



Angus Energy Plc

Balcombe 2z Hydrocarbon Well Testing

Planning Permission Ref: WSCC/040/17/BA

Discharge of Planning Condition 8

P661913

AUGUST 2018

RSK



RSK GENERAL NOTES

Project No.: [REDACTED]

Title: Balcombe 2z Hydrocarbon Well Testing: Discharge of Planning Conditions 8

Client: Angus Energy Plc

Date: 10th August 2018

Office: Helsby

Status: Rev06

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Date:	10/08/2018	Date:	10/08/2018

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Date: 10/08/2018

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1 INTRODUCTION

Angus Energy Plc is seeking to discharge a number of planning conditions in relation to the exploration and appraisal of the existing hydrocarbon lateral borehole at Lower Stumble Hydrocarbon Exploration Site, London Road, Balcombe, Haywards Heath, West Sussex, RH17 6JH.

Planning permission for the works (Ref: WSCC/040/17/BA) was received from West Sussex County Council on 27th October 2017.

This report provides information to discharge Planning Condition 8: Surface Water Drainage Scheme.

Table 1-1: Planning Condition to be Discharged

Planning Condition Number	Planning Condition
8	<p>Development shall not begin until a scheme of surface water drainage has been submitted to and approved in writing by the Minerals Planning Authority. Details shall include:</p> <ul style="list-style-type: none"> • Design for 1:100 year return period. • Inclusion of 30% peak run-off and 20% additional volume for climate change. • Infiltration rates and groundwater levels shall be determined by site investigation and/or testing during the winter period • Inclusion of a suitable freeboard above the seasonal high groundwater table (minimum 1m unless otherwise agreed by the Minerals Planning Authority's engineers). • Consideration of overland flows (pluvial impact). • Evidence of agreement with the Local Water Authority. • Assessment of pollution control measures. <p>The approved scheme shall thereafter be implemented in full and maintained throughout the duration of the development.</p>

This document has been prepared by RSK Environment Ltd on behalf of Angus Energy Plc.

2 **CONDITION 8: SURFACE WATER DRAINAGE SCHEME**

2.1 **Action to Discharge Condition**

An assessment of flood risk and drainage was undertaken as part of the 2017 planning application (WSCC/040/17/BA), which also referenced previously submitted documentation in support of the 2013 planning application (WSCC/063/13/BA). A new surface water drainage scheme has been now been developed for the project.

2.1.1 **Site Drainage**

ANGS are committed to continuous improvement of environmental performance and management and the prevention of pollution from activities they undertake. The ANGS management team alongside a number of consultants inspected the Balcombe well site and the existing containment infrastructure and have made an informed decision to install new containment infrastructure prior to the well test operation. ANGS will comply with all applicable legislation, industry guidelines and, as far as practicable, accepted best practice in environmental management.

An impermeable membrane will be installed measuring approximately 62.5 x 40m. A perimeter bund (height 300mm) from used railway sleepers (2 x railway sleepers at 150mm height) will be laid and protective geotextile 300g/m² shall be laid on top of the stone surface area within the bund.

A fully welded 1.0mm textured HDPE membrane will be laid on top of the geotextile area and fixed to the top of sleepers. The HDPE membrane is textured to prevent slippage. A further 300g/m² protective geotextile over HDPE area has been fixed to the perimeter sleepers.

An access ramp in/out of the area in timber/stone will be installed. To protect the HDPE membrane further, 100mm thick rig mats (5m x 1m) will be provided to the entire area excluding 3m x 3m for the cellar.

The fuel tank will be double skinned (secondary containment) in line with the Oil Storage Regulations. Chemicals are stored in containers containing drip trays. Any oils, diesels, chemicals in use shall be stored on drip trays.

The concrete slab has Aco drains flowing into the cellar forming a sealed impermeable area. The surface water from the pad will be directed into the cellar and be disposed of off-site via a suction tanker to a waste water treatment works.

Surface water and water used in the well test operation on the 15m x 14m pad will be contained within the site and removed as necessary by tanker ensuring no offsite discharges from this area.

The impermeable membrane will be designed to accommodate the 1 in 100 year rainfall event, plus a 30% increase in rainfall resulting from climate change.

Based on the surface area of the impermeable membrane (62.5m x 40m), an increase in impermeable area at the site of 2, 500m² is anticipated. The impermeable membrane

and perimeter bund ensures that no surface water runoff from the pad area is discharged to the surrounding water environment or to the ground.

The volume surface water from the impermeable membrane will be attenuated in storage tanks, with freeboard provided through the incorporation of the perimeter bund. To enable the storage of the surface water runoff from the site during a 1 in 100 year (plus 30% climate change event), perimeter bunds of a nominal height of 300mm should be installed. The total capacity of the bunded area in line with the above is 750m³.

Based on the specifications noted above, a maximum attenuated storage capacity of 475m³ is to be provided in storage tanks, sufficiently accommodating the 1 in 100 year plus climate change volume of 466m³. (based on a CV of 1.0 as requested by West Sussex Council) The remaining capacity in the bunded area as noted above, provides a measure of freeboard for further events.

The above calculations assumes that all surface water falling during a 1 in 100 year event (including a climate change factor) on the impermeable membrane is retained on site prior to recycling or removal from the site via suction tanker, and as such does not have a discharge rate attributed to the area.

Calculations to support the drainage strategy are included in Appendix 1.

The remainder of the site compound (measuring approximately 90m x 55m) will continue to infiltrate into the underlying strata, albeit at a reduced rate due to the compacted stone laid to facilitate vehicle movements and site activity. Infiltration rates will be confirmed though on site investigation.

A French drain runs along the site compound perimeter. An oil interceptor has been built into the drainage system along with a sump. A 150mm butterfly valve system is in place to prevent discharge from the site. The valve is accessible from a manhole cover situated adjacent to the oil interceptor. The valve will be shut during the operational phase of work and any excess water tankered offsite.

Whilst the site is not operational the overflow outlet pipe from the perimeter French drain discharges via a trickle flow to the watercourse approximately 60m to the southeast of the site.

The Site HSE Advisor will visually inspect the butterfly valve on a daily basis during drilling and well testing. No discharges are allowed from the oil interceptor at any time.

There will be no discharge to local watercourses from the pad area and no silting will arise as a result of the on-site exploratory operations.

2.1.2 Flood Risk

2.1.2.1 Fluvial Flood Risk

The site of the pad and the access track from London Road are located within the Environment Agency (EA) Flood Zone 1. This is the low risk flood zone considered to have a less than 1 in 1000 year (i.e. a probability of less than 0.1%) chance of flooding from rivers or streams.

2.1.2.2 Surface Water (Pluvial) Flood Risk

According to Environment Agency data, the majority of the site is shown to be at a very low risk from surface water flooding. Two isolated areas of 'low' and 'low to medium' risk are shown adjacent to the southeast and southwest site boundary respectively.

The site is located within an area considered by the Strategic Flood Risk Assessment (SFRA) prepared by West Sussex County Council to have a low to medium risk of flooding from surface water flows.

2.1.2.3 Groundwater Flood Risk

The site is located within an area that is considered to be potentially at medium risk of flooding from groundwater flooding according to Flood Map G of the SFRA prepared by West Sussex County Council (2010). However, given the underlying geology, and as the site is on ground that is locally elevated above the valley floor and outside of the fluvial floodplain (considered indicative of potentially worst case groundwater flooding potential), it is concluded to be at low risk from this source of flooding.

2.1.2.4 Conclusion

Given the site setting within the local topography of the surrounding land, the site is not considered to be at risk from surface water (overland flow) flooding and therefore no site-specific flood risk mitigation measures are recommended.

2.1.3 Summary

It is considered that the above information provides sufficient reassurance that the proposed surface water drainage installation at the site is appropriate and sufficient, and that further design and assessment is not required.

APPENDIX 1: MICRODRAINAGE CALCULATIONS

Balcombe 2z Hydrocarbon
Well Testing
100 (+30%) storage



Date 15.05.18

Designed By

File Runoff rates 100 ...

Checked By

Elstree Computing Ltd

Source Control W.12.5

Summary of Results for 100 year Return Period (+30%)

Outflow is too low. Design is unsatisfactory.

Storm Event	Max Level (m)	Max Depth (m)	Max Volume (m ³)	Status
15 min Summer	98.160	0.160	75.2	O K
30 min Summer	98.217	0.217	101.9	O K
60 min Summer	98.280	0.280	131.7	O K
120 min Summer	98.349	0.349	163.8	O K
180 min Summer	98.389	0.389	183.0	O K
240 min Summer	98.419	0.419	196.8	O K
360 min Summer	98.464	0.464	218.2	O K
480 min Summer	98.499	0.499	234.3	O K
600 min Summer	98.526	0.526	247.4	O K
720 min Summer	98.550	0.550	258.5	O K
960 min Summer	98.589	0.589	276.8	O K
1440 min Summer	98.647	0.647	304.1	O K
2160 min Summer	98.709	0.709	333.3	O K
2880 min Summer	98.756	0.756	355.1	O K
4320 min Summer	98.825	0.825	387.6	O K
5760 min Summer	98.878	0.878	412.5	O K
7200 min Summer	98.922	0.922	433.2	O K
8640 min Summer	98.959	0.959	450.9	O K

Storm Event	Rain (mm/hr)	Time-Peak (mins)
15 min Summer	120.318	27
30 min Summer	81.509	42
60 min Summer	52.662	72
120 min Summer	32.767	132
180 min Summer	24.403	192
240 min Summer	19.681	252
360 min Summer	14.546	372
480 min Summer	11.717	492
600 min Summer	9.898	612
720 min Summer	8.618	732
960 min Summer	6.920	972
1440 min Summer	5.068	1452
2160 min Summer	3.703	2172
2880 min Summer	2.959	2892
4320 min Summer	2.154	4332
5760 min Summer	1.719	5776
7200 min Summer	1.444	7216
8640 min Summer	1.252	8656

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10080 min Summer	98.992	0.992	466.5	O K
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30 min Winter	98.217	0.217	101.9	O K
60 min Winter	98.280	0.280	131.7	O K
120 min Winter	98.349	0.349	163.8	O K
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Storm Event	Rain (mm/hr)	Time-Peak (mins)
10080 min Summer	1.111	10096
15 min Winter	120.318	27
30 min Winter	81.509	42
60 min Winter	52.662	72
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Date 15.05.18
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Designed By [Redacted]
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10080 min Winter	1.111	10096



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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	100	Cv (Summer)	1.000
Region	England and Wales	Cv (Winter)	1.000
M5-60 (mm)	20.000	Shortest Storm (mins)	15
Ratio R	0.333	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+30

Time / Area Diagram

Total Area (ha) 0.250

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.083	4-8	0.083	8-12	0.083



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Model Details

Storage is Online Cover Level (m) 100.000

Tank or Pond Structure

Invert Level (m) 98.000

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	470.0	1.000	470.0	1.001	0.0