SURFACE WATER MANAGEMENT PLAN

Revision 5

March 2023

APPROVAL LIST

	Title	Name
Prepared By	HSE & Permit Advisor	Sean Smart
1st Reviewed By	Field Development Manager	Nick Mace
2nd Reviewed By	Operations Engineer	Caroline Foster
Approved By	Country Manager	Tom Selkirk

REVISION HISTORY

Revision	Reason for Revision	Date of Revision
Rev 0	Supersedes V1.4 of Envireau Water Surface Water Management Plan following construction of the West Newton A Wellsite.	01/04/2021
Rev 1	Inclusion of Appendix 3.	27/04/2022
Rev 2	Change of parameter suite testing. Appendix 3 now Appendix 2.	26/05/2022
Rev 3	Updated following Environment Agency Schedule 5 Notice.	24/08/2022
Rev 4	Updated following Environment Agency Schedule 5 Notice.	08/11/2022
Rev 5	Updated following Environment Agency Schedule 5 Notice.	23/03/2023

CONTENTS

1. Introduction 5
2. Scope 5
3. Definitions 5
4. Site Description 6
4.1 Site Location and Setting 6
4.2 Surface Water Containment System 6
4.2.1 Drilling Area 6
4.2.2 Production Area 6
4.3 Surface Water Discharge System 6
4.3.1 Class 1 SPEL Oil-water Separator 6
4.3.2 Surface Water Discharge Point 7
4.3.3 Surface Water Monitoring Sampling Points 7
4.4 Attenuation Capacity 8
4.4.1 Drilling Area 8
4.4.2 Production Area 8
4.5 Secondary Containment Systems 8
5. Discharge to Surface Water 9
5.1 Greenfield Runoff Rate 9
5.2 Control of Discharges 9
5.3 Drilling Area 9
5.3.1 High Risk Activities 9
5.3.2 Production Operations 10
5.4 Production Area 10
5.4.1 Production and Suspension Operations 10
5.5 Discharge Process Map 11
6. Sampling and Analysis 12
6.1 Sampling Philosophy 12
6.2 Drilling Area 12
6.2.1 High Risk Activities 12
6.2.2 Low Risk Activities 14
6.3 Production Area 14
6.4 Lambwath Stream 15
6.5 Sampling Methodology 16
7. Surface Water Analysis and Discharge Records 17
7.1 Surface Water Monitoring Data 17

8. **Training** **17**

9. **References** **17**

Appendix 1 - Discharge Risk Assessment **19**

Appendix 2 – Surface Water Screening Limits **21**

Appendix 3 – Surface Water Monitoring – Sampling Point Location Plans **23**

Appendix 4 – Surface Water Monitoring Report Forms **25**

1. INTRODUCTION

Rathlin Energy (UK) Limited (Rathlin) is a private company with its head office in Beverley, East Riding of Yorkshire. Rathlin Energy is a petroleum exploration, development and production company with operations in the United Kingdom. Rathlin Energy is the operator of PEDL 183.

The purpose of the Surface Water Management Plan is to outline the surface water management arrangements to be implemented at the West Newton A (WNA) Wellsite (the 'Site') during the long term production operations, which for clarity includes periodic drilling, workover and testing operations.

2. SCOPE

This Surface Water Management Plan is applicable to the WNA Wellsite and all operations permitted therein. It is applicable to Rathlin, its contractors and subcontractors and can be used in support of applications to the Environment Agency under EPR2016.

3. DEFINITIONS

µg/l:	Micrograms per litre
AOD:	Above Ordnance Datum
BGS:	British Geological Survey
BS:	British Standard
CIRIA:	Construction Industry Research and Information Association
EA:	Environment Agency
GRR:	Greenfield Runoff Rate
HDPE:	High Density Polyethylene
High Risk Activity(ies)	Onsite activities determined by the Operator as presenting a higher level of risk to surface water
l/s/ha:	Litres per second per hectare
Low Risk Activity(ies)	Onsite activities determined by the Operator as presenting a low level of risk to surface water
M:	Metres
mg/l:	Milligrams per litre
NGR:	National Grid Reference
PEDL:	Petroleum Exploration and Development Licence
PPG3:	Use and design of oil separators in surface water drainage systems
USEPA16:	Sixteen Poly Aromatic Hydrocarbons regulated by the U.S. Environmental Protection Agency (USEPA) based on their potential human and ecological health effects
UKAS:	The United Kingdom Accreditation Service

4. SITE DESCRIPTION

4.1 Site Location and Setting

The WNA Wellsite is located approximately 1.25km north of the village of West Newton and 12km northeast of Hull.

The site address is as follows:

West Newton A Wellsite
Rathlin Energy (UK) Limited
Fosham Road
Marton
Hull
HU11 5DA
National Grid Ref: TA 19268 39131

The site covers an area of approximately 3ha and is situated at an elevation of approximately 13m AOD.

4.2 Surface Water Containment System

The site has been designed so that any materials falling onto the site are contained prior to going off site. This allows for the containment of any hazardous substances and non-hazardous substances which could cause surface water pollution.

4.2.1 Drilling Area

The site shall be created by levelling the surface, constructing 1.1m deep ditches around the perimeter of the site and installing a HDPE membrane over the entirety of the site. The site surface shall be created, in the most part, from 300mm MOT type 1 aggregate. All but the Western side of the perimeter containment ditches shall have 300mm diameter twin walled perforated pipe installed and be back filled to surface with granular material, the western perimeter containment ditch shall remain open.

The drilling cellars shall create an impermeable containment area within which the wells will be drilled. The HDPE membrane shall be sealed to the edge of the cellars. Concrete slabs shall be installed around the cellars and drainage channels shall be installed where necessary to direct drilling fluids back to the cellars. Any fluids falling on the site (including rainfall) shall permeate through the surface aggregate and collect in the perimeter containment ditches.

4.2.2 Production Area

The production area shall be constructed in a similar fashion with 0.6m deep ditches around the perimeter of the site and an HDPE membrane across the whole site and topped with MOT type 1 for the surface. All of the perimeter containment ditches shall be piped and backfilled. Any fluids falling on the surface shall percolate through the aggregate and collect in the perimeter containment ditches. The perimeter containment ditches shall be sloped towards the outlet point.

The two separate areas shall be independent of each other with a raised concrete baton formed between the drilling area and production area to prevent cross contamination.

Bunds shall be formed where tanks containing hazardous substances are to be stored or transferred. Bunds and loading areas shall be constructed in accordance with the methodology detailed within CIRIA C736[1] (2014) Guidance [Ref. 1]. Any fluids falling on these areas will be contained within the areas.

4.3 Surface Water Discharge System

4.3.1 Class 1 SPEL Oil-water Separator

A Class 1 SPEL Oil-water Separator (herein referred to as an interceptor) shall be installed prior to the surface water discharge point from the site. Surface water from both the drilling area and production area shall flow into the interceptor. Isolation valves shall be installed within each containment system prior to the interceptor.

[1] Containment systems for the prevention of pollution: Secondary, tertiary and other measures for industrial and commercial premises.

A hydrobrake shall be installed prior to the interceptor to ensure that the interceptor is not flooded and only the maximum allowable run off rate can be flowed through the discharge system.

4.3.2 Surface Water Discharge Point

Surface water is processed through the interceptor and discharged to a field drain located on the north west boundary of the site (Discharge Point (Outlet 1)). The Discharge Point (Outlet 1) discharges to a dry field drain present along the western boundary of the site at National Grid Reference (NGR): TA 19221 39198. The current field drainage system feeds to this point at the perimeter of the field so no additional rainwater shall be entering the system via the site discharge due to the construction of the site. The field drain flows towards the north and confluences with the Lambwath Stream approximately 350m north of the site. At this point, the Lambwath Stream is at an elevation of approximately 8mAOD and flows towards the west. The capacity of the field drain is not known. The rate of discharge to the field drain will be limited by the hydrobrake installed prior to the interceptor. The hydrobrake will limit the discharge to a rate no greater than the Greenfield runoff rate.

4.3.3 Surface Water Monitoring Sampling Points

Surface water monitoring sampling points have been identified within the site and their location, including National Grid Reference (NGR), are provided within Table 4.1.

Sample Point No.	Sampling Point	Location	NGR
#1	Holding Tank No. 1	Drilling Area – Western Boundary	TA 19242 39176
	Holding Tank No. 2	Drilling Area – Western Boundary	TA 19242 39172
#2	Drilling Area Perimeter Containment Ditch	Drilling Area – Western Boundary	TA 19236 39168
#3	Discharge Point (Outlet 1)	Outlet 1 – North West Boundary of site	TA 19238 39196
#4	Production Area Perimeter Containment Ditch	Production Area – North West boundary	TA 19363 39192

Table 4.1 Information of Surface Water Monitoring Sampling Points

Details of the sampling points are detailed below.

- #1 – Drilling Area Sample Point – Isolated water storage tanks.
- #2 – Drilling Area Sample Point – Drilling area surface water containment ditch.
- #3 – Outlet 1 Sample Point – Discharge point from site.
- #4 – Production Area Sample Point – Production area surface water containment ditch.

Surface water monitoring sampling points external to the site have been identified and their location, including National Grid Reference (NGR), are provided within Table 4.2.

Sample Point No.	Sampling Point	Location	NGR
#5	Lambwath Stream (Upstream)	~0.578Km Northeast of Site	TA 19545 39729
#6	Lambwath Stream (Downstream)	~0.568Km Northwest of Site	TA 18908 39670

Table 4.2 Information of Surface Water Monitoring Sampling Points

Details of the sampling points are detailed below.

- #5 – Upstream Sample Point (Zinc analysis only) – Public footpath that crosses Lambwath Stream.
- #6 – Downstream Sample Point (Zinc analysis only) – Public footpath that crosses Lambwath Stream.

For clarity, the external surface water monitoring sampling points are for quarterly sampling and analysis for Zinc only. These sampling points have been agreed with the Environment Agency to ensure that Zinc identified within off-site discharges is monitored to ensure that Zinc levels are diluted and do not impact on Lambwath Stream.

4.4 Attenuation Capacity

A drainage assessment concludes that the site well pad and oil production facility can contain a 1 in 100-year storm event with an allowance for climate change (+30%), without the need to discharge any surface water runoff. As such, the site will not increase the risk of off-site flooding and if necessary, can attenuate the volume of water generated from an extreme storm, which would then be discharged from the site or removed by road tanker.

4.4.1 Drilling Area

The design and construction of the well pad means that rainfall-runoff generated over the platform area (13,225m^2) and also the topsoil bund (1,188m^2, which could potentially contribute to runoff), can be contained either within the perimeter containment ditch or on the site platform up to the height of the containment berm.

As assessed in the Flood Risk Assessment, the Drilling Area is required to have an attenuation capacity of 2,283m^3 and at least 174mm bunding above the top of the surface stone to contain the volume of rainfall from a 7-day, 1 in 100-year storm event plus 30% climate change volume.

4.4.2 Production Area

The design and construction of the oil production facility means that rainfall-runoff generated over the area (11,483m^2) and also the topsoil bund (2,099m^2, which could potentially contribute to runoff), can be contained either within the perimeter containment ditch or on the facility platform up to the height of the containment berm.

As assessed in the Flood Risk Assessment, the Production Area is required to have an attenuation capacity of 2,151m^3 and at least 174mm bunding above the top of the surface stone to contain the volume of rainfall from a 7-day, 1 in 100-year storm event plus 30% climate change volume.

4.5 Secondary Containment Systems

Surface water from precipitation will accumulate within the secondary containment systems located within the wellsite. The surface water level within secondary containment system will be monitored to ensure bund overtop does not occur.

When required, surface water (includes surface water contaminated by the site inventory and/or fire-fighting water / cooling water) contained within the secondary containment system will be transferred offsite to an Environment Agency Licensed Waste Water Disposal / Treatment Facility via road tanker.

5. DISCHARGE TO SURFACE WATER

5.1 Greenfield Runoff Rate

Based on the Environment Agency guidance [Ref. 2] and SuDS manual C7532 [Ref. 3], the greenfield runoff rate to limit surface water discharge, based on a 1 in 1 year peak flow has been calculated using the HR Wallingford Greenfield runoff tool as 3.66l/s/ha. This equates to a maximum flow rate of 10.24l/s given the surface water drainage area.

5.2 Control of Discharges

Only the appointed person shall have access to the isolation valves and subsequently 'open' and 'close' the discharge operation as dictated by the site operations and the analysis results of any sampling undertaken as described in the sections below.

To facilitate any discharge, manually operated isolation valves will be opened. The keys for the isolation valves will be held in the Rathlin Energy Office and by the on-call operator (the appointed person). Each respective drainage pipe leading to the interceptor shall have a set of isolation valves leading to the interceptor and will be opened and shut accordingly as dictated by the phase of the development.

The discharge of surface water across both sections of the proposed site have been assessed to highlight the inherent risks associated with discharging. The residual risk, once mitigation measures have been implemented concludes that the risk is 'not significant'. The Discharge Risk Assessment has been presented in Appendix 1.

5.3 Drilling Area

5.3.1 High Risk Activities

During periods of high risk activities, such as drilling, testing, workover operations and well maintenance treatments, the interceptor shall remain isolated from the drilling area so as to prevent surface water (rainfall) on the site discharging into the surface water course. The interceptor shall remain open for the production area.

As there is an increased risk to surface water becoming contaminated within the drilling area, surface water will be pumped from the containment system into a separate holding tank installed within the site where it will be sampled in accordance with Section 6.4. The parameters for analysis are presented in Section 6.2 and consider potential pollutants present at the site as part of the high risk activities.

The two (2) 50,000 litre holding tanks will be installed within the site at the locations detailed within Table 5.1.

Equipment	Location	NGR
Holding Tank No.1	Drilling Area – Western Boundary	TA 19242 39176
Holding Tank No.2	Drilling Area – Western Boundary	TA 19242 39172

Table 5.1 Information of Holding Tanks within Drilling Area

Each holding tank will provide containment of a maximum 50,000 litres (50 m^3) with a combined capacity to hold 100,000 litres (100 m^3) of surface water.

Upon receipt of the sampling results, the surface water contained within the holding tank that has been sampled shall be discharged through the surface water discharge system given the water falls within the screening limits set out in Appendix 2. In the event that the results from the analysis indicate that the surface water has been contaminated and does not meet the screening limits set out in Appendix 2, arrangements will be made for the surface water to be removed from site via vacuum tanker to an Environment Agency approved Waste Facility for treatment and/or disposal.

By holding the fluids within the holding tank(s), this ensures that the fluids cannot be contaminated after the sample has been taken and prior to discharge.

For clarity, only one (1) sample will be taken of the fluids contained within the holding tank. Immediately following the sampling procedure, the holding tank will be isolated to ensure that no additional fluids are pumped in to the tank thus ensuring that the fluids contained within the holding tank remain a true representation of the sample analysis.

Following the conclusion of drilling, testing, workover operations, well maintenance treatments and high risk activities, a sample shall be taken from the perimeter containment ditch and a full suite of analysis shall be undertaken, the

parameters of which have been identified in Section 6.2. Once the sampling results have been received and comply with the screening limits set out in Appendix 2, the surface water shall be discharged through the interceptor to the field drain, with the interceptor being left open. Sampling and analysis shall then take place on a monthly basis.

5.3.2 Production Operations

During periods of production the interceptor shall remain 'open' so as to allow surface water (rainfall) on the site to discharge into the local surface water course, preventing the build-up of levels within the containment system and preventing flooding of the site.

Surface water will be discharged from the perimeter containment ditch to the Discharge Point (Outlet 1) located on the north west boundary of the site via the interceptor. The interceptor is designed, manufactured and tested in accordance with the European Standard BS EN 858-1 [Ref. 4].

The discharge arrangement means there is a negligible risk that free phase hydrocarbons would be present in the discharge; however, the interceptor does provide an additional level of environmental protection. The interceptor will be fitted with a high fluid level alarm system so as to warn the Operator to close the isolation valves and arrange for servicing of the interceptor preventing any potential hydrocarbons from being discharged to the surface water course.

The discharge equipment will be inspected on a regular basis and the condition recorded on the Rathlin Energy Testing and Maintenance Form (RE-05-FO-059). Any issues identified will be addressed. Records will be made available to the Environment Agency for inspection.

In the event of a spillage or leak occurring within the drilling area, the containment system will be isolated from the interceptor immediately with the spillage area remediated and the surface water sampled. Once the results confirm that the surface water has not been contaminated, the containment system will be opened to allow discharge operations to continue. In the event that the results from the analysis indicate that the surface water has been contaminated, arrangements will be made for the surface water to be removed from site via vacuum tanker to an Environment Agency approved Waste Facility for treatment and/or disposal.

5.4 Production Area

The activities taking place on the production area are limited in so far as either being in production or inactive. The production area has an independent containment system to that of the drilling area and therefore the management of surface water during the neighbouring drilling and/or testing operations can also be managed independently, namely being left open to enable the discharge of surface water from the production area only.

5.4.1 Production and Suspension Operations

During periods of production, or when the production area is inactive, the interceptor shall remain 'open' to allow surface water (rainfall) on the site to discharge into the surface water course, preventing the build-up of levels within the containment system and preventing flooding of the site.

Surface water will be discharged from the perimeter containment ditch to the Discharge Point (Outlet 1) located on the north west boundary of the site via the interceptor. The interceptor is designed, manufactured and tested in accordance with the European Standard BS EN 858-1 [Ref. 4].

The discharge arrangement means there is a negligible risk that free phase hydrocarbons would be present in the discharge; however, the interceptor does provide an additional level of environmental protection. The interceptor will be fitted with a high fluid level alarm system so as to warn the Operator to close the isolation valves and arrange for servicing of the interceptor preventing any potential hydrocarbons from being discharged to the surface water course.

Again, the discharge equipment will be inspected on a regular basis and the condition recorded on the Rathlin Energy Testing and Maintenance Form (RE-05-FO-059). Any issues identified will be addressed. Records will be made available to the Environment Agency for inspection.

In the event of a spillage or leak occurring within the production area, the containment system will be isolated from the interceptor immediately with the spillage area remediated and the surface water sampled. Once the results confirm that the surface water has not been contaminated, the containment system will be opened to allow discharge operations to continue. In the event that the results from the analysis indicate that the surface water has been contaminated, arrangements will be made for the surface water to be removed from site via vacuum tanker to an Environment Agency approved Waste Facility for treatment and/or disposal.

For clarity, surface water discharge will only be permitted in the event that the screening limits detailed within Table A1, Appendix 2 are met.

5.5 Discharge Process Map

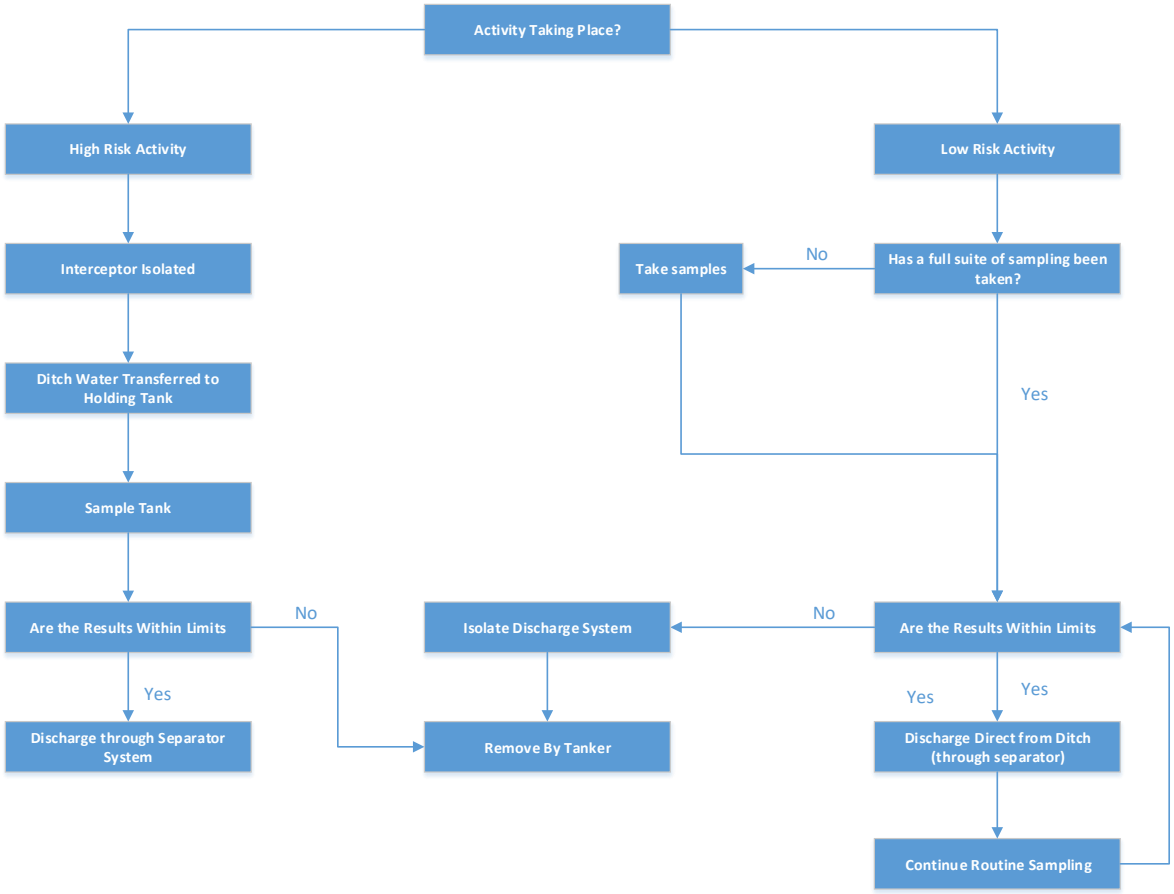

Figure 5.1: Discharge Process Map

6. SAMPLING AND ANALYSIS

6.1 Sampling Philosophy

The reason for sampling the surface water is two-fold. Firstly, there is a requirement to ensure that surface water being discharged from the site will not introduce contamination to the local surface water network. Therefore, limits shall be set on parameters for discharge to surface water which are consistent with Environmental Quality Standards [Ref. 5].

Secondly, the testing of the surface water is part of the site integrity management. The results from the surface water testing can be corroborated against the results of the groundwater testing to determine whether there is a leak pathway between the site surface and the groundwater.

Therefore, there will be two parameter sets to test at different intervals and from different sample points.

6.2 Drilling Area

The proposed drilling area will be subject of two (2) types of activities categorised by their perceived risk to surface water. As such there is a requirement to ensure that suitable sampling and analysis regimes are in place to manage the varying levels of risk. Details of 'High Risk' activities and 'Low Risk' activities and the sampling regimes are provided within Section 6.2.1 and 6.2.2.

6.2.1 High Risk Activities

High risk activities include activities where the risk of contamination within surface water is increased significantly by the potential for polluting substances to be introduced to the surface water discharge system. Potentially polluting substances includes both hazardous substances and non-hazardous substances which could cause surface water pollution.

High risk activities identified within the proposed drilling area include:

- Drilling Operations;
- Workover Operations;
- Well Maintenance Treatments;
- Well Test and Completion Operations;
- When potentially polluting substances are stored on site (with the exception of fuel stored as part of trailer mounted water sampling equipment and fuel stored to enable power supply to the site);
- When mining waste or fuels are stored on site (with the exception of fuel stored as part of trailer mounted water sampling equipment and fuel stored to enable power supply to the site);
- Servicing and maintenance operations of plant and equipment where breaking of containment occurs;
- Spillage of a hazardous substance and/or a non-hazardous substance which could cause surface water pollution;
- Unintentional leak from plant and equipment of a hazardous substance and/or a non-hazardous substance which could cause surface water pollution; and
- Well Abandonment Operations.

During 'high risk' activities surface water shall be contained within one (1) of two (2) holding tanks installed within the site where it will be sampled in accordance with Section 6.4. The surface water will be discharged through the surface water discharge system where analysis results meet the screening limits set out in Appendix 2.

Where analysis results do not meet parameters set out in Appendix 2, arrangements will be made for the surface water to be removed from site via vacuum tanker to an Environment Agency approved Waste Facility for treatment and/or disposal.

During 'High Risk' activities, isolation valves installed within the drilling area surface water discharge system shall be 'locked close' to ensure that there are no accidental / unauthorised discharges to surface.

Isolation valves shall be installed at the following points within the surface water discharge system:

- Each respective drainage pipe leading to the interceptor; and
- The discharge line from each individual Holding Tank to the separator.

During 'High Risk' activities where the isolation valves are closed, the surface water shall be sampled quarterly for a full suite of parameters as part of the site integrity checks.

The parameters, frequency and sampling locations for 'high risk' activities have been provided within Table 6.1.

Parameters[2] - High Risk Activities		
• pH • Electrical Conductivity • Total Suspended Solids • Turbidity • Alkalinity (Total Bicarbonate) • Hardness • Mercury (Total Hg) • Cadmium • Sulphate • Sulphur • Chloride • Sodium • Nitrate	• Calcium • Magnesium • Potassium • Aluminium • Iron • Manganese • Zinc • Benzene • Toluene • Ethyl Benzene • m/p Xylene • o Xylene • MTBE	• Total Petroleum Hydrocarbons - aromatic and aliphatic class and carbon banding C8 to C35 • Polyaromatic Hydrocarbons USEPA16 • Antimony • Arsenic • Boron • Total Chromium • Copper • Lead • Nickel • Selenium

Frequency	Sample Point
Prior to discharge during 'High Risk Activities'.	Holding Tank No.1 – Reduced Suite (Blue) (NGR: TA 19242 39176).
Prior to discharge during 'High Risk Activities'.	Holding Tank No. 2 – Reduced Suite (Blue) (NGR: TA 19242 39172).
Upon cessation of 'High Risk Activities'.	Perimeter Containment Ditch – Full Suite (NGR: TA 19236 39168).
Quarterly.	Perimeter Containment Ditch – Full Suite (NGR: TA 19236 39168).
Quarterly.	Outlet 1 – Reduced Suite (Blue) (NGR: TA 19221 39198).

Table 6.1 Sampling and Analysis Parameters for High Risk Activities

For clarity, surface water sampling undertaken within the site provides for two (2) separate methods of environmental monitoring.

The first methodology of environmental monitoring provides for suite of surface water sampling to be undertaken, which will either be taken from the Holding Tanks prior to discharge, or from the Outlet when discharging from the ditch. This sampling methodology is to monitor for contamination being released from the site to the surrounding surface water. The reduced suite of surface water sampling has been set in accordance with the Environmental Quality Standards [Ref. 5] and Drinking Water Standards [Ref. 6] and is identified in Blue within Table 6.1.

The second methodology of environmental monitoring provides for a full suite of surface water sampling within the drilling area to be undertaken:

- Following the cessation of 'High Risk Activities';
- A spillage / leak of a hazardous substance and/or a non-hazardous substance which could cause surface water pollution;
- Quarterly to provide a comparison between the surface water analysis results and the groundwater analysis results to identify any issues of integrity within the site containment systems.

The full suite of surface water sampling includes all parameters detailed within Table 6.1.

[2] Blue parameters analysed for prior to discharge.

Upon receipt of the sampling results, the surface water that has been sampled shall be discharged through the surface water discharge system given the water falls within the screening limits set out in Appendix 2. In the event that the results from the analysis indicate that the surface water has been contaminated and does not meet the screening limits set out in Appendix 2, arrangements will be made for the surface water to be removed from site via vacuum tanker to an Environment Agency approved Waste Facility for treatment and/or disposal.

The reduced suite (Blue) of sampling will be utilised to monitor for surface water contamination.

The full suite of sampling will be utilised to monitor for contamination from the site to groundwater.

6.2.2 Low Risk Activities

Low Risk Activities include activities where the site is inactive or in production as the potential for contamination is reduced significantly by hazardous substances and/or a non-hazardous substance which could cause surface water pollution not being stored within the area, and produced fluid (production only) being contained within pipework.

Low risk activities identified within the proposed drilling area include:

- Production Operations;
- When potentially polluting substances are not stored on site (with the exception of fuel stored to enable power supply to the site); and
- When mining waste or fuels are not stored on site (with the exception of fuel stored to enable power supply to the site).

During 'Low Risk' activities, isolation valves installed within the drilling area surface water discharge system shall be 'locked open' permitting continuous surface water discharges to surface.

During 'Low Risk' activities where the isolation valves are open, the surface water shall be sampled monthly for a reduced suite (Blue) of parameters as part of the site integrity checks.

The parameters, frequency and sampling location have been provided within Table 6.2.

Parameters[3] - Low Risk Activities		
• pH • Electrical Conductivity • Total Suspended Solids • Turbidity • Alkalinity (Total Bicarbonate) • Hardness • Mercury (Total Hg) • Cadmium • Sulphate • Sulphur	• Chloride • Sodium • Nitrate • Calcium • Magnesium • Potassium • Aluminium • Iron • Manganese • Zinc	• Benzene • Toluene • Ethyl Benzene • m/p Xylene • o Xylene • MTBE • Total Petroleum Hydrocarbons - aromatic and aliphatic class and carbon banding C8 to C35 • Polyaromatic Hydrocarbons USEPA16

Frequency	Sample Point
Following a leak / spillage of a hazardous substance and/or a non-hazardous substance which could cause surface water pollution.	Perimeter Containment Ditch – Full Suite (NGR: TA 19236 39168).
Monthly where isolation valves are 'open'.	Outlet 1 – Reduced Suite (Blue) (NGR: TA 19221 39198).
Quarterly.	Perimeter Containment Ditch – Full Suite (NGR: TA 19236 39168).

Table 6.2 Sampling and Analysis Parameters for Low Risk Activities

6.3 Production Area

The proposed production area will be the subject of 'Low Risk Activities' throughout its lifetime including periods of inactivity and production. Therefore, quarterly samples shall be taken from a sample point within the 'production area'

[3] Blue parameters analysed for prior to discharge.

containment as part of the site integrity checks and quarterly samples of a reduced suite shall be taken from the discharge point (Outlet 1).

For clarity, whilst hazardous and non-hazardous substances which could cause surface water pollution will be stored within the production area in high volumes, the storage vessels will be located within purpose-built containment bunds constructed in accordance with the methodology detailed within CIRIA C736[4] (2014) Guidance [Ref. 1].

The parameters, frequency and sampling location have been provided within Table 6.3.

Parameters[5] - Low Risk Activities		
• pH • Electrical Conductivity • Total Suspended Solids • Turbidity • Alkalinity (Total Bicarbonate) • Hardness • Mercury (Total Hg) • Cadmium • Sulphate • Sulphur • Chloride • Sodium • Nitrate	• Calcium • Magnesium • Potassium • Aluminium • Iron • Manganese • Zinc • Benzene • Toluene • Ethyl Benzene • m/p Xylene • o Xylene • MTBE	• Total Petroleum Hydrocarbons - aromatic and aliphatic class and carbon banding C8 to C35 • Polyaromatic Hydrocarbons USEPA16 • Antimony • Arsenic • Boron • Total Chromium • Copper • Lead • Nickel • Selenium

Frequency	Sample Point
Following a leak / spillage of a hazardous substance and/or a non-hazardous substance which could cause surface water pollution.	Perimeter Containment Ditch – Full Suite (NGR: TA 19363 39192).
Quarterly.	Perimeter Containment Ditch – Full Suite (NGR: TA 19363 39192).
Monthly.	Outlet 1 – Reduced Suite (Blue) (NGR: TA 19221 39198).

Table 6.3 Sampling and Analysis Parameters for Production Area Configuration

For clarity, surface water discharge will only be permitted in the event that the screening limits detailed within Table A1, Appendix 2 are met.

6.4 Lambwath Stream

Two (2) external surface water monitoring sampling points have been identified for quarterly sampling and analysis. The sampling points are for the sampling and analysis for Zinc only which is to ensure that Zinc identified within off-site discharges is monitored. This is to ensure that Zinc levels are diluted and do not impact on Lambwath Stream.

The parameters, frequency and sampling location for external surface water monitoring are provided within Table 6.4.

Parameters - External Monitoring	
• Zinc	
Frequency	**Sample Point**
Quarterly.	Lambwath Stream (Upstream – Zinc analysis only) (NGR: TA 19545 39729).
Quarterly.	Lambwath Stream (Downstream – Zinc analysis only) (NGR: TA 18908 39670).

Table 6.4 Sampling and Analysis Parameters for External Monitoring

[4] Containment systems for the prevention of pollution: Secondary, tertiary and other measures for industrial and commercial premises.
[5] Blue parameters analysed for Surface Water Discharge.

6.5 Sampling Methodology

1. All sampling equipment shall be clean, sanitised and in working order prior to use.
2. Suitable sampling locations shall be identified, ideally fixed and marked as the sample spot for consistency.
3. Water shall be visually inspected and the following details shall be recorded:
   a) Depth of water;
   b) Signs of oil / grease;
   c) Date and time; and
   d) Weather Conditions;
4. Nitrile Gloves shall be applied and sample containers marked-up as necessary detailing the following:
   a) Client Name for Laboratory (Rathlin Energy UK Limited);
   b) Location (West Newton A Wellsite / Lambwath Stream (Upstream / Downstream);
   c) Sample Identification; and
   d) Date and time sample taken.
5. The sample shall be collected from the inspection chamber/perimeter containment ditch/holding tank (depending on phase of operation), below the surface layer. Caution must be taken when sampling in shallow water that debris from the bottom is not disturbed. If disturbance occurs, the sample should be disregarded and retaken.
6. Sample bottles shall be filled completely, so as to removed air when the top is screwed on, unless otherwise stated by the laboratory. Water bottles shall be filled on a flat clean surface.
7. Sample bottles shall be placed into the cool box provided.
8. Beakers shall be filled and hand probes used to measure field water chemistry parameters (pH, electrical conductivity, temperature).
9. Paperwork shall be completed and shall accompanying the samples to the laboratory which shall arrive within 48 hours of being taken. Storage of the samples shall be suitable and include a cool box to store samples at the necessary temperatures.

7. SURFACE WATER ANALYSIS AND DISCHARGE RECORDS

Records of all the surface water sampling and surface water discharge activities will be recorded within the Rathlin Energy Environmental Management System on Rathlin Energy Discharge to Surface Water Record (RE-05-FO-034). The records will include the date, time and all relevant results of monitoring and analysis undertaken.

Records will be made available to the Environment Agency for inspection.

7.1 Surface Water Monitoring Data

Surface water monitoring has been undertaken within the site since November 2015 following the determination by the Environment Agency of an application for a surface water activity permit (EPR/BB3001FT) [Ref. 7] permitting the '*discharge of surface water run off from the site during periods of inactivity*.'

In accordance with Table S4.1 of the West Newton A Environmental Permit (EPR/BB3001FT) [Ref. 7], surface water monitoring has been undertaken on a quarterly basis, with the analysis results of the surface water sampling documented on Rathlin Energy Surface Water Monitoring Report Form (RE-05-FO-051) and submitted to the Environment Agency via the Regulatory Officer.

Rathlin Energy Surface Water Monitoring Report Forms (RE-05-FO-051) covering a two (2) year period from July 2020 to July 2022 have been collated and are provided within Appendix 4.

8. TRAINING

All personnel involved in surface water discharge operations will be trained and competent and a record of training held within the Rathlin Energy Environmental Management System.

9. REFERENCES

Serial	Document Reference	Document Title
Ref. 1	CIRIA C736 (2014) Guidance	Containment systems for the prevention of pollution: Secondary, tertiary and other measures for industrial and commercial premises.
Ref. 2	Environment Agency 2013 Report SC030216	Rainfall runoff management for developments.
Ref. 3	CIRIA C753 (2015) Guidance	The SuDS Manual.
Ref. 4	European Standard BS EN 858-1	Separator systems for light liquids (e.g. oil and petrol) Principles of product design, performance and testing, marking and quality control.
Ref. 5	Environmental Quality Standards	The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015.
Ref. 6	Drinking Water Standards	The Water Supply (Water Quality) Regulations .
Ref. 7	EPR/BB3001FT	West Newton Well Site Permit number EPR/BB3001FT.

Page Left Blank Intentionally

APPENDIX 1 - DISCHARGE RISK ASSESSMENT

Page Left Blank Intentionally

APPENDIX 2 – SURFACE WATER SCREENING LIMITS

West Newton A Laboratory Analysis Parameter Limits

Surface water parameters shall not be discharged if the screening limits provided within Table A1 are exceeded.

Parameter	LOD	Unit	Screening Limit
pH	0.01	pH Units	6.5 – 9.5
Electrical Conductivity	2	µS/cm	<2500
Total Suspended Solids	10	mg/l	<100
Benzene	0.0005	mg/l	<1
Toluene	0.005	mg/l	<5
Ethel Benzene	0.001	mg/l	<1
m/p Xylene	0.002	mg/l	<2
O Xylene	0.001	mg/l	<1
MTBE	0.0001	mg/l	<1
Total Petroleum Hydrocarbons – aromatic and aliphatic class and carbon banding C8 to C35	0.01	mg/l	<10
Polyaromatic Hydrocarbons USEPA16	0.173	mg/l	<0.173
Aluminium	0.0015	mg/l	<0.2
Antimony	0.002	mg/l	N/A
Arsenic	0.0009	mg/l	<0.05
Boron	0.012	mg/l	<2
Cadmium	0.00003	mg/l	<0.00015
Chloride	0.3	mg/l	<250
Chromium	0.0002	mg/l	<0.0034
Chromium (Total)	0.0015	mg/l	<0.0034
Copper	0.001	mg/l	<0.001
Iron	0.02	mg/l	<1
Lead	0.0004	mg/l	<0.0012
Manganese	0.0015	mg/l	<0.123
Mercury	0.00001	mg/l	<0.00007
Nickel	0.0002	mg/l	<0.004
Selenium	0.0012	mg/l	N/A
Sodium	0.1	mg/l	<200
Zinc	0.0015	mg/l	<0.093
Alkalinity (Total Bicarbonate)	0.2	mg/l	N/A
Hardness	1	mg/l	N/A
Sulphate	0.05	mg/l	<250

Parameter	LOD	Unit	Screening Limit
Sulphur	0.01	mg/l	N/A
Nitrate	0.2	mg/l	<50
Calcium	0.2	mg/l	<1,000
Magnesium	0.1	mg/l	<25
Potassium	0.1	mg/l	<250

Table A1 Surface Water Screening Limits

Screening limits have been selected based on baseline surface water monitoring and taking into account of freshwater Environmental Quality Standards [Ref. 5] and Drinking Water Standards [Ref. 6].

The surface water parameters shall be tested at regular intervals to allow for interpretation and comparison with the Groundwater monitoring. Surface water parameters to be tested are provided within Table A2.

• pH • Electrical Conductivity • Total Suspended Solids • Turbidity • Alkalinity (Total Bicarbonate) • Hardness • Mercury (Total Hg) • Cadmium • Sulphate • Sulphur • Chloride • Sodium • Nitrate	• Calcium • Magnesium • Potassium • Aluminium • Iron • Manganese • Zinc • Benzene • Toluene • Ethyl Benzene • Xylene • MTBE	• Total Petroleum Hydrocarbons - aromatic and aliphatic class and carbon banding C8 to C35 • Polyaromatic Hydrocarbons USEPA16 • Antimony • Arsenic • Boron • Total Chromium • Copper • Lead • Nickel • Selenium

Table A2 Surface Water Parameters

APPENDIX 3 – SURFACE WATER MONITORING – SAMPLING POINT LOCATION PLANS

Page Left Blank Intentionally

APPENDIX 4 – SURFACE WATER MONITORING REPORT FORMS

Page Left Blank Intentionally