Base Load Power Hub (BLPH)

HAZID Terms of Reference

Document Number: 123A90-DDL-SAF-RE-30008

Document Class: 3

1	02/10/2023	Issue for Information (IFI)	R. Dalungi	C. Caracciolo	D. Lo Sterzo
0	20/09/2023	Issue for Information (IFI)	R. Dalungi	C. Caracciolo	D. Lo Sterzo
Rev.	Date	Description	Prepared	Reviewed	Approved

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Revision / Change Log

Rev.	Description
0	Issue for Information (IFI)
1	Issue for Information (IFI)

HOLDS LIST

No.	Description
1	
2	
3	
4	

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1. INTRODUCTION

1.1. PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

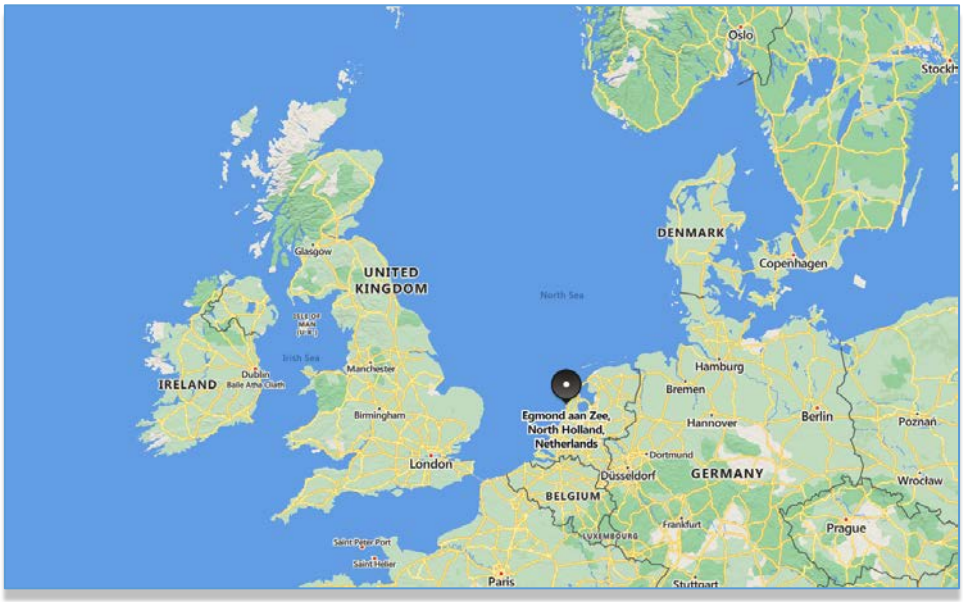


Figure 1 - HOLLANDSE KUST NOORD WIND PARK Location Map



Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

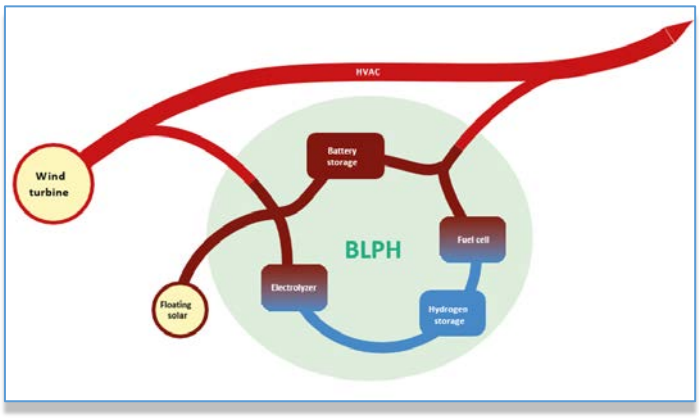


Figure 3 - BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2. DOCUMENT SCOPE

Scope of this document is to explain the HAZID methodology, present and clarify the role of the participants and to define the scope of work of the review.

On chapter 4 is presented the timing of the session, while here below there are the main reference documents to be considered for the session.

2.1. REFERENCES

Doc. No.	Description
K559-2254-PI-PPL-001	BLPH Base Load Power Hub Plot Plan
K559-2254-PM-PLN-003	Basic Design Engineering Package
K559-2254-PR-REP-001	Process Description
K559-2254-SE-REP-001	HAZID Report
123A90-DDL-PR-BL-80002	Heat & Mass Balance
123A90-DDL-PR-DG-80003	BLPH Process Flow Scheme Electrolyser And Hydrogen Drying Package
123A90-DDL-PR-DG-80004	BLPH Process Flow Scheme Hydrogen Storage
123A90-DDL-PR-DG-80005	BLPH Process Flow Scheme Fuel Cell Package
123A90-DDL-PR-UFD-80006	BLPH Utility Flow Diagram Water Treatment Plant
123A90-DDL-PR-UFD-80007	BLPH Utility Flow Diagram Instrument Air And Nitrogen Systems
123A90-DDL-PR-UFD-80008	BLPH Utility Flow Diagram Vent Systems
123A90-DDL-SAF-RE-30001	Fire Protection Philosophy
123A90-DDL-SAF-RE-30046	HSE Design Philosophy

Table 1 - Reference Documents

2.2. DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project
ALARP	As Low As Reasonably Practicable
BESS	Battery Energy Storage System
BLPH	Base Load Power Hub
EPC	Engineering Procurement Construction
FEED	Front End Engineering Design
HAZID	Hazard Identification
HKN	Hollandse Kust Noord
HSE	Health, Safety, Environment
PFD	Process Flow Diagram
SHESAMS	Safety, Health, Environment, Security Action Management
SIMOPS	Simultaneous Operations
SGSI	Shell Global Solutions International
TSO	Transmission System Operator
WTG	Wind Turbine Generator

Table 2 - Definitions and Abbreviations

Here below a list of definitions of words often used during an HAZID Session:

Guideword: Key words to be used in association with their associated expanders in order to guide and stimulate creative thinking towards the identification of representative hazards.

Hazard: Anything with the potential to cause harm, including ill health or injury, damage to properties and environment or community impact.

Incident: Any accident and near miss according to their definition.

Likelihood: The expectation, possibility or chance of something happening (also referred as frequency).

Loss: The adverse impact of any event on business causing:

- Harm to persons
- Harm to the environment
- Asset damage
- Damage to community

Node: A logic section of the plant/system to be examined in the HAZID (typically consists of a specific project configuration like Option 1, Option 2, etc. or a part of the facilities to be analysed.

Residual risk: The level of risk remaining after implementation of existing controls and recommended preventive and mitigating measures.

Risk: Combination of the likelihood of occurrence of a hazardous event and the severity of consequence that can be caused by the event or exposure(s).

Risk Ranking: A means of expressing the risk of an activity in terms of a value that represents both its likelihood and severity.

3. ATTENDEES

The HAZID team should comprise the following roles:

- HAZID Chairman
- HAZID Secretary
- Project Engineer Manager
- Project Engineer
- Technical Safety Engineer
- Process Engineer
- Instrumentation Engineer (on part time base)
- Piping/Mechanical Engineer (on part time base)
- Electrical Engineer (on part time base)
- Operation and maintenance technician (usually from Client side)

The Attendance List must be filled out and signed using the Template shown in Attachment 1 - ATTENDANCE LIST TEMPLATE during the workshop, and it will be attached to the HAZID report.

The Chairman will be responsible to assure the independency of the process and therefore shall be external to the project team and shall be selected on a list of qualified experts with certified experiences. The Chairman shall ensure that all specialists contribute according to their own expertise making sure that no individual dominates the discussions. For this purpose, the Chairman shall carry out a brief orientation session prior to the start of the HAZID to ensure that the team is aware of the whole HAZID process. The Chairman will have the duty to terminate a discussion if it seems unlikely that a solution will be agreed upon shortly, taking note that the argument under study will be investigated in a dedicated meeting. The Chairman shall ensure that every aspect and all parts of the project to be analyzed are covered and that due attention is given to each item in relation to its overall importance. Finally, the Chairman shall check that correct and adequate records have been maintained during the whole activity, with specific focus on "recommendations".

The HAZID Secretary should be familiar with HAZID procedures, engineering terminology as well as with the worksheet used for the analysis. The HAZID Secretary shall ensure that clear and correct records of the HAZID study are kept and that a final report is prepared which lists all the hazards identified, the recommended actions and the conclusions drawn. The Secretary is also responsible to make sure all the members of the HAZID team will sign the attendance sheet for each HAZID session.

4. TIMING AND VENUES

The HAZID session will be held on 5th October 2023.

The session will commence at 09:00 a.m. Italian time.

The scheduled completion is at approximately 05:30 pm.

The following facilities will be provided in Rosetti Marino Offices:

- Sufficient room and tabletop lay-down area for team members to deploy drawings and documents;
- Wall area to stick up master copies of drawings if necessary;
- Electronic Projector;
- Documentation copies available for attendees;
- VideoConference facilities if necessary.

The HAZID session will be recorded by means of MS Excel.

Action Sheets will be provided by Chairman in English language and MS Word compatible format, using FEED template.

5. HAZID STUDY METHODOLOGY

The main reasons for carrying out HAZID studies are to:

- provide a forum to draw on collective experience at an early stage to ensure inherent safety, health aspects/risks and environmental issues are properly considered in design;
- focus on identifying hazard to people working on the installation, both in terms of accident or long/short term exposure for biological hazard, and/or a damage to the Assets considering also security aspects and/or impacts to environment or community;
- check whether the precautions and safeguards incorporated in the project development are sufficient to either prevent the hazard occurring or mitigate the severity of any consequence to ALARP level.

The HAZID will be carried out in accordance with COMPANY procedure and the principles of ISO 17776.

The HAZID technique consists of a structured brainstorming of potential hazard scenarios using a comprehensive set of guidewords, which are shown in Attachment 2 - LIST OF GUIDEWORDS.

The examination should be conducted in a climate of positive thinking and frank discussion.

During this phase of the project, the Worksheet attached to the HAZID Report produced during the FEED Engineering (i.e., Doc. No. K559-2254-SE-REP-001) will be taken as a starting point: all the hazards previously identified will be reviewed and the specific threat (or cause) and its associated consequences will be derived using tables in Attachment 3 - CONSEQUENCES RISK RANKING.

The adequacy and presence of the existing safeguards (either preventive or mitigating) are assessed and finally, the risk associated to the hazardous event is evaluated with the support of the risk matrix shown in Attachment 4 - CROSSWIND RISK MATRIX. If the identified control measures are not felt to be sufficient, new recommendations are made, which could reduce the frequency or severity of the hazard identified.

Table 3 identifies the nodes used during the FEED.

Node	Node Description
1	Electrical System
2	Hydrogen System
3	Water & Utilities System

Table 3 - Node description

Also, the available Process and Utility Flow Diagrams (PFDs and UFDs) along with the plot plans will be reviewed in order to assess risks present during normal operations, maintenance, start-up and shut-down phases.

5.1. HAZID WORKFLOW

The following steps summarise the HAZID process:

1. Define and describe the areas for review of each node;
2. describe main features of the area, including proposed plant, layout, safety measures, and operating conditions (for Engineering, the Process or Layouts representative normally does this);
3. apply the check-list technique in systematic way selecting the first safety hazard category / guideword using the selected checklist;
4. consider each hazard category and its possible causes, noting which ones exist in the area under consideration;
5. for each existing hazard, consider if the hazard can be removed or reduced in size;
6. if a hazard cannot be removed, note the main existing or planned protective measures and discuss adequacy;
7. make recommendations if protective measures are inadequate or if further work is required;
8. repeat steps 3-7 for all hazard categories;
9. repeat steps 1-8 for other areas.

In step 5, the study team should not attempt to design a solution unless the solution is obvious. The study team's functions are to identify hazards and carry out an initial high level qualitative assessment of the adequacy of the planned hazard management measures. The project will decide on the most appropriate measures.

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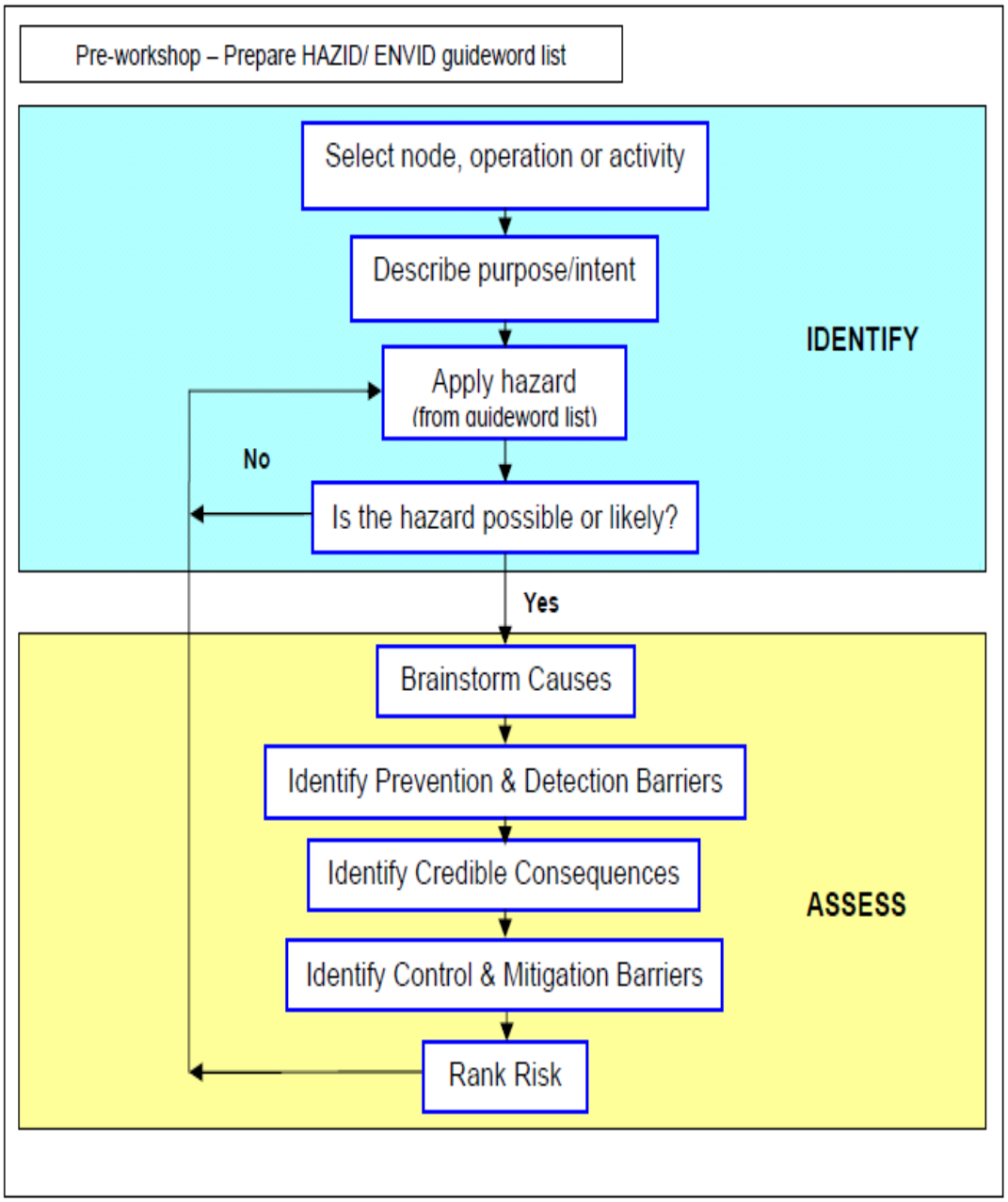


Figure 4 - HAZID Workflow

6. REPORTING

At the end of the HAZID sessions a report will be produced with the intent to record all the main aspects of the activity. The HAZID Report shall be issued as a single report; the initial revision shall clearly list all the Recommendations and identify their assigned parties (attachments and Annexes may be used in order to simplify the document structure).

The HAZID study report shall comprise the following:

- Introduction
- Objective
- HAZID scope
- HAZID Methodology including the List of Guidewords applied
- Risk Matrix
- Terminology
- List of studied nodes
- HAZID Worksheets
- Recommendations / Action Sheets
- Attendance lists

A risk ranking summary table for the scenarios containing the recommendations shall be included, for recording the total number of low, medium, medium-high and high (intolerable) risks both for current and future scenarios.

For this session the document "HAZID Report" will be issued.

Attachment 5 - HAZID WORKSHEET TEMPLATE and Attachment 6 - ACTION SHEET TEMPLATE show respectively the Worksheet Template and the Action Sheet Template to be used within this Report.

7. FOLLOW UP AND CLOSE OUT PROCEDURE

After the execution of HAZID workshop, HAZID Close Out Report (Doc. No. 123A90-DDL-SAF-RE-30010) will be issued including a list with the text of each recommendation raised during the session.

For every raised recommendation, proper Action Sheets will be prepared and distributed to the discipline engineers that are responsible to communicate the progress of their resolution, with the closing out to be supported with documents proving the effective implementation of the requested action.

Every HAZID Actions Sheets needs to be signed by the Contractor Responsible Discipline PSL, Tech Safety Leader and Project Engineering Manager, as well as from Discipline PSL and Tech Safety Leader.

Those parties identified for actions shall be responsible for implementing any outstanding query raised in the report. If the recommendation is considered impractical or an alternative is suggested, then the new recommendation shall be agreed with the Project Management and shall be subjected to Company's approval prior to its implementation.

Responses shall be added to the HAZID Action Sheets, signed and dated by the action owner and returned to the project HSE representative. The response shall address the issue, be technically correct and fully auditable. When the action is completed is sent to the lead discipline engineer for endorsement, and then the HSE representative for review. The HSE representative has the responsibility (support from other disciplines may be an option, as required) to provide a final check for the consistency of the recommended actions.

The main aspects to be verified are reported below:

- Single word answers (such as Done, Added, OK, etc.) are unacceptable: a clear and referenced justification must be provided. Answer must be clear and univocal, giving no raise to multiple or misleading interpretations;
- The node description, the expected consequences and the risk ranking must be evident to support the process efficacy;
- Any answer, which refers to a plot plan, a procedure or a study, should have a copy of the document attached if practical. If the reference document size is big, a copy of the relevant topic plus the document cover sheet will suffice;
- If the action requires modification to a procedure, Layouts etc. a copy of the drawing shall be attached with the modification highlighted.

The Project Manager is ultimately responsible for ensuring that all recommendations or actions are implemented, or future, or included in an agreed punch list, before handover to the Company.

In order to demonstrate the completion of follow-up activities , the duly filled and signed Action Sheets will be included in the HSSE Action Tracking Register and Close out report (Doc. No. 123A90-DDL-SAF-RE-30004) with the intent to clearly identify how each recommendation has been implemented.

ATTACHMENT 1 - ATTENDANCE LIST TEMPLATE

Name	Role / Discipline	Company	Sign

ATTACHMENT 2 - LIST OF GUIDEWORDS

Hazard number	Hazard description
01	**Hydrocarbons**
H-01.01	Oil under pressure
H-01.02	Hydrocarbons in formation
H-01.03	LPGs (e.g. Propane)
H-01.04	LNGs
H-01.05	Condensate
H-01.06	Hydrocarbon gas
H-01.07	Oil at low pressures
H-01.08	Wax
H-01.09	Coal
02	**Refined hydrocarbons**
H-02.01	Lube and seal oil
H-02.02	Hydraulic oil
H-02.03	Diesel fuel
H-02.04	Aviation Fuel, Petrol
H-02.05	Hydrocarbons above auto- ignition temp
H-02.06	Asphalt
H-02.07	Bunker Fuel
H-02.08	Heat Transfer Fluid
H-02.09	Transformer Oil
03	**Other flammable materials**
H-03.01	Cellulosic materials
H-03.02	Pyrophoric materials
H-03.03	Carbon-fibre-reinforced vegetation
H-03.04	Dry Vegetation
H-03.05a	Hydrogen
H-03.05b	Oxygen

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Hazard number	Hazard description
H-03.06	Flammable gases in bottles
H-03.07	Hydrocarbon Vapours in pipe vents
04	**Explosives**
H-04.01	Detonators
H-04.02	Conventional explosive material
H-04.03	Perforating gun charges
H-04.04	Explosive gases
05	**Pressure hazards**
H-05.01	Bottled gases under pressure
H-05.02	Fluid under Pressure
H-05.03	Non-hydrocarbon gas under pressure in pipework
H-05.04	Air under high pressure
H-05.05	Hyperbaric operations
H-05.06	Decompression
H-05.07	Water under pressure
06	**Hazards associated with differences in height**
H-06.01	People at height >1.8m
H-06.02	People at height <1.8m
H-06.03a	Overhead equipment
H-06.03b	Dropped objects
H-06.04	People under water
H-06.05	People below grade
07	**Objects under induced stress**
H-07.01	Objects under tension
H-07.02	Objects under compression
H-07.03	Objects under variable/dynamic/cyclic loading
08	**Dynamic situation hazards**
H-08.01	On-land transport (driving)
H-08.02	On-water transport (boating)
H-08.03	In-air transport (flying)

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Hazard number	Hazard description
H-08.04	Boat collision hazard to other vessels and offshore structures
H-08.05	Marine Activity (diving)
H-08.06	Equipment with moving or rotating parts
H-08.07a	Use of hazardous hand tools (grinding, sawing)
H-08.07b	Use of knives, machetes and other sharp objects
H-08.08	Transfer from boat, Flotel to offshore platform
H-08.09	Ship-to-Ship Collison
H-08.10	Vessel quality
09	**Environmental hazards**
H-09.01	Weather
H-09.02	Sea state / river currents
H-09.03	Tectonic
10	**Hot surfaces**
H-10.01	Process piping and equipment between 60 °C and 150 °C
H-10.02	Process piping and equipment over 150 °C
H-10.03	Engine and turbine exhaust systems
H-10.04	Steam piping
11	**Hot fluids**
H-11.01	Temperatures between 100 °C and 150 °C
H-11.02	Temperatures greater than 150 °C
12	**Cold surfaces**
H-12.01	Process piping between -25 °C and -80 °C
H-12.02	Process piping less than -80 °C
H-12.03	Cold Surfaces
13	**Cold fluids**
H-13.01	Oceans, seas and lakes less than 10 °C
H-13.02	Cryogenic Liquids
14	**Open flame**
H-14.01	Heaters with fire tube
H-14.02	Direct-fired furnaces

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Hazard number	Hazard description
H-14.03	Flares
15	**Electricity**
H-15.01	Voltage > 50V to 600V in cables
H-15-02	Voltage > 50V to 600V in equipment
H-15.03	Voltage >600V
H-15.04	DC Voltage
H-15.05	Lightning discharge
H-15.06	Electrostatic energy
16	**Electromagnetic radiation**
H-16.01	Ultraviolet radiation
H-16.02	Infrared radiation
H-16.03	Microwaves
H-16.04	Lasers
H-16.05	E/M radiation: high voltage AC cables
17	**Ionizing radiation - Open source**
H-17.01	Alpha, beta, open source
H-17.02	Gamma rays, open source
H-17.03	Neutron, open source
H-17.04	Naturally occurring ionising radiation
H-17.05	X-rays
18	**Ionizing radiation - Closed source**
H-18.01	Alpha, beta, closed source
H-18.02	Gamma rays, closed source
H-18.03	Neutron, closed source
19	**Asphyxiates**
H-19.01	Low oxygen atmospheres
H-19.02	Excessive CO2
H-19.03	Drowning
H-19.04	Excessive N2
H-19.05	Halon

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Hazard number	Hazard description
H-19.06	Smoke
H-19.07	SF6 (Sulphur Hexafluoride)
20	**Toxic gas**
H-20.01	H2S (hydrogen sulphide, sour gas)
H-20.02	Exhaust fumes
H-20.03	SO2
H-20.04	Benzene
H-20.05	Chlorine
H-20.06	Welding fumes
H-20.07	Tobacco smoke
H-20.08	CFCs
H-20.09	CO
H-20.10	HF
21	**Toxic liquid**
H-21.01	Mercury
H-21.02	PCBs
H-21.03	Biocides
H-21.04	Methanol
H-21.05	Brines
H-21.06	Glycols
H-21.07	Degreasers
H-21.08	Isocyanates
H-21.09	Sulphanol
H-21.10	Amines
H-21.11	Corrosion inhibitors
H-21.12	Scale inhibitors
H-21.13	Liquid mud additives
H-21.14	Odorant additives
H-21.15	Alcoholic beverages
H-21.16	Recreational drugs

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Hazard number	Hazard description
H-21.17	Used engine oils
H-21.18	Carbon tetrachloride
H-21.19	Grey and/or black water
H-21.20	Paint, Solvents and General Chemicals
H-21.21	Shell Therma B Oil
22	**Toxic solid**
H-22.01	Asbestos
H-22.02	Man-made mineral fibre
H-22.03	Cement dust
H-22.04	Sodium hypochlorite
H-22.05	Powered mud additives
H-22.06	Sulphur dust
H-22.07	Pig trash
H-22.08	Oil-based muds
H-22.09	Pseudo-oil based muds
H-22.10	Water-based muds
H-22.11	Cement slurries
H-22.12	Dusts
H-22.13	Cadmium compounds and other heavy metals
H-22.14	Oil based sludges
H-22.15	Chemicals for Cleaning RO Membrane
H-22.16	Dechlorination Chemicals
23	**Corrosive substances**
H-23.01	Hydrofluoric acid
H-23-02	Hydrochloric acid
H-23.03	Sulphuric acid
H-23.04	Caustic soda (sodium hydroxide)
H-23.05	Battery Acids
24	**Biological hazards**
H-24.01	Poisonous plants

Hazard number	Hazard description
H-24.02	Large animals
H-24.03	Small animals
H-24.04	Food-borne bacteria (e.g. E.coli)
H-24.05	Water-borne bacteria (e.g. legionella)
H-24.06	Viral & Bacterial pathogens
H-24.07	Disease-transmitting insects
H-24.08	Respiratory disease infections
H-24.09	Blood-borne/sexually transmitted diseases
H-24.10	Latent disease or health problems
H-24.11	Other infections
25	**Ergonomic hazards**
H-25.01	Manual materials handling
H-25.02	Damaging noise
H-25.03	Loud steady noise > 85dBA
H-25.04	Heat stress (high ambient temperatures)
H-25.05	Cold stress (low ambient temperatures)
H-25.06	High humidity
H-25.07	Vibration
H-25.08	Workstations
H-25.09	Lighting
H-25.10	Incompatible hand controls
H-25.11	Awkward location of workplaces and machinery
H-25.12	Mismatch of work tophysical abilities
H-25.13	Mismatch of work to cognitive abilities
H-25.14	Long and irregular working hours/shifts
H-25.15	Poor organisation and job design
H-25.16	Work planning issues
H-25.17	Indoor climate (too hot/cold/dry/humid)
26	**Psychological hazards**
H-26.01	Living on the job/away from family

Hazard number	Hazard description
H-26.02	Working and living on a live plant
H-26.03	Post-traumatic stress
27	**Security-related hazards**
H-27.01	Piracy, hijack, kidnap, terrorism
H-27.02	Assault
H-27.03	Sabotage
H-27.04	Crisis (military action, civil disturbances, terrorism)
H-27.05	Theft, pilferage
28	**Use of natural resources**
H-28.01	Land
H-28.02	Water
H-28.03	Air under high pressure
H-28.04	Trees, vegetation
H-28.05	Gravel
H-28.06	Personal welfare & 3rd party relations
29	**Medical**
H-29.01	Medical unfitness
H-29.02	Motion sickness
30	**Noise**
H-30.01	High level noise
H-30.02	Intrusive noise

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ATTACHMENT 3 - CONSEQUENCES RISK RANKING

People

	Definition
0	No injury or health effect
1	Slight injury or health effect No Treatment Case or First Aid Case. Illnesses that result in noticeable discomfort, minor irritation or transient effects that are reversible after exposure stops.
2	Minor injury or health effect Medical Treatment Case. Lost Workday Case or Restricted Work Case, where either has a duration of up to and including 5 days. Illnesses with reversible health effects such as food poisoning and dermatitis.
3	Major injury or health effect Lost Workday Case or Restricted Work Case, where either has a duration exceeding 5 days. Illnesses with irreversible health effects such as sensitization, noise induced hearing loss, chronic back disorders or repetitive strain injury Mental illness due to stress with reversible health effects.
4	Permanent total disability or up to three fatalities Illnesses with irreversible health effects such as corrosive burns, asbestosis and silicosis. Cancer. Mental illness due to stress with irreversible health effects.
5	More than three fatalities Illnesses with irreversible health effects such as multiple asbestosis cases traced to a single exposure situation. Cancer in a large exposed population.

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Assets

	Definition
0	No damage
1	Slight damage Costs less than US $100,000.
2	Minor damage Costs between US $100,000 and US $1 million.
3	Moderate damage Costs between US $1 million and US $10 million.
4	Major damage Costs between US $10 million and US $100 million.
5	Massive damage Costs in excess of US $100 million.

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Communities

	Definition
0	No damage
1	Slight damage, indicated by: • Infrequent slight nuisance. (Nuisance to include interference with reasonable comforts and enjoyments of life, general inconvenience relating to day to day activities or enjoyment of land). • No observable adverse or perceived effect on livelihood, social and cultural assets, community security, community health, vulnerable or Indigenous People. • Local public awareness but no discernible concern.
2	Minor damage, indicated by: • Limited short term nuisance • Limited effects on livelihood and/or social or cultural assets, community health. • No observable adverse effect on community security, vulnerable or Indigenous Peoples. • Local public concern.
3	Moderate damage, indicated by: • Persistent nuisance. • Effects on livelihood and/or social or cultural assets, community health. • Limited observable adverse effect on community security, vulnerable or Indigenous Peoples. • Local or Regional public concern • Local stakeholders, e.g. community, NGO, industry and government, are aware.
4	Major damage, indicated by: • Persistent effects on livelihood and/or social or cultural assets, community health. • Effects on community security, vulnerable or Indigenous Peoples and/or human rights infringements, that are serious and/or at a community level. • Mitigation is complex or protracted. • National public concern. • Impact on local and national stakeholder relations. • National government and/or NGO involvement with potential for international NGO action.
5	Massive damage • Persistent, severe impact on livelihood and/or social or cultural assets, community security, community health, vulnerable or Indigenous Peoples and/or human rights infringements. • Impact may affect a large geographic area or population. • Mitigation is complex or protracted, and of limited effectiveness. • International public concern. • High level of concern and action(s) governments and/or by international NGOs.

Environment

	Definition
0	No Effect No Impact to the Environment
1	Slight Effect Slight environmental damage contained within the premises. A small spill in a process area or tank farm area that readily evaporates.
2	Minor Effect Minor environmental damage, but no lasting effect. A small on-site spill with potential to harm the environment that has no off-site impact. On-site groundwater contamination with no potential for off-site contamination. A single exceedance of statutory or other prescribed limit.
3	Moderate Effect Limited environmental damage that will persist or require cleaning up. A spill with potential to harm the environment that requires removal and disposal of over 100 m^3 of impacted soil/sand. A spill with potential to harm the environment which reaches surface water off-site. Off-site groundwater contamination. Off-site habitat and/or ecology effects or damage, e.g. fish kill or damaged vegetation. Repeated exceedance of statutory or other prescribed emission limit for longer than 3 months and/or, with potential long-term effect.
4	Major Effect Severe environmental damage that will require extensive measures to restore beneficial uses of the environment. A spill to water with potential to reach a shore and cause harm to the environment. Off-site contamination of surface or groundwater over an extensive area. Requirement for Tier 2 oil spill emergency response. Off-site habitat and/or ecology effects or damage for greater than 1 year. Extended exceedances of statutory or other prescribed emission limits for greater than 1 year and/or with potential long-term effect.
5	Massive Effect Persistent severe environmental damage that will lead to loss of natural resources over a wide area. A spill resulting in pollution of a large tract of wetlands, ocean, part of a river estuary or beach/coastal habitat Requirement for Tier 3 oil spill emergency response. Persistent off-site habitat and/or ecology effects or damage with proven long-term effect.

ATTACHMENT 4 - CROSSWIND RISK MATRIX

RISK ASSESSMENT

The Group Risk Assessment Matrix (RAM) is used to assess the worst credible harm caused by the identified potential consequence and its corresponding likelihood of occurring.
The RAM risk rating is the colour (Light Blue, Dark Blue, Yellow or Red)



Step 2: Determine the likelihood of each consequence based on historical data

Step 1: Estimate the Worst Credible Severity Of the Harm Possible

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					

ATTACHMENT 5 - HAZID WORKSHEET TEMPLATE

ITEM NO.	HAZARD	THREAT	CONSEQUENCE	SAFEGUARDS	RISK RANKING												RECOMMENDATION	OWNER	PROJECT PHASE	COMMENTS
					People			Assets			Community			Environment						
					S	P	R	S	P	R	S	P	R	S	P	R				

ATTACHMENT 6 - ACTION SHEET TEMPLATE

BLPH
SHEAMS SIGNATURE FORM

Action No:		**Rev:**	
Action Title:	**HAZID Study Actions**	**Date:**	
Ref. Doc:			
Title:			
Node:			
Reference Drawings:			
Parameter		**Deviation**	
Cause:			
Consequence:			
Safeguards:			
Action:			
RESPONSE:			
Attachments:			
Name:	Signature:	Raise PCN: Yes/No	PCN No:

RESPONSE ACCEPTANCE:

Discipline Lead:	Signature:	Date:
HSE Lead:	Signature:	Date:
Proj. Manager:	Signature:	Date:
Client:	Signature:	Date:

FUTURE ACTION/CROSS REFERENCE: