

Geothermal Resources Ltd

ABN 45 115 281 144

ANNUAL REPORT

**GEOHERMAL EXPLORATION LICENCE
222**

FOR THE PERIOD

20 March 2007 to 19 March 2008

April 2008

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1. Introduction

GEL 222 was granted to Geothermal Resources Limited ('Geothermal Resources') on 20 March 2006. The licence is granted in the Arrowie Basin, South Australia. This report details the work conducted during Licence Year 2 of the licence (20 March 2007 – 19 March 2008 inclusive), in accordance with Regulation 33 of the Petroleum Act 2000.

Geothermal Resources work program commitment for the first year was a review of all open file geophysical and drilling data to obtain accurate cover depth and bedrock lithology information (Table 1). This was to be supplemented by 3D modelling to determine the location of possible buried granite bodies and measuring of geothermal gradients in any accessible drill holes.

The above work was completed, and in addition a pre-collar percussion drillhole (Frome 8) was bored to 201 metres. This effectively brought forward a part of the Year 3 shallow drilling program to Year 1 (see Table 1).

Near to GEL 222 Geothermal Resources also holds existing GELs 181, 208, 209, 210 and 279 & 280. An overall or 'grouped' exploration approach to the entire GEL block has been taken.

2. Work Completed

2.1 Drilling

Just prior to the end of Year 1, the percussion drill pre-collar for **Frome 8** (436376E 6491295N, AGD 66 co-ordinate system) was drilled to a depth of 201 metres. In Year 2 the hole was successfully completed with diamond coring to 500 metres depth on 4 August 2007. Between 201 to 393.5 metres, fine-grained thinly bedded, grey-green dolomitic siltstones and minor dark grey siltstones were encountered. This was followed by interbedded, grey, fine-medium grained sandstones, fine conglomerates and dark grey greywacke and siltstone that extended to the end of the hole.

2.2 Temperature logging

Downhole temperature logging was carried out more than a month after completion of drilling in order to allow water in the drillhole to reach thermal equilibrium with the country rocks. The Department for Water, Land and Biodiversity Conservation were contracted to do the logging using extremely accurate and sensitive state of the art logging equipment, which recorded a continuous temperature log for the entire hole.

Frome 8, unlike Frome 2, 3 and 9 to the west on Gels 181 and 210, recorded an approximately normal crustal temperature gradient. This suggests that a heat generating granite does not lie at depth beneath this area as earlier postulated.

3. Reporting Against Requirements of the Petroleum Act 2000

(a) Summary of regulated activities conducted under the licence during the year

Drillhole Frome 8 completed to 500 metres depth and detailed temperature logging carried out.

Drilling:

- Well name: Frome 8
- Spud date (core): 29/07/2007
- Rig release: 5/08/2007
- Casing: 152mm PVC 0-10m; 40mm PVC 0-500m; capped – ready for rehabilitation.
- Constructions: None required

Temperature survey:

- Survey name: Temperature and Gamma survey
- Contractor: DWLBC
- Date: 21/09/2007
- Details: To BoH (500m) @ 50mm increments

(b) Report for the year on compliance with the Act, these regulations, the licence and any relevant statement of environmental objectives

Geothermal Resources carried out its field activities in accordance with the Cooper Basin Drilling SEO, dated November 2003 (see Appendix 1). All prevention and remediation measures, as listed in Appendix 1, were diligently followed. Geothermal Resources is not aware of any SEO non-compliance issues. Site visits and inspection by PIRSA personnel during drilling operations raised no non-compliance issues. Drill site rehabilitation was commented on favourably by PIRSA personnel.

All obligations were complied with, other than the late submissions for the wire-line LAS file and the Well Completion Report (WCR).

The LAS file for the wire-line log of Frome 8 was submitted late through incomplete knowledge of the reporting requirements for geophysical surveys.

The WCR was submitted approximately 3 months late as the company was unable to employ the needed staff.

(c) Actions to rectify non-compliance with obligations imposed by the Act, these regulations or the licence, and to minimise the likelihood of the recurrence of any such non-compliance

Ongoing efforts to find and employ suitably qualified technical staff to assist with tasks including timely submission of all reports.

(d) A summary of any management system audits undertaken during the relevant licence year, including information on any failure or deficiency identified by the audit and any corrective action that has, or will be, taken

Management closely monitored all activities and did not detect any reportable deficiencies or incidents.

(e) List all reports and data relevant to the operation of the Act during the relevant licence year

Report	Due date	Date submitted	Statement of compliance
2007 Annual Report	19/05/2008	April 2008	Compliant
Notification of Activity	not applicable	Jul. 2006	Compliant (early)
Frome 8 (diamond tail): Daily Drilling Reports	30/07/2007 to 6/08/2007	30/07/2007 to 6/08/2007	Compliant
Frome 8 Wire-line log LAS files (Temp. & Gamma)	21/11/2007	April 2008	Late; ie. non-compliant
WCR for Frome 8	5/02/2008	May 2008	Late; ie. non-compliant

(f) Report of incidents reportable to the Minister under the Act and regulations

No incidents occurred and therefore none were reported.

(g) Report on any reasonably foreseeable threats that reasonably present, or may present, a hazard to facilities or activities under the licence, and a report on any corrective action that has, or will be, taken.

No threats identified.

(h) Operations proposed for the ensuing year

Owing to the negative temperature logging results, which do not support the existence of a hot buried granite geothermal reservoir at depth, it is proposed to relinquish GEL 222.

4. Expenditure for Year 2

Commercial in Confidence

TABLE 1: Proposed Work Program for GEL 222

Year	Work Commitment	Work completed
One	<p>Review of open file geophysical and drilling data to obtain accurate cover depth and bedrock lithology information.</p> <p>3D modelling to determine subsurface geology and location of possible buried granite bodies.</p> <p>Measure detailed geothermal gradients in any accessible water wells and oil wells.</p> <p>Estimated Budget \$30,000</p>	<p>Acquisition of existing gravity, aeromag, seismic and drilling data. Database compilation.</p> <p>3D modelling, using Vulcan software.</p>
Two	<p>Thermal resource modelling and rock fracture studies.</p> <p>Interpretation of all data to determine optimum drill site locations.</p> <p>Estimated Budget \$40,000</p>	<p>Temperature logging followed by thermal modelling.</p> <p>Optimum drill site located.</p> <p>Frome 8 drilled to 500m and temperature logged.</p>
Three	<p>3-4 shallow drill holes to an aggregate depth of at least 2000 metres to measure detailed geothermal gradients and obtain information regarding cover sequences.</p> <p>Re-evaluation of theoretical thermal resources and fracture / permeability models based on drilling results.</p> <p>Estimated Budget \$150,000</p>	
Four	<p>1 deep pilot drill hole to intersect top of hot dry rock source.</p> <p>Measure detailed temperature gradient. Measure reservoir temperature. Analysis of reservoir properties. Analysis of reservoir fracturing. Evaluation of thermal data and fracture / permeability models.</p> <p>Estimated Budget \$500,000</p>	

Five	<p>Drilling 1 production and 1 injection well to set up circulation cell.</p> <p>Measurement key parameters to determine viability of project.</p> <p>If positive, detailed planning for full scale exploitation.</p> <p>Estimated Budget >\$1,000,000</p>	
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Figure 1. GEL boundaries, pastoral leases and planned holes at start of Year 2

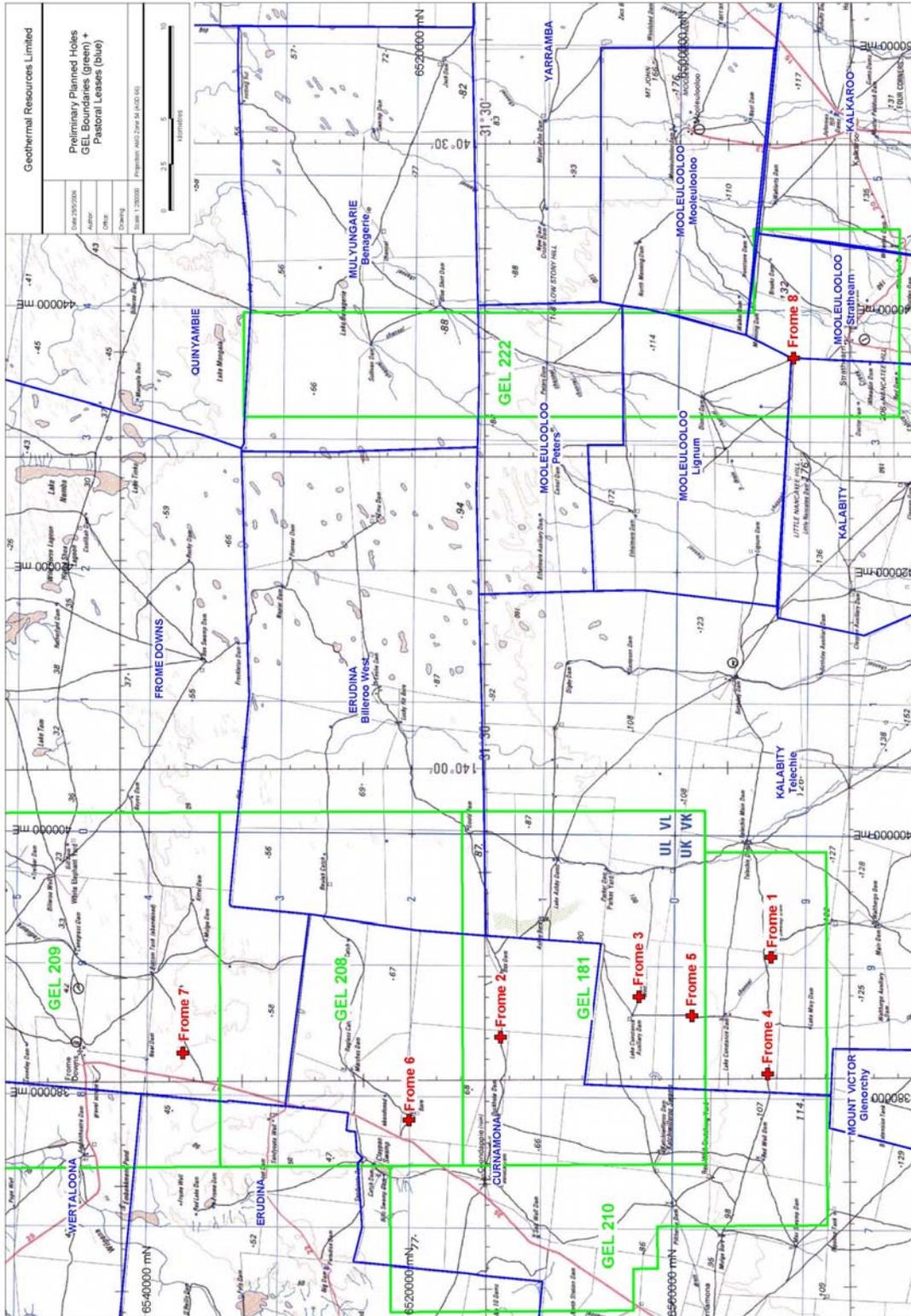
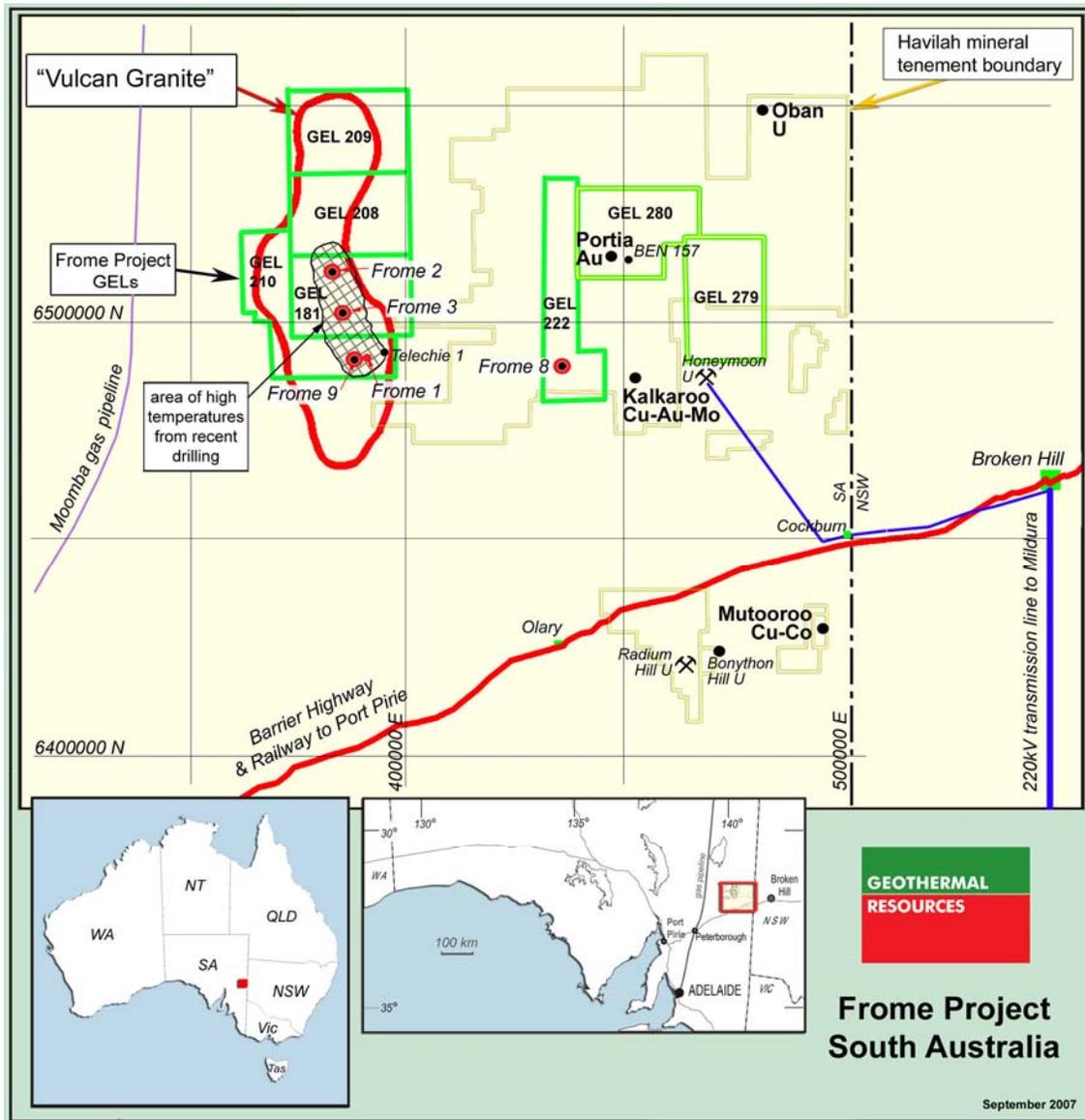


Figure 2. Location of Frome 8 completed during Year 2 on GEL 222



APPENDIX 1

ASSESSMENT of GEOTHERMAL RESOURCES

PERFORMANCE IN ACHIEVING

ENVIRONMENTAL OBJECTIVES

(as defined in the COOPER BASIN DRILLING SEO, 2003)

for all Drilling and Well Operations

in GEL 222 (AR 2008)

ASSESSMENT of GEOTHERMAL RESOURCES PERFORMANCE IN ACHIEVING ENVIRONMENTAL OBJECTIVES (as defined in the COOPER BASIN DRILLING SEO, 2003)

2008 AR: GEL 222 (all Drilling and Well Operations)

Environmental Objectives	Assessment Criteria	Compliant/ Non-Compliant	Comment
<p>Objective 1:</p> <p>Minimise the risk to public and other third parties.</p>	<ul style="list-style-type: none"> • Reasonable measures implemented to ensure no injuries to the public or third parties. 	Compliant	
<p>Objective 2:</p> <p>Minimise disturbance and avoid contamination to soil.</p>	<p><u>Well Site and Access Track Construction</u></p> <ul style="list-style-type: none"> ▪ 0, + 1 or + 2 GAS criteria are attained for 'Minimise visual impacts of abandoned well sites and access tracks' objective as listed in Appendix 4 for well lease and access track construction. ▪ No unauthorised off-road driving or creation of shortcuts. ▪ No construction activities are carried out on salt lakes, steep tableland land systems or wetlands land systems (as defined in EIR). <p><u>Fuel and Chemical Storage and Handling</u></p> <ul style="list-style-type: none"> ▪ No spills/leaks outside of areas designed to contain them. ▪ Level of hydrocarbon continually decreasing for in situ remediation of spills. ▪ Soils remediated to a level as determined by the SHI process. <p><u>Waste Disposal (domestic, sewage and sludges)</u></p> <ul style="list-style-type: none"> ▪ All domestic wastes are disposed of in accordance with WPA licensing requirements. ▪ 0, + or + 2 GAS criteria for 'Waste material' objective is attained. 	<p><u>Well Site and Access Track Construction:</u></p> <p>Compliant</p> <p>GAS +1</p> <p><u>Fuel and Chemical Storage and Handling:</u></p> <p>Compliant</p> <p><u>Waste Disposal:</u></p> <p>Compliant</p> <p>GAS +2</p>	<p>GAS of +1, rather than +2, because the earthwork disturbance is only beginning to blend with the surroundings.</p>

Environmental Objectives	Assessment Criteria	Compliant/ Non-Compliant	Comment
<p>Objective 3:</p> <p>Avoid the introduction or spread of pest plants and animals and implement control measures as necessary.</p>	<ul style="list-style-type: none"> ▪ No weeds or feral animals are introduced to operational areas. 	Compliant	
<p>Objective 4:</p> <p>Minimise disturbance to drainage patterns and avoid contamination of surface water and shallow ground water resources.</p>	<p><u>Well Lease and Access Track Construction.</u></p> <ul style="list-style-type: none"> ▪ Well leases and access tracks are located and constructed to maintain pre-existing water flows (ie. channel contours are maintained on floodplains and at creek crossings). <p><u>Drilling Mud Sumps and Flare Pits</u></p> <ul style="list-style-type: none"> ▪ No overflow of drill cuttings, mud and other drilling fluids from mud sumps. ▪ No waste material disposal to sumps and flare pits. <p><u>Fuel/Chemical Storage and Handling</u></p> <ul style="list-style-type: none"> ▪ No leaks spills outside of areas designed to contain them. 	Compliant	
<p>Objective 5:</p> <p>Avoid disturbance to sites of cultural and heritage significance.</p>	<ul style="list-style-type: none"> ▪ Proposed well sites and access tracks have been surveyed and any sites of Aboriginal and non-Aboriginal heritage identified. ▪ Any identified cultural and heritage sites have been avoided. 	Compliant	
<p>Objective 6:</p> <p>Minimise loss of aquifer pressure and avoid aquifer contamination.</p>	<p><u>Drilling & Completion Activities</u></p> <ul style="list-style-type: none"> ▪ There is no uncontrolled flow to surface (Blow out). ▪ Sufficient barriers exist in casing annulus to prevent cross flow between separate aquifers of hydrocarbon reservoirs. ▪ Relevant government approval obtained for abandonment of any radioactive tool left down-hole. 	Compliant	

Environmental Objectives	Assessment Criteria	Compliant/ Non-Compliant	Comment
<p>Objective 6 cont. :</p> <p>Minimise loss of aquifer pressure and avoid aquifer contamination.</p>	<p><u>Producing, Injection, Inactive and Abandoned Wells</u></p> <ul style="list-style-type: none"> ▪ No cross-flow behind casing between aquifers, and between aquifers and hydrocarbon reservoirs unless approved by DWLBC. 		
<p>Objective 7:</p> <p>Minimise disturbance to native vegetation and native fauna.</p>	<p><u>Well Lease and Access Track Construction and Restoration</u></p> <ul style="list-style-type: none"> ▪ Any sites with rare, vulnerable and endangered flora and fauna have been identified and avoided. ▪ 0, + 1 or + 2 GAS criteria are attained for 'Minimise impacts on vegetation' objectives as listed in Appendix 2, during well lease and access track site selection and construction and for 'Re-establish natural vegetation on abandoned well sites and access track' objective in Appendix 4. <p><u>Waste Management</u></p> <ul style="list-style-type: none"> ▪ Refer to assessment criteria for Objective 11. <p><u>Fuel and Chemical Storage and Management</u></p> <ul style="list-style-type: none"> ▪ Refer to assessment criteria for Objectives 2 and 4. 	<p>Compliant</p> <p>Appendix 2 GAS: +2</p> <p>Appendix 4 GAS: +1</p>	<p>GAS of +1, rather than +2, because there are no perennials.</p>
<p>Objective 8:</p> <p>Minimise air pollution and greenhouse gas emissions.</p>	<ul style="list-style-type: none"> ▪ Compliance with EPA requirements. 	<p>Compliant</p>	
<p>Objective 9:</p> <p>Maintain and enhance partnerships with the Cooper Basin community.</p>	<ul style="list-style-type: none"> • No unresolved reasonable complaints from the community. 	<p>Compliant</p>	
<p>Objective 10:</p> <p>Avoid or minimise disturbance to stakeholders and/or associated infrastructure.</p>	<ul style="list-style-type: none"> • No reasonable stakeholder complaints left unresolved. 	<p>Compliant</p>	

Environment Objectives	Assessment Criteria	Compliant/ Non- Compliant	Comment
<p>Objective 11:</p> <p>Optimise waste reduction and recovery.</p>	<ul style="list-style-type: none"> ▪ With the exception of drilling fluids, drill cuttings and other fluids disposed during well clean-up, and sewage wastes, all wastes to be disposed of at an EPA licensed facility in accordance with IPA Licence conditions. ▪ Attainment of GAS criteria for 'Site left in clean, tidy and safe conditions after final clean-up' objective during well site restoration (refer Appendix 4). ▪ Attainment of Gas criteria for 'site left in clean, tidy and safe condition' objective during borrow pit restoration (refer Appendix 5). 	<p>Compliant</p> <p>Site cleanliness GAS: 0</p>	<p>A GAS score of 0 is the maximum attainable in this category.</p>
<p>Objective 12:</p> <p>Remediate and rehabilitate operational areas to agreed standards.</p>	<ul style="list-style-type: none"> ▪ No unresolved reasonable stakeholder complaints. <p><u>Contaminated Site Remediation</u></p> <ul style="list-style-type: none"> ▪ Contaminated sites are remediated in accordance with criteria developed with the principals of the National Environment Protection Measure of Contaminated sites and in consultation with the EPA. <p><u>Well Site and Access Track Restoration</u></p> <ul style="list-style-type: none"> ▪ The attainment of 0, + 1 or + 2 GAS criteria for (refer Appendix 4): <ul style="list-style-type: none"> – 'minimise visual impact of abandoned well sites' – 'minimise visual impact of abandoned access tracks' – 're-establish natural vegetation on abandoned well sites and access tracks' <ul style="list-style-type: none"> • <i>Note:</i> Well abandoned issues addressed under objective 6. 	<p>Compliant</p> <p>na</p> <p>GAS: +1</p>	<p>GAS of +1, rather than +2, because the earthwork disturbance is only beginning to blend with the surroundings.</p>

