TAYLORS

Urban Development | Built Environments
Infrastructure | Engineering and Project Management

ENGINEERING EVIDENCE STATEMENT

SUNBURY SOUTH PSP &
35-60 FOX HOLLOW DRIVE, SUNBURY

PREPARED BY ANDREW MATHESON FOR
ASIA-PACIFIC PROPERTY GROUP PTY LTD
AUGUST 2017

Building 8, 270 Ferntree Gully Road, Notting Hill, 3168 | (03) 9501 2800 | tds@taylorsds.com.au | Certified to ISO 14001, ISO 9001 & AS/NZS 4801

Table of Contents

1. Preliminary Information 3
1.1 Name and Address 3
1.2 Education and Experience 3
1.3 Area of Expertise 3
1.4 Expertise to Make the Report 3
1.5 Instructions 3
1.6 Report Preparation 3
1.7 Identity of Other Persons Relied upon in this Report 3
1.8 Summary of Opinions 4
1.9 Provisional Opinions Not Fully Researched 4
1.10 Matters Outside of My Expertise 4
1.11 Practice Note Declaration 4
2. Introduction 5
3. Definitions 5
4. Summary 6
5. Break of Slope 8
6. PSP Exhibited Connector Boulevard 12
7. Melbourne Water Developer Services Scheme 16
8. Conclusion 19
9. Appendix A – Feature and Level Survey 20
10. Appendix B – Break of Slope Cross Section (12d Model®) 21
11. Appendix C - Connector Boulevard 12d Model® Outputs 27
12. Appendix D – Taylors WL-27 Revised Concept Wetland Design 32

1. Preliminary Information

1.1 Name and Address

Andrew Matheson, Civil Engineer.

Taylors Development Strategists 8/270, Ferntree Gully Road, Notting Hill Vic 3168

1.2 Education and Experience

My educational qualifications and membership of professional associations are as follows:

- *Bachelor of Engineering (Civil), 2005, Swinburne University*

My professional experience includes 13 years experience as a Civil Engineer, comprising:

- *2 years, Manager & Engineering Strategist, Taylors Development Strategists*
- *9 years, Engineer & Senior Engineer, GHD*
- *2 years, Under Graduate Engineer, Land Management Surveys*

1.3 Area of Expertise

I have been involved in the land development and civil infrastructure industries for thirteen (13) years and spent most of that time practising in the field of Civil Engineering and specialising in the design and delivery of rural, urban, residential and industrial roads, drainage, sewer and water main infrastructure and earthworks for land development projects.

1.4 Expertise to Make the Report

I have considerable experience in the engineering considerations for associated projects of this nature having delivered subdivision infrastructure and major road and drainage infrastructure throughout metropolitan Melbourne for approximately 13 years in my capacity as a Civil Engineering Consultant and Project Manager. My Curriculum Vitae is attached.

1.5 Instructions

I was instructed by Asia-Pacific Property Group Pty Ltd to prepare a report and present my opinion on the engineering design and drainage strategy proposed in the Sunbury South PSP.

1.6 Report Preparation

In the preparation of this report I have reviewed:

- The submission to the VPA prepared on behalf of Asia-Pacific Group Pty Ltd;
- The Exhibited Sunbury South PSP and associated reports
- The VPA revised Break of Slope alignment
- The VPA Part A Submission (August 2017)
- The revised Melbourne Water draft Developer Services Scheme;
- Site Inspections

1.7 Identity of Other Persons Relied upon in this Report

I was assisted in the preparation of this report by additional members of staff acting under my express instructions. The opinions in this report, however, remain my own.

1.8 Summary of Opinions

My opinions in relation to this matter are attached.

1.9 Provisional Opinions Not Fully Researched

To the best of my knowledge all matters on which I have made comment in this statement have been appropriately researched or are based on my knowledge and experience. The statement does not contain any provisional opinions that have not been fully researched.

1.10 Matters Outside of My Expertise

To the best of my knowledge, none of the matters on which I have made comment in this statement are outside my area of expertise. To the best of my knowledge the report is complete and does not contain matters which are inaccurate.

1.11 Practice Note Declaration

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

I have read the Guide to Expert Evidence and agree to be bound by it.

Signature:  Date: 12 August, 2017

2. Introduction

I have been instructed by Asia-Pacific Property Group Pty Ltd to provide my expert opinion on the matters raised relating to the Sunbury South PSP.

I have been asked to undertake a review of the exhibited PSP with respect to:

- The 'break of slope' line as defined in the exhibited PSP and by the VPA
- The proposed alignment of the PSP exhibited Sunbury Ring Road Southern Link (Connector Boulevard), including the proposed changes to the Fox Hollow Drive / Ring Road Intersection; and
- The Melbourne Water developer services scheme drainage strategies that affect the Subject Land.

This Statement has been structured in a manner that responds to each of the above items and a detailed assessment/response can be referred to as follows:

Section	Issue/s Considered
Section 5.	Break of Slope
Section 6.	PSP Exhibited Connector Boulevard and Intersection
Section 7.	Melbourne Water Revised Draft Developer Services Scheme

3. Definitions

VPA	Victorian Planning Authority
PSP	Sunbury South Precinct Structure Plan
MWC	Melbourne Water Corporation
DSS	Developer Services Scheme
WSUD	Water Sensitive Urban Design
ICP	Infrastructure Contribution Plan
DELWP	Department of Environment, Land, Water and Planning
GGF	Growling Grass Frog

4. Summary

The Subject Land comprises of 77.11 hectares of land and is made up of eight (8) individual titles:

95 Watsons Rd – Lot 5 PS404987;

35 Fox Hollow Drive – Lot 18 PS617530;

37 – 43 Fox Hollow Drive – Lot 17 PS617530;

45 Fox Hollow Drive – Lot 6 PS404987;

50 Fox Hollow Drive – Lot 14 PS404987;

55 Fox Hollow Drive – Lot S6 PS404987;

60 Fox Hollow Drive – Lot 13 PS404987; and

65 Fox Hollow Drive – Lot 12 PS404987.

The Subject Land location and title details are provided below in Figure 1.

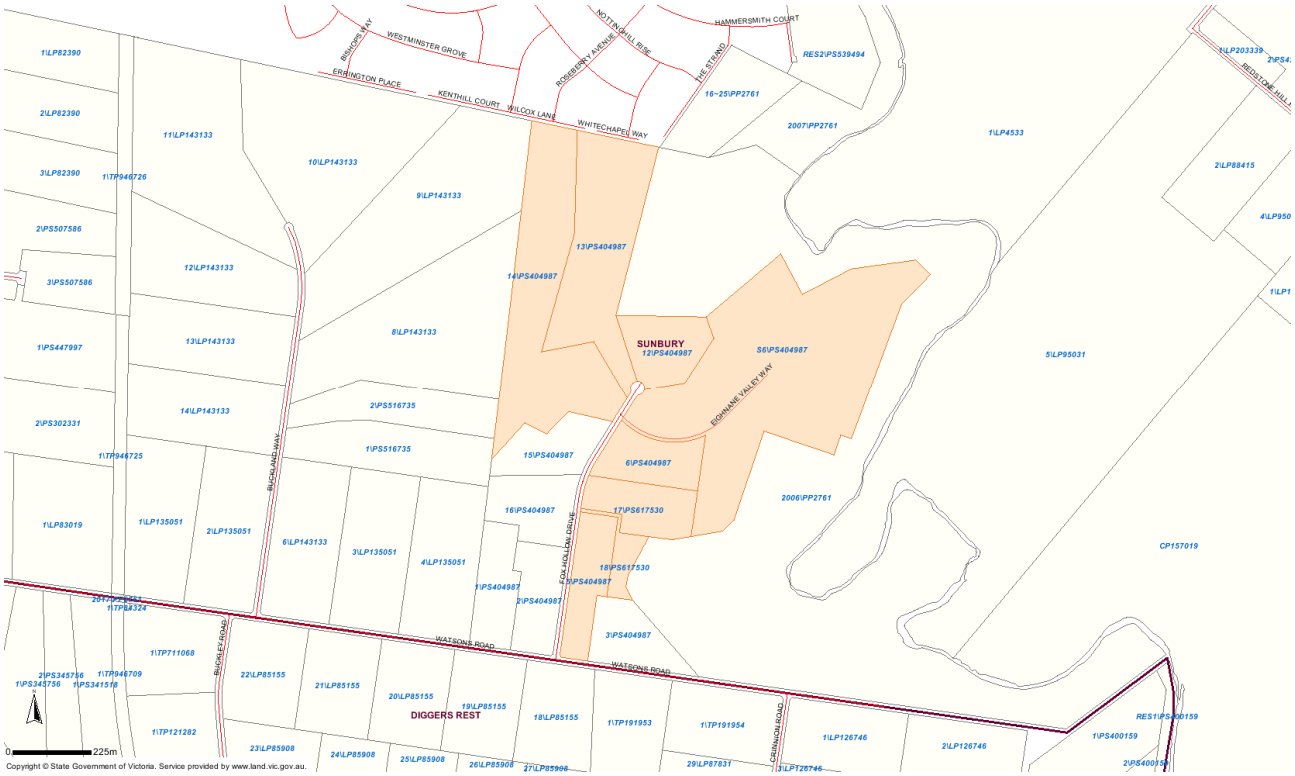


Figure 1 – Subject Land Locality Plan

The Sunbury South PSP proposes the construction of the Sunbury Ring Road Southern Link through the Subject Land ultimately connecting Sunbury Road to Vineyard Road. The Southern Link, also referred to as the Connector Boulevard, has a reserve width of 34 metres, divided carriageway, on-street parking, off-street cycle paths and pedestrian paths.

It is my opinion that the proposed alignment proposed in the exhibited PSP can be re-designed to provide better outcomes for urban design, earthworks disturbance and construction cost. I have reviewed the PSP exhibited alignment and undertaken a comparative design on an alternative alignment that utilises the natural terrain to reduce earthworks. The alternative design also provides better urban design outcomes and development potential on the Subject Land. Finally, the alternative design provides potential savings to the Infrastructure Contribution Plan for Sunbury South.

Melbourne Water has proposed that the Subject Land be encumbered by 3 large constructed wetlands which are mostly located in land which can be developed for residential uses. The drainage strategy proposed in the PSP has been based upon the use of traditional constructed wetlands however, there are several alternative treatment systems which can be utilised to achieve the "Best Practice" objectives which also responds to the constraints of the land (presence of underlying rock, topography, etc). Benefits of using alternative WSUD treatment systems (Bio-retention systems) include the flexibility to integrate treatment facilities with existing vegetation and environs, smaller reserve footprints and greater construction sustainability.

It is my opinion that the drainage strategy proposed in the MWC DSS and PSP should provide greater flexibility, consider innovation and technology, and provide greater commercial viability for landholders. It is on that basis that it is recommended that the following key amendments be made to the existing strategy:

a. Provide flexibility in the use of other WSUD technology and enable the use of bio-retention cells, or other appropriate technology, in lieu of traditional constructed wetlands;

b. Provide flexibility in orientation of water treatment reserves to better integrate with the natural terrain of the land;

c. Provide flexibility in the location of water treatment reserves to better integrate with developable area and minimise poor urban design outcomes.

It is my opinion that greater flexibility could be provided by adding a note to Plan 11 in the PSP stating that "confirmation of size and final location of wetland reserves is subject to functional and detailed design approval to the satisfaction of Melbourne Water".

5. Break of Slope

Asia-Pacific Group has instructed me to review the break of slope line as defined in the exhibited PSP and the revised break of slope line as provided by the VPA in May 2017. I understand that the break of slope was been defined by the VPA based on a 'virtual' site inspection. The exhibited PSP defines the break of slope on Plan 3 as the "setback required for bush fire management, protection of visual and landscape qualities, and linear trails". The PSP cross section, 'Local Access Street Level 1 (16m)' cross section, allows for residential development on land as steep as a 17.5% gradient.

To assess the break of slope I have overlayed the supplied VPA linework on to the feature and level survey conducted by Taylors on the 1st August 2016. A copy of the feature and level survey is provided in Appendix A. I have examined the feature and level survey for abrupt changes in gradient and for areas that exceed 17.5% gradient in proximity of the VPA supplied break of slope line.

My analysis of the feature and level survey revealed the need to highlight several areas on the Subject Land which show no discernible break of slope adjacent to the VPA alignment. I have summarised these areas below and identified them in Figure 2 below.

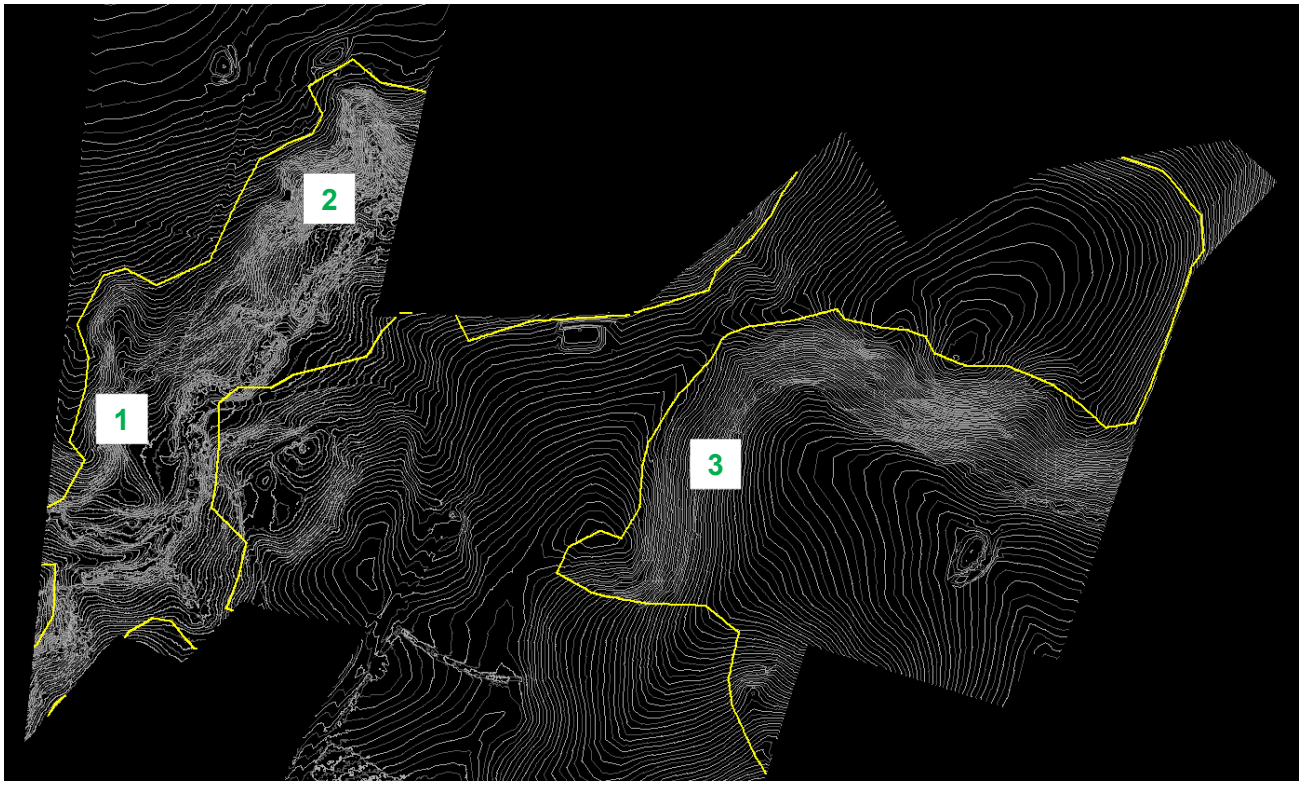


Figure 2 – VPA Supplied Break of Slope and Areas of Interest

Area 1

I have reviewed Area 1 and overlaid the VPA supplied Break of Slope alignment onto the Taylors feature and level survey using 12d® Model software; refer Figure 2 below. Taylors and Asia-Pacific Group see potential for a 16-metre-wide, Level 1 Access Street adjacent to the western boundary of the site with connectivity to the Connector Boulevard Road. This connection would eliminate the reliance on neighbouring properties for access to the northern developable areas of the Subject Land. The VPA break of slope line shows a minimum width of 11 metres between the site boundary and the break of slope. When compared to the feature survey, the minimum width is 24 metres to an actual significant change in gradient as can be seen by the contour information provided in Figure 2 below. It is my opinion, that on average, the VPA Break of Slope line has been inset approximately 10 metres too far into the developable area. Cross Sections shown in Figure 3 have been provided in Appendix B.

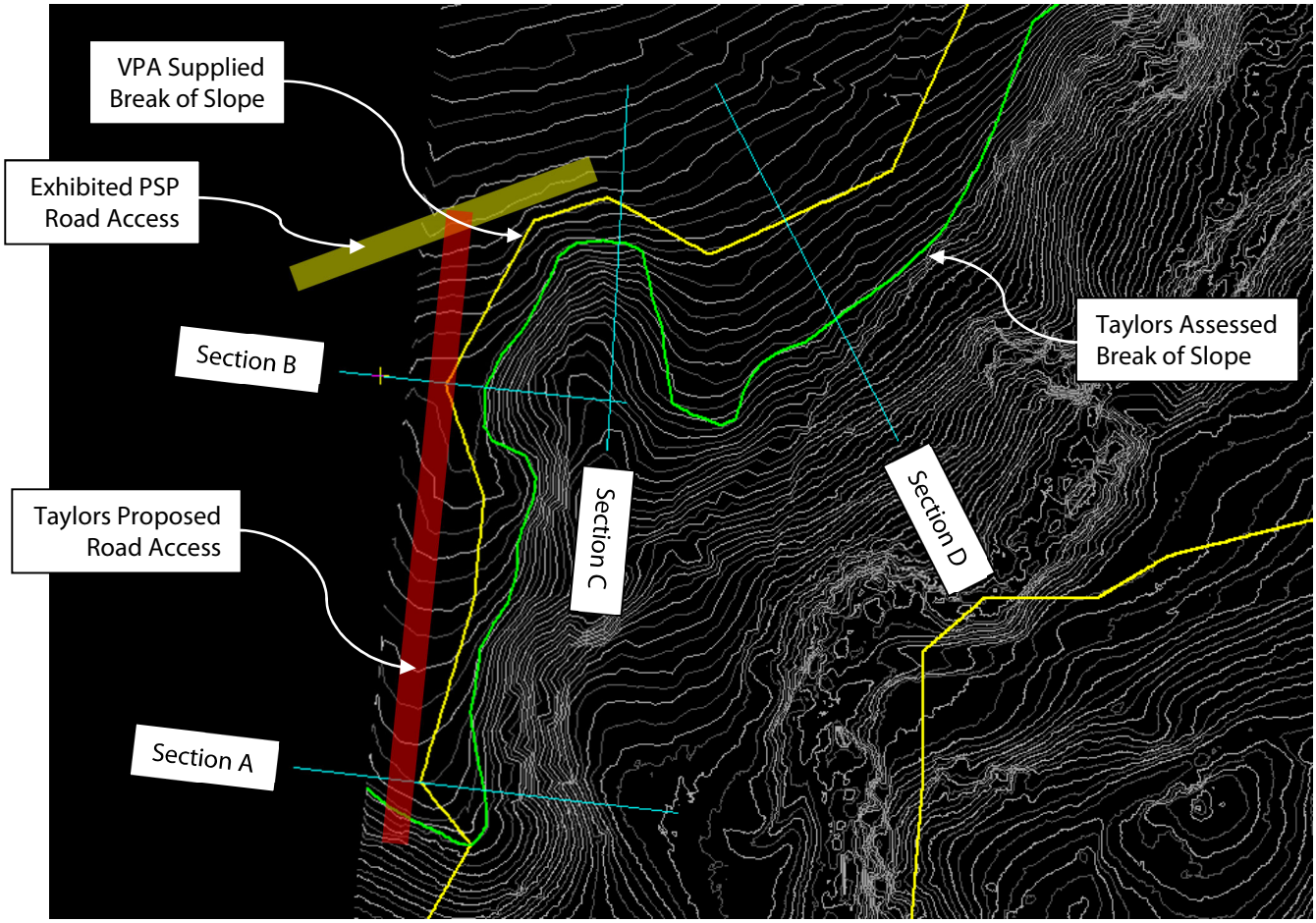


Figure 3 – Area 1 Break of Slope Comparison

Area 2

I have reviewed Area 2 and overlaid the VPA supplied Break of Slope alignment onto the Taylors feature and level survey using 12d® Model software; refer Figure 3 below. It is my opinion that, on average, the VPA Break of Slope line has been inset approximately 18m too far into developable land. Cross Sections shown in Figure 4 have been provided in Appendix B.

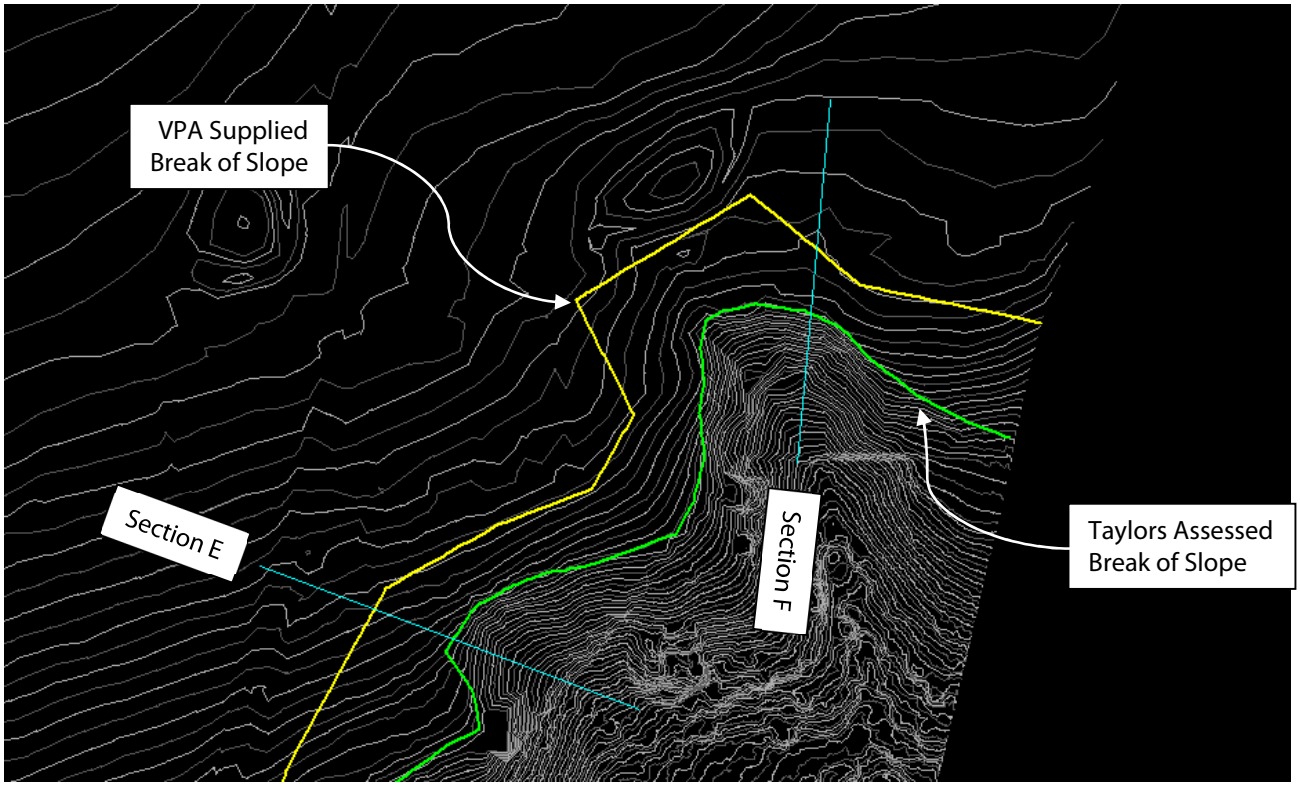


Figure 4 – Area 2 Break of Slope Comparison

Area 3

I have reviewed Area 3 and overlaid the VPA supplied Break of Slope alignment onto the Taylors feature and level survey using 12d® Model software; refer Figure 4 below. Taylors see potential in relocating the Sunbury Ring Road Southern Link to this break of slope to utilise the flatter terrain that it offers and minimise earthworks and construction cost. The relocation of the Ring Road is discussed in detail in Section 6. It is my opinion that, on average, the VPA Break of Slope line has been inset approximately 12m too far into developable land. This will negate the benefits of relocating the Ring Road as explained in Section 6. Cross Sections shown in Figure 5 have been provided in Appendix B.

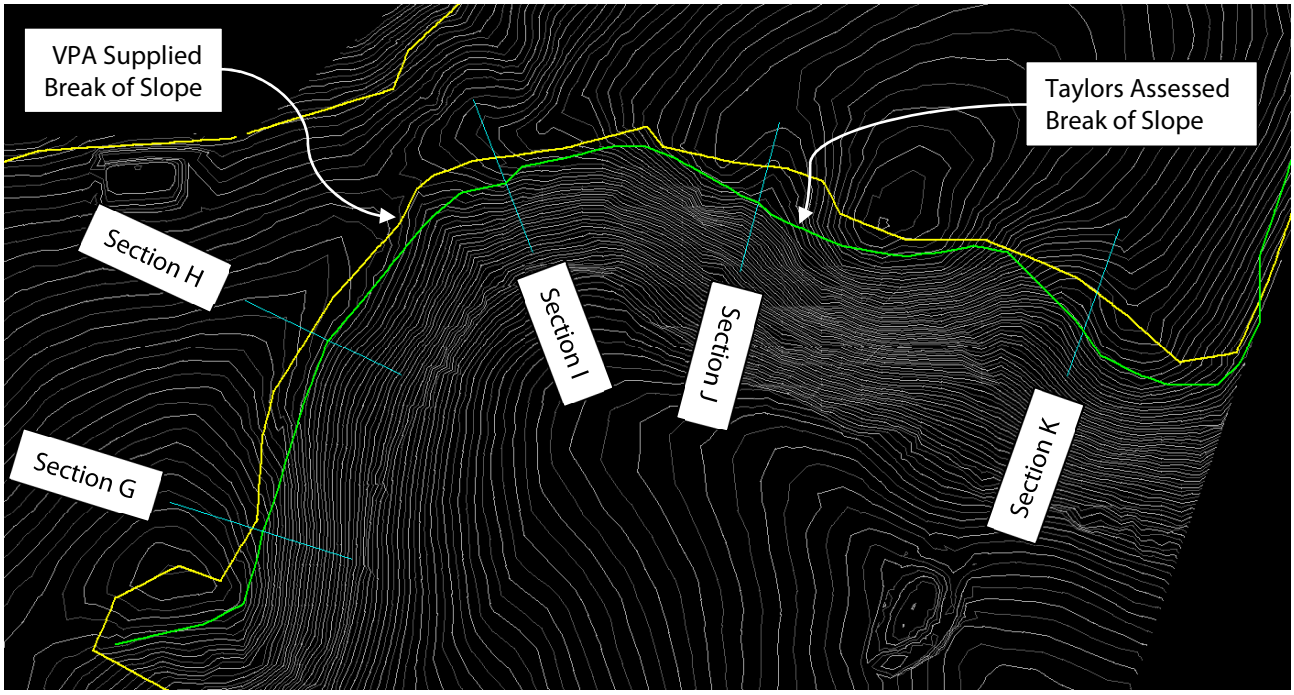


Figure 5 – Area 3 Break of Slope Comparison

Upon review of the feature and level survey plan, and analysis of the VPA provided Break of Slope, it is my opinion that the VPA Break of Slope line has been incorrectly located and that the Break of Slope location which I have identified, by scientific analysis, should be adopted.

6. PSP Exhibited Connector Boulevard

Asia-Pacific Group has instructed me to review the alignment of the Sunbury Ring Road Southern Link, which has been designed as a 34-metre-wide Connector Boulevard in the Sunbury South Precinct Structure Plan, with the view of identifying the advantages for amending the alignment to that presented by the Asia-Pacific Group masterplan. The Connector Boulevard provides a strategic transport link between Sunbury Road and Vineyard Road alleviating traffic congestion through the centre of Sunbury.

In my opinion, the exhibited PSP alignment for the Connector Boulevard is inefficient. The exhibited alignment pass through land with a significant cross slope. The natural cross-fall along the exhibited alignment averages 1v : 10h or a grade of 10%. Across a 34-metre-wide road reserve, this amounts to 3.4 metres of elevation difference from one side to the other. This difference in elevation must be resolved by either extensive battering or retaining walls. By altering sections of the exhibited alignment to avoid these steeper cross falls, the earthworks component of the Connector Boulevard can be reduced, thus reducing construction and ICP costs. By utilising the existing crest adjacent to the conservation reserve, the slope across the road reserve is greatly reduced. To test these assumptions, I have prepared two designs, the first following the exhibited PSP alignment, and an alternative design utilising the natural terrain as describe above.

Methodology

- Review Taylors prepared feature and level survey information;
- Site inspection, including walk through of both VPA and Asia-Pacific Group road alignments;
- Model road centrelines for the VPA and Asia-Pacific Group road alignment in 12d software both horizontally and vertically;
- Apply PSP Exhibited 34 metre wide Connector Boulevard road template (with cut/fill batters at 1v : 5h);
- Volumetric analysis for earthworks calculated by 12d for each alignment;
- Take off 2d quantities for both the VPA and Asia-Pacific Group alignments in AutoCAD;
- Prepare bill of quantities for both alignments with current industry rates for construction items.

Assumptions

- Road Design levels at Harpers Creek is similar for both models resulting in minimal changes to culvert design, therefore cost of culvert excluded from comparison;
- No road grades to exceed 8%;
- Road Design levels and grade at Jacksons Creek is similar for both models. Therefore, no impact to the bridge design over Jacksons Creek and thus bridge excluded from cost comparison;
- Design for Intersection of Fox Hollow Drive & Collector Boulevard is similar for both models. No impact to intersection design, therefore excluded from cost comparison.
- Fox Hollow Drive estimated to cost $2,800 per lineal metre, excluding intersections. Fox Hollow Drive is an ICP funded road.

Results

- Exhibited PSP Road Length = 1,200 lineal metres;
- Taylors Road Length = 1,260 lineal metres;
- The Taylors Road design having additional 60 lineal metres of length results in more pavement area however is more efficient in earthworks design reducing total excavation volume by approximately 8,500 cubic metres. The total cost of the Taylors alignment, in isolation, is marginally higher than the exhibited PSP alignment, however the location of Taylors' Fox Hollow Drive & Collector Road intersection is further south than exhibited PSP alignment resulting 41 lineal metres less road length in Fox Hollow Drive;
- The Taylors revised alignment straightens the road alignment on approach to the proposed bridge over Jacksons Creek;
- Exhibited Fox Hollow Drive Length = 876 lineal metres;
- Taylors Proposed Fox Hollow Drive Length = 835 lineal metres;
- Reduced earthworks at Fox Hollow Drive / Connector Boulevard intersection, see below.
- It is estimated that the Taylors proposed alternative alignment will result in a reduction of approximately $134,000 to the total construction cost.

Outputs from 12d® Model, for each alignment, have been included in Appendix A

Item	PSP Exhibited	Taylors Alternative
Connector Road Preliminaries	$46,500	$46,500
Connector Road Earthworks	$2,484,220	$2,329,668
Connector Road Pavement & Drainage	$2,399,762	$2,549,765
Connector Road Utilities	$342,000	$355,000
Connector Road Signage & Linemarking	$205,000	$215,000
Connector Road Total Cost	**$5,477,482**	**$5,495,923**
Fox Hollow Drive Total Cost	**$2,452,800**	**$2,338,000**
Additional Intersection Earthworks	**$38,000**	**Nil**
Total ICP Cost	**$7,968,282**	**$7,833,923**
Difference		**- $134,359**

Table 1 - Summary of Engineering Opinion of Cost

It is my opinion that the revised alignment for the Connector Boulevard is generally in accordance with the exhibited PSP alignment, and achieves the objectives of providing connectivity between Sunbury Road and Vineyard Road while adhering to Austroads design guidelines for urban roads. The revised alignment also has the added benefit of reducing the ICP costs.

It is also my opinion that the intersection of the Connector Boulevard and Fox Hollow Drive as presented in the Asia-Pacific Group masterplan leads to better engineering outcomes. The revised Connector Boulevard design moves the alignment further south and onto an existing plateau that has been created for the existing court-bowl. By moving the intersection south to this plateau, the revised design eliminates approximately 41 lineal metres of road length, and also approximately 1,900 cubic metres of excavation that would be required to cut through the plateau; Refer Figure 6 below.

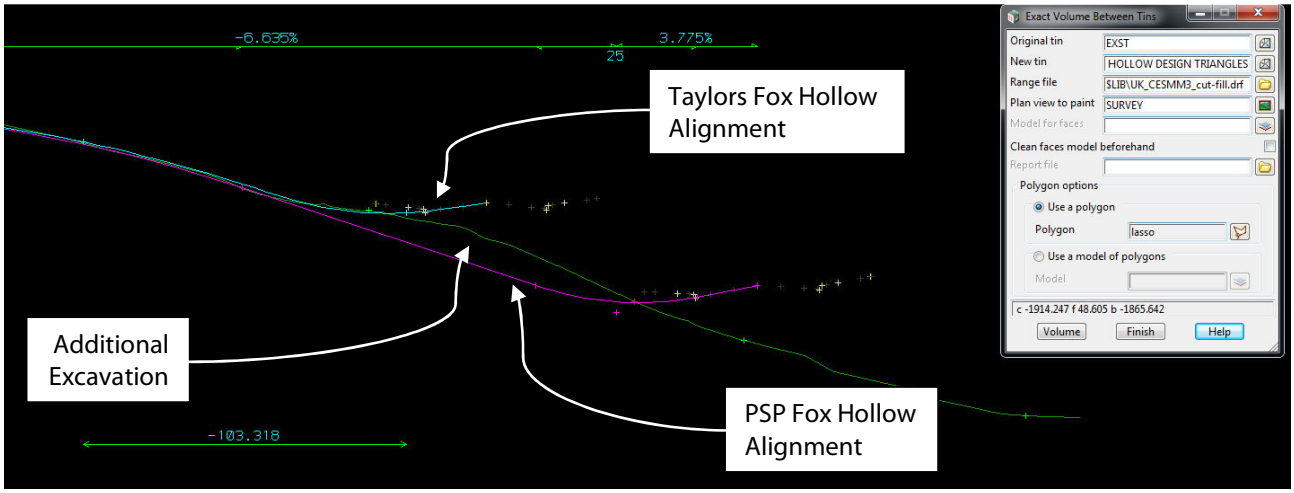


Figure 6 – Fox Hollow Drive / Connector Boulevard Intersection Grading

I have also reviewed the proposed Subject Land masterplan and understand that the Fox Hollow Drive / Connector Boulevard intersection intends to utilise the existing road reserve required for the existing court-bowl on Fox Hollow Drive. This proposal will eliminate the requirement for road closures and consolidation of titles.

7. Melbourne Water Developer Services Scheme

I have reviewed the revised draft Melbourne Water Developer Services Scheme as provided by the VPA on 27th June 2017. It is my opinion that Melbourne Water and the VPA should permit a degree of flexibility when the functional and detail designs for the stormwater treatment systems are presented for approval by Asia-Pacific Group. There are several factors in my opinion that require design flexibility when compared to the presented MWC draft DSS drainage reserves;

- Orientation, Shape and Integration with Terrain – The orientation and shape of the MWC draft DSS wetlands could be optimised during functional and detailed design phases to better integrate with the natural terrain of the Subject Land. The design phase of the wetlands will benefit from a feature and level survey of the Subject Land, providing more detailed surface level information than was available to MWC when preparing the draft DSS. This will reduce the extent of earthworks battering required for the wetland construction resulting in reduced construction costs, reduced footprint for the infrastructure and reduced maintenance costs incurred by MWC and/or Hume Council.

  The current placement of wetlands within the MWC draft DSS, in my opinion, leads to poor land development outcomes. An example of this is wetland WL-27 which has been placed in a narrow gully immediately above a section of the Jacksons Creek conservation area which is proposed by the Department of Environment, Land, Water and Planning (DELWP) as Growling Grass Frog (GGF) habitat area.

  Upon review of the exhibited MWC draft DSS, wetland WL-27 has a very large reserve area, and when the areas of 'landscape values' are added, it results in a large reduction of net developable area. Table 9 in the exhibited PSP identifies WL-27 as having an area of 2.91 hectares. It should be noted that the developable area in the catchment serviced by WL-27 is only 5.4 hectares, a catchment-to-wetland ratio of 50% when compared to a normal expectation of 3 to 5%.

  By relocating the wetland to flatter terrain, the overall size of the wetland can be reduced and earthworks minimised. A requirement of Melbourne Water is to achieve batter slopes no steeper than 1m vertical to every 5m horizontal (1v:5h) or 20% gradient. This results in improved safety and ability to maintain landscapes. The natural slope within the gully is on average 1v in 6h or a gradient of approximately 16.67%. A 1v:5h batter slope from a 1m high embankment or dam wall would require approximately 30 metres of horizontal distance before it intersects the 1v:6h gully slope. The land within the conservation zone has a flatter at a slope of 1v in 15h, or a gradient of approximately 6.67%. The same scenario of a 1m high embankment of dam wall would only take approximately 7.5 metres of horizontal distance before it intersects the 1v:15h terrain above the break of slope line.

This is a reduction of approximately 22.5 metres of batter length which when applied to the whole wetland would result in a large reduction of drainage reserve area. Figures 7 & 8 below show examples of fill and cut slope and the effect of steep terrain.

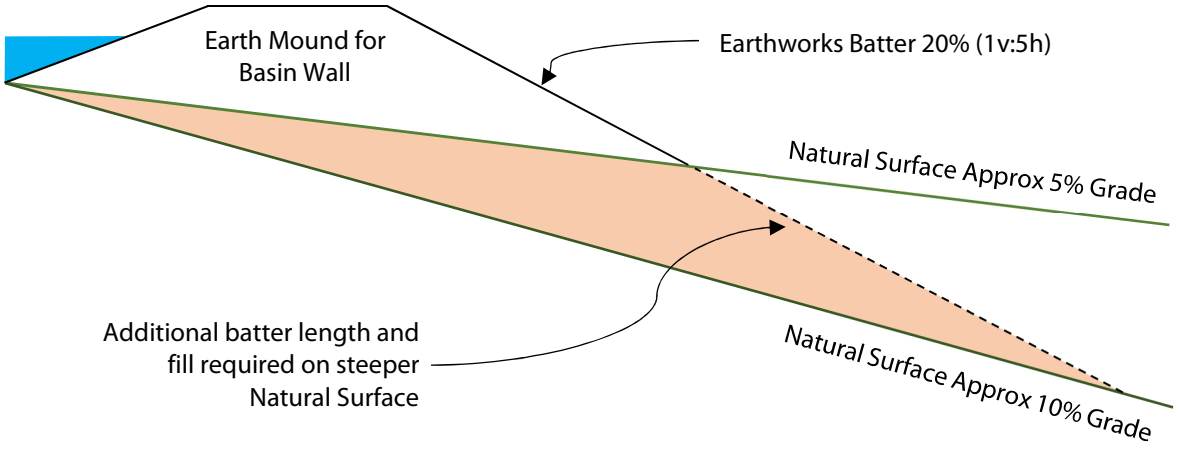


Figure 7 – Earthworks Fill Batter Example

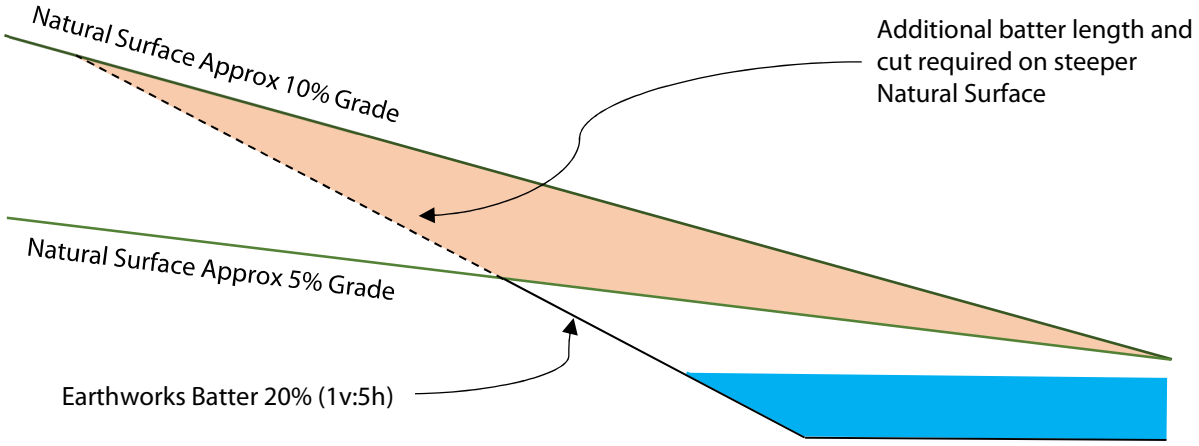


Figure 8 – Earthworks Cut Batter Example

It is my opinion that by relocating WL-27 to the flatter terrain within the conservation zone, a significant reduction in drainage reserve size and earthworks disturbance to the natural terrain can be achieved. The comparison design that I have prepared to test these assumptions is provided in Appendix B. The re-design of WL-27 has resulted in an overall Wetland reserve size of 0.95 hectares; a reduction of 1.96 hectares. This is a catchment-to-wetland ratio of 7.9%.

The reduction in size of the drainage reserve also has large implications on the ongoing maintenance cost that will be incurred by Hume City Council. Upon construction of wetland WL-27, the ongoing maintenance and management of the wetland will be transferred from Melbourne Water to Hume City Council. It is my opinion that the reduction of 1.96 hectares of reserve area by the alternative design will reduce landscape maintenance, grass slashing and weed removal costs significantly.

Further, I understand that Mr Gary Walsh and Mr Aaron Organ will present evidence on the following benefits of co-locating wetland WL-27 inside the DELWP conservation zone;

- More sustainable treated water volume for frog habitat ponds due to increased impervious area;
- Cost sharing of access and maintenance paths into conservation area and wetland infrastructure;
- Removal of weed species within the conservation area;
- Increased frog wetland habitat and a reduction of terrestrial habitat;

It is my opinion that by relocating WL-27 further north along the natural gully, into the DELWP conservation reserve, a significant reduction of drainage reserve size, construction and maintenance cost can be achieved, while providing benefit to the Growling Grass Frog habitat area. A concept functional layout plan for the proposed co-location of Wetland WL-27 into the DELWP conservation zone has been provided in Appendix D.

- Only Traditional Wetlands Considered – It is my understanding that the MWC draft DSS proposes only traditional wetland water treatment systems be considered within their strategy. It is my opinion that alternative, proven, water quality treatment systems should be considered for the smaller wetlands such as WL-26. It is my opinion that for these smaller areas consideration of the implementation of a bio-retention system would reduce the overall treatment area and drainage reserve size, resulting in a more efficient use of space and reduced cost to the overall drainage scheme. Additionally, a bio-retention system at the WL-26 location would reduce earthwork costs due impacts of building in steep terrain which is inefficient. In my opinion, a bio-retention system is more suitable to this terrain due to the reduced overall footprint and costs to achieve the same level of water quality treatment.

8. Conclusion

It is my opinion that the Asia-Pacific Group masterplan is worthy of support subject to the following;

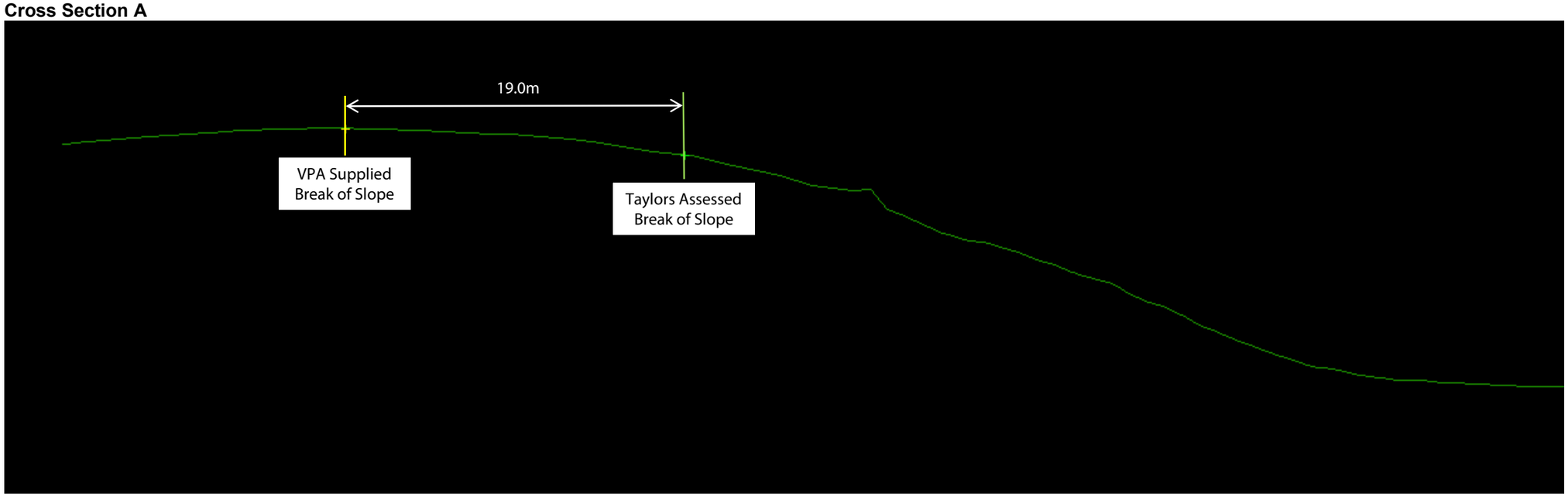
- The revised Melbourne Water Draft Developer Services Scheme needs to provide greater flexibility from by including commentary within the PSP stating that “confirmation of size and final location of wetland reserves is subject to functional and detail design approval to the satisfaction of Melbourne Water”;
- Melbourne Water provides flexibility in the use of other WSUD technology and enable the use of bio-retention cells in lieu of traditional constructed wetlands for WL-26;
- Co-location of wetland WL-27 and the DELWP conservation reserve should be supported by MWC and the VPA as it has benefits to construction and maintenance costs and reduced reserve area;
- Revise the alignment of the Sunbury Ring Road Southern Link (Connector Boulevard) and corresponding intersection with Fox Hollow Drive to reduce cost to the ICP and earthworks implications onto developable land.
- Review the Break of Slope line supplied by the VPA which has been incorrectly located and amend in accordance with Taylors scientifically assessed alignment.

ANDREW MATHESON
Taylors
August 2017

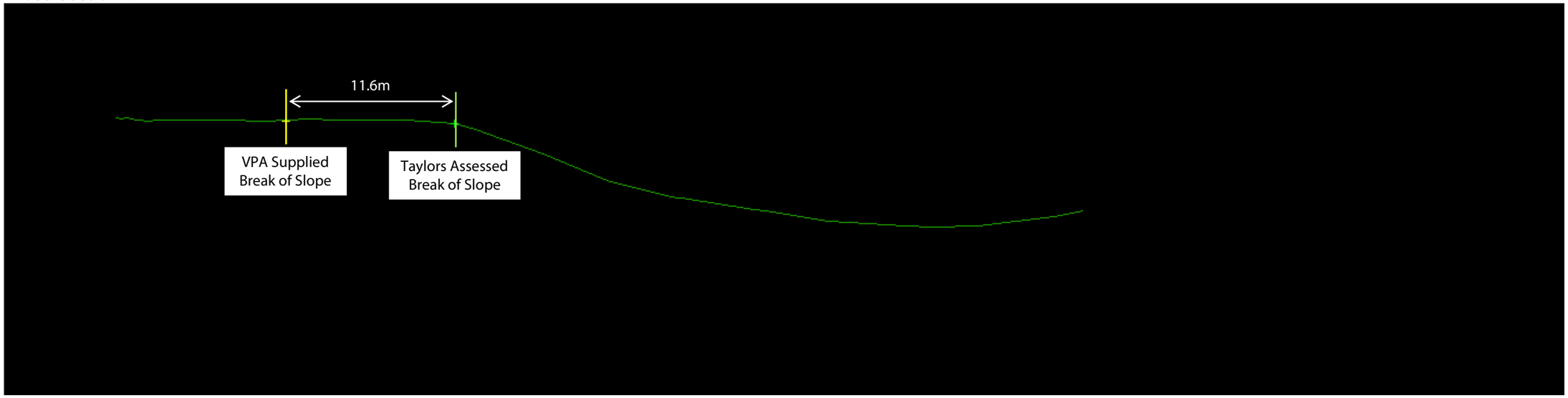
9. Appendix A – Feature and Level Survey

10. Appendix B – Break of Slope Cross Section (12d Model®)

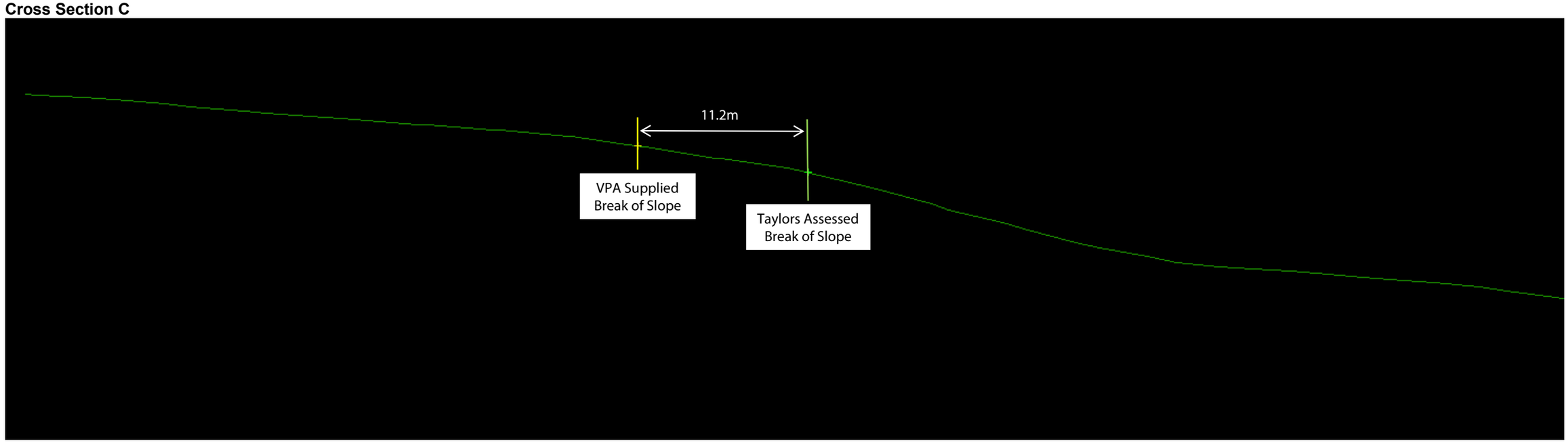
Cross Section A



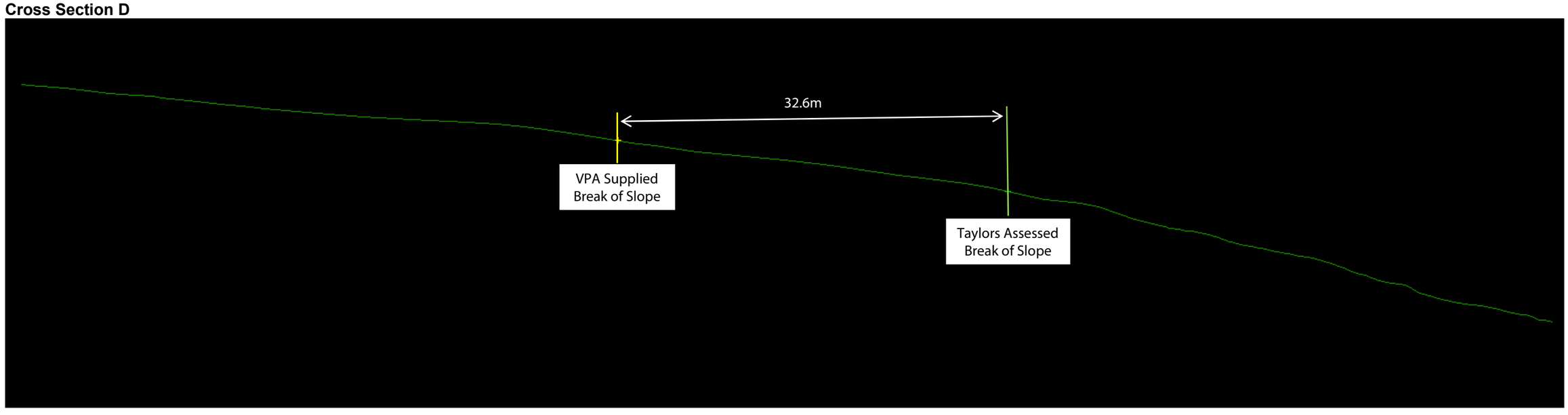
Cross Section B



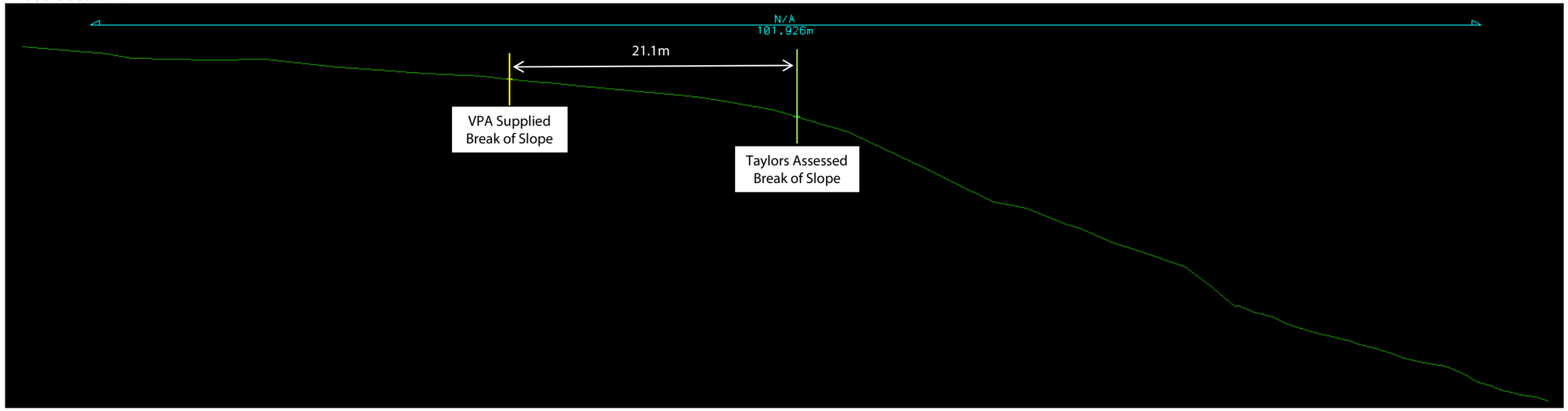
Cross Section C



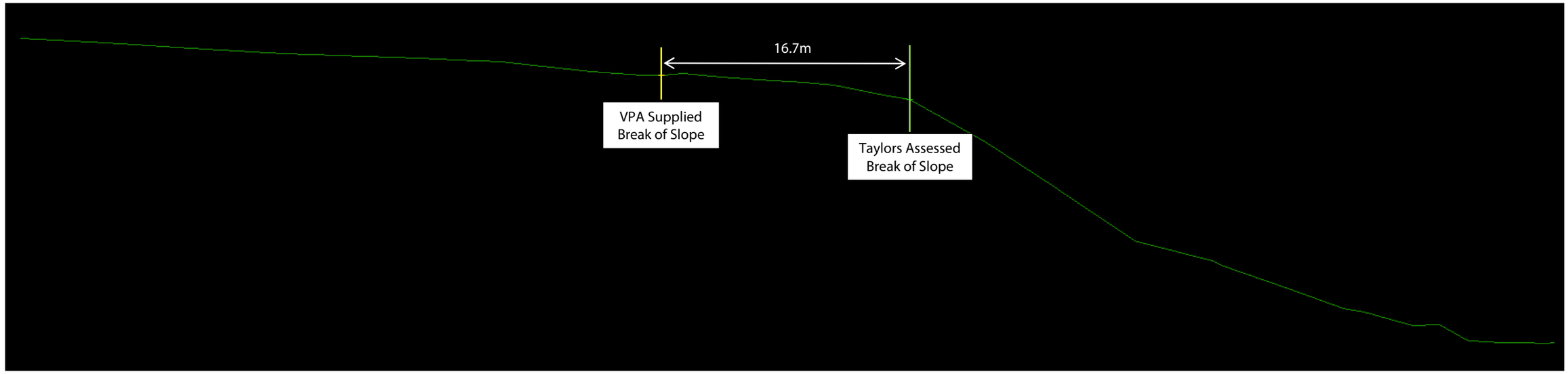
Cross Section D



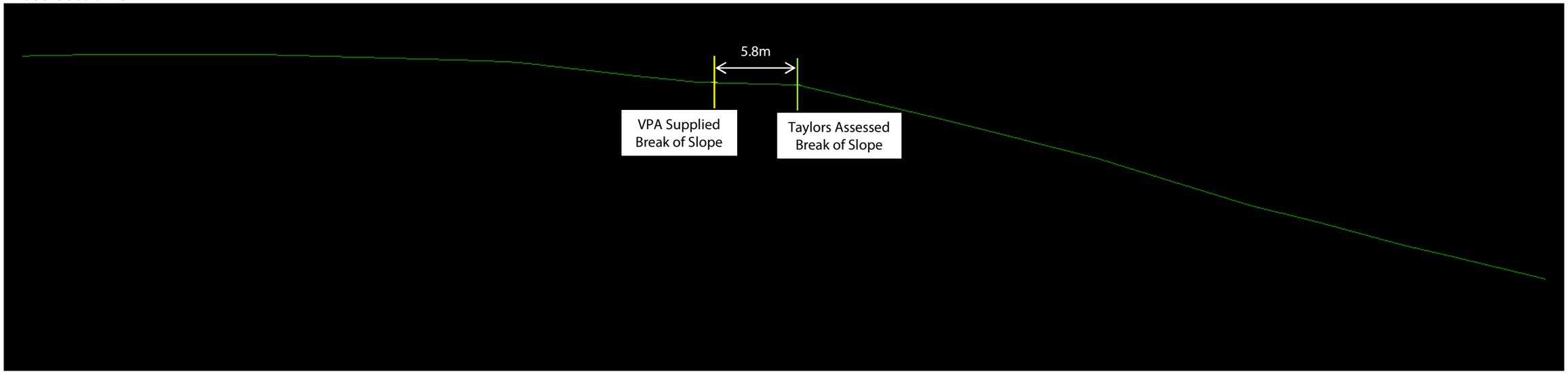
Cross Section E



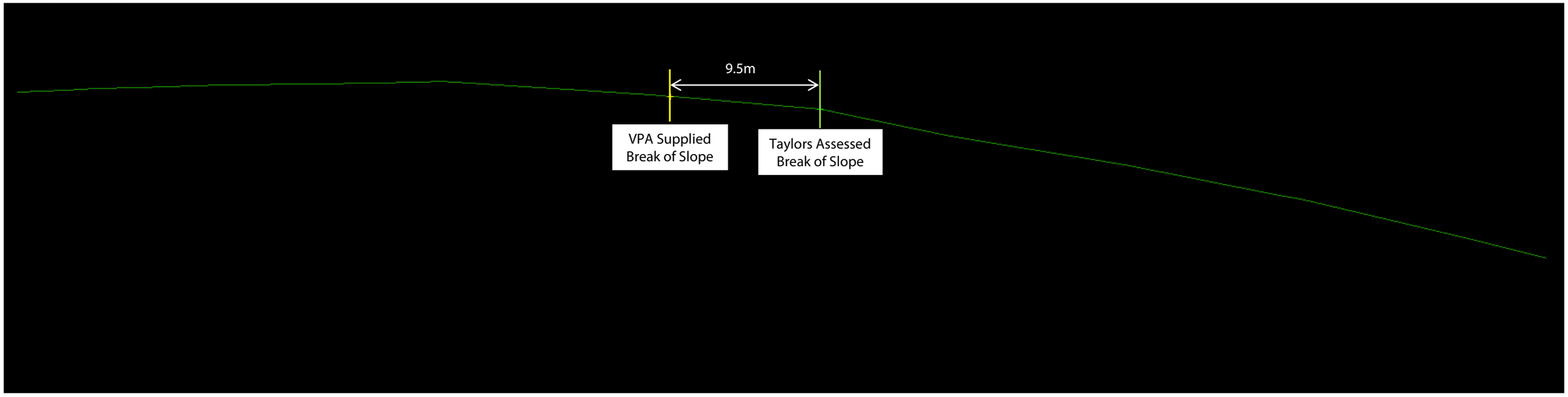
Cross Section F



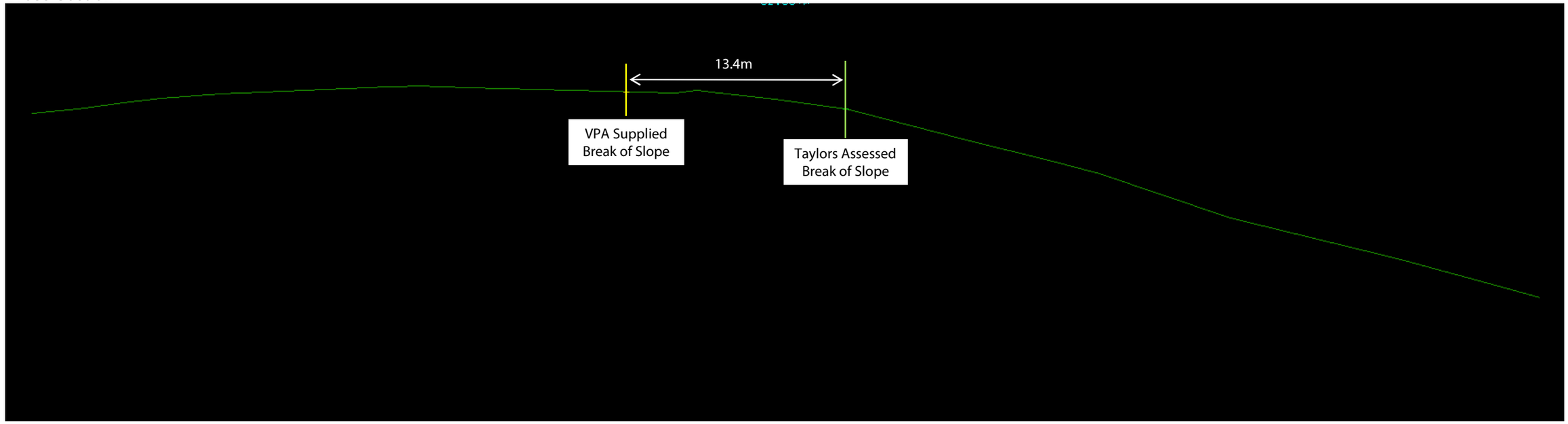
Cross Section G



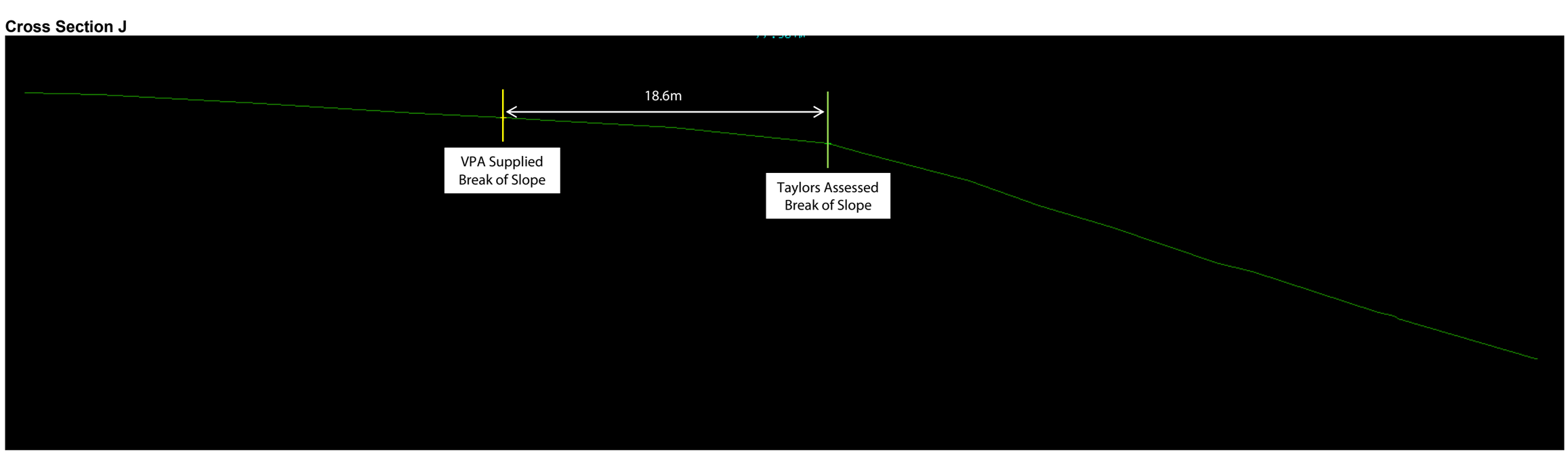
Cross Section H



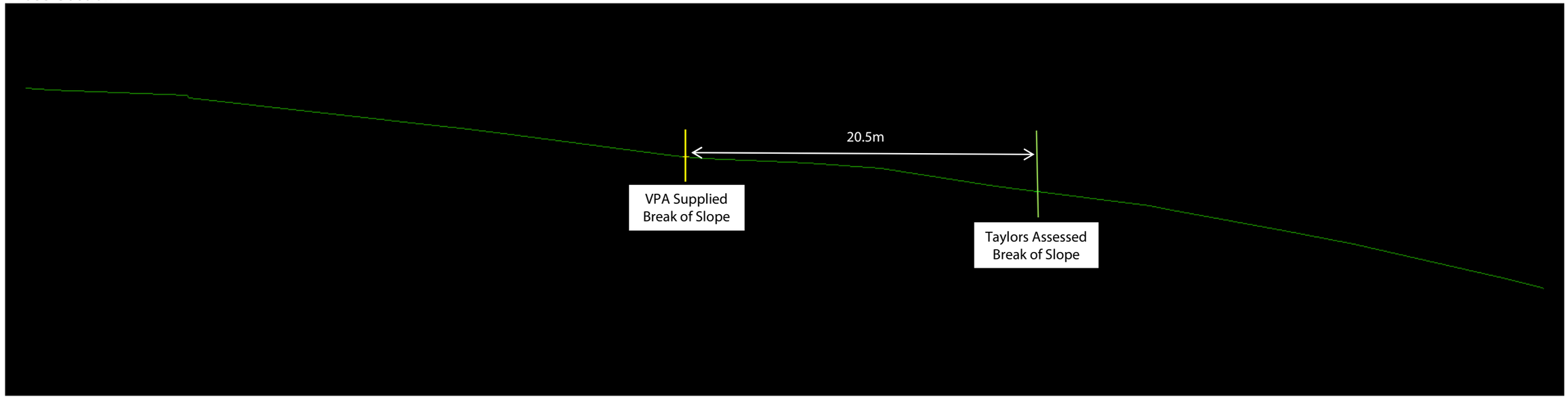
Cross Section I



Cross Section J

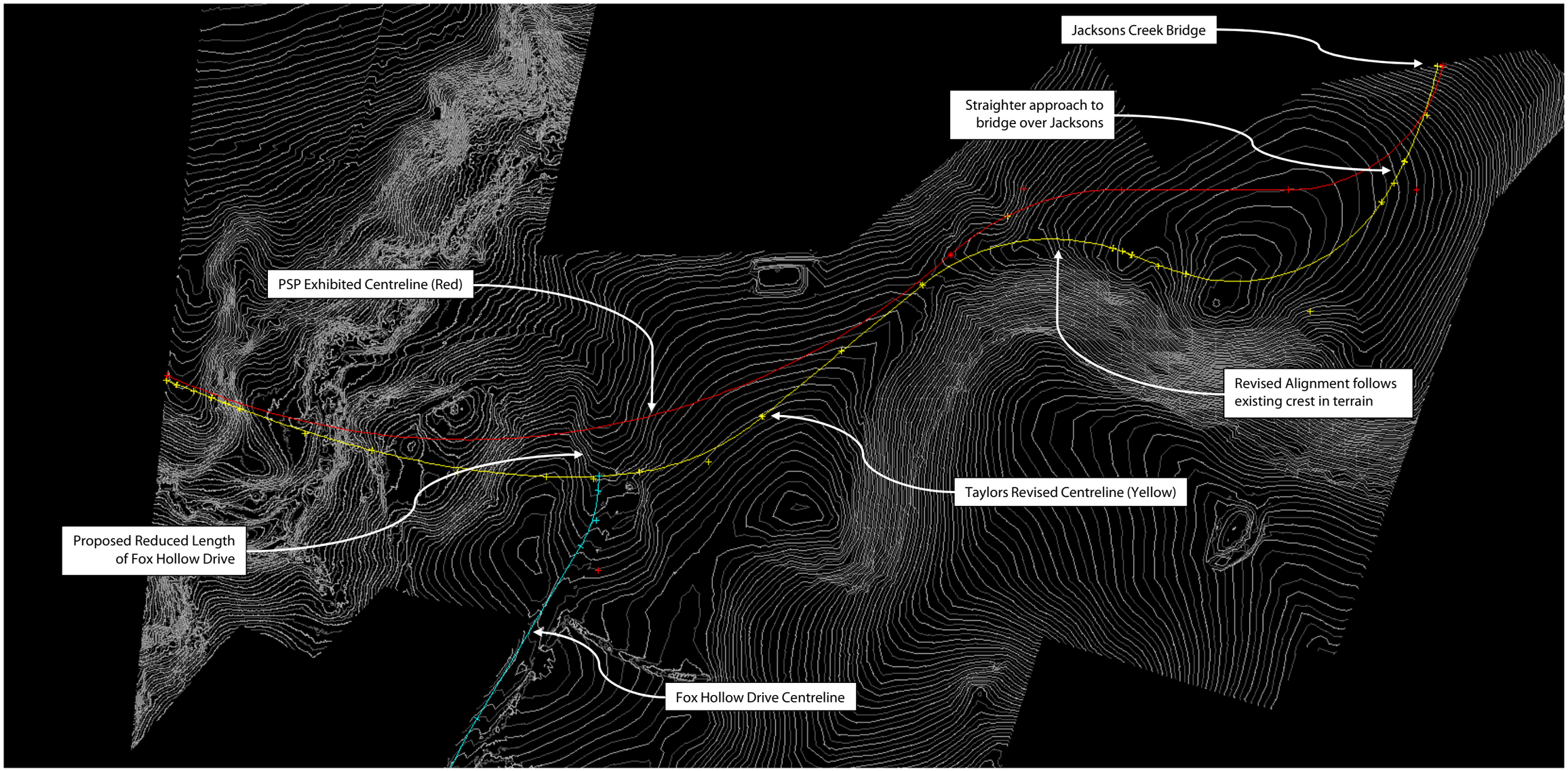


Cross Section K

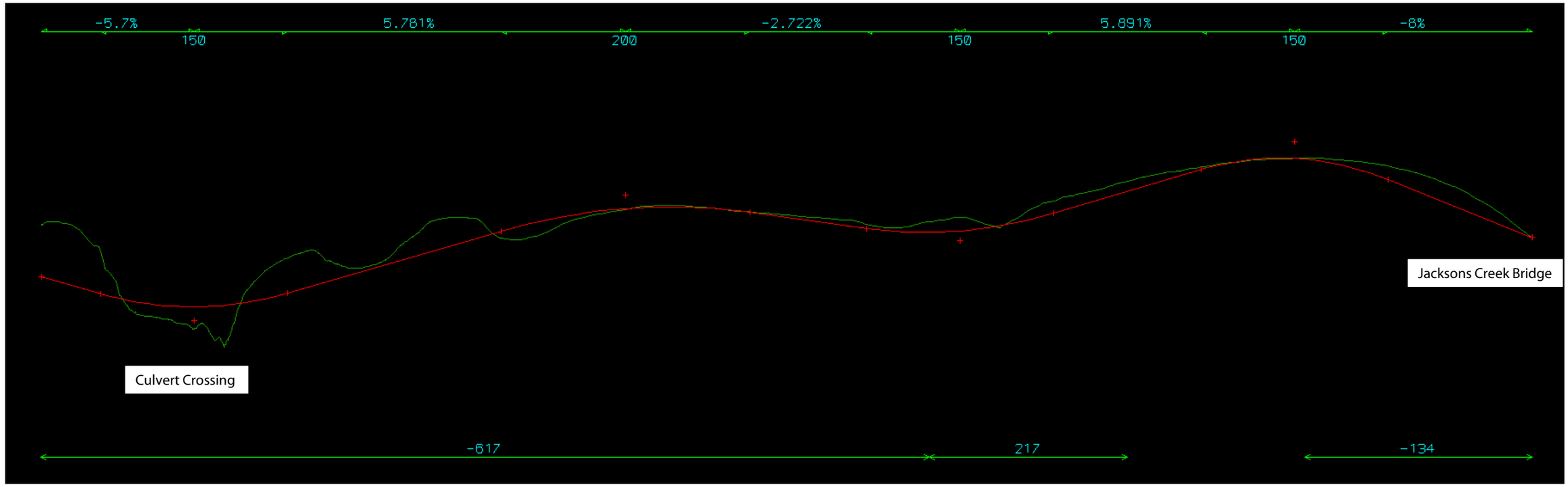


11. Appendix C - Connector Boulevard 12d Model® Outputs

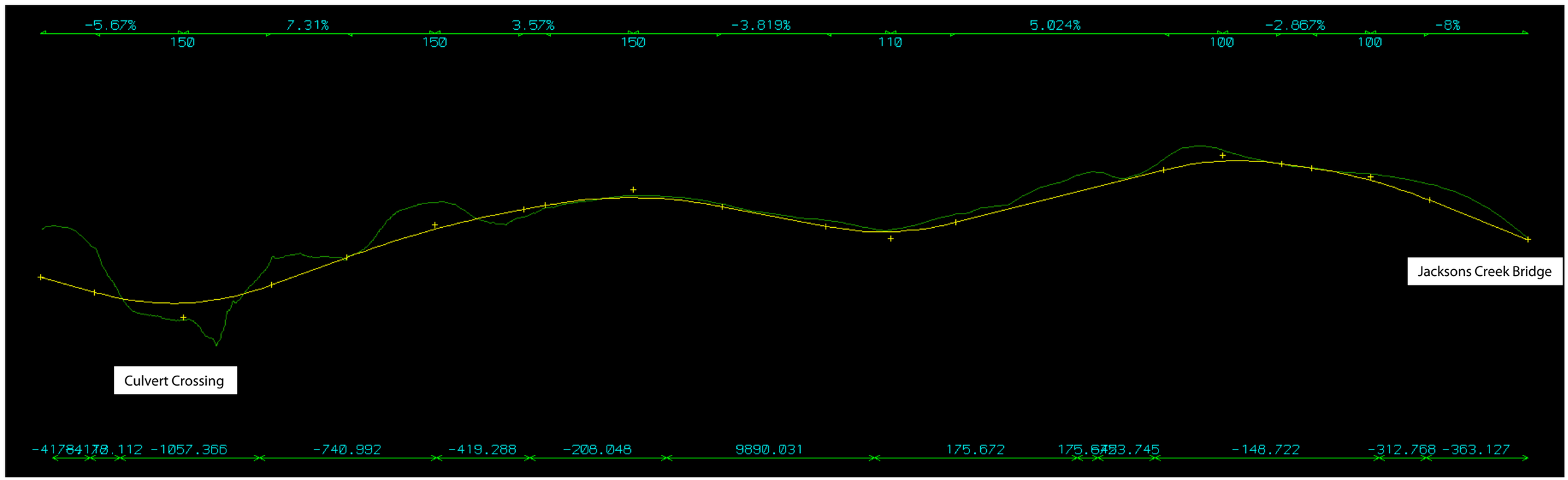
Road Centreline Horizontal Alignment – PSP Exhibited Alignment vs Taylors Revised Alignment



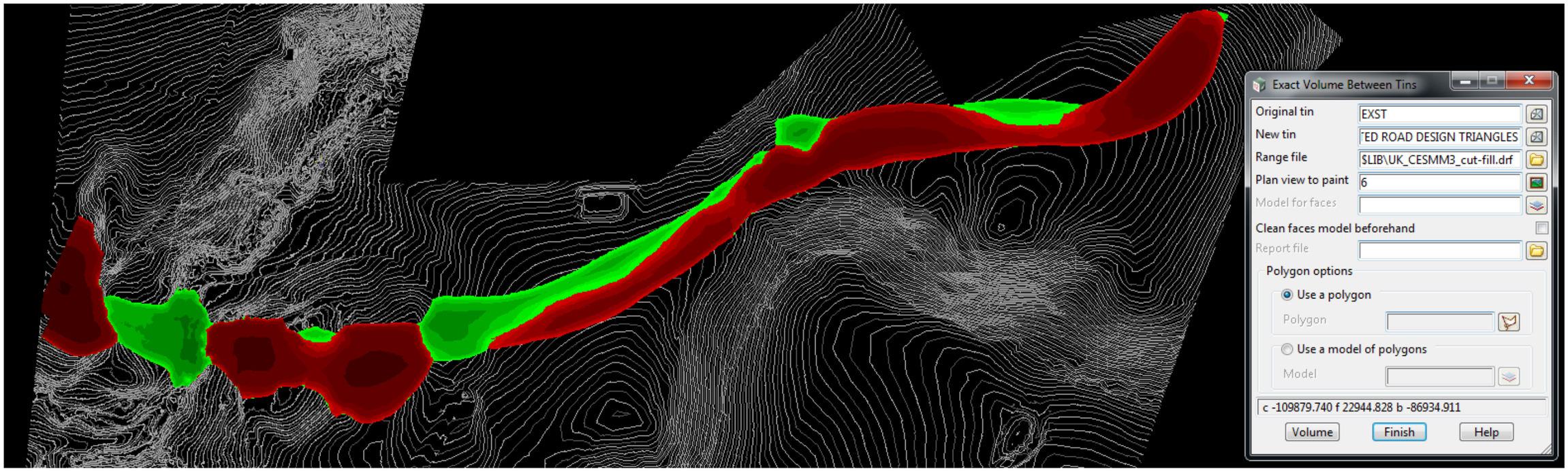
Road Centreline Vertical Grading – PSP Exhibited Alignment



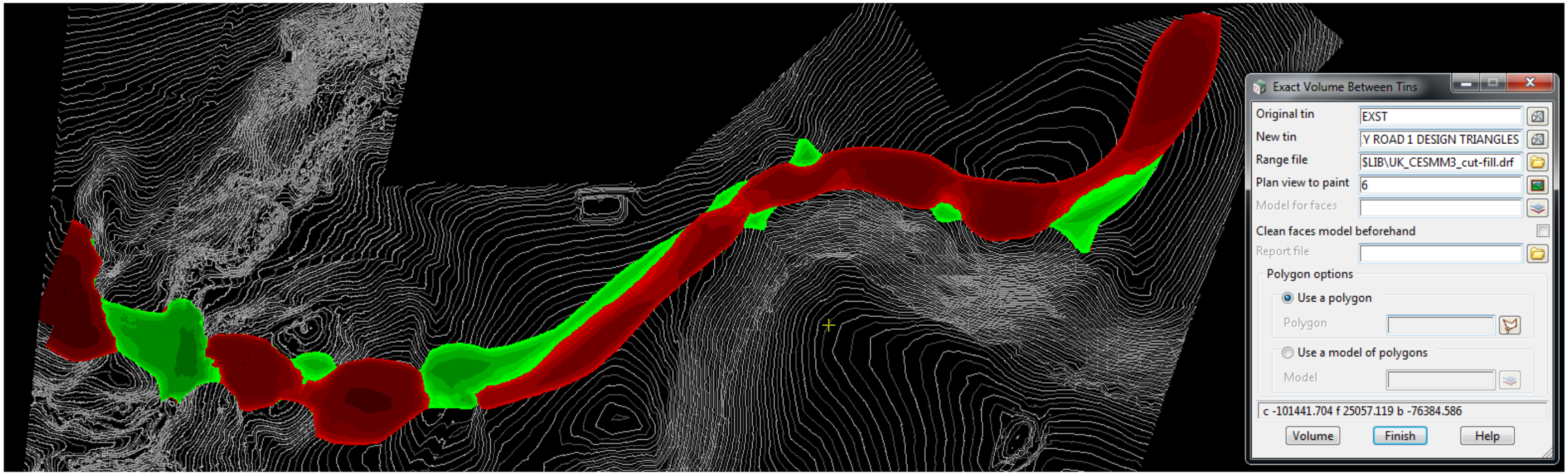
Road Centreline Vertical Grading – Taylors Revised Alignment



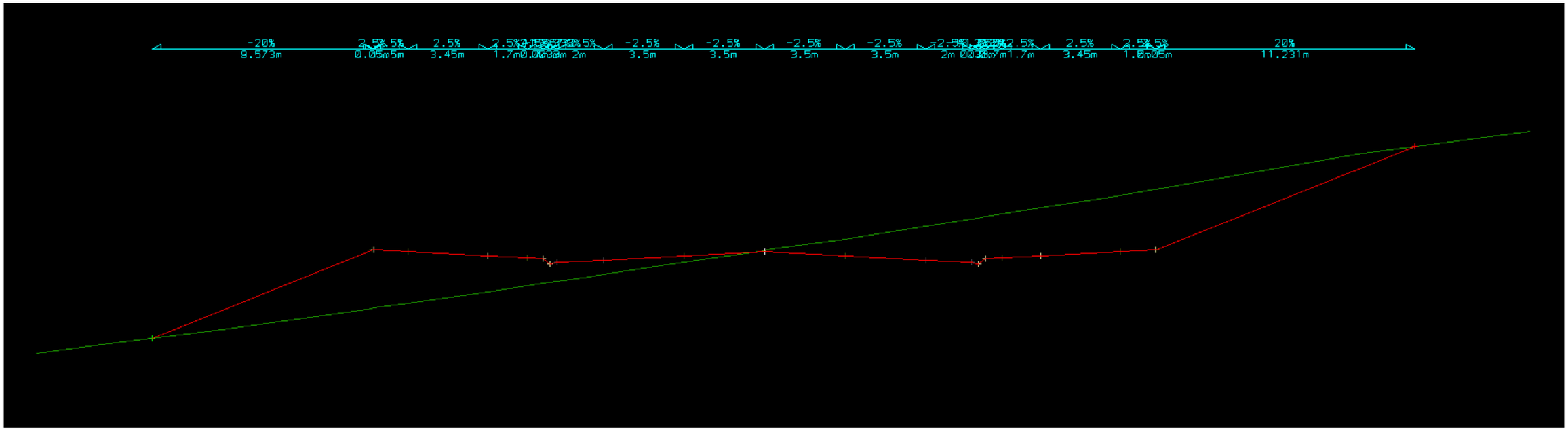
Cut/Fill Diagram – PSP Exhibited Alignment (Red = Cut, Green = Fill)



Cut/Fill Diagram – Taylors Revised Alignment (Red = Cut, Green = Fill)



Connector Boulevard Full Cross Section Applied to Both Alignments



12. Appendix D – Taylors WL-27 Revised Concept Wetland Design