

Tir Pentwys Access Road: Geotechnical Study May 2016

In July 2012, SLR submitted a Desk Study and Geotechnical Assessment of the 2.1km lower section of the haul road which is proposed to traverse the existing slope to the south of Cefn Crib Farm to a new access on to Crumlin Road. The assessment was subsequently incorporated into a Second Supplementary Environmental Statement submitted in January 2013.

The Assessment concluded that the analysis of the potential for structurally controlled failure mechanisms demonstrates that planar, wedge or toppling failure is unlikely to occur for the proposed access road design orientation and cut angle. However it recommended that prior to commencement of construction, additional discontinuity measurements should be made to reinforce the predictions made. The assessment also noted the possibility for kinematic risk of localised failure, and that the final design should thus incorporate some form of rock fall protection particularly where higher cut slopes are proposed. It also recommended that artificial support in the form of rock gabions be used in areas of cut overburden. The risk of any problems associated with historic deep mining was deemed to be low, but the Assessment recommended a programme of drilling to assess risk from shallow mining.

In July 2013, Parsons Brinckerhoff (PB) undertook a geotechnical appraisal of the SLR assessment. This generally endorsed the findings of the SLR assessment, but recommended that a number of additional studies should be undertaken which build upon the recommendations of the SLR assessment. These comprised suggested additional discontinuity surveys; additional topographic surveys to cover the full length of the scheme; details of route configuration and cutting heights; design slopes shown on a design drawing; rock stabilisation measures; overburden slope stabilisation (gabian baskets or similar); a programme of drilling; and cutting / stabilisation works at the Crumlin road junction.

These requirements from PB were amplified in a further letter dated 5th September 2014, which recommended an intrusive investigation via the drilling of a limited number of rotary cored boreholes along the centre line of the proposed route. This exercise would be designed to provide further information on rock quality / strength parameters which in turn would assist the design via a greater understanding of the geological sequence and the geological characteristics of the bedrock which will be encountered in constructing the road and cuttings. PB also recommended undertaking a non-intrusive geomorphological field mapping exercise above and below the centre line of the proposed cut. This would map breaks in slope and identify any areas of former land slipping that could be susceptible to reactivation by future excavation work.

The PB letter concludes, importantly, that *“it is our view that the construction of the lower haulage road slopes is geotechnically feasible”* but that there are areas of geotechnical uncertainty which should be addressed. This is important in that there is no dispute between the geotechnical experts who have been engaged in this process (SLR Consulting, Parsons Brinckerhoff and Burroughs Consulting Engineers) that it will be geotechnically feasible to construct the access road. The only issue relates to the detailed design of the access road and an acknowledgement between all parties that further geotechnical work will need to be undertaken to provide information to support the detailed designs. However, this is conventional and routine for all such schemes.

It should also be noted that substantial amount of preparatory work and investigation has already been undertaken which underpins the conclusions reached regarding the geotechnical ability to construct the road and the engineering solutions which will be available. This work and investigations comprise:

- (i) Typical cross sections along the access road illustrating the available techniques for cut slopes, gabion baskets engineering, drainage etc (plan ref C77/SD/E submitted 9th December 2011).
- (ii) Typical cross sections along the upper section of the access route (plan ref TP12/5 submitted 17th October 2011).
- (iii) Access Road and Geotechnical Assessment (SLR July 2012), included within the Second Supplementary ES January 2013) including a review of available data, site walkover and joint survey, rock mass discontinuity data, rock mass stability assessments, and outline engineering approaches to road construction and stability of the cut slopes.
- (iv) Plate bearing tests carried out at intervals of 50 metres along the upper section of the access tack which confirms that the foundation of the road is likely to be of adequate strength to support the proposed construction (submitted 12th February 2013).
- (v) Submission of further details of the access road junction with Crumlin Road illustrating the anticipated crest heights of the cutting (plan ref SSES/04 submitted 17th April 2014).

This information provides confidence that it will be geotechnically feasible to construct the access road along the alignment which is proposed, but as is customary for engineering projects of this type, there are areas of uncertainty at this stage of the design process.

These areas of uncertainty would be addressed by a study comprising the following:

1. A detailed review of all previous studies published geological information and aerial photography.
2. Topographical survey of the haul road route.
3. 3D model with AutoCAD Civils 3D to determine scheme footprint (i.e. crest line of cut slopes and toe line of fill slopes) based on details shown on plan reference C7777/SV/E dated 30th November 2011 (accompanying SLR letter dated 9th December 2011).
4. Geotechnical walkover survey and geomorphological assessment to include the collection of further rock mass discontinuity data and examine access and positions for subsequent intrusive ground investigation.
5. Ground investigation works consisting of rotary cored boreholes along the proposed alignment, targeted to areas identified in the geotechnical walkover survey, and sections where deep cutting is required. The ground investigation to include down hole optical televiewer logging to provide information and discontinuity spacing's and orientations with depth.
6. Geotechnical assessment based on findings of additional ground investigation works to:
 - Quantify risk of planar, toppling and wedge failures over full depth of cut slopes;
 - Determine final slope profiles to be undertaken through detailed design and whether intermediates berms need to be included;

- Provide assessment of rock excavatability;
- Provide a combined a combined ground investigation and geotechnical design report to reflect the above.

7. Produce detailed general arrangement drawings showing:

- The access road with the extent of cut slopes along the full route
- Cross section details of areas of shallow cut and the locations;
- Cross section of areas of fill (hairpin bend) and the location;
- Details of rock bolt secured gabion facing (for areas of friable/poor rock) and locations;
- Details of drapery rock fall netting of crib walling (for areas of moderate to good rock) and locations;
- Details of reinforced earth fill and locations;
- Details of the junction arrangement with Crumlin Road including cross sections and confirmation of treatment of cut slopes;
- Details of drainage along the access road; and
- Details of the surface treatment of the access road.

In accordance with the implementation programme submitted by SLR on 14th March 2016, it is anticipated that the site investigation works would be undertaken during August and September 2016, with the results of the geological study informing the designs and preparation of the above plans undertaken in September and October 2016.

It is proposed that the above measures be incorporated into a planning condition requiring the implementation of the site works, production of a geotechnical report, and preparation of the general arrangement design plans for submission to and approval by the local planning authority prior to commencement of construction of the access road.