

**Stability Assessment  
at**

**Cambrian Quarry,  
Gwernymynydd,  
Mold**

**Interpretative Report**

**for  
ASH Resources (Cambrian Quarry)**

**Engineer : Sloane Mead**

**Project Number : PN122722**

**August 2012**

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## Section 7.4 INFILLING OPERATIONS-STABILITY

**Revision: Revised 06/12/2012 by Keith Nicolls, Geotechnics Ltd**

"Maximum safe slope angles with respect to proposed infilling materials to be placed in the quarry need to be defined on the basis of their actual material characteristics and the perceived risk of instability associated with the proposed future land use. The relevant material characteristics in respect of slope stability are the shear strength parameters, known as cohesion (c) and friction angle (f). For the long-term condition associated with permanent slopes and embankments it is the "effective" parameters (c' and f') that are of concern. In this regard, it is assumed that all slopes will be free draining.

It is understood that the imported material used for filling will

- not include unsuitable, saturated, contaminated or highly organic materials, and
- will be laid in lifts not exceeding 1m, and
- be dozed flat with nominal compaction from the plant.

Based on this and following discussions with the Client, it is Geotechnics Ltd's opinion that

- bench heights should not exceed 5m,
- berm widths should not be less than 3m, and
- the local slope angle (between toe of slope and crest of bench) should be no greater than 23°.

(This is based on a Factor of Safety of 1.15 on  $f' = 26^\circ$ , with c' assumed to be negligible. The assumed f' value of 26° equates to a typical effective friction angle for soft to firm clay fill materials).

The relatively low Factor of Safety reflects the fact that there will be no public access during construction, and the fact that as the entire quarry lies within a basin like structure there is no significant risk of tipped material escaping from the site.

It will be possible to engineer steeper slopes if required, however this will require design of retaining structural bunds of coarse granular fill within the tipped material, and will require formal slope stability design, based on actual known material characteristics.

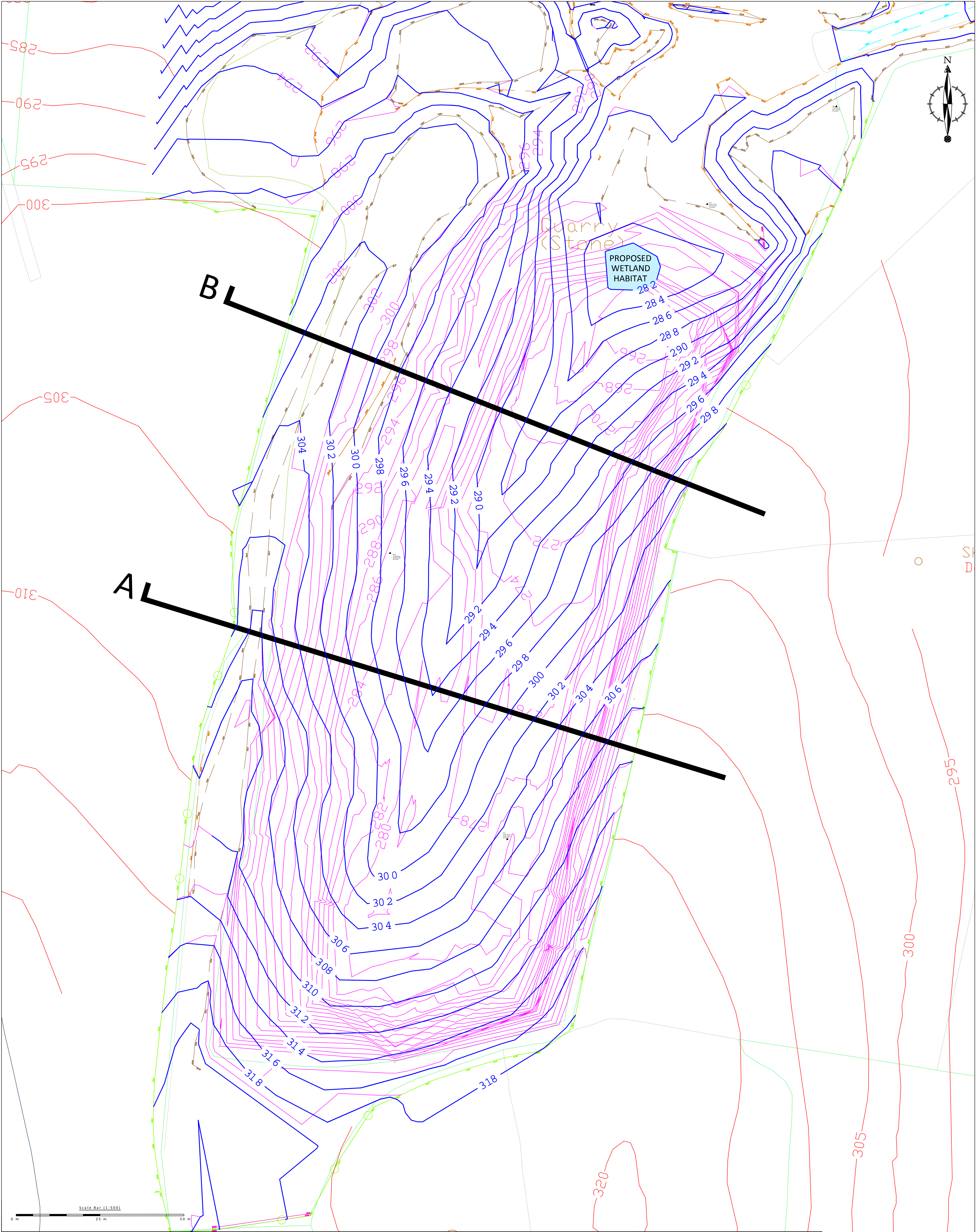
Including the bench, this configuration will allow for an overall slope angle of about 20° over a two bench height. This should only be used for preliminary design purposes and all the fill design should be done in such away that there is no potential route for slipped material to escape the confines of the quarry.

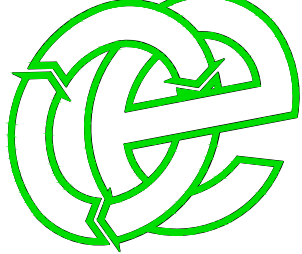
It should also be noted that self weight settlement of the infill materials will occur for some considerable time after placement. Such settlement can be minimised by the use of adequate compaction and grading screening control to minimise the volume of voids in the placed fill."

Please refer to revised Drawings:-

- 2304-426-02 Cross Sections (B1)
- 2304-426-01 Proposed Restoration Plan (A)







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**KEY:**

- 300 — PROPOSED contours @ 2 m intervals
- 265 — EXISTING contours @ 5 m intervals
- 265 — EXISTING contours from site survey @ 2 m intervals
- Emaspisite natural environment boundary
- Cross section locations

**Notes:**

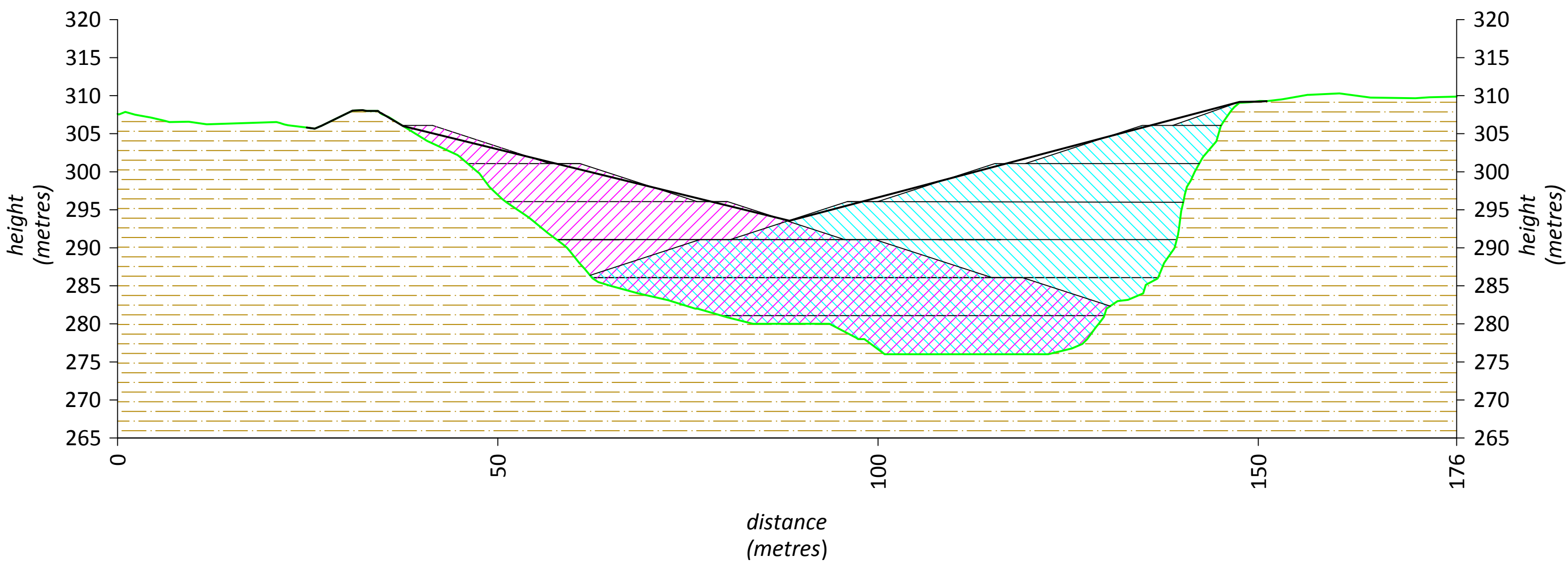
\*\*\*\*Drawing is a draft for discussion only\*\*\*\*

Revision Details:		Date:
Rev:	Description:	
-	Draft for consultation	14/08/12
A	Updated draft - restored slopes amended to between 1 in 3 and 1 in 4 as per EA agreement	28/11/12

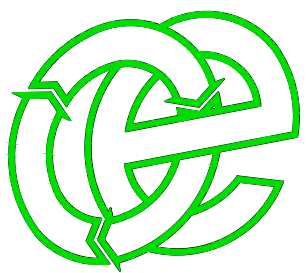
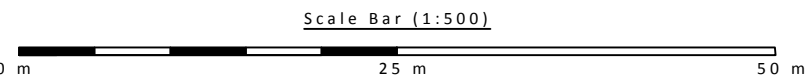
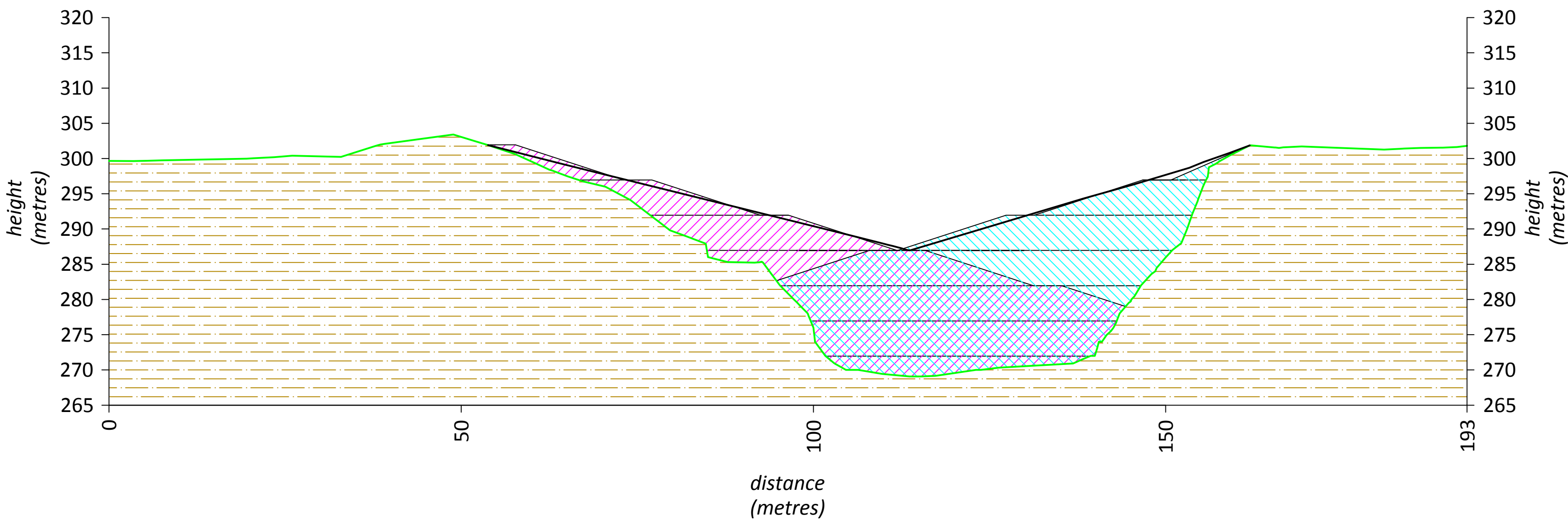
Title: PROPOSED RESTORATION PLAN		Scale: 1:500	Grid Ref:
Drawing No: 2304/426/01		Date: 28 November 2012	Revision: A
Site: Cambrian Quarry, Gwernymynydd, North Wales		Drawn by: RS	Checked: Printed at: A1
Client: Alan's Skip Hire Ltd		Client No: 426	Job No: 2304



CROSS SECTION A



CROSS SECTION B



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Title: CROSS SECTIONS		Scale: 1:500	Grid Ref:
Drawing No: 2304/426/02		Date: 5 December 2012	Revision: B
Site: Cambrian Quarry, Gwernymynydd, North Wales		Drawn by: RS	Checked: RD Printed at: A1
Client: Alan's Skip Hire Ltd		Client No: 426	Job No: 2304

**KEY:**  
— Proposed ground level  
— Existing ground level  
Fill to western bench  
Fill to eastern bench

**Notes:**  
\*\*\*\*Drawing is a draft for discussion only\*\*\*\*

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Rev	Description	Date
-	Draft for consultation	14/08/12
A	Updated draft - restored slopes amended to between 1 in 3 and 1 in 4 as per EA agreement	28/11/12
B	Section refs. wrong in Revision A - corrected	05/12/12