

Rathlin Energy

Environmental Risk
Assessment

Environmental Permit
Variation

West Newton A
Wellsite

East Riding of Yorkshire

PEDL 183

December 2018



APPROVAL LIST

	Title	Name	Signature
Prepared By	HSE & Permit Advisor	Sean Smart	
Reviewed By	HSE and Planning Manager	Jonathan Foster	
Approved By	Country Manager	Tom Selkirk	

COPYRIGHT

© 2018 Rathlin Energy (UK) Limited. All Rights Reserved.

The contents of this document may not be reproduced or copied without the express written permission of Rathlin Energy (UK) Limited.

Table of Contents

1.	Introduction.....	5
2.	Scope.....	6
3.	Definition.....	7
3.1	Definitions for the Environmental Risk Assessment	7
3.2	Other Definitions.....	7
4.	Methodology	8
4.1	Scoring Criteria.....	8
	Assessment of Odour Risk	11
	Assessment of Noise and Vibration	12
	Assessment of Groundwater Risk	13
	Assessment of Fugitive Emissions Risk	14
	Assessment of Visible Plumes Risk.....	15
	Assessment of Possible Sources of Accidents	16
	Discharges to Surface Water Assessment.....	19
	Assessment of Air Emissions Risk.....	20
	Assessment of the Disposal and Recovery of Waste Produced Onsite	21
	Global Warming Potential	25
	Energy Sources, Conversion Efficiency and Emissions Factors	25
	Energy Emission Factors	25
	Assessment of Global Warming Impact.....	26

Page Left Blank Intentionally

1. INTRODUCTION

Rathlin Energy (UK) Limited (Rathlin) is a private company with its head office in Beverley, East Riding of Yorkshire. Rathlin is a petroleum exploration, development and production company with operations in the United Kingdom. Rathlin is the operator of PEDL183.

In support of a permit variation for the proposed West Newton A-2 well testing operation an Environmental Risk Assessment has been undertaken. The Environmental Risk Assessment has been carried out in accordance with the [Environment Agency Guidance](#).

2. SCOPE

The Environmental Risk Assessment is applicable to the West Newton A wellsite in accordance with environmental permits and planning consent. It is provided in support of an application to the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016 to vary the existing environmental permit.

This Environmental Risk Assessment is applicable to the proposed well testing operations on the WNA-2 well and any associated activities.

3. DEFINITION

3.1 Definitions for the Environmental Risk Assessment

ID:	Identification number the hazard has been given to allow for easy referencing.
Source:	A source of pollutants from the activity taking place such as flaring. (Source can also be referred to as 'hazard').
Receptor:	Although the likelihood of pollution is low it may have an adverse effect on surrounding residents, wildlife and habitats; these are known as the pollutants receptors.
Pathway:	The pathway the pollutant is taking such as air or unsaturated zones.
Risk Management:	Mitigation measures that will be put in place to control the risks so far as reasonably practicable.
Probability of Exposure:	The chance of the hazard occurring taking into account mitigation measures.
Consequence:	A result of an event or action that has occurred.
Overall Risk:	A hazard that has been assessed and has been given a risk rating level post mitigation measures i.e. not significant, low, medium, high very high etc.
Not Significant:	The severity of risk together with the likelihood of the risk is not expected to cause harm to the environment.
Low:	The severity of risk together with the likelihood of the risk has low potential for causing harm to the environment.
Medium:	The severity of risk together with the likelihood of the risk has a moderate potential for causing harm to the environment.
High:	The severity of risk together with the likelihood of the risk has a high potential for causing harm to the environment.

3.2 Other Definitions

PEDL:	Petroleum Exploration and Development Licence;
WNA-2:	West Newton A 2 Well

4. METHODOLOGY

The structure of the Environmental Risk Assessment is consistent with the Environment Agency guidance using a source-pathway-receptor model and includes:

- Identifying the risk from the site;
- Assessing risks and checking they are acceptable;
- Justifying appropriate measures to control the risk (if needed); and
- Presenting the risk assessment.

The Environmental Risk Assessment has included the following items, which have been reviewed for applicability within the proposed WNA-2 well testing operations:

- Accidents & incidents that have potential to cause harm to the environment;
- Air emissions;
- Dust;
- Fugitive emissions;
- Global warming potential;
- Light;
- Noise;
- Odour;
- Releases to water; and
- Waste.

This Environmental Risk Assessment is based on a qualitative assessment and details the activities and events that may lead to environmental impact on one or more receptors.

4.1 Scoring Criteria

In order to establish a risk rating for each **Source-Pathway-Receptor** (S-P-R) linkage both the Likelihood (**Probability of Exposure**) and Consequence have been issued a score. The score is used in conjunction with Table 4.3 to provide an overall risk rating of the activity. All scores and risk ratings are provided on the basis that the mitigation measure are in place.

Likelihood	Descriptor
Very Low	Rarely encountered, never reported or highly unlikely.
Low	Infrequent Occurrences.
Medium	Can be expected to occur several times per year.
High	Repeated Occurrences.

Table 4.1: Scoring System - Likelihood

Consequence	Descriptor
Very Low	Slight environmental effect that does not exceed a regulatory standard.
Low	Minor environmental effect which may breach a regulatory standard but is localised to the point of release with no significant impact on the environment or human health.
Medium	Moderate, localised effect on people and the environment in the vicinity of the incident.
High	A major environmental incident resulting in significant damage to the environment and harm to human health.

Table 4.2: Scoring System - Consequence

The risk matrix presented in Table 4.3 derives a risk rating for each S-P-R linkage identified within this Environmental Risk Assessment.

Risk Rating		Consequence			
		Very Low	Low	Medium	High
Likelihood	Very Low	Not Significant	Not Significant	Low	Low
	Low	Not Significant	Low	Medium	Medium
	Medium	Low	Medium	Medium	High
	High	Low	Medium	High	High

Table 4.3: Risk Matrix

Environmental risks are assigned a Not Significant, Low, Medium or High risk rating and coded using a colour coded system. A description of each risk rating is presented in Table 4.4.

Risk Rating	Acceptable?	Descriptor
Not Significant	Acceptable	Near-certain that an incident will not occur. If it did occur the consequences would not be significant.
Low	Acceptable	Unlikely an incident will occur or give rise to anything more than a minor consequence on the immediate area.
Medium	Tolerable	The activity can only take place provided that any impacts remain localised and risk remediation is readily available.
High	Unacceptable	The risk must be further reduced before the activity can commence.

Table 4.4: Risk Rating Definitions

Receptors	Search Radius	Name	Distance from Site ¹	Direction from Site	Grid Reference (Edge)
RAMSAR	10km	None	-	-	-
Special Areas of Conservation (SAC)	10km	None	-	-	-
Special Protection Areas (SPA)	10km	Hornsea Mere	6.92km	North	TA 17983 46008
		Greater Wash	5.39km	East	TA 24044 41899
Sites of Special Scientific Interest (SSSI)	2km	Lambwath Meadows	1.00km	Northeast	TA 20100 39699
Scheduled Ancient Monuments	2km	None	-	-	-
National Nature Reserves	2km	None	-	-	-
Local Nature Reserves	2km	None	-	-	-
Local Wildlife Sites	2km	Burton Constable Parkland	1.78km	South	TA 19098 37311
		Mill Avenue, Burton Constable	2.00km	South	TA 19442 37093
		Sallymere Plantation	1.70km	Southwest	TA 17778 38222
		The Moors, Burton Constable	0.82km	Southwest	TA 18876 38359
		Wycliffe, North Plantation	0.90km	Southwest	TA 18676 38389
Water Features (Closest in All Directions)	2km	Field Drain	0.06km	North	TA 19235 39265
		Pond at Black Bush Cottage	0.50km	East	TA 19815 39298
		Field Drain	1.08km	East	TA 20381 39178
		Field Drain	0.01km	South	TA 19247 39072
		Field Drain	0.01km	West	TA 19231 39097
Sensitive Receptors: Households / Businesses	2km	Church House	0.53km	Southwest	TA 18916 38673
		Old School House	0.58km	Southwest	TA 18948 38593
		Wood End Farm	0.63km	West	TA 18625 38977
		Black Bush Farm	0.67km	East	TA 19892 39301
		Caley Cottage	0.70km	East	TA 19947 39168
		High Fosham Cottage	0.74km	East	TA 19991 39142
		Marton Farm	0.78km	West	TA 18481 39216
		White House Farm	0.84km	Southwest	TA 18618 38534
		Piper Garth	1.05km	West	TA 18214 39235
		Straits Farm (Withernwick)	1.08km	North	TA 19571 40124
		Manor House	1.12km	Northeast	TA 19804 40071
		Wood House	1.15km	South	TA 19077 37949
		The Crescent (West Newton Village)	1.15km	South	TA 19501 37967
		Heywood Farm	1.16km	West	TA 18095 39261
		The Cottage	1.17km	South	TA 19367 37922
		Treasure Cottage	1.30km	West	TA 17952 39248
		Model Farm	1.45km	Southeast	TA 19912 37803
		Hill Farm	1.52km	West	TA 17710 39289
		Mount Pleasant	1.54km	Southeast	TA 20163 37846
		Homer House	1.55km	Northeast	TA 20285 40378
Farm at Low Fosham	1.65km	East	TA 20878 38786		
Old Farm Cottage	1.67km	Southeast	TA 20352 37829		
Withernwick Hall	1.85km	North	TA 19635 41070		
Longdykes Farm	1.91km	Northwest	TA 18325 40764		
Northfield Cottage	2.00km	North	TA 19463 41185		

Table 4.5: Receptor Details

¹ Location of the receptor relevant to the centre of the West Newton A wellsite.

ASSESSMENT OF ODOUR RISK

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Breaking containment on tanks and pipework carrying produced fluids.	Air – Prevailing winds from the south west.	SSSI SPA Water Features Sensitive Receptors	Site location is within rural area where local receptors are very few. Breaking containment of tanks and pipework systems is to be kept to a minimum. Tanks and pipework to be cleaned / purged where possible prior to breaking containment. Maintenance and inspections are to be conducted as directed by written procedures. Records will be kept of complaints and action taken to resolve complaints if required. An Odour Management Plan will be in place, distributed and adhered to.	Low Breaking of containment expected to be at end of operations only. Odour unlikely.	Very Low None expected	Not Significant
002	Transporting well control fluid from the borehole to surface.	Air – Prevailing winds from the south west.	SSSI SPA Water Features Sensitive Receptors	Site location is within rural area where local receptors are very few. Tanks and pipework to be tested for leaks as required by written procedures. Breaking containment of pipework systems is to be kept to a minimum. Tanks and pipework to be cleaned where possible prior to breaking containment. Maintenance and inspections are to be conducted as directed by written procedures. Records will be kept of complaints and action taken to resolve complaints if required. An Odour Management Plan will be in place, distributed and adhered to.	Low Odorous emissions may be released from the tanks.	Very Low Complaints regarding unfamiliar odour.	Not Significant
003	Incinerations of natural gas during testing operations.	Air – Prevailing winds from the south west.	SSSI SPA Water Features Sensitive Receptors	Flare unit to be agreed by Environment Agency to ensure compliance prior to use. Monitoring of flare combustion temperature to be undertaken during flaring. Flare proposals to include 98%+ combustion efficiency. Flare equipment to be tested for leaks prior to delivery / use as required by manufacturer / written procedures. Performance monitoring and inspections are to be conducted. Records will be kept of complaints and action taken to resolve complaints if required. An Odour Management Plan will be in place, distributed and adhered to.	Low The approved flare will be designed to ensure high combustion efficiency.	Low Complaints regarding unfamiliar odour.	Low
004	Storage / use / transfer and decanting of odorous products during operations.	Air – Prevailing winds from the south west.	SSSI SPA Water Features Sensitive Receptors	Odorous products to be substituted for odourless products where reasonably practicable. Chemicals and oils to be segregated and quantities of each to be kept to a minimum. An Odour Management Plan will be in place, distributed and adhered to. During transfer / decanting of odorous chemicals / oils the following procedures are to be undertaken: <ul style="list-style-type: none"> Containers are to be sealed when not in use and will to be checked periodically for damage and leaks; Spillage pads / containers are to be used to ensure any spillages are contained and can be remediated effectively and efficiently; Avoid direct sunlight where possible; and Reduce evaporation rate by eliminating air flow and surface area. 	Very Low Odorous emissions may be released during transfer / decanting of chemicals / oils.	Low Odours (if any) would be limited to the immediate area.	Not Significant
005	Release of odour from the storage of raw materials.	Air – Prevailing winds from the south west.	SSSI SPA Water Features Sensitive Receptors	Use of raw materials that are less likely to cause odour problems. Raw materials to be ordered to requirement to ensure stored quantities are kept to a minimum. An Odour Management Plan will be in place, distributed and adhered to. Records will be kept of complaints and action taken to resolve complaints if required.	Low Raw materials should not be given the time to decompose before removal.	Very Low Odour is not expected to breach the site boundary.	Not Significant
006	Release of odour from site waste skips.	Air – Prevailing winds from the south west.	SSSI SPA Water Features Sensitive Receptors	Skips to be self-contained / enclosed to prevent emissions. Skips to be clearly marked to ensure that waste is kept segregated and cross contamination does not occur. Skips to be monitored and emptied daily / as required. Records will be kept of complaints and action taken to resolve complaints if required. An Odour Management Plan will be in place, distributed and adhered to.	Low Skips emptied frequently.	Very Low Odour is not expected to breach the site boundary.	Not Significant

ASSESSMENT OF NOISE AND VIBRATION

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Vehicles including: <ul style="list-style-type: none"> Engines; Reversing Alarms Unloading / Loading 	Atmosphere and Ground Vibrations	SSSI SPA Water Features Sensitive Receptors	Noise limits set by the planning authority shall not be breached. Transport restrictions set by the planning authority shall not be breached. Vehicle loads and transportation to be planned to reduce quantity of deliveries / collections. Directional / white noise reversing alarms are to be fitted to site vehicles if required. Loading / unloading operations will be planned where possible during day light hours. Trained operators to load / unload vehicles using MHE plant equipment. Equipment when not in use to be switched off. Records will be kept of complaints and action taken to resolve complaints if required.	Low Old School House is 520m Southwest	Very Low Noise complaints	Not Significant
002	Site plant, equipment, generators and movement of each around site.	Atmosphere and Ground Vibrations	SSSI SPA Water Features Sensitive Receptors	Noise limits set by the planning authority shall not be breached. Vehicles / equipment are to be serviced and maintained to manufacturer's / industry standards. Directional / white noise reversing alarms are to be fitted to site vehicles if required. Loading / unloading operations will be planned where possible during day light hours. Trained operators to load / unload vehicles using MHE plant equipment. Equipment when not in use to be switched off. Noise monitoring to be conducted during operations. Records will be kept of complaints and action taken to resolve complaints if required.	Low Old School House is 520m Southwest	Very Low Noise complaints	Not Significant
003	Flaring Operations	Atmosphere	SSSI SPA Water Features Sensitive Receptors	Regular maintenance and inspections are to be conducted as directed by written procedures. Flare is of an shrouded and/or enclosed design. Noise levels to be monitored. Flare unit to be monitored and controlled at all times. Gas rates to the flare can be reduced is required. Perimeter safe zone established around flare unit. Records will be kept of complaints and action taken to resolve complaints if required. The Incineration of natural gas will not exceed 10 tonnes per day.	Low Old School House is 520m Southwest	Very Low Noise complaints	Not Significant

ASSESSMENT OF GROUNDWATER RISK

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Produced Hydrocarbons from the formation.	Loss of well integrity leading to leakage.	Groundwater bearing formations not including the producing formation.	<p>The borehole is constructed to industry standards / best available techniques and reviewed by an independent well examiner.</p> <p>Adequate mud weight / suspension fluid weight, well control equipment and procedures in place.</p> <p>Competent Site Supervisor who holds a certified in date well control certificate is to be present during operations.</p> <p>Use of competent drilling fluids / suspension fluids management personnel.</p> <p>Cementing best practices utilised.</p> <p>A Hydrogeological Risk Assessment has been conducted by a specialist hydrogeologist.</p>	Very Low Management actions and procedures should prevent this happening.	Low Minor pollution event	Not significant
002	Acid Wash and Squeeze	Introduced to the formation via perforations.	Groundwater bearing formations not including the producing formation.	<p>The borehole is constructed to industry standards / best available techniques and reviewed by an independent well examiner.</p> <p>Competent Site Supervisor who holds a certified in date well control certificate is to be present during operations.</p> <p>A Hydrogeological Risk Assessment has been conducted by a specialist hydrogeologist.</p> <p>Acid will be introduced to targeted formations only which may be the formation at a volume considered de minimis and in a dilute solution, 15%. Once the acid reacts with the formation it becomes a spent (neutralised) resulting in salt, water and carbon dioxide.</p> <p>In the event a target formation has groundwater present it will be considered permanently unsuitable, not least to the presence of hydrocarbons.</p>	Very Low Management actions and procedures should prevent this happening.	Low Slight pollution occurrence which would be restricted by well control	Not significant
003	Spillages from the surface	Percolation to the near surface groundwater.	Groundwater bearing formations.	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>The impermeable membrane has been the subject of integrity tests during construction.</p> <p>Large volumes of hazardous materials are to be stored within secondary containment bunds.</p> <p>Arrangements are made for the water within the sump to be discharged to surface water / groundwater or a road haulage tanker for subsequent offsite disposal via a licenced waste facility during periods of operations, which may include permitted reinjection wells.</p> <p>Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation.</p> <p>Vehicle spillage kits are to be carried during transportation of wastes.</p> <p>Vehicles are to adhere to approved traffic routes as outlined by planning authority / client.</p>	Very Low Management actions and procedures should prevent this happening.	Low Impact is unlikely to exceed the site boundary.	Not significant

ASSESSMENT OF FUGITIVE EMISSIONS RISK

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Emissions to Air. Methane Emissions from the wellbore.	Air – vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	The well is to be constructed to industry standards and be the subject of an independent well examination. Well control fluids and/or equipment onsite to retain well control. Wellsite Supervisor onsite who holds an in date Well Control Certificate to be present at all times during operations. The well will be the subject of a number of integrity tests during the installation. Gas will be diverted to a single release point to a flare unit. Gas detection units are provided at site for early detection of methane. Notification to the emergency services and the local Fire and Rescue service will adopt a major accident plan.	Very Low Management Action should prevent this happening,	Low Low quantities of methane are not likely to have a localised effect. Emissions should disperse prior to reaching local receptors	Not Significant
002	Emissions to Air. VOC's from exhaust systems.	Air – vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	Vehicle loads and transportation to be planned to reduce quantity of deliveries / collections. Vehicles are to be serviced and maintained to manufacturer's / industry standards. Equipment when not in use to be switched off. Records will be kept of complaints and action taken to resolve complaints if required.	Low Nearest housing is 670m North.	Low Impact is unlikely to exceed the site boundary.	Low
003	Emissions to Air. VOC's from tanks / pipework.	Air – vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	Breaking containment of tanks and pipework systems is to be kept to a minimum. Tanks and pipework to be cleaned where possible prior to breaking containment. Records will be kept of complaints and action taken to resolve complaints if required.	Low Nearest housing is 670m North.	Low Impact is unlikely to exceed the site boundary.	Low
004	Emissions to Air. Dust and mud generated by vehicles.	Air – vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	Operations to be planned / designed to minimise transport and handling operations. Vehicles are to drive on approved roads and follow site traffic management system. Roads to / from the site are monitored for mud deposits. A road sweeping contractor will be arranged for road cleaning if required. Avoid certain activities that may present dust if high winds occur. Daily monitoring of wind / weather forecasts. Records will be kept of complaints and action taken to resolve complaints if required.	Very Low Nearest housing is 670m North.	Low Dust on cars, clothing or property. Mud on local highway (nuisance)	Not Significant
005	Litter generated on site.	Air – vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	Provision of adequate refuse receptacles for both inside and outside working areas. Training on environmental awareness and site waste management. Litter to be cleared at end of each day / shift. Skips to be monitored and emptied when required by authorised contractor. Site inspection process.	Very Low Management Action should prevent this happening,	Very Low Impact is unlikely to exceed the site boundary.	Not Significant
006	Emissions to Water. Run-off from site operations.	Flow by gravity.	Water Features	Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches. Containment ditches are to be emptied by a licenced contractor at tested to ensure the correct EWC code is applied. A field drain is present on the proposed southern and western boundary of the wellsite. This will be the subject to visual inspection and if necessary sampling to identify any potential pollutants.	Very Low Management Action should prevent this happening,	Very Low Impact is unlikely to exceed the site boundary.	Not Significant
007	Pests. Flies from refuse accumulated on site. Rats / mice from surrounding area. Wasps accumulating around materials used during operations.	Air – vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	Provision of adequate refuse receptacles for both inside and outside working areas. Training on environmental awareness and site waste management. Litter to be cleared at end of each day / shift. Skips to be monitored and emptied when required by authorised contractor. Site inspection process.	Very Low Management Action should prevent this happening,	Low Impact is unlikely to exceed the site boundary.	Not Significant

ASSESSMENT OF VISIBLE PLUMES RISK

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Emissions to Air. Plume emissions from flaring operation.	Dispersion by wind.	SSSI SPA Water Features Sensitive Receptors	Flare units designed and constructed to industry standards / best available techniques. Flare units to be of a shrouded and enclosed nature ensuring efficient combustion. Monitoring procedures established to include monitoring of the gas entering the flare. Flare units will be monitored during operation. Good phase separation upstream of flare to remove and prevent liquid carryover. Procedures established and communicated to operational personnel should the flow rate of gas exceed or fall below the flares flow range.	Very Low Management Action should prevent this happening,	Low Impact is unlikely to exceed the site boundary.	Not Significant

ASSESSMENT OF POSSIBLE SOURCES OF ACCIDENTS

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Transferring Substances: <ul style="list-style-type: none"> • Spillages; • Overfilling; • Incorrect Connections 	Flow by gravity; Air – Vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Drip trays to be utilised.</p> <p>Site / vehicle spillage kits to be readily available.</p> <p>Spillages to be remediated immediately.</p> <p>Trained operators to carry out loading / unloading operations.</p> <p>Specific areas identified for loading / unloading operations.</p> <p>Emergency response plan established / tested.</p>	Very Low Management Action should prevent this happening,	Low Impact is unlikely to exceed the site boundary.	Not Significant
002	Plant or equipment failure.	Flow by gravity; Air – Vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Maintenance and inspections are to be conducted as directed by written procedures.</p> <p>Safety critical spares readily available.</p> <p>Competent trained personnel only to operate plant or equipment.</p> <p>Emergency response plan established / tested.</p> <p>Drip trays to be utilised.</p> <p>Site / vehicle spillage kits to be readily available.</p> <p>Spillages to be remediated immediately.</p>	Very Low Management Action should prevent this happening,	Low Impact is unlikely to exceed the site boundary.	Not Significant
003	Containment failure.	Flow by gravity; Air – Vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	<p>Pipework and valves installed to above maximum theoretical working pressure.</p> <p>Pressure system checks.</p> <p>Equipment / pipework to be tested prior to operational use.</p> <p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Maintenance and inspections are to be conducted as directed by written procedures.</p> <p>Competent trained personnel only to operate plant or equipment.</p> <p>Operation / task to be planned and communicated.</p> <p>Training on environmental awareness for site personnel during site induction.</p> <p>Emergency response plan established / tested.</p>	Very Low Management Action should prevent this happening,	Low Impact is unlikely to exceed the site boundary.	Not Significant
004	Poor storage arrangements of hazardous substances	Flow by gravity; Air – Vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Hazardous substances to be stored in dedicated areas.</p> <p>COSHH Assessments and SDS sheets in place for hazardous items with a list and location of hazardous substances made available to the Fire & Rescue Service and copy held on site as part of Emergency Response Plan.</p> <p>Personnel to be trained in safe handling / use of hazardous items.</p> <p>COSHH items to be segregated in line with current regulations.</p> <p>Emergency response plan established / tested.</p>	Very Low Management Action should prevent this happening,	Low Impact is unlikely to exceed the site boundary.	Not Significant
005	Impact from Fire Water <ul style="list-style-type: none"> • In use; • Failed containment 	Flow by gravity; Air – Vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	<p>Site based fire risk assessment to be in place together.</p> <p>Fire awareness training / site induction for personnel.</p> <p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Local Fire & Rescue Service to be notified of operations with a review of the emergency response and a site visit possibly being undertaken.</p> <p>COSHH Assessments and SDS sheets in place for hazardous items with a list and location of hazardous substances made available to the Fire & Rescue Service and copy held on site as part of Emergency Response Plan.</p>	Very Low Management Action should prevent this happening,	Low Impact is unlikely to exceed the site boundary.	Not Significant

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
006	Fire and associated fumes.	Air – Vapours carried on the wind. Spread of fire on the Ground.	SSSI SPA Water Features Sensitive Receptors	<p>Site based fire risk assessment to be in place together.</p> <p>Fire awareness training / site induction for personnel.</p> <p>Hazardous materials stored appropriately.</p> <p>Local Fire & Rescue Service to be notified of operations with a review of the emergency response and a site visit possibly being undertaken.</p> <p>COSHH Assessments and SDS sheets in place for hazardous items with a list and location of hazardous substances made available to the Fire & Rescue Service and copy held on site as part of Emergency Response Plan.</p> <p>No sources of ignition are allowed on working pad of the site unless authorised and permit to work is in place.</p> <p>Fire points, extinguishers and a fire water tank located around the site.</p> <p>Containment of fire water / AFFF foam used in the event of firefighting measures will be contained within the site.</p> <p>Emergency response plan both on and off site established / tested.</p> <p>Emergency telephone number located on information board at site entrance.</p>	Very Low Management Action should prevent this happening,	Medium Potential for impact to exceed the site boundary.	Low
007	Incompatible Substances coming into contact (Unwanted Reactions)	Flow by gravity; Air – Vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Segregation of incompatible substances.</p> <p>COSHH items to be segregated in line with current regulations.</p> <p>Personnel to be trained in safe handling / use of hazardous items.</p> <p>COSHH Assessments and SDS sheets in place for hazardous items with a list and location of hazardous substances made available to the Fire & Rescue Service and copy held on site as part of Emergency Response Plan.</p> <p>Emergency response plan established / tested.</p>	Very Low Management Action should prevent this happening,	Low Impact is unlikely to exceed the site boundary.	Not Significant
008	Runaway Reactions	Flow by gravity; Air – Vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Trained Operatives only to carry out mixing operations.</p> <p>COSHH items to be segregated in line with current regulations.</p> <p>COSHH Assessments and SDS sheets in place for hazardous items with a list and location of hazardous substances made available to the Fire & Rescue Service and copy held on site as part of Emergency Response Plan.</p> <p>Personnel to be trained in safe handling / use of hazardous items.</p> <p>Emergency shutdown procedures to be established and tested prior to and during operations.</p> <p>Safe working procedures / toolbox talks to be conducted prior to operations commencing.</p> <p>Training on environmental awareness for site personnel during site induction.</p>	Very Low Management Action should prevent this happening,	Low Impact is unlikely to exceed the site boundary.	Not Significant
009	Vandalism	Various – acts of vandalism may cause fires, loss of containment from containers, damage to site equipment, etc.	SSSI SPA Water Features Sensitive Receptors	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Site security measures to be established and reviewed for suitability.</p> <p>Site personnel to be aware of possible unauthorised personnel on site and the actions to take if such personnel discovered.</p> <p>When not in use, equipment is to be shut down and isolated.</p> <p>Hazardous materials are to be stored in locked store, if applicable, when not in use.</p> <p>Emergency communications to be established between operational personnel and site security.</p> <p>Emergency response plan both on and off site established / tested.</p>	Very Low Management Action should prevent this happening,	Low Impact is unlikely to exceed the site boundary.	Not Significant

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
010	Flooding	Flow by Gravity	SSSI SPA Water Features Sensitive Receptors	The proposed wellsite is in an area designated as Flood Zone 1 and is described as: <i>Land having a less than 1 in 1,000 annual probability of river or sea flooding.</i>	Very Low Site Location should prevent this happening	Medium Potential for impact to exceed the site boundary.	Low
011	Spillages and Leaks as a result from vehicle related accidents	Flow by gravity; Air – Vapours carried on the wind.	SSSI SPA Water Features Sensitive Receptors	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Vehicles to be serviced and maintained to manufacturer's / industry standards.</p> <p>Regular maintenance and inspections to be conducted as directed by the manufacturer / written procedures.</p> <p>Site / vehicle spillage kits to be readily available.</p> <p>Spillages to be remediated immediately using vacuum cleaners / pumps and not to be washed down where possible.</p> <p>Training on environmental awareness for site personnel.</p> <p>Record and investigate complaints, pollution incidents or breaches of permit conditions and the actions taken to rectify complaints and prevent further occurrences.</p> <p>Emergency response plan established / tested.</p>	Very Low Management Action should prevent this happening,	Low Impact is unlikely to exceed the site boundary.	Not Significant

DISCHARGES TO SURFACE WATER ASSESSMENT

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Overflow of site perimeter during operational and non-operational activities.	Flow by gravity Percolation to the subsurface	Water Features Surrounding Land	<p>Water produced and/or used within the activity is re-used where possible within the operation for well control, cementing operations, and drilling operations.</p> <p>Waste water is contained within the site boundary via storage tanks.</p> <p>Surface run-off water is contained within the impermeable membrane and perimeter ditches.</p> <p>Water within the sump may be recycled as fire water by the Fire and Rescue Service. Used fire water will be tested for contamination prior to being removed from site for onward disposal to an authorised licenced facility by an authorised licenced waste carrier.</p> <p>Discharges to surface water are permitted by the Environment Agency.</p>	<p>Very Low</p> <p>Management Action should prevent this happening,</p>	<p>Very Low</p> <p>Site is contained and no discharges will take place.</p>	Not Significant

ASSESSMENT OF AIR EMISSIONS RISK

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Greenhouse gas emissions from site power generation.	Air – Vapours carried on the wind. Atmosphere.	SSSI SPA Water Features Sensitive Receptors	Generators are maintained and serviced in line with manufacturer's guidelines thus ensuring that they operate efficiently and minimising emissions, noise and vibration. Service and maintenance regimes are implemented and adhered to and all work is carried out by a competent trained electrician / mechanic. Generators supplied within the rig structure respond to power demand and the working load and output varies during the operations being conducted. When power is not required generators are switched off to reduce emissions, fuel usage, noise, vibration and wear and tear on the equipment.	Very Low Not expected to impact the immediate or surrounding area.	Very Low Minute levels of CO ₂ compared to global scale.	Not Significant
002	Greenhouse gas emissions from flaring of natural gas during operations.	Air – Vapours carried on the wind. Atmosphere.	SSSI SPA Water Features Sensitive Receptors	Flare units designed and constructed to industry standards / best available techniques. Flare units to be of a shrouded and enclosed nature ensuring efficient combustion. Monitoring procedures established to include monitoring of the gas entering the flare. Flare units will be monitored during operation. Good phase separation upstream of flare to remove and prevent liquid carryover. Procedures established and communicated to operational personnel should the flow rate of gas exceed or fall below the flares flow range.	Very Low Not expected to impact the immediate or surrounding area.	Very Low Minute levels of CO ₂ compared to global scale.	Not Significant
003	Greenhouse gas emissions from vehicles and site equipment during operations.	Air – Vapours carried on the wind. Atmosphere.	SSSI SPA Water Features Sensitive Receptors	Vehicle loads and transportation to be planned to reduce quantity of deliveries / collections. Vehicles are to be serviced and maintained to manufacturer's / industry standards. Regular maintenance and inspections are to be conducted as directed by written procedures. Vehicles when not in use to be switched off. Ambient air quality monitoring may be undertaken to establish Ambient air quality baseline and during flaring activities.	Very Low Not expected to impact the immediate or surrounding area.	Very Low Minute levels of CO ₂ compared to global scale.	Not Significant

ASSESSMENT OF THE DISPOSAL AND RECOVERY OF WASTE PRODUCED ONSITE

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Well Suspension Brine	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	Non-Hazardous Waste Stream. Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches. Licenced Waste Carrier and Licenced Waste Facility used. Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation. Vehicles to adhere to approved traffic routes as outlined by planning authority / client.	Very Low Management Action should prevent this happening,	Low Waste Stream is Non-Hazardous	Not Significant
002	Spent Hydrochloric Acid	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	Non-Hazardous Waste Stream. Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches. Licenced Waste Carrier and Licenced Waste Facility used. Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation. Vehicles to adhere to approved traffic routes as outlined by planning authority / client.	Very Low Management Action should prevent this happening,	Low Waste Stream is Non-Hazardous	Not Significant
003	Formation Water	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	Non-Hazardous Waste Stream. Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches. Licenced Waste Carrier and Licenced Waste Facility used. Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation. Vehicles to adhere to approved traffic routes as outlined by planning authority / client.	Very Low Management Action should prevent this happening,	Low Waste Stream is Non-Hazardous	Not Significant
004	Cement	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	Non-Hazardous Waste Stream. Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches. Licenced Waste Carrier and Licenced Waste Facility used. Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation. Vehicles to adhere to approved traffic routes as outlined by planning authority / client.	Very Low Management Action should prevent this happening,	Low Waste Stream is Non-Hazardous	Not Significant
005	Accommodation Waste Water and Sewage.	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	Non-Hazardous Waste Stream. Waste water and foul sewage will be stored in dedicated tanks either a cess tank or under-cabin tank. Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches. Licenced Waste Carrier and Licenced Waste Facility used. Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation. Vehicles to adhere to approved traffic routes as outlined by planning authority / client.	Very Low Management Action should prevent this happening,	Low Waste Stream is Non-Hazardous	Not Significant

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
006	Surface Run-off Water.	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Surface water is mainly rainfall (precipitation), however, the impermeable membrane exists to protect against pollution from oil spillages and, therefore, has the potential to contain oils.</p> <p>Arrangements are made for the water within the sump to be discharged to surface water / groundwater or a road haulage tanker for subsequent offsite disposal via a licenced waste facility during periods of operations, which may include permitted reinjection wells.</p> <p>If signs of contamination are present within the water, attempts at site will be made to remove the contamination (i.e. use of hydro-sorb pads to remove oil contamination) and tests will be conducted at site or the licenced waste facility to identify the best route to be undertaken for recycling.</p> <p>Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation.</p> <p>Vehicle spillage kits are to be carried during transportation of wastes.</p> <p>Vehicles to adhere to approved traffic routes as outlined by planning authority / client.</p>	<p>Very Low Management Action should prevent this happening,</p>	<p>Low Waste Stream is Non-Hazardous (chance to become hazardous)</p>	<p>Not Significant</p>
007	Fuel Oil Spill from Power Generation	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Fuel oil is stored within a bunded system reducing the chance of a spill (waste).</p> <p>Transportation from site to the licenced waste facility is by a licenced waste carrier in road bulk haulage vehicles.</p> <p>Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation.</p> <p>Vehicle spillage kits are to be carried during transportation of wastes.</p> <p>Vehicles are to adhere to approved traffic routes as outlined by planning authority / client.</p>	<p>Very Low Management Action should prevent this happening,</p>	<p>Low Waste Stream is Hazardous but in minor quantities.</p>	<p>Not Significant</p>
008	Engine, Gear and Lubricating Oils from Mobile Plant.	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Low level volumes to be onsite.</p> <p>Waste oils will be collected and stored on site within bunded trays for subsequent offsite recycling or disposal.</p> <p>Transportation from site to the licenced waste facility is by a licenced waste carrier in road bulk haulage vehicles.</p> <p>Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation.</p> <p>Vehicle spillage kits are to be carried during transportation of wastes.</p> <p>Vehicles are to adhere to approved traffic routes as outlined by planning authority / client.</p>	<p>Very Low Management Action should prevent this happening,</p>	<p>Low Waste Stream is Hazardous but in minor quantities.</p>	<p>Not Significant</p>
009	Hydraulic Oils from Mobile Plant.	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Waste oils will be collected and stored on site within bunded trays for subsequent offsite recycling or disposal.</p> <p>Transportation from site to the licenced waste facility is by a licenced waste carrier in road bulk haulage vehicles.</p> <p>Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation.</p> <p>Vehicle spillage kits are to be carried during transportation of wastes.</p> <p>Vehicles are to adhere to approved traffic routes as outlined by planning authority / client.</p>	<p>Very Low Management Action should prevent this happening,</p>	<p>Low Waste Stream is Hazardous but in minor quantities.</p>	<p>Not Significant</p>

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
010	Oil Rags / Absorbents from Mobile Plant Maintenance.	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Oil rags and absorbent materials used during plant maintenance and for spillages within the site will be stored on site in steel drums (209 litres) prior to disposal offsite by a licenced waste contractor.</p> <p>Oil rags and absorbent materials will be removed from site at the end of operations or when quantities held permit a practical economic and environmental operation.</p> <p>Transportation from site to the licenced waste facility is by a licenced waste carrier in road bulk haulage vehicles.</p> <p>Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation.</p> <p>Vehicle spillage kits are to be carried during transportation of wastes.</p> <p>Vehicles to adhere to approved traffic routes as outlined by planning authority / client.</p>	Very Low Management Action should prevent this happening,	Low Waste Stream is Hazardous but in minor quantities.	Not Significant
011	Waste Filters from Mobile Plant Maintenance	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	<p>Wellsite constructed with an impermeable liner at a slight decline to ensure rainwater and any pollutants are stored within containment ditches.</p> <p>Low level volumes to be onsite.</p> <p>Waste oil filters from mobile plant maintenance will be stored on site in steel drums (209 litres) prior to disposal offsite by a licenced waste contractor.</p> <p>Waste oil filters will be removed from site at the end of operations or when quantities held permit a practical economic and environmental operation.</p> <p>Transportation from site to the licenced waste facility is by a licenced waste carrier in road bulk haulage vehicles.</p> <p>Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation.</p> <p>Vehicle spillage kits are to be carried during transportation of wastes.</p> <p>Vehicles to adhere to approved traffic routes as outlined by planning authority / client.</p>	Very Low Management Action should prevent this happening,	Low Waste Stream is Hazardous but in minor quantities.	Not Significant
012	Paper and Cardboard from Office routines	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	<p>Waste generated from the office accommodation units will be paper and cardboard and will be segregated and stored on site in skips for subsequent offsite recycling via a licenced waste facility.</p> <p>Use of enclosed skips will ensure that waste can be contained within the site boundary.</p> <p>Transportation from site to the licenced waste facility is by a licenced waste carrier in road bulk haulage vehicles.</p> <p>Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation.</p> <p>Vehicles to adhere to approved traffic routes as outlined by planning authority / client.</p>	Very Low Management Action should prevent this happening,	Low Waste Stream is Non-Hazardous	Not Significant
013	Canteen Waste.	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	<p>Canteen waste generated on site will be stored on site in enclosed skips for subsequent offsite disposal to a licenced waste facility.</p> <p>Canteen waste will comprise of food packaging, food waste, plastic containers, paper, cardboard etc.</p> <p>Use of skips will ensure that waste can be contained within the site boundary.</p> <p>Transportation from site to the licenced waste facility is by a licenced waste carrier in road bulk haulage vehicles.</p> <p>Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation.</p> <p>Vehicle spillage kits are to be carried during transportation of wastes.</p> <p>Vehicles to adhere to approved traffic routes as outlined by planning authority / client.</p>	Very Low Management Action should prevent this happening,	Low Waste Stream is Non-Hazardous	Not Significant

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
014	Packaging from Delivered Products	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	<p>Wood used in the packaging of equipment, including pallets and dunnage, will be stored on site for subsequent reuse or offsite recycling via a licenced waste facility.</p> <p>Where possible, packaging used for transportation of goods will be returned to the manufacturing supplier with the delivery vehicle.</p> <p>Waste generated from packaging will be segregated and stored on site skips for subsequent offsite recycling via a licenced waste facility.</p> <p>Transportation from site to the licenced waste facility is by a licenced waste carrier in road bulk haulage vehicles.</p> <p>Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation.</p> <p>Vehicles to adhere to approved traffic routes as outlined by planning authority / client.</p>	Very Low Management Action should prevent this happening,	Low Waste Stream is Non-Hazardous	Not Significant
015	Metal from Engineering Works	Transportation via Licenced Waste Contractor to Facility	Licenced Waste Facility Along Traffic Route	<p>Waste metal generated on site through minor engineering works and packaging will be stored on site for subsequent reuse or offsite recycling via a licenced waste facility.</p> <p>Transportation from site to the licenced waste facility is by a licenced waste carrier in road bulk haulage vehicles.</p> <p>Vehicles used for transportation are to be serviced and maintained in accordance with manufacturers / legislation.</p> <p>Vehicle spillage kits are to be carried during transportation of wastes.</p> <p>Vehicles are to adhere to approved traffic routes as outlined by planning authority / client.</p>	Very Low Management Action should prevent this happening,	Low Waste Stream is Non-Hazardous	Not Significant
016	Natural Gas	Air – Prevailing winds from south west (average statistics from the Met Office). Atmosphere.	SSSI SPA Water Features Sensitive Receptors	<p>Natural gas will be incinerated using permitted flare units.</p> <p>Flares are of a shrouded and enclosed design.</p> <p>Flare units to be monitored and controlled at all times. Gas rates to the flare can be reduced is required.</p> <p>Perimeter safe zone established around flare unit.</p> <p>Records will be kept of complaints and action taken to resolve complaints if required.</p>	Very Low Not expected to impact the immediate or surrounding area.	Very Low Minute levels of CO ₂ compared to global scale.	Not Significant

GLOBAL WARMING POTENTIAL

Serial No.	Activity	Substance	Chemical Formula	Atmospheric Lifetime (Years)	Global Warming Potential (GWP)	Direct / Indirect Release	Released Mass Per Operation (Tonnes)	Global Warming Potential of Emissions (Released Mass x GWP)
001	Flaring of Natural Gas ²	Carbon Dioxide	CO ₂	Variable	1	Direct	19.856	19.86
002		Methane	CH ₄	12.3	21	Direct	0.319	6.699
003		Nitrous Oxide	NO _x	120	310	Direct	0.009	2.79
004	Flaring of Natural Gas ³	Carbon Dioxide	CO ₂	Variable	1	Direct	208.483	208.483
005		Methane	CH ₄	12.3	21	Direct	3.351	70.371
006		Nitrous Oxide	NO _x	120	310	Direct	0.089	27.59
007	Flaring of Natural Gas ⁴	Carbon Dioxide	CO ₂	Variable	1	Direct	19.856	19.86
008		Methane	CH ₄	12.3	21	Direct	0.319	6.699
009		Nitrous Oxide	NO _x	120	310	Direct	0.009	2.79
010	Flaring of Natural Gas ⁵	Carbon Dioxide	CO ₂	Variable	1	Direct	148.916	148.916
011		Methane	CH ₄	12.3	21	Direct	2.393	50.253
012		Nitrous Oxide	NO _x	120	310	Direct	0.064	19.84
013	Power Generation	Carbon Dioxide	CO ₂	Variable	1	Direct	558	558
014	Liquid CO ₂ Injection	Carbon Dioxide	CO ₂	Variable	1	Direct	6	6

ENERGY SOURCES, CONVERSION EFFICIENCY AND EMISSIONS FACTORS

Serial No.	Energy Source	Location of Emission	Delivered to Primary Conversion Factor	CO ₂ Factor (t/mwh, Primary)
001	Gas Oil	Direct	1	0.250

ENERGY EMISSION FACTORS

Serial No.	Fuel	MWh	Delivered to Primary Conversion Factor	t/MWh	Carbon Dioxide Emissions (MWh x Delivered to Primary Conversion Factor x t/MWh)
001	Gas Oil	2232	1	0.250	2232 X 1 x 0.250 = 558,000 Kg of Carbon Dioxide emissions.

² Well clean up / Initial Well Test using Shrouded Flare (2.5mmscfd) for a total period of 4 days = 10mmscf

³ Extended Well Test using Enclosed Flare (3.5mmscfd) for a total period of 30 days = 105mmscf

⁴ Well clean up / Initial Well Test using Shrouded Flare (2.5mmscfd) for a total period of 4 days = 10mmscf

⁵ Extended Well Test using Shrouded Flare (2.5mmscfd) for a total period of 30 days = 75mmscf

ASSESSMENT OF GLOBAL WARMING IMPACT

ID	Source	Pathway	Receptor	Risk Management	Probability of Exposure	Consequence	Overall Risk
001	Greenhouse gas emissions from site power generation.	Air – Vapours carried on the wind. Atmosphere.	SSSI SPA Water Features Sensitive Receptors	Generators are maintained and serviced in line with manufacturer's guidelines thus ensuring that they operate efficiently and minimising emissions, noise and vibration. Service and maintenance regimes are implemented and adhered to and all work is carried out by a competent trained electrician / mechanic. Generators supplied within the rig structure respond to power demand and the working load and output varies during the operations being conducted. When power is not required generators are switched off to reduce emissions, fuel usage, noise, vibration and wear and tear on the equipment.	Very Low Not expected to impact the immediate or surrounding area.	Very Low Minute levels of CO ₂ compared to global scale.	Not Significant
002	Greenhouse gas emissions from flaring of natural gas during operations.	Air – Vapours carried on the wind. Atmosphere.	SSSI SPA Water Features Sensitive Receptors	Flare units designed and constructed to industry standards / best available techniques. Flare units to be of a shrouded and enclosed nature ensuring efficient combustion. Monitoring procedures established to include monitoring of the gas entering the flare. Flare units will be monitored during operation. Good phase separation upstream of flare to remove and prevent liquid carryover. Procedures established and communicated to operational personnel should the flow rate of gas exceed or fall below the flares flow range.	Very Low Not expected to impact the immediate or surrounding area.	Very Low Minute levels of CO ₂ compared to global scale.	Not Significant
003	Greenhouse gas emissions from vehicles and site equipment during operations.	Air – Vapours carried on the wind. Atmosphere.	SSSI SPA Water Features Sensitive Receptors	Vehicle loads and transportation to be planned to reduce quantity of deliveries / collections. Vehicles are to be serviced and maintained to manufacturer's / industry standards. Regular maintenance and inspections are to be conducted as directed by written procedures. Vehicles when not in use to be switched off. Ambient air quality monitoring may be undertaken to establish Ambient air quality baseline and during flaring activities.	Very Low Not expected to impact the immediate or surrounding area.	Very Low Minute levels of CO ₂ compared to global scale.	Not Significant
004	Greenhouse gas emissions from Liquid CO ₂ injection.	Air – Vapours carried on the wind. Atmosphere.	SSSI SPA Water Features Sensitive Receptors	Small volumes of CO ₂ utilised. Liquid CO ₂ has been produced from atmosphere. Any release to atmosphere would not increase quantity of CO ₂ from the atmosphere.	Very Low Not expected to impact the immediate or surrounding area or have global significance.	Very Low Minute levels of CO ₂ compared to global scale.	Not Significant