

Project No.: 018-118D

18 September 2020

Economic Development Queensland  
Level 14, 1 William Street  
BRISBANE QLD 4000

**Email:** Kalon.Harding@dsmip.qld.gov.au

**Attention:** Mr K Harding

**PLANS AND DOCUMENTS**  
referred to in the PDA  
**DEVELOPMENT APPROVAL**

**Approval no:** DEV2020/1099

**Date:** 9 December 2020



Dear Kalon

**RE: GEOTECHNICAL SLOPE STABILITY - TECHNICAL NOTE**  
**OXLEY PDA - STAGE 1A**  
**SEVENTEEN MILES ROCK ROAD, OXLEY**

## 1.0 INTRODUCTION

It is understood that Economic Development Queensland (EDQ) is proposing to develop Stage 1A of the Oxley PDA site (the former Oxley Secondary College site), by the construction of a residential subdivision comprising thirty-nine new residential allotments, a childcare centre, a retirement living precinct and open space areas. The location and extent of Stage 1A are indicated in Figure 1.



Figure 1: Stage 1A location and extent

This letter updates our Technical Note prepared on 4 September 2020, following subsequent discussions with EDQ.

As input to the design and DA/EDQ approval processes for the Stage 1A development, additional slope stability and a groundwater assessments of the Stage 1A site have been undertaken and the results are given in the following reports:

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| <ul style="list-style-type: none"><li>• <i>Third Draft Geotechnical Investigation and Slope Stability Assessment</i><br/>Oxley PDA – Stage 1A<br/>Blackheath Road, Oxley<br/>Project No.: 018-118D Dated: 3 September 2020</li></ul> | <ul style="list-style-type: none"><li>• <i>Groundwater Assessment</i><br/>Oxley PDA – Stage 1A<br/>Blackheath Road, Oxley<br/>Project No.: 018-118D<br/>Dated: 15 September 2020</li></ul> |
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## 2.0 EDQ DOCUMENTS

It is understood that our assessment (Technical Note), of the site is required to address the following EDQ provided documentation:

- Department of State Development, Manufacturing, Infrastructure and Planning's letter to EDQ of 23 April 2020 (Ref DEV2020/1099);
- Appendix A of EDQ's submitted reports review; and
- Department of State Development, Tourism and Innovation's letter to EDQ of 15 September (Ref DEV2020/1099).

Prior to the completion of Butler Partners's two assessment reports listed above, a review of the two EDQ documents was conducted and the results were given in Butler Partners's letter of 15 May 2020. This current letter provides an update of our 15 May letter, based on the results of the latest geotechnical investigation report of 3 September 2020 and the groundwater assessment report of 24 August 2020.

## 3.0 REVIEW OF DOCUMENTS PROVIDED BY EDQ

The following two EDQ supplied documents have been re-reviewed and Butler Partners's responses to geotechnical issues raised in both documents are given below.

### 3.1 The Minister of Economic Development, Queensland's Letter of 23 April 2020

#### 3.1.1 Point 15

##### a) Stage Specific Recommendations

The two reports nominated in Section 1.0 provide geotechnical risks/recommendations that are considered to be applicable to sections of the Stage 1A, where investigation work has been conducted; additional investigation work will be required over the Stage 1A site.

Butler Partners has held discussions with the civil works designers KN Group Pty Ltd (KN Group) on how the geotechnical recommendations given in Butler Partners Slope Stability Assessment report of 3 September have been considered in the civil design and have overviewed KN Group's earthworks drawings, which are considered to be consistent with our slope stability report recommendations.

##### b) Further Investigation or Design Required

No additional geotechnical investigation is now required, prior to finalisation of concept and detailed design of Stage 1A. Additional, lot specific investigations will be required in the future, by the lot owners.



### 3.2 Appendix A – Geotechnical Further Issues

#### 3.2.1 Point a) Development Proposal Impacts

Butler Partners has reviewed the Stage 1A development proposal, and completed significant additional geotechnical investigation of the Stage 1A site. Updated site specific stability analysis has been undertaken, which provides specific development geotechnical recommendations. It is not considered necessary that geotechnical risks be superimposed on the development plans.

The upslope and downslope extents of updated slope stability analysis results are given in the latest geotechnical investigation report; no potential failure areas have been identified relative to lots, building envelopes and infrastructure. Several potential slope failure areas have been identified in the backyards of properties located along (and external to) the southern site boundary.

#### 3.2.2 Point b) Building Loads/Slope Modifications

The latest stability analysis considered the earthworks and drainage proposals, building locations/loading (internal/external) and any maintenance access loading and no adverse effects on slope stability were identified.

#### 3.2.3 Point c) Deep Foundations

The need for deep foundations must be determined by lot specific geotechnical investigation, based on the proposed building type/load proposed for each lot, which is currently unknown, but will be the responsibility of each lot owner.

#### 3.2.4 Point d) Slow Creep Failure

No proposed residential building envelopes or infrastructure has been identified that could be affected by soil creep or deep-seated slow creep failure.

#### 3.2.5 Point e) Subsoil Drainage and Concrete Lining

Butler Partners has confirmed with the civil works designer, the scope of subsoil drainage/concrete drain lining required. It is considered that the proposed KN Group's concrete drain indicated in Figure 2 is appropriate for use across the rear of the allotments.

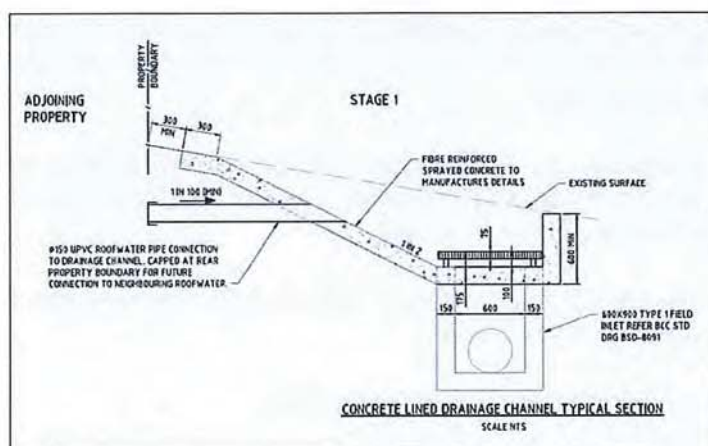


Figure 2: KN Group's concrete lined drain detail

It is understood that drainage lines/swales are to be located within Lots 14 and 20 to convey captured stormwater flow to the road below the allotments; we consider that the swale can be grassed without the need for concrete lining.

### 3.2.6 Point f) Vegetation Planting and Maintenance

This recommendation applies to zones within Stage 1A.

### 3.2.7 Point g) Eastern Slope and Waterway Stability

The entrance road does not require further slope stability assessment and the earthworks associated with the establishment of the lots, roads, stormwater infrastructure and other assets would currently not be expected to require further analysis of the slope stability within the waterway; however, some analysis may be required, depending on the results of future discussions with the civil works designer.

### 3.2.8 Point h) Southern Slope Stability

Butler Partners has reviewed whether development exclusion buffers are required along the southern site boundary, due to identified zones of potential instability located external to the site and minimum offsets have been nominated in the latest geotechnical investigation report.

### 3.2.9 Point i) Prevention of Water Ingress into the Site Slopes

Butler Partners confirm that the comments relating to the discharge of roof water to ground by lots along Blackheath Road also applies to the lots along Seventeen Mile Rocks Road.

### 3.2.10 Point j) Further Investigation – Prior to Construction

#### i) Confirm Testing Scope and Timing

Further geotechnical investigations are not required (including monitoring), prior to finalisation of the Stage 1A layout design, civil design (concept/detailed) or prior to construction. Further investigation will be confined to the following scope:

- Pre construction testing on a lot-by-lot basis by individual lot owners prior to building design and construction.

Butler Partners could, if required, confirm on an on-going advice basis, if any adverse findings result from Post-Approval lot-based investigations which could be managed privately within-lot through reasonable foundation works or in-lot localised actions. No pre-approval investigations are considered to be required.

Following completion of the additional geotechnical investigation of the Stage 1A area, Butler Partners confirms that mapping to indicate zones of uncontrolled fill is not appropriate; identification should be made during bulk earthworks.

Butler Partners confirm that no further design works are required to be undertaken prior to the removal of uncontrolled fill material.

### 3.2.11 Point k) Further Investigation – Post Construction

Butler Partners is available, if required, to provide conceptual recommendations on the scope of stability assessment required for each lot, i.e. ground investigation type/depth, laboratory testing required and the technical aspects of the assessment, including whether testing is required to confirm groundwater, uncontrolled fill or slickenside assumptions.



### 3.2.12 Point l) Groundwater

Butler Partners has conducting groundwater level monitoring on Stage 1A and elsewhere on the site and the results to date are summarised in Butler Partners's groundwater assessment report of August 2020. Following completion of additional geotechnical investigation of the Stage 1A area, Butler Partners advises, that no design/construction needs to be delayed.

#### i) **Borehole 18**

Additional investigation has been undertaken around Bore 18 and it is considered that the identification and treatment of any existing uncontrolled fill should be undertaken during bulk earthworks for the development.

### 3.2.13 Point m) Sensitivity Analysis

#### i) **Slickensides**

Butler Partners has already undertaken stability analysis using possible soil strength reduction due to the presence of slickensides and the additional investigation and stability analysis undertaken has required no change to the development works due to slickensides.

#### ii) **Groundwater Depth**

A detailed groundwater model has been completed and has indicated that a potential groundwater level rise to closer than 5m to the ground surface is not expected.

#### iii) **Undrained Analysis**

It is considered that slope stability analyses does not need to be undertaken for undrained conditions, as this is not considered to be the critical condition.

### 3.2.14 Point n) Long Term Monitoring

Butler Partners does not consider that up-front installation of ground movement monitoring measures (e.g. permanent survey markers etc.) or permanent groundwater monitoring wells is considered to be required.

### 3.2.15 Point o) Surface Creep

Following completion of the additional geotechnical investigation of the Stage 1A area, surface creep is not considered to be a significant risk.

Except for the rear fill at several adjoining properties along the southern site boundary and a very small zone of ground at the entrance road location, no slope angles in excess of 18° are present on the site.

### 3.2.16 Point p) Dispersive Soils

- i) Following completion of the additional geotechnical investigation of the Stage 1A area, Butler Partners considers that sinkhole development is highly unlikely.
- ii) Butler Partners recommends that any decommissioned services on the site should be located, removed and remediated to prevent future sinkholes development along their alignments.

- iii) Butler Partners considers that the influence of dispersive soils on land stability is negligible, provided that the geotechnical investigation report recommendations are adopted.
  - iv) Butler Partners should work with the civil works designer to determine the most appropriate design of services installation such that they do not present future sinkhole risks.
  - v) Use of soakage pits as a method of stormwater discharge, must be avoided anywhere over, close to or behind sloping ground.
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- vi) The additional geotechnical investigation of the Stage 1A area, has provided additional information as input to a Dispersive Soil Management Plan.

3.2.17 Point g) Acid Sulfate and Acidic Soils

- i) Butler Partners consider that no acid sulfate soils (ASS) exist on the sloping sections of Stage 1A.
- ii) An Acid Sulfate Soil Management Plan (ASSMP) is not considered to be necessary for the sloping (elevated) sections of the site.

3.3 **The Minister of Economic Development, Queensland's Letter of 15 September 2020**

3.3.1 Stage Specific Recommendations

Refer to Section 3.1.1 a) above.

3.3.2 Southern Boundary Drainage Corridor

Refer to Section 3.2.5 above.

3.3.3 Development Exclusion Zones (Southern Boundary)

6. Nature of the risk

The exclusion zones at the rear of the proposed lots are to prevent any slope failure in uncontrolled (or inadequately controlled) fill comprising the backyards of adjacent properties on Seventeen Mile Rocks Road, from adversely affecting development on the proposed Stage 1A lots. The exclusion zones widths of 6m and 8m have been matched to the assessed risks of failure in the adjacent backyards, which is exactly the same issue as for properties located along Blackheath Road.

a) **Exclusion Zone Restrictions**

- i. The development exclusion zone does not require any measures to reduce intensive usage by residents, as there is not considered to be a risk to life.
- ii. No building structures or land improvements, etc., may be constructed within the exclusion zone.
- iii. Slope Risk Assessment - There is sufficient information available on the risk to lots and Butler Partners has undertaken a slope risk assessment, which has informed the decision regarding the exclusion zone widths.



#### 3.3.4 Vegetation Removal and Reinstatement

##### 7. Slope Stability Analysis Assumptions

Butler Partners confirms that the proposed Stage 1A removal of existing trees noted in Saunders Havill Group's Drawing Nos. 9216E13 and E15, VCFMPG of 25 August 2020 is considered to be in accordance with the groundwater and slope stability analysis assumptions and that isolated vegetation removal does not reduce the critical Factor of Safety against overall slope failure below that presented in our slope stability assessment report of 3 September 2020.

#### 3.3.5 Lot Tree Clearing

Refer to Section 3.3.4 above.

#### 3.3.6 Tree Planting Zone

Butler Partners approves of Saunders Havill Pty Ltd planting and removals.

As noted in our recent telephone discussions, the trees are not relied on for overall slope stability. Sections 5.14 and 5.16 will be revised accordingly.

#### 3.3.7 Plan of Development Requirements

Butler Partners confirms that the geotechnical elements of the POD (listed below) are in accordance with our geotechnical report recommendations:

- Steep residential lots (items 18-23); and
- Retaining walls (items 24-28).

#### 3.3.8 Residual Strength Analysis (Development FOS)

The calculated Factor of Safety (FOS) for Bore 105 is below the acceptable level, however the value of 1.19 results from adverse effects from outside of the development boundary (from existing lots on Seventeen Mile Rocks Road). The minimum acceptable long term FOS is achieved within the development lots and the section of minimum FOS values in our 3 September report will be expanded to include a specific discussion on lower acceptable FOS values that apply to residual strength (slickenside) stability analysis.

#### 3.3.9 Groundwater Monitoring

- a) Butler Partners confirms verbal advice that the recommendation to continue groundwater monitoring through the next wet season does not require all of the existing groundwater monitoring wells to be retained.
- b) Based on discussions with KN Group, it is considered that Monitoring Well 102 can be retained through the wet season, without being impacted by bulk earthworks activities. It is considered that the retention of one well is adequate, given the general uniformity of the site ground conditions.

We are currently in the process of updating our Slope Stability Assessment Report of 3 September 2020 to be consistent with the responses given in this Technical Note; it is anticipated that the updated (and finalised), report should be ready for issue on, or about, 30 September 2020.

We trust that the above is sufficient for your current requirements. Please do not hesitate to contact us if you require any additional information.

Yours faithfully

**BUTLER PARTNERS PTY LTD**

**BRUCE BUTLER**

Senior Principal

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