Appendix 4

Additional Benkelman Beam Testing - West Tomingley Road, Tomingley

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MACQUARIE GEOTECH

Geotechnical Engineers & Engineering Geologists
NATA Accredited Construction Materials Testing
Laboratory for Soils, Aggregates and Concrete
Geotechnical & Environmental Drilling

NATA

RECEIVED
DATE 20/1/12 BY MDS

16 January, 2012

Geolyse
1st Floor
62 Wingewarra Street
Dubbo NSW 2830

Attention: Stephen Hoynes

Additional Benkelman Beam Testing – West Tomingley Road, Tomingley

At the request of Stephen Hoynes, Geolyse on behalf of Alkane Resources Ltd, Macquarie Geotechnical has carried out additional benkelman beam testing from the junction of Tomingley-Narromine Road and the concrete causeway on West Tomingley Road, Tomingley. The objectives of this investigation were to determine the condition of the pavement prior to construction of the pavement & intersection upgrade.

Benkelman Beam testing for surface deflection of the pavement was performed. The field work was undertaken utilising Macquarie Geotechnical's Benkelman Beam and ballasted truck with 8.2 tonne load over the rear axle with weigh bridge certificate. The truck had dual rear wheels and a single rear axle. Tyre pressures were 550 kPa (85 Psi) with consistent wear on all tyres. Both inside and outside wheel-paths of each lane from Chainage 0+000m to 0+100mm were tested in a staggered pattern such that one test point was taken every 10m along the alignment.

The detailed Benkelman Beam test report is attached and the following paragraphs summarises the main findings of the deflection testing.

A Road Functional Class of "**Class 7**" was adopted for assessment of the results.

Traffic volumes were calculated on the basis of traffic count provided by the client which is **2.0 x 10^6** ESAs.

- The deflection data was variable with deflections generally ranging between 0.072mm and 1.248 mm.
- The deflection values derived from the data are summarised overleaf.

Average Deflection	0.35mm
Standard Deviation	0.22mm
Characteristic Deflection	0.53mm

Bathurst 9 Bant Street PO Box 71 Bathurst NSW 2795 (T) 6332 2011 (F) 6334 4213
Dubbo 21 Beni Street PO Box 1804 Dubbo NSW 2830 (T) 6885 4033 (F) 6885 5533
Lithgow 1/5 Castlereagh Hwy Lidsdale NSW 2790 (T) 6355 7991 (F) 6355 7994
Gulgong 1/9 Industrial Ave Gulgong NSW 2852 (T) 6374 1858 (F) 6374 1752
www.macgeo.com.au macgeo@macgeo.com.au

If you have any further questions please contact the undersigned on 6332 2011.

Yours sincerely

John Boyle

Senior Engineering Geologist
BSc (Hons) Affil MIE Aust

Reviewed by

Robert Cox

Principal Engineering Geologist
B.App. Sc (Geology) Affil MIE Aust

Attached: Benkelman Beam Results

Benkelman Beam Deflection Test Report

Client:	Alkane Resources Ltd c/- Geolyse	**Job No.:**	11-439
Client Address:	PO Box 910, Dubbo NSW 2830	**Date of Test:**	1-12-11
Project:	Pavement Investigation & Design	**Report No.:**	18-BB
Location:	Tomingley West Road, Tomingley NSW	**Layer:**	Surface

Test Procedure: RTA T160 **Road Temperature:** N/A

Thickness of AC Layer: 50mm **Air Temperature:** N/A

Chainage	lane	Wheel path	dial gauge reading (mm)					max. deflection (mm)
			200mm	600mm	900mm	2.7m	9.0m	
0	West Bound	inner					0.311	0.622
10	West Bound	outer					0.146	0.292
20	West Bound	inner					0.083	0.166
30	West Bound	outer					0.417	0.834
40	West Bound	inner					0.044	0.088
50	West Bound	outer					0.322	0.644
60	West Bound	inner					0.153	0.306
70	West Bound	outer					0.162	0.324
80	West Bound	inner					0.095	0.190
90	West Bound	outer					0.116	0.232
100	West Bound	inner					0.119	0.238
0	East Bound	outer					0.061	0.122
10	East Bound	inner					0.061	0.122
20	East Bound	outer					0.178	0.356
30	East Bound	inner					0.150	0.300
40	East Bound	outer					0.112	0.224
50	East Bound	inner					0.110	0.220
60	East Bound	outer					0.174	0.348
70	East Bound	inner					0.462	0.924
80	East Bound	outer					0.228	0.456
90	East Bound	inner					0.113	0.226
100	East Bound	outer					0.207	0.414

Deflection parameters

sub-section	mean deflection (mm)	standard deviation (mm)	characteristic deflection (mm)	Inner = Inner Wheel Path
East/West	**0.35**	**0.22**	**0.53**	Outer = Outer Wheel Path

AUSTROADS road functional class: factor f: 1.65

MACQUARIE GEOTECH

Macquarie Geotechnical
9 Bant Street
BATHURST NSW 2795

PO Box 71 BATHURST NSW 2795
Phone: 02 6332 2011
Fax: 02 6334 4213

Report Form: 18-BB Issue 1 - Revision A Issue Date:2/6/03 Page 1 of 1

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Appendix 5

Tomingley Gold Project Narromine to Tomingley Pipeline Operational Condition and Ongoing Maintenance Costs

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GEOLYSE

CIVIL & ENVIRONMENTAL ENGINEERING
TOWN PLANNING ARCHITECTURE SURVEYING
ENVIRONMENTAL CONSULTING

Our Ref: 111122_LEO_001

E-MAILED
24 January 2012

The General Manager NSW
Alkane Resources Ltd
PO Box 910
DUBBO NSW 2830

Attention: Mr Michael Sutherland

Dear Sir

TOMINGLEY GOLD PROJECT NARROMINE TO TOMINGLEY PIPELINE OPERATIONAL CONDITION AND ONGOING MAINTENANCE COSTS

We understand that Narromine Shire Council has lodged a submission in regards to the proposed Tomingley Gold Project concerning matters relating to the Narromine to Tomingley pipeline. We understand that the issues raised by Narromine Council include the following:

- The condition of the pipeline at the end of the mine life and the future life expectancy of the pipeline; and
- Ongoing repair and maintenance costs.

We understand that the Tomingley Gold Project has a production life of 10 to 12 years and our response to Council's issues is based on that assumption.

Pipeline Condition and Life Expectancy

There are various components that make up the Narromine to Tomingley pipeline, namely the HDPE pipeline itself, valves (air, scour and control) and the pump station and its pump and various fittings.

Following 10-12 years of operational service, it is anticipated that the HDPE pipeline would be in good condition. The life expectancy of HDPE pipe would be influenced by properties of the soil in which it is constructed and the quality of the water that the pipeline is conveying. It is not uncommon for HDPE pipe to be used in circumstances where a pipeline may be required to have a design life of 50 to 100 years.

Given the nature of the water to be pumped to the Tomingley Gold Project, significant internal abrasion of the pipeline would not be expected to occur and the general soil quality along the pipeline route does not appear to be aggressive in nature, so the life expectancy of the HDPE pipeline would be in the order of at least 50 years.

The condition of the valving and pump station components after 10-12 years of serviceable life would again be directly influenced by the quality of water being extracted from the 'Woodlands' bore. Valving and pump station components typically have a serviceable life of 5-15 years in applications where non turbid non aggressive water is being pumped. The valving and pump station components would be expected to be either newly replaced or in fair condition following 10-12 years of operational service.

Po Box 1842
1st Floor, 62 Wingewarra Street Dubbo NSW 2830
T: 02 6884 1525 F: 02 6884 1470 E: dubbo@geolyse.com W: www.geolyse.com ABN: 73 492 152 535

GEOLYSE

Ongoing Repair and Recurrent Pipeline Maintenance Costs

It is assumed that the overall Narromine to Tomingley pipeline in its entirety would be in good condition at the conclusion of the 10-12 year operational period. The annual maintenance and repair cost of a pipeline system is influenced by numerous factors, namely the complexity of the pipeline system, the quality of the pipeline components, quality of water being transferred and the usage/hours in operation.

It would be expected that a relatively simple rising main system such as the proposed Narromine to Tomingley pipeline would incur an annual maintenance fee much lower than that of a complex municipal water reticulation system.

Pipeline annual maintenance costs are typically budgeted as a percentage of the initial capital investment. Depending on the complexity of the pipeline system, maintenance budgets vary from 0.5% to 3% of the initial capital investment. Given the simple nature of the Narromine to Tomingley pipeline, an annual average maintenance cost of around 1% of initial capital investment would, at this preliminary assessment stage, appear reasonable.

Any maintenance budget for the pipeline system should include labour and parts to replace, repair or clean the following components:

- air valves;
- scour valves;
- control valves;
- telemetry; and
- pump station components such as; inlet screen, impellor replacement, electrical maintenance.

It is anticipated that the annual maintenance and repair costs incurred during the first 10-12 years of the pipeline's operational life would not be significantly less than that in future years beyond the initial 10-12 years.

Following the closure of the Tomingley Gold Project, the annual volume of water transferred by the pipeline system would be significantly reduced. It is reasonable to assume that the annual maintenance costs of the pipeline system would reduce with this decreased usage of the pipeline.

We trust that the provision of this information is satisfactory for your purposes at this point in time, however, if there are any further questions in regards to this matter or any issue requires clarification, please do not hesitate to contact our Dubbo office.

Yours faithfully
Geolyse Pty Ltd

STEPHEN J HOYNES
Civil Engineer

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Appendix 6

OzArk Response to OEH Queries over the Tomingley Gold Project Biodiversity Offset Strategy and BioBanking Credit Calculations

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Environmental & Heritage Management Ltd
ABN 59 104 582 354

RW Corkery & Co Pty Limited
c/o Alex Irwin
Senior Environmental Consultant
Geological and Environmental Consultants

Brooklyn
Level 1, 12 Dangar Road
PO Box 239
BROOKLYN NSW 2083
Phone: (02) 9985 8511
Fax: (02) 9985 8208
Email: brooklyn@rwcorkery.com

Orange
62 Hill Street
ORANGE NSW 2800
Phone: (02) 6362 5411
(02) 6393 2302
Fax: (02) 6361 3622
Email: orange@rwcorkery.com

Brisbane
Level 19, 1 Eagle Street
BRISBANE QLD 4000
Phone: (07) 3360 0217
Fax: (07) 3360 0222
Email: brisbane@rwcorkery.com

Website: www.rwcorkery.com

Re: Alkane Resources Pty Limited Tomingley Gold Project

Dear Alex,

In response to correspondence from Mr Brad Tanswell of the NSW Environmental Protection Authority (EPA) dated 15/12/2011 the following responses have been provided as requested and responses supplied:

BIODIVERSITY

Biodiversity Impacts

Issue: Some inaccuracies remain in the proposed Biodiversity Offset Strategy (BOS). Clarification of the area to be included in the offset is required.

Response: The Proponent has re-issued a figure (**Figure 2.19 (Modified)**) showing the location of offsets (vegetated area to be removed has not been highlighted). You will note that there are two main changes to the areas identified on the original *Figure 2.19* of the Environmental Assessment (and *Figures A10.1 and A10.2* of the Biodiversity Assessment) and included in the BioBanking credit calculations.

1. To accommodate the Eastern Surface Water Drainage Structure the Proponent will be required to remove a small (30m x 30m) patch from the remnant vegetation (of Community 3). This has increased disturbance by 0.1ha and reduced conservation by 0.1ha.

2. The area of Community 4 conserved has been reduced to 1.9ha as it has been identified that 3.0ha of the original area was located on land for which the Proponent holds an agreement with the land owner. It is noted that areas to the south of the Mine Site on the eastern side of the Newell Highway identified in the

OzArk Environmental & Heritage Management P/L –145 Wingewarra Street ; PO Box 2069 Dubbo NSW 2830
Tel: 6882 0118; Fax: 6882 0630; Mob: 0403 763 504;
E-mail: jodie@ozarkehmlcom.au ; phil@ozakehm.com.au ; cheryl@ozarkehm.com.au
Web: www.ozarkehm.com.au

original Figure 2.19 were not included in BioBanking calculations and have also been removed from **Figure 2.19 (modified)**.

With respect to isolated paddock trees, the Mine Site is under cultivation for wheat, hence there are few isolated paddock trees in areas to be affected. When the calculations were entered into BBAM 10m2 was added per paddock tree to be affected in the requisite community. We believe this is adequate as loss of the paddock trees was considered for both the development site and offset site credit reports.

It is duly noted that the Peak Hill to Tomingley transmission line is not being considered by the EPA as a component of this project.

It is acknowledged that the scales of the figures supplied in the *Environmental Assessment* and Biodiversity Assessment have made it difficult to provide the level of confidence the OEH requires to determine if ancillary infrastructure (i.e. relocated telephone lines, transmission lines, amenities and bunds) affect the offset area.

The consultant has liaised with the Proponent and can confirm that ancillary infrastructure will be, with limited exceptions where the linear nature of the disturbance requires linear strips of remnant vegetation to be crossed, placed adjacent to remnant vegetation. The disturbance will also be preferentially placed beyond (adjacent to) the proposed remnant extension areas, however, where overlaps are unavoidable due to the compressed nature of the Mine Site, grasses and shrubs would be planted in preference to trees (which could interfere with the powerline or pipeline infrastructure). In essence, the structure of a grassy woodland community can be easily designed in these areas when planning landscaping to facilitate effective offsets without reducing the quantum of the offset or change the number of tube stock or kilograms of seed purchased for the rehabilitation activity.

With respect to Figures A10.1 and A10.2, the discussion related to the isolated paddock trees provides the detail required from your query. **Figure 2.19 (Modified)** has been provided for your perusal.

An error in the tables compiled for the purpose of BioBanking credit calculations: 4.9ha of Poplar Box–Belah Woodland (Community 4) would **not** be affected by the activity.

Inaccuracies with the BioBanking calculations are further addressed below. The issue identified by OEH is provided in *italics*, with the response provided in regular text.

- *Erroneous inclusion of some vegetation in the loss component of the assessment.*
  - 4.9ha of Poplar Box–Belah Woodland (Community 4) has been incorrectly identified as being affected by the activity.
- *Low condition classification of one vegetation community in the assessment where EPA concludes the data supports a 'moderate to good' classification.*
  - Idiosyncrasies in data collection in BioBanking are the issue.
    - The consultant suspects the Belah Black Oak Western Rosewood Wilga community (Community 5) (Benson 57) in the impact footprint of the Waste Rock Emplacement, may also be the river red gum community in some areas along the man-made drainage line (Gundong Creek).

OZARK ENVIRONMENTAL & HERITAGE MANAGEMENT P/L –145 Wingewarra Street ; PO Box 2069 Dubbo NSW 2830
Tel: 6882 0118; Fax: 6882 0630; Mob: 0403 763 504;
E-mail: jodie@ozarkehmlcom.au ; phil@ozakehm.com.au ; cheryl@ozarkehm.com.au
Web: www.ozarkehm.com.au

- Several factors may have played a role - namely the data entry into the overstorey regeneration category is the main issue. Sometimes an area will be heavily grazed but an individual tree from each cohort would be observed growing in a place that cannot be grazed (growing though a drum / abandoned farm machinery), the majority of the area assessed does not support regeneration (due to grazing pressure) hence judgment was applied where 'low condition' reflected the 'true' nature of the ecological condition (as opposed to technical where one tree is regenerating but it won't lead to local recovery of the current extent of the patch. In the case of the river red gum area these areas were ploughed right up to the banks of the creek, in places you couldn't plough there were signs of regeneration but again contribution of these bits of regeneration in a ploughed 20m buffer on the creek were limited hence 'low condition' applied.

- *Failing to place the 100ha assessment circle over the area of greatest change therefore underscoring the landscape change.*

  - The circle was placed over the area which had the greatest effect to the areas species, populations and community's ecology i.e. Fuzzy Box Woodland EEC, Inland Grey Box Woodland EEC, removal of trees with substantive hollows and spouts.

  - A meeting with OEH in January 2012 noted that the circle should have been placed over the vegetation type undergoing the greatest change in extent. Benson 57 is in 'low condition' does not provide the same ecological values i.e. there are no EECs or tree hollows / spouts however the requisite process is now noted.

- *Rerun of required credit points.*

  - The consultant appreciates and thanks OEH for re-running the data and updating the information.

- *Tier 2 'No Net Loss'*

  - Thank you for bringing this to our attention, the Tier system we are now aware is the lowest common denominator that can be achieved by the project, not for individual communities.

  - In this instance the Project will achieve Tier 3 'Mitigated Net Loss' as the number of credits generated for Community 5 is inadequate for offsetting.

  - The Proponent will modify the rehabilitation plan to include requisite species (Belah / Black Oak, Western Rosewood and Wilga). The number of hectares required (prior to OEH review) was 18ha. The Proponent will ensure 25ha of this community is incorporated into the rehabilitation plan. Although currently Tier 3 is achieved we can independently undertake this activity to facilitate 'appropriate' habitat offset requirements.

OZARK ENVIRONMENTAL & HERITAGE MANAGEMENT P/L –145 Wingewarra Street ; PO Box 2069 Dubbo NSW 2830
Tel: 6882 0118; Fax: 6882 0630; Mob: 0403 763 504;
E-mail: jodie@ozarkehmlcom.au ; phil@ozakehm.com.au ; cheryl@ozarkehm.com.au
Web: www.ozarkehm.com.au

- *Design of the offset.*
    - The advice of the OEH is noted and appreciated. It is duly noted that the offset design is not the most desirable. The design has been proposed to address the needs for specific local populations of regionally significant species and listed threatened species within the design constraints associated with the activity.
        - In this instance, within this highly fragmented landscape the best ecological outcome for known species of interest are associated with improving habitat for Grey-crowned Babblers (V –TSC Act) and the Fat-tailed Dunnart (regionally significant). Both species were recorded in association with linear corridors and from experience, utilise this habitat resource in the region.
        - Both species have been adopted as 'flagships'. At least two possibly four families of Grey-crowned Babblers live in the Mine Site and an unknown nature and extent of a population of Fat-tailed Dunnarts. The most achievable habitat restoration for these species was considered to be doubling (at least) the width of the linear remnant, re-establishing a functional ecosystem (mainly native grasses and shrubs) and establishing a new cohort of trees. Relocating offsets in other locations would not address effects to these known local populations. It is however accepted that other designs in other areas would be preferable however this scenario does not help the species in the Mine Site within the constraints of developing the area.
- Offset Security
    - The inconsistent information within the EA and statement of commitments will be addressed to note 'in-perpetuity conservation arrangements would be implemented'. This will be achieved either by a Property Vegetation Plan, Conservation Agreement, Trust Agreement or Planning Arrangement.

Thanks you for the feedback and direction to assist with future BOS assessments.

Regards

Phil Cameron
Senior Project Manager / Principal Ecologist
OzArk Environmental & Heritage Management Pty Limited
PO Box 2069 DUBBO 2830
Ph 02 6882 0118 / 0423 198 898
Fax 02 6882 0630 phil@ozarkehm.com.au

OZARK ENVIRONMENTAL & HERITAGE MANAGEMENT P/L –145 Wingewarra Street ; PO Box 2069 Dubbo NSW 2830
Tel: 6882 0118; Fax: 6882 0630; Mob: 0403 763 504;
E-mail: jodie@ozarkehmlcom.au ; phil@ozakehm.com.au ; cheryl@ozarkehm.com.au
Web: www.ozarkehm.com.au

Appendix 7

Detailed Mine Site Layout
(Drawing TGP-1130-00-G-001 rev5)

(Total No. of pages including blank pages = 4)

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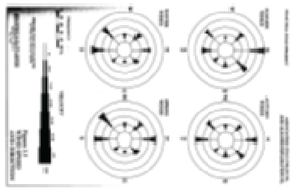
DO NOT SCALE - WORK TO DIMENSIONS

WIND DATA



EARTHWORK QUANTITIES

EARTHWORK QUANTITIES	CUBIC M
WYOMING	
ROM PAD AND RAMP	367,281
RSF BUNDING	202,000
WRE 1 - LOW GRADE STOCKPILE	1,500,000
WRE 1 - WASTE	1,036,795
WRE 2 - 40m HIGH	14,303,700
TOPSOIL WYOMING (2m high)	193,000
LEVEE BANKS - WYOMING	29,000
TOTAL	17,631,776
CALOMA	
WRE 3	17,384,270
LEVEE BANKS - CALOMA	44,000
TOPSOIL CALOMA (2m HIGH)	272,609
TOTAL	17,700,879

NO	DATE	DRN	CHD	ENG	REVISION
5	18/8/19	RMA			POTENTIAL CALOMA TWO PIT AND WASTE EXTENSION ADDED
4	01/08/19	RMA			CALOMA TOP SOIL DUMP ALTERED, EXTRA DUMP ADDED, TABLE ADJUSTED TO SUIT
3	22/07/19	JR			WRE 3 MOVED, CALOMA TOPSOIL DUMPS MOVED, ROADS AND DRAINS ADJUSTED TO SUIT.
2	26/06/19	JR			WRE 2 AND 3 CHANGED, CALOMA TOPSOIL, WATER SUPPLY, ROADS ADJUSTED TO SUIT
1	17/6/19	JR			PIT FOOTPRINTS CHANGED, HAUL ROADS ADJUSTED TO SUIT.
0	6/12/18	JJR			ISSUED FOR EPL

REFERENCE DRAWING TITLE | DRAWING NUMBER

ALKANE RESOURCES LTD

mintrex consulting division of Northshore Pty Ltd — Job No. ALK 1130

ABN 84 064 105 488
ph. (0161) 0442 3333
fax.(0161) 0442 3300

FULL SIZE ON A1 ORIGINAL – IF PRODUCED AT A3 DOUBLE SCALE

PROJECT: TOMINGLEY GOLD PROJECT

DRAWN	CHECKED	APPROVED	DATE
JJR			
DESIGN ENG.	DESIGN CHK.		

TITLE: GENERAL SITE LAYOUT PLAN

SCALE 1:10000 | DRAWING No TGP-1130-00-G-001 | REV 5

PROJECTION AMG Zone 55
Datum Horizontal AGD66

A1

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Appendix 8

Additional Flood Modelling and Flood Heights - Tomingley Gold Project (SEEC)

(Total No. of pages including blank pages = 8)

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SEEC

STRATEGIC ENVIRONMENTAL
AND ENGINEERING CONSULTING

www.seec.com.au

Alex Irwin
RW Corkery & Co Pty Ltd
62 Hill Street
ORANGE NSW 2800

our reference: 09000056-01
your reference:

1 February 2012

Dear Alex,

Additional Flood Modelling and Flood Heights - Tomingley Gold Project

In response to our discussions with Tim Baker from NSW Office of Water on 25 January 2012, we have conducted additional flood modelling around the Tomingley Gold Project site. Following are the results of that modelling.

In addition, please also find following further details concerning the Eastern Surface Water Diversion Structure (ESWDS).

Flood Modelling and Flood Heights

Figure 1 below shows the results of additional flood modelling around the Project Site for the 100-year ARI event. The purpose of this modelling is to show the extent of change in flood heights on adjacent properties. The hatched area shows the limit of the changed flood heights - beyond that zone, modelling shows no change. Spot height changes note where flood levels will either decrease (negative values) or increase (positive values).

The maximum change is an increase of +0.64m, where an aflux occurs immediately upstream of the site access road crossing over the site bund. As can be seen from the spot heights, this increase quickly dissipates on the adjoining lands to the point where no impact occurs. As a result, the area of land impacted by an increase in flood height is relatively minor.

Suites 9 and 10 Bowral Mall
Cnr Boolwey & Station Streets, Bowral
PO Box 1098, Bowral NSW 2576

t 02 4862 1633
f 02 4862 3088
e reception@seec.com.au

Principals: MV Passfield CPESC and AP Macleod CPSS, CPESC

ABN 12 291 237 901

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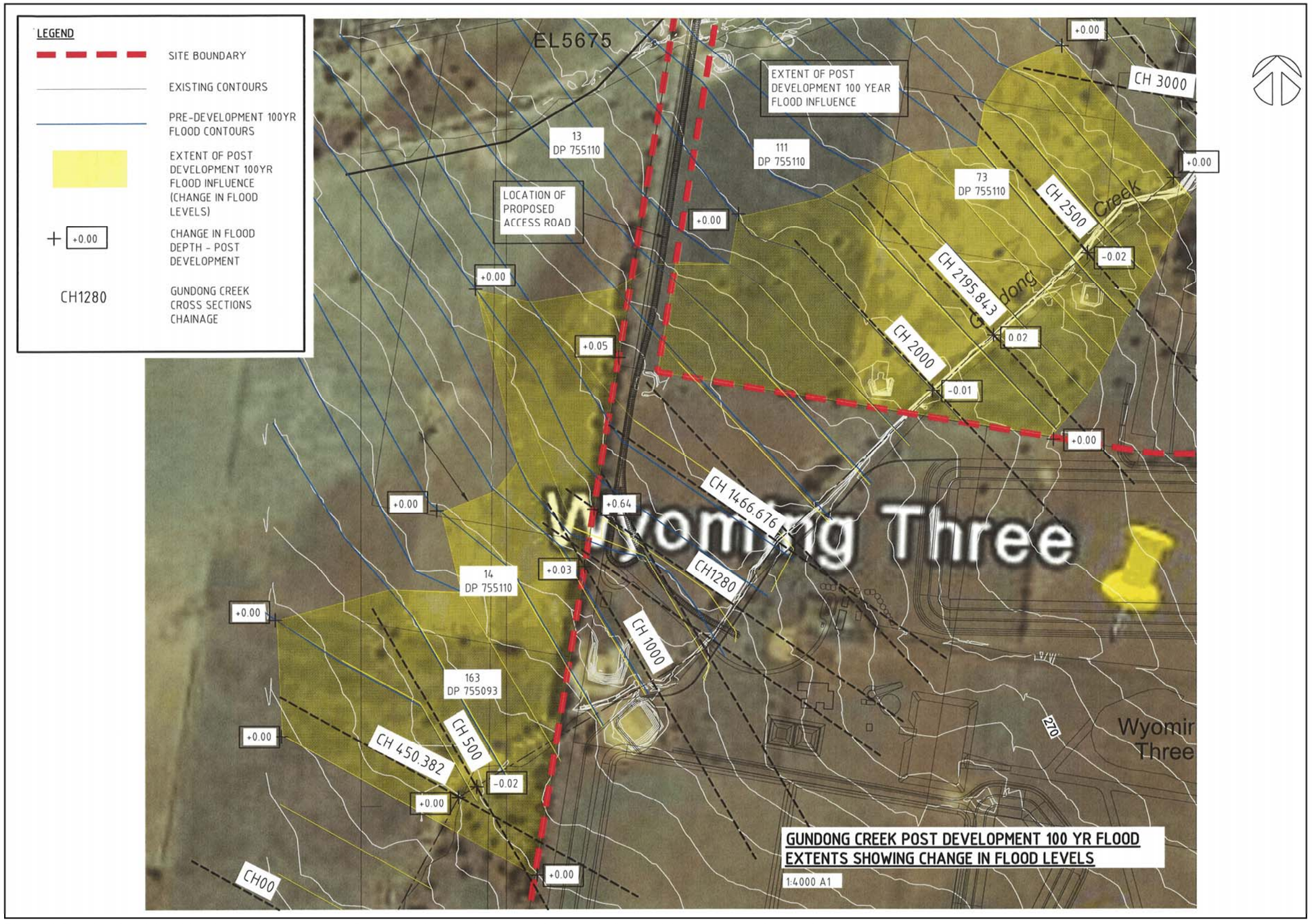

Figure 1 Results of additional flood modelling (100-year ARI event), showing the extent of change in flood heights around the Project Site.

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Note that the results shown in **Figure 1** differ slightly from those presented in the Surface Water Assessment (SEEC, 2010). This is as a result of slightly different model calibration although this variation is not significant. The results presented in the Surface Water Assessment (SEEC, 2010) are still considered valid as they are inherently conservative.

Eastern Surface Water Diversion Structure (ESWDS)

We concur with the NSW Office of Water that the ESWDS needs to be stable. We have investigated the design provided for this structure (by others) to determine whether it can be adequately stabilised. Although the ESWDS has relatively steep sides and is significantly incised at various points, we consider that it can be suitably armoured to minimise the risk of erosion and ensure stability for the life of the structure.

Armouring would involve achieving an appropriate level of ground cover, using a material (or materials) that can cope with the anticipated flow volumes and velocities. Ultimately, ground cover to a C-factor of 0.05 (equivalent to 70% grass cover) would be the minimum, in accordance with the recommendations and guidelines in the NSW Blue Book Volumes 1 and 2E (Landcom, 2004 and DECC, 2008). This might necessitate the use of rock armouring, geofabric or similar. The final design would be considerate of cost while ensuring that the requirement for stability was met.

If you have any questions or comments regarding the above, please feel free to contact either me or Jason Armstrong on 02 4862 1633.

Yours faithfully,

Andrew Macleod

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