU05	Along the road, near the pump station at a distance of 750 m from location NU01.	21N 659939 654934	14-09-2018	11:14 AM		2x		10x					x		x						1.5–3.3 m/s	North-East	Noise of airboats. Noise of construction activities from a distance. Noise of light trucks. Noise of leaves and small twigs rustling. Noise of birds
NU06	Uninhabited area along the Gangaram Panday Road. 1.94 km away north west site from the Staatolie headquarters.	21N 663109 647202	14-09-2018	12:25 PM			2x						x	x	x				x		3.3–5.5 m/s	North-East	Constant noise of excavator/machine from the forest. Siren. Wind. Noise of leaves and small twigs rustling. Noise of birds. Noise of grasshoppers, insects and crickets. 2.5 meters from the centre of the road
NU07	Residential area. In front of the residence, along the Gangaram Panday Road and 1.09 km away from the Wayambo Road.	21N 669207 645474	14-09-2018	12:51 PM			4x	5x					x	x	x	x	x			x	3.3–5.5 m/s	North-East	Constant noise of excavator/machine from a distance. Walking and talking persons. Noise of cars, light trucks and cargo trucks. Radio music; wind; leaves and small twigs rustling, noise of barking dogs; noise of birds and insects. 2.5 meters from the centre of the road
NU08	Calor residence. Overgrown area, on the Calor Dam. Average grass height of 0.3 meter. Distance from the axis of the road to the position of the noise meter is 45 m.	21N 674632 646379	14-09-2018	13:30 PM			20x	10x	6x	1x			x	x	x						1.5–3.3 m/s	North-East	Noise of cars, light trucks and heavy trucks. Wind. Noise of leaves and small twigs rustling. Noise of birds, grasshoppers and insects. 45m distance from the centre of the road
NU09	Driveway of the residence at the Wayambo Road. Nearest residence on the East site of the Calor property. Distance from the axis of the road to the position of the noise meter is 8 m.	21N 674951 646381	14-09-2018	14:20 PM			36x	1x	3x				x	x	x						1.5–3.3 m/s	North-East	Noise of cars, light trucks and heavy trucks. Noise of leaves and small twigs rustling. Noise of birds and insects. 8m distance from the centre of the road

NU10	Driveway of the residence at the Wayambo Road. Nearest residence on the West site of the Calor property. Distance from the axis of the road to the position of the noise meter is 8 m.	21N 674451 646300	14-09-2018	13:53 PM			42x	2x	9x				x	x	x	1					1.5–3.3 m/s	North-East	Noise of cars, heavy trucks, light trucks and cargo trucks. Noise of leaves rustling; noise of small twigs rustling, barking dog. Noise of birds and insects. 8m distance from the centre of the road
NU11	Driveway of the residence at the Wayambo Road. Nearest residence on the West site of the Soengie property. Distance from the axis of the road to the position of the noise meter is 8 m.	21N 678133 647040	14-09-2018	14:45 PM			45x	4x	8x	1x			x	x	x						1.5–3.3 m/s	North-East	Noise of cars, heavy trucks, light trucks, cargo truck and moped. Noise of leaves and small twigs rustling. Noise of birds and insects. 8m distance from the centre of the road.
NU12	Driveway of the residence at the Wayambo Road. Nearest residence on the East site of the Soengie property. Distance from the axis of the road to the position of the noise meter is 8 m.	21N 678754 647211	14-09-2018	15:03 PM			39x	3x	9x	1x			x		x	1				x	1.5–3.3 m/s	North-East	Noise of cars, heavy trucks, light trucks and cargo trucks. Wind. Noise of leaves and small twigs rustling. Noise of birds and barking dog. 8m distance from the centre of the road.

General Nighttime Measurements

Measuring date:	**26-9-2018**
Number of measurements:	**3**
Measured by:	**Nakchedi A. /Jagdew K.**
Noise measurement locations:	**See below**
Weather:	**Clear/ stars and full moon**

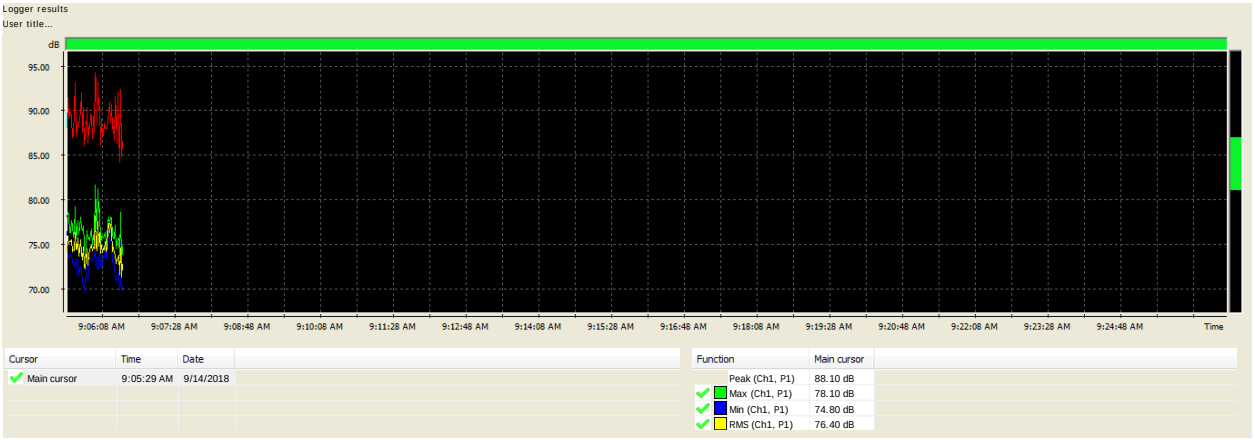
					Provide numbers						Estimate										See wind tab	Estimate	
ID #	**Locations**	**GPS no.**	**Date**	**Time**	**Small boats**	**Airboats**	**Type I (Cars)**	**Type II (Light Trucks)**	**Type III (Bus and Heavy Trucks**	**Type III (Pedest/Moped/ Bike)**	**Avg speed**	**Overfly**	**Birds**	**Insects**	**Leaves**	**Dogs**	**Music**	**Claxon**	**Alarm**	**Talking**	**Wind speed**	**Wind direction**	**Remarks**
NU01	At the quay near the pump station (90 m from the pump station).	21N 659197 654912	9/26/2018	10:43 PM				2x						x							<0.3 m/s	Not sure	Constant noise of pumping station; noise of light trucks; noise of insects, crickets and frogs.
NU13	Near the pick-up point TNW (swamp). 1.5 km away on the north site of location NU01 and 2 m away from the quay.	21N 659132 656402	26-09-2018/ 27-09-2018	11:45 PM		4x		1x	1x					x						x	<0.3 m/s	Not sure	Noise of airboats; noise of bus and light truck; constant noise of insects, crickets and frogs.
NU14	Along the road, near the pick-up point TNW at a distance of 750 m from location NU13.	21N 659623 656898	9/27/2018	12:31 AM		2x								x							<0.3 m/s	Not sure	Noise of airboats; constant noise of insects, crickets and frogs.

Appendix 3A Noise Log Results Daytime Measurements

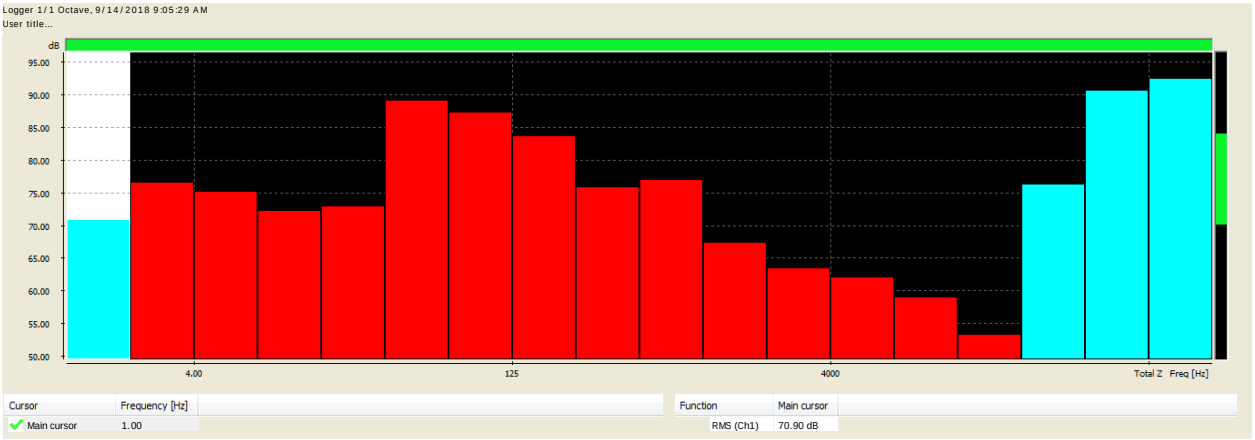
Daytime Measurements
Location: NU01 (60s measurement)

Log number:	&LOG569
Date:	14-09-2018
Time:	9:06 a.m.
Description of the location:	At the quay near the transfer station (90 m from the transfer station). Airboats/boats are starting and arriving on this spot. Material is being loaded on the airboats. (60s test).
Observation during measurement	Constant noise of airboats, loading of material on airboat, constant noise of pumping station. Wind speed: 3.3–5.5 m/s (Light breeze) (Light breeze) Wind direction: North-East
Position of the noise meter	1 meter away from a stationary operating airboat.

&LOG569 : Logger results



&LOG569 : Logger 1/1 Octave

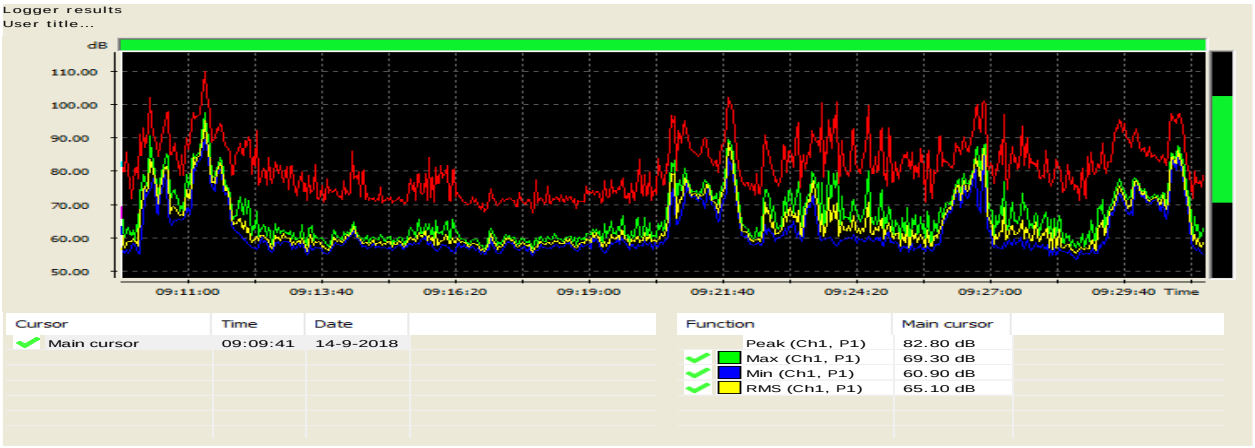


Nr.	Time	Cause
1.	9:06-9:07	Constant noise of airboats (departure), loading of material on airboat, constant noise of pumping station.

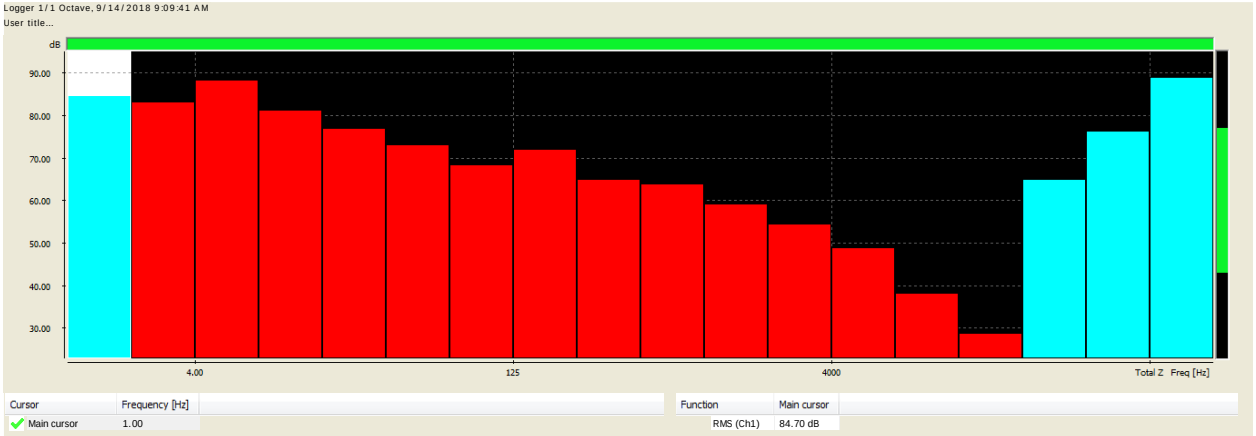
Location: NU01

Log number:	&LOG570
Date:	14-09-2018
Time:	9:10 a.m.
Description of the location:	At the quay near the transfer station (90 m from the transfer station). Airboats/boats are starting and arriving on this spot. Material is being loaded on the airboats.
Observation during measurement	Noise of airboats, loading of material on airboat, sound of waves produced by airboat, talking persons. Noise of light trucks, claxon. Wind speed: 3.3–5.5 m/s (Light breeze) Wind direction: North-East
Position of the noise meter	2 meters away from a stationary operating airboat.

&LOG570 : Logger results



&LOG570 : Logger 1/1 Octave



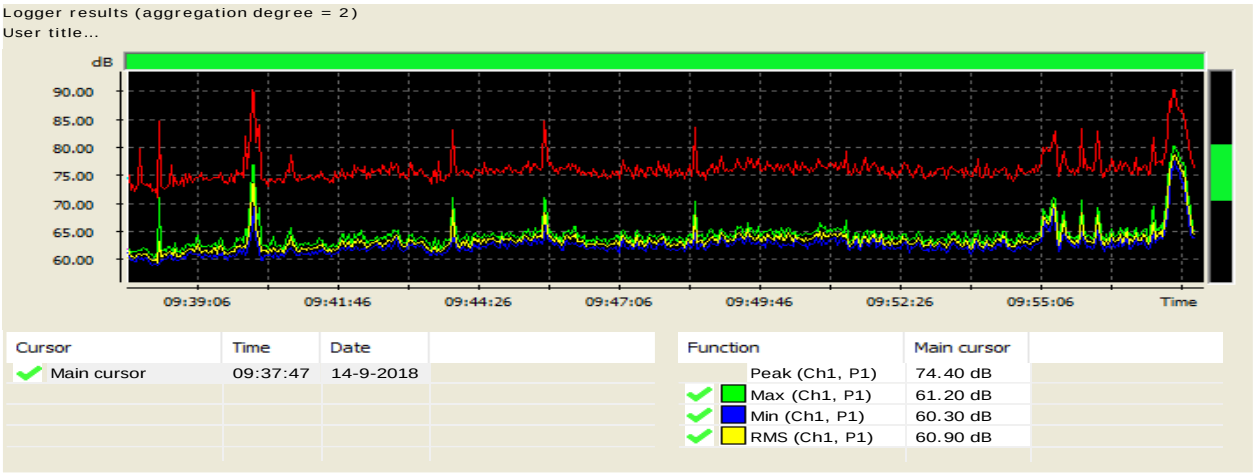
IS-344 - Noise Logger Results

Nr.	Time	Cause
1.	9:10-9:30	Constant noise of pumping station in a distance
2.	9.10-9.11	Airboat starting (1x), departures and turns around the corner
3.	9:11	Airboat arrives to pick up someone (1x)
4.	9:12	Small boat passing by (1x); sound of waves produced by small boat
5.	9:13	Talking person; light truck passing by (1x); claxon
6.	9:14	Airboat departures (1x)
7.	9:15	Noise of waves produced by airboat
8.	9:16	Noise of material being loaded
9.	9:17	Talking persons
10.	9:18	Talking persons
11.	9:19	Noise of walking in the airboat; talking persons; light truck passing by (1x)
12.	9:20-9:22	Airboat starting (2x); noise of airboat; airboat departures (1x)
13.	9:20	Airboat starting (2x); talking persons
14.	9:21	Noise of airboat
15.	9:22	Airboat departures (2x)
16.	9:23	Airboat arrives (2x); noise of steps
17.	9:24	Sound of waves produced by airboat; loading material; talking persons (3x)
18.	9:25	Loading material; talking persons (2x);
19.	9:26	Arrival of airboat from north side (1x); loading material; talking persons (3x)
20.	9:27	Arrival of airboat (1x); airboat turns to west side (1x); sound of waves produced by airboat
21.	9:28	Sound of waves produced by airboat; loading of material; talking person trough walkie talkie;
22.	9:29	Starting airboat (1x)
23.	9:30	Airboat departures (1x); talking person

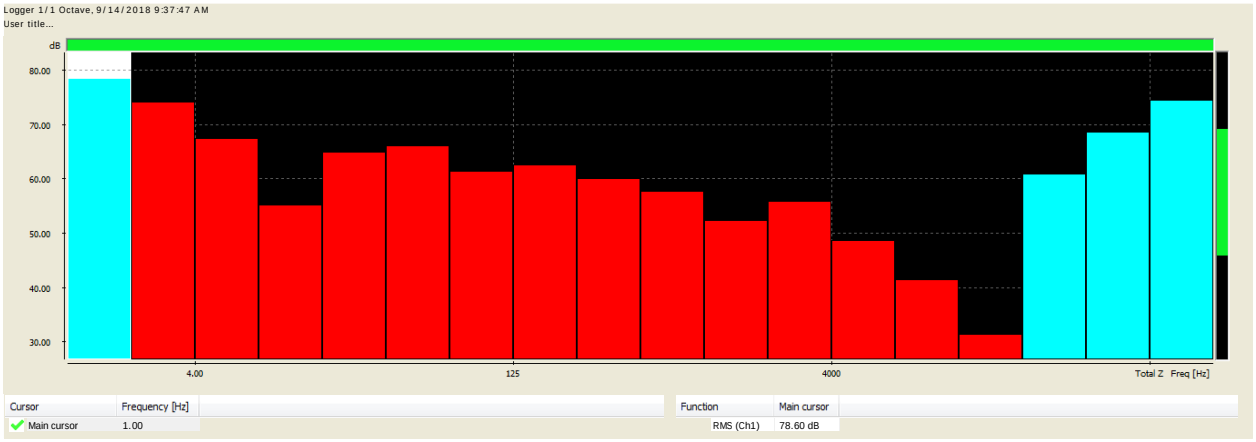
Location: NU02

Log number:	&LOG571
Date:	14-09-2018
Time:	9:37 a.m.
Description of the location:	Along the road to the emplacement, near the transfer station at a distance of 100 m from location NU01.
Observation during measurement	Constant noise of pumping station, noise of airboats; noise of leaves of coconut trees rustling, noise of birds and grasshoppers Wind speed: 3.3–5.5 m/s (Light breeze) Wind direction: North-East
Position of the noise meter	100 m away (east side) from location NU01

&LOG571 : Logger results



&LOG571 : Logger 1/1 Octave

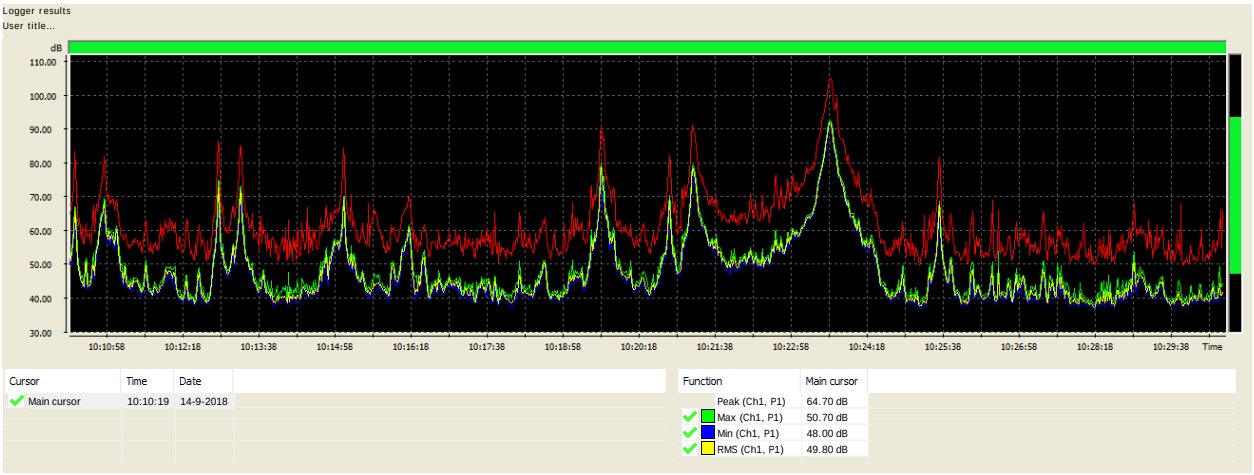


Nr.	Time	Cause
1.	9:38-9:58	Constant noise of pumping station, noise of leaves rustling; noise of coconut trees rustling, noise of grasshoppers in grass
2.	9:39	Claxon
3.	9:40	Noise of car door being closed; light truck passing by (1x)
4.	9:41	Light truck passing by (1x)
5.	9:42	Airboat starting (1x)
6.	9:43	Airboat starting (1x)
7.	9:44-9:46	Noise of arrived airboat (1p) (1x)
8.	9:46	Light truck passing by (2x)
9.	9:47	Airboat passing from south to west (1x)
10.	9:48	Airboat passing from west to east (quay) (1x)
11.	9:49	Light truck passing by (1x)
12.	9:51	Noise of birds
13.	9:53	Noise of birds
14.	9:54-9:56	Airboat starting (neutral) (5p) and departures (stationary) to west (1x)
15.	9:56	Departure of airboat to west (5p) (1x); light truck passing by (2x)
16.	9:57	Airboat starting (neutral) (2p) (1x) and departures (stationary) to north; light truck passing by (1x)
17.	9:58	Arrival airboat from west (1x)

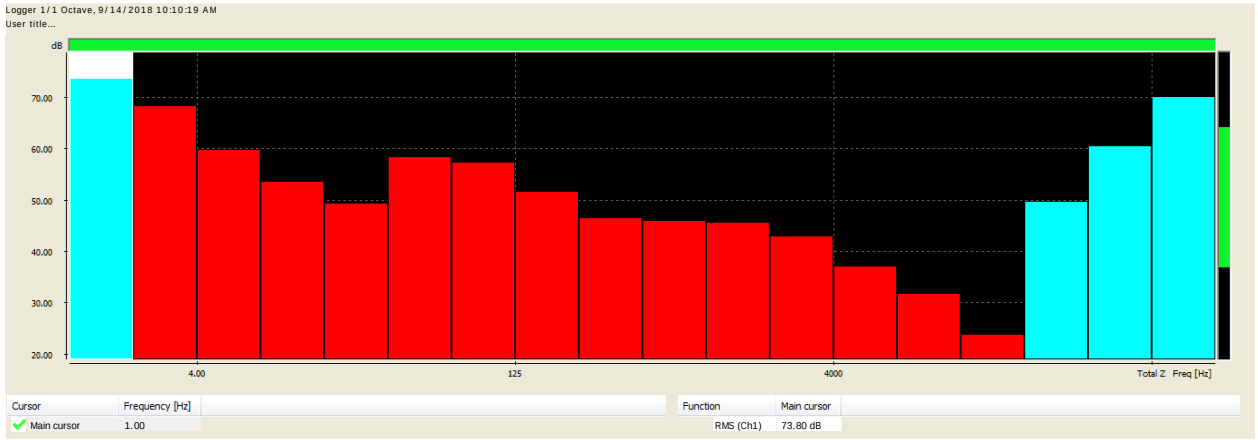
Location: NU03

Log number:	&LOG572
Date:	14-09-2018
Time:	10:10 a.m.
Description of the location:	Along the road to emplacement, between a T-junction, near the transfer station at a distance of 250 m from location NU01.
Observation during measurement	Constant noise of pumping station and machines from a distance, leaves and small twigs rustling. Noise of heavy trucks; noise of light trucks; noise of tractor. Noise of birds. Wind speed: 3.3–5.5 m/s (Light breeze) Wind direction: North-East
Position of the noise meter	250 m away (east side) from location NU01

&LOG572 : Logger results



&LOG572 : Logger 1/1 Octave



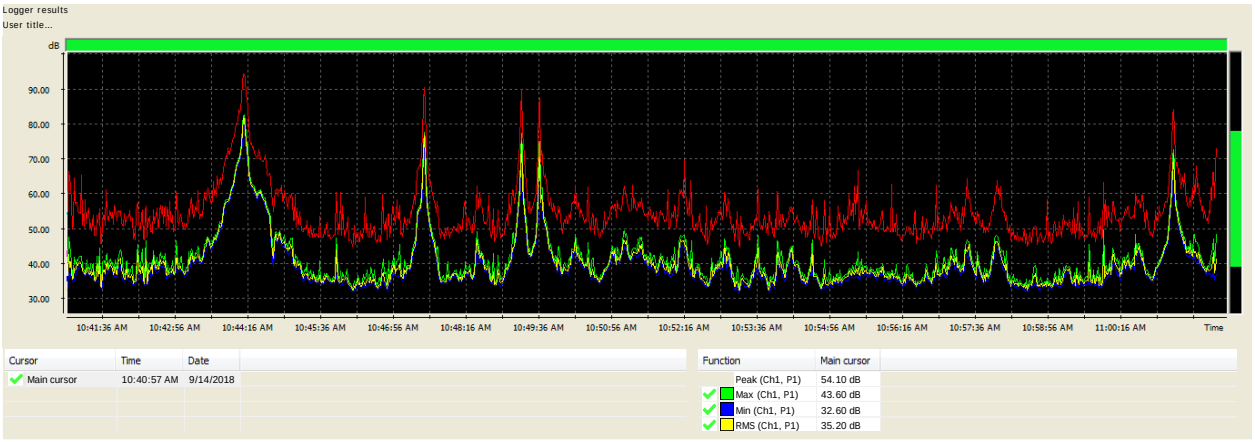
IS-344 - Noise Logger Results

Nr.	Time	Cause
1.	10:10-10:30	Constant noise of pumping station and machines from a distance, leaves and small twigs rustling
2.	10:10	Airboat passing by from west to north (1x)
3.	10:11	Light truck passing by (2x)
4.	10:13	Light truck passing by (1x)
5.	10:15	Airboat (1p) arrives from north (1x); light truck passing by (1x)
6.	10:16-10:17	Airboat starting (neutral) (2p) with load (1x) and departures (stationary) to west
7.	10:16	Noise of birds
8.	10:20	Heavy truck passing by (1x)
9.	10:21	Light truck passing by (1x)
10.	10:22	Caterpillar machine passes by (1x)
11.	10:23	Sound of a tractor at a distance
12.	10:24	Tractor passing by (1x)
13.	10:26	Light truck passing by (1x)

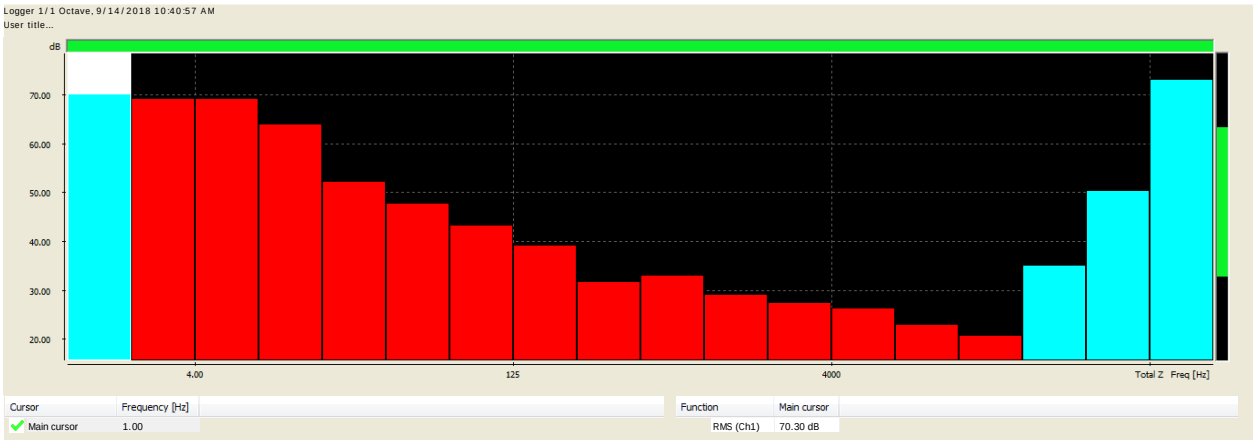
Location: NU04

Log number:	&LOG573
Date:	14-09-2018
Time:	10:40 a.m.
Description of the location:	Along the road to the emplacement, near the transfer station at a distance of 500 m from location NU01. Vegetation observed on both sides of the road.
Observation during measurement	Noise of airboat; noise of small boats. Noise of heavy truck and light trucks. Noise of birds, leaves and small twigs rustling. Wind speed: 1.5–3.3 m/s (Light breeze) Wind direction: North-East
Position of the noise meter	500 m away (east side) from location NU01

&LOG573 : Logger results



&LOG573 : Logger 1/1 Octave

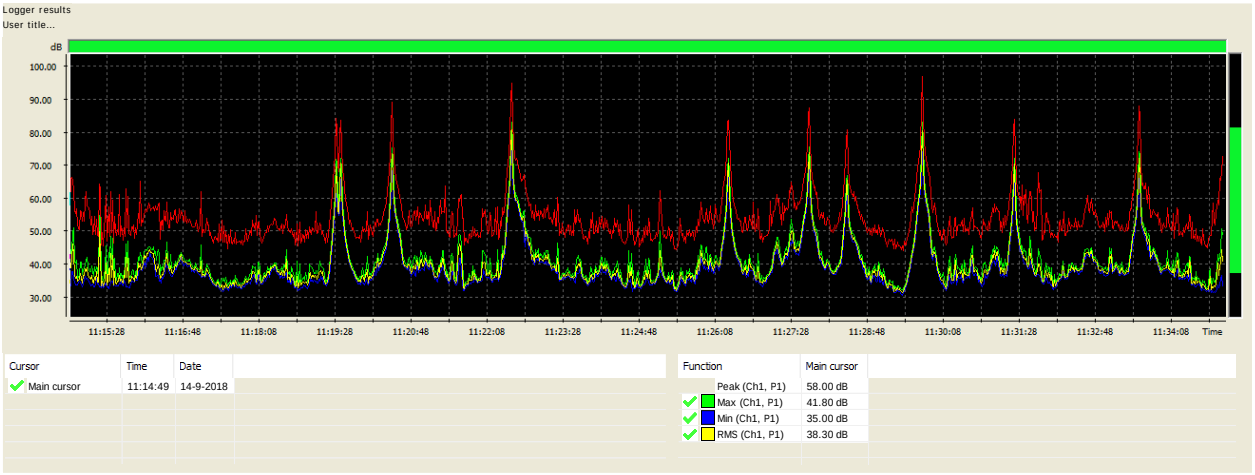


Nr.	Time	Cause
1.	10:41-11:01	Noise of leaves rustling; noise of twigs rustling
2.	10:41	Noise of leaves rustling; noise of small twigs of coconut tree rustling; noise of birds
3.	10:44	Heavy truck passing by (1x)
4.	10:47	Light truck passing by (1x)
5.	10:49	Light truck passing by (1x)
6.	10:50	Light truck passing by (2x)
7.	10:51	Small boat arrives from west (1x)
8.	10:53	Airboat arrives from south and turns to west (1x)
9.	10:59	Small boat arrives (3p) (1x), noise of starting car

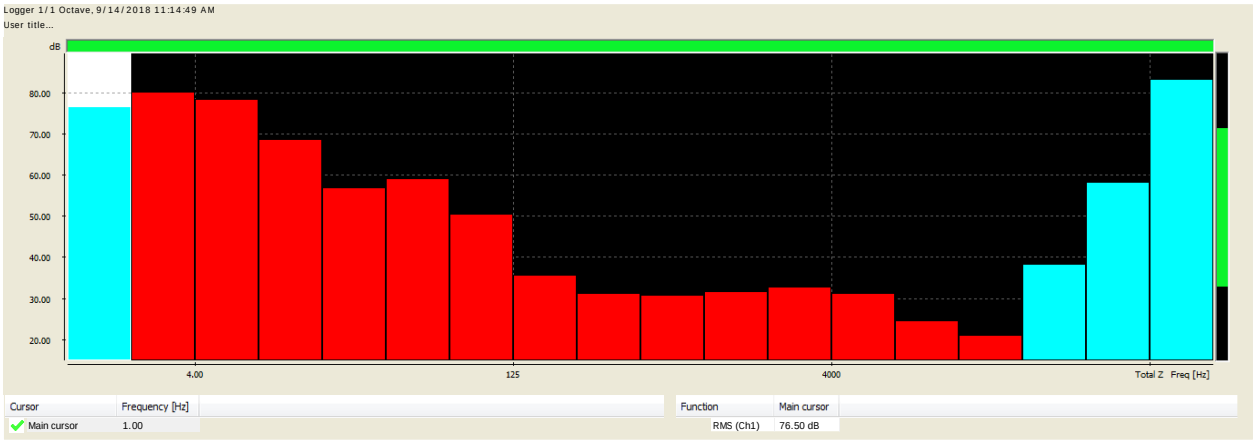
Location: NU05

Log number:	&LOG574
Date:	14-09-2018
Time:	11:14 a.m.
Description of the location:	Along the road to the emplacement, near the transfer station at a distance of 750 m from location NU01. Vegetation observed on both sides of the road.
Observation during measurement	Noise of airboats. Noise of construction activities from a distance. Noise of light trucks. Noise of leaves and small twigs rustling. Noise of birds Wind speed: 1.5–3.3 m/s (Light breeze) Wind direction: North-East
Position of the noise meter	750 m away (east side) from location NU01

&LOG574 : Logger results



&LOG574 : Logger 1/1 Octave

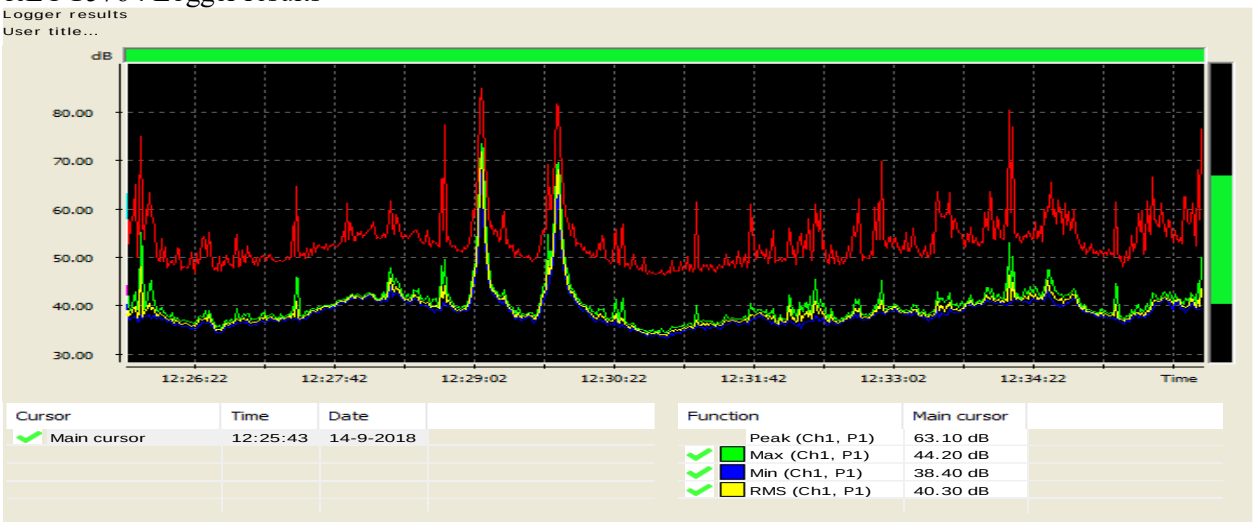


Nr.	Time	Cause
1.	11:15- 11:35	Constant noise of leaves rustling; noise of small twigs rustling
2.	11:15	Noise of birds
3.	11:16	Noise of construction activities from a distance; noise of birds
4.	11:17	Airboat (1x) starting and departures to west
5.	11:20	Light truck passing by (2x)
6.	11:21	Light truck passing by (1x)
7.	11:22	Light truck passing by (1x)
8.	11:26	Light truck passing by (1x)
9.	11:27	Airboat (2p) (1x) arrives from west
10.	11:28	Light truck passing by (2x)
11.	11:30	Light truck passing by (1x)
12.	11:31	Light truck passing by (1x)
13.	11:33	Light truck passing by (1x)

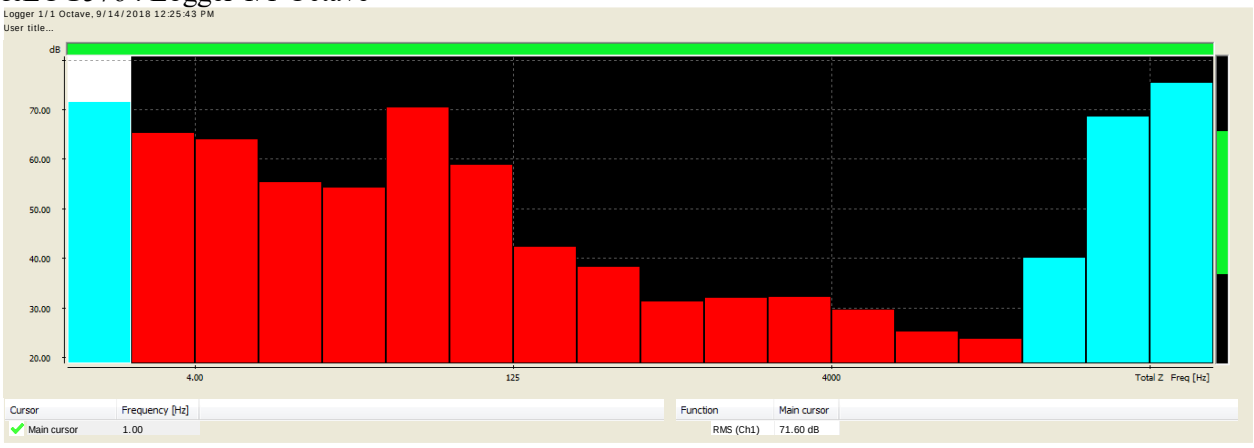
Location: NU06

Log number:	&LOG576
Date:	14-09-2018
Time:	12:25 p.m.
Description of the location:	Uninhabited area along the Gangaram Panday Road. 1.94 km away north west site from the Staatolie headquarters.
Observation during measurement	Constant noise of excavator/machine from the forest. Siren. Wind. Noise of leaves and small twigs rustling. Noise of birds. Noise of grasshoppers, insects and crickets Wind speed: 3.3–5.5 m/s (Light breeze) Wind direction: North-East
Position of the noise meter	2.5 meters from the axis of the road

&LOG576 : Logger results



&LOG576 : Logger 1/1 Octave

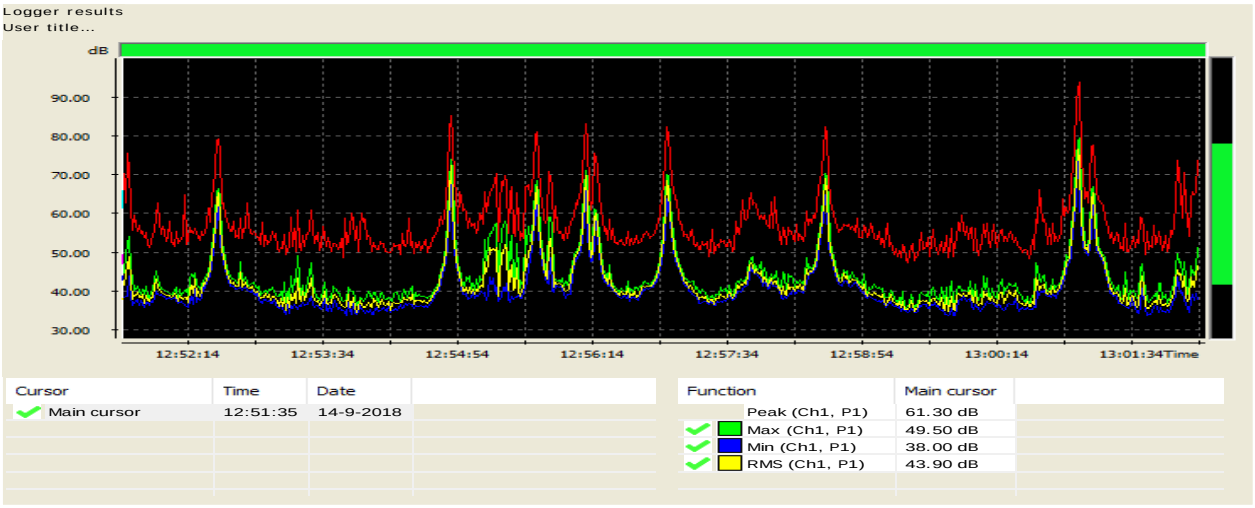


Nr.	Time	Cause
1.	12:26-12:36	Constant noise of excavator/machine from the forest, noise of leaves rustling; noise of small twigs rustling
2.	12:26	Wind; noise of leaves rustling; noise of small twigs rustling
3.	12:27	Noise of birds, crickets and insects
4.	12:28	Wind; noise of leaves rustling; noise of small twigs rustling
5.	12:29	Car passing by (1x); wind; noise of leaves rustling; noise of small twigs rustling
6.	12:30	Car passing by (1x); siren alarm from Staatsolie
7.	12:31	Noise of excavator/machine sound from the forest
8.	12:32	Wind; noise of leaves rustling; noise of small twigs rustling
9.	12:33	Noise of insects
10	12:35	Wind; noise of leaves rustling; noise of small twigs rustling
11.	12:36	Wind; noise of leaves rustling; noise of small twigs rustling; noise of insects

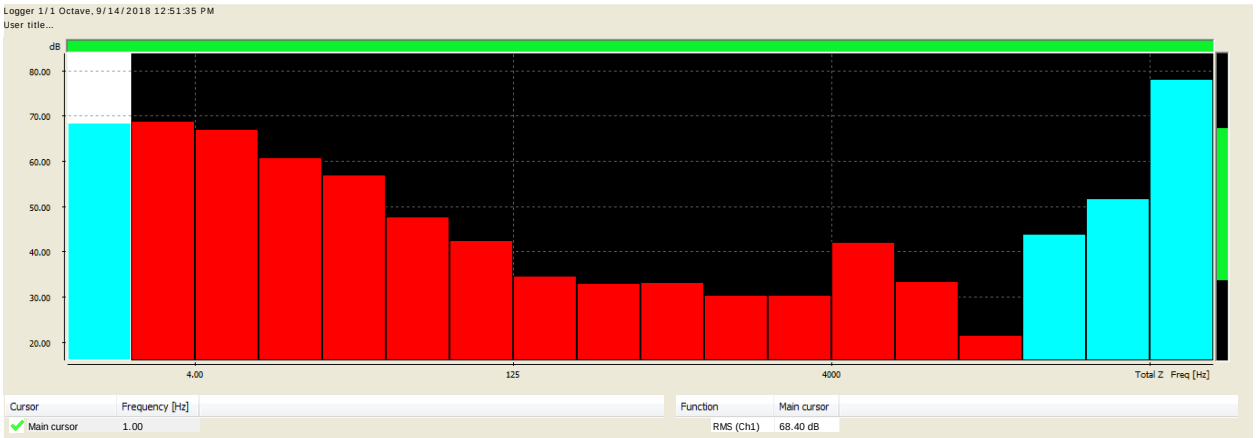
Location: NU07

Log number:	&LOG577
Date:	14-09-2018
Time:	12:51 p.m.
Description of the location:	Residential area. In front of the residence, along the Gangaram Panday Road and 1.09 km away from the Wayambo Road.
Observation during measurement	Constant noise of excavator/machine from a distance. Walking and talking persons. Noise of cars, light trucks and cargo trucks. Radio music; wind; leaves and small twigs rustling, noise of barking dogs; noise of birds and insects Wind speed: 3.3–5.5 m/s (Light breeze) Wind direction: North-East
Position of the noise meter	2.5 meters from the axis of the road

&LOG577 : Logger results



&LOG577 : Logger 1/1 Octave



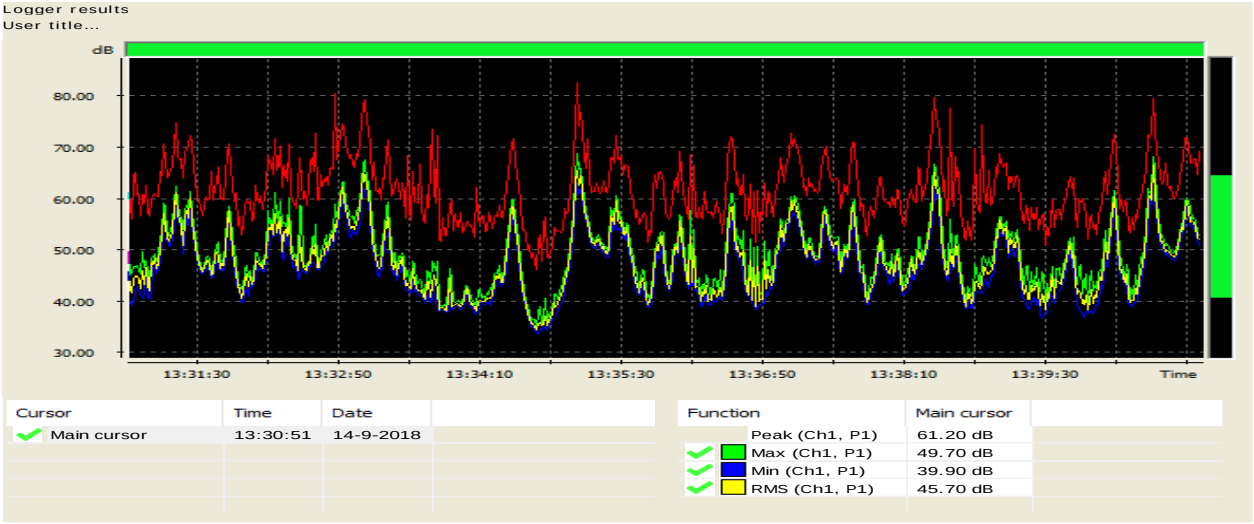
IS-344 - Noise Logger Results

Nr.	Time	Cause
1.	12:52-13:02	Constant noise of excavator/machine from a distance, wind, noise of leaves rustling; noise of small twigs rustling,
2.	12:52	Wind; noise of leaves rustling; noise of small twigs rustling; radio music
3.	12:53	Light truck passing by (1x)
4.	12:54	Noise of birds
5.	12:55	Car passing by (1x); walking persons (2x); noise of barking dogs
6.	12:56	Car passing by (2x); light truck passing by (1x)
7.	12:57	Light truck passing by (1x); noise of birds; noise of insects
8.	12:58	Talking person (1x); noise of leaves rustling; noise of small twigs rustling
9.	12:59	Cargo truck passing by (1x)
10.	13:01	Car passing by (1x); light truck passing by (1x); wind

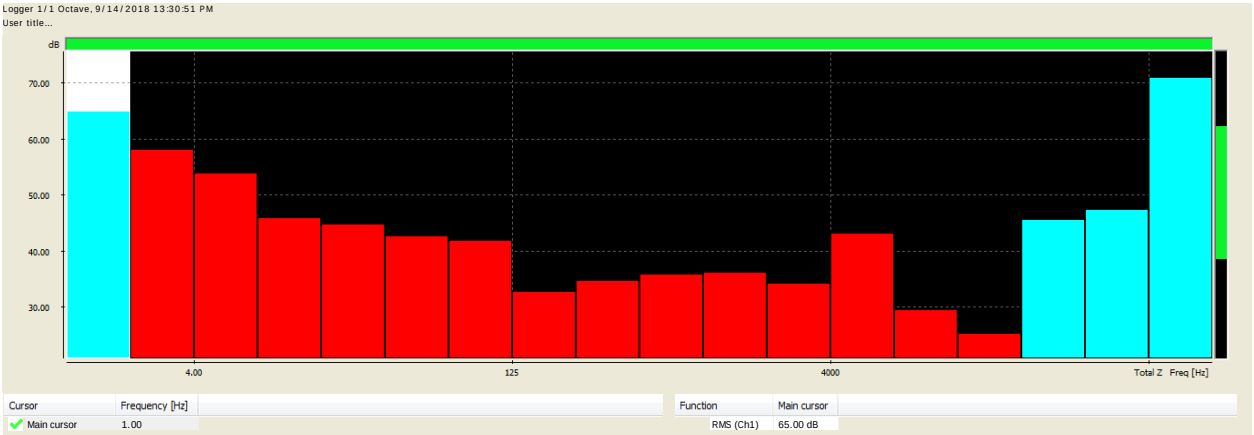
Location: NU08

Log number:	&LOG578
Date:	14-09-2018
Time:	13:30 p.m.
Description of the location:	Calor residence. Overgrown area, on the Calor Dam. Average grass height of 0.3 meter. Distance from the axis of the road to the position of the noise meter is 45 m.
Observation during measurement	Noise of cars, light trucks and heavy trucks. Wind. Noise of leaves and small twigs rustling. Noise of birds, grasshoppers and insects Wind speed: 1.5–3.3 m/s (Light air) Wind direction: North-East
Position of the noise meter	45m distance from the axis of the road

&LOG578 : Logger results



&LOG578 : Logger 1/1 Octave



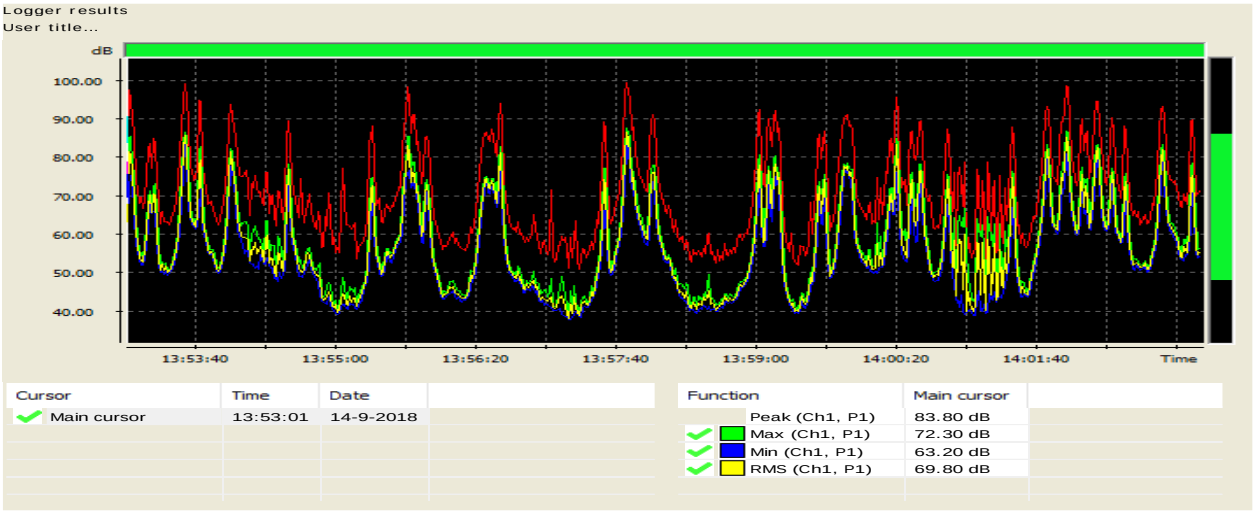
IS-344 - Noise Logger Results

Nr.	Time	Cause
1.	13:31-13:41	Wind, noise of leaves rustling, noise of small twigs rustling, noise of birds and grasshoppers/insects
2.	13:31	Car passing by (4x); noise of birds
3.	13:32	Car passing by (2x); heavy truck passing by (2x)
4.	13:33	Car passing by (2x); heavy truck passing by (2x)
5.	13:34	Car passing by (2x)
6.	13:35	Heavy truck passing by (1x); noise of birds
7.	13:36	Car passing by (3x), light truck passing by (2x); heavy truck passing by (1x)
8.	13:37	Car passing by (2x); light truck passing by (2x); cargo truck passing by (1x)
9.	13:38	Light truck passing by (1x); cargo truck passing by (1x); moped passing by (1x)
10.	13:39	Car passing by (3x); light truck passing by (1x)
11.	13:40	Car passing by (2x); light truck passing by (1x)
12.	13:41	Cargo truck passing by (1x)

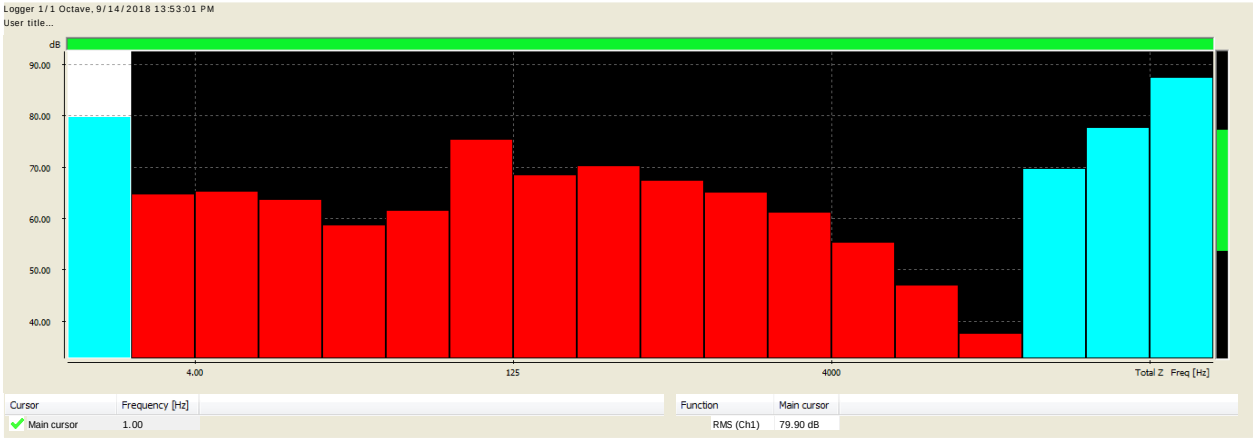
Location: NU09

Log number:	&LOG579
Date:	14-09-2018
Time:	13:53 p.m.
Description of the location:	Driveway of the residence at the Wayambo Road. Nearest residence on the East site of the Calor property. Distance from the axis of the road to the position of the noise meter is 8 m.
Observation during measurement	Noise of cars, light trucks and heavy trucks. Noise of leaves and small twigs rustling. Noise of birds and insects. Wind speed: 1.5–3.3 m/s (Light air) Wind direction: North-East
Position of the noise meter	8m distance from the axis of the road

&LOG579 : Logger results



&LOG579 : Logger 1/1 Octave



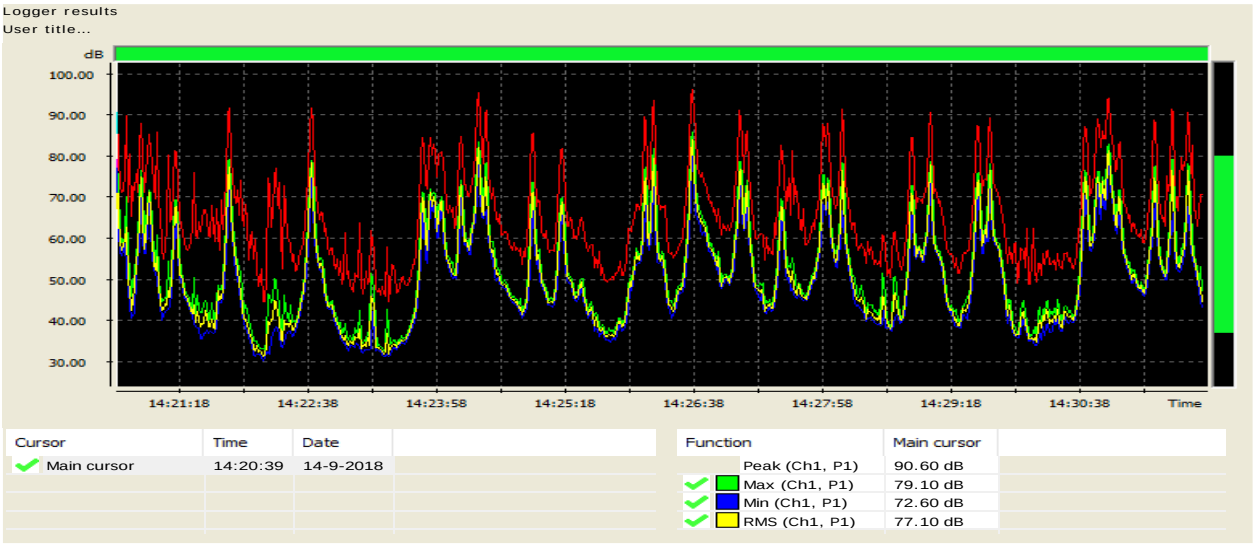
IS-344 - Noise Logger Results

Nr.	Time	Cause
1.	14:21-14:31	Noise of leaves rustling, noise of small twigs rustling, noise of birds and insects
2.	14:21	Car passing by (3x); noise of leaves rustling; noise of small twigs rustling; noise of birds and insects
3.	14:22	Car passing by (1x)
4.	14:23	Car passing by (2x)
5.	14:24	Car passing by (7x); heavy truck passing by (1x)
6.	14:25	Car passing by (4x)
7.	14:27	Car passing by (3x), heavy truck passing by (1x)
8.	14:28	Car passing by (4x)
9.	14:29	Car passing by (2x)
10.	14:30	Car passing by (2x)
12.	14:31	Car passing by (8x); heavy truck passing by (1x); light truck passing by (1x)

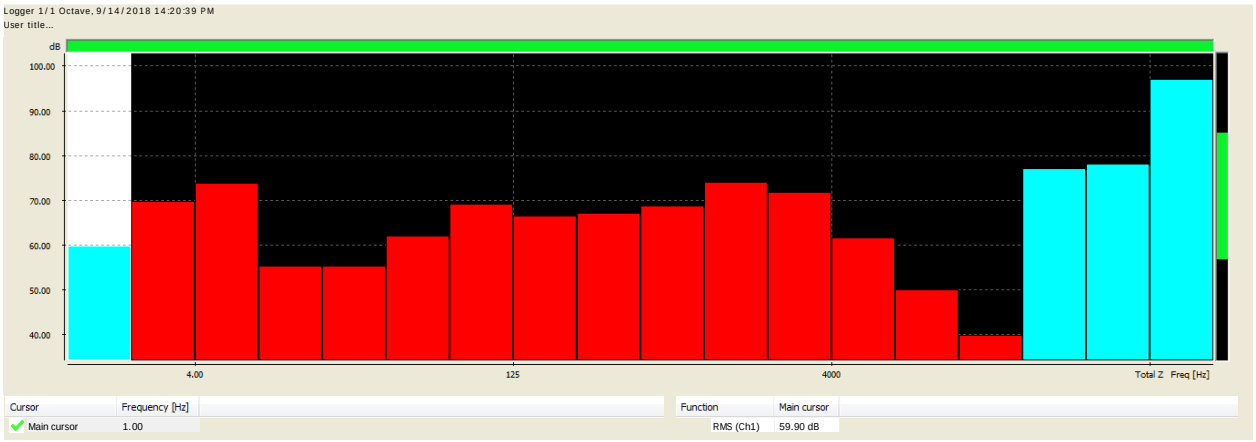
Location: NU10

Log number:	&LOG582
Date:	14-09-2018
Time:	14:20 p.m.
Description of the location:	Driveway of the residence at the Wayambo Road. Nearest residence on the West site of the Calor property. Distance from the axis of the road to the position of the noise meter is 8 m.
Observation during measurement	Noise of cars, heavy trucks, light trucks and cargo trucks. Noise of leaves rustling; noise of small twigs rustling, barking dog. Noise of birds and insects. Wind speed: 1.5–3.3 m/s (Light air) Wind direction: North-East
Position of the noise meter	8m distance from the axis of the road

&LOG582 : Logger results



&LOG582 : Logger 1/1 Octave



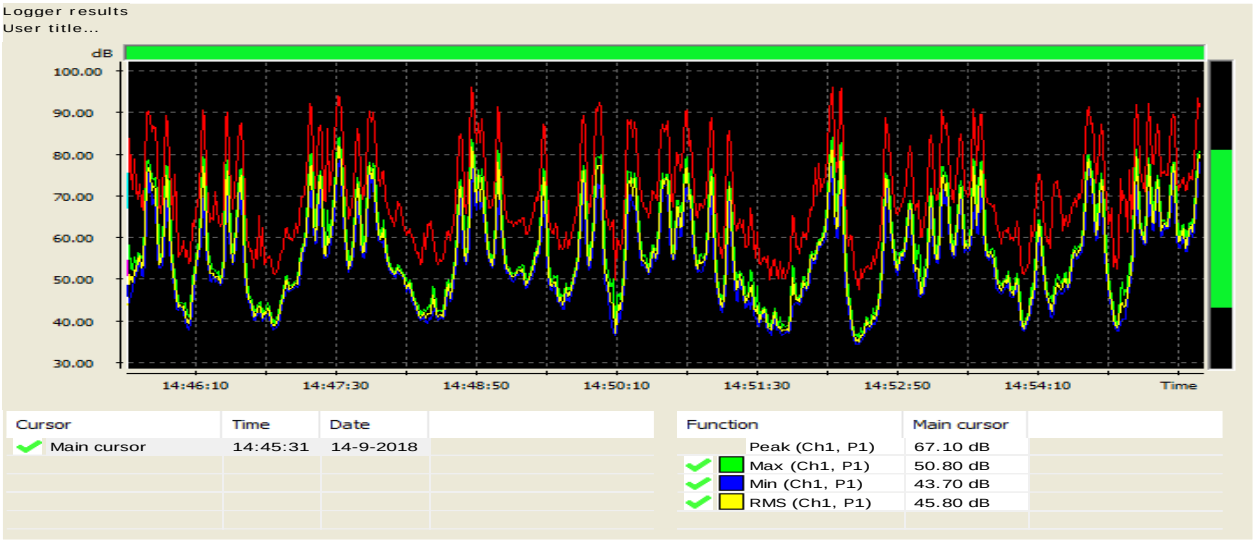
IS-344 - Noise Logger Results

Nr.	Time	Cause
1.	13:53-14:03	Noise of leaves rustling; noise of small twigs rustling, barking dog, noise of birds and insects
2.	13:53	Car passing by (5x)
3.	13:54	Car passing by (3x); noise of leaves rustling; noise of small twigs rustling; noise of birds
4.	13:55	Car passing by (9x)
5.	13:56	Car passing by (1x); heavy truck passing by (2x)
6.	13:57	Car passing by (3x); heavy truck passing by (1x)
7.	13:58	Car passing by (2x)
8.	13:59	Car passing by (6x); cargo truck passing by (1x)
9.	14:00	Car passing by (5x); heavy truck passing by (1x); cargo truck passing by (1x)
10.	14:01	Car passing by (3x); noise of barking dog; noise of birds
11.	14:02	Car passing by (5x); heavy truck passing by (4x)
12.	14:03	Heavy truck passing by (1x)

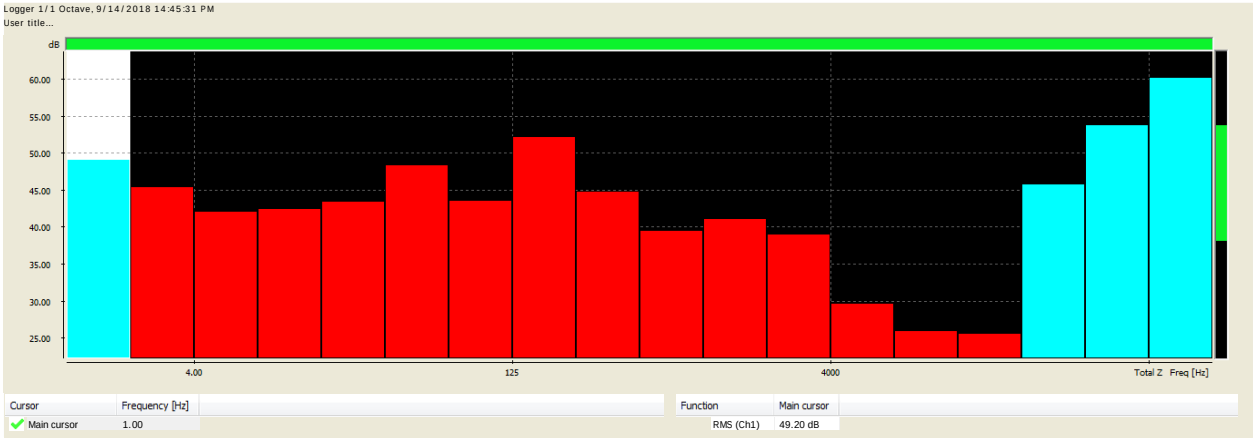
Location: NU11

Log number:	&LOG583
Date:	14-09-2018
Time:	14:45 p.m.
Description of the location:	Driveway of the residence at the Wayambo Road. Nearest residence on the West site of the Soengie property. Distance from the axis of the road to the position of the noise meter is 8 m.
Observation during measurement	Noise of cars, heavy trucks, light trucks, cargo truck and moped. Noise of leaves and small twigs rustling. Noise of birds and insects. Wind speed: 1.5–3.3 m/s (Light air) Wind direction: North-East
Position of the noise meter	8m distance from the axis of the road

&LOG583 : Logger results



&LOG583 : Logger 1/1 Octave



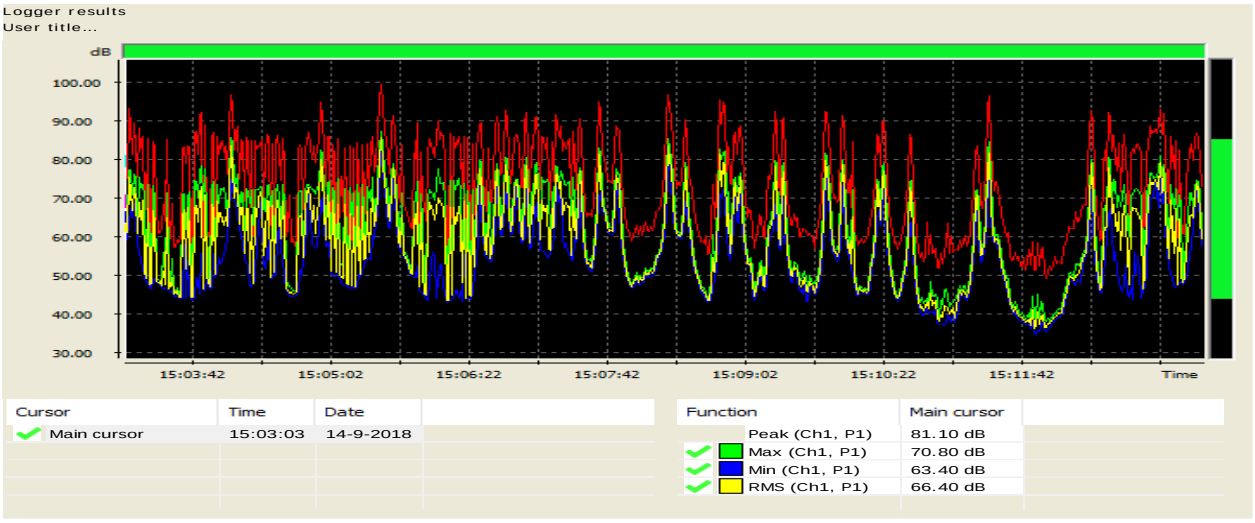
IS-344 - Noise Logger Results

Nr.	Time	Cause
1.	14:46-14:55	Noise of leaves and small twigs rustling, noise of birds and insects
2.	14:46	Car passing by (5x); noise of leaves rustling; noise of small twigs rustling; noise of birds; noise of insects
3.	14:47	Car passing by (8x); heavy truck passing by (1x)
4.	14:48	Car passing by (1x); heavy truck passing by (2x)
5.	14:49	Car passing by (6x); heavy truck passing by (1x)
6.	14:50	Car passing by (4x); heavy truck passing by (1x); light truck passing by (1x)
7.	14:51	Car passing by (9x)
8.	14:52	Car passing by (1x); heavy truck passing by (1x)
9.	14:53	Car passing by (7x); moped passing by (1x)
10.	14:54	Car passing by (2x); noise of birds
11.	14:55	Car passing by (2x); heavy truck passing by (2x); light truck passing by (1x); cargo truck passing by (2x)

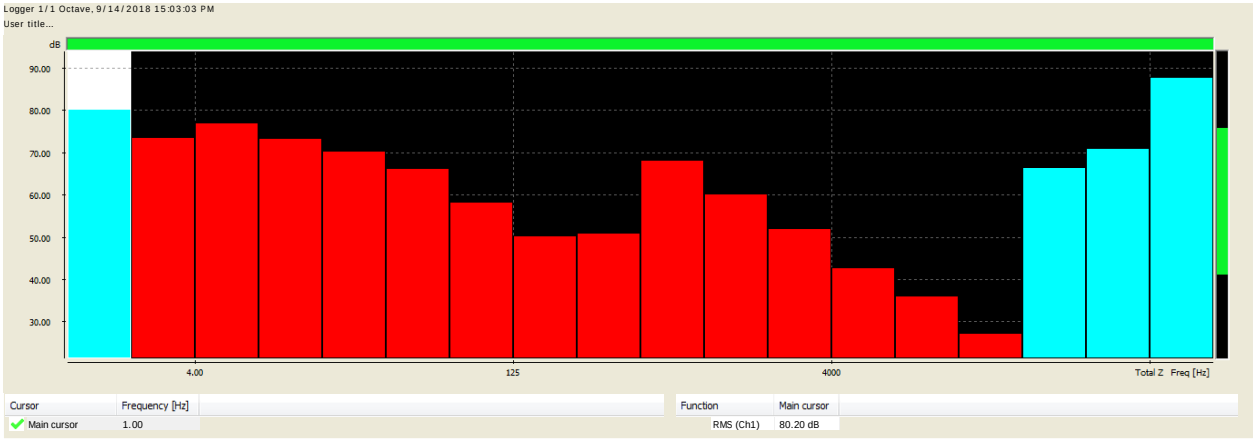
Location: NU12

Log number:	&LOG584
Date:	14-09-2018
Time:	15:03 p.m.
Description of the location:	Driveway of the residence at the Wayambo Road. Nearest residence on the East site of the Soengie property. Distance from the axis of the road to the position of the noise meter is 8 m.
Observation during measurement	Noise of cars, heavy trucks, light trucks and cargo trucks. Wind. Noise of leaves and small twigs rustling. Noise of birds and barking dog. Wind speed: 1.5–3.3 m/s (Light air) Wind direction: North-East
Position of the noise meter	8m distance from the axis of the road

&LOG584 : Logger results



&LOG584 : Logger 1/1 Octave



IS-344 - Noise Logger Results

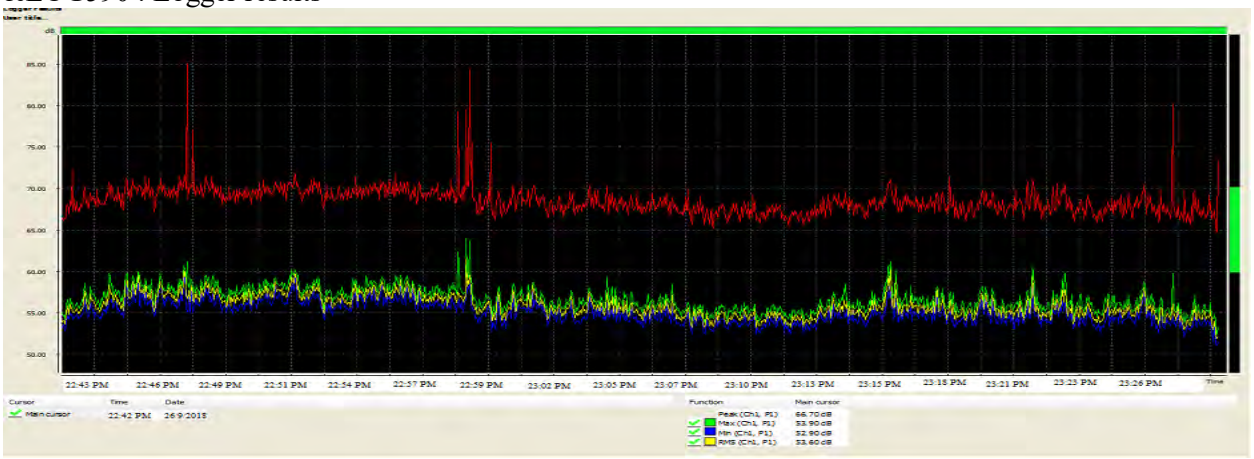
Nr.	Time	Cause
1.	15:03-15:13	Noise of leaves rustling; noise of small twigs rustling, noise of barking dog; noise of birds
2.	15:03	Car passing by (2x); wind; noise of leaves rustling; noise of small twigs rustling; noise of barking dog; noise of birds
3.	15:04	Talking persons; car passing by (1x); heavy truck passing by (1x); noise of barking dog
4.	15:05	Car passing by (1x); light truck passing by (1x); cargo truck passing (1x); moped passing by (1x); noise of barking dog
5.	15:06	Car passing by (1x); heavy truck passing by (2x); cargo truck passing by (1x); noise of barking dog; noise of bird
6.	15:07	Car passing by (11x); heavy truck passing by (2x); wind; noise of barking dog; noise of birds
7.	15:08	Car passing by (4x); heavy truck passing by (1x)
8.	15:09	Car passing by (5x); noise of barking dog; noise of bird
9.	15:10	Talking persons; car passing by (4x); heavy truck passing by (1x); noise of birds
10.	15:11	Car passing by (3x)
11.	15:12	Car passing by (1x); heavy truck passing by (1x); noise of barking dog; noise of bird
12.	15:13	Car passing by (6x); heavy truck passing by (1x)

Appendix 3B Noise Log Results Nighttime Measurements

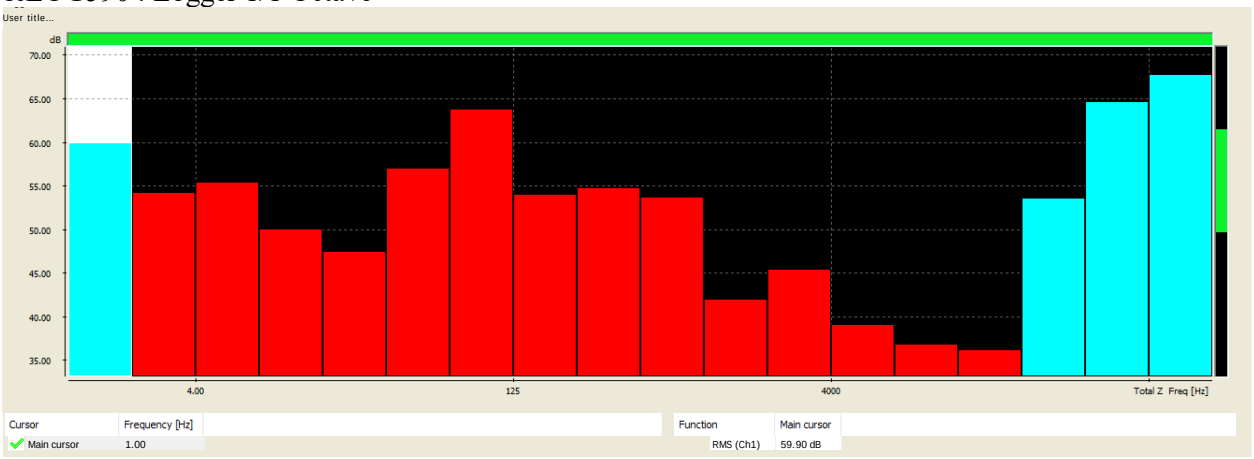
Nighttime Measurements
Location: NU01

Log number:	&LOG590
Date:	26-09-2018
Time:	22:43 p.m.
Description of the location:	At the quay near the transfer station (90 m from the transfer station). All airboats are ashore.
Observation during measurement	Constant noise of pumping station; noise of light trucks; noise of insects, crickets and frogs. Wind speed: <0.3 m/s (Calm) Wind direction: Not sure
Position of the noise meter	2 m away from the quay

&LOG590 : Logger results



&LOG590 : Logger 1/1 Octave

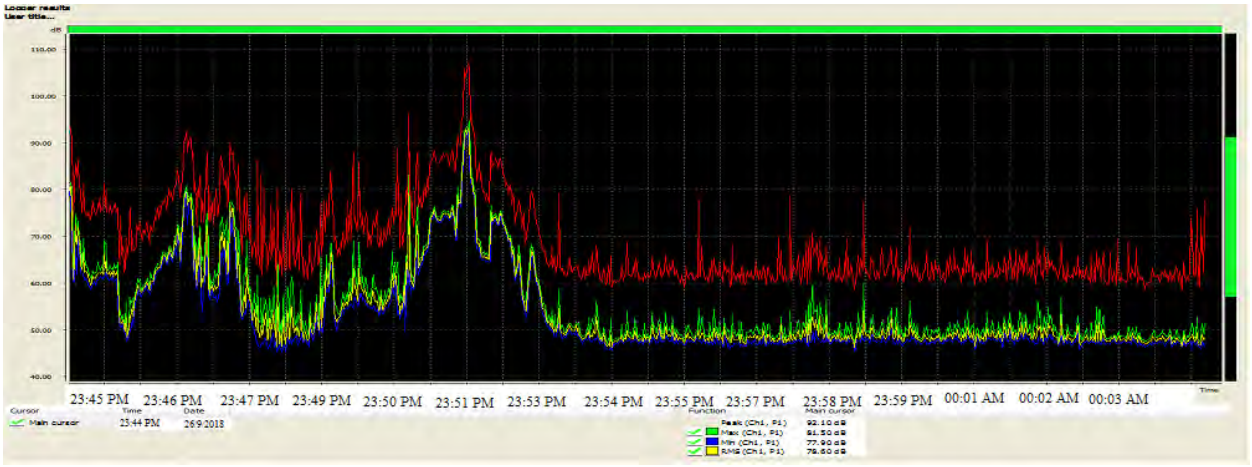


Nr.	Time	Cause
1.	22:43- 23:26	Constant noise of pumping station; noise of light trucks; noise of insects, crickets and frogs.
2.	23:00	Light truck passing by (1x)
3.	23:26	Light truck passing by (1x)

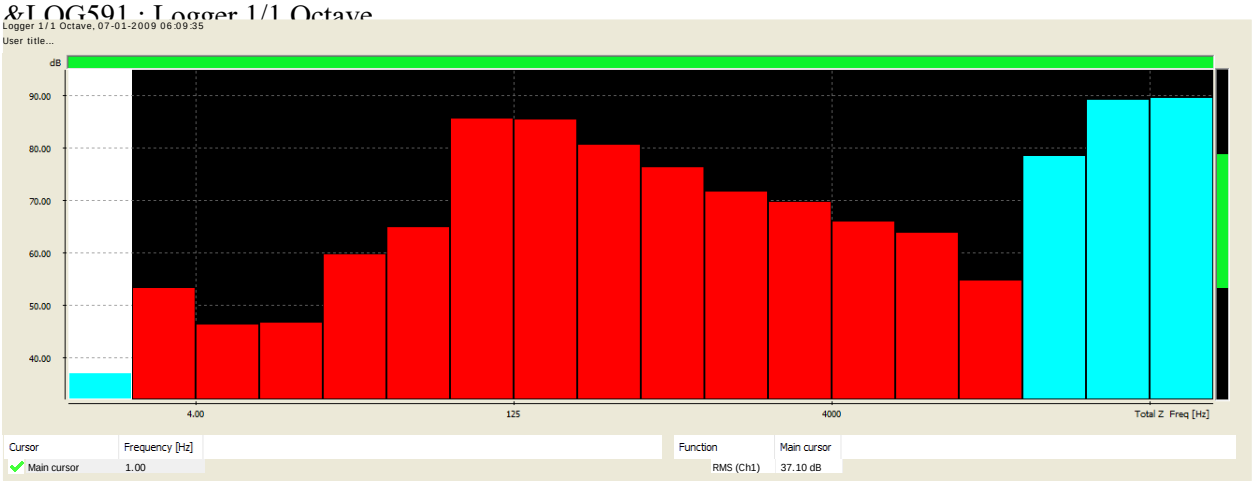
Location: NU13

Log number:	&LOG591
Date:	26-09-2018/ 27-09-2018
Time:	23:45 p.m.
Description of the location:	Near the pick-up point TNW (swamp). 1.5 km away on the north site of location NU01 and 2 m away from the quay.
Observation during measurement	Noise of airboats; noise of bus and light truck; constant noise of insects, crickets and frogs. Wind speed: <0.3 m/s (Calm) Wind direction: Not sure
Position of the noise meter	1.5 km away from location NU01 and 2 m away from the quay

&LOG591 : Logger results



&LOG591 : Logger 1/1 Octave



Nr.	Time	Cause
1.	23:45-00:05	Noise of airboats; noise of bus and light truck; constant noise of insects, crickets and frogs.
2.	23:45	Airboat arrives from south (1p) (1x)

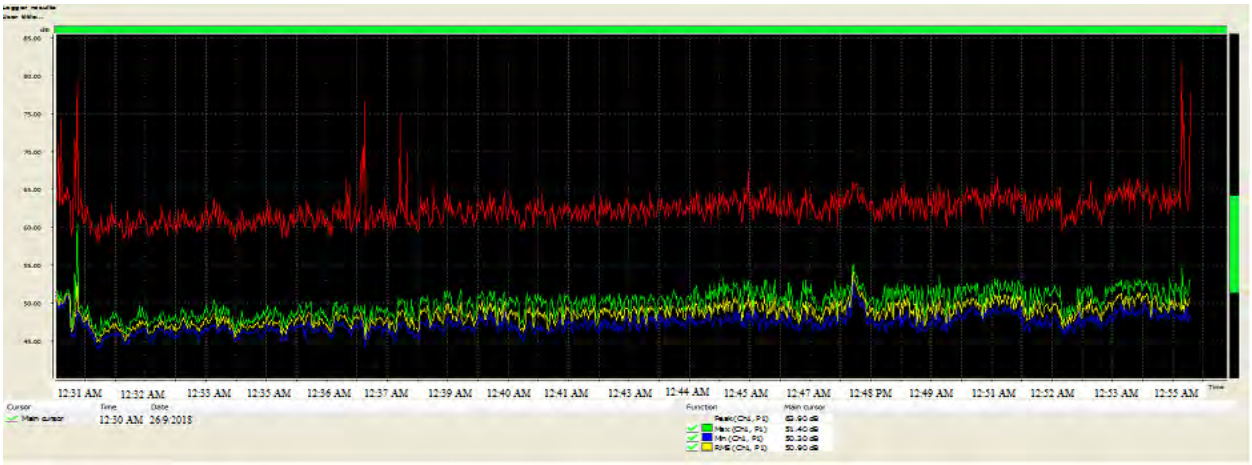
IS-344 - Noise Logger Results

3.	23:46	Noise of airboat; talking person
4.	23:47	Airboat arrives (with persons) (1x)
5.	23:48	Bus arrives (with persons) (1x); noise of airboat; talking person; walking persons
6.	23:49	Walking persons in airboat; talking persons light truck passing by (1x)
7.	23:50	Loading of material; talking persons; noise of light truck engine
8.	23:51	Airboat starting and departures to south (1x); talking persons
9.	23:52	Noise of airboat; airboat starting and departures to east (1x)
10.	23:53	Airboat starting and departures to east
11.	23.54-00:05	Talking persons; noise of bus engine

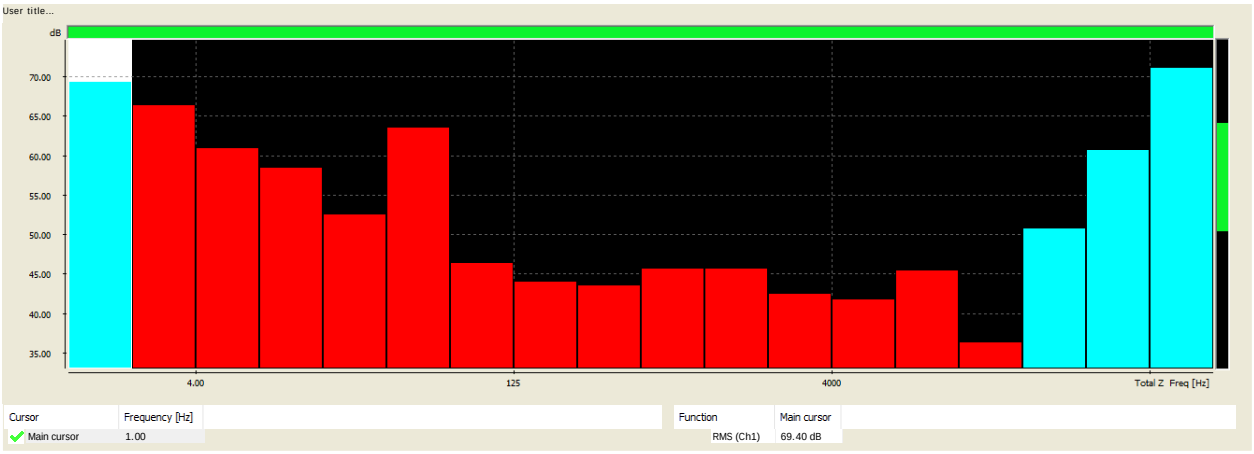
Location: NU14

Log number:	&LOG592
Date:	27-09-2018
Time:	12:31 a.m.
Description of the location:	Along the road, near the pick-up point TNW at a distance of 750 m from location NU13.
Observation during measurement	Noise of airboats; constant noise of insects, crickets and frogs. Wind speed: <0.3 m/s (Calm) Wind direction: Not sure
Position of the noise meter	750 m away from location NU13

&LOG592 : Logger results



&LOG592 : Logger 1/1 Octave



Nr.	Time	Cause
1.	12:31-12:53	Noise of airboats; constant noise of insects, crickets and frogs.
2.	12:31-12:36	Noise of insects and frogs

IS-344 - Noise Logger Results

3.	12:36	Noise of insects and frogs
4.	12:38	Noise of airboat
5.	12:39	Noise of airboat
6.	12:44	Airboat departures (1x)
7.	12:46	Airboat departures (1x)
8.	12:50-12:53	Noise of airboat

2C Social Baseline

Updated Social Impact Assessment (SIA)

for

the Uitkijk Appraisal Drilling Program (ADP) 2018

November 2018
Final Draft

Report prepared by Rachelle Bong A Jan
Study commissioned by ILACO

Table of Contents

List of Figures

List of Tables

Abbreviations and Acronyms

ABS	General Bureau of Statistics (*Algemeen Bureau voor de Statistiek*)
ADP	Appraisal Drilling Program
AoI	Area of Impact
BIC	Citizens Information Center (*Burger Informatie Centrum*)
BO	Government Manager (*Bestuursopzichter)*
BOPD	Barrels of Oil Per Day
CCU	Corporate Communications Upstream
CR	Community Relations
CSI	Corporate Social Investment
DC	District Commissioner (*Districtscommissaris*)
DR	District Council (*Districtsraad*)
DWV	Water Supply Service (*Dienst Watervoorziening*)
EA	Environmental Assessment
EBS	Energy Company Suriname (*Energie Bedrijven Suriname*)
EHS	Environmental, Health, and Safety
EMMP	Environmental Management and Monitoring Plan
ESIA	Environmental and Social Impact Assessment
IFC	International Finance Corporation
GoS	Government of Suriname
HSEQ	Health, Safety, Environment and Quality
LVV	Agriculture, Animal Husbandry, and Fisheries (*Landbouw, Veeteelt en Visserij*)
MINOWC	Ministry of Education, Science and Culture (*Ministerie van Onderwijs, Wetenschap en Cultuur*)
MOU	Memorandum of Understanding
MUMAs	Multiple Use Management Areas
NB-LBB	Nature Conservation Division of the Forestry Service Suriname (*Afdeling Natuurbeheer van Dienst 's Lands Bosbeheer*)
NEC	Noordam Environmental Consultancy
NH	Natural Resources (*Natuurlijke Hulpbronnen*)
NV	Public Limited Company - PLC (*Naamloze Vennootschap*)
NIMOS	National Institute for Environment and Development in Suriname (*Nationaal Instituut voor Milieu en Ontwikkeling in Suriname*)
OBO	Assistant Government Manager (*Onder Bestuursopzichter*)
OWTC	Public Works, Transport and Communication (*Openbare Werken, Transport en Communicatie*)
PAPs	Project Affected Persons
POC	Paradise Oil Company
PS	Performance Standards
RGD	Regional Health Department (*Regionale Gezondheidsdienst*)
RR	Resort Council (*Ressortraad*)
ROGB	Ministry of Physical Planning, Land and Forest Management

SBB	Foundation for Forest Management and Production Control (*Stichting Bosbeheer en Bostoezicht*)
SIA	Social Impact Assessment
SRD	Surinamese Dollars
SRK	SRK Consulting (South Africa) (Pty) Ltd
SUV	Sports Utility Vehicle
SWM	Suriname Water Supply Company (*Surinaamsche Waterleiding Maatschappij*)
WBG	World Bank Group

Executive summary

This Social Impact Assessment provides an examination of the potential social impacts, both negative as well as positive, that may ensue following the implementation of a proposed Appraisal Drilling Program (ADP) in the Uitkijk Block.

Prior to the impact assessment, a baseline study was conducted to determine the existing socio-economic conditions, including population, employment opportunities, public services, traffic, and land use, relevant to the study area - which was determined to be the surroundings of the Wayamboweg and the Gangaram Pandayweg.

The methodology applied for data collection involved:

1) Desk review of relevant documents (ESIA studies from 1999-2014, Project description provided by Staatsolie, Inception report ILACO and other relevant documents / publications).
2) Review meeting minutes of external stakeholder meetings.
3) Consultations with primary stakeholders (by phone or in person).
4) Field investigation.

Interviewed stakeholders included government representatives, residents living along the Wayamboweg and Gangaram Pandayweg, representatives of special interest groups, land owners and a representative of Staatsolie.

Analysis of the baseline characteristics shows that the study area is located in Wayambo resort, one of six resorts of the District of Saramacca. Each district is led by a District Commissioner, who is supported by a workforce of (Assistant) Government Managers at the resort level. Wayambo resort has a surface area of 872 square km and counts 1,186 residents. Residential areas are situated on both sides of the Wayamboweg and Gangaram Pandayweg. It is assessed that between 50- 60 households are located along the Wayamboweg starting from km 7 until the T-junction with the Gangaram Pandayweg, while 345 persons belonging to less than 100 families are permanent residents living along the Gangaram Pandayweg. Activities of economic importance in the study area include livestock breeding, agriculture, wood processing, and horticulture. Family owned small businesses include grocery stores, restaurants and gas service stations. The majority of the population is of Hindustani descent and practices the Hindu religion. Locals are employed by the government, Staatsolie or work in the agriculture sector. Regarding educational facilities present in the Wayambo resort, one primary school is located at Huwelijkszorg (along the Gangaram Pandayweg) and another one at Pomona. The area of impact (AoI) features no structures and sites that are considered tangible heritage. The Regional Health Department has one clinic located at La Prevoyance, which is also located along the Gangaram Pandayweg. Most families living along the Gangaram Pandayweg still rely on the collection of rain water for use as drinking water, while households located along the Wayamboweg have access to tap water. All households located along the Wayamboweg and along the Gangaram Pandayweg are supplied with electricity from the Energy Company Suriname. Regarding recreational activities; during fishing season (usually the dry season), fishing spots or 'fish holes' are opened to the public. This provides additional income to some of the land owners. Both the Wayambo as well as the Gangaram Pandayweg are heavily travelled roads.

Traffic comprises commuter traffic, including employees and contractors of Staatsolie, school busses and passers-by.

Stakeholder consultations conducted with primary stakeholders of the study area called attention to conflicts existing between project Proponent and local area users. Although it is not the aim of this study to resolve matters between the parties involved in the conflict, some helpful tools to facilitate building of a healthy relationship between Staatsolie and other actors may include:
(1) Public disclosure of the ESIA report,
(2) Transparent and timely information provision, and
(3) Active application of a transparent grievance mechanism.

Pertaining to the planned project, stakeholders brought forward the following key concerns:

- If Staatsolie is planning on using the Wayamboweg and the traffic intensity will increase as a result of this, then Staatsolie must see to it that the appropriate road safety measures are taken (road signs etc.).
- In case Staatsolie is planning on constructing new infrastructural works in the Project area (dams etc.), then this may possibly adversely affect the hydrology of the area. As such it is recommended by stakeholders that proper research of the area is conducted to determine the root cause(s) of problems experienced with flooding prior to construction. Otherwise this may create new conflicts with the area users (farmers) that are complaining about problems with flooding on their lands. It is the perception of some area users that flooding problems can be attributed to the activities of Staatsolie in the Wayambo swamp. Whether these stakeholder views are justified or not cannot be judged within the context of this project.
- Many cars of Staatsolie drive on the Gangaram Pandayweg. The residents use rainwater in the household and the dust that is blown up comes into the rainwater through the roof gutters.
- Increased traffic and speeding vehicles on the Gangaram Pandayweg, in particular trucks.

We cannot judge in the context of this study whether the perceptions voiced by the stakeholders are justified or not. The aspects and perceptions reported above have been previously raised with Staatsolie and are being investigated / considered / have been addressed outside of this process – they are included in this report for completeness. It is acknowledged that some issues raised may not be directly relevant to this particular project.

A total of six potential impacts were identified that are associated with the implementation of the intended Project. The potential negative impacts directly related to project activities include: impact on air and water quality (drinking water and surface water), impact on safety in general (on the road), impact from oil spills produced by project activities on water / soil quality and the natural environment or biological resources, impact to farm infrastructure or other property of land owner, and the impact from noise. One indirect impact, nuisance to local residents, can result from activities conducted by third parties. All of the potential negative impacts can be effectively managed by mitigation measures so that only negligible or minor impacts will remain.

Given the low degree of human settlement and its concentration along the Wayamboweg and Gangaram Pandayweg, only limited direct social impacts are anticipated from the ADP 2018 at the Uitkijk Block.

Even though the identified negative impacts have been rated, with mitigation, as low or insignificant, they still require the attention of the Project team. Conflict may arise when people perceive that nuisances or problems they are experiencing which they believe are caused by the Project are not properly considered and resolved. In the absence of an effective stakeholder consultation and engagement program, the potential for the development of some level of discontent among the local community may increase and give rise to resistance. From information obtained during stakeholder consultations this already was the case.

Completely eliminating the negative impacts of the Project is not conceivable, for instance there will be nuisance from the dust generated by the passing vehicles on the unpaved Gangaram Pandayweg. Yet, if Project Affected Persons (PAPs) are properly informed about the purpose, timing and duration of Project associated activities, then they will likely consider the dust a tolerable temporary nuisance.

In order to create an environment that facilitates maximization of positive social impacts and minimization of negative social impacts, it is recommended the Project engages the PAPs in all stages of Project design, execution and evaluation.

Consultations with area residents suggest that the Staatsolie grievance mechanism is not functioning optimally. Staatsolie needs to make a conscious effort to find out why this is the case. If not, then problems will keep arising which does not help to build a healthy relationship with the local community.

In line with international best practice, the consultant proposes that existing conflicts between Staatsolie and individual stakeholders or stakeholder groups should in the first place be resolved through discussion/communication. The assistance of a neutral facilitator or conflict resolution expert (or expert team) can help reach a solution that is satisfactory to all parties involved. In this way impartiality of the deliberation process is improved upon and it reduces tensions and the risk of conflict among participants.

1. Introduction

1.1 Background

Project motivation

According to the Strategic Plan of the State Oil Company Suriname N.V. (*Staatsolie Maatschappij Suriname N.V.* - Staatsolie), one of the strategic targets is to maintain the annual average daily production of 16,250 BOPD (Barrels of Oil Per Day). It is envisioned that future oil production from the Uitkijk Block project area will compensate for the decline experienced in oil production rate.

Through the appraisal activities Staatsolie aims to (1) establish the presence of producible reservoirs, (2) discover more reserves, (3) curtail geological risks existing in this area, (4) secure future development drilling programs, and (5) enhance the status of reserves from contingent into verified reserves.

Exploration programs were conducted between 2001 and 2014, and Staatsolie is planning to proceed with additional appraisal of the Uitkijk Block in order to improve the reserve base. The Appraisal Drilling Program (ADP) 2018 includes at least four (4) wells.

Project organization

Staatsolie has selected the engineering firm ILACO to conduct an updated Environmental and Social Impact Assessment (ESIA) for the Uitkijk ADP 2018 (the Project).
The consultant was appointed by ILACO, to undertake an updated Social Impact Assessment (SIA) which will inform the ESIA for the project. The Project is overseen by a team from Staatsolie involving an environmental engineer and representatives of several departments including among others Rig Operations, Field production Tambaredjo, and Corporate Communications.

Project description

The Project site is located in the onshore concession area called Uitkijk Block (see figure 1 below), which is approximately 15-25 km west of the western boundary of Paramaribo and adjacent to the eastern border of the Tambaredjo Oil Field that is managed by Staatsolie. The Wayamboweg, which is a major road connecting east and west Suriname, divides the Uitkijk Block in a northern and southern part, respectively Uitkijk-North and Uitkijk-South. Project activities will be carried out in the Uitkijk Block at a distance of at the least 1 km from the Wayamboweg, between the Soeng Ngie dam located at Wayamboweg km 26 and the Calor dam at Wayamboweg km 30. The project site can be reached through a trail from the existing Tambaredjo Oil Field of Staatsolie and via the Wayamboweg.

The project area is an extensive wetland characterized by coastal mudflats, mangrove swamp, sand/shell beach ridges, open grass swamp and swamp wood forest. The Uitkijk -North area is sparsely populated. The local population mostly consists of persons living and/or working in individual residences, small farms, and businesses that are located on both sides of the Wayamboweg.

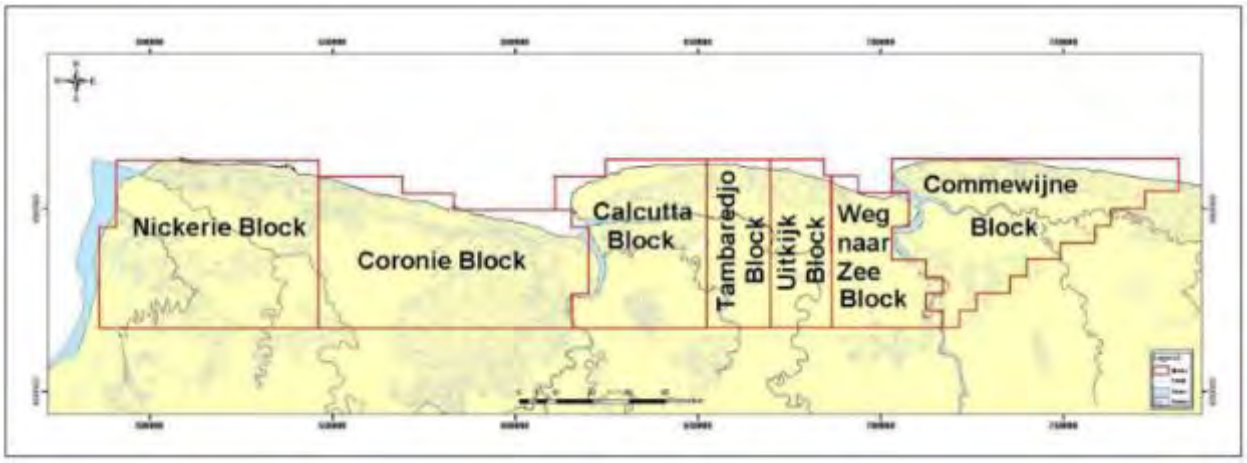


Figure 1. Onshore concession blocks including Uitkijk Block (Map source: Noordam Environmental Consultancy, 2011)

At least 4 well locations are identified for the current ADP (figure 2), with the possibility of an increase to more wells (additionally 10 wells) within the project area after evaluation of the study area, which will be conducted by Staatsolie. Also, the exact location of the wells may be changed based on the results of the wells that will be drilled first (Staatsolie, 2018).

Project planning comprises four project phases (Staatsolie, 2018), namely:

(1) Construction phase including transport of personnel, supplies and materials, and clearing activities

(2) Drilling operations including transport of personnel, supplies and materials, and well drilling and completion

(3) Field production (testing phase) involving transport of personnel and crude oil, and well monitoring

(4) Decommissioning phase entailing transport of personnel and materials, well monitoring and abandonment.

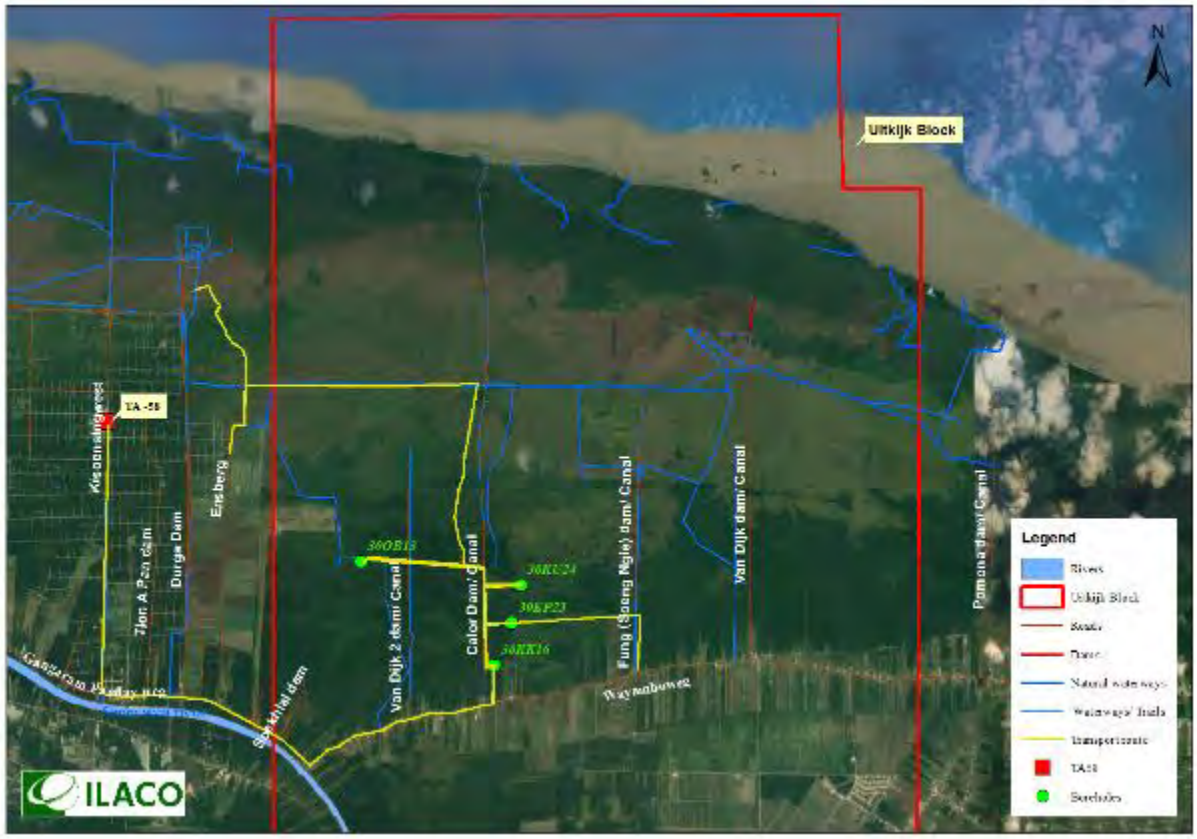


Figure 2. Overview of the project with proposed appraisal wells (30KK16, 30KP23, 30KU24, 30OB13)

Main objectives of this study

The main objectives for this specialist study are to:

1. Conduct stakeholder consultation sessions
2. Describe current baseline characteristics of the area under study
3. Identify, describe and rate the potential socio-economic impacts associated with Project activities
4. Recommend mitigation measures to avoid and/or minimize impacts and/or optimize concomitant benefits of the proposed Project.

Legal and regulatory framework

Although there is no statutory basis for conducting ESIAs for development proposals in Suriname, the National Institute for Environment and Development in Suriname (NIMOS) has published national Guidelines for Social Impact Assessment in Suriname.

This specialist study will be guided by national and international standards, specifically:
-NIMOS' Generic Environmental Impact Assessment Guidelines
-NIMOS' Environmental Assessment Guidelines Volume IV (Social Impact Assessment)
-World Bank Group (WBG) / International Finance Corporation (IFC) Performance Standards (PS) and Environmental, Health, and Safety (EHS) guidelines

-Staatsolie Corporate Standards regarding Health, Safety, Environment and Quality (HSEQ) and Community Relations (CR).

NIMOS has classified the Uitkijk ADP 2018 as a Category B-path 2 Project, meaning a limited ESIA study is required. Between 1999 and 2013 several ESIAs were conducted pertaining to the project area, hence only an update of the most recent ESIA authored by Noordam (May 2013) is required together with an Environmental and Social Management Plan (ESMP).

1.2 Study Area

Certain project activities will be executed in proximity to the Wayamboweg, while other activities will be coordinated from the landing stage near the Tambaredjo area, where the Sarah Maria facilities of Staatsolie are located. It is anticipated that especially during the construction phase, transport of personnel, materials and supplies will take place via the Wayamboweg and the Gangaram Pandayweg.

Therefore the study area determined by the consultant (see figure 3) includes:
-The Wayamboweg, specifically the road stretch from the Soeng Ngie dam (located at Wayamboweg km 9) until the T-junction of the Gangaram Pandayweg with the Wayamboweg and its surroundings
-The Gangaram Pandayweg and its surroundings.

Figure 3. Study area: Part of the Wayamboweg and Gangaram Pandayweg and their surroundings (indicated by orange lines). Map sourced from: ILACO, 2018

1.3 Report outline

This report is structured as follows:

- Chapter 2 states the methodology used for data collection, provides a list of consulted stakeholders, and describes sources of secondary data.
- Chapter 3 delivers a description of the socio-economic environment present in the study area such as demographic information, employment opportunities, cultural and archeological resources, and economic activities undertaken by the local community.
- Chapter 4 discusses the stakeholder consultation sessions carried out for the SIA in order to obtain stakeholder views and concerns regarding the proposed Project.
- Chapter 5 proposes guidelines for meaningful participation of stakeholders likely to be affected by the Project.
- The potential socio-economic impacts that may result from the execution of the proposed Project are identified and assessed in Chapter 6 and presented together with proposed mitigation measures.
- Chapter 7 contains the conclusions and recommendations.

2. Methodology

2.1 Approach

Several exploration / drilling programs have been conducted by Staatsolie in the Tambaredjo Block and by Paradise Oil Company N.V. (POC) in the Uitkijk Block (Noordam, 2011). Therefore, numerous ESIA studies were conducted in the past and are currently being updated. As such, sufficient baseline information about the Study Area has been documented in ESIA reports.

Existing baseline information was primarily sourced from:
(1) The 2014 report 'ESIA of Production Development in the Farmersland Area in Suriname' by Noordam Environmental Consultancy (NEC),
(2) The 2011 draft report 'Review of the Environmental and Social Impact Statement prepared in 2000 for the Uitkijk / Wayambo Exploration Drilling and Validation with respect to proposed exploration drilling and testing in the Uitkijk Block by NEC,
(3) The 2013 final draft addendum 'Environmental Impact Assessment for the proposed appraisal drilling project in the Uitkijk Block Addendum for ten additional wells' by NEC is used as a basis for the present report.

Primary data was collected through fieldwork conducted on October 17, 2018 and October 19, 2018. During fieldwork firsthand information was gathered through qualitative interviews with local stakeholders / key informants and field reconnaissance. This primary information served to complement existing information, fill knowledge gaps identified during the desk research and to assess whether baseline information provided in the ESIA reports is still relevant.

The applied methodology for above mentioned specialist study involved:

- Collection of socio-economic baseline data as follows;

1. Desk study of reports/documents containing baseline information of the Study Area
2. Conduct stakeholder consultations with primary stakeholders (e.g. residents and representatives of local governance institutions)
3. Field observations carried out in the Study Area.

- Description and rating of the potential social impacts using the impact rating methodology outlined in chapter 6 of this report.

2.2 Desk Review

Apart from the above listed earlier ESIA studies in the Uitkijk general area, consulted secondary sources included the draft inception report by ILACO 'Updated ESIA for the Uitkijk ADP 2018', the project description document 'Drilling Program of the Uitkijk Area 2018' provided by Staatsolie, minutes from stakeholder meetings conducted by ILACO, and the 'Districtsplan Saramacca 2018',

which contains information or data presented in the Wayambo Resort plan. Furthermore, socio-economic data presented in online sources (reports / publications) obtained from the websites of the Government of Suriname (GoS) and the General Bureau of Statistics (*Algemeen Bureau voor de Statistiek* – ABS). Finally, a 2003 publication by The Stichting Surinaams Museum, authored by Versteeg, and titled 'Suriname before Columbus' (*Suriname voor Columbus*) was also reviewed.

2.3 External Stakeholder meetings

External stakeholder meetings were held and/or attended by ILACO which served to share information about the proposed project and to obtain feedback (issues/concerns) from participants of the meeting. External stakeholder meetings included:

(1) A meeting with representatives of the local government namely Government Managers (*Bestuursopzichters – BO's*) and Assistant Government Managers (*Onder Bestuursopzichters – OBO's*)).
(2) A meeting with representatives of the NIMOS.
(3) A meeting with the representatives of the Ministry of Physical Planning, Land and Forest Management, specifically the Nature Conservation Division of the Forestry Service Suriname (*Afdeling Natuurbeheer van Dienst 's Lands Bosbeheer – NB-LBB*).
(4) A meeting with the representatives of the Ministry of Agriculture, Animal Husbandry, and Fisheries (*Landbouw, Veeteelt en Visserij - LVV*).

The minutes of the external stakeholder meetings were recorded and provided to the consultant for incorporation in the updated SIA. In addition to the external stakeholder meetings, ILACO also had meetings with two primary stakeholders (the land owners) living along the Wayamboweg. Minutes of these meetings were also documented and provided to the consultant for analysis and integration in the report.

2.4 Stakeholder Consultations

Stakeholder consultations were conducted by the consultant on 2 October 2018, from 17-19 October 2018 and on 22 October 2018 through person to person contact in the field or by means of phone conversations. Structured interviews were used to gather information about the baseline characteristics of the study area and the socio-economic circumstances of communities living in the study area and likely to be affected by activities accompanying the project. Topics of discussion involved among others: demography, issues / concerns about the proposed project, land use in the area, and earlier experiences with Staatsolie specifically regarding handling of complaints and communication.

Stakeholders interviewed included:

- Residents living along the Gangaram Pandayweg and Wayamboweg,
- Representatives of local government institutions,

- A representative of the Foundation Redevelopment Rice Culture Saramacca (*Stichting Wederopbouw Rijstcultuur Saramacca*) and the Farmers Collective Wayambo and Gangaram Pandayweg (*Boerencollectief Wayambo- en Gangaram Pandayweg*),
- A representative of the Wayambo Green Growers Organization,
- Owners of the land where project activities are proposed, and
- A representative from Staatsolie in the function of Community Relations Officer from the Corporate Communication Upstream Department (one person).

Residents living along the Gangaram Pandayweg and Wayamboweg where selected for the interviews based on the referral of the OBOs who accompanied the consultant during field work. This approach was chosen as the OBO holds an extensive knowledge of the local communities as well as the study area.

The consultant reduced bias by validating the information provided by one respondent with that of others. Finally, stakeholders were asked to consider potential impacts, negative and positive, that could result from the planned project and to offer suggestions for addressing these impacts.

Depending on the stakeholder group, interviews either took place at the residence of the stakeholder or at their office. The Community Relations Officer from Staatsolie and the landowners were interviewed by phone.

2.5 Limitations and Assumptions

Several versions of the project description were provided by Staatsolie, which was experienced as confusing during the implementation of this study. At the time this report was written detailed information regarding the envisioned travel routes for the mobilization of personnel and transport of materials and equipment was not yet completely clear. Furthermore, information concerning the maximum number of wells to be drilled in the future and the exact location of these wells was not divulged, which complicated identification of project impacts.

This social specialist study and associated recommendations are based on a number of assumptions, which should be considered when assessing information presented in this report. In collecting interview data, it was presumed that interviewees answered honestly to the questions and did not willfully amend or withhold information. Also, it is assumed that the local government representatives are well informed about the study area and have the best interests at heart for the entire population in the area under their responsibility. The consultant is confident that these assumptions do not compromise the overall results of the study.

3. Socio-economic baseline

3.1 Administrative structure

The project site is situated in the Uitkijk Block, which is located in the Wayambo resort, one of six resorts belonging to the District of Saramacca. Each district is led by a District Commissioner (DC) who is selected by the government and is assigned to the Ministry of Regional Development (www.gov.sr). The DC is supported by an advisory council consisting of elected civil servants at the District level (so-called District Council members – *district raadsleden*) and at the resort level (Resort Council members – *ressort raadsleden*). Locally, the DC is supported by a labor force of BOs and OBOs). The District Commissioner's Office is located at Groningen, the main town of Saramacca district where most of the state's administrative services are located.

3.2 Demography / Population

Wayambo resort (see figure 4 below) has a population of 1,186 persons, which represents less than 10% of the districts' 15,696 inhabitants (Districtsplan Saramacca 2018, 2017). According to the Ressortplan Wayambo 2014, Wayambo resort has a surface area of 872 square km.

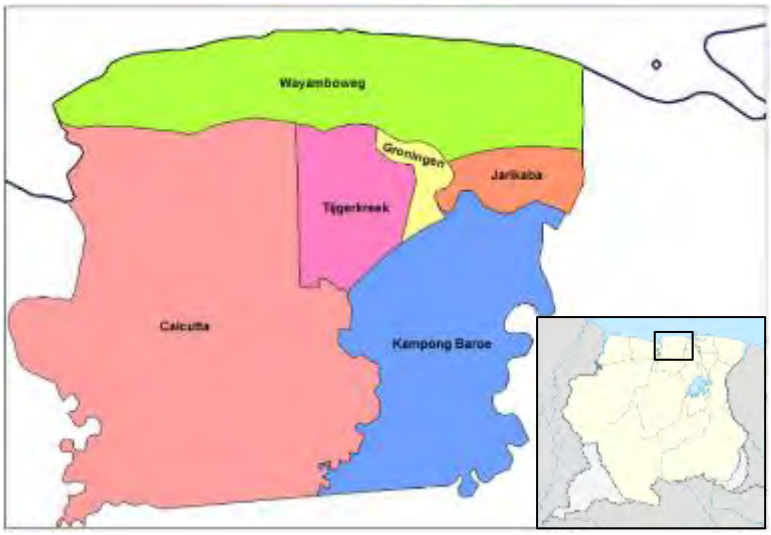


Figure 4. Map indicating the six resorts (Calcutta, Tijgerkreek, Jarikaba, Wayambo, Kampong Baroe, and Groningen) belonging to district Saramacca with the Wayambo resort indicated in green. Map adapted from: https://en.wikipedia.org/wiki/Resorts_of_Suriname

Between 50 and 60 households are located along the Wayamboweg starting from km 7 until the T-junction with the Gangaram Pandayweg (pers. comm. BOs, 17 October 2018). With regard to the Gangaram Pandayweg, it is estimated that 345 persons belonging to less than 100 families are permanent residents living along the Gangaram Pandayweg.

Along the Gangaram Pandayweg, homes are concentrated in 4 locations (see figure 5) namely (1) Sarah Maria, (2) La Prevoyance (around 10-12 residences in addition to local government institutions such as the office of the OBO, an office of the Ministry of LVV and a Regional Health Department (RGD) clinic), (3) Bombay (about 15-16 residences), and (4) Huwelijkszorg (approximately 30 residences). In the road stretch starting from the beginning of the Gangaram Pandayweg (at junction with Wayamboweg) until where the Staatsolie Sarah Maria facility is located, roughly 25-30 residences were observed.

Figure 5. Map indicating settlements (Sarah Maria, La Prevoyance, Bombay, Huwelijkszorg) situated along the Gangaram Pandayweg. Map adapted from sources: ©2018 CNES/Airbus, Digital Globe, Landsat / Copernicus, U.S. Geological Survey, Kaartgegevens ©2018 Google)

Vulnerable Groups

Low income households

Within the study area, about 95 persons living along the Gangaram Pandayweg were receiving social benefits from the Ministry of Social Affairs and Housing (Duijves and Heemskerk, 2014).

Indigenous and Tribal Peoples

Tribal communities of Indigenous Peoples and Maroons are not located in the vicinity of the project site, or in the area of impact (AoI). Hence safeguards for the presence of Indigenous Peoples are not applicable.

Disabled persons
According to key informants three persons with disabilities live along the Gangaram Pandayweg. Many households include elderly who have age-related physical limitations (Duijves and Heemskerk, 2014).

3.3 Economic activities

Along the Gangaram Pandayweg, one sawmill is in operation. Other economic activities involve animal husbandry (cattle and poultry) and the cultivation of several fruit and vegetable crops together with rice monoculture. Nevertheless, most farming lands are fallow or abandoned (Duijves and Heemskerk, 2014). Farming plots differ in size covering a few hectares up to more than 100 hectares. Cultivated crops include: tomatoes (*Lycopersicon esculentum*), eggplant (*Solanum melongena*), beans (*Phaseolus* spp.), and oerdi (*Vigna mungo*)[1]. Small businesses located along the Gangaram Pandayweg include a family owned roti shop (where Indian food is sold) and a convenience store. About 4-5 families are active in fisheries. Economic activities carried out on the Saramacca River include transportation of tree logs and sand, and fisheries.

Along the part of the Wayamboweg that is included in the study area several economic activities were observed (figure 6). Land use activities are typified by cattle farming (pigs, cows, sheep, goats, and poultry) and the cultivation of a variety of fruit and vegetable crops such as plantains (Musa *spp.*), citrus (Citrus *spp.*), tomatoes, tayerblad (*Xanthosoma brasiliense*), oerdi, cabbage (*Brassica oleracea* var. capitata), and rice (*Oryza sativa).* Family operated small businesses located along the Wayamboweg include three grocery stores, one shop that sells Indonesian food, one barbershop, a gym, two oil service stations that include a carwash, and a factory where broomsticks are produced.

Figure 6. Agriculture and animal husbandry practiced along the Wayamboweg

[1] Oerdi (also: urdi; Lat: *Vigna mungo*) is a bean species, which is much used in the Indian kitchen, among others to make dahl.

3.4 Ethnicity and Religion

District Saramacca has a multicultural and multi-ethnic society, but the Hindustani and Javanese ethnic groups dominate the social landscape (Districtsplan Saramacca 2018 (2017). This was also mirrored in collected field data and population data from 2014 attained from the General Bureau of Statistics (*Algemeen Bureau voor de Statistiek* - ABS) online data bank, which showed that the Hindustani ethnic group takes up 53.3% of the total district population followed by the combined Javanese and Indigenous ethnic groups with 25.6% .

Most residents living along the Gangaram Pandayweg practice the Hindu religion which is evident by the presence of two Hindu temples, one located at Huwelijkszorg (around Gangaram Pandayweg km 24.5) and another one at Bombay (Gangaram Pandayweg km 18). Along the Wayamboweg two places of worship where observed, one Hindu temple and one Muslim mosque.

3.5 Sensitive receptors

Sensitive receptors include, but are not limited to, hospitals, schools, day-care facilities, elderly housing and convalescent facilities. These are areas where the occupants are more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants. Extra care must be taken when dealing with contaminants and pollutants in close proximity to areas recognized as sensitive receptors. Figure 7 below illustrates the five sensitive receptors located in the AoI, three places of worship, one school, and one health clinic, and their location relative to the location of the proposed wells in the Uitkijk Block and possible transport routes along the Wayamboweg and Gangaram Pandayweg.

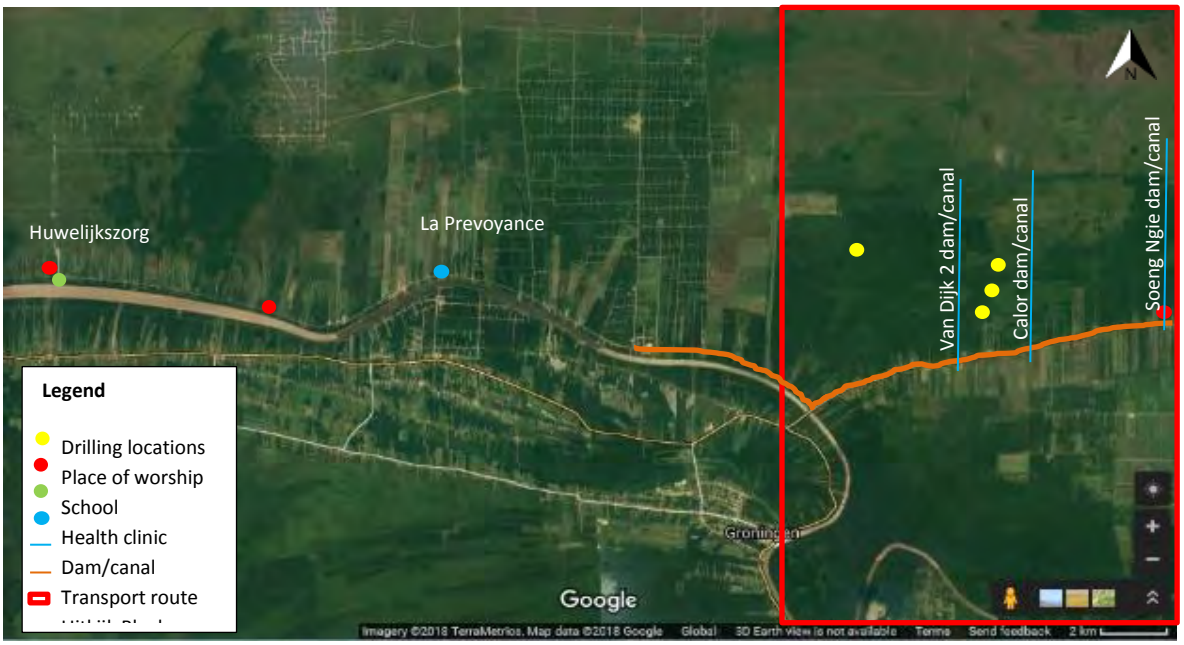


Figure 7. Sensitive receptors located in the AoI. Map adapted from: Imagery©2018 TerraMetrics; Map data© 2018 Google

3.6 Cultural and archaeological resources

Cultural heritage sites and other locations of cultural significance

It is not expected that the Project will have adverse effects on tangible cultural heritage, as the area of impact (AoI) features no structures and sites that are considered tangible heritage. Cultural significant buildings found in the study area include three Hindu temples and one Muslim mosque (see figure 8 below).

Figure 8. Places of worship (Hindu temple on the left and Muslim mosque on the right) located along the Wayamboweg

Archaeological sites

The national register of cultural heritage sites (Versteeg, 2003) identifies three archaeological sites in the AoI. Details in relation to these three sites are displayed in the table below (table 1). It must be taken into account that lack of national register status does not mean that sites do not exist in the project area, as only a limited amount of places have been excavated. Known archaeological sites will not be directly affected by this Project.

Table 1. Detailed information about known archaeological sites located in the AoI (Adapted from source: Versteeg, 2003)

Nr.	Site number and name	Coordinates	Finder/excavator(s) & year	Description	Culture
1	Sur-40 Tambaredjo -3 (district Saramacca)	317.40/963.68	D.C. Geijskes (1957), J. van Petten (1959)	Settlement with graves	Koriabo
2	Sur-41 Tambaredjo -1 (district Saramacca)	316.20/965.35	D.C. Geijskes (1954)	Settlement with graves	Kwatta
3	Sur-42 Tambaredjo -2 (district Saramacca)	318.34/965.60	D.C. Geijskes (1957)	Settlement with graves	Kwatta

Given the absence of Suriname national guidelines in the case of archaeological finds (guidelines are still in review phase by the government Directorate of Culture of the MINOWC), any direct activities

and indirect future activities resulting from the Project, should be consistent with internationally recognized good practice as described in the ICOMOS (1990) Charter for the Protection and Management of the Archaeological Heritage.

Besides above mentioned, Project stakeholders must comply with the Government of Suriname (GoS) Monument Law of 2002 for fixed archaeological resources found during the course of the project.

Article 20.1 stipulates that monuments found in excavations and on which no one can prove the right of ownership are owned by the state. 2. The owner of the land in which the monuments have been dug up is required to transfer the found monuments to the State and is entitled to a reimbursement amounting to half the value of those monuments. 3. Monuments found in an investigation…may be transferred to a place suitable for their custody on the instructions of the Minister [of Education, Science and Culture].

Article 21 states that the finder……, within thirty working days after the discovery must indicate the exact location, time, monument and particulars of the discovery to the District Commissioner (DC) of the district in which the discovery has been made who shall immediately notify the Minister.

Project activities should also abide by Foundation for Forest Management and Production Control (*Stichting Bosbeheer en Bostoezicht* - SBB) 2011 Code of Practice that includes a zoning standard for places of cultural importance and archaeological sites. This Code of Practice stipulates that if archaeological or cultural historical findings are made, relics and locations have to be reported immediately to the ministry of Education, Science and Culture (*Ministerie van Onderwijs, Wetenschap en Cultuur* - MINOWC). The licensee and their staff, contractors or representatives will refrain from interfering in any way with such sites and / or relics. National guidelines are still in review phase by the government Directorate of Culture of the MINOWC and are not available for distribution.

3.7 Employment

2014 data retrieved from the ABS online data bank shows that the biggest occupational group in district Saramacca involves the 'Elementary occupations' (1,695 persons), followed by the occupational group 'Service Workers and Shop and Market Sales Workers' (964 persons) and as third largest group the 'Skilled Agricultural and Fishery Workers' (941 persons). Contracting agencies located along the Gangaram Pandayweg at Sarah Maria (see figure 9) and Huwelijkszorg take care of sourcing contract workers for projects implemented by Staatsolie. About 20-30 persons living along the Gangaram Pandayweg are currently employed by Staatsolie as contract workers, while almost ten persons work at local government institutions as Resort Council members, BOs and OBOs. People living along the Wayamboweg also find employment with Staatsolie and the government.

Figure 9. Contracting agency located along the Gangaram Pandayweg

3.8 Education

Stakeholder consultations indicated that Wayambo resort has two primary schools, located at Pomona and Huwelijkszorg. In 2017, people from Wayambo resort asked the local government for support with the establishment of a public library / multi-media center (Districtsplan Saramacca 2018, 2017). In addition, a need was conveyed for educational programs focused on art and culture.

3.9 Health

In district Saramacca four health clinics of the RGD are located (ABS, 2017). The clinic most closely located for inhabitants of the Wayambo resort is at Groningen or Tijgerkreek. Although RGD health care facilities are located at La Prevoyance along Gangaram Pandayweg km 12.5 (see figure 10 below), including a recently built facility to accommodate medical personnel, these are currently not operational, requiring residents in need of medical attention to travel to RGD clinics located elsewhere.

Figure 10. RGD clinic and accommodation for medical personnel located at La Prevoyance

3.10 Utilities and other public services

- At the district level, the Water Supply Service (*Dienst Watervoorziening* - DWV) of the Ministry of Natural Resources (*Ministerie van Natuurlijke Hulpbronnen* - NH) together with the SWM carries responsibility for public provision of drinking water. By August 2017, more than 100 households of Wayambo resort were connected to the water distribution network of the Suriname Water Supply Company (*Surinaamsche Waterleiding Maatschappij* - SWM) (www.gov.sr). Stakeholder interviews confirmed that all households located along the Wayamboweg have access to SWM tap water. The residents living along the Gangaram Pandayweg are not yet connected to the drinking water network. Therefore, most families living along the Gangaram Pandayweg still rely on the collection of rain water for use as drinking water.
- Households located along the Wayamboweg and along the Gangaram Pandayweg are supplied with electricity from the Energy Company Suriname (NV *Energie Bedrijven Suriname* – NV EBS).
- The ministry of LVV has a branch located at La Prevoyance.
- The district government has a local office for the BOs at La Prevoyance

3.11 Recreation / Tourism

During the dry season, which is considered fishing season, land/plot owners allow recreational fishers (generally arriving from Paramaribo) to enter their terrain against payment in order to fish at the fishing holes or fishing spots (see figure 11). Each weekend, about 4-5 fishing boats and small passenger boats go out on the Saramacca River for recreational purposes.

Figure 11. Plot owners promoting their fishing holes on roadside signs

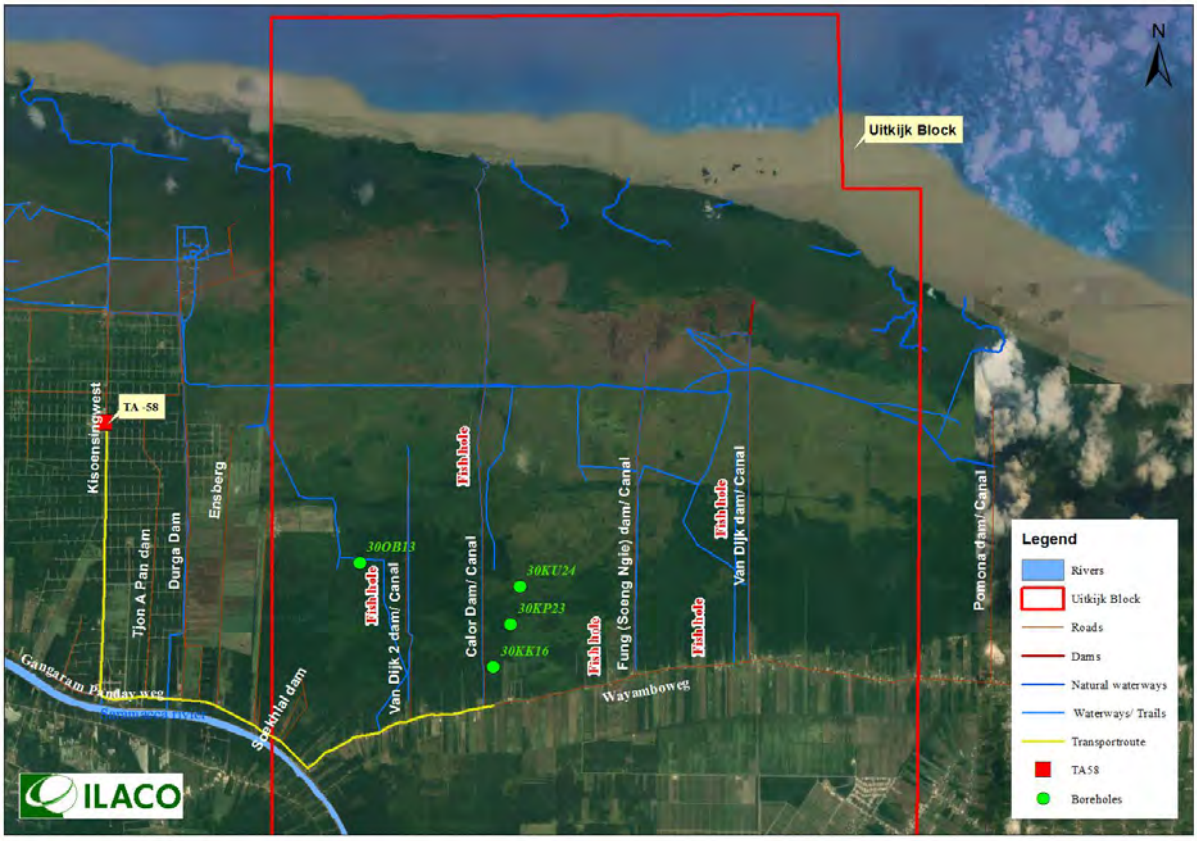


Figure 12. Overview of fish holes in the project area (Source: Environmental Impact Statement Wayombo Concession Seismic Delineation Program, E2 Environmental Alliance Inc, September 2000)

3.12 Transport / Traffic

Daily traffic on the Gangaram Pandayweg and the Wayamboweg includes transportation of school children by school bus. Other traffic occurring within the study area involves:
- Commuter traffic (mainly Staatsolie regular employees and contractor employees).
- Area residents / inhabitants.
- People passing through on their way to or from Paramaribo.

In 2014, stakeholders along the Gangaram Pandayweg noted a greater traffic intensity on the road between seven and nine o'clock in the morning and from 12-15 pm in the afternoon. Traffic rush hours were ascribed to commuter traffic with regard to Sarah Maria operations (Duijves and Heemskerk, 2014). Furthermore, it was indicated that the Gangaram Pandayweg stretch extending from Sarah Maria to Huwelijkszorg is far less travelled than the Gangaram Pandayweg section between Sarah Maria and the Wayamboweg, which was also observed during field investigation.

3.13 Development projects

In the development plan for Saramacca (Districtsplan Saramacca 2018, 2017) the local community expressed a great need for: (1) improvement of the drainage system of the Wayambo resort, (2) enhancement of public transport, and (3) the paving of roads. Residents living along the Gangaram Pandayweg specifically requested access to the public water distribution network and improvement of telecommunication services. Currently, the Government of Suriname is preparing a loan application to the World Bank Group, for a project to improve drainage of the greater Paramaribo area. Dredging of the Saramacca canal, repair of some of the primary sluices (i.e. at Uitkijk and where the Saramacca canal meets the Suriname River), and enhanced flood control management are part of this proposed project.

According to the Districtsplan Saramacca 2018 (2017), the Ministry of LVV has stated its intention to dig a new drainage canal extending from Pomona towards the Saramacca River to allow proper drainage of the area situated to the north of the Wayamboweg. Furthermore, the Ministry of NH will aim to asphalt all roads present in the Pomona project while the Ministry of Public Works, Transport and Communication (*Openbare Werken, Transport en Communicatie* - OWTC) has committed to paving the Gangaram Pandayweg and rehabilitation of the dam situated on the right bank of the Saramacca River.

In 2016, Staatsolie conducted a reputation and needs survey along the Gangaram Pandayweg (Staatsolie Nieuws, 2017). In recent years Staatsolie has invested in social projects aimed at addressing the needs identified by the community i.e. drinking water supply and rehabilitation of infrastructure. Community projects executed in 2018 in district Saramacca in general and along the Gangaram Pandayweg in particular that were financed or otherwise supported by Staatsolie included (Staatsolie Nieuws 2017; 2018):
-Renovation and construction of the public schools located at Huwelijkszorg and Tambahredjo
-Enhancement of the water production station located at Tijgerkreek.

-Rehabilitation of the road section located before the Uitkijk Bridge (on the Hamburg side).

4. Stakeholders and Stakeholder engagement

4.1 Stakeholders

The stakeholders interviewed (by the consultant) for the SIA are clustered in four stakeholder groups namely: (1) representatives of the government, (2) residents/inhabitants of the study area, (3) representatives of farmer organizations and (4) owners of land where project activities are planned. Table 2 provides a description of the stakeholders engaged for the Social Impact Assessment (SIA), their main concerns with regard to the Project. We cannot judge in the context of this project whether these perceptions are justified.

In addition, a representative of the Project Proponent Staatsolie (Corporate Communications Upstream (CCU) Officer) was also interviewed on:

1) Staatsolie's communication procedures with stakeholders;
2) Handling of complaints(complaint mechanism) received by Staatsolie and
3) Communication about the ADP project activities (e.g. employment opportunities).

According to the CCU officer, there is regular communications with landowners on whose property activities are ongoing (further details are included in the Minutes of Meeting).

In Summary, stakeholder consultations revealed the following key issues/concerns:

1) Flooding of the farming lands located along the Wayamboweg and Gangarampandayweg due to Staatsolie activities.
2) Speeding traffic on the unpaved Gangarampandayweg creating dust clouds that affect the air and drinking water quality, and also road safety.
3) Road safety on the Wayamboweg.
4) Oil spills that haven't been cleaned up properly by Staatsolie or by contractors from Staatsolie.
5) Staatsolie indicates that they will not drill in agricultural areas, however it still happened.
6) Increased hunting (on iguanas), poaching and fishing activities in the area due to increased accessibility.

The aspects and perceptions as reported above, except for #3,4 and 5 have been previously raised with Staatsolie and are being investigated / considered / have been addressed outside of this process – they are included here for completeness. It is acknowledged that some may not be directly relevant to this particular project.

Table 2. Description of engaged stakeholders and their concerns

Nr.	Name stakeholder group – Function/ occupation	Interest / position	Stakeholder concerns about the project
1	**Government representatives -** Assistant Government Managers and Government Managers of the Wayambo resort	Tasks include: • Support government policy at the local level. • Communicate or engage with inhabitants/residents of the area under their responsibility. • Act as intermediary between the residents/inhabitants and third parties. • Deliver or transfer important issues brought forward by the residents to the DC.	• Appropriate road safety measures must be taken (road signs, control on speeding etc.), particularly near dangerous road curves right before and after the Calor property. • New infrastructural works in the Project area (dams etc.) may possibly adversely affect the hydrology of the area. Proper research of the area must be conducted prior to construction to avoid conflicts with the area users (farmers). • Certain residents complain that Staatsolie does very little for them in the area. • Concern that oil spills are not properly dealt with (clean up according to industry standards). • Staatsolie maintains the Gangaram Pandayweg, however only 25 % of total (300) culverts are operational. This presents problems. • <u>Dust:</u> many cars of Staatsolie drive on the Gangaram Pandayweg. The residents use rainwater in the household and the dust that is blown up comes into the rainwater through the roof gutters. • <u>Flooding:</u> There is a perception among farmers that Staatsolie is responsible for flooding,
	Government representatives – Ministry of LVV	• Conduct agricultural extension work (provide information, organize training sessions for farmers).	• LVV is not aware of the complaints registration system of Staatsolie. • Main concern: Staatsolie indicates that they will not drill in agricultural areas, yet they still do it.

		• Collect agricultural data/statistics for analysis and policy formulation.	• Farmers Collective of the Wayambo and the Gangaram Panday weg has an issue with the pipelines of Staatsolie, which are not located at a recommended distance from the road.
	Government representatives – Nature Conservation Division of the Forestry Service (NB-LBB)	• Execute nature protection and conservation activities. • Perform law enforcement tasks. • Formally in charge of the overall management of Protected Areas on behalf of the Government.	• Most common complaint received from area residents in the past 5 years is illegal hunting. Violation of the Nature Conservation Law in the Wayambo area includes illegal sport hunting by local residents. • LBB is not aware of the complaints registration system of Staatsolie. • Concern related to the planned Project: increased hunting (on iguanas), poaching and fishing activities in the area due to increased accessibility.
	Government representatives – NIMOS	NIMOS' mission statement: To initiate the development of a national legal and institutional framework for environmental policy and management in the interest of sustainable development in the Republic of Suriname.	No concerns were listed
2	**Inhabitants /residents –** Residents of the Gangaram Pandayweg and Wayamboweg	Stakeholders interviewed work in agriculture and/or animal husbandry, for the government, or for Staatsolie.	• Some stakeholders had no complaints about Staatsolie. • Sometimes Staatsolie assists farmers with infrastructural works in case of flooding on their land. • Some persons living along the Wayambo and Gangaram Pandayweg are employed by Staatsolie. • Issues/complaints are directly communicated with the Staatsolie CRO or through the BOs/OBOs/DC. • Many people moved away from the Gangaram Pandayweg due to difficult living conditions, poor infrastructure and lack of services.

			• Nuisances experienced due to traffic on the Gangaram Pandayweg include: (1) The dust generated by speeding trucks. (2) Road safety (allowed speed limit is exceeded). (3) Noise produced by the trucks.
3	**Representatives of farmer organizations –** Chairman of the Board of the Farmers Collective Wayambo and Gangaram Pandayweg (*Boerencollectief Wayambo- en Gangaram Pandayweg*), also Chairman of the Board of the Foundation Redevelopment Rice Culture Saramacca (*Stichting Wederopbouw Rijstcultuur Saramacca*) Chairman of the Board of the Wayambo Green Growers Organization	• Both organizations represent the interests of farmers. • Both stakeholders are very familiar and knowledgeable about the study area and with its users as they have lived in and/or worked at this area for decades. • The Farmers Collective (around 30 members) aims to fulfill the needs of rice farmers located at the Gangaram Pandayweg and the Wayamboweg; the cooperation works to benefit the rice farmers' community, which consists of around 20 active members. • The Wayambo Green Growers Organization represents the interests of about 115 members (vegetable farmers) located along the Wayamboweg, and the Gangaram Pandayweg.	• Staatsolie is not interested in or does not care for the issues that are affecting the farmers in the study area. • People move away because the rice sector and their livelihoods are destroyed as a result of water management and hydrology issues. A thorough study needs to be conducted to determine the root cause(s) of these problems. • Staatsolie is currently involved in a conflict with two stakeholders. • Staatsolie has not spent enough towards giving back to the community; there is dissatisfaction. • Studies are only conducted as a formality; many reports are written, but nothing is implemented. • Stakeholders were aware of the complaints mechanism; one person thinks it only works on paper, while the other stakeholder does not utilize the complaints mechanism to register his complaints. • Since the arrival of Staatsolie in the area many disruptions in the social and ecological environment came about.
4	**Land owners –** Landowner / area user of private property	• The properties are for private use (used as a weekend home for leisure)	• In the past there were some issues with Staatsolie, but the communication has improved. CCU regularly makes phone contact and

	referred to as the Calor dam Area user / caretaker of the property and authorized representative of family that owns the private property referred to as Soeng Ngie dam	• Some low intensity agriculture is practiced (fruit trees) in the front, and recreational fishing in the back of the Calor property. • Currently no activities occur at the Soeng Ngie property. Only a little bit of recreational fishing in the canal during the fishing season.	issues are immediately discussed and addressed by Staatsolie. • The representative of the Soeng Ngie property (owner: Mr. Fung You Kee) had no complaints; collaboration with Staatsolie went well in the past and agreements were kept. At the moment no land use activities are carried out at the Soeng Ngie property. • The collaboration is good between the land owners and Staatsolie. • Illegal hunting activities are not taking place anymore in the swamp, because (1) the deer population has been decimated, and (2) no ease of access of the area (trails are overgrown).

Note: We cannot judge in the context of this project whether these perceptions are justified. Staatsolie's retort to the perceptions raised by stakeholders has not been sought and is not documented in this report.

4.2 Stakeholder engagement practiced by Staatsolie

Stakeholders are engaged by Staatsolie in various ways; either directly through informal communication (from time to time) and stakeholder meetings (formal communication) or indirectly with the assistance of a local intermediary such as the BO (Duijves and Heemskerk, 2014). There is regular communication with landowners where activities are taking place, the DC and BO's. The new approach is to have a communication plan for every project that regulates the means of communication with stakeholders (pers. comm. Mrs. J. Sanches, CCU Staatsolie, 2 October 2018).

Staatsolie also engages with the community through their Corporate Social Investment (CSI) Program (Staatsolie Nieuws, 2017), which was established on the basis of the Corporate Social Responsibility Policy of Staatsolie. The CSI program finances sustainable social development projects centered on capacity building, development and growth of the communities where Staatsolie is active.

Specific to the ADP Uitkijk project, landowners of the parcels where the Project activities are proposed were personally contacted by representatives of Staatsolie (pers. comm. Mr. Calor, 18 October 2018; pers. comm. Mr. Timmer, 22 October 2018). Government representatives from the Ministries of LVV, Regional Development (BOs/OBOs), Physical Planning, Land and Forest Management, and the NIMOS were informed of the pending Project through stakeholder meetings.

5. Meaningful engagement and grievances redress

5.1 Participation and consultation

When planning Project components, it is vital to consider the views of Project Affected Persons (PAPs) and manage the development of measures for impact mitigation in a participatory manner. Though understanding Staatsolie's existing engagement practices and community relationships is not strictly part of the Scope of Work for the EIA, these aspects are reported below.

The following activities are currently undertaken by Staatsolie to achieve active participation of stakeholders and to obtain their feedback:

- Staatsolie has a Corporate Communications Upstream (CCU) department with Community Relations Officers (CRO's) tasked with engagement of local communities. Since 2016 CRO's are permanently stationed at Sarah Maria. The Community Relations Officer (CRO) is in charge of information sharing with the inhabitants/residents of the study area regarding Staatsolie projects and also organizes and conducts meetings with government representatives when necessary. Besides formal means of communication (through stakeholder meetings), the community is also engaged in an informal manner through occasional personal visits or phone calls.
- Another way PAPs are informed about Staatsolie Projects is through written publications for example through use of 'Background Information Documents' (in Dutch and English) that contain information about the Project itself, the ESIA process and how PAPs can participate or contribute to the process. These documents are shared during the stakeholder meetings, through flyers at stores, ads in local newspapers, the FB page "BIC Saramacca" or BO's.
- Furthermore, a consulting structure is used to enhance communication between Staatsolie and the local population with representatives of the district government (DC) and local government (BOs and OBOS) acting as liaison.

To ensure continued meaningful participation and consultation of stakeholders, Staatsolie will undertake the following activities:

- In line with NIMOS guidelines, any Public Hearing or other public meeting with PAPs will be publicized in the media with a minimum of 15 business days in advance. To ensure that all relevant stakeholders are informed, flyers about the public consultation meeting may be posted at relevant public locations, such as the Citizens Information Center (*Burger Informatie Centrum* – BIC) in Groningen, the DC office in Groningen, the gas station at the entrance of the Gangarampandayweg, and the BO office at La Prevoyance. In addition, an announcement will be posted on the Saramacca BIC web site. Personal invitations must be extended to the DC, land owners, representatives of farmers' interest groups, and the Ministries of LVV and ROGB. To ensure that the PAPs are able to participate in the hearing, the Public Hearing will take place in the most accessible location in or near the AoI. In the past, Staatsolie has also made bus transportation available to the residents of the Wayambo and Gangarampandayweg but unfortunately this service was not used efficiently and

therefore is currently not available anymore. The public stakeholder meeting must be held at a time that suites the local population best, preferably in the late afternoon.

- In organizing consultations with PAPs, the Project must ensure that they are meaningful, and that there will be sufficient advance notice, needed language assistance, and sufficient time for participants to receive information about the basic issues and the appraisal drilling program in advance. With regard to providing information on potential impacts, it will be important that existing complaints are addressed by persons that are knowledgeable about the topic. For example, if people have complained about dams that have been damaged, Staatsolie could give an example of how such incidents have been dealt with.

- It is important to fully document all consultation and disclosure efforts, and draft a detailed report on the issues raised and how they will be addressed. If appropriate, the views of men and women will be recorded separately. Vulnerable groups such as the elderly and the disabled will be identified and special measures put in place to enable their contributions to Project activity planning.

- As appropriate, Staatsolie will actively engage with other key stakeholders in Project planning and monitoring.

5.2 Disclosure of the Social Baseline and Impact Assessment

Best practice dictates the following procedure to be followed by Staatsolie:

- After its drafting, the ESIA study, of which this Social Baseline and Impact Assessment is an integral part, is required to be disclosed by Staatsolie. It is proposed that the ESIA will be disclosed for at least 30 days, in line with NIMOS guidelines for Category B projects[2]. NIMOS allows public disclosure through their office and website for the general public. In addition, it is recommended that Staatsolie forwards copies of the ESIA report to local government authorities, and other relevant governmental agencies.

- ESIA documentation, and any other relevant Safeguard instruments, will be made available at relevant accessible locations in the Project area. A summary of these documents in non-technical Dutch will be distributed to the different stakeholders. The final ESIA will be cleared by Staatsolie and then disclosed on its website.

An example of Staatsolie compliance with the above is demonstrated by the disclosure of ESIA reports (conducted earlier) on the Staatsolie website, together with non-technical summaries.

[2] NIMOS (2017). Guidance Note NIMOS Environmental Assessment Process. URL: http://www.nimos.org/smartcms/downloads/Final%20Guidance%20Note%20NIMOS%20EIA%20Process%202017.pdf

5.3 Grievance redress mechanism

Through careful Project design and implementation, by ensuring full participation and consultation with PAPs, and by establishing communication and coordination among the various implementation entities, the Project aims to try to prevent grievances. Even so, PAPs may still disagree with a decision, practice or activity related to the Project. If this is the case, complaints or grievances coming from the community are dealt with by way of a grievance mechanism.

Besides communicating with the local communities, the CRO and other relevant staff of Staatsolie manage a grievance mechanism, also referred to as a complaint registry or complaint procedure. The aim of this grievance mechanism is to prevent and address concerns and grievances related to Project impacts. In theory, the mechanism should ensure that possible complaints are received, registered, reviewed, and investigated; followed by the development of resolution options and reaching agreement on proposed resolution options. Hereafter implementation of the selected resolution should be monitored, until the tracking is finished. A general grievance mechanism's final procedure involves the evaluation of lessons learned.

In practice, complaints received by Staatsolie from PAPs are handled as follows:
Within a week the complainant will receive notice that the complaint has been registered and is being dealt with. Usually feedback is given within a week (3 - 7 days). Depending on the severity of the complaint and the number of actors involved, the settlement process can take approximately three months or longer; for instance if involved parties cannot arrive at an agreement that is satisfactory to all and legal action is taken by the afflicted party. If the complaint is received by the guard; then the complainant has to complete a form. When the complaint is received via email it will be forwarded to the relevant persons of CCU which registers the complaint and does the follow-up. Other relevant departments are informed for their part into reaching a solution to the complaint. Sometimes the complainants offer suggestions to resolve the problem and sometimes extra meetings are necessary to deliberate with each other in order to arrive at an arrangement that is acceptable to all involved (pers. comm. Mrs. J. Sanches, CCU Staatsolie, 2 October 2018).

In spite of the grievance mechanism adopted by Staatsolie a few years ago, area inhabitants still complain about a number of concerns (also see Table 2) that are affecting their daily lives, for which they hold Staatsolie responsible. We cannot judge in the context of this project whether these perceptions are justified.

Comparison of current grievances voiced by area inhabitants (e.g. dust generation along the Gangaram Pandayweg, flooding of lands, and inadequate replacement of culverts), with grievances documented in earlier ESIA studies shows that there has been only minimal improvement in the circumstances.

Furthermore, based on information obtained from stakeholders the following was noted:
-Not all stakeholders were aware of the existence of a Staatsolie complaints mechanism/procedure.
-Some were aware of the grievance mechanism, but did not know exactly how it worked.

-A few stakeholders are in direct contact with the CRO or other Staatsolie personnel and do not utilize the mechanism to have their complaints addressed. They rely on the CRO directly for processing their complaint.

Staatsolie needs to make a conscious effort to find out why there are still concerns (also see Table 2). An improved grievances mechanism can be an important instrument to build a healthy relationship with the local community.

The Staatsolie Complaints Register (Procedure or Mechanism) needs to be used as designed in order to (Noordam (2013) :

(1) Develop a structured and satisfactory settlement of complaints;
(2) Minimize recurrence of complaints, and
(3) Provide management information for continuous improvement.

An evaluation of the current grievance mechanism will be useful to both transform procedures that do not function optimally, and strengthen procedures that have been positively received by users.

The second action to improve grievance redress would be to increase awareness of the existence of the grievance mechanism among stakeholders and to explain how it works.

6. Social impact assessment

6.1 Introduction

This section discusses the SIA conducted to identify the potential social impacts, positive and negative, which may occur as a result of the Project being executed. By predicting socio-economic effects of the anticipated Project, the SIA may guide the Project team in key decision making. The impact analysis will concentrate on the social groups (e.g. individuals, communities) that inhabit or make use of the AoI and are most likely to be affected (either directly or indirectly) by the planned Project.

For impact identification and rating the consultant utilized the following resources:

- Social baseline data
- Information derived from stakeholder consultations
- Project descriptions supplied by ILACO and Staatsolie
- Previous ESIA studies conducted
- Specialist knowledge of the consultant.

6.2 Assessment methodology

The potential social impacts of the ADP in the Uitkijk Block were determined using the impact rating system provided as Annex 2.

6.3 Impact Identification and rating

The identified impacts are summarized in table 3 below and their applicability for the current project is discussed. In addition to the impacts, mitigation measures to address the impacts assessed are also provided in this chapter.

Table 3. Overview and discussion of identified potential impacts and proposed mitigation measures

Identified Impacts	Description and proposed mitigation measures	Comment regarding proposed activity
1. Impact from noise generated by transport vehicles, especially airboats, and construction activities	During all phases of the proposed project, transport of personnel, materials and supplies will be necessary. Transportation of personnel will be done with vehicles on land and airboats in the swamp area. Airboats will be deployed on a daily basis. This will lead to locally increased noise levels in the AoI, which may disturb local area users, including the residents living along the Wayambo and Gangaram Pandayweg. However, the disturbance of local people is anticipated to be minimal, as noise levels at the residences are usually exceeded by noise generated by passing traffic on the Wayamboweg and Gangaram Pandayweg. The project site itself that is located in the Uitkijk Block is uninhabited hence no human receptors are to be found there. Mitigation measures may include: 1. Efficient management of logistics to minimize traffic and shorten construction time. 2. Inform nearby residents and businesses in a timely manner of anticipated airboat traffic schedules. 3. Try to avoid or minimize airboat traffic at night. 4. No construction activities conducted at nighttime hours.	Existing direct impact, localized and of temporary duration. Very low significance
2. Impact on air quality and drinking water quality from dust generated by traffic along the Gangaram Pandayweg	The unpaved Gangaram Pandayweg is the only access road leading to the Sarah Maria facilities. It is anticipated that during the entire duration of the APD Project at Uitkijk (up to two and a half years) deliveries related to the project will take place thereby utilizing different types of transportation. One of the main concerns voiced by stakeholders living along the unpaved	Existing direct impact, localized and of medium-term duration. Medium significance

	Gangaram Pandayweg regards dust generated by speeding vehicles. The dust deteriorates the air quality which poses a health risk to area inhabitants. Households located along the Gangaram Pandayweg are not yet connected (by the SWM) to the public water distribution network. As such, most families living along the Gangaram Pandayweg rely on the collection of rain water in storage bins for use as drinking water. As traffic drives along the sandy Gangaram Pandayweg, the dust it generates settles on the roofs and in the gutters of homes located along the road. The dust then pollutes the drinking water collected in storage tanks, which is experienced as a significant nuisance. Mitigation measures may include: 1. Efficient management of logistics to minimize traffic on the Gangaram Pandayweg.. 2. Increase the frequency of speed control activities along the Gangaram Pandayweg (speed limit 40km/h). 3. Intensify the already existing spray schedule of the water spraying trucks and / or hire more trucks to conduct spraying of the Gangaram Pandayweg especially concerning the road stretch from the beginning of the Gangaram Pandayweg at the Wayamboweg until the turn for the Kisoensingh road (inhabited area),especially in the dryer season.	
3. Impact on Safety from traffic on the Wayambo and Gangaram Pandayweg	Residents living along the Gangaram Pandayweg have complained about the speed limit (40 km) being exceeded by motorists on a regular basis. Road safety on the Wayamboweg and Gangaram Pandayweg is a major concern expressed by stakeholders. Staatsolie (Plant Security and Personnel Services department) is regularly conducting speed control on the Gangaram Pandayweg and Wayamboweg targeted at Staatsolie Personnel and Contractors. Defensive Driving Training is compulsory for all Staatsolie and contractor employees. From the Calor property located along the Wayamboweg, where the collection/buffer tanks (4 tanks with a capacity of 90 barrels each) are situated, vacuum trucks (capacity of 62 or 94 barrels) will transport the crude	Existing direct impact, localized and of medium-term duration. Low significance

	oil to the TA-58 treatment plant. The trucking will be done twice a day (daylight – 12 hours operations). Mitigation measures may include: 1. Project proponent must organize road safety awareness campaigns for own personnel, contractor personnel, and area users (residents and other frequent users of the area). 2. To improve road safety: increase the frequency of speed control activities to record and monitor vehicle speed.	
4. Impact from oil spills produced by project activities on water/soil quality and the natural environment or biological resources	From the test tank facilities, the crude will be transported by means of a 6" header (to be buried at a depth of 60 cm in the dam) to the site with the collection/buffer tanks (4 tanks with a capacity of 90 barrels each) along the Wayamboweg (on the Calor property). In relation to the appraisal drilling program, the highest risk to surface water and soil contamination is likely posed by oil or fuel spillage occurring during test production, transport of fuel and the maintenance of equipment in the field. Stakeholders reported that during Staatsolie activities in the swamp, sometimes dirty or muddy water is observed. This poses a problem as it is perceived as though Staatsolie does not conduct a proper clean-up of the project site. Fishing spots or 'fish holes' are located on the private terrain of land owners living along the Gangaram Pandayweg) and Wayamboweg, also see Figure 12 Contamination of the surface water in the canals (that are used as 'fishing holes') may result in loss of income. Mitigation measures may include: 1. Develop a water/soil quality monitoring program to timely identify areas/points of contamination. 2. Determine appropriate emergency response plan for immediate containment of the oil and proper clean-up of oil spill according to relevant EHS guidelines.	Existing direct impact, localized and of medium-term duration. Medium significance

	3. Properly inform the relevant land owner about all measures taken to avoid or mitigate impact.	
5. Impact to farm infrastructure or other property of land owner due to project activities	Proposed Project activities include opening of the Calor dam to allow passage of the Drilling Rig, construction of collection/buffer tanks (4 tanks with a capacity of 90 barrels each) at the site along the Wayamboweg, placement of a 6" header (to be buried at a depth of 60 cm) in the dam. The transportation of materials for the construction phase (including utility poles, high-density polyethylene pipelines and electrical cables) will be transported via the Calor dam with a tractor during the dry season and with a carrier during the wet season through the trails. The property of the land owner can be impacted as a result of oil spills or leakages occurring. Also in case infrastructure is built (e.g. dams, trails) this may affect the surface water resources (e.g. flooding) as normal water movement patterns are hindered. Area inhabitants have repeatedly voiced their concerns about flooding of their lands as their livelihoods are affected by this. However, no activities will be conducted on agricultural land. Use will be made of the Calor dam for project activities. Mitigation measures may include: 1. Proponent must comply with the HSEQ guidelines regarding procedures for inspections and maintenance schedules (of equipment). 2. Take care to monitor that waste management is carried out strictly according to the waste management plan. In case contractors are hired to execute jobs for Staatsolie then monitoring of the compliance with Staatsolie procedures must take place. 3. During the life time of the Project, properly inform the land owner of progress made with the project and eventual damages caused to the property. Take care to repair any damage caused (or provide compensation for the damage incurred) to the satisfaction of the land owner.	Existing direct impact, localized and of medium-term duration. Medium significance

6. Nuisance to local residents due to third party activities in the swamp area	Trails constructed by Project proponent allow access to third parties. Some nuisance may occur to local residents as a result of third parties gaining entry to the swamp area, possible entering on lands that are privately owned and engaging in activities that are unwanted and possibly illegal. NB-LVV indicated that the most common complaint received from the residents along the Wayamboweg and Gangaram Pandayweg in the past 5 years is illegal hunting. NB-LVV expressed their concern related to the planned Project namely an increase in hunting (on iguanas), poaching and fishing activities in the area due to increased accessibility of the area. Mitigation measures may include: 1. Project proponent must take care to block all entrances to the premises e.g. fence off the entrance location to the landing stage to avoid third party entry. 2. Put up clearly marked signs indicating 'No entry allowed/ Trespassing on private land'.	Existing indirect impact, localized and of temporary duration Very low significance

Cumulative impacts

Cumulative impacts may occur as a result of the GoS moving forward with the implementation of development projects mentioned in the Districtsplan Saramacca 2018.

During stakeholder consultations, issues/perceptions were raised, which may lead to cumulative impacts occurring. These issues included:
(1) Dust from the unpaved Gangaram Pandayweg that collects on the roofs and ends up in the drinking water storage bins.
(2) Poor drainage conditions of the area, resulting in flooding.
(3) Dissatisfaction with how the Gangaram Panday road is maintained by Staatsolie.

We cannot judge in the context of this project whether these perceptions are justified. Staatsolie's retort to the perceptions raised by stakeholders has not been sought and is not documented in this report.

7. Conclusions and recommendations

The results of the above impact analysis are summarized in the table below. This table also shows the residual impact after implementation of mitigation measures discussed in Chapter 6.

Table 4. Summary table of assessed social impacts, presented before and after mitigation

Impact	Rating without mitigation	Rating with mitigation
1. Impact from noise generated by transport vehicles, especially airboats, and construction activities	**VERY LOW**	**INSIGNIFICANT**
2. Impact on air and drinking water quality from dust generated by traffic along the Gangaram Pandayweg	**MEDIUM**	**LOW**
3. Impact on Safety from traffic on the Wayamboweg and Gangaram Pandayweg	**LOW**	**INSIGNIFICANT**
4. Impact from oil spills produced by project activities on water / soil quality and the natural environment or biological resources	**MEDIUM**	**LOW**
5. Impact to farm infrastructure or other property of land owner due to project activities	**MEDIUM**	**LOW**
6. Nuisance to local residents due to third party activities in the swamp area	**VERY LOW**	**INSIGNIFICANT**

From the summary table above we see a total of six potential impacts identified that are associated with the implementation of the intended Project. The potential negative impacts directly related to project activities include: impact on air and water quality (drinking water and surface water), impact on safety (on the road), impact from oil spills produced by project activities on water / soil quality and the natural environment or biological resources, impact to farm infrastructure or other property of land owner, and the impact from noise. One indirect impact, nuisance to local residents, can result from activities conducted by third parties. Most of the potential negative impacts can be effectively managed by mitigation measures so that only negligible or minor impacts will remain.

Given the low degree of human settlement and its concentration along the Wayamboweg and Gangaram Pandayweg, only limited direct social impacts are anticipated from the ADP 2018 at the Uitkijk Block.

Even though the identified negative impacts have been rated, with mitigation, as low or insignificant, they still require the attention of the Project team. Conflict may arise when people perceive that nuisances or problems they are experiencing which they believe are caused by the Project (justified or not) are not properly considered and resolved.

In the absence of an effective stakeholder consultation and engagement program, the potential for the development of some level of discomfort or discontent among the local community may increase and give rise to friction.

From information obtained during stakeholder consultations this already was the case, for example the concerns brought forward by the local government representatives about complaints received from residents living along the Wayamboweg and Gangaram Pandayweg..

We cannot judge in the context of this project whether these perceptions are justified. Staatsolie's retort to the perceptions raised by stakeholders has not been sought and is not documented in this report.

Completely eliminating the negative impacts of the Project is not conceivable, for instance there will be nuisance from the dust generated by the passing vehicles on the unpaved Gangaram Pandayweg. Yet, if PAPs are properly informed about the purpose, timing and duration of Project associated activities, then they will likely consider the dust a tolerable temporary nuisance.
In order to create an environment that facilitates maximization of positive social impacts and minimization of negative social impacts, it is recommended the Project engages the PAPs in all stages of Project design, execution and evaluation. The following actions could benefit such community engagement:
(1) Public disclosure; the results of the ESIA are made available for the public at an accessible location;
(2) Transparent and timely information provision; people are adequately and timely informed about the construction activities: when, where, for how long, and what can be expected in terms of impacts;
(3) Grievance Mechanism; the local area users should be made are aware of the grievance mechanism by the Project team and should understand how to utilize it.

Consultations with area residents suggest that the Staatsolie grievance mechanism is not functioning optimally.

Staatsolie needs to make a conscious effort to find out why this is the case. If not, then problems will keep arising which does not help to build a healthy relationship with the local community.
In line with international best practice, the consultant proposes that existing conflicts between Staatsolie and individual stakeholders or stakeholder groups should in the first place be resolved through discussion/communication. The assistance of a neutral facilitator or conflict resolution expert (or expert team) can help reach a solution that is satisfactory to all parties involved. In this way impartiality of the deliberation process is improved upon and it reduces tensions and the risk of conflict among participants.

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Annexes

Annex 1. Summary stakeholder consultations

Nr.	Date (place/communication means)	Name person(s) consulted	Topics discussed
1	2 October 2018 (by phone)	Mrs. J. Sanches	Project description, appointments with land owners, approach Farmers Collective, grievance procedure/mechanism
2	17 October 2018 (office at Wayamboweg)	Mr. A. Vreedzaam Mr. R. Oedai Mr. L. Sardjoe Mr. J. Sadiwirja	Baseline info of the area, concerns/issues, mitigation
3	17 October 2018 (office at Gangarampandayweg)	Mr. K. Sukul	Relationship with Staatsolie, Farmers Collective, perception of the locals, grievance mechanism, concerns about the Project, baseline info about the area
4	18 October 2018 (by phone)	Mr. Calor	Relationship/communication with Staatsolie, grievance procedure, land use, concerns about the Project, potential hunting impact
5	19 October 2018 (Wayamboweg and Gangarampandayweg)	Mr. L. Sardjoe Mr. J. Sadiwirja Mr. R. Ramlal	Collect baseline info about the study area (through field reconnaissance)
6	19 October 2018 (Wayamboweg and Gangarampandayweg)	Mrs. A. Thakoer Mr. R. Biharie	Concerns about the Project, baseline info, past experience with Staatsolie
7	19 October 2018 (Wayamboweg)	Mr. P. Sukhraj	Concerns about the Project, baseline info, past experience with Staatsolie, Wayambo Green Growers Organization, grievance mechanism/procedure
8	22 October 2018 (by phone)	Mr. M. Timmer	Relationship/communication with Staatsolie, grievance procedure, land use, concerns about the Project, potential hunting impact

Annex 2. Impact Assessment Methodology

The **significance** of an impact is defined as a combination of the **consequence** of the impact occurring and the **probability** that the impact will occur.
For each potential impact identified, the significance is rated on a 6-point scale as displayed in the table below.

INSIGNIFICANT: the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity.
VERY LOW: the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity.
LOW: the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity.
MEDIUM: the potential impact **should** influence the decision regarding the proposed activity.
HIGH: the potential impact **will** affect a decision regarding the proposed activity.
VERY HIGH: The proposed activity should only be approved under special circumstances.

First the **consequence** rating for the impact is determined based on the combined scoring of the three criteria (see also table below):

- ***Extent***– *the area over which the impact will be experienced*
- ***Intensity***– *the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*
- ***Duration***– *the timeframe over which the impact will be experienced and its reversibility*

Rating	Definition of Rating	Score
A. *Extent*– *the area over which the impact will be experienced*		
Local	Confined to project or study area or part thereof (e.g. site)	1
Regional	The region, which may be defined in various ways, e.g. cadastral, catchment, topographic	2
(Inter) national	Nationally or beyond	3
B. *Intensity*– *the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources* Magnitude – severity or extent of the impact		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered Minimal effect on livelihood and/or daily life	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way Some influence on livelihood and/or daily life, but it does not lead to dramatic loss of income or quality of life	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3

	Loss of livelihood and/or severe effect on quality of life	
C. ***Duration***– *the time frame for which the impact will be experienced and its reversibility*		
Short-term	Up to 2 years (i.e. reversible impact)	1
Medium-term	2 to 15 years (i.e. reversible impact)	2
Long-term	> 15 years (state whether impact is irreversible)	3

The combined score of these three criteria corresponds to a **consequence** rating, as follows:

Combined Score (A+B+C)	3 - 4	5	6	7	8 - 9
Consequence Rating	Very low	Low	Medium	High	Very high

Second, the **probability** of the impact occurring was assessed according to the following definitions:

Probability– the likelihood of the impact occurring	
Improbable	< 40% chance of occurring **(Small likelihood that the impact will be experienced)**
Possible	40% - 70% chance of occurring **(About 50% chance that the impact will be experienced)**
Probable	> 70% - 90% chance of occurring **(Distinct likelihood that the impact will be experienced)**
Definite	> 90% chance of occurring **((Virtual) certainty that the impact will be experienced)**

Third: The overall **significance** of the impact as a combination of the **consequence** and **probability** ratings was determined, as set out below:

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	**INSIGNIFICANT**	**INSIGNIFICANT**	**VERY LOW**	**VERY LOW**
	Low	**VERY LOW**	**VERY LOW**	**LOW**	**LOW**
	Medium	**LOW**	**LOW**	**MEDIUM**	**MEDIUM**
	High	**MEDIUM**	**MEDIUM**	**HIGH**	**HIGH**
	Very High	**HIGH**	**HIGH**	**VERY HIGH**	**VERY HIGH**

As a fourth step in the impact identification and rating, the status of the impact was noted i.e. positive or negative effect, followed by a statement of the level of confidence in the assessment of the impact (high, medium or low).

Finally, as part of the impact assessment methodology, appropriate and practical management measures to address impacts are recommended. The management measures are classified as mitigation measures intended to avoid or minimize potential negative impacts and optimization measures intended to generate or maximize potential benefits of the Project. The significance of each potential impact is rated before and after the application of mitigation/optimization.

Appendix 3 Stakeholders Consultation

Date	Stakeholder
August 23, 2018	Mr. Calor
August 24, 2018	NIMOS
August 28, 2018	Mr. Calor
	Mr. Timmer
September 19, 2018	Nature Conservation Division (NB) of the Forest Service (LBB)
September 20, 2018	Department sub-directorate of the ministry of Agriculture, Animal Husbandry and Fisheries (LVV)
October 2, 2018	District Commissioner (DC) Saramacca

MEETING MINUTES

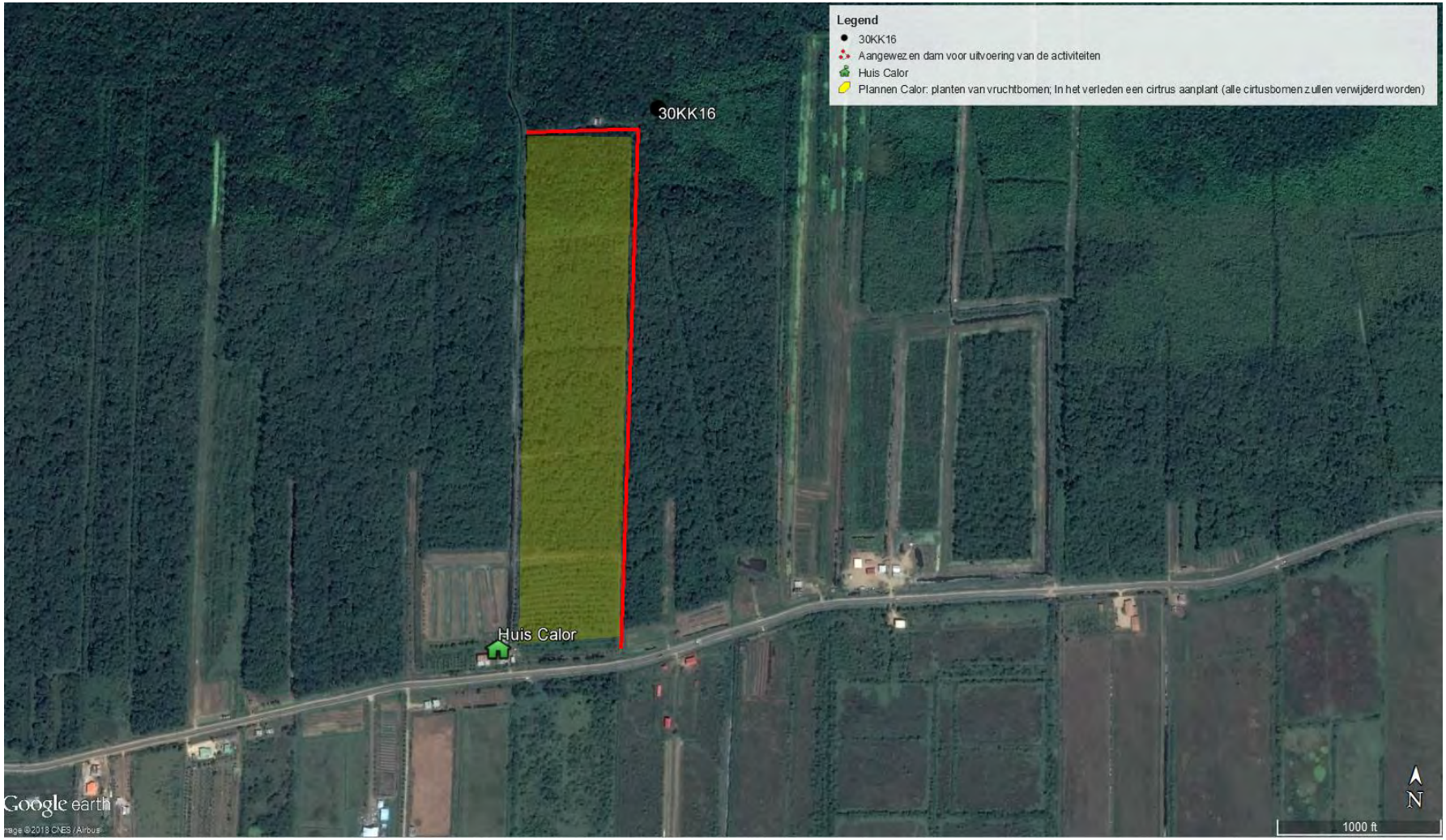
Participanten: Lilian Mwakipesile (SST Tam), Jacintha Sanches (CCU), Pearl Nahar (LMU), Amprie Joesman (IDM), Soeraya Mangalsing (HSEQU)

Datum: 23 Augustus 2018

Onderwerp: Gesprek met dhr. Calor over het Uitkijk ADP-2018 project

Highlights:

1. Het Uitkijk Appraisal Drilling Program (4 bronnen) is voorgelegd aan dhr. Calor. Verder werd hij ook op de hoogte gesteld over de mogelijke toekomstige plannen (o.a. ontwikkelen van het gebied).
2. Dhr. Calor heeft geen bezwaar tegen uitvoeren van de activiteiten, echter heeft hij gevraagd met het volgende rekening te houden:
    a. Staatsolie kan gebruik maken van een dam, oostelijk van zijn huis langs de Wayambo weg (zie figuur 1). Hierbij zal een inrit gemaakt moeten worden, waarbij het nodig is om een duiker te plaatsen voor de afwatering.
    b. Hij heeft plannen om dit jaar een deel van zijn perceel wederom in cultuur te brengen door het verwijderen van de huidige vegetatie/citrus aanplant) en vervolgens vruchtbomen (z.a. manja bomen) te planten die minder zorg nodig hebben.
    c. De beheerderswoning niet gebruiken tijdens de werkzaamheden
3. Staatsolie heeft een kaart (vervaardigd 1995) en hypothecair uittreksel (daterend van 2013) van perceel #153 ontvangen van dhr. Calor. Als rechthebbende van het terrein staat N.V. Weltevreden vermeld. De directieleden van de venootschap zijn dhr. Calor en dhr. Arthur Tjin.
4. Dhr. Calor heeft geen moeite dat Staatsolie de “Calor Dam” zal doorsteken. Hij gaf aan dat de doorgang open mag blijven, omdat hij geen plannen heeft om de dam te onderhouden. In het verleden werd de dam onderhouden voor toegang voor vissers naar het Noorden, hetgeen niet meer het geval is. De vissers (vrienden Calor), die toegelaten worden tot het terrein, blijven tot de voorzijde van het kanaal. Alleen dhr. Calor vaart, met een airboat, in de vaargeul.
5. In het weekend worden vissers toegelaten (overwegend gedurende de droge periode) op het terrein van Calor.
6. Elke zaterdag vaart dhr. Calor in het kanaal.
7. Dhr. Calor werd geïnformeerd over de milieu studie, die uitgevoerd zal worden door ILACO.
8. Volgens dhr. Calor hebben de stropers in het verleden het gebied uitgeput v.w.b. dieren in het wild (o.a. herten).


Legend
30KK16
Aangewezen dam voor uitvoering van de activiteiten
Huis Calor
Plannen Calor: planten van vruchtbomen; In het verleden een cirtrus aanplant (alle cirtusbomen zullen verwijderd worden)
30KK16
Huis Calor
Google earth
1000 ft
N

Minutes of Meeting

Project:	Update ESIA Uitkijk ADP 2018
Project Code:	IS-344
Subject:	NIMOS Consultation
Attendance:	ILACO: Koenjbiharie S/Bharosa V NIMOS: Tjon- Akon Q/ Sewnath M
Location:	Mr. Jagernath Lachmonstraat 100
Date:	24/08/2018
Compiled by:	Bharosa V.

Subject	**Discussion/Remarks**
Agenda	- Planning, time schedule and points of attention - Approach - Gap Analysis - Project description - Additional concerns
Planning, time schedule and points of attention	- Screening by NIMOS: only an update is required from the ESIA executed in 2013. - The formal kick off with the client has been executed and an orientation site visit was carried out. - As mentioned in the NIMOS document, data is not supposed to be older than 5 years.
Approach and gap analysis	- The approach will be based on the gap analysis which has been executed already. - Gaps include: hydrology (data will be used from another project carried out by ILACO in the swamps), water quality (latest data is from 2012), inventory of land use and activities, traffic, noise, social economical aspects and legal framework (the draft natura conservation act has been updated recently).
Scoping meetings	- One on one meetings will be held with key stakeholders: NIMOS, Boerencollectief, NB-LBB, LVV etc.) - Residents and local farmers will also be interviewed (enquete).
Project description	- Two alternatives are being addressed: 1. Option 1: piping system via the Calor dam 2. Option 2: barge system via the Soengie dam
Additional concerns	- None mentioned.

Minutes of Meeting

Project:	Update ESIA Uitkijk ADP 2018
Project Code:	IS-344
Subject:	Stakeholder consultation
Attendance:	ILACO: Narain. S/ Ramdat. N Mr. Calor
Location:	Office notary Calor–Juliana straat #21
Date:	28/08/2018
Compiled by:	Ramdat. N

Subject	Discussion/Remarks
Agenda	• General • Concerns from Mr. Calor • Follow up
General	• State oil Company wants to construct a pipeline through Mr. Calor property to the closest borehole. • Mr. Calor wants to know the coordinates of the loading site east of the Wayamboweg. • Mr. Calor wants to know when the project will start. • Mr. Calor would like it if the water level in the canal would be measured during a whole year after connecting the trace of Staatsolie to the canal.
Concerns from mr. Calor	• Mr. Calor doesn't have an opinion about the project. He doesn't think the state oil company will take it into consideration either, because of past experiences. • Mr. Calor is bothered by the activities of the State oil company. He mentioned a past experience he had with a certain Spanish company, where the employee only spoke Spanish. • Mr. Calor doesn't have any agreements with State Oil Company. He wants them to connect the route at the back of the canal, not the front. He has no problem if the trace is connected 2 km from the front part. • Mr. Calor said that the collaboration is good between him and the State oil Company. • Mr. Calor uses his property only for planting fruit trees. • Mr. Calor is not part of the group Boerencollectief.
Follow up	• Contact Mr. Calor to give him the necessary information about the size of the loading site and when the project will start.

Minutes of Meeting

Project:	ESIA Uitkijk ADP 2018
Project Code:	IS-344
Subject:	Stakeholder consultation
Attendance:	ILACO: Nairan S/ Bharosa V Landowner: Timmer M
Location:	SV Voorwaartslaan 18
Date:	28/09/2018
Compiled by:	Bharosa V

Subject	Discussion/Remarks
Agenda	• Project introduction • ESIA approach • Involvement Mr. Timmer • Land use and planned activities • Concerns and complains • Appointments and cooperation
Project introduction	- 4 appraisal drillings holes are proposed by Staatsolie. - The activities will take place in the Uitkijk Block, near the Wayambo road, between the Calor Dam and the Soengnie Dam. - 3 options for transportation are available: 1. via the property of Mr. Calor 2. Beside the terrain of Mr. Oedit, where the infrastructure of Staatsolie exists. 3. Between the Calor Canal and the Ensberg Canal.
ESIA approach	- The screening phase has been completed. Only an update study is required. The update concerns: noise and traffic, water and water quality, hydrology, legal framework, socio study Field measurements are currently taking place.
Involvement of Mr. Timmer	- Mrs. Sanches from Staatsolie kept Mr. Timmer constantly informed about past activities of Staatsolie. - Even if Mr. Timmer was unaware about the Uitkijk ADP 2018, he expects Mrs. Sanches to keep him informed in the future. - Mr. Timmer is not a member of the Boerencollectief and his farm is located outside the Uitkijk Block.
Land use and planned activities	- Staatsolie was pressured by the other dam caretakers in the Uitkijk Block to further excavate their canals. - Staatsolie laid out traces alongside all the dams within the Uitkijk Block. - The Soengnie dam only has a natural water flow and no culverts. - In the dry season, driving on the trace alongside the Calor Dam is possible. - Mr. Timmer has always cooperated with Staatsolie and has no issues when the terrain of mr. Soengnie is used for transportation activities. - Mr. Timmer has no future plans with the Soengnie dam.
Concerns and complains	- Mr. Timmer mentioned that illegal poachers and fishermen come into the area, when a trace is laid from Weg naar Zee area to the Staatsolie area. Also the residents have the same problem with these illegal poachers and fishermen in the area. - Rising water level in the swamps was observed due to swamp fires by fishermen and other unknown natural causes. - There are issues between Mr. Oedit and Staatsolie when it comes to cooperation.
Appointments and cooperation	- There is a good collaboration between Staatsolie and Mr. Timmer. - Staatsolie was given permission by Mr. Timmer for transportation activities on his property many times before.

Minutes of Meeting

Project:	ESIA Uitkijk ADP 2018
Project Code:	IS-344
Subject:	Stakeholder consultation
Attendance:	ILACO: Narain S/Bharosa V LBB: Ho Tsoi R/ Sanredjo E/ Esajas V/ Soedhwa D/ Gobind H/ Esajas H/ Lingaard M Staatsolie: Mangalsing S/ Sanches J
Additional:	LBB: Esajas V (questions via telephone)
Location:	Cornelis Jongbawstraat #33
Date:	19/09/2018
Compiled by:	Bharosa V.

Subject	**Discussion/Remarks**
Agenda (IS-344)	• Project introduction • ESIA approach • Questions/ Answers • Appointments and cooperation • Update Nature Conservation Act
Project introduction	- The locations of the 4 appraisal drilling holes are presented. - 4 appraisal drilling holes will be made by Staatsolie in the Calor property, near the Wayambo road, in the Uitkijk Block of the district of Saramacca. - The activities will take place between the Calor Dam and the Soengnie Dam. - The Calor Dam will be used to access the area. A collection tank will be placed on the Calor Dam and the material in it will be transported using a vacuum truck. This dam is connected to the sea and has a length of approximately 14.3 km. - The nearest drilling location is approximately 1 km from the Wayambo road. - The Calor Canal will be used as a waterway to access the locations and for transport purposes from and to the existing oil field of Staatsolie. - The pontoons will be pushed forward using excavators. - Existing waterways will be used as much as possible and if required the overgrown parts will be cleared with excavators. - A strip of 4 meters will be added on the dam to place the flow line, which will have low or high electricity voltage masts for power. - Exploitable oil reserves will be checked if they will be sustainable for a long time and if the area can be developed with more drilling holes. The purpose of the 4 drilling holes is to produce crude oil within a period of a year, so that more data is obtained about the reserves in the area. If more water than oil is found in the pit, it will be closed off. Staatsolie hopes that all the 4 drilling holes will have a positive outcome.
ESIA approach	- The screening phase has been completed. Only an update study is required. The update concerns: noise and traffic, water and water quality, hydrology, legal framework, socio study
Questions/ Answers	***ILACO:*** Q: Is LBB/ NB represented in the Wayambo area? Incase not, in what way does monitoring take place in the area? A: No, LBB is not represented in the Wayambo area. No monitoring activities of LBB in the area. Q: What current activities do LBB / NB develop in the Wayambo area? What are the future activities?

	A: LBB/ NB have no ongoing activities or haven't planned any future activities. Q: Is there any prospective legislation that applies to the area? A: Yes, the Nature Conservation Act Q: What is the status of the Wayambo area? Is it a protected area and, if so, what kind of a protected area? A: The project area is located inside the Noord Saramacca MUMA and outside the Coppename Estuary Nature Reserve. The Coppename Estuary Nature Reserve is included on the list of wetlands of the RAMSAR Convention. The area has the protected status of a MUMA, which contains its own management plan. Q: What is the implication of the protected status of the area for the activities that people / organizations (want to) develop in the area? With other words can one fish and / or hunt in the area? Other human activities that are forbidden? A: Fishing and hunting is permitted in consensus with the corresponding seasons and within allowed numbers. Q: Update on protected species, species given a protected status or newly discovered species in the area over the past 5 years? A: No, all immigrated species, aquatic birds and mammals in the area have a protected status. No new species were observed in the area over the period of 5 years or gained a protected status. Furthermore, no data about Fauna is available for the Wayambo area. Q: Disturbance of certain species in the area in the past 5 years? A: Yes, the excavation of the canals formed an immigration obstacle for some species. Furthermore, no habitat/ fauna disturbance has been recorded over the past 5 years. Q: Have there been any complaints from the residents along the Wayambo and Gangaram Panday in the past 5 years related to the drilling activities of Staatsolie? A: Yes, the most common complaint is illegal hunting. Q: Is there a procedure for dealing with complaints from the residents, related to the drilling activities of Staatsolie? A: No, LBB has no procedure for handling complaints from residents. Most complaints are received indirectly. Q: What were the three most frequent violations of the legislation regarding nature conservation? And who are the offenders (local residents, outsiders)? A: Violation of the law in the Wayambo includes illegal sport hunting by local residents. Q: Are the new Staatsolie activities/ projects communicated with LBB / NB? A: Yes, collaboration between Staatsolie and LBB is stable. However, Staatsolie wishes to strengthen cooperation with LBB. Q: Is LBB/ NB familiar with Staatsolie's complaints registration system? A: No, LBB is not aware of the complaints registration system of Staatsolie. Q: Are there concerns regarding the planned drilling activities of Staatsolie? Possible /potential effects that can occur because of the project that may affect the protected area? A: Yes, a number of concerned were mentioned:

	➢ The trace of the airboats can cause emigration of species. ➢ Water contamination in periods with higher water levels. ➢ Clearing the forest will cause shifts of fauna habitat. ➢ Urbanization of some species due to deforestation. ➢ Increased hunting (on iguanas), poaching and fishing activities in the area due to increased accessibility. Q: If care points are identified; which mitigating measures can be taken? Are there suggestions for improvement of the planned work to minimize the impact on the protected area? A: Yes, a few mitigating measures and suggestions were mentioned: ➢ LBB suggests that feline species in the area must be taken into account when monitoring. ➢ Staatsolie states that all contaminated material or spills will be cleaned-up. ➢ As a mitigation measure, LBB recommends relocation of the observed mammals from the disturbed areas.
Appointments and cooperation	- Measures must be taken to minimize impacts of the drilling activities. - The baseline data of the area will be collected and LBB will be invited when the results are presented. - Mr. Calor is the only one who uses the Calor Canal. Even though others are not permitted for this, illegal poachers, hunters and fishers still have access to the canal. - LBB will use KML files to process GPS information of the drilling holes.
Update Nature Conservation Act	- The Draft Nature Conservation Act must still undergo a lot of screening in the parliament. Primarily the Environmental Framework Law must be approved before any new nature related law can be implemented.

Minutes of Meeting

Project:	ESIA Uitkijk ADP 2018
Project Code:	IS-344
Subject:	Stakeholder consultation
Attendance:	ILACO: Narain S/Bharosa V LVV: Martodimedjo R/ Nazir H/ Omapersad A/ Budjahwan R/ Poeran R Staatsolie: Sanches J
Additional:	LVV: Warsodikromo H (questions via telephone)
Location:	Letitia Vriesdelaan #8-10
Date:	20/09/2018
Compiled by:	Bharosa V.

Subject	**Discussion/Remarks**
Agenda	• Project introduction • ESIA approach • Questions/ Answers • Appointments and cooperation
Project introduction	- ILACO has been selected by Staatsolie to conduct an ESIA study: Uitkijk ADP - 4 appraisal drillings holes are proposed by Staatsolie - The activities will take place in the Uitkijk Block, near the Wayambo road, between the Calor Dam and the Soengnie Dam - 3 options for transportation are available: 1. Via the property of Mr. Calor 2. Beside the terrain of Mr. Oedit, where the infrastructure of Staatsolie exists. 3. Via the property between the van Dijk Canal and the Ensberg
ESIA approach	- The screening phase has been completed. Only an update study is required. The update concerns: noise and traffic, water and water quality, hydrology, legal framework, socio study
Questions/ Answers	***ILACO:*** Q: Have there been any complaints from the residents along the Wayambo and Gangaram Panday in the past 5 years related to the drilling activities of Staatsolie? A: Yes, issues with Boerencollectief of the Wayambo and the Gangaram Panday road include the pipelines of Staatsolie, which are 2.5 meters away from both sides of the road instead of the recommended 5 meters. Q: Is there a procedure for dealing with complaints from the residents, related to the drilling activities of Staatsolie? A: No, LVV has no procedure for handling complaints of residence. Also, no questions or reporting of the Wayambo area done by LVV. Q: Is LVV represented in the area? Local branch present? If yes, where established? A: Yes, at Uitkijk, in the district of Saramacca. Q: What exactly is the role/ responsibility of LVV in the area, particularly in relation to water management? A: The involvement of LVV is essential due to agricultural activities in the area. They could add their insights about possible impacts, which should be taken into account. LVV has no drainage plans regarding the water management of the Wayambo area. Q: What current activities does LVV develop in the Wayambo area? What are the

	future activities? A: The main activity is farming, mostly concentrated alongside the Wayambo and Gangaram Panday road. LVV wishes to add agricultural advice and make an inventory of the proposed activities on the map. Q: How many farmers in the Wayambo area are active? A: Currently, between 40 and 50 farmers are active in the agricultural sector of the Wayambo area. Q: What are the main crops harvested in the Wayambo area? A: The main crops in the area include rice, bananas and vegetables Q: What are the main farm animals cultivated in the Wayambo area? A: The main farmed animals include cattle and chickens. Q: How big is the total area used for agricultural activities? A: The total area used for agricultural activities is approximately 50-60 ha. Q: Are fishing activities, including sport fishing being deployed in the area? A: Yes, sport fishing in the area is mostly practiced by local farmers. Q: Do sand/ gravel excavations take place in the area? If so, where? A: Yes, sand excavations take place in the southwest part of the Uitkijk Block. Q: Are the new Staatsolie activities / projects communicated with LVV? A: No, although interactions between Staatsolie and LVV are recommended, to stay informed and given the opportunity to share their thoughts and concerns. Q: Is LVV familiar with Staatsolie's complaints registration system? A: No, LVV is not aware of the complaints registration system of Staatsolie. Q: Are there concerns regarding the planned drilling activities of Staatsolie? Possible /potential effects that can occur because of the project that may affect the protected area? A: Yes, the main concern of LVV is that however Staatsolie indicates that they will not drill in agricultural areas, they still do it. Q: If care points are identified; which mitigating measures can be taken? Are there suggestions for improvement of the planned work to minimize the impact on the protected area? A: As a mitigation measure, LVV suggests that no dredging activities are required for the construction of a trace. Soil compaction by clearing a path with an excavator is sufficient for making a trace.
Appointments and cooperation	- Meeting with the local farmers will be planned in the first week of October 2018. LVV wishes to be invited in this session, so they can be better informed and give additional agricultural information.

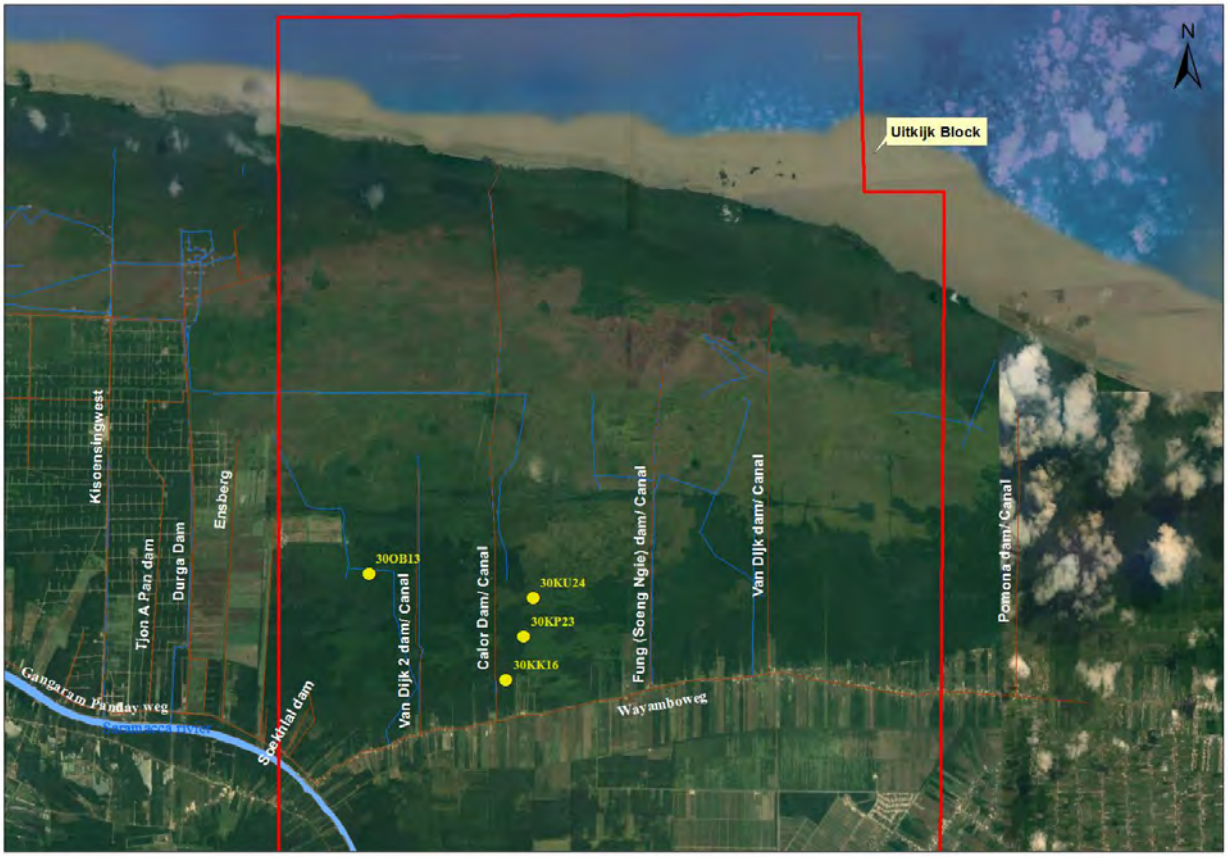
Minutes of Meeting

Project:	Update ESIA Uitkijk ADP 2018
Project Code:	IS-344
Subject:	Stakeholder consultation
Attendance:	ILACO: Narain S/Punwasi S Staatsolie: Mangalsing S/ Sanches J/ Wolff M/ Joesman A DC: Biharie R/ Sadiwirja J/ Sardjoe L/ Oedai R/ Vreedzaam A
Location:	Conference room DC Saramacca
Date:	02/10/2018
Compiled by:	Punwasi S

Subject	**Discussion/Remarks**
Agenda	- Introduction - Project introduction and description (ppt presentation) - ESIA process - Concerns and complains - Questions/Answers - Additional concerns - Appointments and cooperation
Introduction	- Study area: Uitkijk Block Staatsolie, near the Wayambo road, between the Calor Dam and the Soengnie Dam - The study concerns an update of existing ESIA of the area. - Alternatives for infrastructure (3) were explained by Ms. Mangalsing of Staatsolie: option 2, barge system via the Calor dam, will be used by Staatsolie.
ESIA process	- The screening phase has been completed. Only an update study is required. The update concerns: noise and traffic, water and water quality, hydrology, legal framework, socio study.
General concerns and complaints	- *Dust:* many cars of Staatsolie drive on the Gangaram Panday road. The residents use rainwater in the household and the dust that is blowed up comes into the rainwater through the roof gutters. - *Flooding:* ➢ A few people complain about flooding in the area. The farmers organization stepped to court, but it has never been proven that flooding is caused by Staatsolie's activities. ➢ In the great rainy season Wayambo is under water, especially where the dams are not high enough. - *Traffic:* increased traffic on the Gangaram Panday road, especially DAF trucks driving fast on the road in the great rainy season. Ms. Mangalsing of Staatsolie states that Staatsolie will talk to the truck contractors and will carry out speed controls.
Questions/ Answers	***BO's of DC Saramacca:*** Q: Will drillings be done on properties of the residents? A: one (1) of the appraisal drilling holes will be on the property of Calor. Currently there are ongoing discussions. The 1st appraisal drilling hole will be made 1 km away from the Wayambo Road and the last 4 km away from the Wayambo Road. After drilling, Staatsolie will inspect if the appraisal drilling holes are going to be used. On the Calor site there will be 2-3 oil tanks with bund walls and from there oil will be transported with trucks to the Staatsolie area. ***ILACO:*** Q: Is there a procedure at DC Saramacca for reporting concerns and complains from the residents?

	A: Yes, it is included in the tasks and qualifications of the BO's. The concerns and complains are received through the BO at DC's office, and from the DC's office reported to Staatsolie. Q: What is the land-use along the Wayambo- and Gangaram Panday road? A: Stock breeding, dry crops and rice cultivation. Q: How is the cooperation between the BO's and Staatsolie? A: The cooperation between the BO's and Staatsolie is good, and there is always communication from Staatsolie. Q: Are statistics available from the Wayambo area at the DC? A: Yes, the DC receives statistics from CBB. The statistics per year are also included in the district's plan. Staatsolie will check with the DC for the district plans. Q: What does the DC do when the areas are flooded? A: Wherever the government can help, they do help (for example in Pomona), but in private areas the government has no control. BO, Mr. Bihari, states that a pumping station has to be installed at Wayambo.
Additional concerns	- Certain residents complain that Staatsolie does very little for them in the area. - During Staatsolie activities in the swamp, sometimes dirty / muddy water is observed. - Only 25 % of total (300) divers are operational.
Appointments and cooperation	- Meeting with the RR-members in the big stakeholder's consultation. - Statistics from the Wayambo area will be received from the DC (hard copy). - Public consultation: 12 October 2018 (tentative).

ENVIRONMENTAL SOCIAL MANAGEMENT PLAN
FOR THE UITKIJK APPRAISAL DRILLING PROGRAM
2018



UPDATED FOR APPRAISAL ACTIVITIES IN THE UITKIJK NORTH AREA

Draft Report
November 2018

Table of Contents

Abbreviations

CCU	Corporate Communications Upstream
DO	Drilling Operations Division
ELT	Ecological Land Type (see review study)
ESMP	Environmental Social Management Plan
GFI	General Field Instruction
HSE	Health, Safety and Environment
HSEQU	Health, Safety, Environment and Quality Upstream
MUMA	Multiple Use Management Area
PS & PS	Plant Security and Personnel Services

1 INTRODUCTION

One of the strategic goals of the Staatsolie is to sustain the annual average daily production of 16,250 BOPD (Staatsolie Strategic Plan). Future oil production from the Uitkijk Block will compensate for the decline in oil production rate. Appraisal activities will be carried out to establish the presence of producible reservoirs, find more reserves, minimize geological risks present in this area, secure future development drilling programs and upgrade contingent reserves in to prove reserves. After exploration programs between 2001 and 2014, the Staatsolie is planning to further appraise the Uitkijk Block in order to increase the reserve base. The appraisal drilling program (ADP) for the Uitkijk Block consists of at least four (4) wells with the possibility for 10 wells in addition.

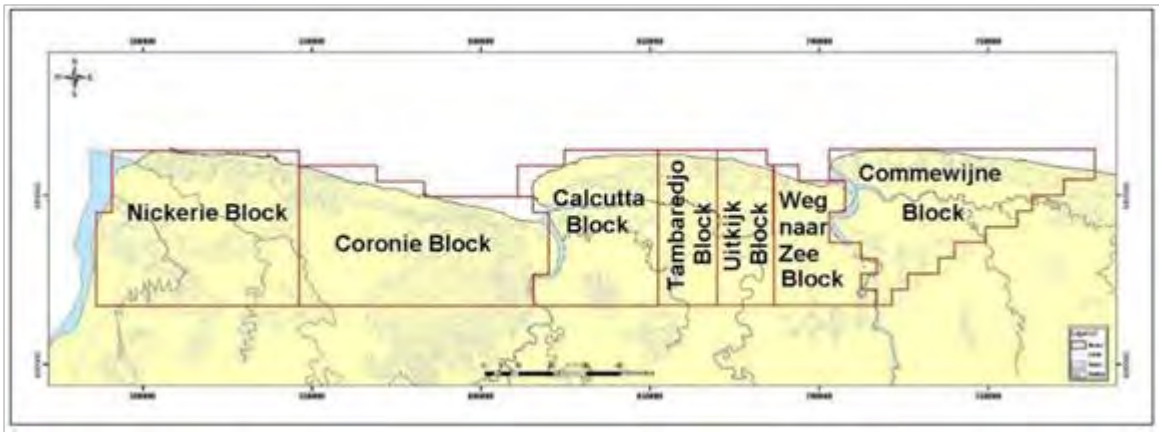


Figure 1: Overview of the onshore concessions blocks

The project is located in the Uitkijk Block Concession, about 15-25 km west of the western boundary of Paramaribo and immediately east of the Tambaredjo Oil Field operated by Staatsolie.

The Uitkijk Block is divided into two parts (North and South) by the 'Oost-Westverbinding', which is a primary road connecting east and west Suriname. The project activities will be executed in the northern part of the Concession area, known as the Uitkijk North area (Figure 1)

The Uitkijk-North Block is found within the Wayambo Swamp, a wetland that is part of the North Saramacca MUMA. To the north-west of the exploration area is the Coppename-monding Nature Reserve, a wetland of international importance.

The Wayambo Swamp is crossed by a number of so-called “fish holes” (visgaten), long S-N running canals that are used to catch swamp fish, mostly for recreational purposes.
Southwest of the Uitkijk-North exploration Block is an area of rice farming, which takes its irrigation water from the exploration area, but no rice growing has been undertaken since 2005. Along the southern boundary, the Wayambo Road is found with scattered houses and limited agricultural activities.

Wetlands serve vital functions such as providing wildlife habitat, irrigation water supply, flood control, improved water quality, and (fishing) sport usage. They frequently provide breeding and nesting grounds for many types of animals, including some protected species. Wetlands vegetation is generally resilient to mechanical stress but soils recover slowly from compaction and displacement. Channeling and damming may affect the water flow which can cause changes to the water levels and quality over large areas far beyond the immediate site of the disturbance.

Special care must be taken to maintain the natural equilibrium of the wetland environment and the surrounding transition areas. Disruption of water flow can occur by cleaning of existing trails (water ways accessible for airboats, carriers and the swamp rig) or canals (when clay is excavated), creating new trails or canals (or deep vehicle tracks), or construction of access roads or polders. These changes may also cause changes in water quality with consequent alteration of vegetation and fish and wildlife

habitats. Clearing of trees can result in increased underbrush and subsequent accumulation of organic material, thereby altering water quality.
In large expanses of wetlands, small areas of raised dry land can constitute very important habitats. The coastal ridgewood and ridge forest ELTs are limited in distribution in the Wayambo Swamp. They serve as important habitats and are, therefore, an important element of the wetland complex.

In summary, the primary environmental sensitivities of the Wayambo Swamp are:

- Natural surface water drainage (hydrology) and water quality,
- Vegetation and other components of fish and wildlife habitats,
- Fish and wildlife and their susceptibility to disturbance and
- Land use compatibility with other existing and potential uses.

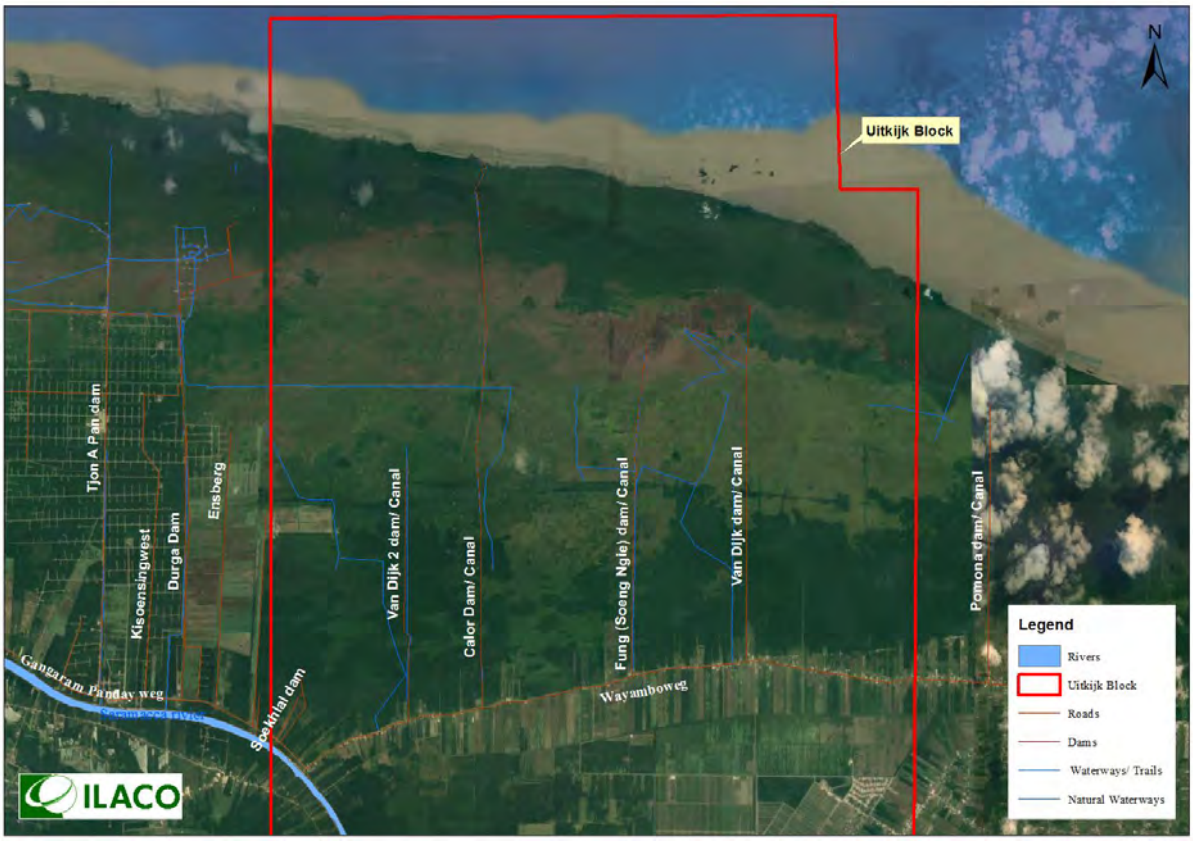


Figure 2: Uitkijk Concession Block met roads, dams and canals

This document, the Environmental and Social Management Plan (ESMP), details the approach that will be followed during construction, operation and decommissioning of the Uitkijk ADP Project to ensure that its negative impact on the environment is minimized.

Contractors that will be involved shall review and commit to the ESMP before starting the works.

This document is intended as a dynamic document that may be continually edited and updated by the HSEQ Upstream Division as new insights develop during the implementation of this ESMP.

1.1 ENVIRONMENTAL MANAGEMENT

Compliance with the provisions of a number of Staatsolie documents that address Health, Safety, and Environmental (HSE) issues are mandatory, principally:

- **Health, Safety & Environmental and Quality Policy**: is aimed at continually improving performance and aspires to prevent harm to the safety and health of its Emloyees, contractors, neighbors, and the environment.
- **GFI's**: general procedures to guide Staatsolie's operations so that it complies with the HSE policy. GFI's applicable to this project are listed in appendix C.
- **Community Relation Policy**: is aimed at performing business activities in such a way that communities' interest and expectations with regard to socio-environmental aspects are properly considered.

1.2 DESCRIPTION OF THE ESMP

1.2.1 Purpose and scope of the ESMP

The purpose of this ESMP is to set out the management and monitoring measures required to minimize the environmental impacts of construction, operations and decommissioning at the Uitkijk ADP Project area, and to ensure that responsibilities and appropriate resources are efficiently allocated to the project. The ESMP addresses the construction, operational and decommissioning phases.

Emergency planning measures are addressed in the HS-plan associated with the risk register that has been established for the project activity.

1.2.2 Structure of this ESMP

This ESMP is made up of three parts:

Part 1: Introduction
Provides brief background to the project and sets out the corporate environmental management requirements as well as a brief description of the purpose, scope and structure of the ESMP.

Part 2: Environmental Management Procedures
This section sets out the roles and responsibilities for implementation of the ESMP, environmental training requirements, emergency response planning, and monitoring requirements.

Part 3: Environmental Specifications
Explains the approach adopted to develop the environmental specifications and sets out the actual specifications in tabular form.

2 ENVIRONMENTAL PROCEDURES

2.1 ROLES AND RESPONSIBILITY

This paragraph is intended to ensure that an accountability process is defined and implemented to make certain that responsibilities are performed effectively. The general roles and responsibilities of various parties are outlined in the section below.

2.1.1 The Owner's team

Different processes will be executed during the project. All processes within Staatsolie are owned by a Process Owner. Following table indicates the different processes that will take place during the project and the responsible Process Owner.

Table 1: Process Owners

Process	Process Owner
Construction of infrastructure and drilling locations	Drilling Operations Manager
Drilling and completion of appraisal or production development wells and required facilities	
Well plug and abandonment	
Decommissioning	
Planning of locations of wells	Manager Reservoir Management
Testing of appraisal wells and transporting the produced flow to the collection/ treatment facilities	Manager Lifting, Gathering & Transport
Decommission	

Position	HSE responsibility
Upstream Director	Overall accountability for HSE matters for all upstream operations.
Project Asset Manager	Overall responsibility for HSE matters with regards to activities during the operational and decommissioning phase.
Manager Lifting, Gathering & Transport	Responsibility for HSE matters related to the testing of the appraisal wells and transporting the produced fluid from the wells to the treatment facilities of Staatsolie.
	Responsibility for taking into account HSE matters during expansion of the appraisal program
	Responsibility for HSE matters related to maintenance
	Responsibility for HSE matters related to decommissioning activities.
HSEQ Upstream Manager	Responsibility to support the operations and monitor the performance with regards to HSE matters.
Environmental Engineer	Overall responsibility for Environmental Support for the Uitkijk ADP Project
Corporate Communication Upstream Manager Staatsolie	Overall accountability of Community and Public Relations support for all Staatsolie operations and activities.
Community Relations Officer	Overall responsibility of Community Relations support for the Uitkijk ADP Project
SOM Employees and contractors	Shall be aware of the ESMP requirements and adhere to the relevant mitigation measures.

The **Drilling Operations (DO) Manager and the Lifting, Gathering & Transport Manager** shall all within their departments:

- Ensure that the key on-site staff (contractor-supervisors) are duly informed of the ESMP and associated responsibilities and implications of this ESMP prior to commencement of construction (in order to minimize undue delays);
- Inform key on-site staff through initial environmental awareness training of their roles and responsibilities in terms of the ESMP;
- Ensure that a copy of the ESMP shall be available to all on site Construction and Drilling Contractor Field Supervisors;
- Inform the environmental engineer **one week** before the date of the commencement of the project (this date being the day on which preparations activities will start);
- Perform weekly HSE inspections based on the weekly ESMP checklist and submit compliance reports every 2 weeks to the Environmental Engineer (based on reporting scheme in table 2 in paragraph 2.6.6 Reporting);
- Undertakes a post-decommissioning inspection upon completion of each location, which may result in recommendations for additional clean-up and rehabilitation measures;
- Ensure that method statements are submitted to the Environmental Engineer for a tasks requiring such;
- Ensure that action items to rectify non-compliance are closed out in a timely and satisfactory manner.

The **HSEQ Upstream Manager** shall:

- Identify areas of non-compliance and proposes action items to rectify them in consultation with the Project Manager/Project Leader. Undertakes spot inspections to determine compliance with the ESMP and monitor the activities of the contractor on site with regard to the requirements outlined in this ESMP;
- Alert when action items intended to remedy non-compliance are not closed out in a timely and satisfactory manner;
- Compile compliance reports;
- Submit reports on the implementation of the ESMP and non-compliance to the NIMOS;
- Undertake a post-decommissioning inspection upon completion of the project area, which may result in recommendations for additional clean-up and rehabilitation measures.

2.1.2 SOM Divisions/Process Owner-representatives and Contractors

The Process Owner-representatives and Contractors delivering services to the project have a duty to demonstrate respect and care for the environment in which they are operating. The Process Owner-representatives and Contractors shall comply with the specifications of the ESMP and abide by the instructions of relevant Process Owners and the HSEQ Upstream Manager regarding the implementation of this ESMP. The Process Owner-representatives and Contractors shall report to the relevant process owner and the HSEQU Manager on all matters pertaining to the ESMP.

The representatives of Process Owners shall:

- Ensure that copies of the ESMP shall be available at their offices, and shall also ensure that all personnel on site (including Sub-Contractors and their staff, and suppliers) are familiar with and understand the requirements of the ESMP;
- Ensure that all activities under their control are undertaken in accordance with the following:
    - Health, Safety, Environment and Quality Policy,
    - Community Relations Policy,
    - All applicable Staatsolie GFIs,
    - The ESMP.
- Ensure that all employees and sub-contractors comply with this ESMP

- Execute daily HSE inspections and any non-compliance with the specifications of the ESMP should be reported immediately.
- Compile Method Statements as listed hereunder;
- Ensure that any problems and non-conformances are remedied in a timely manner, to the satisfaction of the responsible process owner;
- Ensure that all personnel are aware of the Contingency Plans and are adequately trained therein;
- Compile the required reports (see table 2, to be submitted to the Upstream HSE Head).
- Ensure that after decommissioning the site is being signed off by the relevant parties.

Method statements are to be compiled by Process Owner-representatives for approval by their Process Owner, who reviews and endorses them. The HSEQ Upstream Manager must receive a copy of the method statement for review 2 weeks before commencement of the activity and if there are any issues regarding the environmental specifications he/ she shall make these known to the Process Owner within a week. The method statement typically shall cover applicable details including, but not limited to:

- A reference to the Environmental Specifications;
- Description of the activities to be undertaken;
- Location where activities will be undertaken, and if on privately owned land the name of the owner will be placed;
- Construction drawings;
- Map of the location;
- Materials and equipment requirements;
- How and where material will be stored;
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- Timing of activities (start and end dates).
- Assurance that the landowner/user is aware of the planned activity

The following method statements for construction shall be submitted to the Process Owner not less than 14 days prior to the intended date of commencement of the activity:

- Site preparation;
- Construction activities;
- Setting up or changing of access routes;
- Construction of dams and water management structures;
- Changes of dams and water management structures;
- Movement of rig;
- Large transports along clay dams.

The Process Owner Representatives shall abide by these approved method statements. Appendix A gives an explanation of method statements and provides a pro forma method statement sheet that must be completed by the process owner for each activity requiring a method statement as specified in here above. A checklist has been included in Appendix B to facilitate the random and weekly site inspection for the Uitkijk ADP Project site. These completed checklists must be submitted to the HSEQ Upstream Manager at the end of each week.

2.2 ENVIRONMENTAL TRAINING

Environmental awareness training courses shall be run for all personnel on site. It is incumbent upon the Process Owner to convey the objectives of the ESMP and the specific provisions of the ESMP to all personnel involved in the operation of the Uitkijk ADP Project. Environmental training must cover the specific environmental management requirements as set out in the ESMP, but must also ensure that all on-site staff are aware of and familiar with the relevant requirements and principles/objectives

of the HSE Policy, ER Policy, applicable procedures (GFIs) and the ESMP. The Process Owner will initialize the training sessions for all new or additional staff and the HSE department shall support with Environmental Awareness Courses (Integrated Health, Safety and Environmental Inductions). The Process Owner shall ensure that all his/her staff attends the awareness courses to be held not less than one week before the Commencement Date. Where applicable, the Field Supervisors shall provide job-specific training on an ad hoc basis when workers are engaged in activities that require method statements. A copy of the ESMP shall be available on site, and the Field Supervisors shall ensure that all the personnel on site (including Sub-Contractors and their staff) as well as suppliers are familiar with and understand the specifications contained in the ESMP.

Operation training will include information on:

- Working on privately owned land
- Current land and water use
- Clearing, access and transportation
- Waste minimization, handling and disposal methods
- Fire and spill prevention and control
- Emergency response procedure (Health, Safety and Environmental issues)
- Handling and storage of hazardous materials, fuels and oils
- Reclamation measures.

2.3 COMMUNITY ENGAGEMENT

2.3.1 Introduction

Community or stakeholder engagement describes the ongoing, interactive relationship between Staatsolie and the community. It is about building and maintaining constructive relationships over time. It is an ongoing process between the company and its project stakeholders that extends throughout the life of the project and encompasses a range of activities and approaches, from information sharing and consultation, to participation, negotiation, and partnerships. It enables people to be informed about local issues related to Staatsolie activities and to contribute ideas and help identify solutions. It strengthens community cooperation and builds the people's trust. Staatsolie recognizes the value of involving the community in its HSE policy which includes as one of the key-elements: "Communication of the Health, Safety and Environmental policy, objectives and targets, and other relevant matters to all employees, contractors and stakeholders".
The nature and frequency of community engagement should reflect the level of project risks and impacts.
The current project does not encompass much stakeholder engagement, because there are very few stakeholders. Therefore no specific Community Engagement Plan (CEP) is thought to be required for the Uitkijk ADP Project. It is, however, essential that Staatsolie designs and implements a generic company CEP, which can then be used for all operations, including appraisal drilling. For the current study only a framework will be provided to guide engagement on issues such as the management of environmental and social impacts and the management of grievances.

2.3.2 Purpose

Community engagement in the current context is seen as the way of interacting with residents. It is an ongoing process which allows a two-way communication. Stakeholders / residents and Staatsolie will both benefit from community engagement. The purposes is to help outline how Staatsolie will obtain a better understanding of the public's interest and perspective regarding their activities in the Uitkijk-North area. It also helps people within the community feel involved in and be heard in the project.

In order for Staatsolie to understand the concerns, needs and aspirations of the community, Staatsolie needs to create this two-way communication. This can be achieved through:

- Keeping the community informed about issues that affect, or are important to the community

- Creating avenues for Staatsolie to listen to issues that affect, or are important to the community

Meaningful community engagement usually results in minimization of vagueness, conflict and delays, and the establishment of relationships in the local community that can benefit current and future projects. It can limit the number of surprises that occur during a project because all parties share information openly and consistently.

2.3.3 Community engagement for the current project

Within Staatsolie, community engagement is in effect the responsibility of the Corporate Communication Upstream (CCU) department of Staatsolie, but this engagement is mostly restricted to procedures and activities to provide access to private land. The involved land owners have been contacted and the project activities on their land have been discussed. A statement of approval and an agreement on compensation have been agreed on. Furthermore the Community Relations Officer has organized meetings with the district government, other government organizations, farmers and residents in order to inform them on the coming activities and to discuss.
The current ESIA has identified a number of stakeholders which have been consulted. Their concerns are included in the ESIA.

2.3.4 Activities for the current project

In the study of 2013, a number of impacts have been identified that could directly or indirectly affect people in the study area. In the current study, 2 impacts have been added concerning noise and hydrology. Many of these impacts have been considered as to be minor (insignificant). Nevertheless such impacts require attention of Staatsolie, because social unrest may develop when people have the feeling that the nuisances they experience or the problems they believe to have been caused by the project are not acknowledged and/or properly addressed. Such reaction, whether or not justified, could result in a significant negative impact. Staatsolie should undertake a series of activities that provide a positive contribution of community engagement, such as:

1 Public disclosure
To keep the community informed, it is recommended that the results of the ESIA must be available for the public at an accessible location.

2 Community relations officer
It would be useful to have a community relations officer for the area; someone familiar with the people living in the area, their living conditions, and their customs. In addition knowledge of the project outline and processes is essential for this officer. The community relations officer should be an intermediary between Staatsolie and the local community and should have good communication skills. In earlier projects it was not always clear to area locals and officials whom they could approach if questions arose. The officer should communicate any problem directly to the field coordinator and subsequently give feedback to the local community.

3 Grievance Mechanism/Complaints management
In 2005, Staatsolie established a formal grievance mechanism and procedure, in line with international best practice. This mechanism is recently improved and upgraded to a complaints management system. The mechanism provides a structured interface between Staatsolie management and aggrieved parties, and a process to understand and resolve problems. Staatsolie will ensure that the local communities are aware of this grievance mechanism and how to utilize it. Proper use of the complaints registry and investigation procedure ensures that all grievances are adequately addressed.

4 Involve District government and Resort authorities
District government and Resort authorities should be informed in support of the community relations officer. It is recommended that relevant district/resort officials, who could serve as a liaison between the area inhabitants and the national

government, are involved for relevant project activities, for instance large transports. It could be useful to take them on a tour to help them better understand the project.

2.4 IMPLEMENTATION OF ESMP

This section provides a description of the methods that will be used to monitor performance against ESMP commitments.

2.4.1 Monitoring

Respective Process Owners together with the HSEQ Upstream Division are responsible for monitoring the performance of on-site personnel against the commitments of the ESMP. Overall control for this function will lie with the HSEQU Manager, and responsibility for day-to-day monitoring will lie with the Process Owner representatives. The Process Owner is obliged to, and will have the power to suspend activities if they do not comply with the performance standards specified in the ESMP. The following principal items will be monitored:

- Correct implementation of ESMP;
- Compliance with Method Statements; and
- Physical parameters and indicators, e.g. water quality.

2.4.2 Data and information management

Quantitative data should be stored in the Staatsolie Environmental Statistics database, which will allow systematic storage and manipulation of data, and will permit rapid retrieval for the purposes of internal and external reporting. The representatives of the HSEQU Manager will administer this database. In order to ensure a consistent and coherent system for documenting the implementation of the ESMP, all written records and other information will be stored in a filing system that is compatible with the requirements of the existing HSE Management System. This will comprise standardized forms, documents and reporting procedures.

2.4.3 Reporting

The frequency and nature of reporting of environmental management performance will depend upon the nature of the activity and aspect that is being managed. Reporting will consist of:

- Reports to the Project Manager/Project Leader and Deputy Director E&PC, on critical issues, as required;

The table below gives an overview of the other obligatory reporting lines.

Table 2: Regular reports and report lines

Report Name	Description	Frequency	Responsibility of	Receiver
Water quality monitoring reports	Reports of water quality monitoring done for the project	1 week after monitoring has taken place.	Lifting, Gathering & Transport Manager	HSEQU Manager
Weekly report of safety talks	Reports of talks	Weekly	All Process Owners	HSEQU Manager
Weekly HSE Inspection	Compliance with ESIA and ESMP	Weekly	All Process Owners	HSEQU Manager
Incidents	Report type and consequences for loss of days	When accidents happens	All Process Owners	HSEQU Manager

Reports of drills held.	Drills as emergency response etc.	Monthly	Lifting, Gathering & Transport Manager Drilling Operations Manager	HSEQU Manager
Method statement	Method statements	Two weeks before commencement	All Process Owners	HSEQU Manager

2.4.4 Feedback

Feedback on performance will be communicated to the appropriate parties concerned. Any substandard performance will trigger a process that notifies the responsible party of the nature of the issue and indicates the actions that are required to rectify the situation. This will be followed up by further monitoring to ensure that the sub-standard performance has been corrected.

3 ENVIRONMENTAL SPECIFICATIONS

3.1 APPROACH TO THE ESMP AND ENVIRONMENTAL SPECIFICATIONS

The general principles contained within this section shall apply to all activities for the duration of the construction, drilling operation and decommissioning phases of the Uitkijk ADP Project. An environmental impact is defined as any change to the existing environment, either adverse or beneficial, that is directly or indirectly the result of the project and its associated activities. Impacts are generated by certain aspects of those activities. In the context of this document, an aspect is defined as *"an action, event, product or service, occurring as a component or result of an activity, which interacts with the existing environment"*. The fundamental approach adopted in the compilation of this ESMP is that management effort should be focused on environmental aspects to prevent impacts from occurring, i.e. a proactive approach. Proactive measures are then backed up with reactive measures, which serve to minimize the severity or significance of the impact, if it cannot be prevented at source. A series of tables incorporating management measures has been developed and grouped to cover the main activities that give rise to potential impacts during the three above mentioned project phases. Each table provides further detail on the following:

- Impacts arising from aspects;
- Prescribed mitigation measure(s);
- Environmental control objectives for each impact (or cluster of impacts);
- Compliance reporting requirements, including method and frequency of reporting.
- Monitoring and performance evaluation, including performance indicators and monitoring methods; and
- Identification of the person(s) responsible for implementation of the mitigation measure(s).

These tables are presented in the remainder of this section of the ESMP.

Table 3: Environmental Specifications table

Component	Impacts Assessment	Environmental management objective	Mitigation Measures	Responsibility	Monitoring & Performance Evaluation		Compliance reporting
					Performance indicators	Monitoring Methods	
Surface Water Resources	Changes in the hydrology of the Wayambo Swamp due to blockage of water	To minimize alteration of water flow and disturbance of swamp vegetation and animals Prevent excess water flowing into the relatively small catchment found to the west of the Calor Dam that could result in flooding of agricultural land along the Wayamboweg.	Avoid creating unnatural levees, dikes, channels and drainage routes. Excavated material from the canal should be placed on both sides of the canal with breaks every 100 meters in order to preserve, as much as possible, the existing drainage patterns. Debris, wood and soil material should not be placed into any water body. Limit the width of the cutting (opening /passage) to a minimum (for example: 15-20m depending on the distance required for passage of the rig). Keep the cutting open for as short as possible, and close it directly after passage/return of the rig. Conduct frequent monitoring on the temporary closing, and prevent any collapse. Restore the dam in its original state upon finalization of the project unless Mr. Calor requires another procedure and this does not cause any significant environmental impacts.	Drilling Operations Manager FPT	Breaks present. Change of water level upstream and downstream of dams. Method statements	Visual inspection of water level and excavated material after construction	Complete weekly ESMP checklist
	Water pollution with spilled and leaked oil and/or grease during construction	To prevent the pollution of surface water and negative impacts to vegetation and animals	Use leak proof containers and storage tanks	Lifting, Gathering & Transport Manager	Number of spills	Visual inspection	Complete weekly ESMP checklist
			Stationary fuel and oil storage facilities will have a secondary containment system, such as a berm, capable of holding the capacity of the largest container plus an appropriate volume to accommodate rainfall.	Manager Lifting, Gathering & Transport	Number of spills	Visual inspection	Complete weekly ESMP checklist
			Fuel and oil tanks and pipelines will be inspected routinely for leaks	Manager Lifting, Gathering & Transport	Number of leaks	Visual inspection	Complete weekly ESMP checklist
			Have the oil spill contingency plan in place for the area under consideration	Manager Lifting, Gathering & Transport	Plan in place and awareness among field staff	Field inspections	Complete weekly ESMP checklist
			Appropriate spill response equipment will be available with all oil and fuel transfer and storage facilities and equipment.	Manager Lifting, Gathering & Transport	Number of spills	Visual inspection	Complete weekly ESMP checklist
			Containment equipment e.g. booms, and other response equipment and materials will be carried on the drilling rig for deployment in case of a spill.	Manager Lifting, Gathering & Transport	Number of spills	Visual inspection	Complete weekly ESMP checklist
			Follow the Staatsolie procedures for maintenance and clean - up	Manager Lifting, Gathering & Transport	Awareness among field staff - no residues found after clean-up	Field inspections	Complete weekly ESMP checklist

Component	Impacts Assessment	Environmental management objective	Mitigation Measures	Responsibility	Monitoring & Performance Evaluation		Compliance reporting
					Performance indicators	Monitoring Methods	
	Increased turbidity in fish holes due to rig, carrier and airboat travelling	To limit the increase of turbidity to a minimum	Reduce the number of crossings of privately owned fish holes (in practice only the Calor and Van Dijk-2 Canals) and in this way limit the spread of turbidity.	Drilling Operations Manager	No visible turbidity outside the crossing location. Method statement	Visual inspection	Complete weekly ESMP checklist
			Do not travel in privately owned fish holes, unless permission has been given. (Impacts on fish holes are currently not foreseen, but the fishing activities for the additional 10 wells should be taken into consideration, as these well locations are not yet known.)	Drilling Operations Manager Manager Lifting, Gathering & Transport	Signed permission of owner	Inspection	Complete weekly ESMP checklist
Vegetation	Loss of vegetation (general)	To minimize biodiversity loss in the area	Limit the footprint of disturbance to the minimum through optimized planning	Drilling Operations Manager	Actual clearance not exceeding planned clearance	Visual inspection	Weekly progress report on construction of watertrails and drilling locations, Method Statement, Weekly ESMP checklist
	Loss of ridge wood and ridge forest, also as a habitat	To protect sand ridges ecosystems	Do not project large trails and infrastructure on top, or near ridges; keep a distance of 50m at least	Drilling Operations Manager	Number of disturbed sand ridges	Track actual clearance on maps with sand ridges indicated	Weekly progress report on construction of watertrails and drilling locations, Method Statement
	Damage to ecosystems (and to project personnel, infrastructure and equipment due to fire)	To prevent biodiversity loss due to fires (and to avoid damage to personnel, oil infrastructure and equipment)	Develop and implement a fire contingency plan	Manager Lifting, Gathering & Transport and Drilling Operations Manager	Plan in place and awareness among field staff	Field inspections	Complete weekly ESMP checklist
			Develop and implement strict fire control procedures and measures	Manager Lifting, Gathering & Transport	Awareness among field staff	Field inspections	
			Implement a fire risk awareness program for Staatsolie personnel and contractors working in the Uitkijk-North area	Manager Lifting, Gathering & Transport	Awareness among field staff	Training records	
			Only when working in the Long Dry Season: Discuss the risks of vegetation and peat fires to Staatsolie personnel, materials and equipment in stakeholders meetings and organize special meetings during extremely dry periods to point out the fire risk again	Manager Lifting, Gathering & Transport	Awareness among field staff	Training records	
		To prevent grass and brush fires in order to prevent injury to	Remove any combustible vegetation or vegetation debris within 10 meter from pipelines, tanks, wellheads and other required oil infrastructure.	Manager Lifting, Gathering & Transport	Number of incidents	Method statement; field inspections	Complete weekly ESMP checklist

Component	Impacts Assessment	Environmental management objective	Mitigation Measures	Responsibility	Monitoring & Performance Evaluation		Compliance reporting
					Performance indicators	Monitoring Methods	
		personnel, and damage to oil infrastructure and equipment)					
Fish and wildlife	Decrease in fish and wildlife abundance due to the Uitkijk-North project or project-induced activities'	Prevent loss of biodiversity resulting from increased ecological pressure	Access will be located and constructed in such a way that use by unauthorized persons can be controlled.	Manager Lifting, Gathering & Transport Drilling Operations Manager	Number of trespassers	Access control and security inspections	Incident reports
			Impose the Staatsolie Waterway Regulations also for the Wayambo Swamp	Manager Lifting, Gathering & Transport and Drilling Operations Manager	Number of incidents	Safety inspections	Incident reports
			When traveling in water, care will be exercised to reduce the risk to aquatic life. Speeds will be adjusted to allow sufficient reaction time to avoid collisions with wildlife.	Manager Lifting, Gathering & Transport and Drilling Operations Manager	Number of incidents Awareness	Inspection Training records	Incident reports
			Continue to impose a ban on wildlife harvesting at the Uitkijk ADP Project area for all Staatsolie personnel, contractors and authorized visitors.	PS&PS superintendent Drilling Operations Manager and Manager Lifting, Gathering & Transport	Number of violators	Security inspections	Incident reports
			Prohibit travelling outside the designated waterways, unless permission has been obtained for special reasons.	Manager Lifting, Gathering & Transport Drilling Operations Manager	Number of trespassers Awareness	Inspection	Method statement Complete weekly ESMP checklist
			The access routes will be made inaccessible when they are no longer needed for the program by creating pullbacks (barriers to travel) at all the potential entry points, unless there is an overriding reason to do otherwise. In addition: 1. Block all entrances to the premises by fencing off. 2. Put up clearly marked signs indicating “No Entry” or “Trespassing on Private Land”	Manager Lifting, Gathering & Transport	Number of trespassers	Visual inspection	Complete weekly ESMP checklist Close out visit
			Upon Closure: Destroy all access roads, dams, canals and trails. On domain property everything must be brought to the original as far as possible (state before activities were carried out). On property of third parties consultation with the party may take place, but any agreement should not cause other environmental concerns.	Manager Lifting, Gathering & Transport	Closure completion criteria	Visual inspection on compliance with set criteria	Closure report and sign off
			Undertake a continuous environmental awareness and education program for Contractors and Staatsolie Employees focusing on the importance of minimizing harm to the environment	Manager Lifting, Gathering & Transport	Awareness among field staff	Training records, number of safety talks	

Component	Impacts Assessment	Environmental management objective	Mitigation Measures	Responsibility	Monitoring & Performance Evaluation		Compliance reporting
					Performance indicators	Monitoring Methods	
Solid Waste and Sewage	Pollution of the environment Entrapment and poisoning of animals Spread of disease and illness	To minimize waste generation and recycle as much waste as possible. To dispose of waste in line with accepted international practice	Store solid waste in an approved area in covered drums for collection and disposal	Manager Lifting, Gathering & Transport Drilling operations Manager	Housekeeping incidents	Waste management procedure	Weekly waste reports/Weekly checklist
			Provide rubbish bins for litter at appropriate locations and arrange for regular collection				
			Depending on the waste type, this will be recycled, reused or disposed at a suitable facility.				
			All hazardous materials, including oil and contaminated soil, will be stored separately and disposed of according to Staatsolie requirements				
Social	Complaints of landowners/users or other parties	To avoid all conflicts and to maintain the good name of the company	Enter into a land use agreement (contract) with landowners.	Production Asset Manager/ CCU Head	# of complaints	Records	Signed landuse agreement at start of project (see an example of such an agreement in annex E)
			Complaints register	Corporate Legal Affairs (CLA)			Monthly complaints report
			Close-out inspection	CCU Head			Close-out-inspection report signed by owner
	Nuisance caused by noise/traffic to the people living near airboat landing stages or along the Wayamboweg and the Gangaram Pandayweg	To avoid all conflicts and to maintain the good name of the company	Locate the landing as far as feasible away from the road When using airboats: operate at a moderate speed (2500 RPM) during the first 500 meters in order to reduce noise levels, provided that conditions allow such. In addition: Efficient management of logistics to minimize traffic and shorten construction time. Inform nearby residents and businesses in a timely manner of anticipated airboat traffic schedules. Try to avoid or minimize airboat traffic at night. Limit construction activities conducted at nighttime hours. Include safety measures such as: 1. safety awareness campaigns for personnel, contractors and area users (residents and other frequent users of the area) 2. Improve road safety by increase in frequency of speed control activities to record and monitor vehicle speed.	Drilling Operations Manager Manager Lifting, Gathering & Transport	# of complaints	Records	Monthly complaints report

3.2 PHYSICAL MONITORING FRAMEWORK

The key focus of the monitoring program will be the impacts from the various project activities on the environment at representative sites and at any sites where problems have arisen or are suspected. This will provide information on the accuracy of the impact predictions that were made and on the effectiveness of the Environmental Management Plan. It will also provide important input information for any future development activities in similar areas.

The primary variables to be addressed in the monitoring program will be surface water quality, vegetation and noise and hydrology as added under the current study. Data will be acquired for every drilling site during the project's activities there. Subsequent sampling and analysis will be conducted to collect comparative data. The monitoring framework program is presented in table1. Based on this framework the Environmental Engineer should set up a documented sampling program.

Table 4: Monitoring framework programme for the Uitkijk ADP Project

Aspect	Parameters	Frequency	Monitoring locations
Water quality	EC (field meter) or chlorides[1], TSS[2] or turbidity[3], or Secchi Colour and clarity	Before, during and after drilling till reference / standard is met	1. At three fixed locations along the Calor Canal, north-mid- south 2. All wells: two locations in total near the drilling locations. One location east and one location west near the drilling locations.
	Check for oil spills and oil films (visual)	Daily during project	At all activity areas
Water levels (Hydrology)	Check the water levels in the swamp (visually) Place a local reference level	Daily During sampling	Upstream and downstream of dams, data can be acquired from the installed divers (DZS-08, DZS-09, DZS-10, DZS-11, DZS-12, DZS-13, DZS-15, DZS-16, DZS-17 under the project "Study Water management Buru and Wayambo Swamp, District Saramacca") in the Calor Canal and the Wayambo Swamp At each sampling site
Vegetation	Width and location of trails in forested parts – according to design	Directly upon completion of trails	All new trails
Waste	Check if landing sites and station yards are clean Check proper storage of waste Check proper disposal of waste Log on waste	Daily weekly weekly daily at collection of waste	All working locations
Noise	Noise levels along the road and near the closest residents	During noisy project activities, on the basis of complaints	Along the road near the closest residents and on the drilling locations.

[1] For the water of the Buru Swamp the following relation has been found: EC [µS] = 2.95 x Cl [mg/l]. The standards for chloride are 600 mg/l (average), 1200 mg/L (maximum). Expressed into EC this becomes 1765 and 3540 µS respectively. For the Typha swamp and the Parwa zone higher figures are allowed.
[2] Total Suspended Solids
[3] Using a turbidity meter (or Secchi disk) in the field is more practical, less time-consuming and less costly

Appendices

Appendix A: Method Statement

METHOD STATEMENT

SOM DEPARTMENT:…….……. **DATE:**……

PROPOSED ACTIVITY (give title of method statement and reference to Environmental specification):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

START AND END DATE OF WORKS FOR WHICH METHOD STATEMENT IS REQUIRED:

Start Date:	End Date:

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated maps and plans where possible):

In case on private land: include signature of owner/user to show that he/she is aware

Please attach extra pages if more space is required

Appendix B: ESMP Checklist

Weekly Checklist

To be submitted to the HSEQU Division

Location:

Mitigation measure	Yes/No	Comments
All personnel on site are aware of the contents of the ESMP and were made aware of environmental issues.		
All personnel on site are aware of the ERPs (spill response, medevac, fire contingency plan, the Calcutta Waterways regulations		
All personnel on site are aware of the drugs and alcohol policy		
MSDS's are available for all hazardous substances on site.		
Drip trays are being used where there is a risk of spillage (i.e. fuelling of equipment).		
Fuel is stored in a bunded area (with 110% of the stored fuel volume) and no leaks are visible.		
All containers and storage tanks are leak proof		
There are no spills and leakages		
There is no visible turbidity in the		

Mitigation measure	Yes/No	Comments
Calor and Van Dijk-2 Canals, outside the used sections (trail to drilling location)		
Project vehicles do not use privately owned canals or dams without permission		
The clearing width of new trails is as specified		
No damage is done to ridge vegetation		
No animal kills have been reported		
Waste is collected in appropriate bins/areas and removed to a suitable landfill regularly. No waste is lying around in or outside the drilling platform/wells/trails.		
Firefighting equipment is functional and accessible.		
Spill response equipment and materials is functional and accessible.		
There is no trespassing by project personnel		

Mitigation measure	Yes/No	Comments
There is no trespassing by unauthorized persons		
There are no complaints from the community		
Water levels upstream and downstream of dams are at the same height.		
Trails/waterways have been made inaccessible upon abandonment		
Excavated material from the canal is placed on both sides of the canal with breaks every 100 meters		
Openings are closed after passage of the rig		
Airboats are operating at a moderate speed (2500 RPM) during the first 500 meters		
Any other observations or comments.		

Department delegate

Completed by: ……

Date: …….

Sign: ……..

Environmental Engineer

Received and checked by: ……

Date: …….

Sign: ……..

Appendix C: Water quality monitoring form

Area	
Date	
Monitored by	
Weather conditions	

Sample name	Eco-system	Coordinates (UTM/WGS84)		Sampling time	Water level (cm)	pH	EC µS/cm	chlorides (mg/L)	TESMP gr C	Color	Clarity	Turbidity NTU	Oil & Grease (mg/L)
		Easting	Northing										
	Standard				N/A	N/A	<1,765	<600	N/A				<10

T = Typha (Langagrasi)
FO = Freshwater Open Swamp
SW = Swampwood

Environmental Engineer/ HSE technician

Received and checked by: ……

Date: …….

Sign: ……..

Appendix D: Weekly progress report on construction of water trails and drilling locations

Date	Construction: Water trail or Drilling location	Location of construction (x, y coordinates)	Length and width of construction (m)

Appendix E: Weekly Waste Report

Contractor's name :
Project :
Location :
Period :
Reported by :

Waste type	Quantity	Unit: m3 or kg	Disposal destination
Waste paper			
Packaging material			
PET/ HDPE			
Food waste			
Ink cartridges			
Waste metal			
Waste concrete			
Waste oil			
Oil contaminated sorbents			
Oil contaminated pails			
Oil contaminated barrels			
Waste oil filters			
Mud waste water			
General/ miscellaneous waste			

Appendix F: Overeenkomst inzake mijnbouwwerkzaamheden.

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. 1980 nr. 128) 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 utvoering 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

_____ _____

R. Elias
Managing Director

Appendix G: Close out inspection list

CLOSE UP INSPECTION LIST BASED UPON ESMP/LANDUSE AGREEMENT # .....

Date:
Project:
Location:
Inspectors:

Measure	Yes/ No	Remarks
1. Have all project-related blockages of canals and related structures (temporary closures, culverts etc .) been removed?		
2. Have all dams of landowners been rehabilitated to their pre-project state?		
3. Have all project access roads, canals, and other infrastructure been removed?		
4. Have all trails that were cleared for the project been blocked adequately to prevent use by third parties?		
5. Is there any surface water pollution (specify)? *		
6. Is there any soil disturbance or soil pollution (specify)?		
7. Is there any waste present at the area (specify)?		
8. Have all civil constructions been removed from the area?		
9. Are there any other non-compliance issues (specify)?		

*To verify this water samples should be taken to analyze the following parameters:

- Conductivity, Turbidity, Oil and Grease

Voor akkoord

HSE Staatsolie CCU Staatsolie IDM Landowner

Appendix H: List of applicable GFIs

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 ESMPloyees 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.
119C	**Personal Protective Equipment and Dress Code.** English/Dutch	This GFI identifies the most common types of personal protective equipment for the various locations on the Saramacca Field.
120C	**General traffic rules.** English/Dutch	This GFI defines the general traffic rules to guide the performance of company ESMPloyees, contractor's ESMPloyees 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.

GFI no	Subject	Scope
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.
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 ESMPloyee'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 ESMPloyees & 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 ESMPloyee 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.

GFI no	Subject	Scope
	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.
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.

Appendix I: Project Waste Management Plan

Table of Contents

1.0 Introduction

In order to manage the waste generated during the project this Waste Management Plan has been prepared. All employees, including Staatsolie and contractors, shall manage waste generation through implementation of the waste hierarchy, where avoidance and minimization of waste are the mostly preferred.

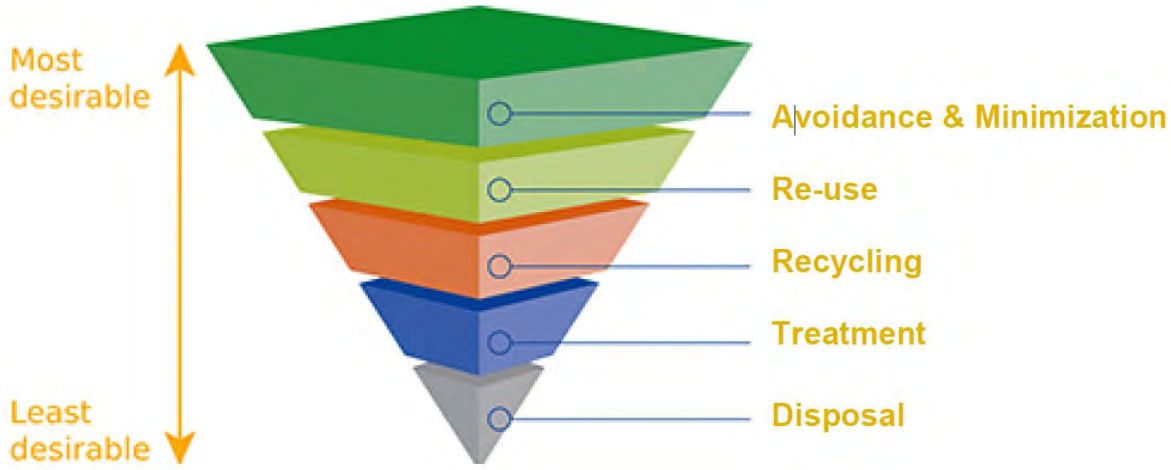


Figure I-1: Waste Management Hierarchy

2.0 Scope

This waste management plan applies to the activities carried out for the appraisal drilling activities in the Uitkijk North Area.

3.0 Terms and Definitions

Waste Generator	The department/employee carrying out the activity, which results in the material becoming surplus and being designated for discarding.
Hazardous waste	Any wastes, which because of its quantity, physical, chemical or infectious characteristics have the potential to cause harm to human health or the environment.
Waste Avoidance and minimization	Waste avoidance and minimization are at the top of the waste hierarchy. Avoidance is mostly preferred in the list of waste hierarchy where zero waste is generated. Slight modifications in activities can improve efficiencies in utilizing to reduce waste generation e.g. reducing paper waste by printing double sided.
Reuse	The action or practice of using something again, whether for its original purpose

	(conventional reuse) or to fulfill a different function (creative reuse or repurposing).
Recycling	Involves processing used waste materials into new products.
Treatment	Waste treatment refers to the activities required to ensure that waste has the least practicable impact on the environment.
Disposal	Wastes that cannot be reused, recycled or treated will be segregated and stored in designated waste storage areas for incineration, disposal in a landfill or for collection by a waste transporter.
Landfill	Site for the disposal of waste materials by burial.

4.0 Responsibilities

Functionary	**Responsibility**
Employees/Departments Staatsolie (Waste Generator)	• Ensure that practices are conducted to avoid unnecessary waste generation by prevention, minimization and reuse of waste. • Separate reusable, recyclable and other waste by placing them in therefore labeled waste bins. • Remove all waste from the Uitkijk North Area.
Manager Lifting, Gathering & Transport Drilling operations Manager	• Implementation of mitigation measures as provided in chapter 3 of the ESMP.
HSEQ Upstream Manager	• Advice on the management of waste that are not covered by this plan. • Manage and analyze waste data and provide advice on improvements of waste management within the company. • Monitor and report on the implementation of this plan.

5.0 Waste management

Waste segregation

To effectively implement the waste management hierarchy, segregation of waste streams at the source is essential. Therefore the appropriate and clearly labeled waste bins have to be provided at strategic locations.

Waste collection, transport, storage and handling

The waste will be stored temporary on the rig and transported with an airboat to the landing at TA53. From the landing the separated waste will be collected and transported to the waste handling facilities of Staatsolie, including the Sarah Maria dumpsite and the landfarm.

Waste Management (disposal/treatment)

Waste category	Waste Type	Waste Management
Office	PET bottles	Recycling (AMRECO)
	Paper	Open burning; Staatsolie is in the process to separate paper waste for recycling by AMRECO
	Copy/print cartridges	Export (BAP)
Industrial	Packaging material	Open burning; Staatsolie is in the process to construct a landfill, including an incinerator
	Metal scrap	Recycling (COBO)
	Drilling waste (cuttings, water based mud)	Reuse as much as possible, discharge in the swamp or at the Landfarm when oil polluted
	Batteries	Export (BAP)
	Waste oil (lubricating oil, hydraulic oil)	Oil is currently stored in portafeeds at the Landfarm of Staatsolie. Staatsolie is in the process to check if the waste can be send to EQ Recycling. On the other hand Staatsolie plans to construct a treatment system (centrifuge + decanter) to treat the oil at the landfarm.
	Rags/gloves contaminated with oil	Open burning; Staatsolie is in the process to construct a landfill, including an incinerator

Special waste:

- Sewage waste from the portable toilets is collected and dumped in a septic tank on dry land. This waste is handled by a contractor of Staatsolie (Uitzendbureau Sarah Maria).

Appendix J: Handling of spills and leakage

1.0 Introduction and scope

Oil spill is a risk associated with production and transportation of crude oil. Oil spills can occur due to human errors, equipment failures and bypassing maintenance procedures.

This plan is applicable for the ADP Uitkijk Project and is based on the existing procedures and plans of Staatsolie with regards to oil spill preparedness and response.

2.0 Prevention of oil spills

Prevention of oil spills has a lot to do with operational procedures. Following the maintenance procedures and operations protocols ensures a safe operation. The latter aids in the goal to prevent occurrence of oil spills within the implementation process of the company's HSEQ policy and core values.

3.0 Minimize impact on the environment

In order to minimize the impact on the environment, in case of an oil spill, the following measures will be implemented:

- Bund walls for the test tank facility and loading station.
- Bin to collect the oil from the hoses that will be used for loading.
- Daily monitoring by operators.
- Markings and signs will be placed to indicate the locations of the pipelines. Guards will be placed for the protection of the manifolds.
- Maintenance activities as required.
- The ADP Uitkijk Area will be provided with booms that can be used for demarcation of oil spills.

4.0 Response

In case of an oil spill in the Uitkijk project area the response will be done as follows:

- Notification
    - Notify relevant parties (in accordance with the "Melding procedure" – Figure J-1).

- Containment activities
    - Assess where the spill will drift to by the wind and guide spill with booms to an accessible site for recovery with skimmer.
    - Place sorbents for later removal.

- Reclaiming and clean-up activities
    - Skim the oil and contaminated soil/vegetation in a bin on a barge.
    - Transport the oil and contaminated material to the landing.
    - Transport oil and contaminated soil to the Landfarm facility of Staatsolie, for treatment.
- Monitoring

- Monitor the oil spill location (e.g. water quality).

MELDINGSPROCEDURE

Staatsolie Oil Spill Response Team

t.b.v.

Upstream

1. Indien U melding krijgt van een oil spill, handel dan als volgt:
Vraag de melder naar:
- Locatie en omvang van de olievlek
- Naam, adres en telefoonnummer van de melder in geval van een buitenstaander
- Naam en afdeling in geval van een Staatsolie employee
- Overige bijzonderheden zoals: eventuele schade of persoonlijke ongelukken, de richting waar de olie naartoe gaat en of de spill toeneemt

2. Indien het een spill betreft op Saramacca, bel of meld de Head Guard van Saramacca en geef de informatie door:
Head Guard:
- Internelijn: 444#
- Buitenlijn: 375222 tst 444#

3. De Head Guard meldt vervolgens de desbetreffende afdeling en vraagt voor verificatie van de informatie:
- Gedurende werktijd, via het kantoor van de desbetreffende afdeling
- Na werktijd en in het weekend, de desbetreffende afdelings standby operator (zie lopende roosters)

OPERATIONELE AFDELINGEN

Locatie	Telefoon Kantoor
CS	68847, 63217, 63217
JS	67870, 67871, 67874, 67877
SM & LP	65840, 65846
CT TA-58	65870, 65873, 65876
FP TA-58/45	65840, 65844, 65843
Calcutta/ Huwz	68840, 68844, 68856, 68857
TNW	68848, 68849, 68872, 68873

4. Na verificatie wordt in geval van:

- Een kleine spill, deze door de operationele afdeling direct aangepakt
  Actie: Afdelingsleiding of Shift Foreman

- Een grote spill in openbaar water of op de openbare weg, door een Strike Team lid , of de afdelingsleiding aan de Guard gevraagd om het SORT lid conform het wachtdienstrooster te melden. Bij geen response van dit lid, moet steeds het volgend SORT-lid op het wachtdienstrooster worden gebeld.
  Actie: SORT leden

SORT-LEDEN

Functionaris	Telefoon Kantoor	Thuis
P. Brunings	66502	08515353
H. Chin A Lien	66480	08583122
R. Parran	68844	08923766
S. Gopal	65843	0374072 / 08683973
A. Schuitemaker	66850	431974 / 08660070
S. Cheuk A Lam	65873	400275 / 08749000
D. Riedewald	65840	08814953
C. Monsels	65220	08727224
S. Oedit	66553	08854311
A. Entingh	68847	328998 / 08591345
S. Mangalsing	66714	08710554

5. Indien het een spill betreft op TLF of bij de pipeline TLF-Paranam wordt de Guard van TLF door de Head Guard van Saramacca hiervan op de hoogte gebracht.
Head Guard TLF: - Telefoon: 480501 tst 62235
- Telefoon: 486294 tst 62235

Figure J-1