CURRENT WATER MANAGEMENT STATEMENT

In connection with the

APPLICATION FOR AN PERMIT FOR DISCHARGE CONSENT AND ABSTRACTION LICENCE

AT

BRYN QUARRY, GELLIGAER
APPLICATION REFERENCE PAN-014153

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CONTENTS

1. Introduction

Bryn Quarry is located within a large tract of land owned by the Applicant; surrounding the quarry are the applicant's other business activities such as farming, waste recovery and recycling, and an anaerobic digestion facility.

The quarry has been in continuous operation for circa 15 years and, during that time drainage from the quarry and associated activities has been successfully developed and managed.

2. Topgraphy

General

The quarry has been formed on a naturally occurring plateau of land where the surrounding land was characterised by gentle slopes and marshy boggy ground with no defined watercourses

Surrounding the quarry development there are several watercourses which generally flow towards Nelson Bog, which is a SSSI. The bog acts as a natural attenuation system long before run-off enters the main river system (River Rhymney) and its tributaries.

When required, the Applicant is able control the rates of discharge to the watercourses from both surface and groundwaters from the various activities within his ownership by means of the site infrastructure associated with those activities.

Within Operational Quarry

Within the quarry there is a large ground and surface water collection sump located at the base of the worked-out quarry faces, the water level of this sump is freely able to vary depending on the inflows and or rainfall. This water storage area also acts as a natural settlement and attenuation pond.

Discharge from the sump is controlled by means of pumping to a sub-surface pipe system to the north west, see plan reference BAL-EQS-2021-001 for the location.

Near the quarry entrance, this sub-surface pipe discharges into a large open concrete chamber, which discharges via a 225mm diameter pipe to a short section of open ditch; this in turn discharges via a 300mm diameter pipe to the existing lagoon system to the south and west of the quarry.

Following treatment within the lagoons, which is confined solely to natural settling of solids due to the reduced flow rate, the treated water is discharged via a pipe to the adjacent watercourse. The quality of the discharge is tested as part of the established routine environmental monitoring.

The lagoons are regularly maintained and are periodically de-silted utilising plant normally available on site. The silt collected from these operations is placed in a bunded quarantine area until it is collected and transported to a designated disposal point. While the silt is in the quarantine area it is tested using the established Waste Acceptance Criteria protocols for the adjacent nearby materials recycling facility. Depending on the results, the silt will either be disposed of to an off-site permitted facility or set aside to dry until it can be accepted into the waste recycling facility.

Thus, it can summarised that the quarry in effect acts as a very large attenuation system; all rainfall is collected and retained in the quarry and can only discharge when the quarry pumps are operational.

Calculations have prepared using the HR Wallingford UK Suds tool and are attached to this report as Appendix A. These calculations indicate that the total storage required for the current operation is 5,388m^3. The storage available in the quarry is far in excess of this figure and is calculated as an approximate cuboid shape of 47m x 46m x 5m giving a storage volume in excess of 10,000m^3.

Conclusions on existing system

The existing surface and groundwater collection and management systems within the Applicant's land are well established and have proved generally robust for all conditions to date.

As the flows into the existing lagoons are controlled by the pumping system which exists in the quarry, over time they have proved to be sufficiently large to settle out the likely suspended solids discharged as a result of the present quarrying and other activities at the quarry.

3. The proposals

3.1 Additional Infrastructure

The operator has undertaken to install new flow control devices at both the lagoon and the quarry discharge outlets. These will be a penstock or sluice gate, which has a vertical door which can be raised or lowered by means of a handle and can completely cut off the flow from either the quarry or lagoon.

3.2 Enhanced Management

The quarry operator will instigate an additional management control procedure to deal with the treatment of contaminated water within the lagoon system.

This will require the operator to:-

(i) Stop pumping water from the quarry until such time as the situation is under control.

(ii) Close the sluice gates at both the lagoon and quarry outlets which will immediately stop or restrict flow out of the lagoon system.

(iii) Deal with the situation either in the quarry, the lagoons or both to remediate whatever the source of any potential contamination or excess flow.

(iv) Re-instate the flow once ready.

3.3 Surface Water Monitoring Regime

Surface water monitoring will continue to be progressed on a monthly basis with levels, and, where possible flow rates measured and recorded, with together with samples of water for subsequent laboratory analysis, from each monitoring position as detailed in TABLE 1 below. The monitoring locations nearest the quarry are depicted on BAL-EQS-2021-001.

All monitoring will continue to be carried out by suitably trained personnel with dedicated and clean sampling equipment. The water samples collected will be analysed at a suitably accredited laboratory.

TABLE 1 Surface water monitoring and recording points

Location	Easting	Northing	Ground Elevation (mAOD)	Description
SW1	312656	196153	197	Natural spring located at boundary between SST & shale beds
SW2	312899	195952	203	Natural spring located at boundary between SST & shale beds
SW4	312348	195754	151	High flow discharge from mine working entry point, outflow to Nelson Bog SSSI
SW5*	312479	196193	179	Outlet of settlement lagoons from quarry floor water management system
SW-UP	312612	196313	204	Up-gradient point from the discharge point of the settlement ponds (SW5)
SW-DOWN	312724	196470	215	Down-gradient point from the discharge point of the settlement ponds (SW5)
SW DIS*	312524	196431	174	Discharge from the quarry water management system prior to flow into existing surface water lagoons
SW QDIS* (Generally Not Used)	312479	196470	170	Discharge from the quarry when pumping to the north of the quarry takes place

*Indicates those points which directly record discharge from the quarry

4. Conclusions and recommendations

This statement has established that the control of surface waters and rainfall events during the current quarry operations have been successfully managed with no recorded breaches of environmental requirements.

All rainfall entering the quarry is captured and retained in the quarry until such time that it is pumped to the established discharge point, where it will flow to the surface water lagoons treatment to remove excess amounts of suspended solids.

New flow control penstocks will be installed which will enable the flows both into and out of the lagoons to be cut off if required.

All lagoons and attenuation ponds should be inspected on a daily basis. Any required repairs and/or maintenance should be recorded and carried out as soon as practicable. If excessive suspended solids or pollutants be observed in the quarry and/or lagoons, the penstocks should be closed until such time that the situation is brough back into normal operation. All such actions will be reported to the quarry manager and recorded in the daily environmental log.

Regular de-silting of the lagoons should be carried out at least on a quarterly basis to ensure that they continue to treat the discharges effectively.

Appendix A

Calculations to Establish Surface Water Storage Requirements for the Quarry Area

Surface water storage requirements for sites

www.uksuds.com | Storage estimation tool

Calculated by:	John Perkins
Site name:	Bryn Quarry
Site location:	Gelligaer

This is an estimation of the storage volume requirements that are needed to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). It is not to be used for detailed design of drainage systems. It is recommended that hydraulic modelling software is used to calculate volume requirements and design details before finalising the design of the drainage scheme.

Site Details

Latitude:	51.65750° N
Longitude:	3.26054° W
Reference:	113424746
Date:	Nov 10 2021 13:00

Site characteristics

Total site area (ha):	6.64
Significant public open space (ha):	0
Area positively drained (ha):	6.64
Impermeable area (ha):	4
Percentage of drained area that is impermeable (%):	60
Impervious area drained via infiltration (ha):	0
Return period for infiltration system design (year):	10
Impervious area drained to rainwater harvesting (ha):	0
Return period for rainwater harvesting system (year):	10
Compliance factor for rainwater harvesting system (%):	66
Net site area for storage volume design (ha):	6.64
Net impermable area for storage volume design (ha):	4.29
Pervious area contribution to runoff (%):	30

* where rainwater harvesting or infiltration has been used for managing surface water runoff such that the effective impermeable area is less than 50% of the 'area positively drained', the 'net site area' and the estimates of Q_{BAR} and other flow rates will have been reduced accordingly.

Design criteria

Climate change allowance factor:	1.4
Urban creep allowance factor:	1.1
Volume control approach	Use long term storage
Interception rainfall depth (mm):	5
Minimum flow rate (l/s):	2

Methodology

esti	IH124
Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics

	Default	Edited
SOIL type:	3	3
SPR:	0.37	0.37

Hydrological characteristics

	Default	Edited
Rainfall 100 yrs 6 hrs:	--	82
Rainfall 100 yrs 12 hrs:	--	123.6
FEH / FSR conversion factor:	1.2	1.2
SAAR (mm):	1469	1469
M5-60 Rainfall Depth (mm):	20	20
'r' Ratio M5-60/M5-2 day:	0.2	0.2
Hydological region:	9	9
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 10 year:	1.42	1.42
Growth curve factor 30 year:	1.78	1.78
Growth curve factor 100 years:	2.18	2.18
Q_{BAR} for total site area (l/s):	45.41	45.41
Q_{BAR} for net site area (l/s):	45.41	45.41

Site discharge rates

	Default	Edited
1 in 1 year (l/s):	40	40
1 in 30 years (l/s):	80.8	80.8
1 in 100 year (l/s):	99	99

Estimated storage volumes

	Default	Edited
Attenuation storage 1/100 years (m^3):	4779	4779
Long term storage 1/100 years (m^3):	609	609
Total storage 1/100 years (m^3):	5388	5388

Appendix B

Drawing

196500
196400
196300
196200
196100
196000
312600
312700
312800
312900
313000
313100
313200
Slurry Bed
Ty Ni
WB
203.6m
Lagoon
Pond
El Ps
Flow Monitoring Point SWUP
Flow Monitoring Point SWDIS
Stream 2 as identified in Hydrogeo Report
Flow Monitoring Point SW5
Existing Treatment Lagoon Complex
Flow Monitoring Point SW1
Existing Manhole
Quarry Sump
Quarry Pump
Track
Collects
Spreads
Issues
Drain
DUNG STORE
PO
PV
KEY
Current Quarry Sump
Approximate line of overland pump discharge.
Approximate line of sub-surface pump discharge
Approximate line of pipeline to treatment lagoons
Watercourses
Current Operational Quarry Void

REVN	DATE	AMENDMENT
J P C E Limited
CLIENT
BRYN QUARRY Ltd
GELLIARGWELLT FARM
GELLIGAER ROAD
GELLIGAER
CAERPHILLY
CF82 8PY
JOHN PERKINS
CONSULTING ENGINEER
Bronhaul,
Abernant Road
Aberdare CF44 0PY
Tel 07889 644649
e-mail jpce@hotmail.co.uk
DRAWING TITLE & SCHEME
DISCHARGE CONSENT APPLICATION FOR BRYN QUARRY GELLIARGWELLT FARM, NELSON
EXISTING SURFACE WATER SYSTEM AT BRYN QUARRY
Drawing Number	Drawn By :
BAL-EQS-2021-001	J PERKINS
Date : NOV 2021	Scale 1:2000@A3
Checked :	