Witness Statement - Amendment C207 to the Hume Planning Scheme (Sunbury South Precinct Structure Plan)

1. Name and Address

   Mr Slavko Kacavenda

   c/- GHD 180 Lonsdale Street Melbourne

2. Qualifications and Experience
   - BE (Hons) Monash 1980
   - Member: Australian Geomechanics Society (AGS)
   - Professional Experience
     - 2004 – 2017 Principal Geotechnical Engineer, GHD
     - 2002 – 2004 Senior Geotechnical Engineer, GHD
     - 1999 – 2002 Associate Geotechnical Engineer, Geo-Eng
     - 1992 – 2002 Senior Geotechnical Engineer, Geo-Eng
     - 1980 – 1992 Geotechnical Engineer, SECV

3. Areas of Expertise

   I have over thirty years experience in application of geotechnical engineering to civil infrastructure, mining and other projects. I have a wide breath experience in the geotechnical field including investigations, laboratory testing, assessments, design and construction. I am a key member of a number of alliances primarily in the mining industry, providing leadership and technical direction in small to large scale earthworks operations.

4. Expertise to Prepare Report

   I have prepared many reports on geotechnical assessments of earthworks both controlled and uncontrolled, ground improvements, developed technical specifications, modelled post construction settlements and measured actual performance across a range of earth materials. These range from feasibility studies to actual redevelopment projects.

5. Instructions which defined Scope of Report

   I received instructions from Norton Rose Fullbright Australia, legal team, acting for Hi-Quality Quarry Products Pty Ltd and Trantaret Pty Ltd (Hi-Quality) in relation to Hume Planning Scheme Amendment C207, which proposes to incorporate the Sunbury South Precinct Structure Plan into the Hume Planning Scheme to:
   - Review the Amendment and the background materials in my brief
   - Confer with instructing solicitors and counsel where necessary
   - Prepare and expert report regarding the geotechnical issues in relation to proposed development; and
   - Appear before the Panel.

6. Facts, Matters and Assumptions Relied Upon
   - Review of plans and reports
   - Review of documents supplied in the brief by Norton Rose Fullbright Australia
   - My experience relevant to earthworks and site redevelopment assessments

7. Documents to be taken into Account

- GHD report
  - 3133652-19474
- Taylors Plans
  - Proposed Master Plan (Taylors, dated 10 August 2017)
  - Proposed Staging Plan (Taylors, dated 10 August 2017)
  - Design Response Plan (Taylors, dated 10 August 2017)
- Hi Quality Plan
  - Indicative Cut/Fill Scenario (Alluvium, dated 14 August 2017)

8. Identity of Persons Undertaking Work

Slavko Kacavenda with assistance from Marissa Theodorou who provided an overview of the site including historical development as well as cross section through site and typical infill drawings.

9. Summary of Opinions

Hi-Quality proposes program of filling and cut to create additional developable area and facilitate a revised drainage scheme. Whilst a number of challenges have been recognised, with appropriate strategies implemented in the early stages of development these challenges can be successfully mitigated through conventional practices. These practices include zoned fill placement and acceptance criteria under controlled filling and staging.

The substantive portion of my statement is given in the GHD report # 3133652-(19474) attached.

10. My opinions are not provisional except where specifically qualified.

11. The analysis presented in this report is within my area of expertise.

12. I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.

S Kacavenda

14 August 2017

14 August 2017

Lance Ingrams
Divisional Manager
Hi Quality Products
600 Sunbury Road
BULLA VIC 3428

Our ref: 31/33652/19474

Dear Lance

Sunbury South PSP
Hi Quality Development Master Plan Geotechnical Appreciation

1 Introduction

At the request of Hi-Quality Quarry Products Pty Ltd (Hi-Quality), GHD have been appointed to provide geotechnical advice and appraisal of the proposed long-term master plan under consideration. The original 2016 concept has been refined to the Proposed Master and Staging plans dated 11 August 2017 which are attached (See Figures 1 and 2 respectively).

This document presents the key geotechnical aspects relating to proposed revised 2017 development along with the various activities to manage elements of the stormwater/surface water run-off for the Sunbury South PSP and represents an update of the original geotechnical appraisal (GHD ref: 31/33652/259916, dated 23 May 2016.

2 Topographical setting

The site is generally characterised by gentle sloping ground closest to Sunbury road and increasing steepness to the east. Eastern part of the site, generally adjacent to the Emu is occupied by an operating quarry and an operating landfill. Overburden dump from quarrying operation is located in the central part of the site.

A number of natural drainage lines direct bulk of the overland flows to a low point within the site which causes drainage to pond and form a standing water body generally located central to the site (terminal lake). The terminal lake is located west of the current quarry and landfill operation and incorporates a small pipe outlet which directs overflow to Emu Creek.

A number of on-site storage ponds exist within the site Environment Management Plan (August 2011) which manages the stormwater and drainage for the site under Planning Permit 4131.03.

The draft masterplan up for discussion proposes to infill the natural valleys to bring up to platform level and provide a central drainage corridor which accommodates expected overland and upstream flows to discharge to Emu Creek in a controlled and managed manner.

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3 Regional Geological setting

The majority of the site is expected to be underlain by Newer Volcanics (Basalt) with alluvial sediments material in the vicinity of Emu creek, and undifferentiated Ordovician sedimentary rock (Sandstone, Siltstone, Mudstone). The Newer Volcanic geology is likely to compromise shallow bedrock with a soil cover of basaltic clay of intermediate to high reactivity.

4 Proposed Works

To match in with the draft master plan, cut excavations generally less than 10 m (up to 20 m) and filling typically 10 to 15 m (up to 35 m) may be required to prepare development platforms. In the preparation of earthworks platforms it would be necessary to in fill a number of natural gullies and temporarily manage stormwater during the earthworks operation. A central drainage corridor is proposed to accommodate stormwater / flows generated to the south of Sunbury Road and discharge these flows to Emu Creek to the north of the site in a controlled and management manner. Concept plan showing the Indicative Proposed Cut/Fill Scenario including longitudinal section for the proposed waterway is attached (See Figure 3).

5 Challenges

In the assessment of the proposed development the following challenges have been recognised including:

- Deep filling (up to 35 m)
- Redirection of stormwater drainage during filling operations,
- Draining water body or alternatively placing fill in wet conditions,
- Filling adjacent natural hard strata or rock slopes.
- Filling over variable uncontrolled fill (Overburden Dump)
- Bulk excavation of hard strata and rock
- Profiling rock to relatively shallow grades

Whilst the above has been identified as challenges, these are not unique to this particular site and can be managed through conventional engineering solutions and sound earthwork practices. Typical construction strategies to accommodate the challenges above are described in the following sections.

6 Strategy

The common strategies in dealing with the challenges identified above include:

- Staging the works to bring portions of the site on line whilst deeper filling is completed.
- Complete earthworks from lowest elevation working up stream (allows drainage to flow away from new works and won't impound stormwater)
- Maintain natural drainage lines where site / platform levels allow

- Create new temporary drainage lines to allow filling to take place
- Alternating drainage across fill to progressively build up the slope
- Benching into natural slopes
- Over excavation of bedrock abutting new fill and replacement with engineered fill to soften the transition.
- Differentiate fill types for the thickness of fill being considered, (i.e. set criteria for fill to be used in various zones). Such differentiation may include for example :
  - Coarse rockfill in the placement of the first metre of structural fill in areas of wet quarry base.
  - Restricting maximum particle size and fines content in final structural fill zones (say upper 3 to 5 m of placed material in which shallow footings roads and services are to be located),
  - Assign general or alternatively structural fill for bulk filling works below special treatment zones
  - Restriction of max particle size for medium density development or where piles may be considered.
- Provide suitable low permeability and flexible liners and erosion protection as required to:
  - Minimise leakage from Macrophyte areas
  - Minimise leakage from and erosion of temporary construction stage drainage lines
  - Minimise leakage from and erosion of permanent water courses and drainage lines.

Based on current staging plans the general distribution of ground conditions is in the order of the development is:

- Natural ground and minor fill
  - Residential W1 to W8 and W10
  - Employment E2
- Deep Fill
  - Residential W9, W11 to W14
  - Employment E1, E3 and E4

Note: While proposed Domestic and Employment development is over natural landform Employment Stage E4 footprint has largely been disturbed by quarrying activities that currently include overburden dump and land stockpile pad.

A typical cross section through the site along with conceptual bulk earthworks required and practices described above, using on the 2016 concept contours, is shown on Figure 5.

It has been recognised that till such time as fill is brought up to final platform level and before the central drainage corridor comes on line, the current operations will be required to accept stormwater from the development to the South of Sunbury Road and within the site. To this end the current stormwater management practice would direct detention ponds for on-site dust suppression, and where necessary direct excess flows to detention basins or ponds before eventual discharge to Emu Creek to the east (*see Figure 4 item 3, with the 2016 concept plan background.).*

In addition to overall stormwater controls it is likely that temporary stormwater drainage will be required in the filling of natural gullies. Conceptually this can be achieved by creating a temporary drainage channel to one side of the valley, and complete filling till such time as fill has been advanced some height above temporary drainage line, at which point a new temporary drainage line is cut into the new fill as the remainder of the valley is infilled. This practice would then be repeated by alternating temporary drainage across the fill till such time as the fill is complete and brought up to final platform level. This can be demonstrated in sequencing sketches attached to this letter report (*see Figure 6).*

It is expected that the majority of fill will be generated as a requirement to dispose of material from major infrastructure projects. A staged approach to filling would be adopted dependent on which projects come on line and the volumes of fill material generated. The staged approach would consider the time frame in which to achieve primary and secondary settlement which in turn would be informed by trial embankments and settlement monitoring programs.

Presently the residential development land use zone has recognised an excess cut volume which would therefore provide immediate quantities of fill to build up the site and infill valleys. Preliminary platform levels have identified a shortfall in fill material, however, adjusting platform levels during detailed design stages of the project will provide a closer cut / fill balance dependent on which major infrastructure projects come on line generating fill volumes.

Included in construction methodology as development proceeds include:

- Compaction trials to determine optimum thickness of placed layers for compaction plant.
- Method of placement and acceptance of engineered fill
- Determine expected performance criteria (settlement trials)
- Define fill zones on the basis of expected performance criteria

7 Case Studies:

There are a number of case studies and publications involving former quarries which have been re-purposed as developable land for residential and commercial use. Two such case studies have relevance including:

- Assessment of Landfill Site for Residential Development, D.A. Gallagher M.C. Ervin ANZ 2012 Conference Proceedings.
- Settlement Behaviour of Deep Engineered Fill for former Basalt Quarry, Niddrie, Victoria. S. Colls, J Finlayson and D Goad. Australian Geomechanics Vol 45 No. 1 March 2010.

The first referenced case study involves a sand quarry excavated up to 20 m deep in the south eastern suburbs of Melbourne in the late 1970 and early 1980s. Following exhaustion of resources the pit was backfilled predominantly with non-putrescible material most of which was not placed in a controlled manner. Through the construction of trial embankments a reasonable confidence and appreciation of the settlement characteristics of the site was gained. The outcome of the study concluded that based on observations made from the trial embankment program confidence for the development of the site was

provided, subject to specific engineering controls in relation to foundations, pavement design and civil earthworks.

The second case study referenced above is very similar to proposed development, where the former Niddrie Quarry was repurposed for residential development to rehabilitate former uncontrolled fill stockpiles and constructed low medium and high density housing and associated infrastructure on controlled fill up to 35 m thick. Through geotechnical design, assignment of fill types and placement criteria, and settlement monitoring it was possible to reclassify Class P site to Class H. This was based on achieving a characteristic surface movement (made up of components of settlement and shrink/swell of the engineered fill) of less than 70 mm beneath shallow footings.

8 Concluding remarks

The proposed draft masterplan has identified the potential to provide residential and employment land use zones in the redevelopment of the quarry site and adjoining property. A central drainage corridor generally divides the residential and employment zones and being located central to the site provides opportunity to serve both residential and employment zones in the management and discharge of stormwater.

Whilst a number of challenges have been recognised, with appropriate strategies implemented in the early stages of development these challenges can be successfully mitigated through conventional practices. These practices include zoned fill placement and acceptance criteria under controlled filling and staging.

Kind Regards

Slavko Kacavenda
Principal Geotechnical Engineer
03 5136 5855

Attachment: A – Figures

Appendix A

Figures

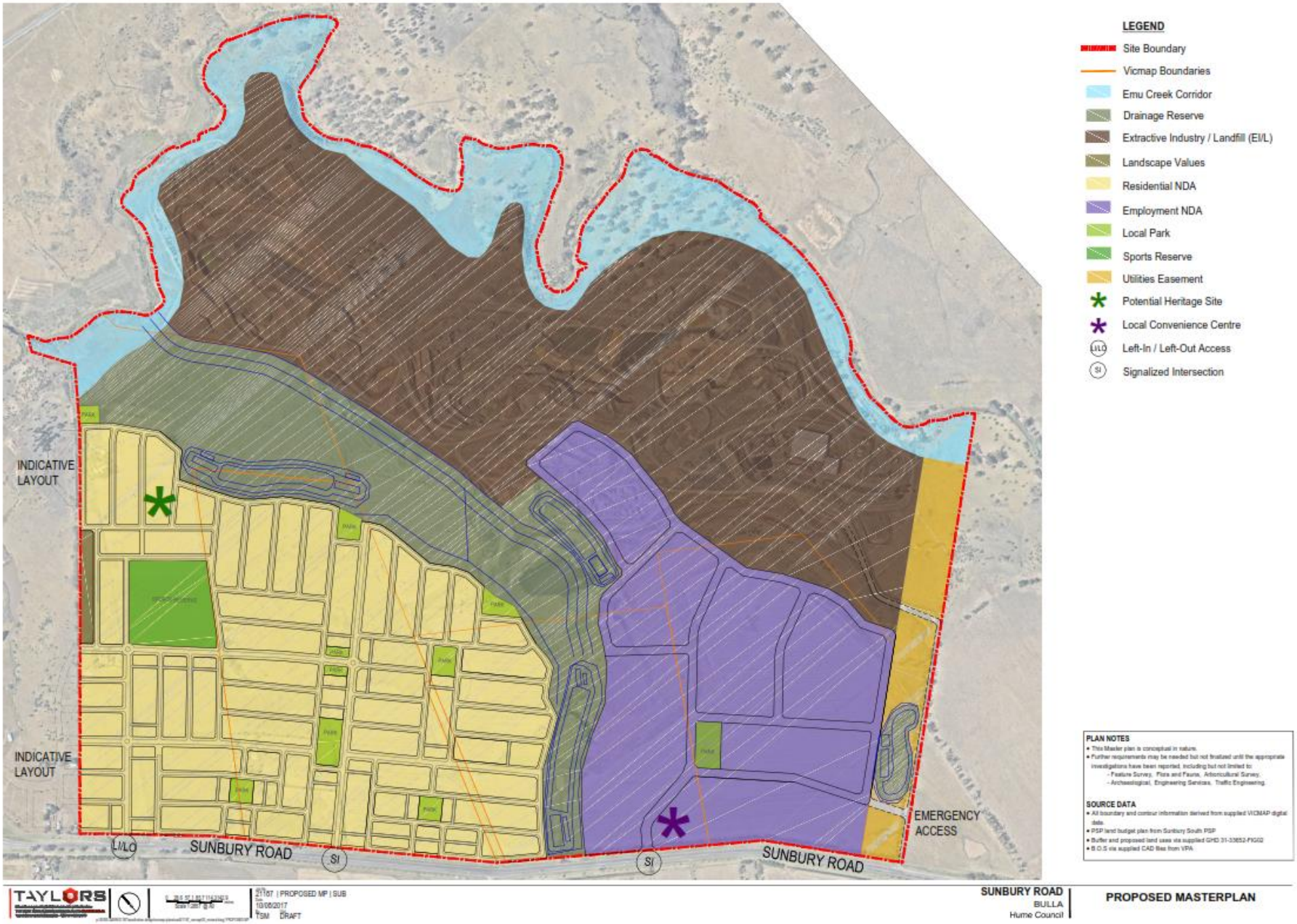


Figure 1 Hi-Quality Development Land Master Plan

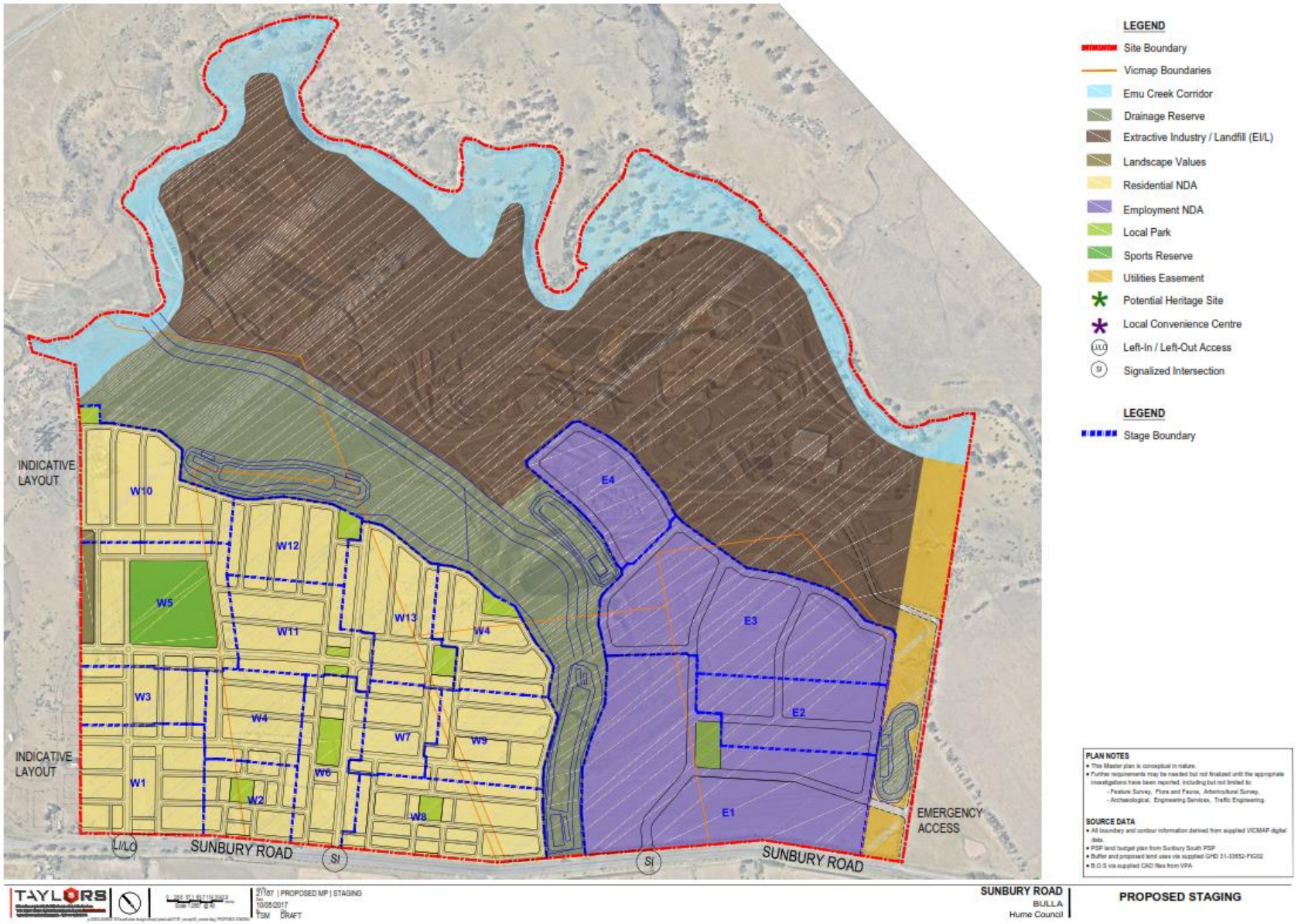


Figure 2 Hi-Quality Development Land Staging Plan

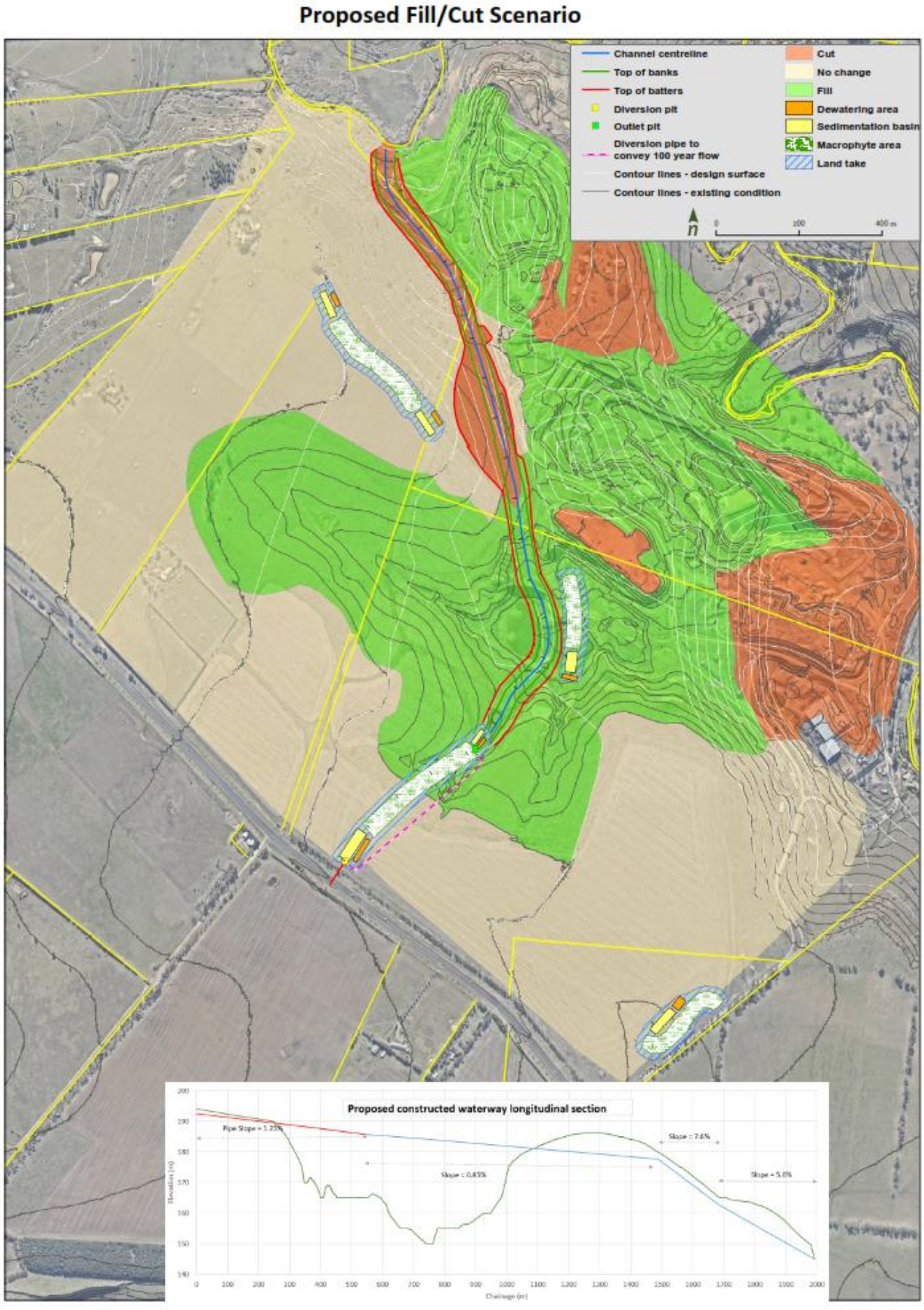


Figure 3 Hi-Quality Indicative Cut/Fill Scenario

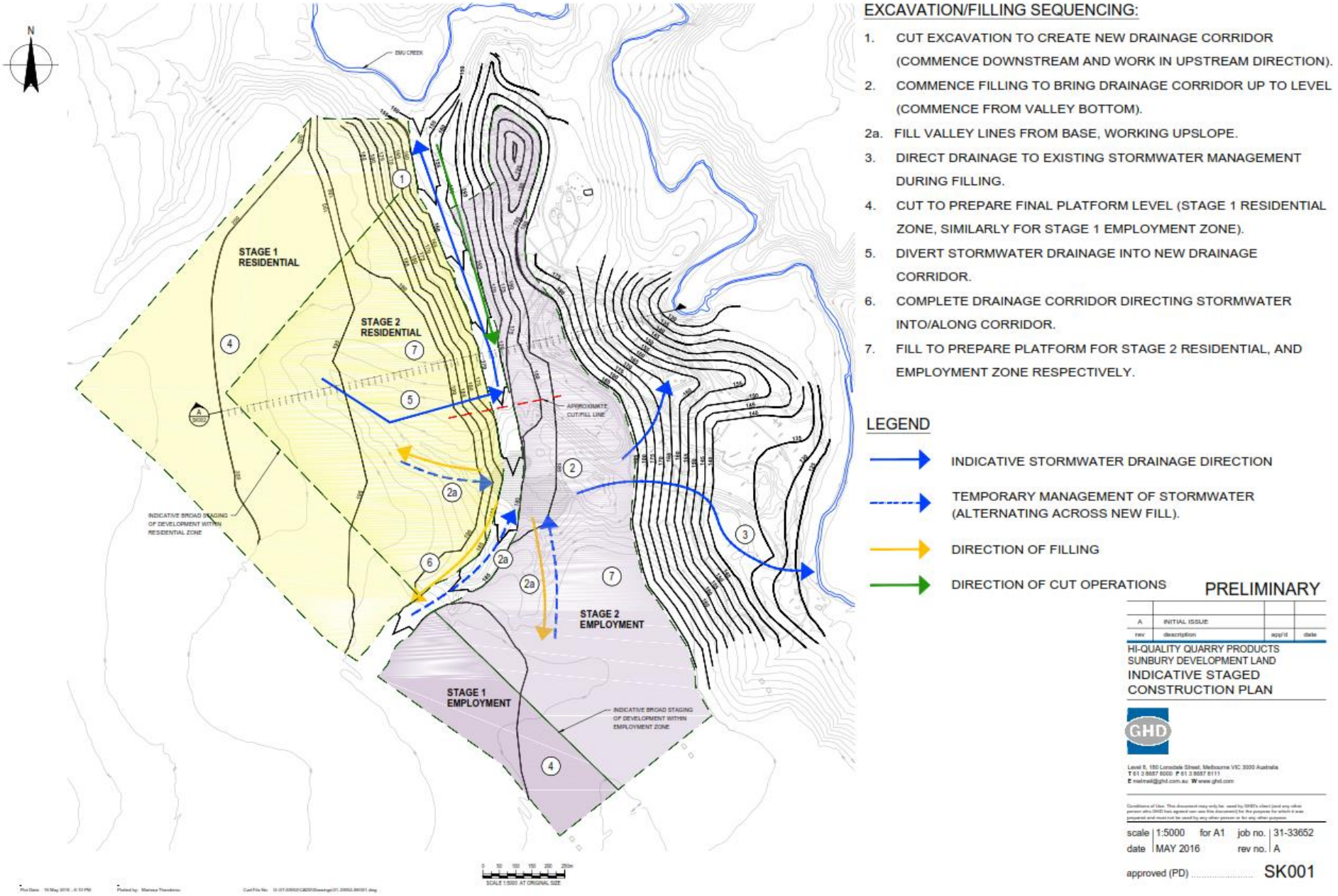


Figure 4 Hi-Quality Indicative 2016 Stage Construction Plan

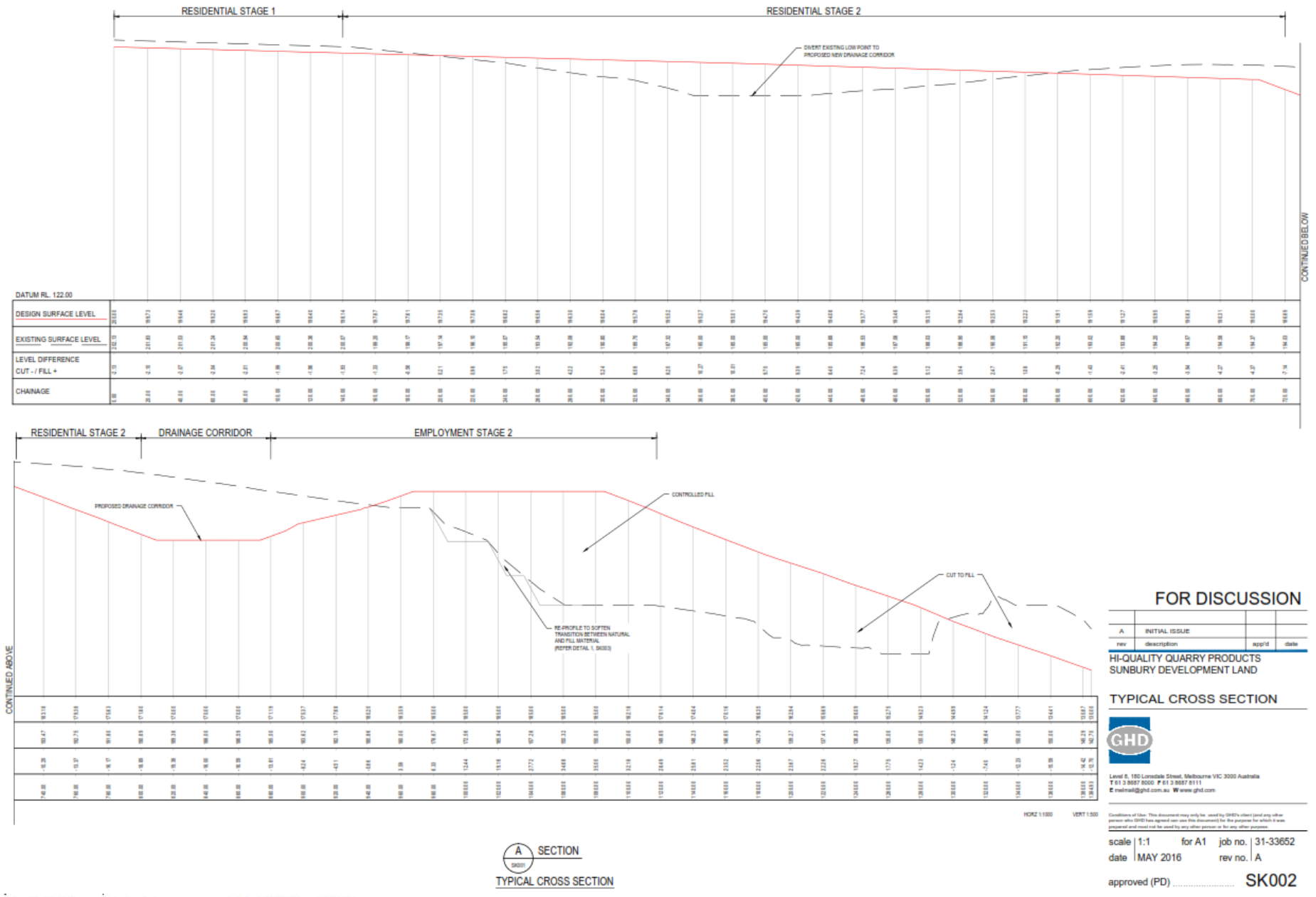
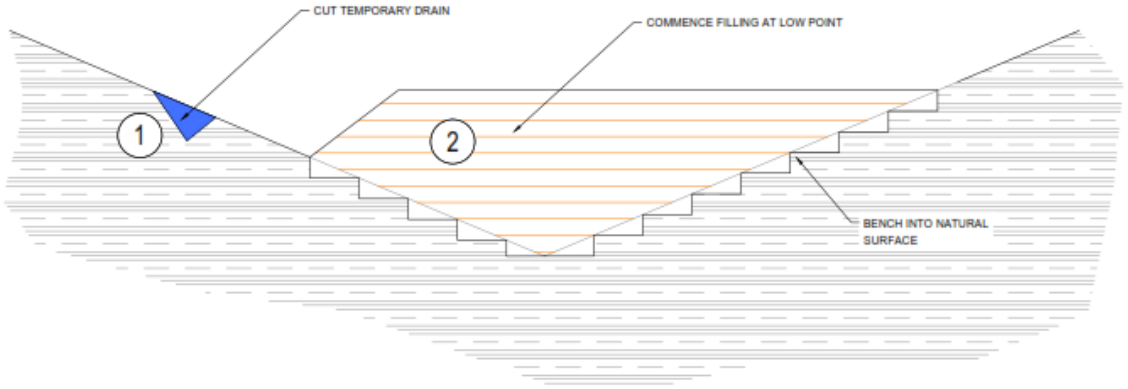
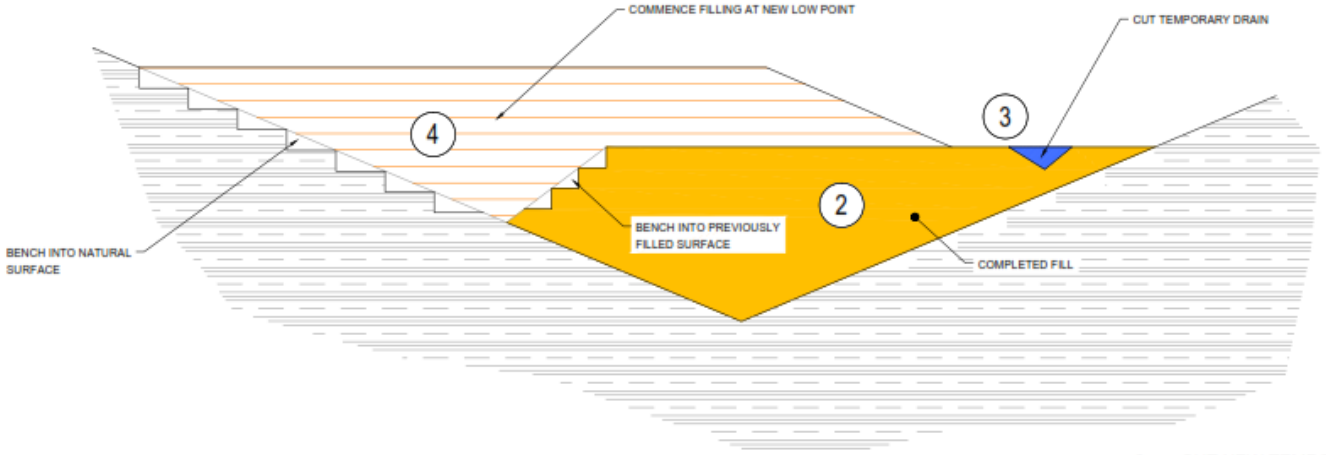


Figure 5 Hi-Quality Indicative 2016 Typical Cross Section



TYPICAL FILLING DETAIL - PHASE 1

1. CUT TEMPORARY DRAINAGE LINE
2. FILL IN VALLEY IN CONTROLLED LAYERS FROM LOWEST ELEVATION/VALLEY FLOOR



TYPICAL FILLING DETAIL - PHASE 2

3. CUT NEW TEMPORARY DRAINAGE AND DIVERT STORMWATER AT BACK OF FILL/NATURAL SLOPE.
4. BRING NEXT LEVEL OF FILL UP BEYOND PREVIOUS STAGED FILLING LEVEL.

FOR DISCUSSION

rev	description	appr'd	date
A	INITIAL ISSUE		

HI-QUALITY QUARRY PRODUCTS
SUNBURY DEVELOPMENT LAND

TYPICAL INFILL DETAILS

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Figure 6 Hi-Quality Indicative 2016 Typical Infill Details