

## TLS Final Report PNR1z

<b>Management System:</b>	HSE	<b>File Name:</b>	TLS Event Report 181211_095331	
<b>Approver:</b>	Senior Geoscientist	<b>Version No:</b>	1	
<b>Reviewer:</b>	HSE&P Manager, Frac Manager, Technical Director	<b>Date of Issue:</b>		
<b>Author:</b>		<b>Proposed date of Review:</b>	n/a	
Version	Section	Revision Information	Date	Reviser
0.1	All	Draft Publication		Senior Geoscientist
1.0	All	Final Publication	11/12/18	Senior Geoscientist
Documents are reviewed as per proposed review date, or sooner if a significant change to the operation has taken place, to ensure relevance to the systems and process that they define.				

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## Event Summary

During operations of sleeve 38 of PNR1z, a seismicity related traffic light system amber light threshold was exceeded. The seismic event had a local magnitude of 0.1 ML. The seismic event hypocenter shown in the map and x-section by the blue dot, was roughly 658.5 from the injection point.

## Event Classification

Green Event	Amber Light	Red Light	Trailing Event (<=0.5ML)	Trailing Event (>0.5ML)
	<b>X</b>			

## Event Details

Magnitude (ML)	Date	Time (24hr) BST	Last Sleeve Injection
<b>0.1</b>	<b>11/12/2018</b>	<b>09:53:31</b>	<b>38</b>

## Hypocenter Information

X [mEast] BNG	Y [mNorth] BNG	Z [mTVDGL]	Distance to Nearest Injection Point (m)
<b>336527</b>	<b>433023</b>	<b>1781</b>	<b>658.5</b>

## Error / Uncertainties

P Trace Quality	S Trace Quality	Trace Quality	Min Ellipsoid size (m)	Mid Ellipsoid size (m)	Max Ellipsoid size (m)
<b>0.71</b>	<b>0.49</b>	<b>0.30</b>	<b>101.820</b>	<b>126.416</b>	<b>453.029</b>

## Downhole Hypocenter Information

X [mEast] BNG	Y [mNorth] BNG	Z [mTVDGL]	Distance to Nearest Injection Point (m)
<b>336399</b>	<b>432748</b>	<b>2258</b>	<b>102.675</b>

## Ground Motion & Well Integrity

Max PPV (mm/sec)	Average PPV (mm/sec)	Fit to GMPE (mm/sec)	Annular Pressure Change (psi)
<b>0.12</b>	<b>0.04</b>	<b>0.9</b>	<b>0</b>

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Injection Information

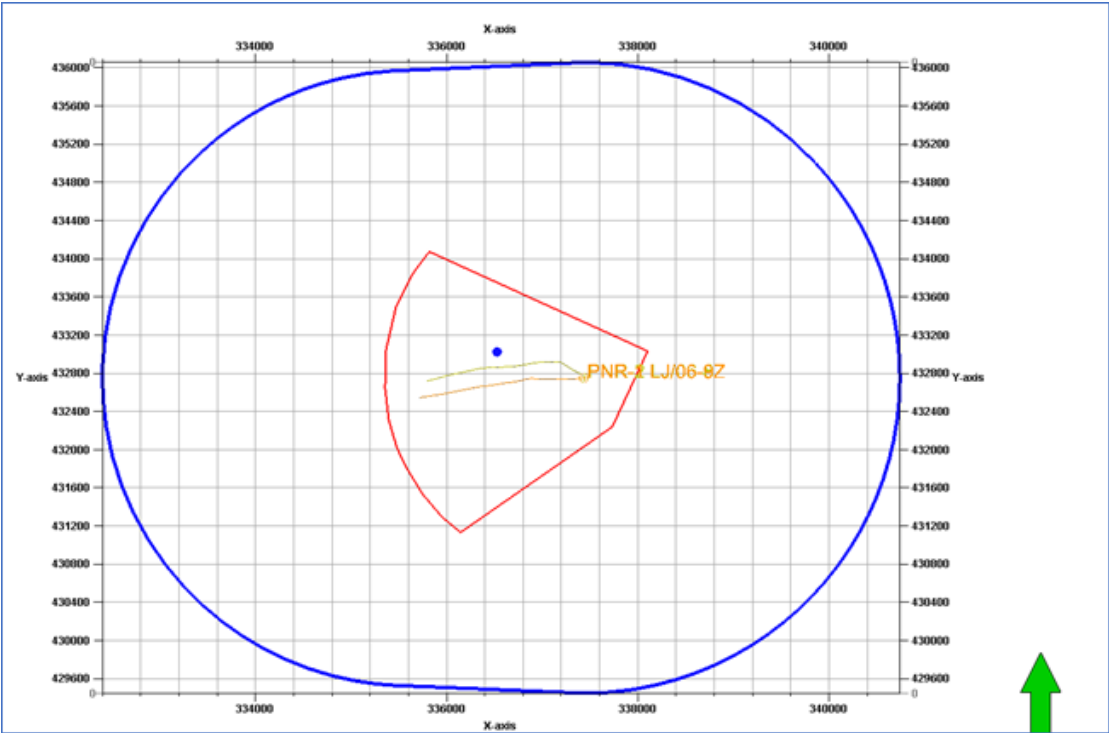
Sleeve	Fluid Volume Injected (m³)	Proppant Volume Injected (tonnes)	Average Rate (m³/min)	Max Treatment Pressure (surface) (bar)	Average Treatment Pressure (surface) (bar)
38	269.7	27.87	3.58	621	527

Stage (cumulative)	Fluid Volume Injected (m³) (cumulative)	Proppant Volume Injected (tonnes) (cumulative)	Flow Back (m³) (cumulative)
17	2937	181	668

Forward Injection Schedule / Additional Mitigation

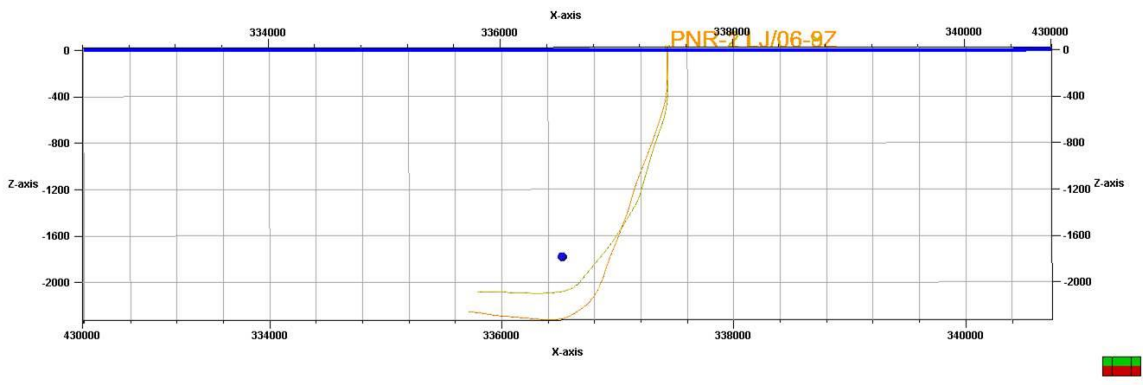
Waiting Time (hr) (<0.0ML)	Next Stage	Proposed Volume (m³)	Mini Frac	Additional Mitigation
-	39	400	no	

Base Map

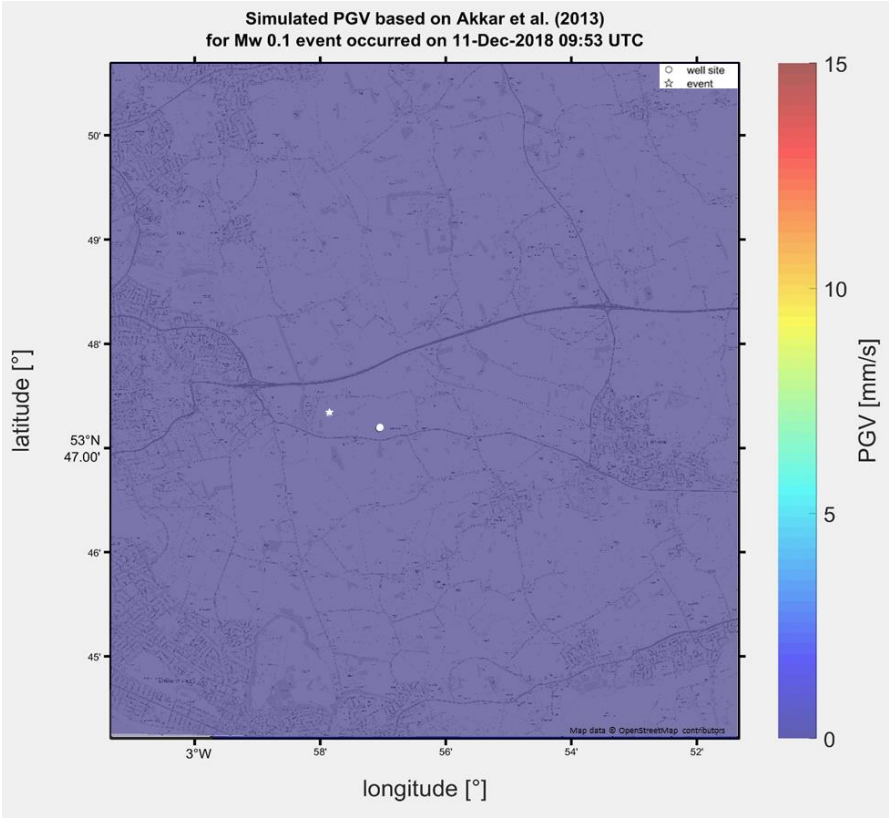


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Cross Section (From South)



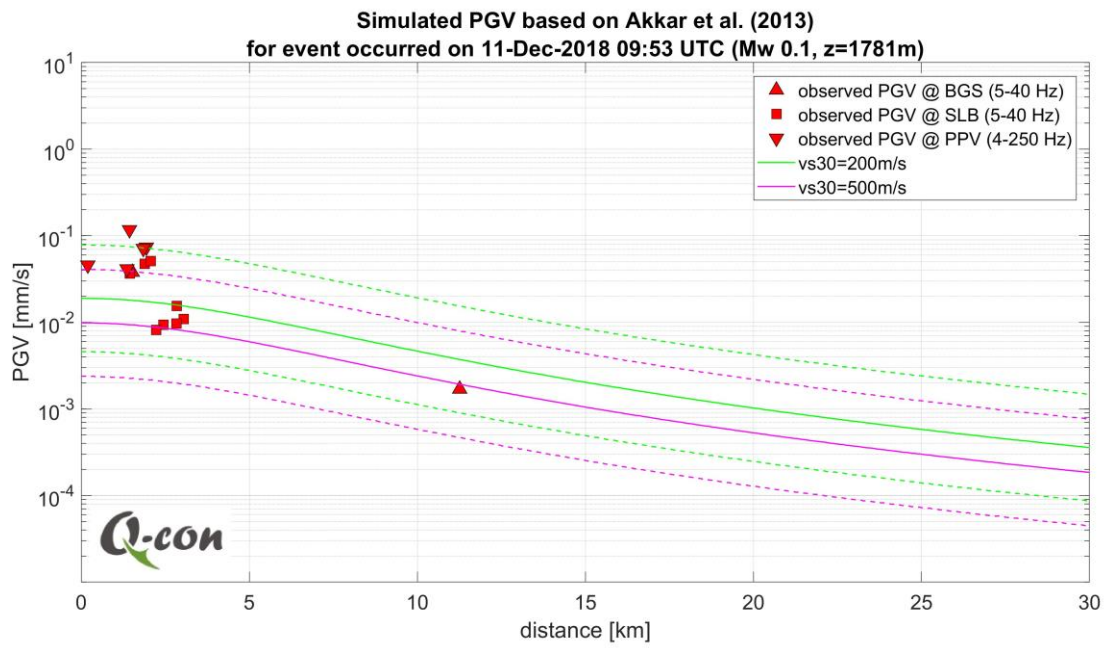
Shake Map



The location of the sensor sites has been redacted on the basis of commercial confidentiality and public safety

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## Attenuation Curve



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