**Van:** [redacted]@shell.com
**Aan:** SodM [redacted]
[redacted]; [redacted]
**Onderwerp:** Combined Operation Summary voor werkzaamheden op Put ROW-2 - Locatie Rossum Weerselo-2 (Nederlandse Aardolie Maatschappij )
**Datum:** vrijdag 20 november 2020 15:06:59
**Bijlagen:** EP202011204193 - SodM Brief - CO Summary Rossum Weerselo-2.pdf
EP202010201628 COS ROW-2 with the Synergy 2 rig - Rev 1.0.pdf

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Goedendag,
Hierbij ontvangt u van ons Combined Operation Summary (in de vorm van een veiligheids- en gezondheidsdocument en begeleidende brief) voor de geplande werkzaamheden op de ROW-2 water injectie put welke is gelegen op de NAM locatie Rossum Weerselo-2.
Indien u vragen heeft kunt u contact opnemen met;
Naam: [redacted]
[redacted]
[redacted]
Telefoon: [redacted]
Wij hopen u hiermee voldoende geïnformeerd te hebben.
Namens [redacted]
met vriendelijke groet,
[redacted]
[redacted]

NAM Nederlandse Aardolie Maatschappij B.V.

SodM
[redacted]
Postbus 24037
2490 AA, Den Haag

**Brief ref.**: EP202011204193

**Assen**, 19 november 2020

**Betreft**: Indienen Combined Operation Summary voor de put interventie op put ROW-2

Geachte [redacted]

Bijgaand treft u aan de Combined Operations Summary (COS) voor het uitvoeren van een put interventie op de water injectie put ROW-2, gelegen op locatie Rossum Weerselo-2, met de DrillTec Synergy 2 rig.

Volgens de huidige planning zullen de put interventie werkzaamheden op put ROW-2 begin januari 2021 aanvangen. De werkzaamheden gaan ca 3 weken duren.

Het bijgaande V&G document is in overleg met alle betrokken partijen (NAM en aannemer) tot stand gekomen en beschrijft de relevante risico's, de wijze waarop deze worden beheerst en de organisatie tussen de betrokken partijen. Naar onze mening kunnen de activiteiten op een veilige en milieuverantwoorde wijze worden uitgevoerd.

We hopen dat u hiermee voldoende geïnformeerd bent.

Hoogachtend,
Nederlandse Aardolie Maatschappij

[redacted]

[redacted]

Bijlage: Combined Operations Summary: Rossum Weerselo-2 and Synergy 2 - EP202010201628, Rev 1

# Combined Operation Summary

# Rossum-Weerselo 2 with the Synergy 2 rig "Workover at ROW-2"

**HEALTH, SAFETY AND ENVIRONMENT DOCUMENT – NAM UIO-T**

**DRILLING, WORKOVER & OPERATIONS - ONSHORE**

**Doc No. EP202010201628**

TABLE OF CONTENTS

# 1 Introduction

This Combined Operation Summary for the workover at the ROW-2 well located at Rossum-Weerselo 2 has been prepared by the Nederlandse Aardolie Maatschappij B.V. (hereafter NAM) and DrillTec to assure themselves and external regulatory authorities that the workover operations are consistent with the requirement for safe and responsible management.

The owners of this document are accountable for the preparation, operation and maintenance of the workover of the ROW-2 well with the Synergy 2 Combined Operation Summary (hereafter COS), and for ensuring it is reviewed when there are any major changes to the design, purpose or organization of either installation.

The owners of this COS are:

Nederlandse Aardolie Maatschappij B.V.
Schepersmaat 2
P.O. Box 28000
9400 HH Assen

DrillTec Netherlands B.V.
Rembrandtlaan 225
7545 ZW Enschede
The Netherlands

## 1.1 Authorization

| Function / role | Name, Department | Signature, date |
|---|---|---|
| **Prepared by Operation Supervisor** Acknowledges that all relevant HSE information is included in this document concerning workover operations. | [redacted] | Approved by email 16/11/2020  RE_ Reminder - Request for approva |
| Checked by **Production Lead East NL** Acknowledges that all relevant information about the site-specific aspects are reviewed and assessed. | [redacted] | [redacted] |
| Checked by **PU Manager East** Acknowledges that all relevant HSE information is included in this document concerning combined operations. | [redacted] | [redacted] |
| Checked by **HSE Manager** Acknowledges that document is in accordance with internal and external regulations and in accordance with the Dutch mining law. | [redacted] | Approved by email 13/11/2020  RE_ Reminder - Request for approva |
| Checked by **Wells Operations Team Lead Synergy 2** Acknowledges that all relevant well design and location specific information is included in this document and certifies that all activities will be executed in accordance with the workover program. Acknowledges all relevant information about the well design are reviewed and assessed. | [redacted] | [redacted] |
| Checked by **Rig Manager Drilling Contractor** Acknowledges that all operations will be executed according to the measures laid down in this document and accepts responsibility to indicate any changes or unexpected hazards, which may have an impact to the risks described in this document. | [redacted] | Approved by email 16/11/2020  AW_ Reminder - Request for approva |

| Function / role | Name, Department | Signature, date |
|---|---|---|
| Checked by **NAM Drilling Supervisors / HCO**<br>Certifies that all activities will be executed according to the measures laid down in this document and is responsible for indicating any changes, which might have an impact on the risks described. | [redacted] | Approved by email 18/11/2020<br>  <br>RE_ Final COS ROW-2.msg |
| Checked by **Technical Safety Engineer (TA-2)**<br>Acknowledges that all relevant Major Accident Hazard information is included in this document concerning workover operations. | [redacted] | [redacted] |
| Checked by **General Manager Wells Operations NL**<br>Acknowledges that all relevant information about the well design are reviewed and assessed. Also responsible to approve any changes to this document | [redacted] | Approved by email 16/11/2020<br>  <br>RE_ Reminder - Request for approva |
| Approved by [redacted] | [redacted] | See cover letter, ref. EP202011204193 |

## 1.2 Regulation compliance

Table 1 is a check to ensure that the requirements defined within annex 1 (section 7 – information to be submitted in a notification of combined operations) of the Directive 2013/30/EU, 12 June 2013 have been complied with. This lists the legislative requirements, along with where this issue is addressed within this COS.

The table is ordered in a way that reflects the structure of this COS.

Table 1 Directive 2013/30/EU annex 1 section 7 check list

| No | Particulars to be included in a Notification of Well Operations – Annex 1 section 7. | COS reference |
|---|---|---|
| 1 | the name and address of the operator submitting the notification | 1. Introduction |
| 2 | in the event that other operators or owners are involved in the combined operations their names and addresses, including a confirmation that they agree with the contents of the notification | |
| 3 | a description, in the form of a bridging document authorized by all parties to the document, of how the management systems for the installations involved in the combined operation will be coordinated so as to reduce the risk of a major accident to an acceptable level | 3. HSE documentation<br>7. Management structure and responsibilities |
| 4 | a description of any equipment to be used in connection with the combined operation but which is not described in the current report on major hazards for any of the installations involved in the combined operations | 4.3 Location preparation for workover<br>4.4 Rig layout drawing |
| 5 | a summary of the risk assessment carried out by all operators and owners involved in the combined operations, which shall include: | |
| | (a) a description of any operation during the combined operation which may involve hazards with the potential to cause a major accident on or in connection with an installation | Attachment 3 |
| | (b) a description of any risk control measures introduced as a result of the risk assessment | Attachment 3 |
| 6 | a description of the Combined Operations and a program of work. Including the dates on which the Combined Operations is expected to commence and finish. | 2. Management summary<br>5. Operational program |

## 1.3 Distribution

This document has embedded document links and is stored in Word format to access the links (and also PDF) on sharepoint in the Collaborative Well file area at the following address:

[Onshore Collaborative Wellfiles - Rossum-Weerselo 2]

The document is controlled by the HCO.

## 1.4 Revision list

| Revision | Revision Date | Status / Reason | Revised by |
|---|---|---|---|
| 1.0 | 19 November 2020 | Final approved version | |
| 0.3 | 4 November 2020 | Out for Review | |
| 0.2 | 16 October 2020 | HAZID included – Preparing for final draft | |
| 0.1 | 13 October 2020 | Draft – for HAZID | |

# 2 Management Summary

## 2.1 Justification for operating under combined operations

NAM has the intention to perform a workover at the injection well ROW-2 using the DrillTec Synergy 2 rig, from the existing Rossum-Weerselo 2 onshore location. The workover contractor is DrillTec under the supervision of NAM.

The Combined Operation activities exists of;

1. Rigging up the Synergy 2 rig on ROW-2 well
2. Perform Workover activities on ROW-2
3. Rigging down Synergy 2 and departure of Rossum-Weerselo 2 location
4. During this planned Workover scope NAM has the intention to inject production water from Schoonebeek in the ROW-7 well

Execution of in itself controlled main activities (e.g. production, injection, construction, workover etc.) simultaneously while in each other's sphere of influence is defined as combined operations.

It is NAM's policy to avoid combined operations unless there is a good justification to consider it. In case combined operations are considered, the associated risks should be identified and properly mitigated. The initiation note for the ROW-2 well has given the direction to take "combined operations" as starting-point for the CO-script and the workover activities based on:

- Manageable interaction risks (ALARP); first pass assessment to be confirmed in CO-script.
- Solid financial justification for combined operations.

The Combined Operation Initiation Note for ROW-2 well is attached as appendix 2.

The outcome of the CO HAZID is that the workover activities can be executed concurrently with injecting production water in the ROW-7 well. During the CO HAZID some deviation from the CO initiation note have been identified and these are shown in section 6.

## 2.2 NAM's HSE policy

NAM's HSE policy is to protect the health and wellbeing of people and to protect the environment with an efficient use of products and energy to provide our products and services. The Hazard and Effect Management Process (HEMP) supports the above policy. HEMP has 4 distinct phases, i.e. identification, assessment, control and recover.

This HSE document gives evidence of the fact that NAM has considered the site-specific hazards in relation to the workover of ROW-2 well and that the known safety systems and managerial arrangements are in place during this project.

## 2.3 Legal context

This document meets the requirements of Working Conditions Regulation (Arbeidsomstandigheden Regeling), paragraph 3.2, article 3.7, which states that a safety and health document must be written for all activities related to drilling, workover and combined operations. This document describes and assesses the site-specific risks and combined operations risks.

## 2.4 Validity

This document is valid for the period covering the workover related operations of ROW-2 well which are planned to commence in the beginning of January 2021. It is estimated that the workover operations will last approximately 3 weeks.

## 2.5 Conclusion

Based upon the combined operation initiation notes a combined operations review has been performed. The involved parties have agreed that the risks are ALARP if the agreements as stated in paragraph 7.2, are met.

# 3 HSE documentation

NAM has a number of HSE documents, which are applicable to this operation. In accordance with Working Conditions Regulation (Arbeidsomstandigheden Regeling) paragraph 3.2, articles 3.7 and 3.10, these documents are integrated with the existing HSE documents from main /sub-contractors. The relationship between the various documents is shown below. References of those documents can be found in chapter 9.

The CO-script is designed as a working document for daily consultation. This document provides the assistance required to manage the location.

Rapport inzake Grote Gevaren Asset Onshore NL Generic + Rapport inzake Grote Gevaren Asset Land Productie Unit Schoonebeek

Rapport inzake Grote Gevaren Synergy 2

COS (NAM)

VG Document NAM Logistics

VG Document NAM Wells – C&WI

Other HSE documents:

- Bridging document
  - There is a bridging / interface document in place that describes the relationship between the HSE Management System (HSE MS) of both NAM and DrillTec (Ref.5).
- Emergency response
  - The Onshore Contingency Plan (OnCP) is available for NAM activities onshore, which contains communication and organization schemes to activate the calamity organization (Ref.6).
  - The location specific fire-hazard related risks and scenarios are described in the LNP (Lokatie Noodplan - Location Emergency Plan) of the area Asset Onshore NL (Ref.9).
  - The rig specific Lokatie Nood Plan (rig specific LNP, Ref. 10) of the DrillTec Synergy 2 applies. The document is available for use on the rig, which replaces the LNP during the workover operation. The document is valid from the moment of handover of the location for the area where the rig is located. The LNP will remain active for the production facilities.

# 4 Location

## 4.1 Location layout

The Location "Rossum-Weerselo-2", hereinafter called ROW-2, is a Production Water Injection Site for the oil production field Schoonebeek. The Rossum-Weerselo 2 location is located on tramweg 7, 7596NA in Rossum, in the municipality of Dinkelland.

Injection of the Production Water takes place in the Rossum-Weerselo reservoir. This reservoir is part of the Twente gas fields and is an empty produced gas field. There are two production water injection wells (ROW-2 and ROW-7) at the site. The production water injection wells are former gas production wells that have been made suitable for injecting injection water.

The nearest house is at ca 40m South of the ROW-7 well and 15m South of the location. There is one access road to the Rossum-Weerselo 2 location.

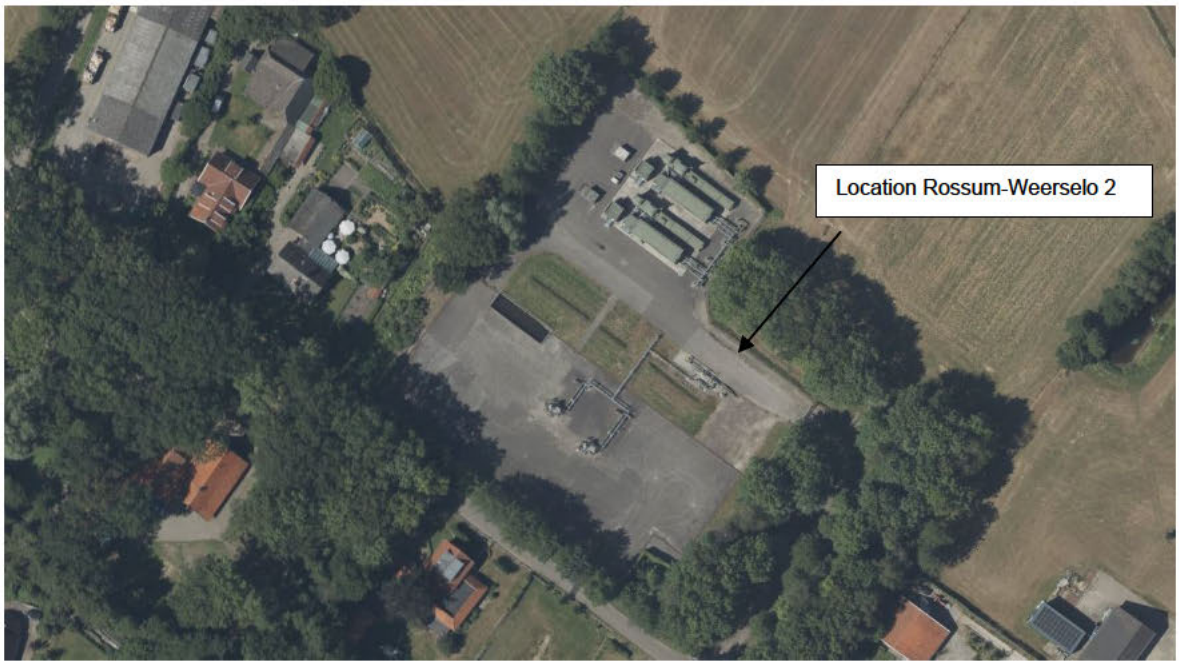



**Figure 4-1: Location Rossum-Weerselo 2: aerial view**

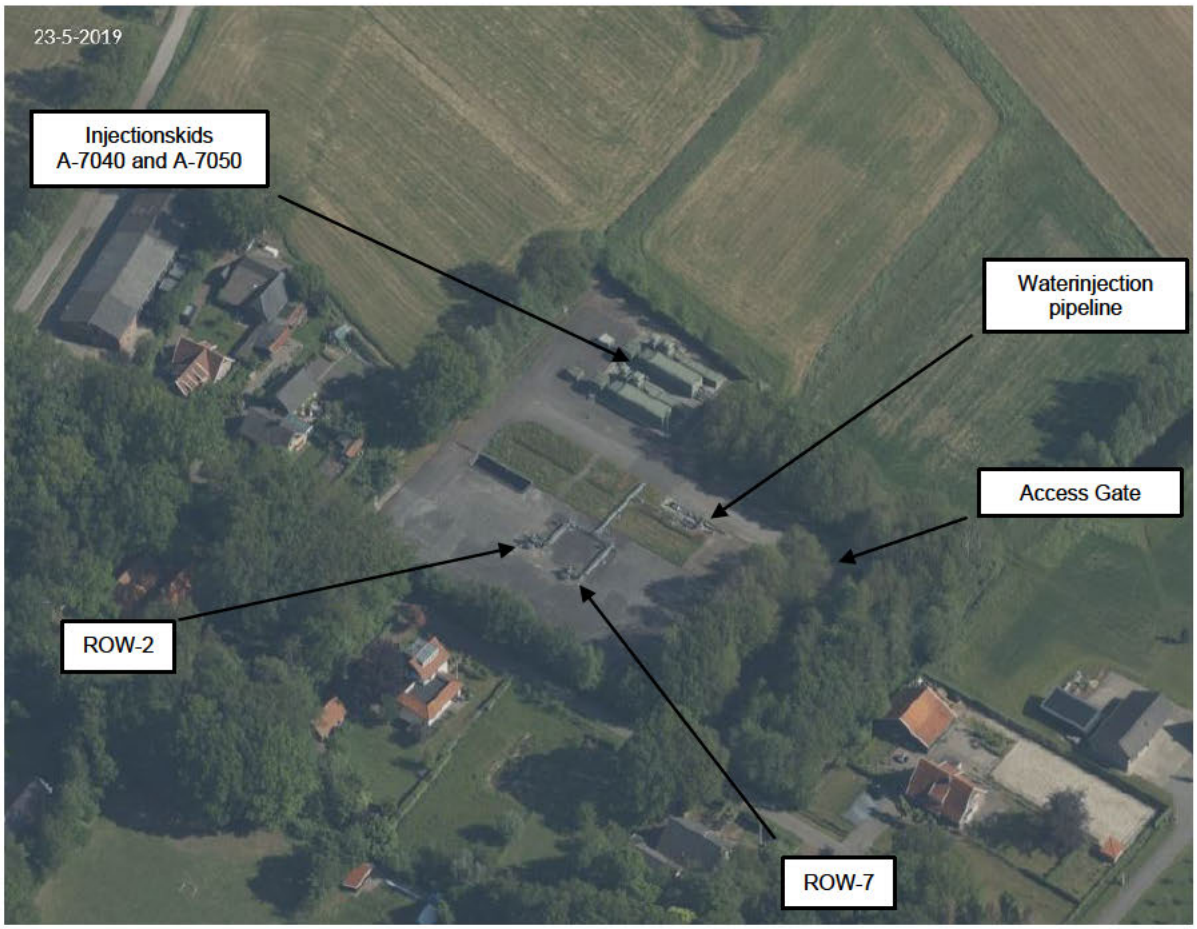



**Figure 4-2: Location Rossum-Weerselo 2: aerial view**

There is one access gate to the location: Gate#1 and is considered the main access gate.

The Rossum-Weerselo 2 location is not a LSA/NORM suspected location and a known $H_2S$ location.

## 4.2 Equipment under pressure on location

There is an incoming Production Water Injection pipeline which is connected to the injection pump skids. The maximum pressure in the water injection pipeline (downstream injection skids) is between 5 – 25 barg. The maximum pressure in the piping upstream the injection skids is 104 barg.

The operational pressure in the water injection pipeline (downstream injection skids) is about 6 to 7 barg. The operational pressure in the piping upstream the injection skids is 4 barg.

## 4.3 Location preparation for the workover

The rig layout is such that it will be possible to drive around the rig. For this purpose, the incoming water pipeline will be protected to allow trucks to drive over it. An enlarged area on the North side of the rig area will be created with a water-turning surface which is slightly angled towards the gutters. Additionally, to allow positioning of the rig, the current water pit will be filled in and stabilized to allow fluid tanks to sit over it. A new temporary water pit will be positioned next to the current water pit to allow collecting of the fluids from the site.

All fluids at the location will be collected via gutters to the newly placed corner pit. There will be a railing around the corner pit. As this is a dedicated corner pit it has no outlet to the environment. All excess fluids will be trucked away as per normal procedure. To create storage capacity, (e.g. in time

of heavy rainfall) additional fluid storage tanks will be placed near the corner pit. After the workover the storage tanks remain on site with a high level alarm until the fluid quality from the site is checked and proved as clean enough to flow to the outer ditch. During this period the signal will, in time, activate NAM Logistics, who will plan a truck (from a fluid truck company) to empty the storage tanks.

There are multiple houses located within the 50 dBA noise foot print of the rig. The nearest house is at about 40 m range from the well ROW-2 in Southern direction.

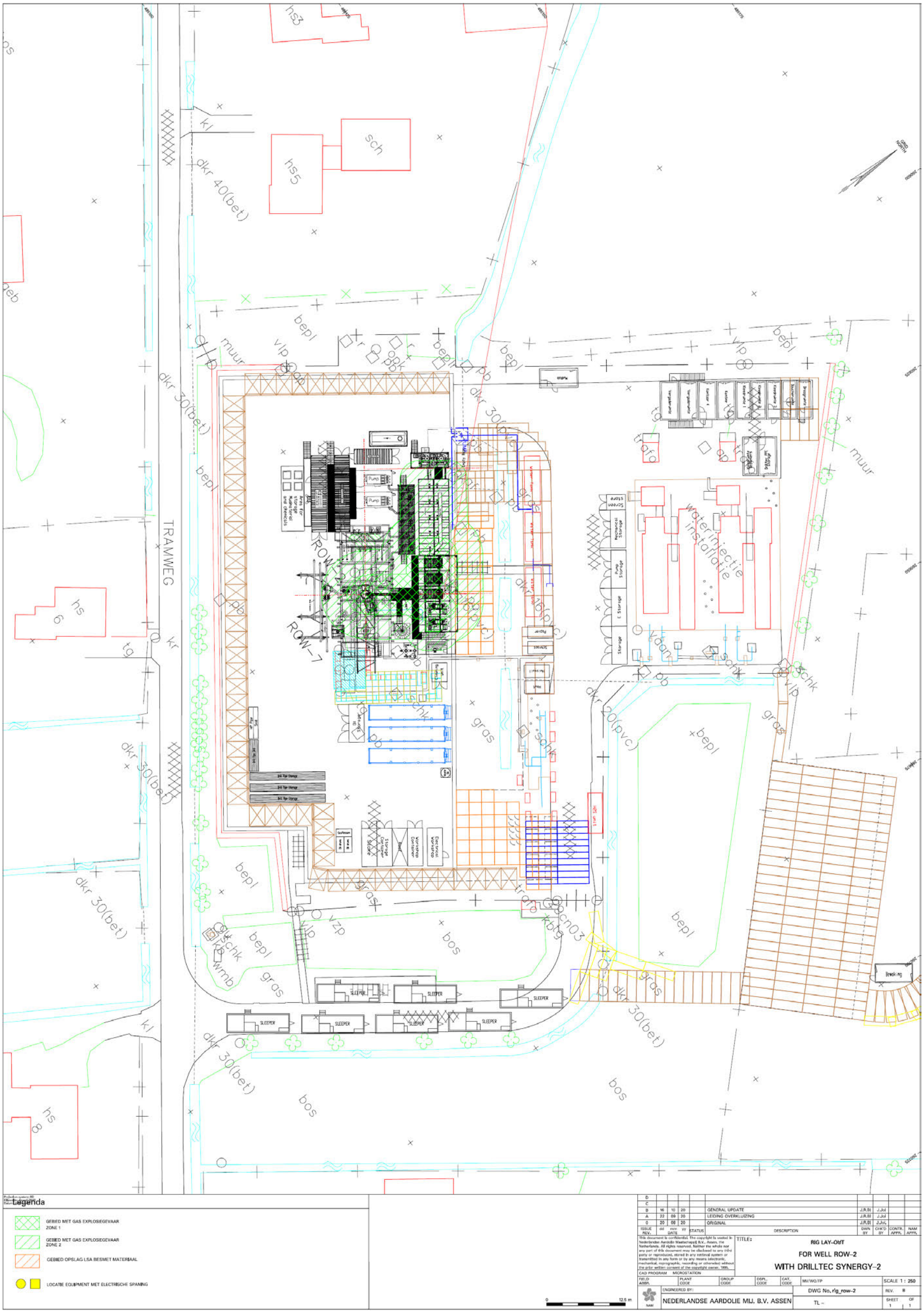
Security is located just outside the entrance on the parking lot of the location, just before turning onto the location through the main gate.

Main muster point is located near the security. Alternative muster will be outside the fence on the North corner of the location.

There will be a parking area established in the field next to the location, after having passed security.

## 4.4 Rig layout drawing for Rossum-Weerselo 2

The integrated drawing, including combined hazardous area drawing for Rossum-Weerselo 2 location with the Synergy 2 rig layout is indicated below. The final version of this drawing will be made available on Sharepoint: [Onshore Collaborative Wellfiles - Rossum-Weerselo 2]



# 5 Operational program

## 5.1 Summary of operational Workover program

### 5.1.1 Operational Workover documents

Specific details are listed in the following documents:

| Project Phase | Document |
|---|---|
| Planning | Well Functional Specifications (WFS) document for ROW-2<br>[Sharepoint Environment]<br><br>Detailed Design Endorsement for ROW-2<br>[Sharepoint Environment] |
| Execution | SODM Work Program ROW-2<br>[Sharepoint Environment]<br><br>Detailed Workover program for ROW-2<br>[Sharepoint Environment] |

### 5.1.2 Execution of operational workover program

The written Detailed Workover Program (DWP - Ref. 8) for ROW-2 shall be executed in accordance with the SodM package. No work shall be carried out, which in any way conflicts with either company's policies or procedures, unless prior agreement has been obtained. The SodM package is according to Mijnbouwregeling Article 8.2.1.1 and will be submitted to SodM six weeks prior to start of operations (as per Mijnbouwregeling Article 8.2.1.2 sub 1).

### 5.1.3 Significant changes to operational program

Any changes to endorsed design and/or detailed workover program shall be discussed with relevant stakeholders and required TA2 approvals (or TA1) shall be sought from disciplines involved in the change. The Wells management of change program is applicable. Prior to implementing, the changes shall be discussed with the personnel concerned. Any significant changes will be reported to SodM as per Mijnbouwregeling article 8.2.1.2, sub 2 & 3.

### 5.1.4 Main workover program

The DrillTec workover rig Synergy 2 will be mobilized and rigged up on the Rossum-Weerselo 2 location. The rig will carry out the following operations:

1. Rigging up the Synergy 2 rig on ROW-2 well
2. Nipple Down Temporary Adaptor Cap (SodM single barrier dispensation pending approval)
3. Nipple Up and Pressure Test BOPs
4. Retrieve pre-cut 5x4" completion tubing
5. Run In Hole overshot assembly, engage with 4" tubing stump / anchor latch, unlatch same from 7" anchor / production packer with right hand rotation. Retrieve 4" tubing stump and anchor latch and lay down same.

   Note: Contingency runs available if 4" tubing stump / anchor latch is unable to be unlatched with right hand rotation.
   - Run In Hole wash over shoe assembly and mill out anchor latch (including 7" production packer)
   - Run In Hole packer picker milling tool to retrieve packer (if not done during 1st contingency)
   - Run In Hole phissing spear and retrieve packer (if not done during 2nd contingency)
6. Check access though existing 7" production packer and 3-1/2" tail pipe and confirm Hold Up Depth.

   Note: This step is omitted if the packer has been milled and retrieved during previous step.
7. Scrape entire 7" production casing in preparation for 7" corrosion log

8. Perform corrosion log on 7" production casing with multi-finger caliper tool (Multi Finger Caliper Tool)

   Note: If corrosion log exceeds threshold, then the decision can be made to temporarily suspend the well ROW-2.
9. Pick up and run in hole Retrievable Test Packer. Set same at circa 1135m along hole top bottom flange (below proposed production packer setting depth). Fill up well with 1.0 – 1.03sg water-based fluid and Pressure Test well to 20/85bar for 5/20min. Retrieve Retrievable Test Packer from well.

   Note: If pressure test fails, then a leak investigation is conducted to acquire information regarding source / location of leak. Pending result, the decision can be made to temporarily suspend the well ROW-2. Please find suspension details / WSD in appendices.
10. Pick up DLT packer and set same at ~50mAHTBF. Fill up well with 1.0 – 1.03sg water-based fluid and Pressure Test DLT to 20/85bar for 5/20min. Nipple down BOP, nipple down LDO tubing head spool and install new bowl weevil type tubing head spool. Retrieve Retrievable Test Packer (Refer to appendices for new Tubing Head Spool arrangement drawings)
11. Run In hole new 5 x 3-1/2" completion tubing and 7" production packer. Install same.
12. Pressure test hanger seals to 20/85bar for 5/15min.
13. Install shear disk plug (390bar shear) in tailpipe nipple. Top up tubing and A-annulus above packer with 1.0 – 1.03sg water-based fluid
14. Pressure tubing to 20/85bar for 5/20min and set 7" production packer.
15. Pressure test A-annulus / production packer to 20/85bar for 5/20min.
16. Set hanger plug and test same to 20/85bar for 5/15min.
17. Nipple Down BOP
18. Nipple Up existing refurbished XMT / like for like XMT or Temporary Adaptor Cap (pending availability) and test same to 20/85bar for 5/15min.
19. Rig up slick line and retrieve hanger plug and plug from tail pipe nipple. Install MCV valve in landing nipple at ~100m Along Hole. Rig down slick line.
20. Rigging down Synergy 2 and departure of Rossum-Weerselo 2 location

A decision tree for the workover at ROW-2 is shown in Figure 3.

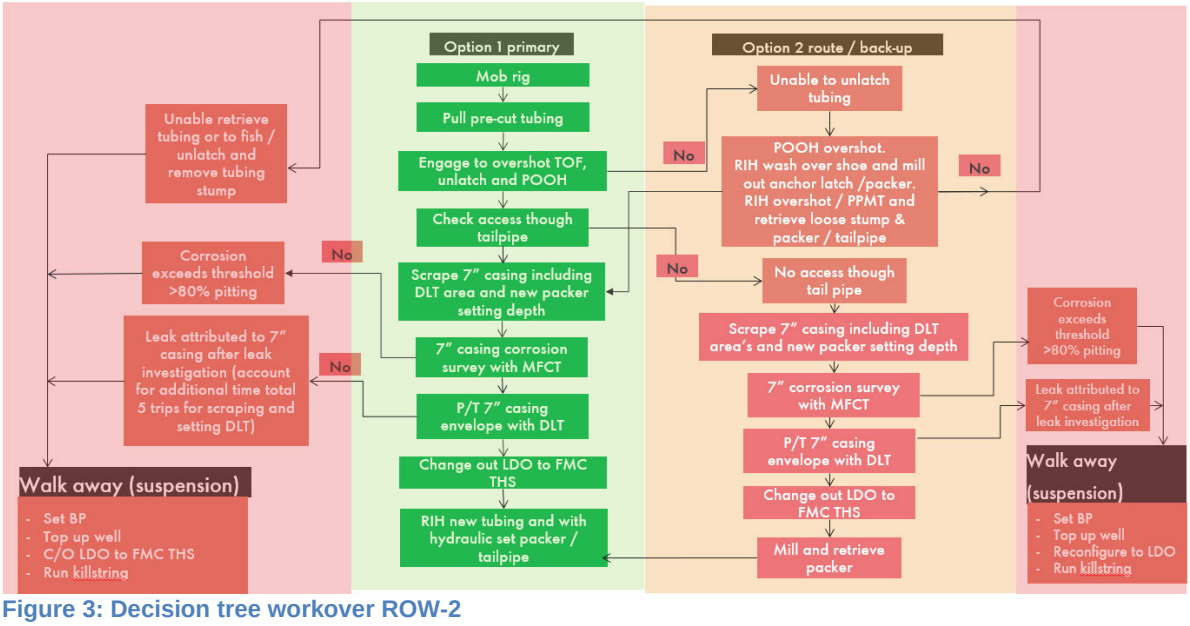



**Figure 3: Decision tree workover ROW-2**

## 5.2 Summary of workover operations

No other workover or well intervention operations are planned on Rossum-Weerselo 2 location during the workover of ROW-2. Any planned well intervention operations, such as slickline, that are part of the workover of ROW-2 are included under 5.1.4 and can be found in more detail in the SODM work program [Ref. 8].

## 5.3 Summary of production operations

Production Water from the Schoonebeek Treatment Plant is transported via the Rossum-Weerselo 3 location to the Rossum-Weerselo 2 location. During the workover and well intervention activities on ROW-2 it is allowed to inject Production Water in the ROW-7 well.

Operations can perform routine maintenance or other operation related activities on location but will not plan and perform well intervention activities on ROW-7 well during the ROW-2 workover activities.

# 6 Combined operations review

The execution of the activities as combined operations is based upon the combined operations review. The report of the combined operations review can be found in attachment 3.

The combined operations review has been reviewed by representatives of all the involved parties (well engineering, workover contractor, operations and HSE teams). The involved parties agree that with the measurements and mitigations as laid down in the combined operations review report, the risks of workover operations concurrently is considered ALARP. Agreements are laid down in chapter 7.2.

Due to electrification of the Synergy 2 unit it is not possible to operate the production water injection skid and the Synergy 2 at the same time. Therefor it has been decided that injection of production water into ROW-7 can only occur when the Synergy 2 is not using its full energy consumption.

The CO initiation note states that ROW-7 shall be protected from dropped objects with an Ameland kap. During the CO HAZID the participants identified that there could be insufficient space to position an Ameland kap on the ROW-7 well. Therefor an alternative method of protecting ROW-7 from dropped objects can be introduced to protect the ROW-7 well from dropped objects.

The Production Unit Manager has decided to continue the activities as combined operations.

# 7 Management structure and responsibilities

## 7.1 General responsibilities & management structure

In alignment with the Dutch ARBO law, the following employers can be identified. NAM owns the site and for that reason have to appoint a NAM employee as Locatie Verantwoordelijk Persoon (LVP). The combined operations take place under single-headed leadership by the Head Combined operations (HCO). The HCO role is in all cases combined with the LVP-role. In Attachment 7 the responsibilities of the HCO and LVP are specified.

The Drilling Supervisor (DSV) will perform the HCO role since this discipline creates the highest interaction risk. During combined operations, the HCO is responsible for identifying interaction risks and ensuring proper follow up on the agreed measures, VGWM/HSEW coordination of activities involving interaction risks and managing the emergency response organization.

NAM DSV has overall responsibility for all well construction related activities & safety on the workover site and ensures adherence of all parties to the requirements of this HSE document; also he should supervise all activities or delegate this duty to a competent person. The deputy for the DSV-role will be the DrillTec tool pusher (TP).

The workover contractor owns the workover installation, performs the workover activity and provides a supervisor for that activity. The DrillTec TP is the workover contractor supervisor. The TP has responsibility for the technical integrity of all equipment used for workover activities, including (sub-) contractors of the DrillTec where they interact with the workover unit, and for the safety and welfare of personnel directly involved in the operations. The TP with his team is handled as one employer on site (Workover employer).

The Head of Area Operations [UPO/T/LPW] has operational responsibility for the oil and gas production on the Rossum-Weerselo 2 location. Operations are allowed but not limited to manipulate the wells within their operating windows.

The general management structure and organization during workover is shown in the organization chart below. The Senior Well Engineer and the Lifecycle Well Engineer in Assen will manage the workover project.

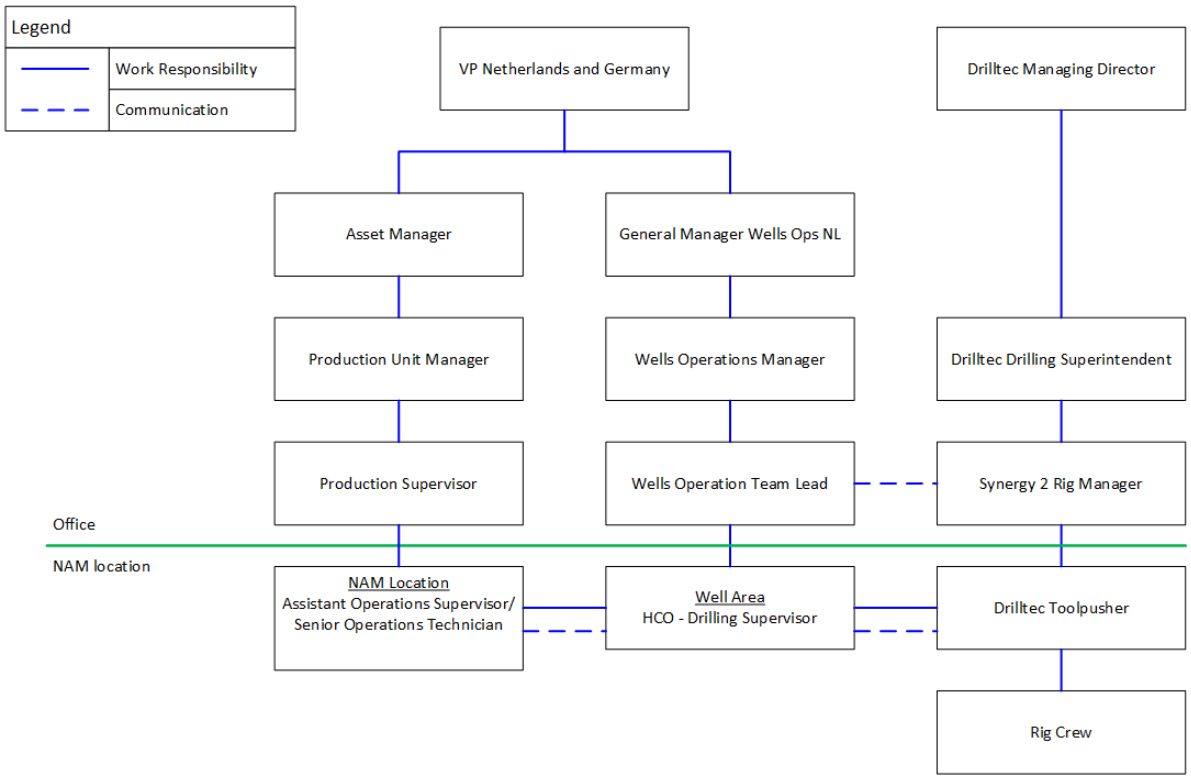



**Figure 7-1: Organogram: during normal work execution in case of workover rig**

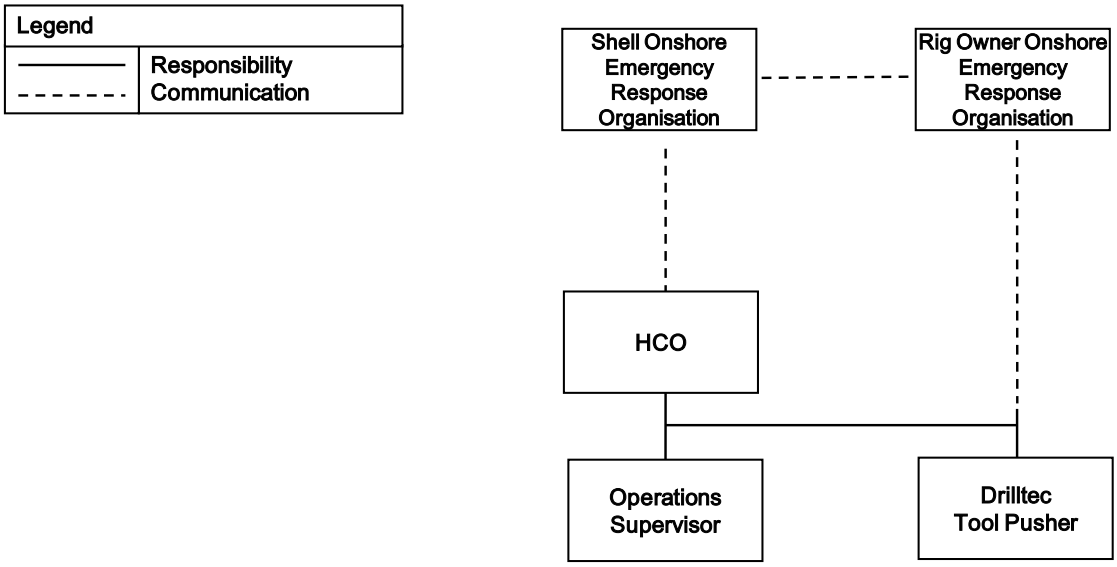
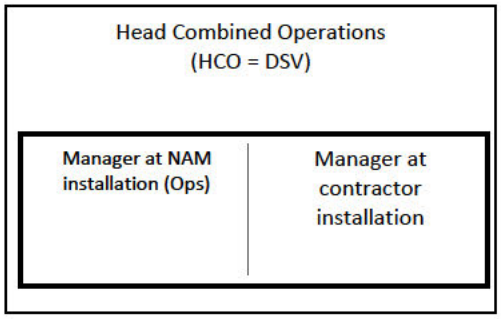



**Figure 7-2: Organogram: during emergencies**

## 7.2 Workover Operations agreements

**Agreements related to responsibilities**

- The NAM DSV will act as Head of Combined Operation (HCO)
- HCO is responsible for managing interaction risks between individual workplaces and giving approval for the sequence and method of execution of these activities on at least daily basis, and upon any change in the situation.
- HCO is also responsible for emergency organization on site in the event of emergency.
- Operation activities will be executed under single-headed supervision of the Production Supervisor
- Workover activities will be executed under single-headed supervision of NAM DSV.
- Operations shall ensure that portable gas detection will be installed in the operational process area (near the wells)
- Plant maintenance activities will be executed under single-headed supervision of the dedicated maintenance Supervisor.




**Agreements related to work areas and hand over of the workover work area**

- For operators and contractors related to operation it is not allowed to walk through the workover area.
- Prior to the supply of the first materials the DSV or his delegate makes sure that the preparation of the location is done according agreed plan.
- The location will be handed over to the HCO when he arrives on location and after he has received an induction to the site from Operations [UPO/T/LPW].
- Combined operations starts after handover to the HCO.
- The location will be handed back to Operations [UPO/T/LPW], after the workover of the ROW-2 well is completed and the rig has departed and when the ROW-2 well is accepted by Operations [UPO/T/LPW]

**Well and location status**

- Asset Onshore NL operations team to confirm the integrity of all wells on the Rossum-Weerselo 2 location and specifically of the Safety Valves and annuli based on the most recent test conducted not later than 3 months prior to rig move.
- During rigging up and down of the Synergy rig ROW-7 will be shut in on the SSSV and UMGV.
- ROW-7 will be protected against dropped objects during the full duration of the Combined Operations. With an Ameland kap or an alternative means of protection.
- Within the workover area only basic routine maintenance checks by operations are allowed when accepted by the HCO.

**Normal operations: work permits & work execution**

- For activities concerning workover the DrillTec permit system will be used, for permits concerning the production location NAM's PtW system will be used.
- Production Unit East is the work permit issuer ('verstrekker') for the operations related activities.

- The DrillTec TP is the work permit issuer ('verstrekker') within the workover related activities. NAM HCO authorises work permits for non-routine and / or critical activities.
- All activities will be discussed with HCO prior to start. Each work permit involving interaction risks shall be co-signed by HCO. With the co-signing of a permit the HCO approves for the sequence and method of execution of the activities with interaction risks on at least a daily basis, and upon any change in the situation.
- HCO initiates daily combined operations communication meeting when / if required as applicable to the planned combines operations, at least attended by the HCO and Operations Supervisor / Senior Operations Technician, to discuss the HSE interactions risks and actions needed. The agreed measures are recorded by the HCO (in a 'CO-logboek'). HCO's decision on HSE interactions risks is final.
- Matrix of Permitted Operations is leading in the decision-making process (Attachment 5).
- Unplanned or corrective work will be discussed with HCO prior to start.
- Necessary operational activities will be done, as far as possible, during daytime.
- The barriers as identified during the combined operations review should be available and functional.

**Normal operations: personnel access control, mustering**

- All personnel (both workover and operations) accessing the Rossum-Weerselo 2 location will report to the workover rig security, which will keep an up to date list of all personnel on site.
- The security will ensure that all personnel accessing the Rossum-Weerselo 2 location will have the correct $H_2S$ training and PSE.
- There is a combined main muster point for all staff and one dedicated alternative as stated in the Rig Specific LNP. (This Rig Specific LNP overrules the Onshore NL LNP during CO in case of a conflict).
- Security & logistics will be located at the private access road as per rig location layout drawings (paragraph 4.4).

**In case of incidents**

- In case an incident or unsafe act/condition the HCO is informed. Reporting and follow up takes place according to "NAM-17.WI.04.01 Incident notifications (internal and external)" (ref. 11) and "UIE-17.PR.04 Incident Reporting and Follow-up" (ref. 12). The requirement concerning internal notification to line management implicates that at least the Asset Manager have to be informed since he is final accountable for the activities within Asset Onshore NL. In relevant cases also the General Manager Wells Operations have to be informed.
- Wells is incident owner for incidents related that occur within workover related activities. Operations is incident owner for incidents which occur in the productional related activities.

**In case of emergency**

- The HCO (DSV) will contact CMK using a internal alarm number 0592 369999.
- The HCO (DSV) will contact duty Emergency Incident Manager (EIM) via CMK.
- The HCO (DSV) will contact HCDC for operational status change and to contact duty LRT of Asset Onshore NL.
- HCDC/CMK will inform shift operations Area East.
- In case emergency services are needed the HCO (DSV) will call 112 **AND** NAM Assen CMK using the internal alarm number **0592 369999.**
- The HCO (DSV) will wear yellow helmet with black band and will perform role as LRT leader awaiting arrival of Asset LVP.
- With emergency services / asset LVP decision will be made who will wear the yellow helmet during the emergency.
- Location response team leader will be supported by the Asset Onshore NL LRT.
- The HCO (DSV) will inform his Wells Operations Team Lead or duty WOTL.
- EIM will mobilize whole or part of ECT based on the situation.
- In case an Emergency Shut Down (ESD) is initiated:

    - The injection skids will shut down and the injection wells will close on the actuated safety valves (SSSV and the UMGV)
- A local Emergency Shut Down (ESD) can be initiated:
    - By the ESD button near the injection skids;
    - By HCDC.
- In case of a potential blow out of ROW-2 the location Rossum-Weerselo 2 shall be closed-in via the ESD button and HCDC shall be informed.

For emergency response the following documents apply:

- The Onshore Contingency Plan (OnCP) (Ref. 6) is available for NAM activities onshore, which contains communication an organization schemes to activate the calamity organization of Technical partners.
- The location specific fire-hazard related risks and scenarios are described in the LNP (Lokatie Noodplan – Location Emergency Plan of the area (Ref. 9).
- The rig specific Lokatie Noodplan (Rig LNP) of the Synergy 2 (Ref. 10) applies and is available for use on the rig. This Rig specific LNP overrules the LNP during CO in case of a conflict.

# 8 Communications

## 8.1 Emergency telephone list

| Item | Details |
|---|---|
| Location name | Rossum-Weerselo 2 |
| Site Location – Address | Tramweg 7, 7596 NA Rossum |
| Entrance Location – Coordinates | E 006 56 12.950<br>N 52 20 36.230 |
| On site emergency response coordinator | NAM Drilling Supervisor (NAM DSV) |
| On site emergency response telephone no. (Synergy 2 DSV/LVP) | 0592 36 49 01 / 06 536 74 665 |
| On site tel. no. | +31 (0)541 625 293 |
| On site fax no. | - |
| HCDC | +31 (0)592 364 720 |
| Emergency no. | 112 |
| CMK, Assen | +31 (0)592 36 99 99 |
| Operation Supervisor – Dennis de Vries | +31 (0)592 36 47 17 |

## 8.2 Rig telephone list

[redacted]

## 8.3 Well engineer NAM Assen telephone list

[redacted]

## 8.4 Asset Onshore NL telephone list

# 9 References

When not available in BMS or Sharepoint, a hardcopy will be made available on location.
General information about the Rossum-Weerselo 2 location can be accessed via the ODT portal:
[Onshore Collaborative Wellfiles - Rossum-Weerselo 2]

1 Rapport inzake Grote Gevaren Asset OnshoreNL
   a) Rapport inzake Grote Gevaren NAM Asset OnshoreNL – Generiek deel (Nam doc.: EP202001264216)
   [RiGG Asset OnshoreNL Generiek]

   b) Rapport inzake Grote Gevaren Asset Land Productie Unit Schoonebeek (doc nr. EP201705201425)
   [RiGG – Productie Unit Schoonebeek]

2 VG Document (Safety and Health document) NAM Wells – C&WI (Nam doc.EP200711201062)
[VG Document Wells C&WI]

3 VG document (Safety and Health document) NAM Logistics (Nam doc. EP201310207662)
[VG Document NAM Logistics]

4 DrillTec Synergy 2 Safety Case (RiGG):
[Located at Rig site]

5 Health, Safety and Environment Management System Interface Document between DRILLTEC & Nederlandse Aardolie Maatschappij B.V.
[NAM - Drilltec Management Bridging Document]

6 Onshore contingency plan (OnCP),(EPE doc. Nr. EP200608213329), located at:
[Onshore contingency plan]

7 Detailed Design Document for ROW-2:
[Detailed design document]

8 Detailed Workover Plan for ROW-2:
[Detailed Workover Plan]

9 LNP for 'Gemeente' Dinkelland:
[Lokatie Noodplan Gemeente Dinkelland]

[Veiligheidsplattegrond Rossum-Weerselo 2]

10 LNP for DrillTec Synergy 2:
[Located at Rig site]

11 NAM-17.WI.04.01 Incident notifications (internal and external)
[NAM-17.WI.04.01 Incident notifications]

12 UIE-17.PR.04 Incident Reporting and Follow-up
[UIE-17.PR.04 Incident Reporting and Follow-up]

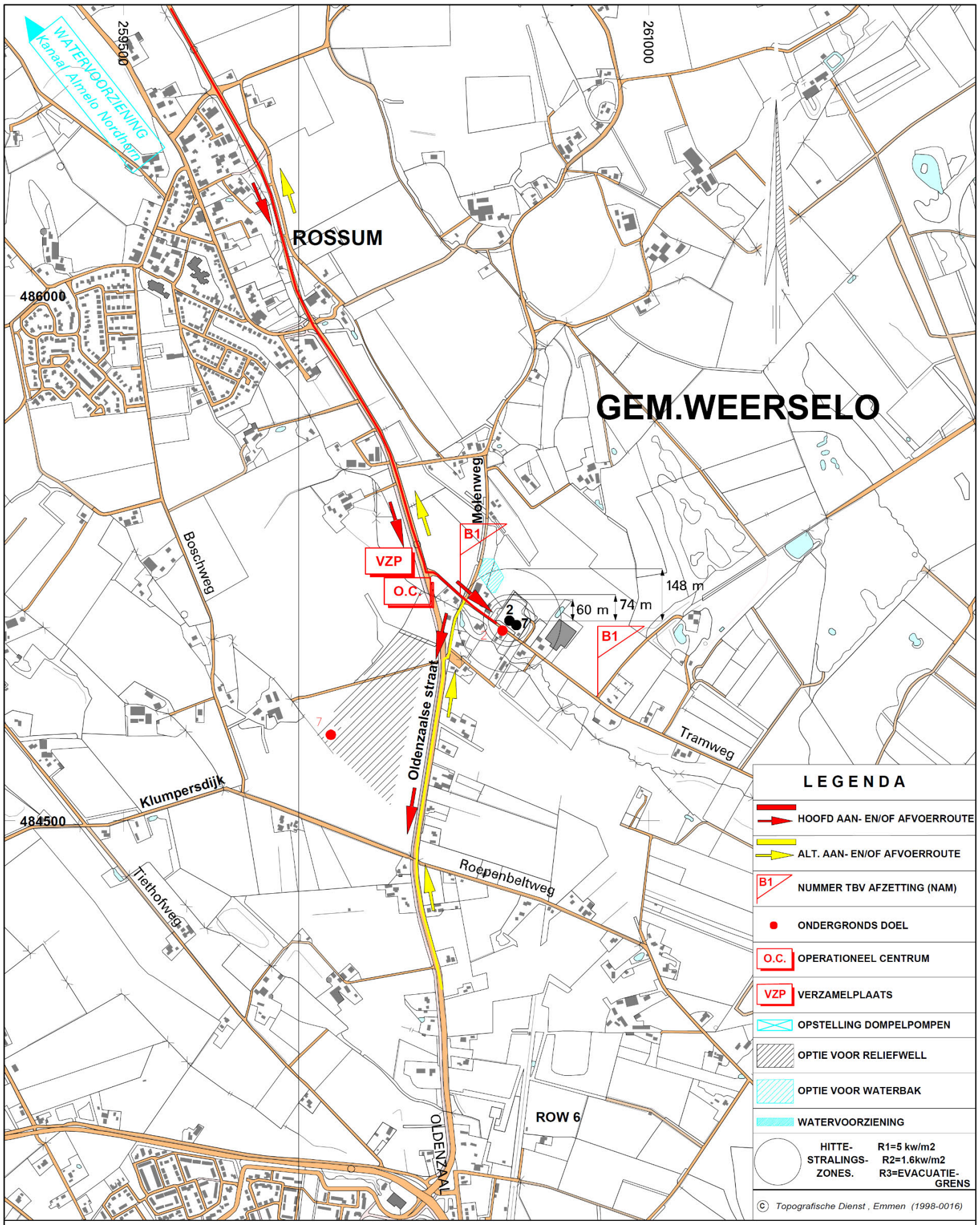
13 Risk Assessment Matrix, figure 1 in "Managing Risk", part of the HSSE & SP Management System Manual, version 6, February 2016.
[Risk Assessment Matrix]

14 H2S management plan NAM – DrillTec Synergy 2 for SCH 3151 and ROW-2
[H2S Management Plan]

# 10 Attachments

**Attachment 1 Response map**

Aanrijroutekaart (trafficplan) Rossum-Weerselo 2 tbv ROW-2 workover




BLUSWATERVOORZIENING

**Toevoerslangen over een afstand van 4900 meter via diverse wegen naar opstelplaats dompelpomp bij kanaal Almelo-Nordhorn.**
**Zie voor gedetailleerde situatie op Overzichtskaart Watervoorziening (tek.nr.60390) KAART 3**
**Waterschap, wegbeheerder en omwonenden inlichten.**

ADVIES VOOR AFZETTEN/AFSLUITEN TOEGANGSWEG(EN)

**B1 - Kruising Molenweg/Tramweg**
**B1 - Tramweg volgen in zuidoostelijke richting tot buiten de gevarenzone.**

BIJZONDERHEDEN

**De locatie ligt in een bebouwd gebied met aan de noordzijde een perceel grasland en aan de andere zijden woningen, binnen een straal van 50 meter.**

NAM

Projection system: RD
Ellipsoide: Bessel (1841)
Datum: Amersfoort

**NEDERLANDSE AARDOLIE MIJ. B.V.**

AANRIJROUTEKAART
LOCATIE
**ROSSUM-WEERSELO-2**
Schaal 1 : 15000

| | | | |
|---|---|---|---|
| Datum : | 27-04-2001 | Tekening nr. : | 0110825002 |
| Laatste wijziging : 20-07-2006 | | Bijlage : | |

## Attachment 2 Original Combined Operations Initiation Note

NAM Nederlandse Aardolie Maatschappij B.V.

**Onderwerp:** Concurrent Operations Initiation Note ROW02 locatie
**EP nr:** EP202007200532
**Datum:** 06 juli 2020
**Plaats:** Assen

Deze notitie heeft tot doel de justificatie te geven voor het in "concurrent operations" injecteren van de put ROW-7 tijdens de workover werkzaamheden in water injectie put ROW-2.

Introductie

Naast ROW-2 bevindt zich op de ROW02 locatie een tweede water injectie put, te weten ROW-7. ROW-7 zal naar verwachting begin augustus 2020 weer beschikbaar zijn voor injectie, na vervanging van de water aanvoerleiding van deze put. Dat levert een geschatte extra olieproductie op van zo'n 50 m3/d. Dit is ook het voordeel van het op injectie houden van ROW-7 tijdens de workover van ROW-2.

Daarbij komt dat in één van de twee andere water injectie putten van de Schoonebeek asset, nl. ROW-4, er nog steeds een reëel risico is dat the thrust chamber van de injectiepomp uitvalt. Als dat gebeurt tijdens de workover in ROW-2 terwijl ROW-7 niet beschikbaar is, zou dat een grote impact hebben op de olieproductie van Schoonebeek, in de orde van 3-400 m3/d olie.

Het voorstel is daarom om tijdens de workover werkzaamheden in ROW-2, ROW-7 op injectie te houden.

Uitgangspunten

- Begin van de rig werkzaamheden: laatste week October 2020 (ref. Short-term Drilling Sequence juni-2020)
- Geplande tijdsduur: 20 dagen
- Bestaande injecterende put: ROW-7 (naar verwachting terug op injectie mid-augustus 2020)

Rig op/afbouw en operaties

Onderstaande figuur en foto geven een overzicht van de ROW02 locatie.

De putrand van ROW-2 is niet meer dan zo'n 10 m verwijderd van ROW-7. De water aanvoerleidingen van beide putten lopen deels ondergronds vanuit de pomphuizen aan de noordkant van de locatie naar de putten. Het wordt aangenomen dat de leidingen geen belemmering vormen tijdens rig opbouw en operaties, dit dient tijdens een locatie inspectie bevestigd te worden. Bij een eerste bezoek aan locatie van de Well Engineer samen met Operaties werd al vastgesteld dat er een rig opbouw mogelijk is waarbij de ROW-7 toevoerleiding aan de put kan blijven.

Rond de putten is voldoende ruimte voor de rig (binnen de blauw-omrande ruimte rond de putten in de figuur beneden). Er is een Amelandkap nodig over ROW-7 tijdens de rig op/afbouw en operaties. Tevens kan put ROW-7 tijdens op/afbouw ingesloten en/of afgeplugd worden.

De toevoerweg van de locatie is de lichtblauw gemarkeerde lijn in de figuur. In het ideale geval wordt een éénrichtings route gehanteerd worden voor aan-en afvoer tijdens rig op/afbouw en operaties. De mogelijkheden daarvoor zullen ook tijdens een locatie inspectie geïdentificeerd worden.

Het bestaande evacuatieplan van ROW02 zal tijdens een locatie inspectie bekeken worden in het licht van de aanwezigheid van de rig, en waar nodig aangepast en/of uitgebreid worden.

Alternatieven ter voorkoming van concurrent operations

- Ander tijdstip van uitvoering: niet mogelijk gezien andere aktiviteiten van de rig en noodzaak voor uitvoering van de workover in 2020, om de vergroting van de water injectie capaciteit door het in bedrijf komen van het water pomp station in De Hulte, voorzien voor eind 2020, ten volle te benutten.

- Water injectie in andere injectieputten opschroeven ter compensatie: naast ROW-7 heeft de Schoonebeek asset momenteel maar twee andere water injectie putten in bedrijf. De capaciteit van de twee putten (ROW-4 en ROW-5) wordt al helemaal benut.

Conclusie

Gezien de te verwachten impact en het niet beschikbaar hebben van alternatieven om de impact te reduceren is het wenselijk de ROW-2 workover onder concurrent operations uit te voeren. Tijdens het opstellen van het C.O.-script zal worden beoordeeld welke maatregelen nodig zijn om deze C.O. veilig uit te voeren. Er zal indien noodzakelijk een meeting worden belegd met betrokkenen.

Betrokken personen zijn:

[redacted]

CO_Initiation_Note _ROW-2_GW_Appro

RE ROW-2 CO Initiation note_Appr

## Attachment 3 Combined operations Review

1 Work scope

During intended workover operations, the scope of work is as described in chapter 5.

2 Risk analysis

The goal of the risk analysis is the identification of the hazards which could have interaction risks and determination of barriers and agreements. All team members have agreed that when these barriers and agreements are met that the risks of performing workover of ROW-2 are ALARP.

2.1 Required inputs

Available information during the risk analysis:

| Information | Input from |
|---|---|
| Details of selected rig | Rig manager |
| Safety/HSE Case for the location | Operations |
| Safety/HSE Case for the rig | Rig manager |
| Emergency Response Plans for the location | Operations |
| Fixed Installation Drawings – locations and outlines | Operations |
| Hazardous Area Drawings | Operations |
| Escape and Life saving Appliance Drawings | Operations |
| Work plan including pre-works plus activity details | Activity owners |
| Rig and Equipment Layout Drawing for activity | Well Engineering Operations |
| Heavy lifts and dropped objects that could have consequences for the installation | Rig manager |
| Learning points from previous workover projects | All |

2.2 Required attendants

[redacted]

The table in paragraph 2.6 has been compiled during the online risk analysis held on 16 October 2020.

## 2.3 HAZARD Checklist

The HAZARD checklist below is derived from the HAZID worksheets from previous onshore workover/drilling operations reviews and issues has been added taken from the Downstream Manufacturing Hazard and Effects Register.

In future this HAZARD Checklist may be extended, based upon experience.

| | Category | Top event |
|---|---|---|
| 1 | Heavy logistics transport (traffic) during rig move and workover (Normal transport to and on site) | Traffic collision of people / bicyclist / car on public road |
| | | Traffic collision on location / with pipeline / objects falling on pipeline or on pressurized site equipment (wellheads) |
| | | Obstruction by transmission towers |
| 2 | Heavy lifting (rig up/down of the rig and workover operations) | Dropped objects |
| | | Toppling crane |
| | | Falling mast |
| 3 | Live wells / pressurized equipment on and near location (gas containment) | Corrective maintenance on equipment / wells |
| | | Gas release, suction of gas into generator intake |
| | | Gas release towards hot surfaces, open flames |
| | | Breathing of atmospheric tanks |
| 4 | Noise, light and sound | Exceeding noise/light limitations |
| 5 | Evacuation | Alarm not audible on entire location |
| | | People unaware of potential dangerous situation |
| | | People enter the location after the alarm goes off |
| 6 | Overflow of waste water system (due to extensive rainfall) | Overflow of location (rainwater pit) with contaminated supply to surface water |
| 7 | Losses | (Excessive) losses (can occur from known geology) |
| 8 | Flammable substances (liquids containment) | Release of a liquid (spill) |
| | | Release of vapor / gas from a liquid (fire or explosion) |
| | | Exhaust of combustibles |
| 9 | Hazardous / toxic chemicals (liquids / vapor) | Leakage of hazardous chemicals (e.g. MeOH, corrosion inhibitor) |
| | | H2S release |
| | | Benzene release (from tubing) |
| | | Mercury release |
| | | Exposure to radiation |
| 10 | Drilling into reservoir | Kick to surface |
| | | Unignited blow out |
| | | Ignited blow out. Wells / pipelines inside 12.5 kW/m2 heat radiation contour |
| | | H2S release from reservoir |
| | | Collision with other wells |
| 11 | Environmental sensitive area | Natura 2000 |
| | | Water born bacteria “Bruin rot” |
| | | Ecologische Hoofdstructuur |
| 12 | Authorities / stakeholders | Wrong information / miscommunication |
| | | Social experience |
| | | Complaints of neighbors |

## 2.4 Status of pressurized systems during CO

**Well, pipeline and equipment status during CO**

*Well ROW-7*

| | |
|---|---|
| During cat 4 lift (Lavett and rig floor): | Closed in (SSSV and UMGV) and protection (with Ameland kap or with legoblocks and draglines installed). |
| During rigging up/down: | Closed in (SSSV and UMGV) and protection (with Ameland kap or with legoblocks and draglines installed). |
| During Workover: | Available for injection |

*Production Water Pipelines:*

| | |
|---|---|
| During cat 4 lift (Lavett and rig floor): | Handvalve incoming production water pipeline closed |
| During rigging up/down: | Handvalve incoming production water pipeline closed |
| During Workover: | Available for injection |

*Production Water pump Skid(s):*

| | |
|---|---|
| During cat 4 lift (Lavett and rig floor): | Shut down |
| During rigging up/down | Shut down |
| During Workover: | Available for injection |

## 2.5 Specific issues and concerns

The following items have been identified

- eMOC regarding single barrier deviation when removing TA cap and installing BOP.
- Electrification issues – restrictions for running Synergy 2 and injection skids simultaneous
- Damage to adjacent housing due to vibrations caused by the Workover activities

## 2.6 Specific issues and concerns

The following actions arose during the operations review are listed below.

| Nr. | Actions from CO Review | Action Party | Date | Status | Code |
|---|---|---|---|---|---|
| 1 | Deliver information regarding the Synergy 2 power requirements for injection of trucked fluids in ROW-2 | [redacted] | 6 Nov 2020 | Information has been shared | C |
| 2 | Determine if the injection skid can be operated and inject production water in ROW-7 when the Synergy 2 is injecting fluids in ROW-2 | [redacted] | 6 Nov 2020 | It has been confirmed that the injection in ROW-7 can be done whilst the Synergy 2 is injecting fluids in ROW-2 (when the rig is not performing at full power) | C |
| 3 | Engineer redundancy in 2x2 m water pit to ensure that the potential contaminated rainwater will be pumped in the storage containers during extreme rainfall (include lessons learned P&A unit). Take in consideration the travel time to truck away the excessive rainwater. | [redacted] | 6 Nov 2020 | 3 x 55m3 storage containers/tanks will be placed to store excessive rainwater. This potential contaminated rainwater will be trucked away towards the 'riool Water Zuiverings Installatie (RWZI)' in Hengelo. | C |
| 4 | Ensure that lego blocks are installed around the 'opkomer' to mitigate collision during transport on location and add them to the lay out drawing | [redacted] | 6 Nov 2020 | Confirmed | C |
| 5 | Reposition chemical and hydrocarbon storage within the gutter system to mitigate soil contamination outside the gutter system | [redacted] | 6 Nov 2020 | Confirmed | C |
| 6 | Ensure that the position of the crane (used during rigging u and down) is chosen in such a way that the crane will not reach the surrounding houses in case the crane would tip over. | [redacted] | 6 Nov 2020 | Crane-radius in relation to the nearest houses will be addressed in the Drilltec lifting plan. | O |
| 7 | Include the lessons learned from Monster with regards to vibrations during the workover (implement vibration-meter and zero measurements of potential damage already present of the surrounding houses) | [redacted] | 6 Nov 2020 | There are zero-point measurements of house damage of five years ago, and another survey will be done before start of operations on ROW-2. Vibration meters will be installed. | C |

| Nr. | Actions from CO Review | Action Party | Date | Status | Code |
|---|---|---|---|---|---|
| 8 | Determine the time restriction (e.g. daytime only and if working in the weekend is allowed) to perform the workover activities in relation to exceeding noise limits at adjacent housing. | [redacted] | 6 Nov 2020 | In progress. Engagement of local residents by NAM's External Relations is ongoing. | O |
| 9 | Organize that gas detection on the Synergy drill floor to detect sour gas coming to surface will be made available | [redacted] | 6 Nov 2020 | H2S sensors will be arranged for and installed during the period that the workover activities are ongoing. | C |

| | |
|---|---|
| C | Closed |
| N | Not closed |
| O | Ongoing |

## 2.7 Risk analysis worksheets

The purpose of the risk analysis is to address and evaluate all the identified interaction risks of the operational program in worksheets and to determine major hazards.

Major hazards are "…substances, activities, operations or conditions which are assessed as having a consequence severity of 5 or risk ranking of red, as defined in the Group 'Risk Assessment Matrix' (RAM)". These risks are indicated as the "Major Risk Area" in the figure below.

The Risk Assessment Matrix was used to quantify the risk of a hazardous event. More information about the Risk Assessment Matrix can be found in "Managing Risk" Guide (ref. 12)

| SEVERITY | CONSEQUENCES | | | | INCREASING LIKELIHOOD | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | People | Assets | Community | Environment | A | B | C | D | E |
| | | | | | Never heard of in the Industry | Heard of in the Industry | Has happened in the Organisation or more than once per year in the Industry | Has happened at the Location or more than once per year in the Organisation | Has happened more than once per year at the Location |
| 0 | No injury or health effect | No damage | No effect | No effect | | | | | |
| 1 | Slight injury or health effect | Slight damage | Slight effect | Slight effect | | | | | |
| 2 | Minor injury or health effect | Minor damage | Minor effect | Minor effect | | | | | |
| 3 | Major injury or health effect | Moderate damage | Moderate effect | Moderate effect | | | | | |
| 4 | PTD or up to 3 fatalities | Major damage | Major effect | Major effect | | | | | |
| 5 | More than 3 fatalities | Massive damage | Massive effect | Massive effect | | | | | |

| 1 | Heavy logistics transport (traffic) during rig move and workover<br>(Normal transport to and on site) | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Traffic collision of people / bicyclist / cars on public road next to location | - Injury / fatality<br>- Damage to third parties<br>- Limitations to transport to and from location<br>- Interrupted or suspended operation | P:4B<br>E:1B | Procedural:<br>- Logistics coordinator will be assigned to the rig<br>- Logistics plan including a sign plan including traffic guides, "verkeer in- en uitritten", traffic signs to make drivers aware of traffic related to well intervention activities.<br>- Staging area for trucks outside location. | Procedural:<br>- OnCP |
| | | | Hardware:<br>- No | Hardware:<br>- No |
| - Traffic collision on location due to limited location size | - Damage to location<br>- Injury / fatality<br>- Limitations to transport to and from location<br>- Interrupted or suspended operation<br>- Damage ROW 2 wellheads, pipeline, piping, injection skids resulting in uncontrolled production water and/or sour gas release. | P:4B<br>E:4C | Procedural:<br>- Logistics coordinator will be assigned to the rig<br>- Dedicated transport route outside hazardous area<br>- Minimize number of trucks on site at one time<br>- Minimize reverse driving where possible<br>- Reverse driving only allowed when guided<br>- Traffic speed limits part of location induction | Procedural:<br>- Onshore Contingency Plan (OnCP)<br>- Rig specific LNP (well intervention) clearly visible and communicated on location<br>- Rossum-Weerselo 2 LNP<br>- NAM Manual for handling $H_2S$ [EP201403202978]<br>- $H_2S$ management plan NAM – DrillTec Synergy 2 for SCH 3151 and ROW-2 |
| | | | Hardware:<br>- Lego blocks to protect pipeline (opkomer).<br>- 'overkluizing' over pipeline to prevent ground forces on underground part of the pipeline.<br>- Protection around ROW-7 well. | Hardware:<br>- None. |

| 2 | Heavy/complex lifting (rig up/down of the rig and workover operations) | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Dropped objects<br>- Falling mast<br>- Toppling crane | - Injury/Fatality<br>- Damage to third parties<br>- Damage to asset with the potential of uncontrolled sour gas or production water release<br>- Interrupted or suspended operation<br>- Damage to adjacent housing | P:4B<br>E:2B | Procedural:<br>- Adhere to lifting plan (minimum distance, positioning of lifting devices, no lifting of loads over pressurized equipment) according Shell U.I.E. specification of Group Standard for lifting and hoisting operations<br>- Supervision by NAM DSV and DrillTec tool pusher<br>- Pre-job safety meeting by supervisor<br>- Dedicated safety observer to monitor lifting of the rig floor and the Lafette<br>- NAM and Drilltec Adverse Weather Policy and Procedures | Procedural:<br>- No go areas. Minimum personnel on site during heavy/complex lift<br>- Rig specific LNP (well intervention) clearly visible and communicated on location<br>- Rossum-Weerselo 2 LNP<br>- NAM Manual for handling $H_2S$ [EP201403202978]<br>- $H_2S$ management plan NAM – DrillTec Synergy 2 for SCH 3151 and ROW-2 |
| | | | Hardware:<br>- Safety system of crane<br>- Certified lifting and hoisting equipment | Hardware:<br>- Topside protection above ROW-7 well |

| 3 | Hydrocarbon pressurized equipment and piping on location (gas containment) | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - N/A<br><br>Rossum Weerselo is a water injection location and there are no Hydrocarbon producing wells on location. The wells are considered non free flowing wells, therefor the HAZID participants concluded that there is no top event related to Hydrocarbon pressurized equipment and piping on location | | | | |

| 4 | Noise, light and sound | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Exceeding noise/light limitations<br>- Vibration as a result of transport/workover activities | - Limited operations<br>- Limitations to transport to and from location<br>- Damage to housing/buildings<br>- Bad reputation<br>- Complaints | P: 1C<br>E: N/A | Procedural:<br>- Minimise planned logistics transport at night<br>- Restricted working hours for the workover activities are restricted (see action 8)<br>- Lighting will be directed inward towards location<br>- Communication to inform neighbors on period of workover<br>- PR; open communication at all stages with parties involved<br>- Operational awareness (safety meeting, toolbox talk)<br>- Work according to environmental permit<br>- Check on minimization of light disturbance<br>- Active noise management where possible | Procedural:<br>- Following general rig noise reduction rules<br>- External affairs |
| | | | Hardware:<br>- Soundwalls<br>- Continuous 'vibration' measurement<br>- Continuous noise monitoring during workover | Hardware:<br>- None |

| 5 | Evacuation/emergency response | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Alarm not audible on entire location<br>- People unaware of potentially dangerous situation<br>- People enter the location after the alarm goes off | - Exposure to the dangerous situation on location | P:4B<br>E:N/A | Procedural:<br>- Evacuation drills during ROW-2 Workover execution<br>- Security keeps a log of persons present<br>- Security is in charge of roll-call<br>- Location induction<br>Hardware:<br>- No | Procedural:<br>- Rig specific LNP (well intervention) clearly visible and communicated on location<br>- Rossum-Weerselo 2 LNP<br>Hardware:<br>- No |

| 6 | Extreme meteorological conditions | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Extreme rainfall<br>- Thunderstorms and lightning or high winds | - Overflow of corner pits resulting in pollution of soil and surface water(s)<br>- Lightning resulting in damage of the workover equipment<br>- Damage to equipment or injury | P:4B<br>E:3C | Procedural:<br>- Truck away stored water from location (to RWZI Hengelo)<br>- Regular checks made by the rig team<br>- NAM and Drilltec Adverse Weather Policy and Procedures<br>Hardware:<br>- Additional fluid storage tanks with level detection | Procedural:<br>- OncP<br>- Work instruction Notification of incident (17WI0401)<br>Hardware:<br>- Earth bonding<br>- Secondary retention and secondary securing according to DROPS manual |

| 7 | Losses | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Total losses (workover related)<br><br>Losses is not considered a top event but part of the workover program. | | | | |

| 8 | Flammable substances (liquids containment) | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Release of a liquid (spill)<br>- Release of vapor / gas from a liquid<br><br>Source: diesel | - Fire<br>- Injury / fatality<br>Note: When diesel is pumped and gets in contact with a heated surface it could ignite (eg in generators)<br>- Soil pollution<br>- Surface water contamination | P: 4B<br>E: 2C | Procedural:<br>- Flammable substances are stored according regulations<br>- No ignition sources within hazardous area zoning<br>- Labeling instructions | Procedural:<br>- Rig specific LNP (well intervention) clearly visible and communicated on location<br>- Onshore Contingency Plan (OnCP) |
| | | | Hardware:<br>- Diesel storage tank is double walled | Hardware:<br>- Gutter system - Gutter system connected to temporary waterpit and water storage containers |

| 9 | Hazardous / toxic chemicals (liquids / vapour) | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Leakage of stored hazardous chemicals in working area<br><br>Source: diesel tank, gas cylinders, hydraulic oil and injection chemicals | - Exposure of personnel<br>- Soil pollution<br>- Surface water contamination | P:3C<br>E:2C | Procedural:<br>- Hazardous chemicals are stored according regulations<br>- Labelling instructions<br>- Unloading / loading procedures | Procedural:<br>- Rig specific LNP (well intervention) clearly visible and communicated on location<br>- Onshore Contingency Plan (OnCP) |
| | | | Hardware:<br>- Double walled diesel tanks<br>- Hazardous chemicals are stored according regulations | Hardware:<br>- Fluid resistant surface (asphalt)<br>- Spill response equipment<br>- Tertiary means of fluid containment for area on the North of the Synergy 2<br>- Gutter system connected to temporary water pit and water storage containers<br>- Drip trays / bunding<br>- PPE |
| - Rossum-Weerselo 2 is not known as a known LSA location | | | | |

| 10 | Workover on ROW-2 | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| ROW-2 is a non-free flowing well – the likelihood of HC coming to surface and result in a well control situation is most unlikely | | | | |
| - Sour Gas to surface | - Uncontrolled sour gas release at drill floor<br>- Uncontrolled release of Benzene at drill floor<br>- Personnel injury / fatality | P:3C<br>E:2C | Procedural:<br>- Well fill up procedure as part of the workover program<br>- Pressure control manual<br>- Dispersion calculations | Procedural:<br>- Pressure control manual<br>- Rig specific LNP (well intervention) clearly visible and communicated on location |
| | | | Hardware:<br>- Gas detection on drill floor | Hardware:<br>- Well control equipment (e.g. BOP) |
| - Unignited blow out – not considered a credible scenario [Ref. Pore Pressure Prediction for ROW-2, Leendert Geurtsen, 10 June 2020]. | | | | |
| - Ignited blow out – not considered a credible scenario [Ref. Pore Pressure Prediction for ROW-2, Leendert Geurtsen, 10 June 2020].<br>- | | | | |
| - Collision with other wells | - N/A | | | |

| 11 | Environmental sensitive area | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Impact Ecologische Hoofd structuur& Environmentally protected area (Natura 2000) | - Disturbance<br>- Exceeding NOx limits<br>- Suspended workover operations | P: N\A | Procedural:<br>- Permit compliance<br>- Noise prognoses<br>- Corner pits isolated to surface water | Procedural:<br>- Noise monitoring |
| | | E:3C | Hardware:<br>- Low NOx emission power supply in case power is not taken from the grit | Hardware:<br>- No |

| 12 | Authorities / stakeholders | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| Stakeholder management is covered by External Affairs. | | | | |

## 2.8 Major hazards identified

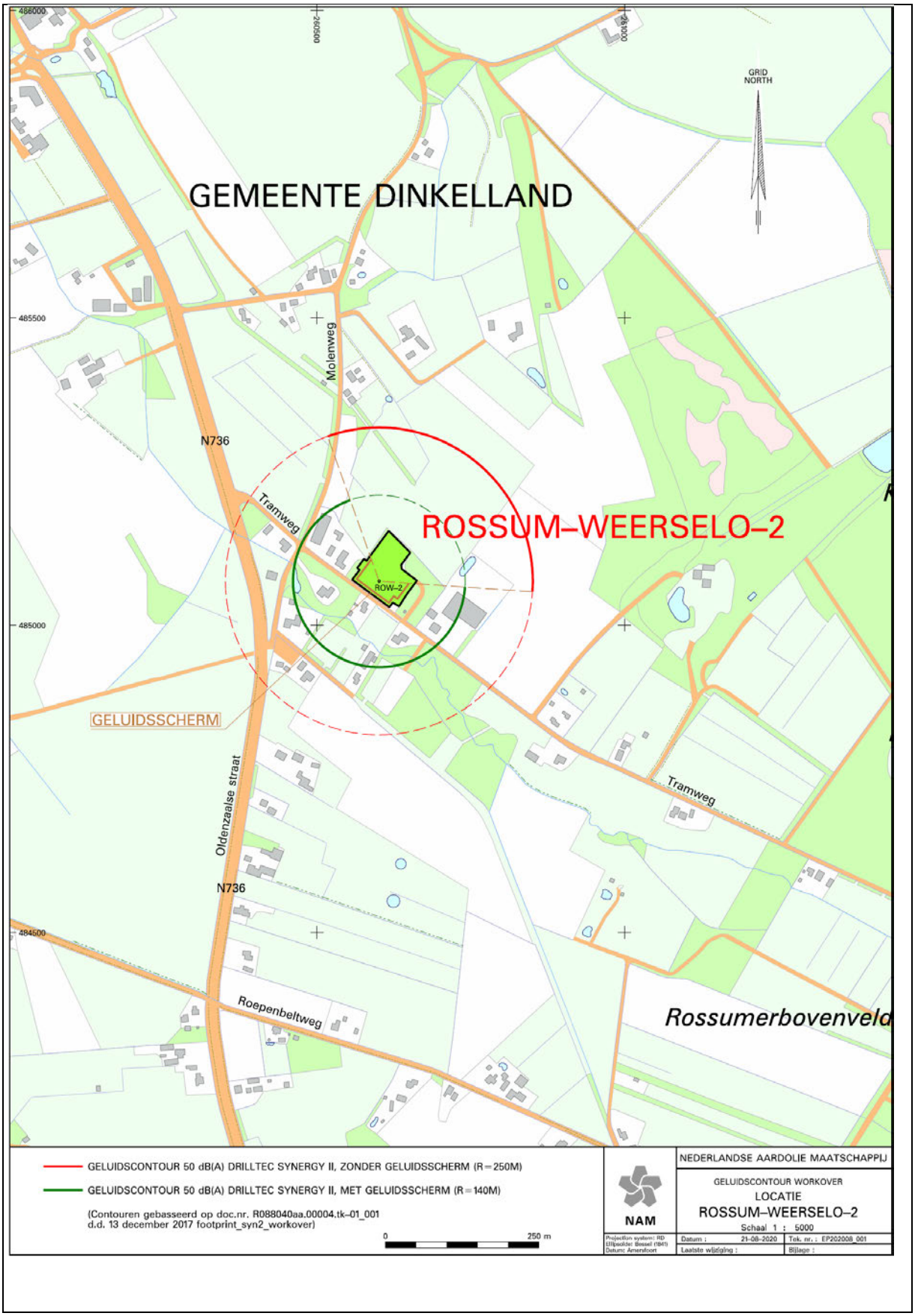
The activities of the work scope are regarded as generally routine project work.

## 2.9 Control of major accidental hazards

The risk analysis of the workover operations identified that the existing and standard procedures and control measures, in conjunction with the project specific actions and measures as listed in the risk analysis worksheets, were considered to be suitable and sufficient to control the major accidental hazards to a level that is ALARP.

## Attachment 4 Environment Permit Documentation

| General |
| --- |
| "Rossum-Weerselo 2" ENVIRONMENT"<br><br>The nearest nature conservation area (Habitatgebied Landgoederen Oldenzaal) is located at a distance of approximately 1,600 meters southeast of the facility. |
| **A BARMM will be submitted to EZ and placed on Sharepoint (the link below is to legal portal):**<br>https://eu001-sp.shell.com/sites/AAFAA1965/Pages/Search.aspx<br><br>Search for "Rossum-Weerselo 2", to find the Kennisgeving Besluit Algemene Regels Milieu Mijnbouw |
| Flaring<br><br>▪ Flaring is not included in the scope. |
| **Noise** |
| Sound contour: 50 dB(A) at 250 meter without sound wall<br><br>Sound contour: 50 dB(A) at 140 meter with sound wall<br><br>See noise contour for ROW-2 workover with the Synergy 2 rig |


GEMEENTE DINKELLAND
GRID NORTH
ROSSUM–WEERSELO–2
ROW–2
GELUIDSSCHERM
Molenweg
Tramweg
Oldenzaalse straat
N736
Roepenbeltweg
Rossumerbovenveld
GELUIDSCONTOUR 50 dB(A) DRILLTEC SYNERGY II, ZONDER GELUIDSSCHERM (R=250M)
GELUIDSCONTOUR 50 dB(A) DRILLTEC SYNERGY II, MET GELUIDSSCHERM (R=140M)
(Contouren gebasseerd op doc.nr. R088040aa.00004.tk–01_001
d.d. 13 december 2017 footprint_syn2_workover)
0
250 m
NAM
NEDERLANDSE AARDOLIE MAATSCHAPPIJ
GELUIDSCONTOUR WORKOVER
LOCATIE
ROSSUM–WEERSELO–2
Schaal 1 : 5000
Datum : 21-08-2020
Tek. nr. : EP202008_001
Laatste wijziging :
Bijlage :

| Light |
| --- |
| Environmental permit: Lights should be properly directed inward and protected to avoid disturbance to the surrounding. |

| Documentation |
| --- |
| **Artikel 42**<br><br>Voor zover documenten met betrekking tot:<br><br>a. de monitoring van het geluid, de registratie van luchtemissies, de bemonstering van het grondwater en de registratie met betrekking tot bodembeschermende voorzieningen op basis van de artikelen 19, 23, 25, 28 en 30,<br><br>b. onderhoudscontracten met betrekking tot op de mobiele installatie aanwezige installaties,<br><br>c. certificaten of bewijzen van:<br><br>1°. Tanks, filters en andere voorzieningen,<br><br>2°. Onderhoud of keuringen van op de mobiele installatie aanwezige voorzieningen en installaties,<br><br>d. de veiligheidsinformatiebladen die behoren bij de op de mobiele installatie aanwezige gevaarlijke stoffen,<br><br>voor de mobiele installatie zijn afgegeven dan wel voorgeschreven, zijn die documenten of een kopie daarvan gedurende de werkzaamheden op de mobiele installatie aanwezig of binnen een termijn die wordt gesteld<br><br>door degene die toeziet op de naleving van dit besluit voor deze beschikbaar.<br><br>**Artikel 43**<br><br>1. Er is een handleiding op de mobiele installatie aanwezig waarin regels zijn gesteld door de uitvoerder ten aanzien van transportbewegingen, pipehandling, het verbranden van aardgas in de openlucht en andere geluidsintensieve activiteiten.<br><br>2. De regels, bedoeld in het eerste lid, beperken de schade aan milieu en overlast voor de omgeving zo goed mogelijk.<br><br>3. De uitvoerder draagt er zorg voor dat een ieder die werkzaam is op de mobiele installatie bekend is met de handleiding en de regels, bedoeld in het eerste lid, naleeft. |

## Attachment 5 Tasks, powers and responsibilities of HCO and LVP

The documents below discuss in further detail the authority and responsibilities of the HCO and LVP.

**Role Description LVP**

Dutch: [Lokatie Verantwoordelijk Persoon (LVP)]

English: [Site Manager (LVP)]

**Role Description HCO**

Dutch: [Hoofd Combined Operations (HCO)]

**Attachment 6 MOPO (Manual of Permitted Operations)**

| | Workover Critical Operations | | | | | | |
|---|---|---|---|---|---|---|---|
| Production Critical Operations during Workover Operations | Asset Production Operation / Workover Operation | Rig up & rig down (incl transport) | Lavett and rig floor lifts | Workover operations (incl transport) | Hoisting operations (during workover) | Loss of well control | Hot work |
| | Standard unmanned operations on Rossum-Weerslo 2 location - Production Water Injection via ROW-7 | N * | N * | Y | Y | N | Y |
| | Shut in well ROW-7 | | | Y | Y | Y | Y |
| | Start up well ROW-7 | N | N | A | A | N | A |
| | Non-routine / routine maintenance on wells and equipment | N | N | A | A | N | A |
| | Well intervention work on ROW-7 well | N | N | A | A | N | A |
| | * ROW-7 is shut in on SSSV and UMGV, handvalve located near the incoming pipeline is closed, XMS is protected by an Ameland kap or alternative means of protection against dropped objects and injection skids are shut down. | | | | | | |

| | |
|---|---|
| Y | = Yes (concurrent operations permitted) |
| N | = No (concurrent operations not permitted) |
| A | = Concurrent Operations permitted only if approved by the HCO |
| | = Not Applicable |

## Attachment 7 Explanatory glossary of abbreviations

| Abbreviations | Meaning |
|---|---|
| ALARP | As Low As Reasonable Practicable |
| ARBO | Arbeidsomstandigheden |
| BARMM | Besluit Algemeen Regels Milieu Mijnbouw |
| BBNP | Brandbestrijding- en Noodplan |
| BOP | Blow Out Preventer |
| CMK | Centrale MeldKamer |
| COS | Combined operation Summary/Script |
| DDP | Detailed Drilling Program |
| DSV | Drilling Supervisor |
| ECT | Emergency Coordination Team |
| EIM | Emergency Incident Manager |
| EZ | Economische Zaken – Economic Affairs |
| HAZID | Hazard Identification |
| HC | Hydrocarbons |
| HCDC | Hoogezand Control Center |
| HEMP | Hazard and Effect Management Process |
| HSE | Health Safety and Environment |
| HSE-MS | HSE Management System |
| LCM | Lost Circulation Material |
| LRT | Location Response Team |
| LSA | Low Specific Activity (Laag radioactief afval) |
| LVP | Locatie Verantwoordelijk Persoon – Location Responsible Person |
| LWE | Lifecycle Well Engineer |
| NAM | Nederlandse Aardolie Maatshapij |
| OnCP | Onshore Contingency Plan |
| PVO | Process Verbaal van Overdracht |
| SodM | Staatstoezicht op de Mijnen – State Supervision of Mines |
| TA | Technical Authority |
| TD | True Depth |
| TP | Tool Pusher |
| VGM-documentatie | Health safety and Environmental documentation |

| Abbreviations | Meaning |
|---|---|
| WABO | Wet Algemeen Besluit Omgevingsrecht |
| WFS | Well Functional Specification |
| WOTL | Wells Operations Team Lead |
| WSDE | Well Site Drilling Engineer |
| WVP | WerkVeiligheidsPlan (Work Safety Plan) |
| | |
| Definitions | Meaning |
| Safety and environmental critical elements (SECEs; also referred to as HSSE Critical Elements) | those items of equipment or structures whose failure could lead to the release of major hazard or whose purpose is to prevent or limit the consequences of a Major incident, excluding business loss |
| Major hazards | substances, activities, operations or conditions which are assessed as having a consequence severity of 5 or risk ranking of red, as defined in the Group 'Risk Assessment Matrix' (RAM) |

**Van:** SodM [redacted]
**Aan:** [redacted] @shell.com"
**Cc:** [redacted] SodM Boren
**Onderwerp:** RE: ROW-2 Tubing cut and XMT-TA change
**Datum:** donderdag 26 november 2020 17:54:42

---

Geachte [redacted],

Op dit moment heb ik geen verdere vragen over de onderstaande boorgatactiviteit op de ROW-02 put.

Met vriendelijke groet,

[redacted]
**Staatstoezicht op de Mijnen / State Supervision of Mines**
**Ministerie van Economische Zaken/ Ministry of Economic Affairs.**
Henri Faasdreef 312 | 2492 JP | Den Haag / The Hague
Postbus / P.O. Box 24037 | 2490 AA | Den Haag
.....
**T** + 31 (0)70 379 8400
[redacted] boren@sodm.nl

---

**Van:** [redacted]
**Verzonden:** dinsdag 20 oktober 2020 14:03
**Aan:** SodM [redacted]
**CC:** NAM-Mailsodm@shell.com; [redacted]
**Onderwerp:** ROW-2 Tubing cut and XMT-TA change

Geachte [redacted]

Hiermee wil ik u op de hoogte brengen van voorgenomen werkzaamheden op put de ROW-2 gesitueerd op locatie ROW-2, Tramweg 7, 7596 NA in Rossum, de werkzaamheden zijn er op gericht om de put voor te bereiden op een workover. Met Slickline zullen de pluggen getrokken worden om vervolgens te kijken of de diepte waarop gesneden moet worden, bereikt kan worden. Aan E-line zal vervolgens de tubing gesneden worden. Vervolgens zal de put met 2 pluggen beveiligd worden alvorens het spuitkruis wordt uitgewisseld voor een tijdelijke adapter. De werkzaamheden staan momenteel gepland op 14 december 2020.

Voor het uitvoeren van deze operaties is een ontheffing aangevraagd onder het zaaknummer AB-5460.

De werkzaamheden zullen bestaan uit:

1. Rig up slickline
2. Retrieve 2 plugs
3. Take echo measurement
4. Bullhead 15m3 BFW
5. Perform drift run
6. Rig down slickline, rig up E-line
7. Perform tubing cut
8. Install 2 plugs
9. Change out tree for temporary adapter

Bijgevoegd vindt u het werkprogramma, Well Examination findings rapport en een rijroute beschrijving.

Mochten er vragen of opmerking zijn dan hoor ik het graag.

Met vriendelijke groeten,

[redacted]

**Nederlandse Aardolie MaatschappijB.V.**
Registered in The Hague, The Netherlands - Trade Register no. 04008869
Correspondence: Postbus 28000, 9400 HH Assen
Office: Schepersmaat 2, 9405 TA Assen
Tel: +31(0)592368511
Email [redacted]
Internet: http://www.nam.nl

**Van:** SodM [redacted]@shell.com"
**Aan:**
**Cc:** [redacted]@shell.com
**Onderwerp:** RE: NAM ROW-2 SodM Work Program
**Datum:** donderdag 26 november 2020 18:16:18
**Bijlagen:** image001.png

---

Geachte [redacted],

Op dit moment heb ik geen verdere vragen over de onderstaande geplande boorgatactiviteit van op ROW-02 put.

Met vriendelijke groet,

[redacted]

.....

**Staatstoezicht op de Mijnen / State Supervision of Mines**
**Ministerie van Economische Zaken/ Ministry of Economic Affairs.**
Henri Faasdreef 312 | 2492 JP | Den Haag / The Hague
Postbus / P.O. Box 24037 | 2490 AA | Den Haag

.....

[redacted]@sodm.nl

---

**Van:** [redacted]@shell.com
**Verzonden:** woensdag 21 oktober 2020 20:33
**Aan:** [redacted]
**CC:** SodM Boren ; SodM Info ; NAM-Well-Examiner@shell.com; NAM-Mailsodm@shell.com; [redacted]
**Onderwerp:** NAM ROW-2 SodM Work Program

[redacted],

Please find attached the Work Program for the ROW-2 well, including the Well Examination report.
Please note that the CO-script will be sent to you separately.

Should you have any questions or remarks, please do not hesitate to contact myself.

Best regards,

[redacted]

*Please note that I read infrequently any emails where I am in CC. Please contact me directly if you require my action or reply.*

Office: Schepersmaat 2, 9405 TA Assen - The Netherlands

[redacted]
[redacted]

**Van:** [redacted]@shell.com
**Aan:** SodM [redacted]
**Cc:** [redacted]@shell.com; [redacted]
**Onderwerp:** Update van: Combined Operation Summary voor werkzaamheden op Put ROW-2 - Locatie Rossum Weerselo-2 (Nederlandse Aardolie Maatschappij )
**Datum:** donderdag 17 december 2020 14:33:37
**Bijlagen:** image002.jpg
EP202010201628 COS ROW-2 with the Synergy 2 rig - Rev 1.1.pdf

---

Goedemiddag,

Zoals eerder deze week telefonisch besproken met de heer [redacted] stuur ik bijgesloten de bijgewerkte versie van het Combined Operations script voor de werkzaamheden op put ROW-2.

Ter verduidelijking: er wordt nu voorzien in gelijktijdige rig operaties in put ROW-2 en waterinjectie in naastgelegen put ROW-7.
Tijdens de HAZID-review van de nieuwe situatie met alle betrokken partijen zijn, in vergelijking met het originele CO script van 20-nov, geen nieuwe risico's of maatregelen geidentificeerd.

Er zijn wel een aantal aanpassingen in de tekst gemaakt (ook aangegeven in de kantlijn van het bijgesloten document):
Section 1.4: Rev table updated
Section 4.4: Updated Layout drawing (it now also includes the temp vent with correct zoning)
Section 7.2: Updated, added and deleted agreements to match the new simultaneous operations
Att 3 – 2.2.1: added HAZID review section
Att 3 – 2.4: Updated to match the outcome of the HAZID review and the new simultaneous operations
Att 3 – 2.6: Updated status action 2
Att6: Updated MOPO to match the outcome of the HAZID review and the new simultaneous operations

Indien u vragen heeft kunt u contact opnemen met;
Naam:
Functie:
Email:
Telefoon:

[redacted]

Ik hoop u hiermee voldoende geïnformeerd te hebben.

Groeten/Regards,
[redacted]

[redacted]

NAM Logo
PO Box 28000, 9400 HH Assen – NL
Office: Schepersmaat 2, 9405 TA Assen – NL

[redacted]

**Internet**: http://www.nam.nl

# Combined Operation Summary

# Rossum-Weerselo 2 with the Synergy 2 rig "Workover at ROW-2"

NAM

**HEALTH, SAFETY AND ENVIRONMENT DOCUMENT – NAM UIO-T**

**DRILLING, WORKOVER & OPERATIONS - ONSHORE**

**Doc No. EP202010201628**

TABLE OF CONTENTS

# 1 Introduction

This Combined Operation Summary for the workover at the ROW-2 well located at Rossum-Weerselo 2 has been prepared by the Nederlandse Aardolie Maatschappij B.V. (hereafter NAM) and DrillTec to assure themselves and external regulatory authorities that the workover operations are consistent with the requirement for safe and responsible management.

The owners of this document are accountable for the preparation, operation and maintenance of the workover of the ROW-2 well with the Synergy 2 Combined Operation Summary (hereafter COS), and for ensuring it is reviewed when there are any major changes to the design, purpose or organization of either installation.

The owners of this COS are:

Nederlandse Aardolie Maatschappij B.V.
Schepersmaat 2
P.O. Box 28000
9400 HH Assen

DrillTec Netherlands B.V.
Rembrandtlaan 225
7545 ZW Enschede
The Netherlands

## 1.1 Authorization

| Function / role | Name, Department | Signature, date |
|---|---|---|
| **Prepared by Operation Supervisor** Acknowledges that all relevant HSE information is included in this document concerning workover operations. | [redacted] | Approved by email: 16 Dec 2020  RE_ Urgent reminder - Request f |
| Checked by **Production Lead East NL** Acknowledges that all relevant information about the site-specific aspects are reviewed and assessed. | [redacted] | [redacted] |
| Checked by **PU Manager East** Acknowledges that all relevant HSE information is included in this document concerning combined operations. | [redacted] | Approved by email: 17 Dec 2020  Re_ Request for approval_ Updated |
| Checked by **HSE Manager** Acknowledges that document is in accordance with internal and external regulations and in accordance with the Dutch mining law. | [redacted] | Approved by email 16 December 2020  RE_ Urgent reminder - Request f |
| Checked by **Wells Operations Team Lead Synergy 2** Acknowledges that all relevant well design and location specific information is included in this document and certifies that all activities will be executed in accordance with the workover program. Acknowledges all relevant information about the well design are reviewed and assessed. | [redacted] | Approved by email 15 December 2020  RE_ Urgent reminder - Request f |
| Checked by **Rig Manager Drilling Contractor** Acknowledges that all operations will be executed according to the measures laid down in this document and accepts responsibility to indicate any changes or unexpected hazards, which may have an impact to the risks described in this document. | [redacted] | Approved by email 16 December 2020  AW_ Urgent reminder - Request f |

| Function / role | Name, Department | Signature, date |
|---|---|---|
| Checked by **NAM Drilling Supervisors / HCO**<br>Certifies that all activities will be executed according to the measures laid down in this document and is responsible for indicating any changes, which might have an impact on the risks described. | [redacted] | Approved by email<br>16 December 2020<br>  <br>RE_ Urgent reminder - Request f |
| Checked by **Technical Safety Engineer (TA-2)**<br>Acknowledges that all relevant Major Accident Hazard information is included in this document concerning workover operations. | [redacted] | Approved by email<br>11 December 2020<br>  <br>RE_ Request for approval_ Updated ( |
| Checked by **General Manager Wells Operations NL**<br>Acknowledges that all relevant information about the well design are reviewed and assessed. Also responsible to approve any changes to this document | [redacted] | Approved by email<br>16 December 2020<br>  <br>RE_ Urgent reminder - Request f |
| Approved by Asset Manager | [redacted] | See cover letter, ref. EP202011204193 |

## 1.2 Regulation compliance

Table 1 is a check to ensure that the requirements defined within annex 1 (section 7 – information to be submitted in a notification of combined operations) of the Directive 2013/30/EU, 12 June 2013 have been complied with. This lists the legislative requirements, along with where this issue is addressed within this COS.

The table is ordered in a way that reflects the structure of this COS.

Table 1 Directive 2013/30/EU annex 1 section 7 check list

| No | Particulars to be included in a Notification of Well Operations – Annex 1 section 7. | COS reference |
|---|---|---|
| 1 | the name and address of the operator submitting the notification | 1. Introduction |
| 2 | in the event that other operators or owners are involved in the combined operations their names and addresses, including a confirmation that they agree with the contents of the notification | |
| 3 | a description, in the form of a bridging document authorized by all parties to the document, of how the management systems for the installations involved in the combined operation will be coordinated so as to reduce the risk of a major accident to an acceptable level | 3. HSE documentation<br>7. Management structure and responsibilities |
| 4 | a description of any equipment to be used in connection with the combined operation but which is not described in the current report on major hazards for any of the installations involved in the combined operations | 4.3 Location preparation for workover<br>4.4 Rig layout drawing |
| 5 | a summary of the risk assessment carried out by all operators and owners involved in the combined operations, which shall include: | |
| | (a) a description of any operation during the combined operation which may involve hazards with the potential to cause a major accident on or in connection with an installation | Attachment 3 |
| | (b) a description of any risk control measures introduced as a result of the risk assessment | Attachment 3 |
| 6 | a description of the Combined Operations and a program of work. Including the dates on which the Combined Operations is expected to commence and finish. | 2. Management summary<br>5. Operational program |

## 1.3 Distribution

- Production Supervisor (UPC/T/EP)
- HCO / NAM Drilling Supervisors (DSV's) Synergy 2 (PTW/O/NL)
- PU Manager East (UPC/T/E)
- General Manager Wells Operations NL (PTW/O/NL)
- Asset Manager (UPC/T)
- HSE Manager (UPC/T/H)
- Wells Operations Team Lead Synergy 2 (PTW/O/NL)
- Lifecycle Well Engineer (PTW/O/NL)
- Rig Manager Drilling Contractor (DrillTec Synergy 2)
- Technical Safety Engineer (TA-2) (UPC/T/DD)
- DrillTec Tool pusher Synergy 2
- Hoogezand Control Center (HCDC)
- Emergency Coordination Team (UPC/T/H)
- SodM (2 hardcopies)

This document has embedded document links and is stored in Word format to access the links (and also PDF) on sharepoint in the Collaborative Well file area at the following address:

[Onshore Collaborative Wellfiles - Rossum-Weerselo 2]

The document is controlled by the HCO.

## 1.4 Revision list

| Revision | Revision Date | Status / Reason | Revised by |
|---|---|---|---|
| 1.0 | 19 November 2020 | Final approved version | [redacted] |
| 1.1 | 17 December 2020 | Based on new insights and detailed information regarding available power on location NAM has concluded that water injection and workover can be executed concurrently. A HAZID review has been performed and the outcome has been added to the COS.<br><br>The changes are recognizable by the grey bar in front of the text. | [redacted] |
| | | | |
| | | | |

# 2 Management Summary

## 2.1 Justification for operating under combined operations

NAM has the intention to perform a workover at the injection well ROW-2 using the DrillTec Synergy 2 rig, from the existing Rossum-Weerselo 2 onshore location. The workover contractor is DrillTec under the supervision of NAM.

The Combined Operation activities exists of;

1. Rigging up the Synergy 2 rig on ROW-2 well
2. Perform Workover activities on ROW-2
3. Rigging down Synergy 2 and departure of Rossum-Weerselo 2 location
4. During this planned Workover scope NAM has the intention to inject production water from Schoonebeek in the ROW-7 well

Execution of in itself controlled main activities (e.g. production, injection, construction, workover etc.) simultaneously while in each other's sphere of influence is defined as combined operations.

It is NAM's policy to avoid combined operations unless there is a good justification to consider it. In case combined operations are considered, the associated risks should be identified and properly mitigated. The initiation note for the ROW-2 well has given the direction to take "combined operations" as starting-point for the CO-script and the workover activities based on:

- Manageable interaction risks (ALARP); first pass assessment to be confirmed in CO-script.
- Solid financial justification for combined operations.

The Combined Operation Initiation Note for ROW-2 well is attached as appendix 2.

The outcome of the CO HAZID is that the workover activities can be executed concurrently with injecting production water in the ROW-7 well. During the CO HAZID some deviation from the CO initiation note have been identified and these are shown in section 6.

## 2.2 NAM's HSE policy

NAM's HSE policy is to protect the health and wellbeing of people and to protect the environment with an efficient use of products and energy to provide our products and services. The Hazard and Effect Management Process (HEMP) supports the above policy. HEMP has 4 distinct phases, i.e. identification, assessment, control and recover.

This HSE document gives evidence of the fact that NAM has considered the site-specific hazards in relation to the workover of ROW-2 well and that the known safety systems and managerial arrangements are in place during this project.

## 2.3 Legal context

This document meets the requirements of Working Conditions Regulation (Arbeidsomstandigheden Regeling), paragraph 3.2, article 3.7, which states that a safety and health document must be written for all activities related to drilling, workover and combined operations. This document describes and assesses the site-specific risks and combined operations risks.

## 2.4 Validity

This document is valid for the period covering the workover related operations of ROW-2 well which are planned to commence in the beginning of January 2021. It is estimated that the workover operations will last approximately 3 weeks.

## 2.5 Conclusion

Based upon the combined operation initiation notes a combined operations review has been performed. The involved parties have agreed that the risks are ALARP if the agreements as stated in paragraph 7.2, are met.

# 3 HSE documentation

NAM has a number of HSE documents, which are applicable to this operation. In accordance with Working Conditions Regulation (Arbeidsomstandigheden Regeling) paragraph 3.2, articles 3.7 and 3.10, these documents are integrated with the existing HSE documents from main /sub-contractors. The relationship between the various documents is shown below. References of those documents can be found in chapter 9.

The CO-script is designed as a working document for daily consultation. This document provides the assistance required to manage the location.

Rapport inzake Grote Gevaren Asset Onshore NL Generic + Rapport inzake Grote Gevaren Asset Land Productie Unit Schoonebeek

Rapport inzake Grote Gevaren Synergy 2

COS (NAM)

VG Document NAM Logistics

VG Document NAM Wells – C&WI

Other HSE documents:

- Bridging document
  - There is a bridging / interface document in place that describes the relationship between the HSE Management System (HSE MS) of both NAM and DrillTec (Ref.5).
- Emergency response
  - The Onshore Contingency Plan (OnCP) is available for NAM activities onshore, which contains communication and organization schemes to activate the calamity organization (Ref.6).
  - The location specific fire-hazard related risks and scenarios are described in the LNP (Lokatie Noodplan - Location Emergency Plan) of the area Asset Onshore NL (Ref.9).
  - The rig specific Lokatie Nood Plan (rig specific LNP, Ref. 10) of the DrillTec Synergy 2 applies. The document is available for use on the rig, which replaces the LNP during the workover operation. The document is valid from the moment of handover of the location for the area where the rig is located. The LNP will remain active for the production facilities.

# 4 Location

## 4.1 Location layout

The Location "Rossum-Weerselo-2", hereinafter called ROW-2, is a Production Water Injection Site for the oil production field Schoonebeek. The Rossum-Weerselo 2 location is located on tramweg 7, 7596NA in Rossum, in the municipality of Dinkelland.

Injection of the Production Water takes place in the Rossum-Weerselo reservoir. This reservoir is part of the Twente gas fields and is an empty produced gas field. There are two production water injection wells (ROW-2 and ROW-7) at the site. The production water injection wells are former gas production wells that have been made suitable for injecting injection water.

The nearest house is at ca 40m South of the ROW-7 well and 15m South of the location. There is one access road to the Rossum-Weerselo 2 location.

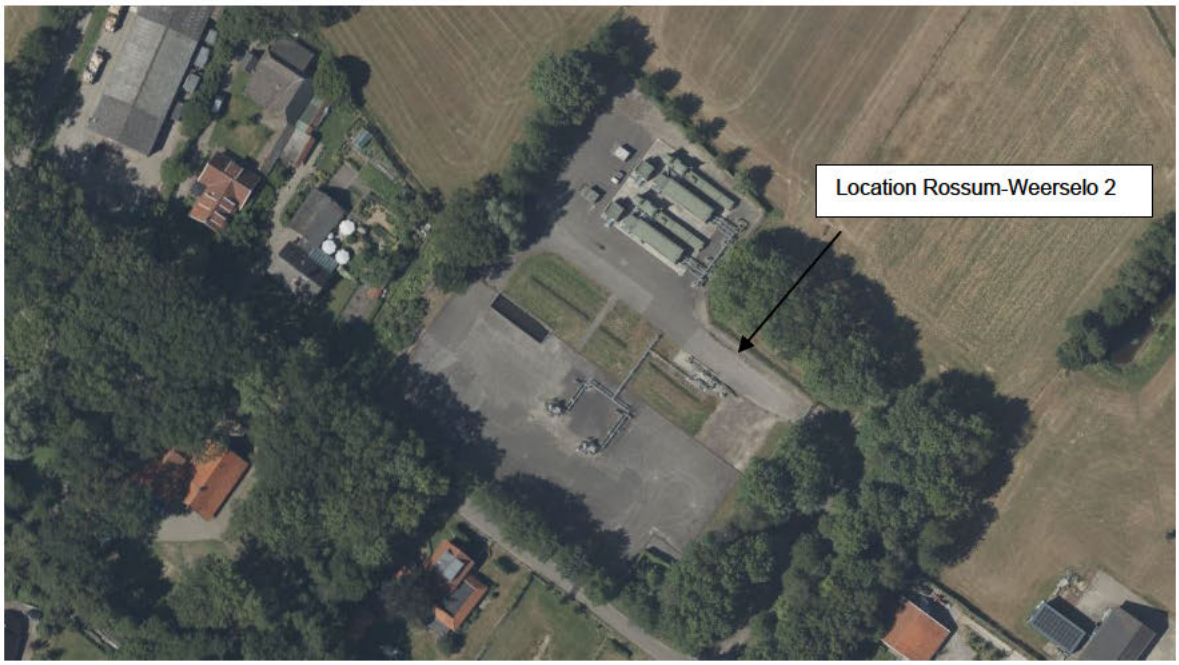



**Figure 4-1: Location Rossum-Weerselo 2: aerial view**

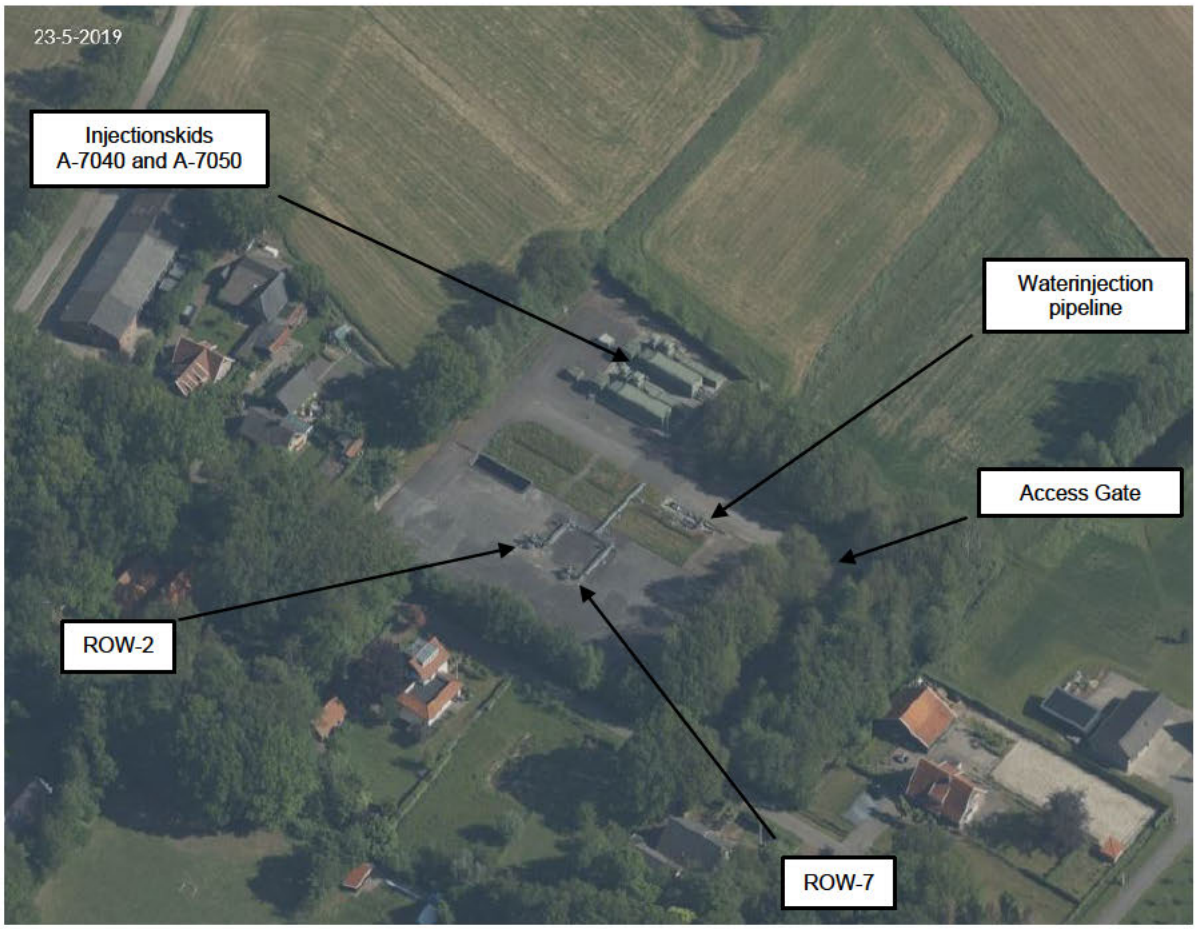



**Figure 4-2: Location Rossum-Weerselo 2: aerial view**

There is one access gate to the location: Gate#1 and is considered the main access gate.

The Rossum-Weerselo 2 location is not a LSA/NORM suspected location and a known $H_2S$ location.

## 4.2 Equipment under pressure on location

There is an incoming Production Water Injection pipeline which is connected to the injection pump skids. The maximum pressure in the water injection pipeline (downstream injection skids) is between 5 – 25 barg. The maximum pressure in the piping upstream the injection skids is 104 barg.

The operational pressure in the water injection pipeline (downstream injection skids) is about 6 to 7 barg. The operational pressure in the piping upstream the injection skids is 4 barg.

## 4.3 Location preparation for the workover

The rig layout is such that it will be possible to drive around the rig. For this purpose, the incoming water pipeline will be protected to allow trucks to drive over it. An enlarged area on the North side of the rig area will be created with a water-turning surface which is slightly angled towards the gutters. Additionally, to allow positioning of the rig, the current water pit will be filled in and stabilized to allow fluid tanks to sit over it. A new temporary water pit will be positioned next to the current water pit to allow collecting of the fluids from the site.

All fluids at the location will be collected via gutters to the newly placed corner pit. There will be a railing around the corner pit. As this is a dedicated corner pit it has no outlet to the environment. All excess fluids will be trucked away as per normal procedure. To create storage capacity, (e.g. in time

of heavy rainfall) additional fluid storage tanks will be placed near the corner pit. After the workover the storage tanks remain on site with a high level alarm until the fluid quality from the site is checked and proved as clean enough to flow to the outer ditch. During this period the signal will, in time, activate NAM Logistics, who will plan a truck (from a fluid truck company) to empty the storage tanks.

There are multiple houses located within the 50 dBA noise foot print of the rig. The nearest house is at about 40 m range from the well ROW-2 in Southern direction.

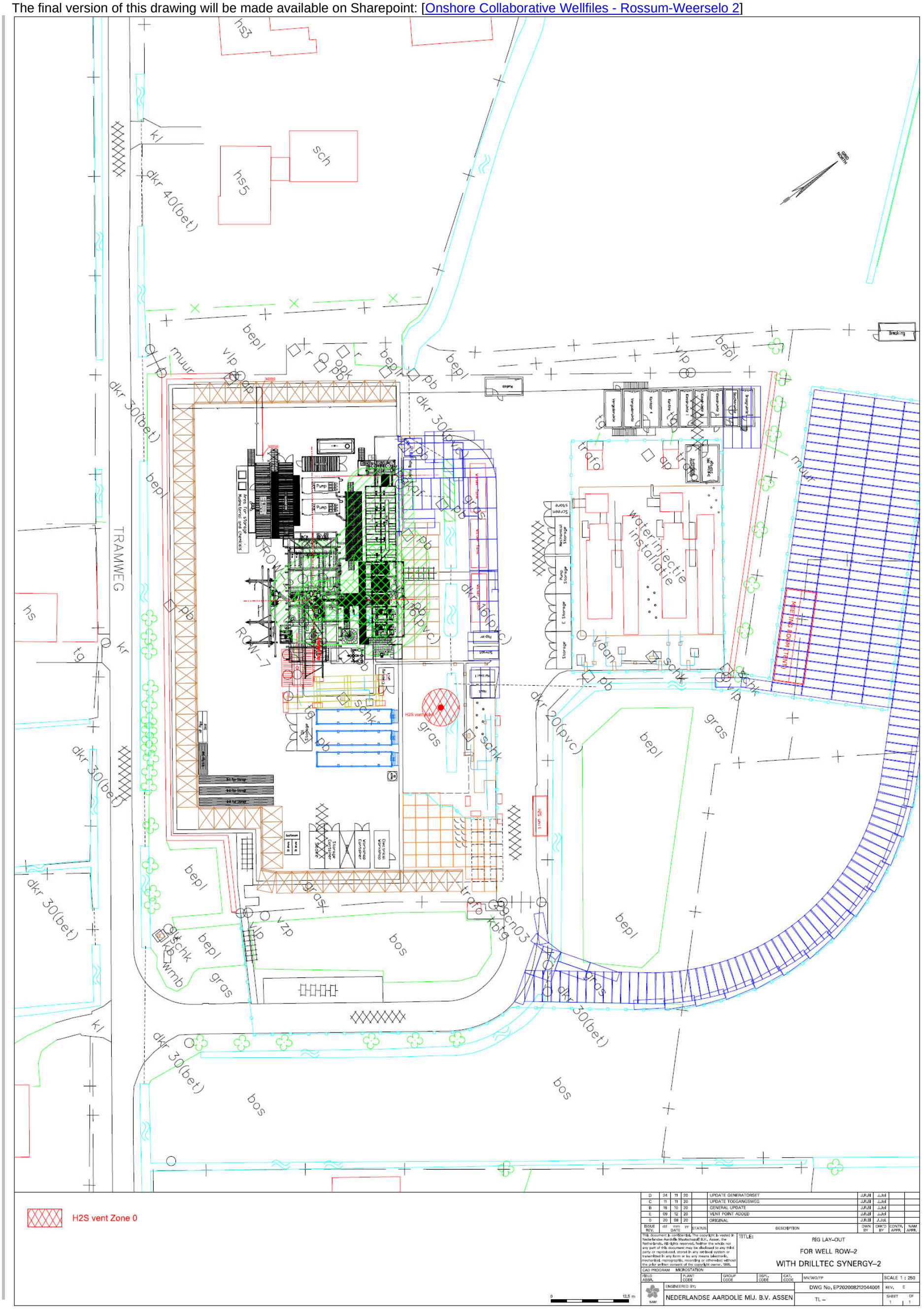
Security is located just outside the entrance on the parking lot of the location, just before turning onto the location through the main gate.

Main muster point is located near the security. Alternative muster will be outside the fence on the North corner of the location.

There will be a parking area established in the field next to the location, after having passed security.

## 4.4 Rig layout drawing for Rossum-Weerselo 2

The integrated drawing, including combined hazardous area drawing for Rossum-Weerselo 2 location with the Synergy 2 rig layout is indicated below.
The final version of this drawing will be made available on Sharepoint: [Onshore Collaborative Wellfiles - Rossum-Weerselo 2]



# 5 Operational program

## 5.1 Summary of operational Workover program

### 5.1.1 Operational Workover documents

Specific details are listed in the following documents:

| Project Phase | Document |
|---|---|
| Planning | Well Functional Specifications (WFS) document for ROW-2<br>[Sharepoint Environment]<br><br>Detailed Design Endorsement for ROW-2<br>[Sharepoint Environment] |
| Execution | SODM Work Program ROW-2<br>[Sharepoint Environment]<br><br>Detailed Workover program for ROW-2<br>[Sharepoint Environment] |

### 5.1.2 Execution of operational workover program

The written Detailed Workover Program (DWP - Ref. 8) for ROW-2 shall be executed in accordance with the SodM package. No work shall be carried out, which in any way conflicts with either company's policies or procedures, unless prior agreement has been obtained. The SodM package is according to Mijnbouwregeling Article 8.2.1.1 and will be submitted to SodM six weeks prior to start of operations (as per Mijnbouwregeling Article 8.2.1.2 sub 1).

### 5.1.3 Significant changes to operational program

Any changes to endorsed design and/or detailed workover program shall be discussed with relevant stakeholders and required TA2 approvals (or TA1) shall be sought from disciplines involved in the change. The Wells management of change program is applicable. Prior to implementing, the changes shall be discussed with the personnel concerned. Any significant changes will be reported to SodM as per Mijnbouwregeling article 8.2.1.2, sub 2 & 3.

### 5.1.4 Main workover program

The DrillTec workover rig Synergy 2 will be mobilized and rigged up on the Rossum-Weerselo 2 location. The rig will carry out the following operations:

1. Rigging up the Synergy 2 rig on ROW-2 well
2. Nipple Down Temporary Adaptor Cap (SodM single barrier dispensation pending approval)
3. Nipple Up and Pressure Test BOPs
4. Retrieve pre-cut 5x4" completion tubing
5. Run In Hole overshot assembly, engage with 4" tubing stump / anchor latch, unlatch same from 7" anchor / production packer with right hand rotation. Retrieve 4" tubing stump and anchor latch and lay down same.

   Note: Contingency runs available if 4" tubing stump / anchor latch is unable to be unlatched with right hand rotation.
   - Run In Hole wash over shoe assembly and mill out anchor latch (including 7" production packer)
   - Run In Hole packer picker milling tool to retrieve packer (if not done during 1st contingency)
   - Run In Hole phissing spear and retrieve packer (if not done during 2nd contingency)
6. Check access though existing 7" production packer and 3-1/2" tail pipe and confirm Hold Up Depth.

   Note: This step is omitted if the packer has been milled and retrieved during previous step.
7. Scrape entire 7" production casing in preparation for 7" corrosion log

8. Perform corrosion log on 7" production casing with multi-finger caliper tool (Multi Finger Caliper Tool)

   Note: If corrosion log exceeds threshold, then the decision can be made to temporarily suspend the well ROW-2.
9. Pick up and run in hole Retrievable Test Packer. Set same at circa 1135m along hole top bottom flange (below proposed production packer setting depth). Fill up well with 1.0 – 1.03sg water-based fluid and Pressure Test well to 20/85bar for 5/20min. Retrieve Retrievable Test Packer from well.

   Note: If pressure test fails, then a leak investigation is conducted to acquire information regarding source / location of leak. Pending result, the decision can be made to temporarily suspend the well ROW-2. Please find suspension details / WSD in appendices.
10. Pick up DLT packer and set same at ~50mAHTBF. Fill up well with 1.0 – 1.03sg water-based fluid and Pressure Test DLT to 20/85bar for 5/20min. Nipple down BOP, nipple down LDO tubing head spool and install new bowl weevil type tubing head spool. Retrieve Retrievable Test Packer (Refer to appendices for new Tubing Head Spool arrangement drawings)
11. Run In hole new 5 x 3-1/2" completion tubing and 7" production packer. Install same.
12. Pressure test hanger seals to 20/85bar for 5/15min.
13. Install shear disk plug (390bar shear) in tailpipe nipple. Top up tubing and A-annulus above packer with 1.0 – 1.03sg water-based fluid
14. Pressure tubing to 20/85bar for 5/20min and set 7" production packer.
15. Pressure test A-annulus / production packer to 20/85bar for 5/20min.
16. Set hanger plug and test same to 20/85bar for 5/15min.
17. Nipple Down BOP
18. Nipple Up existing refurbished XMT / like for like XMT or Temporary Adaptor Cap (pending availability) and test same to 20/85bar for 5/15min.
19. Rig up slick line and retrieve hanger plug and plug from tail pipe nipple. Install MCV valve in landing nipple at ~100m Along Hole. Rig down slick line.
20. Rigging down Synergy 2 and departure of Rossum-Weerselo 2 location

A decision tree for the workover at ROW-2 is shown in Figure 3.

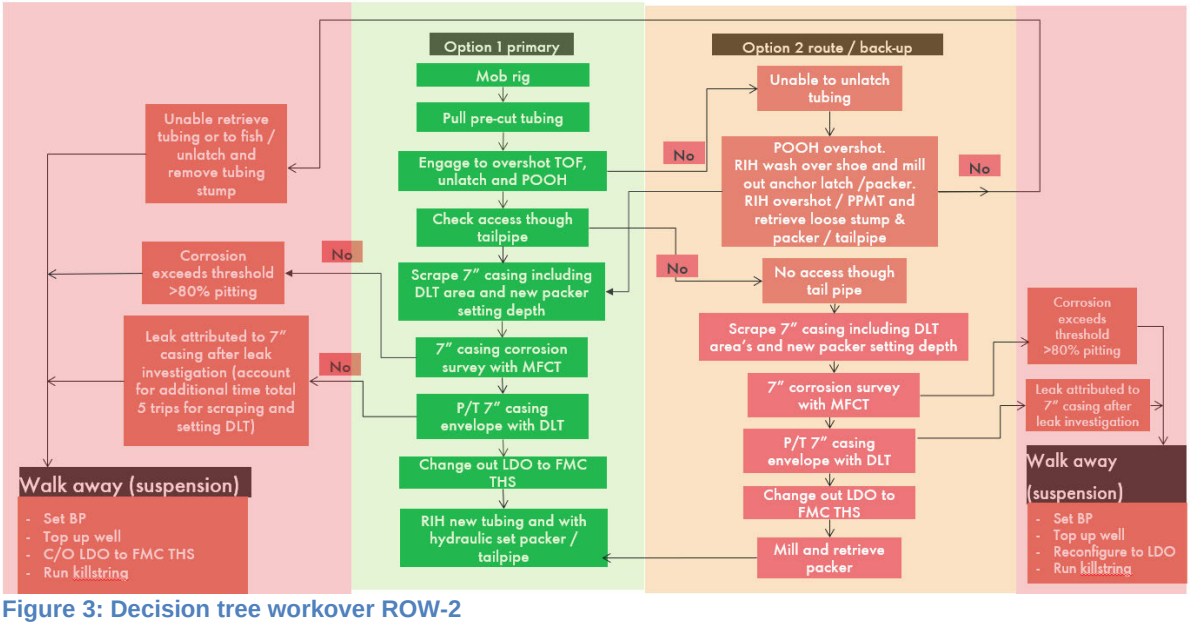



**Figure 3: Decision tree workover ROW-2**

## 5.2 Summary of workover operations

No other workover or well intervention operations are planned on Rossum-Weerselo 2 location during the workover of ROW-2. Any planned well intervention operations, such as slickline, that are part of the workover of ROW-2 are included under 5.1.4 and can be found in more detail in the SODM work program [Ref. 8].

## 5.3 Summary of production operations

Production Water from the Schoonebeek Treatment Plant is transported via the Rossum-Weerselo 3 location to the Rossum-Weerselo 2 location. During the workover and well intervention activities on ROW-2 it is allowed to inject Production Water in the ROW-7 well.

Operations can perform routine maintenance or other operation related activities on location but will not plan and perform well intervention activities on ROW-7 well during the ROW-2 workover activities.

# 6 Combined operations review

The execution of the activities as combined operations is based upon the combined operations review. The report of the combined operations review can be found in attachment 3.

The combined operations review has been reviewed by representatives of all the involved parties (well engineering, workover contractor, operations and HSE teams). The involved parties agree that with the measurements and mitigations as laid down in the combined operations review report, the risks of workover operations concurrently is considered ALARP. Agreements are laid down in chapter 7.2.

The CO initiation note states that ROW-7 shall be protected from dropped objects with an Ameland kap. During the CO HAZID the participants identified that there could be insufficient space to position an Ameland kap on the ROW-7 well. Therefor an alternative method of protecting ROW-7 from dropped objects can be introduced to protect the ROW-7 well from dropped objects in case there is insufficient space to place an Ameland kap.

The Production Unit Manager has decided to continue the activities as combined operations.

# 7 Management structure and responsibilities

## 7.1 General responsibilities & management structure

In alignment with the Dutch ARBO law, the following employers can be identified. NAM owns the site and for that reason have to appoint a NAM employee as Locatie Verantwoordelijk Persoon (LVP). The combined operations take place under single-headed leadership by the Head Combined operations (HCO). The HCO role is in all cases combined with the LVP-role. In Attachment 7 the responsibilities of the HCO and LVP are specified.

The Drilling Supervisor (DSV) will perform the HCO role since this discipline creates the highest interaction risk. During combined operations, the HCO is responsible for identifying interaction risks and ensuring proper follow up on the agreed measures, VGWM/HSEW coordination of activities involving interaction risks and managing the emergency response organization.

NAM DSV has overall responsibility for all well construction related activities & safety on the workover site and ensures adherence of all parties to the requirements of this HSE document; also he should supervise all activities or delegate this duty to a competent person. The deputy for the DSV-role will be the DrillTec tool pusher (TP).

The workover contractor owns the workover installation, performs the workover activity and provides a supervisor for that activity. The DrillTec TP is the workover contractor supervisor. The TP has responsibility for the technical integrity of all equipment used for workover activities, including (sub-) contractors of the DrillTec where they interact with the workover unit, and for the safety and welfare of personnel directly involved in the operations. The TP with his team is handled as one employer on site (Workover employer).

The Head of Area Operations [UPO/T/LPW] has operational responsibility for the oil and gas production on the Rossum-Weerselo 2 location. Operations are allowed but not limited to manipulate the wells within their operating windows.

The general management structure and organization during workover is shown in the organization chart below. The Senior Well Engineer and the Lifecycle Well Engineer in Assen will manage the workover project.

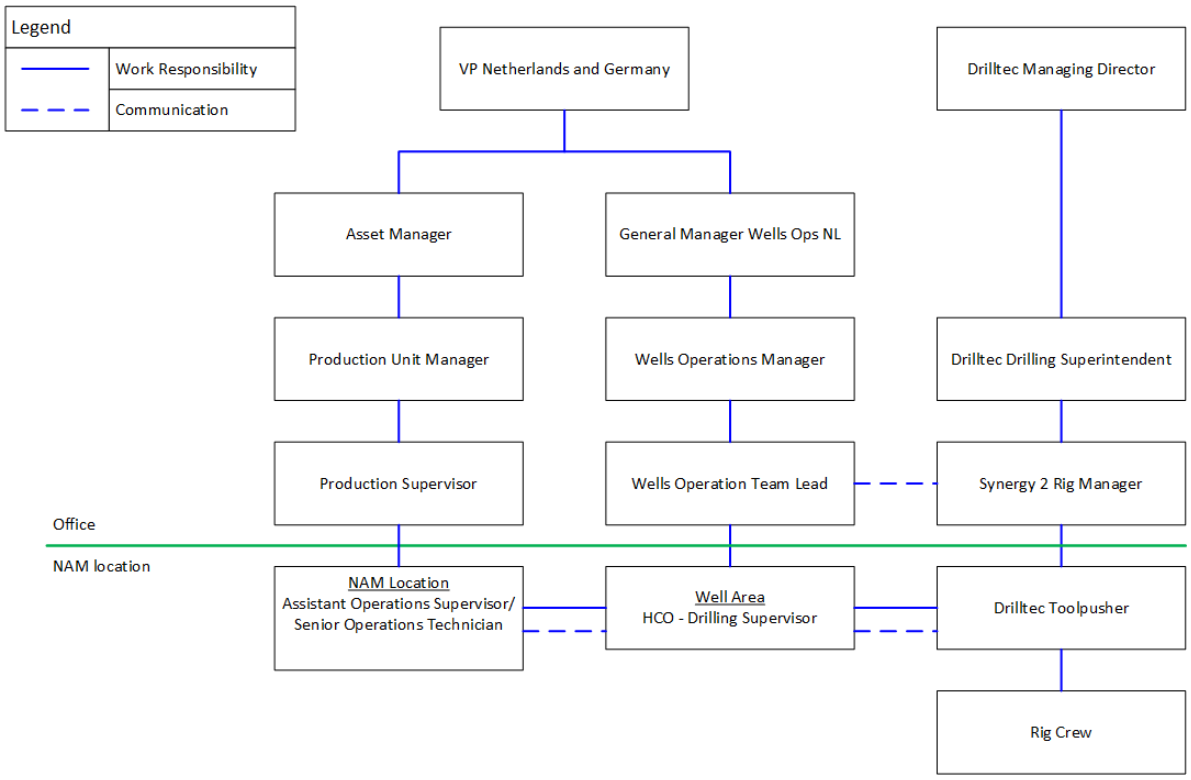



**Figure 7-1: Organogram: during normal work execution in case of workover rig**

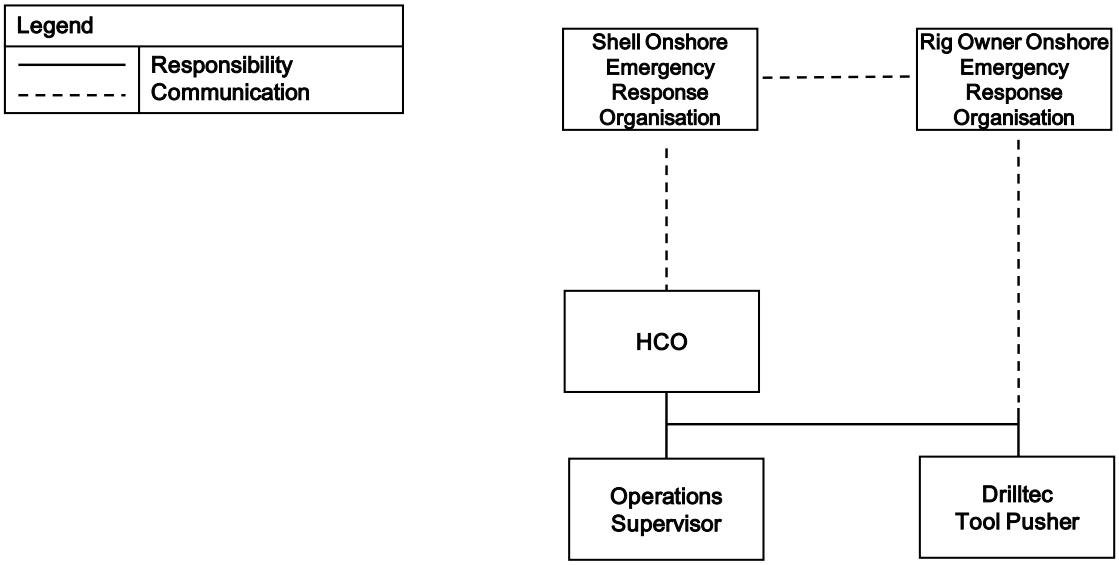
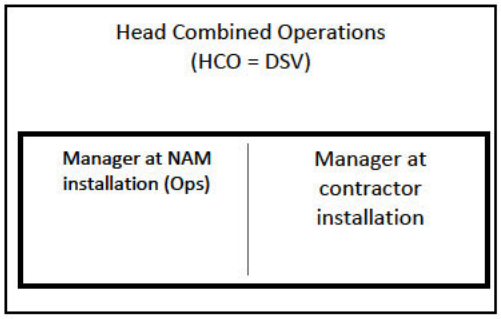



**Figure 7-2: Organogram: during emergencies**

## 7.2 Workover Operations agreements

**Agreements related to responsibilities**

- The NAM DSV will act as Head of Combined Operation (HCO)
- HCO is responsible for managing interaction risks between individual workplaces and giving approval for the sequence and method of execution of these activities on at least daily basis, and upon any change in the situation.
- HCO is also responsible for emergency organization on site in the event of emergency.
- Operation activities will be executed under single-headed supervision of the Production Supervisor
- Workover activities will be executed under single-headed supervision of NAM DSV.
- Operations shall ensure that portable gas detection will be installed in the operational process area (near the wells)
- Plant maintenance activities will be executed under single-headed supervision of the dedicated maintenance Supervisor.




**Agreements related to work areas and hand over of the workover work area**

- For operators and contractors related to operation it is not allowed to walk through the workover area.
- Prior to the supply of the first materials the DSV or his delegate makes sure that the preparation of the location is done according agreed plan.
- The location will be handed over to the HCO when he arrives on location and after he has received an induction to the site from Operations [UPO/T/LPW].
- Combined operations starts after handover to the HCO.
- The location will be handed back to Operations [UPO/T/LPW], after the workover of the ROW-2 well is completed and the rig has departed and when the ROW-2 well is accepted by Operations [UPO/T/LPW]

**Well and location status**

- Asset Onshore NL operations team to confirm the integrity of all wells on the Rossum-Weerselo 2 location and specifically of the Safety Valves and annuli based on the most recent test conducted not later than 3 months prior to rig move.
- ROW-7 will be protected against dropped objects with an Ameland kap or an alternative means of protection during the full duration of the Combined Operations.
- Within the workover area only basic routine maintenance checks by operations are allowed when accepted by the HCO.
- An electrical safeguard will be installed on the ROW-7 injection pump skid. The injection pump skid will be set up in such a way that, if a critical value of power is exceeded, the injection pump and auxiliaries will be switched off, i.e. production water injection will stop and the rig will continue to operate.

**Normal operations: work permits & work execution**

- For activities concerning workover the DrillTec permit system will be used, for permits concerning the production location NAM's PtW system will be used.
- Production Unit East is the work permit issuer ('verstrekker') for the operations related activities.
- The DrillTec TP is the work permit issuer ('verstrekker') within the workover related activities. NAM HCO authorises work permits for non-routine and / or critical activities.
- All activities will be discussed with HCO prior to start. Each work permit involving interaction risks shall be co-signed by HCO. With the co-signing of a permit the HCO approves for the sequence and method of execution of the activities with interaction risks on at least a daily basis, and upon any change in the situation.
- HCO initiates daily combined operations communication meeting when / if required as applicable to the planned combines operations, at least attended by the HCO and Operations Supervisor / Senior Operations Technician, to discuss the HSE interactions risks and actions needed. The agreed measures are recorded by the HCO (in a 'CO-logboek'). HCO's decision on HSE interactions risks is final.
- Matrix of Permitted Operations is leading in the decision-making process (Attachment 5).
- Unplanned or corrective work will be discussed with HCO prior to start.
- Necessary operational activities will be done, as far as possible, during daytime.
- The barriers as identified during the combined operations review should be available and functional.

**Normal operations: personnel access control, mustering**

- All personnel (both workover and operations) accessing the Rossum-Weerselo 2 location will report to the workover rig security, which will keep an up to date list of all personnel on site.
- The security will ensure that all personnel accessing the Rossum-Weerselo 2 location will have the correct $H_2S$ training and PSE.
- There is a combined main muster point for all staff and one dedicated alternative as stated in the Rig Specific LNP. (This Rig Specific LNP overrules the Onshore NL LNP during CO in case of a conflict).
- Security & logistics will be located at the private access road as per rig location layout drawings (paragraph 4.4).

**In case of incidents**

- In case an incident or unsafe act/condition the HCO is informed. Reporting and follow up takes place according to "NAM-17.WI.04.01 Incident notifications (internal and external)" (ref. 11) and "UIE-17.PR.04 Incident Reporting and Follow-up" (ref. 12). The requirement concerning internal notification to line management implicates that at least the Asset Manager have to be informed since he is final accountable for the activities within Asset Onshore NL. In relevant cases also the General Manager Wells Operations have to be informed.
- Wells is incident owner for incidents related that occur within workover related activities. Operations is incident owner for incidents which occur in the productional related activities.

**In case of emergency**

- The HCO (DSV) will contact CMK using a internal alarm number 0592 369999.
- The HCO (DSV) will contact duty Emergency Incident Manager (EIM) via CMK.
- The HCO (DSV) will contact HCDC for operational status change and to contact duty LRT of Asset Onshore NL.
- HCDC/CMK will inform shift operations Area East.
- In case emergency services are needed the HCO (DSV) will call 112 **AND** NAM Assen CMK using the internal alarm number **0592 369999.**
- The HCO (DSV) will wear yellow helmet with black band and will perform role as LRT leader awaiting arrival of Asset LVP.
- With emergency services / asset LVP decision will be made who will wear the yellow helmet during the emergency.
- Location response team leader will be supported by the Asset Onshore NL LRT.

- The HCO (DSV) will inform his Wells Operations Team Lead or duty WOTL.
- EIM will mobilize whole or part of ECT based on the situation.
- In case an Emergency Shut Down (ESD) is initiated:
    - The injection skids will shut down and the injection wells will close on the actuated safety valves (SSSV and the UMGV)
- A local Emergency Shut Down (ESD) can be initiated:
    - By the ESD button near the injection skids;
    - By HCDC.
- In case of a potential blow out of ROW-2 the location Rossum-Weerselo 2 shall be closed-in via the ESD button and HCDC shall be informed.

For emergency response the following documents apply:

- The Onshore Contingency Plan (OnCP) (Ref. 6) is available for NAM activities onshore, which contains communication an organization schemes to activate the calamity organization of Technical partners.
- The location specific fire-hazard related risks and scenarios are described in the LNP (Lokatie Noodplan – Location Emergency Plan of the area (Ref. 9).
- The rig specific Lokatie Noodplan (Rig LNP) of the Synergy 2 (Ref. 10) applies and is available for use on the rig. This Rig specific LNP overrules the LNP during CO in case of a conflict.

# 8 Communications

## 8.1 Emergency telephone list

| Item | Details |
|---|---|
| Location name | Rossum-Weerselo 2 |
| Site Location – Address | Tramweg 7, 7596 NA Rossum |
| Entrance Location – Coordinates | E 006 56 12.950<br>N 52 20 36.230 |
| On site emergency response coordinator | NAM Drilling Supervisor (NAM DSV) |
| On site emergency response telephone no. (Synergy 2 DSV/LVP) | 0592 36 49 01 / 06 536 74 665 |
| On site tel. no. | +31 (0)541 625 293 |
| On site fax no. | - |
| HCDC | +31 (0)592 364 720 |
| Emergency no. | 112 |
| CMK, Assen | +31 (0)592 36 99 99 |
| Operation Supervisor – [redacted] | [redacted] (0)592 36 47 17 |

## 8.2 Rig telephone list

| Name | Function | Telephone Number |
|---|---|---|
| Security | On site security | +31 (0)592 364 900 |
| Tool pusher | DrillTec Synergy 2 Tool pusher | +31 (0)6 200 494 87 |
| [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] |

## 8.3 Well engineer NAM Assen telephone list

| Name | Function | Office | Home | Mobile |
|---|---|---|---|---|
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] | [redacted] | [redacted] |

## 8.4 Asset Onshore NL telephone list

| Name | Function | Telephone Number |
|---|---|---|
| [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] |
| [redacted] | [redacted] | [redacted] |

# 9 References

When not available in BMS or Sharepoint, a hardcopy will be made available on location.
General information about the Rossum-Weerselo 2 location can be accessed via the ODT portal:
[Onshore Collaborative Wellfiles - Rossum-Weerselo 2]

1 Rapport inzake Grote Gevaren Asset OnshoreNL
   a) Rapport inzake Grote Gevaren NAM Asset OnshoreNL – Generiek deel (Nam doc.: EP202001264216)
   [RiGG Asset OnshoreNL Generiek]

   b) Rapport inzake Grote Gevaren Asset Land Productie Unit Schoonebeek (doc nr. EP201705201425)
   [RiGG – Productie Unit Schoonebeek]

2 VG Document (Safety and Health document) NAM Wells – C&WI (Nam doc.EP200711201062)
[VG Document Wells C&WI]

3 VG document (Safety and Health document) NAM Logistics (Nam doc. EP201310207662)
[VG Document NAM Logistics]

4 DrillTec Synergy 2 Safety Case (RiGG):
[Located at Rig site]

5 Health, Safety and Environment Management System Interface Document between DRILLTEC & Nederlandse Aardolie Maatschappij B.V.
[NAM - Drilltec Management Bridging Document]

6 Onshore contingency plan (OnCP),(EPE doc. Nr. EP200608213329), located at:
[Onshore contingency plan]

7 Detailed Design Document for ROW-2:
[Detailed design document]

8 Detailed Workover Plan for ROW-2:
[Detailed Workover Plan]

9 LNP for 'Gemeente' Dinkelland:
[Lokatie Noodplan Gemeente Dinkelland]

[Veiligheidsplattegrond Rossum-Weerselo 2]

10 LNP for DrillTec Synergy 2:
[Located at Rig site]

11 NAM-17.WI.04.01 Incident notifications (internal and external)
[NAM-17.WI.04.01 Incident notifications]

12 UIE-17.PR.04 Incident Reporting and Follow-up
[UIE-17.PR.04 Incident Reporting and Follow-up]

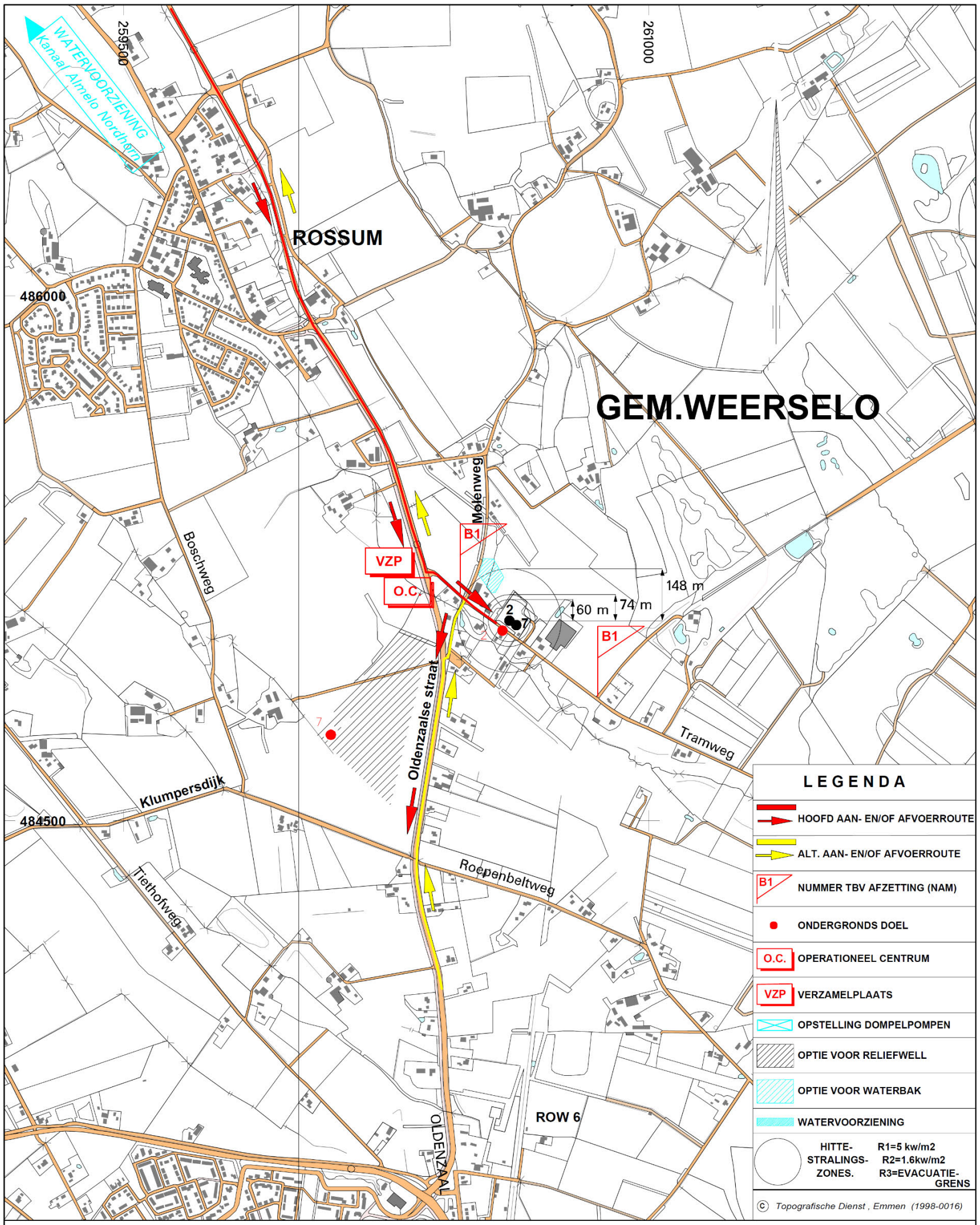
13 Risk Assessment Matrix, figure 1 in "Managing Risk", part of the HSSE & SP Management System Manual, version 6, February 2016.
[Risk Assessment Matrix]

14 H2S management plan NAM – DrillTec Synergy 2 for SCH 3151 and ROW-2
[H2S Management Plan]

# 10 Attachments

**Attachment 1 Response map**

Aanrijroutekaart (trafficplan) Rossum-Weerselo 2 tbv ROW-2 workover




BLUSWATERVOORZIENING

**Toevoerslangen over een afstand van 4900 meter via diverse wegen naar opstelplaats dompelpomp bij kanaal Almelo-Nordhorn.**
**Zie voor gedetailleerde situatie op Overzichtskaart Watervoorziening (tek.nr.60390) KAART 3**
**Waterschap, wegbeheerder en omwonenden inlichten.**

ADVIES VOOR AFZETTEN/AFSLUITEN TOEGANGSWEG(EN)

**B1 - Kruising Molenweg/Tramweg**
**B1 - Tramweg volgen in zuidoostelijke richting tot buiten de gevarenzone.**

BIJZONDERHEDEN

**De locatie ligt in een bebouwd gebied met aan de noordzijde een perceel grasland en aan de andere zijden woningen, binnen een straal van 50 meter.**

NAM

Projection system: RD
Ellipsoide: Bessel (1841)
Datum: Amersfoort

**NEDERLANDSE AARDOLIE MIJ. B.V.**

AANRIJROUTEKAART
LOCATIE
**ROSSUM-WEERSELO-2**
Schaal 1 : 15000

| | | | |
|---|---|---|---|
| Datum : | 27-04-2001 | Tekening nr. : | 0110825002 |
| Laatste wijziging : 20-07-2006 | | Bijlage : | |

## Attachment 2 Original Combined Operations Initiation Note

NAM Nederlandse Aardolie Maatschappij B.V.

**Onderwerp:** Concurrent Operations Initiation Note ROW02 locatie
**EP nr:** EP202007200532
**Datum:** 06 juli 2020
**Plaats:** Assen

Deze notitie heeft tot doel de justificatie te geven voor het in "concurrent operations" injecteren van de put ROW-7 tijdens de workover werkzaamheden in water injectie put ROW-2.

Introductie

Naast ROW-2 bevindt zich op de ROW02 locatie een tweede water injectie put, te weten ROW-7. ROW-7 zal naar verwachting begin augustus 2020 weer beschikbaar zijn voor injectie, na vervanging van de water aanvoerleiding van deze put. Dat levert een geschatte extra olieproductie op van zo'n 50 m3/d. Dit is ook het voordeel van het op injectie houden van ROW-7 tijdens de workover van ROW-2.

Daarbij komt dat in één van de twee andere water injectie putten van de Schoonebeek asset, nl. ROW-4, er nog steeds een reëel risico is dat the thrust chamber van de injectiepomp uitvalt. Als dat gebeurt tijdens de workover in ROW-2 terwijl ROW-7 niet beschikbaar is, zou dat een grote impact hebben op de olieproductie van Schoonebeek, in de orde van 3-400 m3/d olie.

Het voorstel is daarom om tijdens de workover werkzaamheden in ROW-2, ROW-7 op injectie te houden.

Uitgangspunten

- Begin van de rig werkzaamheden: laatste week October 2020 (ref. Short-term Drilling Sequence juni-2020)
- Geplande tijdsduur: 20 dagen
- Bestaande injecterende put: ROW-7 (naar verwachting terug op injectie mid-augustus 2020)

Rig op/afbouw en operaties

Onderstaande figuur en foto geven een overzicht van de ROW02 locatie.

De putrand van ROW-2 is niet meer dan zo'n 10 m verwijderd van ROW-7. De water aanvoerleidingen van beide putten lopen deels ondergronds vanuit de pomphuizen aan de noordkant van de locatie naar de putten. Het wordt aangenomen dat de leidingen geen belemmering vormen tijdens rig opbouw en operaties, dit dient tijdens een locatie inspectie bevestigd te worden. Bij een eerste bezoek aan locatie van de Well Engineer samen met Operaties werd al vastgesteld dat er een rig opbouw mogelijk is waarbij de ROW-7 toevoerleiding aan de put kan blijven.

Rond de putten is voldoende ruimte voor de rig (binnen de blauw-omrande ruimte rond de putten in de figuur beneden). Er is een Amelandkap nodig over ROW-7 tijdens de rig op/afbouw en operaties. Tevens kan put ROW-7 tijdens op/afbouw ingesloten en/of afgeplugd worden.

De toevoerweg van de locatie is de lichtblauw gemarkeerde lijn in de figuur. In het ideale geval wordt een éénrichtings route gehanteerd worden voor aan-en afvoer tijdens rig op/afbouw en operaties. De mogelijkheden daarvoor zullen ook tijdens een locatie inspectie geïdentificeerd worden.

Het bestaande evacuatieplan van ROW02 zal tijdens een locatie inspectie bekeken worden in het licht van de aanwezigheid van de rig, en waar nodig aangepast en/of uitgebreid worden.

Alternatieven ter voorkoming van concurrent operations

- Ander tijdstip van uitvoering: niet mogelijk gezien andere aktiviteiten van de rig en noodzaak voor uitvoering van de workover in 2020, om de vergroting van de water injectie capaciteit door het in bedrijf komen van het water pomp station in De Hulte, voorzien voor eind 2020, ten volle te benutten.

- Water injectie in andere injectieputten opschroeven ter compensatie: naast ROW-7 heeft de Schoonebeek asset momenteel maar twee andere water injectie putten in bedrijf. De capaciteit van de twee putten (ROW-4 en ROW-5) wordt al helemaal benut.

Conclusie

Gezien de te verwachten impact en het niet beschikbaar hebben van alternatieven om de impact te reduceren is het wenselijk de ROW-2 workover onder concurrent operations uit te voeren. Tijdens het opstellen van het C.O.-script zal worden beoordeeld welke maatregelen nodig zijn om deze C.O. veilig uit te voeren. Er zal indien noodzakelijk een meeting worden belegd met betrokkenen.

Betrokken personen zijn: [redacted]

Approvals:

[redacted]

CO_Initiation_Note _ROW-2_GW_Appro

[redacted]

RE ROW-2 CO Initiation note_Appr

## Attachment 3 Combined operations Review

1 Work scope

During intended workover operations, the scope of work is as described in chapter 5.

2 Risk analysis

The goal of the risk analysis is the identification of the hazards which could have interaction risks and determination of barriers and agreements. All team members have agreed that when these barriers and agreements are met that the risks of performing workover of ROW-2 are ALARP.

2.1 Required inputs

Available information during the risk analysis:

| Information | Input from |
|---|---|
| Details of selected rig | Rig manager |
| Safety/HSE Case for the location | Operations |
| Safety/HSE Case for the rig | Rig manager |
| Emergency Response Plans for the location | Operations |
| Fixed Installation Drawings – locations and outlines | Operations |
| Hazardous Area Drawings | Operations |
| Escape and Life saving Appliance Drawings | Operations |
| Work plan including pre-works plus activity details | Activity owners |
| Rig and Equipment Layout Drawing for activity | Well Engineering Operations |
| Heavy lifts and dropped objects that could have consequences for the installation | Rig manager |
| Learning points from previous workover projects | All |

2.2 Required attendants

The risk analysis will normally be attended by the following persons:

| role | Name | Company | Present (yes/no) |
|---|---|---|---|
| [redacted] | | | |

The table in paragraph 2.6 has been compiled during the online risk analysis held on 16 October 2020.

2.2.1 HAZID Review

During the HAZID on the16th October 2020 the HAZID team concluded that there was insufficient power to operate the Synergy 2 and the water injection pump skid simultaneous.

New and detailed information regarding the actual power consumption of the Injection pump skid and the Synergy 2 has been made available after the Combined Operation Summary had been submitted to SodM. The outcome of this new information is that the workover activities and the water injection in ROW-7 can be executed simultaneous.

A HAZID Review has been executed on the 8th December 2020 to identify new Major Accident HAZIDs related to performing the workover and production water injection concurrently. The outcome of this HAZID review has resulted in a new revision of th4e Combined Operation Summary (rev 1.1).

## 2.3 HAZARD Checklist

The HAZARD checklist below is derived from the HAZID worksheets from previous onshore workover/drilling operations reviews and issues has been added taken from the Downstream Manufacturing Hazard and Effects Register.

In future this HAZARD Checklist may be extended, based upon experience.

| | Category | Top event |
|---|---|---|
| 1 | Heavy logistics transport (traffic) during rig move and workover (Normal transport to and on site) | Traffic collision of people / bicyclist / car on public road |
| | | Traffic collision on location / with pipeline / objects falling on pipeline or on pressurized site equipment (wellheads) |
| | | Obstruction by transmission towers |
| 2 | Heavy lifting (rig up/down of the rig and workover operations) | Dropped objects |
| | | Toppling crane |
| | | Falling mast |
| 3 | Live wells / pressurized equipment on and near location (gas containment) | Corrective maintenance on equipment / wells |
| | | Gas release, suction of gas into generator intake |
| | | Gas release towards hot surfaces, open flames |
| | | Breathing of atmospheric tanks |
| 4 | Noise, light and sound | Exceeding noise/light limitations |
| 5 | Evacuation | Alarm not audible on entire location |
| | | People unaware of potential dangerous situation |
| | | People enter the location after the alarm goes off |
| 6 | Overflow of waste water system (due to extensive rainfall) | Overflow of location (rainwater pit) with contaminated supply to surface water |
| 7 | Losses | (Excessive) losses (can occur from known geology) |
| 8 | Flammable substances (liquids containment) | Release of a liquid (spill) |
| | | Release of vapor / gas from a liquid (fire or explosion) |
| | | Exhaust of combustibles |
| 9 | Hazardous / toxic chemicals (liquids / vapor) | Leakage of hazardous chemicals (e.g. MeOH, corrosion inhibitor) |
| | | H2S release |
| | | Benzene release (from tubing) |
| | | Mercury release |
| | | Exposure to radiation |
| 10 | Drilling into reservoir | Kick to surface |
| | | Unignited blow out |
| | | Ignited blow out. Wells / pipelines inside 12.5 kW/m2 heat radiation contour |
| | | H2S release from reservoir |

| | | |
|---|---|---|
| | | Collision with other wells |
| 11 | Environmental sensitive area | Natura 2000 |
| | | Water born bacteria “Bruin rot” |
| | | Ecologische Hoofdstructuur |
| 12 | Authorities / stakeholders | Wrong information / miscommunication |
| | | Social experience |
| | | Complaints of neighbors |

## 2.4 Status of pressurized systems during CO

Well, pipeline and equipment status during CO

*Well ROW-7*

| | |
|---|---|
| During cat 4 lift (Lavett and rig floor): | No requirement to close valves on the well and protection (with Ameland kap or with legoblocks and draglines installed). |
| During rigging up/down: | Available for injection and protection (with Ameland kap or with legoblocks and draglines installed). |
| During Workover: | Available for injection and protection (with Ameland kap or with legoblocks and draglines installed). |

*Production Water Pipelines:*

| | |
|---|---|
| During cat 4 lift (Lavett and rig floor): | Handvalve incoming production water pipeline closed |
| During rigging up/down: | Available for injection |
| During Workover: | Available for injection |

*Production Water pump Skid(s):*

| | |
|---|---|
| During cat 4 lift (Lavett and rig floor): | Shut down |
| During rigging up/down | Available for injection |
| During Workover: | Available for injection |

## 2.5 Specific issues and concerns

The following items have been identified

- eMOC regarding single barrier deviation when removing TA cap and installing BOP.
- Damage to adjacent housing due to vibrations caused by the Workover activities

2.6 Specific issues and concerns

The following actions arose during the operations review are listed below.

| Nr. | Actions from CO Review | Action Party | Date | Status | Code |
|---|---|---|---|---|---|
| 1 | Deliver information regarding the Synergy 2 power requirements for injection of trucked fluids in ROW-2 | [redacted] | 6 Nov 2020 | Information has been shared | C |
| 2 | Determine if the injection skid can be operated and inject production water in ROW-7 when the Synergy 2 is injecting fluids in ROW-2 | [redacted] | 6 Nov 2020 | It has been confirmed that the injection in ROW-7 can be done whilst the Synergy 2 is injecting fluids in ROW-2.<br>An electrical safeguard will be installed on the ROW-7 injection pump skid. The injection pump skid will be set up in such a way that, if a critical value of power is exceeded, the injection pump and auxiliaries will be switched off, i.e. production water injection will stop and the rig will continue to operate. | C |
| 3 | Engineer redundancy in 2x2 m water pit to ensure that the potential contaminated rainwater will be pumped in the storage containers during extreme rainfall (include lessons learned P&A unit). Take in consideration the travel time to truck away the excessive rainwater. | [redacted] | 6 Nov 2020 | 3 x 55m3 storage containers/tanks will be placed to store excessive rainwater. This potential contaminated rainwater will be trucked away towards the 'riool Water Zuiverings Installatie (RWZI)' in Hengelo. | C |
| 4 | Ensure that lego blocks are installed around the 'opkomer' to mitigate collision during transport on location and add them to the lay out drawing | [redacted] | 6 Nov 2020 | Confirmed | C |
| 5 | Reposition chemical and hydrocarbon storage within the gutter system to mitigate soil contamination outside the gutter system | [redacted] | 6 Nov 2020 | Confirmed | C |
| 6 | Ensure that the position of the crane (used during rigging u and down) is chosen in such a way that the crane will not reach the surrounding houses in case the crane would tip over. | [redacted] | 6 Nov 2020 | Crane-radius in relation to the nearest houses will be addressed in the Drilltec lifting plan. | O |

| Nr. | Actions from CO Review | Action Party | Date | Status | Code |
|---|---|---|---|---|---|
| 7 | Include the lessons learned from Monster with regards to vibrations during the workover (implement vibration-meter and zero measurements of potential damage already present of the surrounding houses) | [redacted] | 6 Nov 2020 | There are zero-point measurements of house damage of five years ago, and another survey will be done before start of operations on ROW-2. Vibration meters will be installed. | C |
| 8 | Determine the time restriction (e.g. daytime only and if working in the weekend is allowed) to perform the workover activities in relation to exceeding noise limits at adjacent housing. | [redacted] | 6 Nov 2020 | In progress. Engagement of local residents by NAM's External Relations is ongoing. | O |
| 9 | Organize that gas detection on the Synergy drill floor to detect sour gas coming to surface will be made available | [redacted] | 6 Nov 2020 | H2S sensors will be arranged for and installed during the period that the workover activities are ongoing. | C |

| | |
|---|---|
| C | Closed |
| N | Not closed |
| O | Ongoing |

## 2.7 Risk analysis worksheets

The purpose of the risk analysis is to address and evaluate all the identified interaction risks of the operational program in worksheets and to determine major hazards.

Major hazards are "…substances, activities, operations or conditions which are assessed as having a consequence severity of 5 or risk ranking of red, as defined in the Group 'Risk Assessment Matrix' (RAM)". These risks are indicated as the "Major Risk Area" in the figure below.

The Risk Assessment Matrix was used to quantify the risk of a hazardous event. More information about the Risk Assessment Matrix can be found in "Managing Risk" Guide (ref. 12)

| SEVERITY | CONSEQUENCES | | | | INCREASING LIKELIHOOD | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | People | Assets | Community | Environment | A | B | C | D | E |
| | | | | | Never heard of in the Industry | Heard of in the Industry | Has happened in the Organisation or more than once per year in the Industry | Has happened at the Location or more than once per year in the Organisation | Has happened more than once per year at the Location |
| 0 | No injury or health effect | No damage | No effect | No effect | | | | | |
| 1 | Slight injury or health effect | Slight damage | Slight effect | Slight effect | | | | | |
| 2 | Minor injury or health effect | Minor damage | Minor effect | Minor effect | | | | | |
| 3 | Major injury or health effect | Moderate damage | Moderate effect | Moderate effect | | | | | |
| 4 | PTD or up to 3 fatalities | Major damage | Major effect | Major effect | | | | | |
| 5 | More than 3 fatalities | Massive damage | Massive effect | Massive effect | | | | | |

| 1 | Heavy logistics transport (traffic) during rig move and workover<br>(Normal transport to and on site) | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Traffic collision of people / bicyclist / cars on public road next to location | - Injury / fatality<br>- Damage to third parties<br>- Limitations to transport to and from location<br>- Interrupted or suspended operation | P:4B<br>E:1B | Procedural:<br>- Logistics coordinator will be assigned to the rig<br>- Logistics plan including a sign plan including traffic guides, "verkeer in- en uitritten", traffic signs to make drivers aware of traffic related to well intervention activities.<br>- Staging area for trucks outside location. | Procedural:<br>- OnCP |
| | | | Hardware:<br>- No | Hardware:<br>- No |
| - Traffic collision on location due to limited location size | - Damage to location<br>- Injury / fatality<br>- Limitations to transport to and from location<br>- Interrupted or suspended operation<br>- Damage ROW 2 wellheads, pipeline, piping, injection skids resulting in uncontrolled production water and/or sour gas release. | P:4B<br>E:4C | Procedural:<br>- Logistics coordinator will be assigned to the rig<br>- Dedicated transport route outside hazardous area<br>- Minimize number of trucks on site at one time<br>- Minimize reverse driving where possible<br>- Reverse driving only allowed when guided<br>- Traffic speed limits part of location induction | Procedural:<br>- Onshore Contingency Plan (OnCP)<br>- Rig specific LNP (well intervention) clearly visible and communicated on location<br>- Rossum-Weerselo 2 LNP<br>- NAM Manual for handling $H_2S$ [EP201403202978]<br>- $H_2S$ management plan NAM – DrillTec Synergy 2 for SCH 3151 and ROW-2 |
| | | | Hardware:<br>- Lego blocks to protect pipeline (opkomer).<br>- 'overkluizing' over pipeline to prevent ground forces on underground part of the pipeline.<br>- Protection around ROW-7 well. | Hardware:<br>- None. |

| 2 | Heavy/complex lifting (rig up/down of the rig and workover operations) | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Dropped objects<br>- Falling mast<br>- Toppling crane | - Injury/Fatality<br>- Damage to third parties<br>- Damage to asset with the potential of uncontrolled sour gas or production water release<br>- Interrupted or suspended operation<br>- Damage to adjacent housing | P:4B<br>E:2B | Procedural:<br>- Adhere to lifting plan (minimum distance, positioning of lifting devices, no lifting of loads over pressurized equipment) according Shell U.I.E. specification of Group Standard for lifting and hoisting operations<br>- Supervision by NAM DSV and DrillTec tool pusher<br>- Pre-job safety meeting by supervisor<br>- Dedicated safety observer to monitor lifting of the rig floor and the Lafette<br>- NAM and Drilltec Adverse Weather Policy and Procedures | Procedural:<br>- No go areas. Minimum personnel on site during heavy/complex lift<br>- Rig specific LNP (well intervention) clearly visible and communicated on location<br>- Rossum-Weerselo 2 LNP<br>- NAM Manual for handling $H_2S$ [EP201403202978]<br>- $H_2S$ management plan NAM – DrillTec Synergy 2 for SCH 3151 and ROW-2 |
| | | | Hardware:<br>- Safety system of crane<br>- Certified lifting and hoisting equipment | Hardware:<br>- Topside protection above ROW-7 well |

| 3 | Hydrocarbon pressurized equipment and piping on location (gas containment) | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - N/A<br><br>Rossum Weerselo is a water injection location and there are no Hydrocarbon producing wells on location. The wells are considered non free flowing wells, therefor the HAZID participants concluded that there is no top event related to Hydrocarbon pressurized equipment and piping on location | | | | |

| 4 | Noise, light and sound | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Exceeding noise/light limitations<br>- Vibration as a result of transport/workover activities | - Limited operations<br>- Limitations to transport to and from location<br>- Damage to housing/buildings<br>- Bad reputation<br>- Complaints | P: 1C<br>E: N/A | Procedural:<br>- Minimise planned logistics transport at night<br>- Restricted working hours for the workover activities are restricted (see action 8)<br>- Lighting will be directed inward towards location<br>- Communication to inform neighbors on period of workover<br>- PR; open communication at all stages with parties involved<br>- Operational awareness (safety meeting, toolbox talk)<br>- Work according to environmental permit<br>- Check on minimization of light disturbance<br>- Active noise management where possible | Procedural:<br>- Following general rig noise reduction rules<br>- External affairs |
| | | | Hardware:<br>- Soundwalls<br>- Continuous 'vibration' measurement<br>- Continuous noise monitoring during workover | Hardware:<br>- None |

| 5 | Evacuation/emergency response | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Alarm not audible on entire location<br>- People unaware of potentially dangerous situation<br>- People enter the location after the alarm goes off | - Exposure to the dangerous situation on location | P:4B<br>E:N/A | Procedural:<br>- Evacuation drills during ROW-2 Workover execution<br>- Security keeps a log of persons present<br>- Security is in charge of roll-call<br>- Location induction<br>Hardware:<br>- No | Procedural:<br>- Rig specific LNP (well intervention) clearly visible and communicated on location<br>- Rossum-Weerselo 2 LNP<br>Hardware:<br>- No |

| 6 | Extreme meteorological conditions | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Extreme rainfall<br>- Thunderstorms and lightning or high winds | - Overflow of corner pits resulting in pollution of soil and surface water(s)<br>- Lightning resulting in damage of the workover equipment<br>- Damage to equipment or injury | P:4B<br>E:3C | Procedural:<br>- Truck away stored water from location (to RWZI Hengelo)<br>- Regular checks made by the rig team<br>- NAM and Drilltec Adverse Weather Policy and Procedures<br>Hardware:<br>- Additional fluid storage tanks with level detection | Procedural:<br>- OncP<br>- Work instruction Notification of incident (17WI0401)<br>Hardware:<br>- Earth bonding<br>- Secondary retention and secondary securing according to DROPS manual |

| 7 | Losses | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Total losses (workover related)<br><br>Losses is not considered a top event but part of the workover program. | | | | |

| 8 | Flammable substances (liquids containment) | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Release of a liquid (spill)<br>- Release of vapor / gas from a liquid<br><br>Source: diesel | - Fire<br>- Injury / fatality<br>Note: When diesel is pumped and gets in contact with a heated surface it could ignite (eg in generators)<br>- Soil pollution<br>- Surface water contamination | P: 4B<br>E: 2C | Procedural:<br>- Flammable substances are stored according regulations<br>- No ignition sources within hazardous area zoning<br>- Labeling instructions | Procedural:<br>- Rig specific LNP (well intervention) clearly visible and communicated on location<br>- Onshore Contingency Plan (OnCP) |
| | | | Hardware:<br>- Diesel storage tank is double walled | Hardware:<br>- Gutter system - Gutter system connected to temporary waterpit and water storage containers |

| 9 | Hazardous / toxic chemicals (liquids / vapour) | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Leakage of stored hazardous chemicals in working area<br><br>Source: diesel tank, gas cylinders, hydraulic oil and injection chemicals | - Exposure of personnel<br>- Soil pollution<br>- Surface water contamination | P:3C<br>E:2C | Procedural:<br>- Hazardous chemicals are stored according regulations<br>- Labelling instructions<br>- Unloading / loading procedures | Procedural:<br>- Rig specific LNP (well intervention) clearly visible and communicated on location<br>- Onshore Contingency Plan (OnCP) |
| | | | Hardware:<br>- Double walled diesel tanks<br>- Hazardous chemicals are stored according regulations | Hardware:<br>- Fluid resistant surface (asphalt)<br>- Spill response equipment<br>- Tertiary means of fluid containment for area on the North of the Synergy 2<br>- Gutter system connected to temporary water pit and water storage containers<br>- Drip trays / bunding<br>- PPE |
| - Rossum-Weerselo 2 is not known as a known LSA location | | | | |

| 10 | Workover on ROW-2 | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| ROW-2 is a non-free flowing well – the likelihood of HC coming to surface and result in a well control situation is most unlikely | | | | |
| - Sour Gas to surface | - Uncontrolled sour gas release at drill floor<br>- Uncontrolled release of Benzene at drill floor<br>- Personnel injury / fatality | P:3C<br>E:2C | Procedural:<br>- Well fill up procedure as part of the workover program<br>- Pressure control manual<br>- Dispersion calculations | Procedural:<br>- Pressure control manual<br>- Rig specific LNP (well intervention) clearly visible and communicated on location |
| | | | Hardware:<br>- Gas detection on drill floor | Hardware:<br>- Well control equipment (e.g. BOP) |
| - Unignited blow out – not considered a credible scenario [Ref. Pore Pressure Prediction for ROW-2, Leendert Geurtsen, 10 June 2020]. | | | | |
| - Ignited blow out – not considered a credible scenario [Ref. Pore Pressure Prediction for ROW-2, Leendert Geurtsen, 10 June 2020].<br>- | | | | |
| - Collision with other wells | - N/A | | | |

| 11 | Environmental sensitive area | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| - Impact Ecologische Hoofd structuur& Environmentally protected area (Natura 2000) | - Disturbance<br>- Exceeding NOx limits<br>- Suspended workover operations | P: N\A | Procedural:<br>- Permit compliance<br>- Noise prognoses<br>- Corner pits isolated to surface water | Procedural:<br>- Noise monitoring |
| | | E:3C | Hardware:<br>- Low NOx emission power supply in case power is not taken from the grit | Hardware:<br>- No |

| 12 | Authorities / stakeholders | | | |
|---|---|---|---|---|
| **Top event** | **Consequences** | **Initial Risk** | **Barriers to prevent happening** | **Barriers to limit escalation** |
| Stakeholder management is covered by External Affairs. | | | | |

## 2.8 Major hazards identified

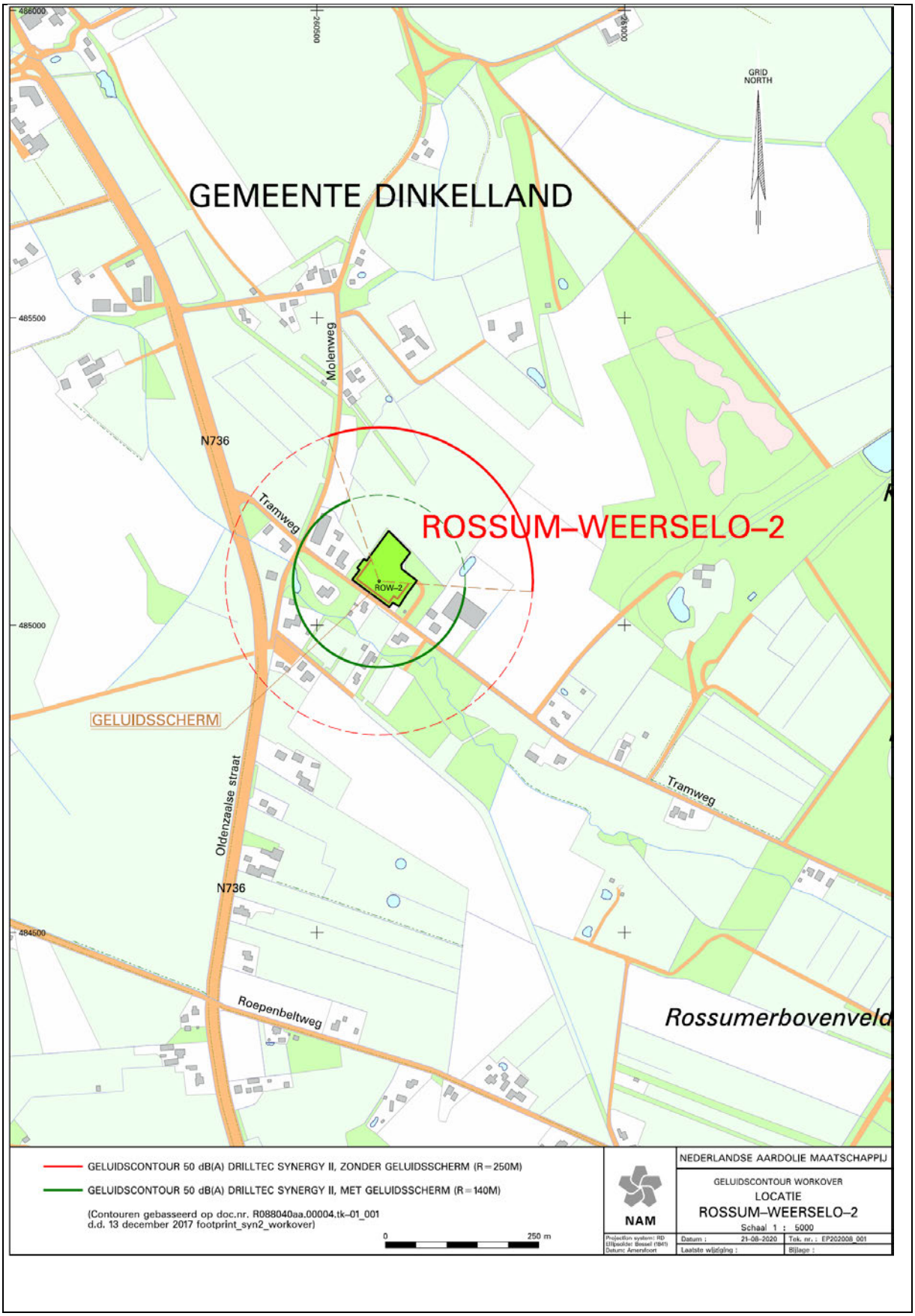
The activities of the work scope are regarded as generally routine project work.

## 2.9 Control of major accidental hazards

The risk analysis of the workover operations identified that the existing and standard procedures and control measures, in conjunction with the project specific actions and measures as listed in the risk analysis worksheets, were considered to be suitable and sufficient to control the major accidental hazards to a level that is ALARP.

## Attachment 4 Environment Permit Documentation

| General |
| --- |
| "Rossum-Weerselo 2" ENVIRONMENT"<br><br>The nearest nature conservation area (Habitatgebied Landgoederen Oldenzaal) is located at a distance of approximately 1,600 meters southeast of the facility. |
| **A BARMM will be submitted to EZ and placed on Sharepoint (the link below is to legal portal):**<br>https://eu001-sp.shell.com/sites/AAFAA1965/Pages/Search.aspx<br><br>Search for "Rossum-Weerselo 2", to find the Kennisgeving Besluit Algemene Regels Milieu Mijnbouw |
| Flaring<br><br>▪ Flaring is not included in the scope. |
| **Noise** |
| Sound contour: 50 dB(A) at 250 meter without sound wall<br><br>Sound contour: 50 dB(A) at 140 meter with sound wall<br><br>See noise contour for ROW-2 workover with the Synergy 2 rig |


GEMEENTE DINKELLAND
GRID NORTH
Molenweg
N736
Tramweg
ROSSUM–WEERSELO–2
ROW–2
GELUIDSSCHERM
Oldenzaalse straat
Tramweg
N736
Roepenbeltweg
Rossumerbovenveld
485500
485000
484500
GELUIDSCONTOUR 50 dB(A) DRILLTEC SYNERGY II, ZONDER GELUIDSSCHERM (R=250M)
GELUIDSCONTOUR 50 dB(A) DRILLTEC SYNERGY II, MET GELUIDSSCHERM (R=140M)
(Contouren gebasseerd op doc.nr. R088040aa.00004.tk–01_001
d.d. 13 december 2017 footprint_syn2_workover)
0
250 m
NAM
NEDERLANDSE AARDOLIE MAATSCHAPPIJ
GELUIDSCONTOUR WORKOVER
LOCATIE
ROSSUM–WEERSELO–2
Schaal 1 : 5000
Datum : 21-08-2020
Tek. nr. : EP202008_001
Laatste wijziging :
Bijlage :

| Light |
| --- |
| Environmental permit: Lights should be properly directed inward and protected to avoid disturbance to the surrounding. |

| Documentation |
| --- |
| **Artikel 42**<br><br>Voor zover documenten met betrekking tot:<br><br>a. de monitoring van het geluid, de registratie van luchtemissies, de bemonstering van het grondwater en de registratie met betrekking tot bodembeschermende voorzieningen op basis van de artikelen 19, 23, 25, 28 en 30,<br><br>b. onderhoudscontracten met betrekking tot op de mobiele installatie aanwezige installaties,<br><br>c. certificaten of bewijzen van:<br><br>1°. Tanks, filters en andere voorzieningen,<br><br>2°. Onderhoud of keuringen van op de mobiele installatie aanwezige voorzieningen en installaties,<br><br>d. de veiligheidsinformatiebladen die behoren bij de op de mobiele installatie aanwezige gevaarlijke stoffen,<br><br>voor de mobiele installatie zijn afgegeven dan wel voorgeschreven, zijn die documenten of een kopie daarvan gedurende de werkzaamheden op de mobiele installatie aanwezig of binnen een termijn die wordt gesteld<br><br>door degene die toeziet op de naleving van dit besluit voor deze beschikbaar.<br><br>**Artikel 43**<br><br>1. Er is een handleiding op de mobiele installatie aanwezig waarin regels zijn gesteld door de uitvoerder ten aanzien van transportbewegingen, pipehandling, het verbranden van aardgas in de openlucht en andere geluidsintensieve activiteiten.<br><br>2. De regels, bedoeld in het eerste lid, beperken de schade aan milieu en overlast voor de omgeving zo goed mogelijk.<br><br>3. De uitvoerder draagt er zorg voor dat een ieder die werkzaam is op de mobiele installatie bekend is met de handleiding en de regels, bedoeld in het eerste lid, naleeft. |

## Attachment 5 Tasks, powers and responsibilities of HCO and LVP

The documents below discuss in further detail the authority and responsibilities of the HCO and LVP.

**Role Description LVP**

Dutch: [Lokatie Verantwoordelijk Persoon (LVP)]

English: [Site Manager (LVP)]

**Role Description HCO**

Dutch: [Hoofd Combined Operations (HCO)]

**Attachment 6 MOPO (Manual of Permitted Operations)**

| Production Critical Operations during Workover Operations | Workover Critical Operations<br>Asset Production Operation / Workover Operation | Rig up & rig down (incl transport) | Lavett and rig floor lifts | Workover operations (incl transport) | Hoisting operations (during workover) | Loss of well control | Hot work |
|---|---|---|---|---|---|---|---|
| | Standard unmanned operations on Rossum-Weerslo 2 location - Production Water Injection via ROW-7 | A | N * | Y | Y | N | Y |
| | Shut in well ROW-7 | Y | | Y | Y | Y | Y |
| | Start up well ROW-7 | A | N* | A | A | N | A |
| | Non-routine / routine maintenance on wells and equipment | N | N | A | A | N | A |
| | Well intervention work on ROW-7 well | N | N | A | A | N | A |

* See attachment 3 - section 2.4

| | |
|---|---|
| Y | = Yes (concurrent operations permitted) |
| N | = No (concurrent operations not permitted) |
| A | = Concurrent Operations permitted only if approved by the HCO |
| | = Not Applicable |

## Attachment 7 Explanatory glossary of abbreviations

| Abbreviations | Meaning |
|---|---|
| ALARP | As Low As Reasonable Practicable |
| ARBO | Arbeidsomstandigheden |
| BARMM | Besluit Algemeen Regels Milieu Mijnbouw |
| BBNP | Brandbestrijding- en Noodplan |
| BOP | Blow Out Preventer |
| CMK | Centrale MeldKamer |
| COS | Combined operation Summary/Script |
| DDP | Detailed Drilling Program |
| DSV | Drilling Supervisor |
| ECT | Emergency Coordination Team |
| EIM | Emergency Incident Manager |
| EZ | Economische Zaken – Economic Affairs |
| HAZID | Hazard Identification |
| HC | Hydrocarbons |
| HCDC | Hoogezand Control Center |
| HEMP | Hazard and Effect Management Process |
| HSE | Health Safety and Environment |
| HSE-MS | HSE Management System |
| LCM | Lost Circulation Material |
| LRT | Location Response Team |
| LSA | Low Specific Activity (Laag radioactief afval) |
| LVP | Locatie Verantwoordelijk Persoon – Location Responsible Person |
| LWE | Lifecycle Well Engineer |
| NAM | Nederlandse Aardolie Maatshapij |
| OnCP | Onshore Contingency Plan |
| PVO | Process Verbaal van Overdracht |
| SodM | Staatstoezicht op de Mijnen – State Supervision of Mines |
| TA | Technical Authority |
| TD | True Depth |
| TP | Tool Pusher |
| VGM-documentatie | Health safety and Environmental documentation |

| Abbreviations | Meaning |
|---|---|
| WABO | Wet Algemeen Besluit Omgevingsrecht |
| WFS | Well Functional Specification |
| WOTL | Wells Operations Team Lead |
| WSDE | Well Site Drilling Engineer |
| WVP | WerkVeiligheidsPlan (Work Safety Plan) |
| | |
| Definitions | Meaning |
| Safety and environmental critical elements (SECEs; also referred to as HSSE Critical Elements) | those items of equipment or structures whose failure could lead to the release of major hazard or whose purpose is to prevent or limit the consequences of a Major incident, excluding business loss |
| Major hazards | substances, activities, operations or conditions which are assessed as having a consequence severity of 5 or risk ranking of red, as defined in the Group 'Risk Assessment Matrix' (RAM) |