MITCHELL SHIRE COUNCIL

7 December 2018

Mr Ben Hawkins
VPA – Strategic Planning Manager
Level 25, 35 Collins St
Melbourne VIC 3000

Dear Mr. Hawkins,

SUBMISSION TO PLANNING SCHEME AMENDMENT GC102 – DONNYBROOK-WOODSTOCK FINAL INFRASTRUCTURE CONTRIBUTIONS PLAN

I write in relation to the above Planning Scheme Amendment which applies to land within Mitchell Shire.

Council officers have collaborated with officers from the City of Whittlesea in preparation of this submission. The City of Whittlesea engaged WT Partnership to undertake a peer review cost estimate of the exhibited 'final' Infrastructure Contributions Plan (ICP) and this cost estimate has informed Mitchell Shire Council's submission.

It is requested that you accept this as a late submission in accordance with Section 22(2) of the *Planning and Environment Act* 1987 and refer it to the Independent Planning Panel in the normal process. We also request advice that the submission is accepted and will be considered.

Set out below is Council's submission in relation to the exhibited Planning Scheme Amendment GC102.

Council advocates for the inclusion of accurate project costing information and costs of borrowing, within the final Donnybrook-Woodstock Infrastructure Contributions Plan (ICP) to facilitate the timely delivery of essential infrastructure and to minimise cost shortfalls.

Having reviewed the exhibited ICP features costings prepared for the VPA it is our understanding that the transport projects have maximized the $114,062 per hectare and community and recreation projects are at $86,627per hectare with a supplementary charge of $412 per hectare.

Due to the differing site conditions associated with the land in this Precinct Structure Pan (PSP) it is believed that the VPA's costings are insufficient which will lead to Council facing a significant shortfall in funding from the ICP. The differing site conditions include gas easement, Growling Grass Frog presence in the Merri Creek and underlying rock to name a few conditions which are likely to have cost implications beyond the standard costings. Some example infrastructure costings are compared below:

Item	**Exhibited 'Final' ICP estimated costs**	**WT Partnership Estimated Cost**	**Difference +/-**
Primary Arterial Road	$3,485/metre	$5,122/metre	- $1,637/metre
Secondary Arterial Road	$3,719/metre	$4,987/metre	- $1,268/metre
Primary/Connector 4-way Interim Intersection	$4,500,000	$6,000,000	- $1,500,000

It is also noted that responding to the exhibited 'final' ICP is complicated by the proposed benchmark costings process being led by the VPA not being finalised or tested through an Independent Planning Panel process. The complication for Council is that the benchmark costings used to inform the majority of infrastructure projects could be subject to change following exhibition of the 'final' ICP without a review opportunity.

1. The supplementary levy is insufficient

The exhibited 'final' ICP provides for a supplementary ley of $412 per hectare is intended to fund the construction of a major bridge culvert, as the standard levy for transport projects is capped and cannot fully fund this project.

The supplementary items are:

- BR-02 Culvert: Patterson Drive – estimated cost of $795,000 (100% internal apportionment)
- BR-05 Bridge: Patterson Drive – estimated cost of $6,415,000 (93% internal apportionment)

The peer review undertaken by WT Partnership estimates the costs of the bridge crossing to be $13,798,090.

Council acknowledges that ICP's are not intended to be the sole funding for development within a Precinct Structure Plan but "contribute" to the cost of development. However, the variation between the cost estimates for this bridge represents a significant shortfall for Council and raises concerns regarding the accuracy of the estimated cost within the exhibited 'final' ICP.

Requested change:

1. The supplementary levy should be increased to reflect the more likely true costs of the Patterson Drive bridge.

2. Staging of the infrastructure projects

At the Ordinary Council Meeting held on 16 May 2016, Council endorsed the *'Potential Development Sequencing, Northern Growth Corridor, Mitchell Shire Council, April 2016'* (refer to Attachment 2).

This report shows a development sequence for the Northern Growth Corridor (including land in neighboring local government areas being City of Hume and City of Whittlesea) detailing how the corridor could be developed in the next 50 years. The purpose of the analysis was to gain an understanding of how and where future growth patterns are likely to occur and to assist Council to make informed decision on infrastructure delivery and planning in the corridor. It is noted that the analysis was based on then current development trends and population data and included consultation with key developers within the corridor.

As it relates to the portion of Mitchell land within the Donnybrook-Woodstock PSP, the analysis estimates that this land won't be under development until 2045-2055. While the actual development timeframes may differ to this, the analysis highlights that the portion of Mitchell land within this PSP is unlikely to be subject to construction activity for a long time given the reliance on the delivery of Patterson Drive crossing Merri Creek.

The concern for Council is that the exhibited 'final' ICP identified the Mitchell infrastructure projects as having a staging of medium or medium-long term priorities with an indicative timing of 5-10 years (approximately). This may impose unnecessary pressure to consider proposals

that could be out of sequence and have flow on effects for Council in its role as collecting agency under the ICP.

Requested change:

2. All ICP infrastructure projects within Mitchell be nominated as long-term projects (10 years and beyond).

I note that Planning Panels Victoria, has indicated a Directions Hearing date will take place on 14 December 2018. I can confirm that this will be attended by Council officers.

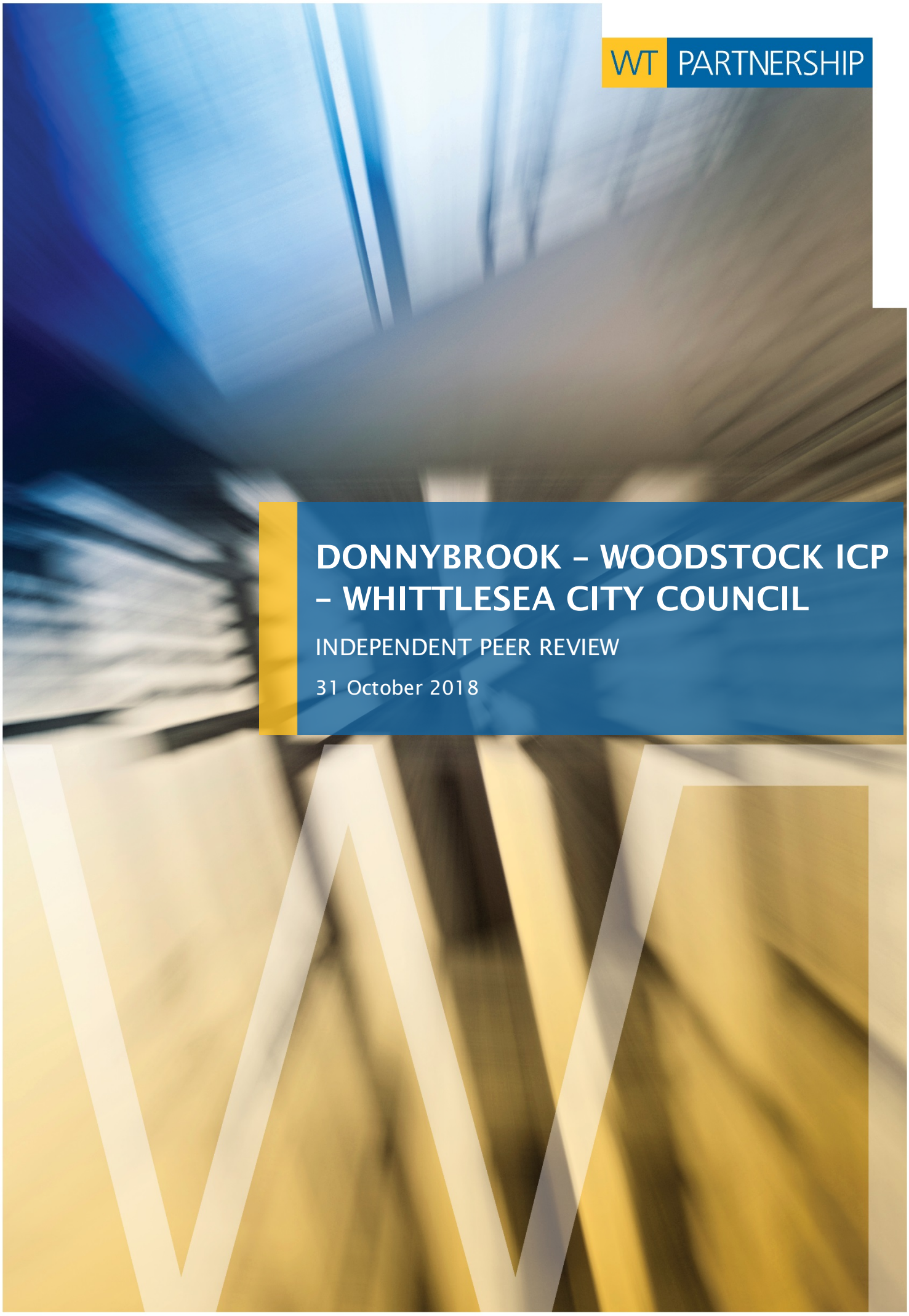
Please note this the officer level response and confirmation of any Council resolution may need to follow.

[redacted]

[redacted]

ENCL

- WT Partnership, 'Donnybrook-Woodstock ICP – Whittlesea City Council: Independent Peer Review' (October 2018)
- Mitchell Shire Council, 'Potential Development Sequencing, Northern Growth Corridor' (April 2016)



WT PARTNERSHIP

DONNYBROOK – WOODSTOCK ICP – WHITTLESEA CITY COUNCIL

INDEPENDENT PEER REVIEW

31 October 2018

CONTENTS

APPENDICES

1 INTRODUCTION

1.1 DECLARATION

1.1.1 I, Andrew Loh, am an Associate of WTP Australia Pty Ltd (WT), an Australian owned quantity surveying practice. A copy of my Curriculum Vitae ("CV") is attached to this report at Appendix B.

1.1.2 WT provides specialist consultancy services to the construction and engineering industries. The principle services provided by WT are cost management and quantity surveying, asset and facilities management, project controls and contract support services.

1.1.3 We have prepared this joint report and have made all enquiries which we believe are desirable and appropriate. No matters of significance which we regard as relevant have to our knowledge, been withheld in making this statement.

1.1.4 In preparing this report we have had regard to the duties and responsibilities set out in Division 2 of Part 31 of the Uniform Civil Procedure Rules 2005 (UCPR) and we agree to be bound by the Expert Witness Code of Conduct in Schedule 7 of the UCPR. We have also had regard to the Guide to Expert Evidence.

1.1.5 This report does not purport to prove facts. All references to facts are to be read as references to assumed facts. Facts have been assumed for the purpose of carrying out the cost estimates and reaching the conclusions contained within this report. When a fact has been assumed based on the readings of a document, a reference to that document is generally provided to that document in the relevant section of this report.

1.1.6 We have used the reference material briefed to us in the email from Whittlesea City Council dated 20 September 2018 regarding the Donnybrook – Woodstock Infrastructure Contributions Plan.

1.1.7 We understand that the immediate use of this statement is for Whittlesea City Council.

31 October 2018		
Date	Mr Andrew Loh	

1.2 EXPLANATION OF EXPERTISE

1.2.1 In our role as quantity surveyors we provide independent advice to both private and government clients offering independent assurance/validation that the estimates submitted as a representation of the construction costs for projects are market-related and relative to those that would be received in a competitive tendering environment.

1.2.2 Specific examples of projects that have relevance to the options that have been considered in this report are as follows:

PROJECT NAME	CLIENT	COMPLETION DATE	RELEVANCE TO THE REPORT
Level Crossing Removal Project – Project Options Report & Reference Design Stage	LXRA	2015 – 2018	Provision of P50/P90 risk adjusted cost estimates for 30 selected sites for various cost options including Reference Design
Western Distributor Proposal	Transurban	2014 – 2015	Provision of independent estimates
CityLink Tulla Widening	Transurban	2014	Provision of independent estimates
Melton Amendment C145 – Rockbank PSP & DCP	Melton City Council	2016	Expert costings evidence for Melton City Council
Melton Amendment C146 & C147 – Plumpton & Kororoit PSP	Melton City Council	2016	Expert costings evidence for Melton City Council

1.3 BRIEF DESCRIPTION OF THE MATTER

1.3.1 WT has been engaged by Whittlesea City Council to prepare a peer review of the costs included as part of the Donnybrook – Woodstock Infrastructure Contributions Plan report prepared by the Victorian Planning Authority (VPA).

1.4 INSTRUCTIONS

1.4.1 WT has been requested to prepare cost estimates for Donnybrook – Woodstock bespoke transport projects, RD-01 to RD-05 (inclusive), IN-01 to IN-17 (inclusive), BR-01 to BR-05 (inclusive) and Ped-01 to Ped-03 (inclusive) and determine any differences to those costings provided by the VPA.

1.5 DOCUMENTS EXAMINED BY WT PARTNERSHIP

1.5.1 In preparing this report, we have been provided with, and have examined the following relevant documents:

AUTHOR	DATE(S)	REV NO.	DESCRIPTION
VPA	August 2018	N/A	Donnybrook – Woodstock ICP
Whittlesea City Council	20 September 2018	N/A	Key Specific Issues relating to DW Transport Projects (Excel File)
VPA	October 2017	N/A	Plan 16 – Utilities (Donnybrook – Woodstock Precinct Structure Plan)
VPA	October 2017	N/A	Donnybrook Road – Typical Cross-Section with Services, West (Donnybrook – Woodstock Precinct Structure Plan)
VPA	October 2017	N/A	Gunns Gully Road Cross Section – Primary Arterial Road 6 Lance – 41.0m (Donnybrook – Woodstock Precinct Structure Plan)
VPA	October 2017	N/A	Koukoura Drive Interim Cross Section – Primary Arterial Road 4 Lance – 34.0m (Donnybrook – Woodstock Precinct Structure Plan)
VPA	October 2017	N/A	Patterson Drive & Cameron Street Interim Cross Section – Secondary Arterial Road 4 Lance – 34.0m (Donnybrook – Woodstock Precinct Structure Plan)
Cardno	October 2016	3	Preliminary Estimate of Development Costs - Wollert PSP – Interim Road Project Cost
Cardno	October 2016	6	Preliminary Estimate of Development Costs - Wollert PSP – Interim Intersection & Bridge Project Costs
Cardno	March 2016	1	Wollert PSP – Interim Road Projects Drawings
Cardno	March 2016	1	Wollert PSP – Ultimate Alignment Design Drawings (Road Projects)
Cardno	March 2016	3	Wollert PSP – Interim Design Drawings (Intersection Projects)
Cardno	March 2016	3	Wollert PSP – Ultimate Design Drawings (Intersection Projects)
DPM Consulting Group	June 2018	1.1	Peppercorn Hill ICP Estimates (Road, Intersection & Pedestrian Crossing Infrastructure)
DPM Consulting Group	Not stated	N/A	Hayes Hill Blvd – Darebin Creek Road Crossing Drawing
DPM Consulting Group	December 2015	N/A	Cameron Street – Darebin Creek Road Crossing Drawing
Traffix Design	June 2018	N/A	Pre-Interim ICP Set (Roads & Intersection Projects)

2 EXECUTIVE SUMMARY

2.1 This report has been prepared for Whittlesea city council as an independent review of the benchmarked infrastructure costings prepared by the Victorian Planning Authority (VPA) and seeks to identify any differences in scope and estimated costs.

2.2 All costs in this report exclude Goods & Services Tax (GST).

2.3 In the absence of any design criteria provided, we have made assumptions as detailed in Section 5 of this report and our detailed cost estimates.

2.4 We have prepared independent cost estimates for the transport projects, RD-01 to RD-05 (inclusive), IN-01 to IN-17 (inclusive), BR-01 to BR-05 (inclusive) and Ped-01 to Ped-03 (inclusive). These estimates have been prepared using first principles estimating based upon current day rates and benchmarking from our internal database to derive a base case cost estimate.

2.5 We note that HV power poles / overhead wires and telecommunication services run along Donnybrook Road and Merriang Road (along periphery of Donnybrook – Woodstock ICP). We have made allowances for relocation works in relation to these existing services for the transport projects along these roads namely IN-01 to IN-05 (inclusive), IN-08 and IN-12.

2.6 We note that whilst Delivery Costs for Traffic Management has been applied as per the percentage set by the VPA (5%) there is a potential likelihood that this may be higher to projects interfacing with Donnybrook Road (IN-01 to In-05 inclusive).

2.7 We note that the Delivery Costs for Supervision & Project Management for transport project BR-01 has been set by VPA at 13% (all other transport projects are at 9%). WT agrees with this change due to the complexities associated with construction over an existing rail corridor (VLine).

2.8 The base case cost estimates, excluding delivery costs, have been used as the basis of our Monte Carlo risk-based modelling to provide a P50 and P90 output with which to compare to the Benchmarked Infrastructure costings.

2.9 We note that the risk model has been applied to the base case construction value only and therefore is a representation of inherent risk (quantifiable uncertainties) only.

2.10 We note that no risk register has been developed as an assessment of Contingent Risk and it is assumed that the Contingency percentage applied as part of the 'Delivery' costs seeks to cover those unmeasured items outside of the base case estimate.

2.11 It is worthwhile noting that by undertaking an independent full risk assessment of Donnybrook – Woodstock ICP including Contingent Risks, the issues unique to the Donnybrook – Woodstock Region such as rock, environmental, cultural and heritage could be analysed with a view to providing Council with confidence that the contingency percentages set by the VPA (15% Roads & Intersections / 20% Bridges) are sufficient.

2.12 WT's Independent P90 Estimate of transport projects RD-01 to RD-05 (inclusive), IN-01 to IN-17 (inclusive), BR-01 to BR-05 (inclusive) and Ped-01 to Ped-03 (inclusive) is $197,337,605. This exceeds the VPA's Cost Estimates of $134,888,243 by $62,449,363 or 46.3%.

2.13 We note that no detail cost breakdown has been provided for transport project Ped-01 to Ped-03 (inclusive) and we have assumed the respective estimated costs stated in section 3.2 of VPA report for Donnybrook – Woodstock ICP to be P90 values.

2.14 Our costs are based upon current day costs excluding escalation.

2.15 A detailed breakdown of all our cost estimates are attached as Appendix A.

3 REVIEW OF BENCHMARK INFRASTRUCTURE COSTINGS

The table below is a summary comparison of the P90 costs for Donnybrook – Woodstock transport projects.

	BY VPA	BY WT		
DESCRIPTION	TOTAL COST (INCLUDING DELIVERY) (A)	TOTAL COST (INCLUDING DELIVERY) (B)	DIFFERENCE (A - B)	DIFFERENCE %
	P90	P90	P90	P90
	$	$	$	
RD-01 Cameron Street: Sydney-Melbourne railway overpass to Patterson Drive – Construction of 2 lane carriageway, excluding intersections (interim treatment)	3,418,196	5,573,889	(2,155,692)	(63%)
RD-02 Gunns Gully Road: Sydney-Melbourne railway overpass to E6 / OMR reservation – Construction of 2 lane carriageway, excluding intersections (interim treatment)	8,538,250	13,689,791	(5,151,541)	(60%)
RD-03 Patterson Drive: Donnybrook Road to Merri Creek – Construction of 2 lane carriageway, excluding intersections (interim treatment)	6,920,868	9,585,485	(2,664,617)	(39%)

	BY VPA	BY WT		
DESCRIPTION	TOTAL COST (INCLUDING DELIVERY) (A)	TOTAL COST (INCLUDING DELIVERY) (B)	DIFFERENCE (A - B)	DIFFERENCE %
	P90	P90	P90	P90
	$	$	$	
RD-04 Patterson Drive: Merri creek to OMR/E6 reservation – Construction of 2 lane carriageway, excluding intersections (interim treatment)	2,899,995	5,159,599	(2,259,604)	(78%)
RD-05 Koukoura Drive: Donnybrook Road to Gunns Gully Road – Construction of 2 lane carriageway, excluding intersections (interim treatment)	3,838,544	6,284,006	(2,445,462)	(64%)
IN-01 - Donnybrook Road & Hayes Hill Boulevard/Langley Park Drive (N-S Blvd Connector) - Construction of an arterial to connector road 4-way intersection (interim treatment)	4,718,000	6,283,668	(1,565,668)	(33%)
IN-02 - Donnybrook Road & Connector Street (N-S Connector) – Construction of an arterial to connector road 4-way intersection (interim treatment)	4,718,000	7,140,800	(2,422,800)	(51%)
IN-03 - Donnybrook Road & Patterson Drive – Construction of an arterial to arterial road 4-way intersection (interim treatment)	5,823,000	8,470,461	(2,647,461)	(45%)
IN-04 - Donnybrook Road & Koukoura Drive – Construction of an arterial to arterial road 4-way intersection (interim treatment)	5,823,000	9,186,309	(3,363,309)	(58%)
IN-05 - Donnybrook Road & Connector Street (Nth-Sth Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)	3,825,000	5,963,362	(2,138,362)	(56%)

	BY VPA	BY WT		
DESCRIPTION	TOTAL COST (INCLUDING DELIVERY) (A)	TOTAL COST (INCLUDING DELIVERY) (B)	DIFFERENCE (A - B)	DIFFERENCE %
	P90	P90	P90	P90
	$	$	$	
IN-06 - Hayes Hill Boulevard & Patterson Drive – Construction of an arterial to blvd connector road 4-way intersection (interim treatment)	4,383,158	7,596,042	(3,212,884)	(73%)
IN-07 - Hayes Hill Boulevard & Koukoura Drive – Construction of an arterial to blvd connector road 4-way intersection (interim treatment)	4,383,158	6,397,241	(2,014,083)	(46%)
IN-08 - Hayes Hill Boulevard & Merriang Road – Construction of an arterial to arterial 3-way intersection (interim treatment)	3,394,000	3,831,930	(437,930)	(13%)
IN-09 - Cameron Street / Connector Street (Nth-Sth Connector) – Construction of an arterial to connector road 4-way intersection (interim treatment)	4,383,158	5,467,008	(1,083,849)	(25%)
IN-10 - Cameron Street / Connector Street (Nth-Sth Connector) – Construction of an arterial to connector road 4-way intersection (interim treatment)	5,145,136	8,661,752	(3,516,616)	(68%)
IN-11 - Cameron Street (blvd connector west/town centre connector east) & Koukoura Drive (arterial) – Construction of an arterial to connector road 4-way intersection (interim treatment)	5,145,136	8,119,910	(2,974,774)	(58%)
IN-12 - Cameron Street / Merriang Road – Construction of a connector to arterial road 3-way intersection (interim treatment)	3,394,000	3,922,654	(528,654)	(16%)

	BY VPA	BY WT		
DESCRIPTION	TOTAL COST (INCLUDING DELIVERY) (A)	TOTAL COST (INCLUDING DELIVERY) (B)	DIFFERENCE (A - B)	DIFFERENCE %
	P90	P90	P90	P90
	$	$	$	
IN-13 - Gunns Gully Road & Connector St (Nth-Sth Connector) - Construction of an arterial to connector road 3-way intersection (interim treatment)	3,625,039	6,111,731	(2,486,691)	(69%)
IN-14 - Gunns Gully Road & Patterson Drive - Construction of an arterial to arterial road 4-way intersection (interim treatment)	5,572,439	8,997,605	(3,425,166)	(61%)
IN-15 - Gunns Gully Road & Koukoura Drive - Construction of an arterial to arterial road 4-way intersection (Connector road north of Gunns Gully Road) (interim treatment)	5,572,439	6,842,043	(1,269,604)	(23%)
IN-16 - Patterson Drive / Connector St (East-West Connector) - Construction of an arterial to connector road 3-way intersection (interim treatment)	3,312,141	5,359,941	(2,047,800)	(62%)
IN-17 - Patterson Drive / Connector St (East-West Connector) - Construction of an arterial to connector road 3-way intersection (interim treatment)	3,312,141	4,319,066	(1,006,924)	(30%)
BR-01 - Cameron Street: Construct a 2-lane interim road bridge spanning Merri Creek and Melbourne-Sydney Railway	23,116,643	21,780,380	1,336,263	6%
BR-02 - Patterson Drive: Construct a 2-lane interim culvert crossing of constructed waterway	794,217	970,447	(176,230)	(22%)
BR-03 - Hayes Hill Boulevard: Construct a Growling Grass	794,217	3,574,287	(2,780,070)	(350%)

	BY VPA	BY WT		
DESCRIPTION	TOTAL COST (INCLUDING DELIVERY) (A)	TOTAL COST (INCLUDING DELIVERY) (B)	DIFFERENCE (A - B)	DIFFERENCE %
	P90	P90	P90	P90
	$	$	$	
Frog Habitat suitable culvert/bridge crossing of Darebin Creek – 2 lane culvert crossing				
BR-04 - Cameron Street: Construct a Growling Grass Frog Habitat suitable culvert/bridge crossing of Darebin Creek – 2 lane culvert crossing	794,217	3,373,076	(2,578,859)	(325%)
BR-05 - Patterson Drive: Construct a 2-lane interim bridge crossing of Merri Creek	6,414,305	13,798,090	(7,383,785)	(115%)
Ped-01 - Crossing Patterson Drive between Donnybrook Road and Hayes Hill Boulevard associated with the key local access street connecting Donnybrook Station to the Non-Gov't. P-12 school campus and SR-02	276,614	271,702	4,912	2%
Ped-02 - Crossing Gunns Gully Road between Koukoura Drive and Patterson Drive associated with the shared path along the gas pipeline easement	276,614	302,665	(26,051)	(9%)
Ped-03 - Crossing Donnybrook Road between Koukoura Drive and Patterson Drive associated with the shared path along the gas pipeline easement connecting south to Northern Quarries PSP	276,614	302,665	(26,051)	(9%)
TOTALS	$134,888,243	$197,337,605	($62,449,363)	(46.3%)

3.1 ROADS (RD-01 TO RD-05 INCLUSIVE)

3.1.1 As highlighted above, the cost estimates indicate an average 57.3% cost difference for the road transport projects. This is due to the common basis of assessment, outlined as follows:

- VPA estimated costs for RD-01 to RD-05 (inclusive) are summarised in Section 3.2, Table 5, Monetary Component Standard Levy Transport Projects of the Donnybrook / Woodstock ICP and are based upon a combination of bespoke projects (RD-01, RD-03 & RD-04) and VPA Benchmark Costing Items 01 & 02 for Primary Arterial & Secondary Arterial Roads respectively (RD-02 & RD-05).
- We have been provided with cross sectional drawings for the proposed roads for all the road projects (refer Section 1.5) and have based our review on the various widths documented in these drawings. In addition, we have based the lengths of the proposed roads for the road projects on the those stated in the detail cost breakdown in the Donnybrook – Woodstock ICP Report (RD-01, RD-03 & RD-04). However, for RD-02 & RD-05, which have been based on Benchmarked Items 01 & 02 respectively, we have calculated the length of the road projects using the following calculation:
- $\text{P90 Primary Arterial Road \$/m} = \frac{\text{P90 Total Benchmark Cost Item-01}}{\text{Standard Lengh of Road (800m)}}$
- $\text{Estimated Length of Road Project} = \frac{\text{VPA Total Estimated Cost}}{\text{P90 Primary Arterial Road \$ /m}}$
- $\text{P90 Secondary Arterial Road \$/m} = \frac{\text{P90 Total Benchmark Cost Item-02}}{\text{Standard Lengh of Road (800m)}}$
- $\text{Estimated Length of Road Project} = \frac{\text{VPA Total Estimated Cost}}{\text{P90 Secondary Arterial Road \$ /m}}$
- We have attempted to independently ascertain the length of road for the individual projects but based upon the scaling of Plan 2 (1:32,000 @ A4) the accuracy makes it difficult to confirm the lengths as appropriate. Therefore, we have assumed the lengths derived from our calculations based upon VPA information noted above, as correct.
- VPA Benchmark Costing Item-01 – Primary Arterial Road drawing indicate a road reserve of 34 m wide. However, the VPA Benchmarking costing is based on a road reserve width of 14 m (7 m wide non-divided 2-way roadway, 3 m wide bike path and 4 m wide nature strip). We have based our review on a road reserve width of 41 m, as per the Gunns Gully Road Cross Section by VPA (2 lane split carriageway only with central median and provision to extend to 6 lanes in the future, excluding local frontage road, comprising of 2 No. 3.5 m wide road lanes, 2 No. 3 m wide bike path, 1 No. 1.5 m wide pedestrian footpath, 20 m wide central median and 6.5 m wide nature strip).
- VPA Benchmark Costing Item-02 – Secondary Arterial Road drawings indicate a road reserve of 34 m wide. However, the VPA Benchmarking costing is based on a road reserve width of 14 m (9 m wide non-divided 2-way roadway with bike lanes, 2 m wide bike path and 3 m wide nature strip). We have based our review on a road reserve width of 34 m, as per the Koukoura Drive Cross Section by VPA (2 lane split carriageway only with central median and provision to extend to 4 lanes in the future, excluding local frontage road, comprising of 2 No. 3.5 m wide road lanes, 2 No. 3 m

wide bike path, 1 No. 1.5 m wide pedestrian footpath, 13 m wide central median and 6.5 m wide nature strip).

3.1.2 This review of the road projects is based upon our independent cost estimate on the VPA cross sectional drawings of the proposed roads within the Donnybrook – Woodstock ICP provided by Whittlesea City Council, information within the Donnybrook – Woodstock ICP Report, the road lengths established by the calculation mentioned above for the selected road projects and the WT Independent Peer Review of VPA Benchmark Infrastructure Costings dated 17 September 2018 (for rates). The following comments identify the cost variances established from our review:

- In general, there appears to be a considerable variance in quantities for the road pavements, shared user path and landscaping areas for all the road projects. This is due to the following:
  - RD-01 – Cameron Street: WT has based the quantities on a road reserve width of 37.8 m (2 lane split carriageway only with central median and provision to extend to 4 lane in the future excluding local frontage road, comprising of 2 No. 5.5 m wide road lanes including chevron & bike lane, 2 No. 3 m wide shared user path, 13 m wide central median and 7.8 m wide nature strip) whereas the VPA costing is based on a road reserve width of only 14 m (9 m wide non-divided 2-way roadway with shoulders on both sides, 2 m wide bike path and 3 m wide nature strip).
  - RD-03 and RD-04 – Patterson Drive: We have based the quantities on a road reserve width of 37.8 m (2 lane split carriageway only with central median and provision to extend to 4 lane in the future excluding local frontage road comprising of 2 No. 3.5 m wide road lanes including chevron & bike lane, 2 No. 3 m wide shared user path, 13 m wide central median and 11.8 m wide nature strip) whereas the VPA costing is based on a road reserve width of only 14 m (9 m wide non-divided 2-way roadway with shoulders on both sides, 2 m wide bike path and 3 m wide nature strip).
  - RD-02 & RD-05 – Refer to Section 3.1.1 for reason of major variance.
- Site preparation – although included as a line item in the VPA cost estimates, quantities have not been allocated.
- Pavements – generally benchmark costing rates for pavements are low when compared to the rates used by WT.
- Subgrade preparation – although included as a line item in the benchmark cost estimate, costs have not been allocated.
- SUP / Footpath – Rate has been amended to reflect a 120 mm thk concrete footpath with SL72 reinforcement (as advised by Whittlesea City Council).
- Landscaping and Topsoil Seeding – generally quantities are low based upon the overall site areas measured for site preparation less paved areas, and the assumption of 20% landscape planting / 80% topsoil seeding.
- Landscape maintenance – although included as a line item in the benchmark cost estimate, quantities have not been allocated.

- Allowances for rock excavation (assume 35% of total excavation volume), additional subgrade preparation, service protection and additional protection for conservation area included for selected road projects (as advised by Whittlesea City Council).
- Delivery costs – these are percentage driven costs and are proportional to the variances in direct costs.

3.2 INTERSECTIONS

3.2.1 This review of intersection projects is based upon our independent cost estimates. The following comments identify the common cost variances found:

- In general, there appears to be a considerable variance in quantities for the road pavements, shared user path and landscaping areas for all the intersection projects. WT has based the extent of all quantities in accordance to the intersection drawings within the Donnybrook – Woodstock ICP Report and the Proposed Road Cross Sectional drawings by VPA (Patterson Drive, Cameron Street, Koukoura Drive and Gunns Gully Road).
- Site preparation – although included as a line item in the benchmark cost estimate, quantities have not been allocated.
- Demolition of existing pavements – item has been included for proposed intersection projects along Donnybrook Road (IN-01 to IN05 inclusive) and Merriang Road (IN-08 & IN-12).
- Pavements – generally benchmark costing rates for pavements are low when compared to the rates used by WT.
- Subgrade preparation - although included as a line item in the benchmark cost estimate, costs have not been allocated.
- Concrete works – there appears to be inconsistent variances (+/-) in quantities for kerbs, shared user paths, cycle paths and traffic islands.
- SUP / Footpath – Rate has been amended to reflect a 120mm thk concrete footpath with SL72 reinforcement (as advised by Whittlesea City Council).
- Street lighting – the benchmark costing estimates include a quantity per intersection leg, however, no rate is applied to this quantity and therefore the cost of this item is not captured as part of the benchmark cost estimates.
- Landscaping and Topsoil Seeding – generally quantities are low based upon the overall site areas measured for site preparation less paved areas, and the assumption of 20% landscape planting / 80% topsoil seeding.
- Landscape maintenance – the rate included in the benchmark cost estimate is low when compared to WT assumption and basis of costs.
- Tie into existing pavements – item has been included for proposed intersection projects along Donnybrook Road (IN-01 to IN05 inclusive) and Merriang Road (IN-08 & IN-12).
- Allowances for rock excavation (assume 35% of total excavation volume), additional subgrade preparation, service relocation / protection, cultural heritage and additional protection for conservation area included for selected intersection projects (as advised by Whittlesea City Council).

- Delivery costs – these are percentage driven costs and are proportional to the variances in direct costs.

3.3 INTERSECTIONS, IN-01 TO IN-05 INCLUSIVE, IN-08 & IN-12

3.3.1 These are bespoke projects and no benchmark costing estimate has been applied.

3.3.2 Based upon our independent cost estimate, variances additional to those already highlighted in Section 3.2.1 include:

- Pavements – variances in pavement quantities are generally based on our following assumptions for the pavement types:
  - all pavements that run in-line with Donnybrook Road have been assumed as primary arterial roads.
  - all pavements that run in-line with Patterson Drive, Koukoura Drive, Merriang Road and Connector Street (IN-05) have been assumed as secondary arterial roads.
  - all pavements that run in-line with Hayes Hill Boulevard / Langley Park Drive (IN-01 & IN-08) and Connector Street (IN-02) have been assumed as collector arterial roads.
- New items – demolition of existing pavements, tie-ins to existing pavements.

3.3.3 We note that whilst Delivery Costs for Traffic Management has been applied as per the percentage set by the VPA (5%) there is a likelihood that this will be higher based upon location and anticipated traffic volumes accessing Donnybrook Road.

3.3.4 We note that there are existing HV poles / overhead wires and telecommunication services which run along Donnybrook & Merriang Roads. We have made allowances for relocation of these services within our estimate for these intersection road projects (as advised by Whittlesea City Council).

3.4 INTERSECTIONS, IN-06, IN-07 & IN-09

3.4.1 Benchmark Costing Item-09 has been applied by VPA.

3.4.2 The extent of the respective intersections is generally higher than that of Item-09 reflected by longer 'legs' of both secondary and / or connector roads. This is presented by higher quantities in most instances.

3.4.3 A standard layout for Hayes Hill Boulevard / Connector Street (IN-09) has not been provided, however, we have assumed it to be similar to a Connector Boulevard as the pavement depth is the same.

3.4.4 Based upon our independent cost estimate, variances additional to those already highlighted in Section 3.2.1 include:

- Intersection layouts include for dedicated turning lanes from secondary arterial roads to connector roads.

- New items – allowances for rock excavation (assume 35% of total excavation volume), additional subgrade preparation and services protection have been included in our estimate (as advised by Whittlesea City Council).
- Concrete works – additional areas of shared user paths.

3.5 INTERSECTIONS, IN-10 & IN-11

3.5.1 Benchmark Costing Item-08 has been applied by VPA.

3.5.2 The extent of the respective intersections is generally higher than that of Item-08 reflected by longer 'legs' of both secondary and / or connector roads. This is presented by higher quantities in most instances.

3.5.3 Based upon our independent cost estimate, variances additional to those already highlighted in Section 3.2.1 include:

- Pavement – we have assumed Koukoura Drive to be a primary arterial road (not secondary arterial as estimated in Item-08).
- Intersection layouts include for dedicated turning lanes from secondary arterial roads to connector roads.
- New items – allowances for rock excavation (assume 35% of total excavation volume) and additional subgrade preparation have been included in our estimate (as advised by Whittlesea City Council).
- Concrete works – additional areas of shared user paths and traffic islands.

3.6 INTERSECTION, IN-13

3.6.1 Benchmark Costing Item-13 has been applied by VPA.

3.6.2 A standard layout for the Connector Street has not been provided, however, we have assumed it to be similar to a Connector Boulevard as the pavement depth is the same.

3.6.3 Based upon our independent cost estimate, variances additional to those already highlighted in Section 3.2.1 include:

- Pavement – we have assumed that the Connector Street to be a collector arterial road (not secondary arterial as estimated in Item-13).
- Lower quantities generally with regards to Traffic islands.
- New items – allowances for rock excavation (assume 35% of total excavation volume), additional subgrade preparation and additional protection to conservation areas have been included in our estimate (as advised by Whittlesea City Council).
- Concrete works – additional areas of shared user paths.

3.7 INTERSECTIONS, IN-14 & IN-15

3.7.1 Benchmark Costing Item-06 has been applied by VPA.

3.7.2 The extent of the respective intersections is generally higher than that of Item-06 reflected by longer 'legs' of primary arterial roads. This is presented by higher quantities in most instances.

3.7.3 Based upon our independent cost estimate, variances additional to those already highlighted in Section 3.2.1 include:

- Pavement – we have assumed Gunns Gully Road and Koukoura Drive to be primary arterial roads (not secondary arterial as estimated in Item-06).
- Intersection layouts include for dedicated turning lanes from primary arterial roads to secondary arterial roads.
- New items – allowances for rock excavation (assume 35% of total excavation volume), additional subgrade preparation and additional protection to conservation areas have been included in our estimate (as advised by Whittlesea City Council).
- Concrete works – additional areas of shared user paths.

3.8 INTERSECTIONS, IN-16 & IN-17

3.8.1 Benchmark Costing Item-15 has been applied by VPA.

3.8.2 The extent of the respective intersections is generally higher than that of Item-06 reflected by longer 'legs' of secondary arterial roads (IN-16 only) and collector arterial roads. This is presented by higher quantities in most instances.

3.8.3 Based upon our independent cost estimate, variances additional to those already highlighted in Section 3.2.1 include:

- Intersection layouts include for dedicated turning lanes from secondary arterial roads to collector arterial roads.
- New items – allowances for rock excavation (assume 35% of total excavation volume), additional subgrade preparation, additional protection to conservation areas and services protection (protection slab for existing high-pressure gas line – IN-17 only) have been included in our estimate (as advised by Whittlesea City Council).
- Concrete works – additional areas of shared user paths.

3.9 BRIDGE, BR-01

3.9.1 This is a bespoke project and no benchmark costing estimate has been applied. We have based our independent estimate on the respective drawings (for BR-01) within the Donnybrook – Woodstock ICP Report.

3.9.2 Based upon our independent cost estimate, variances include:

- Site preparation – although included as a line item in the benchmark cost estimate, quantities have not been allocated.

- Earthworks – WT has allowed for imported fill for bridge abutments (behind reinforced earth walls).
- Overall Super T Cost (Main Span) – We have based our bridge area of 2,781 m^2 on a 176 m span x 15.8 m width (to face of barriers). We believe that a rate of \$3,700/m^2 is sufficient to include for abutments / piers / footings, guard rails, transition slab and kerb & channels. Hence, we are of the opinion that the VPA rates for these selected items appear to be high.
- Anti-Throw Barrier – rate appears to be low. We have based our rate of \$2,600/m on a 2.5 m high anti-throw barrier).
- GREAT Terminal – WT believes a rate of \$15,000/No. to be more adequate (VPA rate of \$5,050/No. appears low).
- New items – allowances included for:
  - Pier protection barriers (rail impact barriers @ up to 1.4 m wide x 2 m high x 2 No.)
  - Occupations Costs (\$750k – 3 weekend VLine occupation cost)
  - Provisional Allowance for Native Flora / Fauna (\$100k) and Cultural Heritage Works (\$50k) as advised by Whittlesea City Council.
- Reinforced Earth Embankment – WT has included reinforced earth walls (at abutments) for this item.
- Supervision & Project Management – We note that VPA has allowed 13% (of total direct cost) for this item (instead of the standard 9%). We agree with this increase due to the complexities which relate to construction over an existing rail corridor.
- Delivery costs (excl. Supervision & Project Management) – these are percentage driven costs and are proportional to the variances in direct costs.

3.10 BRIDGES, BR-02

3.10.1 Benchmark Costing Item-27 has been applied by VPA.

3.10.2 Based upon our independent cost estimate, the main variances include:

- Stripping of topsoil – quantity appears to be low, but rate appears to be high (appears that no allowance has been made for area taken up by batters).
- Formation of batters – quantity appears to be low. WT has assumed the reuse of stockpiled material for this item.
- Box Culvert Unit (incl. Link & Foundation Slabs) – in general rates appear to be low. Quantity for foundation slab appears to be high.
- Apron Slab – quantity appears to be low.
- Wing / Head Wall – quantities and rates appears to be low.
- Structural Fill – rate appears to be low.
- Delivery costs – these are percentage driven costs and are proportional to the variances in direct costs.

3.11 BRIDGES, BR-03 TO BR-04 INCLUSIVE

3.11.1 Benchmark Costing Item-27 has been applied by VPA.

3.11.2 We have based our review on a Bebo Arch Bridge Structure (as per DPM Peppercorn ICP) as instructed by Whittlesea City Council. This is not a like for like comparison as bebo arch bridge structures are different from box culvert bridge structures (Benchmark Costing Item-27) and tend to be more expensive due to the following:

- Larger precast structural components (arches & spandrel panels).
- Increased amount of structural backfill.
- Additional items – provisional allowances for native flora / fauna protection ($100k) and cultural heritage works ($50k) included (as advised by Whittlesea City Council).
- Delivery costs – these are percentage driven costs and are proportional to the variances in direct costs.

3.12 BRIDGE, BR-05

3.12.1 Benchmark Costing Item-19 has been applied by VPA. We have base our independent estimate on the respective drawings (for BR-05) within the Donnybrook – Woodstock ICP Report.

3.12.2 Based upon our independent cost estimate, the main variances include:

- Site preparation – although included as a line item in the benchmark cost estimate, quantities have not been allocated.
- Earthworks – WT has allowed for imported fill for bridge abutments (behind reinforced earth walls).
- Overall Super T Cost (Main Span) – quantity appears to be low. We have based our bridge area of 1,72 m^2 on a 50 m span x 34.83 m width and believe that a rate of $3,850/$m^2$ is sufficient (rate includes for transition slab). Hence, we believe the VPA rates for these selected items appear to be high.
- Guard Rails / Balustrade – quantity appears to be high and rate appears to be low.
- GREAT Terminal – WT believes a rate of $15,000/No. to be more adequate (VPA rate of $5,050/No. appears low).
- New items – provisional allowances for native flora / fauna protection ($100k) and cultural heritage works ($50k) included for this estimate (as advised by Whittlesea City Council).
- Reinforced Earth Embankment – WT has included reinforced earth walls (at abutments) for this item.
- Delivery costs – these are percentage driven costs and are proportional to the variances in direct costs.

3.13 SIGNALISED PEDESTRIAN INTERSECTIONS, PED-01 TO PED-03 INCLUSIVE

3.13.1 This is a bespoke project and no benchmark costing estimate has been applied (no detail cost breakdown provided by VPA).

3.13.2 We note that no detail cost breakdown has been provided for these projects (Ped-01 to Ped-03 inclusive) and we have assumed the respective estimated costs stated in section 3.2 of the VPA report for Donnybrook – Woodstock ICP to be P90 values.

3.13.3 No reference drawings have been provided for these projects, on this basis, we are unable to verify the quantities used. We assume the scope of works include for a signalised pedestrian crossing including commissioning works.

3.13.4 Based upon our benchmarked costing review, variances include:

- Crossing Construction / Materials – rate for this item appears to be high.
- New items – allowances for rock excavation and service protection (temporary works during construction for existing APA transmission gas line – Ped-02 & Ped-03 only) included for this estimate (as advised by Whittlesea City Council).
- Delivery costs – these are percentage driven costs and are proportional to the increase in direct costs

3.13.5 A detailed breakdown of all our cost estimates are attached as Appendix A.

4 ESTIMATE METHODOLOGY

The methodology that we have assumed in the preparation of the estimates are as follows:

4.1 COST ESTIMATES

4.1.1 Identification and review of the appropriate drawing(s) for each respective item as per the information /documentation provided (Section 1.5 refers).

4.1.2 Identification and quantification of the various measurable components that make up the cost estimate for each respective item (i.e. area of pavement / bridge deck, length of kerb / pipework, etc.).

4.1.3 Where alternate units of measurement have been used in the preparation of our cost estimates or where new items have been added, it has been noted in our detailed comments.

4.1.4 Our cost estimates are generally based upon 'first principles' estimating methods based upon current day rates and reflect the 'base case (or 'most likely') cost estimate. These have been benchmarked against rates from current projects of a similar nature within our cost database.

4.1.5 We have included allowances to cover site specific conditions for the various transport project sites based on information provided by Whittlesea City Council (refer Section 1.5). These allowances generally include for excavation in rock, additional subgrade

preparation, services relocation / protection, cultural heritage and protection of native flora / fauna.

4.1.6 Delivery costs have been included as a percentage consistent with those applied by the VPA.

4.2 RISK

4.2.1 The objective of risk analysis is to ascertain an appropriate level of cost contingency, based upon confidence levels. In the case of the Benchmark Infrastructure Costings report, VPA has included for P50 and P90 confidence levels which is consistent with many infrastructure projects.

4.2.2 The base case cost estimate excluding delivery costs has been used as the basis of our Monte Carlo risk-based modelling to provide a P50 and P90 output with which to compare to the Benchmarked Infrastructure costings.

4.2.3 We note that the risk model has been applied to the base case construction value only and therefore is a representation of inherent risk (quantifiable uncertainties) only.

4.2.4 It appears that no formal assessment of Contingent Risk has been undertaken and it is assumed that the Contingency percentage applied as part of the 'Delivery' costs seeks to cover those unmeasured items outside of the base case estimate.

4.2.5 Alternatively, by undertaking a risk assessment of the Donnybrook - Woodstock ICP, the issues unique to the region (i.e. Rock, contamination, environmental or cultural and heritage) could be further assessed and therefore, offer confidence that the Contingent risk included in the project estimates have been adequately covered.

4.2.6 All outputs of the risk modelling have been generated using Pallisade @RISK software for the Monte Carlo simulation for probabilistic cost estimation.

5 ESTIMATE INCLUSIONS & ASSUMPTIONS

The assumptions that we have used in the preparation of the estimates are as follows:

5.1 GENERALLY

5.1.1 Interpretation of design guidelines contained within the Benchmark Costings Report has been accepted.

5.1.2 As the Items represent generic transport projects, the cost estimates assume natural site profiles.

5.2 ROADS

5.2.1 Site preparation has been included based upon the overall length of the road x the road reserve width as indicated on the respective section drawing of each road type (refer Section 3.1.1 & 3.1.2).

5.2.2 Road pavement composition as per Table 3-3 Pavement makeup of the Cardno Benchmark Infrastructure Costing report.

5.2.3 Subgrade preparation has been included as a measured item based upon pavement areas rather than as a percentage as per Item Costing Sheets.

5.2.4 SUP / Footpath rate of $60/m^2$ has been based on a 120mm thk concrete footpath with SL72 reinforcement (as advised by Whittlesea City Council).

5.2.5 Drainage – We have based the drainage pipework quantity on the overall length of each road project respectively and pits at 50m centres (of drainage alignment).

5.2.6 Tree planting – The drawings provided do not indicate trees therefore quantities have been calculated based upon the spacing of trees indicated on the respective drawing of each road type.

5.2.7 Landscaping has been assumed as a split of 20% planting and 80% topsoil seeding. These quantities are calculated to the overall site area less paved areas.

5.2.8 Street Lighting – we have applied a different pricing methodology, based upon the number of light poles, calculated at 50m spacing along the length of the road alignment. We have assumed that no lighting is required to Shared User Paths or Cycle Paths.

5.2.9 Signage – we have assumed that no signage is required for the road projects (RD-01 to RD-05 inclusive).

5.2.10 Other – Allowances for rock excavation (assume 35% of total excavation volume), additional subgrade preparation, service protection and additional protection for conservation area included for selected road projects (as advised by Whittlesea City Council).

5.3 INTERSECTIONS

5.3.1 Site preparation has been included to the Ultimate project boundaries shown on the drawings.

5.3.2 Road pavement composition as per Table 3-3 Pavement makeup of the Cardno Benchmark Infrastructure Costing report.

5.3.3 Subgrade preparation has been included as a measured item based upon pavement areas rather than as a percentage as per Benchmark Costings Report.

5.3.4 SUP / Footpath rate of $60/m^2$ has been based on a 120 mm thk concrete footpath with SL72 reinforcement (as advised by Whittlesea City Council).

5.3.5 Drainage - The drawings provided do not indicate drainage pipes therefore sizing and layouts have been assumed similar to the Benchmark Cost item referenced by VPA. Generally, 450 mm pipe has been assumed along length of road, with 300 mm dia. pipe at 50 m spacing typically used as cross drainage. Pits are also assumed at 50 m spacing.

5.3.6 Traffic signals have been costed as an item per intersection.

5.3.7 Tree planting – The drawings provided do not indicate trees therefore quantities have been calculated based upon the spacing of trees indicated on the respective drawing of each road type and the number of trees indicated on the respective drawing of each intersection type.

5.3.8 Landscaping has been assumed as a split of 20% planting and 80% topsoil seeding. These quantities are calculated to the overall site area less paved areas.

5.3.9 Street Lighting – our pricing is based upon the number of light poles, as indicated on the respective drawing of each intersection type.

5.3.10 Other – Allowances for rock excavation (assume 35% of total excavation volume), additional subgrade preparation, service relocation / protection, cultural heritage and additional protection for conservation area included for selected intersection projects (as advised by Whittlesea City Council).

5.4 BRIDGES

5.4.1 Drawings provided have been used as the basis for our measurement. The following assumptions are reflected in our cost estimate (BR-03 & BR-04 based on Bedo Arch Structures as per DPM Peppercorn ICP – as instructed by Whittlesea City Council):

- Bridges
  - Piers – 100 mm diameter for BR-01; 900 mm diameter for BR-05.
  - 1200 deep super T beams to spans up to 26 m.
  - Anti-throw screens to road bridge over existing rail corridor (BR-01).
  - Pier protection barriers – assumed up to 1.4 m wide x 2 m high.
  - Allowance for Rail Occupation Costs included (BR-01 only).
  - Provisional allowances for protection of native flora / fauna and cultural heritage included.
- Culvert Structures
  - Wing walls & head walls are assumed to be 350mm thick with reinforcement at 350kg/m^3
  - Road pavement has been excluded as part of the culvert costings. This is absent from the VPA costs and we therefore, assume that this is included for elsewhere as part of road or intersection projects.
  - No allowance has been included for additional earthworks to suit interfaces with road projects
- Bebo Arch Structures
  - Bridge structure to consist of Humes Bebo Arch 6210S units (6 m diameter x 2.1 m height @ 11.9t/unit) and 12300S units (12 m diameter x 3 m height @ 16.8t/unit) including associated spandrel panels.
  - Allowance for associated earthworks (excavation, imported structural fill and compaction) and rock beaching included.

- Provisional allowances for protection of native flora / fauna and cultural heritage included (excluding BR-02).

5.5 SIGNALISED PEDESTRIAN INTERSECTIONS

5.5.1 No drawings provided (refer to Section 3.12 for scope assumptions). The following assumptions are reflected in our cost estimate:

- Selected projects include for signalised pedestrian crossing inclusive of commissioning.

5.6 DELIVERY COSTS

5.6.1 The VPA have set the percentages for delivery costs, and these have been applied in the preparation of the estimates as follows:

- Allowance for Survey & Design - 5% of total direct cost.
- Allowance for Contingency - 15% of total direct cost (20% for Bridges).
- Allowance for Traffic Management - 5% of total direct cost.
- Allowance for Supervision & Project Management - 9% of total direct cost (13% for BR-01 only)
- Allowance for Council Fees - 3.25% of total direct cost.
- Allowance for Vic Roads Fees - 1% of total direct cost.
- Allowance for Environmental Management - 0.5% of total direct cost.
- Allowance for Site Establishment - 2.5% of total direct cost.

6 ESTIMATE EXCLUSIONS

The exclusions that we have used in the preparation of the estimates are as follows:

- Lighting to footpaths
- Allowance for site remediation
- Contamination removal
- Relocation of existing services unless noted otherwise
- Underpinning of adjacent footings
- Works outside the site boundary
- Adjoining owner issues
- Loss of income and associated costs from affected businesses
- Negotiated contracts / construction management
- Financing costs
- Cost escalation in construction prices beyond October 2018
- Cost escalation until construction

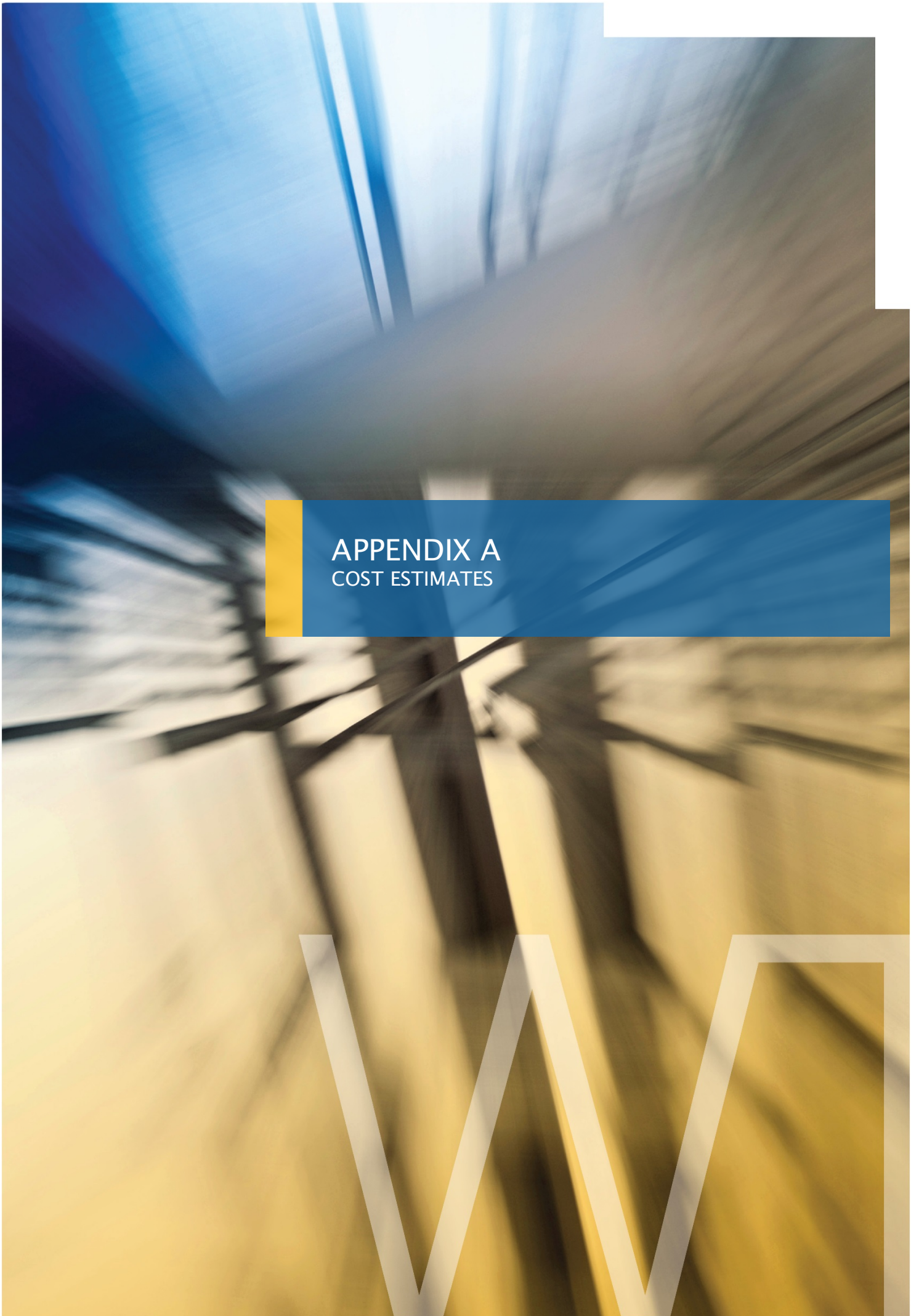
- Cost escalation until completion
- Legal costs
- GST

7 CONCLUSION

We conclude that the costs prepared by VPA for the Donnybrook - Woodstock Roads, Intersections, Bridges and Pedestrian Crossing projects are low by approx. **46.3%**, the reasons are detailed in our report.

Whilst there are many differences of quantity or scope, variances are also driven by differences in pricing. As we have noted in previous reports, the State Government's ongoing appetite to procure and deliver major infrastructure projects is putting increasing pressure on the Victorian market, and therefore, unlikely that demand for labour, plant and material resources is going to reduce in the medium term.

Should you require any further assistance in the above matters please do not hesitate to contact Mr Andrew Loh of WT Partnership.



APPENDIX A
COST ESTIMATES

Independent Peer Review
Donnybrook & Woodstock ICP
Summary

31.10.2018

Description	By VPA Total Cost (Including Delivery) (A)		By WTP Total Cost (Including Delivery) (B)		Diff. (A - B)		Difference %		Comments
	P50	P90	P50	P90	P50	P90	P50	P90	
	$	$	$	$	$	$			
Road Projects									
RD-01 Cameron Street: Sydney-Melbourne railway overpass to Patterson Drive – Construction of 2 lane carriageway, excluding intersections (interim treatment)	3,026,405	3,418,196	5,173,810	5,573,889	(2,147,404)	(2,155,692)	-71%	-63%	Bespoke Project - new items included for site preparation & subgrade preparation - all pavements have been assumed as secondary arterial pavements - quantities differ for pavements / SUP & linemarking (WT has based the quantities on the Cameron St Interim Cross Section - 2 lane split carriageway only with central median and provision to extend to 4 lane in the future, excluding local frontage road by VPA dated Oct 2017) - higher pavement rates - Allowances for rock excavation & additional subgrade prep included
RD-02 Gunns Gully Road: Sydney-Melbourne railway overpass to E6 / OMR reservation – Construction of 2 lane carriageway, excluding intersections (interim treatment)		8,538,250		13,689,791	N/A	(5,151,541)	N/A	-60%	VPA costs have been taken from Section 3.2, Table 5 of the Donnybrook - Woodstock ICP Report dated August 2018 (rate based on Item 1 of benchmark items) - WT assessment is based upon our assessment of Gunns Gully Rd Cross Section - 2 lane split carriageway only with central median and provision to extend to 6 lanes in the future, excluding local frontage rd by VPA dated Oct 2017 - all pavements have been assumed as primary arterial pavements - quantities differ for pavements / SUP & linemarking - higher pavement rates - Allowances for rock excavation, additional subgrade prep included, protection slab for existing gas main & additional protection for conservation area
RD-03 Patterson Drive: Donnybrook Road to Merri Creek – Construction of 2 lane carriageway, excluding intersections (interim treatment)	6,253,080	6,920,868	9,010,991	9,585,485	(2,757,911)	(2,664,617)	-44%	-39%	Bespoke Project - new items included for site preparation & subgrade preparation - all pavements have been assumed as secondary arterial pavements - quantities differ for pavements / SUP & linemarking (WT has based the quantities on the Patterson Dr Interim Cross Section - 2 lane split carriageway only with central median and provision to extend to 4 lane in the future, excluding local frontage road by VPA dated Oct 2017) - higher pavement rates - Allowances for rock excavation, additional subgrade prep included & additional protection for conservation area
RD-04 Patterson Drive: Merri creek to OMR/E6 reservation – Construction of 2 lane carriageway, excluding intersections (interim treatment)	2,619,926	2,899,995	4,791,424	5,159,599	(2,171,498)	(2,259,604)	-83%	-78%	Bespoke Project - new items included for site preparation & subgrade preparation - all pavements have been assumed as secondary arterial pavements - quantities differ for pavements / SUP & linemarking (WT has based the quantities on the Patterson Dr Interim Cross Section - 2 lane split carriageway only with central median and provision to extend to 4 lane in the future, excluding local frontage road by VPA dated Oct 2017) - higher pavement rates - Allowances for rock excavation & additional subgrade prep included
RD-05 Koukoura Drive: Donnybrook Road to Gunns Gully Road – Construction of 2 lane carriageway, excluding intersections (interim treatment)		3,838,544		6,284,006	N/A	(2,445,462)	N/A	-64%	VPA costs have been taken from Section 3.2, Table 5 of the Donnybrook - Woodstock ICP Report dated August 2018 (rate based on Item 2 of benchmark items) - WT assessment is based upon our assessment of Koukoura Dr Cross section - interim (2 lane split carriageway only with central median and provision to extend to 4 lanes in the future, excluding local frontage rd by VPA dated Oct 2017) - all pavements have been assumed as primary arterial pavements - quantities differ for pavements / SUP & linemarking - higher pavement rates - Allowances for rock excavation & additional subgrade prep included
TOTALS - ROAD PROJECTS	**11,899,412**	**25,615,854**	**18,976,224**	**40,292,770**	**(7,076,813)**	**(14,676,916)**			
				% Difference		**(57.3%)**			
Intersection Projects									
IN-01 - Donnybrook Road & Hayes Hill Boulevard/Langley Park Drive (N–S Blvd Connector) - Construction of an arterial to connector road 4-way intersection (interim treatment)	4,336,770	4,718,000	5,904,758	6,283,668	(1,567,989)	(1,565,668)	-36%	-33%	Bespoke Project - New items included for site preparation, demolition of existing pavements, subgrade preparation, tie-ins to existing pavements and removal of existing fencing - Donnybrook Rd assumed to be a Primary Arterial Road - Quantities differ significantly for SUP/Footpath, Traffic Islands & subsoil drainage - WT services relocation rate is based off 100m for relocation of OH electrical and comms along Donnybrook Rd - Higher pavement rates - Inclusion of street lighting costs
IN-02 - Donnybrook Road & Connector Street (N–S Connector) – Construction of an arterial to connector road 4-way intersection (interim treatment)	4,336,770	4,718,000	6,712,952	7,140,800	(2,376,183)	(2,422,800)	-55%	-51%	Bespoke Project - New items included for site preparation, demolition of existing pavements, subgrade preparation, tie-ins to existing pavements and removal of existing fencing - Donnybrook Rd assumed to be a Primary Arterial Road - Quantities differ significantly for SUP/Footpath, Traffic Islands & subsoil drainage - WT services relocation rate is based off 100m for relocation of OH electrical and comms along Donnybrook Rd - Higher pavement rates - Inclusion of street lighting costs
IN-03 - Donnybrook Road & Patterson Drive – Construction of an arterial to arterial road 4-way intersection (interim treatment)	5,297,210	5,823,000	7,958,074	8,470,461	(2,660,864)	(2,647,461)	-50%	-45%	Bespoke Project - New items included for site preparation, demolition of existing pavements, subgrade preparation, tie-ins to existing pavements and removal of existing fencing - Donnybrook Rd assumed to be a Primary Arterial Road - Quantities differ significantly for SUP/Footpath & subsoil drainage - VPA top soil seeding area only 2,600m2 vs WT 19,000m2 - WT services relocation rate is based off 100m for relocation of OH electrical and comms along Donnybrook Rd - Higher pavement rates - Inclusion of street lighting costs

Independent Peer Review
Donnybrook & Woodstock ICP
Summary

31.10.2018

Description	By VPA Total Cost (Including Delivery) (A)		By WTP Total Cost (Including Delivery) (B)		Diff. (A - B)		Difference %		Comments
IN-04 - Donnybrook Road & Koukoura Drive – Construction of an arterial to arterial road 4-way intersection (interim treatment)	5,297,210	5,823,000	8,428,419	9,186,309	(3,131,209)	(3,363,309)	-59%	-58%	Bespoke Project - New items included for site preparation, demolition of existing pavements, subgrade preparation, tie-ins to existing pavements and removal of existing fencing - Donnybrook Rd & Koukoura Drive assumed to be a Primary Arterial Road - Quantities differ significantly for SUP/Footpath & kerb & channel - VPA topsoil seeding area only 2,600m2 vs WT 21,000m2 - WT services relocation rate is based off 100m for relocation of OH electrical and comms along Donnybrook Rd - Higher pavement rates - Inclusion of street lighting costs
IN-05 - Donnybrook Road & Connector Street (Nth-Sth Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)	3,520,607	3,825,000	5,588,678	5,963,362	(2,068,070)	(2,138,362)	-59%	-56%	Bespoke Project - New items included for site preparation, demolition of existing pavements, subgrade preparation, tie-ins to existing pavements and removal of existing fencing - Donnybrook Rd assumed to be a Primary Arterial Road - Quantities differ significantly for SUP/Footpath & traffic island - VPA topsoil seeding area only 2,600m2 vs WT 21,000m2 - WT services relocation rate is based off 100m for relocation of OH electrical and comms along Donnybrook Rd - Higher pavement rates - Inclusion of street lighting costs as well as allowance for cultural heritage works
IN-06 - Hayes Hill Boulevard & Patterson Drive – Construction of an arterial to blvd connector road 4-way intersection (interim treatment)	3,972,466	4,383,158	7,178,091	7,596,042	(3,205,625)	(3,212,884)	-81%	-73%	Benchmark Costing Item-9 applied by VPA - New items included for site preparation & subgrade preparation - Patterson Drive assumed to be a Primary Arterial Road while Hayes Hill Blvd assumed to be a Collector Arterial Road - Quantities differ for SUP/Footpath, traffic island and landscaping (including topsoil seeding) - Higher pavement rates - Inclusion of street lighting costs - Additional extra over costs for rock excavation & subgrade preparation
IN-07 - Hayes Hill Boulevard & Koukoura Drive – Construction of an arterial to blvd connector road 4-way intersection (interim treatment)	3,972,466	4,383,158	5,986,559	6,397,241	(2,014,093)	(2,014,083)	-51%	-46%	Benchmark Costing Item-9 applied by VPA - New items included for site preparation & subgrade preparation - Patterson Drive assumed to be a Primary Arterial Road while Hayes Hill Blvd assumed to be a Collector Arterial Road - Quantities differ for SUP/Footpath, traffic island and landscaping (including topsoil seeding) - Higher pavement rates - Inclusion of street lighting costs - Additional extra over costs for rock excavation & subgrade preparation
IN-08 - Hayes Hill Boulevard & Merriang Road – Construction of an arterial to arterial 3-way intersection (interim treatment)	3,140,479	3,394,000	3,602,730	3,831,930	(462,251)	(437,930)	-15%	-13%	Bespoke Project - New items included for site preparation, demolition of existing pavements, subgrade preparation, tie-ins to existing pavements and removal of existing fencing - Hayes Hill Blvd & Merriang Rd are assumed to be Collector Arterial Roads - Quantities differ significantly for SUP/Footpath & kerb & channel - WT services relocation rate is based off 100m for relocation of OH electrical and comms on Merriang Rd (VPA's services relocation rate appears to be low) - Additional allowances for street lighting costs, extra over rock excavation and extra over cost for subgrade preparation - Higher pavement rates
IN-09 - Cameron Street / Connector Street (Nth–Sth Connector) – Construction of an arterial to connector road 4-way intersection (interim treatment)	3,972,466	4,383,158	5,180,867	5,467,008	(1,208,401)	(1,083,849)	-30%	-25%	Benchmark Costing Item-9 applied by VPA - New items included for site preparation & subgrade preparation - Cameron St assumed to be a Secondary Arterial Road, cross road measured as Collector Arterial Road - Quantities differ for SUP/Footpath, traffic island and landscaping (including topsoil seeding) - Higher pavement rates - Inclusion of street lighting costs - Additional extra over costs for rock excavation & subgrade preparation - Additional allowance for temporary protection during construction (for existing drainage corridor)
IN-10 - Cameron Street (arterial west/blvd connector east) & Patterson Drive (arterial) – Construction of an arterial to arterial/blvd connector road 4-way intersection (interim treatment)	4,720,246	5,145,136	8,048,076	8,661,752	(3,327,830)	(3,516,616)	-71%	-68%	Benchmark Costing Item-8 applied by VPA - New items included for site preparation & subgrade preparation - Cameron St assumed to be a Secondary Arterial Road and Koukoura Drive assumed to be a Primary Arterial Road - Quantities differ for SUP/Footpath, traffic island, kerb & channel & landscaping (including topsoil seeding) - Higher pavement rates - Inclusion of street lighting costs - Additional extra over costs for rock excavation & subgrade preparation.
IN-11 - Cameron Street (blvd connector west/town centre connector east) & Koukoura Drive (arterial) – Construction of an arterial to connector road 4-way intersection (interim treatment)	4,720,246	5,145,136	7,633,042	8,119,910	(2,912,797)	(2,974,774)	-62%	-58%	Benchmark Costing Item-8 applied by VPA - New items included for site preparation & subgrade preparation - Cameron St & Patterson St assumed to be Secondary Arterial Roads (VPA adopted same approach with quantities differing slightly) - Quantities also differ for SUP/Footpath, kerb & channel & landscaping (including topsoil seeding) - Higher pavement rates - Inclusion of street lighting costs - Additional extra over costs for rock excavation & subgrade preparation
IN-12 - Cameron Street / Merriang Road – Construction of an connector to arterial road 3-way intersection (interim treatment)	3,140,479	3,394,000	3,736,168	3,922,654	(595,689)	(528,654)	-19%	-16%	Bespoke Project - New items included for site preparation, demolition of existing pavements, subgrade preparation, tie-ins to existing pavements and removal of existing fencing - Merriang Rd assumed to be a Collector Arterial Road while Cameron St assumed to be a Primary Arterial Road - Quantities differ significantly for SUP/Footpath, traffic island & kerb & channel - WT services relocation rate is based off 100m for relocation of OH electrical and comms along Merriang Rd (VPA's services relocation rate appears to be low) - Additional allowances for street lighting costs, extra over rock excavation and extra over cost for subgrade preparation - Higher pavement rates

Independent Peer Review
Donnybrook & Woodstock ICP
Summary

31.10.2018

Description	By VPA Total Cost (Including Delivery) (A)		By WTP Total Cost (Including Delivery) (B)		Diff. (A - B)		Difference %		Comments
IN-13 - Gunns Gully Road & Connector St (Nth–Sth Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)	3,275,225	3,625,039	5,725,356	6,111,731	(2,450,130)	(2,486,691)	-75%	-69%	Benchmark Costing Item-13 applied by VPA - New items included for site preparation & subgrade preparation - Gunns Gully Rd assumed to be a Primary Arterial Road, side road has been assumed to be a Collector Arterial Road - Quantities differ for SUP/Footpath, traffic island, kerb & channel & landscaping (including topsoil seeding) - Higher pavement rates - Inclusion of street lighting cost and protection for conservation area - Additional extra over costs for rock excavation & subgrade preparation
IN-14 - Gunns Gully Road & Patterson Drive – Construction of an arterial to arterial road 4-way intersection (interim treatment)	5,078,677	5,572,439	8,464,168	8,997,605	(3,385,491)	(3,425,166)	-67%	-61%	Benchmark Costing Item-6 applied by VPA - New items included for site preparation & subgrade preparation - Gunns Gully Rd assumed to be a Primary Arterial Road and Paterson Drive assumed to be a Secondary Arterial Road - Quantities differ for SUP/Footpath, traffic island, kerb & channel & landscaping (including topsoil seeding) - Higher pavement rates - Inclusion of street lighting cost and protection for conservation area - Additional extra over costs for rock excavation & subgrade preparation
IN-15 - Gunns Gully Road & Koukoura Drive – Construction of an arterial to arterial road 4-way intersection (Connector road north of Gunns Gully Road) (interim treatment)	5,078,677	5,572,439	6,346,486	6,842,043	(1,267,810)	(1,269,604)	-25%	-23%	Benchmark Costing Item-6 applied by VPA - New items included for site preparation & subgrade preparation - Gunns Gully Rd & Koukoura Drive assume to be Primary Arterial Roads - Quantities differ for SUP/Footpath, traffic island, kerb & channel & landscaping (including topsoil seeding) - Higher pavement rates - Inclusion of street lighting cost - Additional extra over costs for rock excavation & subgrade preparation
IN-16 - Patterson Drive / Connector St (East–West Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)	3,006,961	3,312,141	5,065,127	5,359,941	(2,058,166)	(2,047,800)	-68%	-62%	Benchmark Costing Item-15 applied by VPA - New items included for site preparation & subgrade preparation - Patterson Drive assumed to be a Secondary Arterial Road, side road assumed to be a Collector Arterial Road - Quantities differ for SUP/Footpath, traffic island, & landscaping (including topsoil seeding) - Higher pavement rates - Inclusion of street lighting cost and additional protection for conversation area - Additional extra over costs for rock excavation & subgrade preparation
IN-17 - Patterson Drive / Connector St (East–West Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)	3,006,961	3,312,141	4,098,971	4,319,066	(1,092,010)	(1,006,924)	-36%	-30%	Benchmark Costing Item-15 applied by VPA - differences include site preparation, subgrade preparation missing from VPA's costings - Inclusion of street lighting costs and additional protection for conservation area - Inclusion of protection slab for high pressure gas line which passes through IN-17 according to Donnybrook ICP Utilities Map - Minimal differences in quantity for drainage pipes, SUP/Footpaths & kerbs & channels - Landscaping area only 4,000m2 for VPA, whereas WT 1,800m2 (WT's topsoil seeding allowance is almost double VPA's) - overall quantity of pavement is similar however, appears to be a difference in demarcation of secondary & collector pavements - higher rates for pavements
TOTALS - INTERSECTION PROJECTS	**69,873,913**	**76,528,948**	**105,658,521**	**112,671,523**	**(35,784,609)**	**(36,142,576)**			
				% Difference	**(51.2%)**	**(47.2%)**			
Bridge Projects									
BR-01 - Cameron Street: Construct a 2 lane interim road bridge spanning Merri Creek and Melbourne-Sydney Railway	20,298,015	23,116,643	19,517,601	21,780,380	780,414	1,336,263	4%	6%	Bespoke Project (based on Dwg 140638-C003 Rev 3 within Donnybrook-Woodstock ICP Aug 2018) - BR-01 comprises the construction a 2 lane interim road bridge spanning Merri Creek and Melbourne-Sydney Railway with deck area of 176m span x 15.8m width - new items included for site preparation & subgrade preparation - Super-T rate appears to be high - Anti-throw barrier (WT's rate based on 2.4m high anti-throw barrier) and GREAT terminal rates appear to be low - Allowance for rail impact pier protection included (up to 1400 wide x 2000 high x 2 No.) - Allowances for reinforced earth wall with imported fill (behind) included at bridge abutments - Allowance for rail occupation costs included (based on 3 weekend occupational costs for VLine) - Allowances for protection of native flora/fauna (Growling Grass Frog) and cultural heritage included
BR-02 - Patterson Drive: Construct a 2 lane interim culvert crossing of constructed waterway	690,624	794,217	927,611	970,447	(236,987)	(176,230)	-34.3%	-22%	Benchmark Costing Item-27 applied by VPA - quantities differ for apron, headwalls & wing walls, possibly only measured to one side /end of culvert - rates differ for box culvert units, head walls & wing walls
BR-03 - Hayes Hill Boulevard: Construct a Growling Grass Frog Habitat suitable culvert/bridge crossing of Darebin Creek – 2 lane culvert crossing	690,624	794,217	3,441,786	3,574,287	(2,751,162)	(2,780,070)	-398.4%	-350%	Benchmark Costing Item-27 applied by VPA (WT review based on Bebo Arch Structure as per DPM Peppercorn ICP as advised by Whittlesea City Council) - Not a like for like comparison as bebo arch structure is more costly compared to a regular box culvert bridge structre - Allowances for rock excavation, protection of native flora/fauna (Growling Grass Frog) and cultural heritage included
BR-04 - Cameron Street: Construct a Growling Grass Frog Habitat suitable culvert/bridge crossing of Darebin Creek – 2 lane culvert crossing	690,624	794,217	3,241,327	3,373,076	(2,550,704)	(2,578,859)	-369.3%	-325%	

Independent Peer Review
Donnybrook & Woodstock ICP
Summary

31.10.2018

Description	By VPA Total Cost (Including Delivery) (A)		By WTP Total Cost (Including Delivery) (B)		Diff. (A - B)		Difference %		Comments
BR-05 - Patterson Drive: Construct a 2 lane interim bridge crossing of Merri Creek	5,828,456	6,414,305	12,359,097	13,798,090	(6,530,641)	(7,383,785)	-112.0%	-115%	Benchmark Costing Item-19 applied by VPA - BR-05 comprises the construction of a 2 lane interim bridge crossing of Merri Creek with deck area based on 50m long span x deck width of 34.83m - new items included for site preparation & subgrade preparation - Super-T rate appears to be high - Guard rails / balustrade and GREAT terminal rates appear to be low - Allowances for reinforced earth wall with imported fill (behind) included at bridge abutments - Allowances for protection of native flora/fauna (Growling Grass Frog) and cultural heritage included
TOTALS - BRIDGE PROJECTS	**28,198,341**	**31,913,599**	**39,487,421**	**43,496,280**	**(11,289,080)**	**(11,582,681)**			
				% Difference	**(40.0%)**	**(36.3%)**			
Signalised Pedestrian Intersection Projects									
Ped-01 - Crossing Patterson Drive between Donnybrook Road and Hayes Hill Boulevard associated with the key local access street connecting Donnybrook Station to the Non Gov't. P–12 school campus and SR-02		276,614		271,702	N/A	4,912	N/A	2%	Bespoke Project - Allowance for excavation in rock included (signal post footings / conduits etc.)
Ped-02 - Crossing Gunns Gully Road between Koukoura Drive and Patterson Drive associated with the shared path along the gas pipeline easement		276,614		302,665	N/A	(26,051)	N/A	-9%	Bespoke Project - Allowance for excavation in rock included (signal post footings / conduits etc.) - Allowance for protection of existing APA gas main included
Ped-03 - Crossing Donnybrook Road between Koukoura Drive and Patterson Drive associated with the shared path along the gas pipeline easement connecting south to Northern Quarries PSP		276,614		302,665	N/A	(26,051)	N/A	-9%	
TOTALS - SIGNALISED PEDESTRIAN INTERSECTION PROJECTS	**-**	**829,842**	**-**	**877,032**	**0**	**(47,190)**			
				% Difference	**N/A**	**(5.7%)**			
GRAND TOTAL - ALL PROJECTS		**134,888,243**		**197,337,605**		**(62,449,363)**			
				% Difference		**(46.3%)**			

31.10.2018

VPA							WTP			
ICP Project ID	Project Description	Treatment	Estimated Total Cost (P90)	UoM	Estimated Length of Project	Assumed Rate per lm of road corridor	Estimated Total Cost (P90)	UoM	Estimated Length of Project	Assumed Rate per lm of road corridor
			$		m	$	$		m	$
									assumed same as VPA	
Item 1	VPA Benchmark Costing - Primary Arterial road (for RD-02)	Interim	2,787,821	m	800	3,485	13,689,791	m	**2450**	5,588
Item 2	VPA Benchmark Costing - Secondary Arterial road (for RD-05)	Interim	2,702,456	m	800	3,378	6,284,006	m	**1136**	5,532
Mt Atkinson & Tarneit Plains ICP Costings										
RD-01	Cameron Street: Sydney-Melbourne railway overpass to Patterson Drive – Construction of 2 lane carriageway, excluding intersections (interim treatment)	Interim	3,418,196	m	843	4,055	5,573,889	m	843	6,612
RD-02	Gunns Gully Road: Sydney-Melbourne railway overpass to E6 / OMR reservation – Construction of 2 lane carriageway, excluding intersections (interim treatment) - (length of road derived by dividing Estimated Cost for in Section 3.2 table by rate per linear metre of Benchmark Item 1, which road projec is based on)	Interim	8,538,250	m	**2,450**	3,485	13,689,791	m	**2,450**	5,588
RD-03	Patterson Drive: Donnybrook Road to Merri Creek – Construction of 2 lane carriageway, excluding intersections (interim treatment)	Interim	6,920,868	m	1,862	3,717	9,585,485	m	1,862	5,148
RD-04	Patterson Drive: Merri creek to OMR/E6 reservation – Construction of 2 lane carriageway, excluding intersections (interim treatment)	Interim	2,899,995	m	778	3,728	5,159,599	m	778	6,632
RD-05	Koukoura Drive: Donnybrook Road to Gunns Gully Road – Construction of 2 lane carriageway, excluding intersections (interim treatment) - (length of road derived by dividing Estimated Cost for in Section 3.2 table by rate per linear metre of Benchmark Item 2, which road projec is based on)	Interim	3,838,544	m	**1,136**	3,379	6,284,006	m	**1,136**	5,532
				m	7,069			m	7,069	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

RD-01 - Cameron Street: Sydney-Melbourne railway overpass to Patterson Drive – Construction of 2 lane carriageway, excluding intersections (interim treatment)

31.10.2018

843 m

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-	%	2.39	-	2.70	-	31,865	m2	2.50	79,664	88,032	94,839	(88,032)	(94,839)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Demolition of existing pavements								m2	25.00	0			-	-	
	Earthworks	5,411	m3	35.43	191,669	40.63	219,815	5,888	m3	39.00	229,646	253,770	273,393	(62,101)	(53,578)	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	171.71	-		m2	155.00	0			-	-	
	Secondary Arterial Pavement	7,567	m2	123.23	932,498	130.48	987,351	9,273	m2	141.00	1,307,493	1,444,844	1,556,571	(512,346)	(569,220)	Quantity is low based upon WT measured areas; pavement area assume to include chevron and on road bike path areas (2 lane carriageway only with provision to extend to 4 lane in the future, excluding local frontage road as per Cameron St Interim Cross Section) Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-		m2	126.00	0			-	-	
	Subgrade preparation	-	%	15.21	-	17.86	-	9,273	m2	2.50	23,183	25,618	27,599	(25,618)	(27,599)	Quantity missing; cost item required.
	Pavement rehab	-	m2	45.90	-	45.90	-		m2		0			-	-	
	Pavement other	-	m2	-	-	-	-		m2		0			-	-	
Concrete Works	Kerb & channel	1,682	m	50.42	84,785	56.78	95,488	3,372	m	55.00	185,460	196,856	212,079	(112,071)	(116,590)	Quantity is low based upon WT measured lengths; assume kerb / channel on both sides of each carriageway
	Cycle path	-	m2	59.60	-	69.63	-		m2	50.00	0			-	-	
	SUP / Footpath	1,682	m2	58.44	98,279	68.10	114,513	5,058	m2	60.00	303,480	322,128	347,038	(223,849)	(232,525)	Quantity is low based upon WT measured areas; pavement area assume to 3m wide SUP on both side of road Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	-	m2	71.43	-	76.92	-		m2	60.00	0			-	-	
Drainage	Drainage pipe - 300mm CR backfilled	105	m	162.30	17,058	176.53	18,553	105	m	225.00	23,681	26,169	28,192	(9,111)	(9,639)	
	Drainage pipe - 375mm CR backfilled	368	m	226.68	83,385	247.84	91,166	369	m	260.00	95,908	105,983	114,178	(22,597)	(23,011)	Rate appears to be low
	Drainage pipe - 450mm CR backfilled	368	m	291.67	107,290	322.90	118,779	369	m	290.00	106,974	118,211	127,352	(10,922)	(8,573)	
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	404.67	-		m	355.00	0			-	-	
	Drainage - pits	17	no.	2,325.57	39,107	2,510.70	42,220	17	no.	2,150.00	36,550	43,583	46,953	(4,476)	(4,733)	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	1,682	m	23.05	38,756	26.77	45,010	3,372	m	45.00	151,740	167,680	180,646	(128,924)	(135,636)	Quantitiy & rate low - allowances include for pits and risers
	Drainage - culvert	-	no.	-	-	-	-		no.		0			-	-	
Traffic	Traffic Signals	-	Item	88,375.88	-	100,881.35	-		Item	300,000.00	0			-	-	
	Traffic Signal conduit	-	m	45.71	-	53.99	-		m		0			-	-	
Landscape	Tree Planting	114	no.	259.62	29,468	322.72	36,631	169	no.	250.00	42,250	44,846	48,314	(15,378)	(11,683)	Quantity appears to be low; assumes trees @15m spacing along road length on median & nature strips (as per Cameron St Interim Cross Section)
	Landscaping	-	m2	20.72	-	23.48	-	3,507	m2	15.00	52,603	55,836	60,153	(55,836)	(60,153)	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding	2,522	m2	7.00	17,647	7.98	20,138	14,028	m2	5.50	77,151	81,892	88,225	(64,245)	(68,086)	
Street Lighting	Street lighting (all inclusive)	841	m	207.67	174,606	237.49	199,680	17	no.	12,000.00	204,000	225,430	242,862	(50,824)	(43,182)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	-	Item / pe	-	-	-	-		Item / per leg		0			-	-	
Misc.	Regulatory signage	-	Item	329.29	-	365.51	-		Item	350.00	0			-	-	
	Linemarking	7,567	m2 of pa	2.40	18,182	2.84	21,474	9,273	m2 of pa	2.50	23,183	24,607	26,510	(6,425)	(5,036)	Quantity appears to be low; based on new pavement quantity
	Landscape maintenance	-	Item	75,000.00	-	86,250.00	-	1	Item	104,000.00	104,000	105,874	114,062	(105,874)	(114,062)	Quantity missing
	Tactile pavers (hazard only)	-	Item	337.14	-	428.57	-		Item	320.00	0			-	-	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

RD-01 - Cameron Street: Sydney-Melbourne railway overpass to Patterson Drive – Construction of 2 lane carriageway, excluding intersections (interim treatment)

843 m

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Other	Service relocation and local site conditions	1	Item	309,859.44	309,859	409,143.00	409,143		Item					309,859	409,143	Items below include for allowances for local site conditions
	Extra over cost for excavation in rock				-		-	1	Item	207,000.00	207,000	228,745	246,434	(228,745)	(246,434)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	93,000.00	93,000	102,770	110,717	(102,770)	(110,717)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
					-		-							-	-	
					-		-							-	-	
Delivery	Surveying & Design	1	%	5.00	107,129	5.00	120,998	1	%	5.00	167,348	$ 183,143.70	$ 197,305.79	(76,014)	(76,308)	% driven item
	Contingency	1	%	15.00	321,388	15.00	362,994	1	%	15.00	502,045	$ 549,431.10	$ 591,917.37	(228,043)	(228,923)	% driven item
	Traffic Management	1	%	5.00	107,129	5.00	120,998	1	%	5.00	167,348	$ 183,143.70	$ 197,305.79	(76,014)	(76,308)	% driven item
	Supervision & Project Management	1	%	9.00	192,833	9.00	217,797	1	%	9.00	301,227	$ 329,658.66	$ 355,150.42	(136,826)	(137,354)	% driven item
	Council Fees	1	%	3.25	69,634	3.25	78,649	1	%	3.25	108,776	$ 119,043.41	$ 128,248.76	(49,409)	(49,600)	% driven item
	Vic Roads Fees	1	%	1.00	21,426	1.00	24,200	1	%	1.00	33,470	$ 36,628.74	$ 39,461.16	(15,203)	(15,262)	% driven item
	Environmental Management	1	%	0.50	10,713	0.50	12,100	1	%	0.50	16,735	$ 18,314.37	$ 19,730.58	(7,601)	(7,631)	% driven item
	Site Establishment	1	%	2.50	53,565	2.50	60,499	1	%	2.50	83,674	$ 91,571.85	$ 98,652.90	(38,007)	(38,154)	% driven item
TOTAL	Excluding Delivery				**2,142,588**		**2,419,962**				**3,346,964**	**$ 3,662,874**	**$ 3,946,116**	**(1,520,286)**	**(1,526,154)**	
	Including Delivery				**3,026,405**		**3,418,196**				**4,727,587**	**$ 5,173,810**	**$ 5,573,889**	**(2,147,404)**	**(2,155,692)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

RD-02 - Gunns Gully Road: Sydney-Melbourne railway overpass to E6 / OMR reservation – Construction of 2 lane carriageway, excluding intersections (interim treatment)

Benchmark Item 1

2,450 m

31.10.2018

		VPA (Qty & Cost Basd on Benchmark Item 1)						WTP (Qty based on Gunns Gully Cross Rd Section - Interim)						Difference (Indicative only as VAP has based project on Benchmark Item make up only - total estimated cost differs)		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-		2.39	-	2.68	-	100,450	m2	2.50	251,125	277,962	296,202	*(277,962)*	*(296,202)*	Quantity missing; Quantity based on Gunns Gully Cross Rd section - interim (2 lanes only with provision to extend to 6 lanes in the future, excluding local frontage rd). Rate includes for site clearance & topsoil removal to suit Interim design standard from edge of road reserve through centre verge.
	Earthworks	4,200	m3	35.43	148,785	40.63	170,634	12,262	m3	39.00	478,228	529,334	564,069	*(380,549)*	*(393,435)*	Quantity based on Gunns Gully Rd Cross section - interim (2 lanes only with provision to extend to 6 lanes in the future).
Road Pavements	Primary Arterial Pavement	5,600	m2	157.08	879,648	171.71	961,596	17,150	m2	155.00	2,658,250	2,942,327	3,135,402	*(2,062,679)*	*(2,173,806)*	Quantity based on Gunns Gully Rd Cross section - interim (2 lanes only with provision to extend to 6 lanes in the future). Rate is low based upon nominated pavement depth.
	Secondary Arterial Pavement	-	m2	123.23	-	130.48	-		m2	141.00	0			-	-	
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-		m2	126.00	0			-	-	
	Subgrade preparation	-	%	15.21	-	17.86	-	17,150	m2	2.50	42,875	47,457	50,571	*(47,457)*	*(50,571)*	Quantity missing; cost item required.
	Pavement rehab	-	m2	45.90	-	45.90	-		m2		0			-	-	
	Pavement other	-	m2	-	-	-	-		m2		0			-	-	
Concrete Works	Kerb & channel	1,600	m	50.42	80,670	56.78	90,855	9,800	m	55.00	539,000	573,061	610,665	*(492,391)*	*(519,811)*	WT measured lengths; assume kerb / channel on both sides of each carriageway
	Cycle path	2,400	m2	59.60	143,040	69.63	167,121		m2	50.00	0			*143,040*	*167,121*	Included in Primary Arterial Pavement costs
	SUP / Footpath	-	m2	58.44	-	68.10	-	18,375	m2	60.00	1,102,500	1,172,170	1,249,088	*(1,172,170)*	*(1,249,088)*	Quantity based on Gunns Gully Cross Rd section - interim (2 lanes only with provision to extend to 6 lanes in the future). Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	-	m2	71.43	-	76.92	-		m2	60.00	0			-	-	
Drainage	Drainage pipe - 300mm CR backfilled	100	m	162.30	16,230	176.53	17,653	306	m	225.00	68,906	76,270	81,275	*(60,040)*	*(63,622)*	Quantity based on overall road alignment length of 2,450m
	Drainage pipe - 375mm CR backfilled	350	m	226.68	79,339	247.84	86,743	1,072	m	260.00	278,688	308,470	328,712	*(229,131)*	*(241,969)*	
	Drainage pipe - 450mm CR backfilled	350	m	291.67	102,083	322.90	113,015	1,072	m	290.00	310,844	344,062	366,640	*(241,979)*	*(253,624)*	
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	404.67	-		m	355.00	0			-	-	
	Drainage - pits	16	no.	2,325.57	37,209	2,510.70	40,171	49	no.	2,150.00	105,350	125,828	134,084	*(88,618)*	*(93,913)*	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	1,600	m	23.05	36,875	26.77	42,826	9,800	m	45.00	441,000	488,128	520,159	*(451,253)*	*(477,333)*	Quantity based on kerb length measured. Rate low - allowances include for pits and risers
	Drainage - culvert	-	no.	-	-	-	-		no.		0			-	-	
Traffic	Traffic Signals	-	Item	88,375.88	-	100,881.35	-		Item	250,000.00	0			-	-	
	Traffic Signal conduit	-	m	45.71	-	53.99	-		m		0			-	-	
Landscape	Tree Planting	160	no.	259.62	41,538	322.72	51,635	492	no.	250.00	123,000	130,773	139,354	*(89,234)*	*(87,719)*	Quantity assumes trees @15m spacing along road length on median & nature strips (as per Gunns Gully Rd Interim Cross Section)
	Landscaping	-	m2	20.72	-	23.48	-	12,985	m2	15.00	194,775	207,083	220,672	*(207,083)*	*(220,672)*	Quantity assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding	3,200	m2	7.00	22,387	7.98	25,548	51,940	m2	5.50	285,670	303,722	323,653	*(281,335)*	*(298,105)*	
Street Lighting	Street lighting (all inclusive)	800	m	207.67	166,133	237.49	189,990	49	no.	12,000.00	588,000	650,837	693,545	*(484,704)*	*(503,555)*	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	-	Item / p	-	-	-	-		Item / per leg		0					
Misc.	Regulatory signage	-	Item	329.29	-	365.51	-		Item	350.00	0					
	Linemarking	5,600	m2 of pa	2.40	13,455	2.84	15,891	17,150	m2 of pa	2.50	42,875	45,584	48,576	*(32,129)*	*(32,684)*	Quantity based on Gunns Gully Rd Cross section - interim (2 lanes only with provision to extend to 6 lanes in the future).
	Landscape maintenance	-	Item	75,000.00	-	86,250.00	-	1	Item	104,000.00	104,000	106,049	113,007	*(106,049)*	*(113,007)*	Quantity missing
	Tactile pavers (hazard only)	-		337.14	-	428.57	-		Item		0			-	-	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

RD-02 - Gunns Gully Road: Sydney-Melbourne railway overpass to E6 / OMR reservation – Construction of 2 lane carriageway, excluding intersections (interim treatment)

Benchmark Item 1

2,450 m

31.10.2018

		VPA (Qty & Cost Basd on Benchmark Item 1)						WTP (Qty based on Gunns Gully Cross Rd Section - Interim)								
Item	**Sub Item**	**Qty**	**Unit**	**Rate (P50)**	**Amount (P50)**	**Rate (P90)**	**Amount (P90)**	**Qty**	**Unit**	**Rate**	**Amount**	**Amount (P50)**	**Amount (P90)**	***Difference (Indicative only as VAP has based project on Benchmark Item make up only - total estimated cost differs) (P50)***	***Difference (Indicative only as VAP has based project on Benchmark Item make up only - total estimated cost differs) (P90)***	**Comments**
Other	Services reloaction				-		-		Item					-	-	Items below include for allowances for local site conditions & service protection
	Extra over cost for excavation in rock				-		-	1	Item	430,000.00	430,000	475,952	507,184	*(475,952)*	*(507,184)*	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	172,000.00	172,000	190,381	202,874	*(190,381)*	*(202,874)*	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
	Protection slab for high pressure gas line				-		-	1	Item	80,000.00	80,000	88,549	94,360	*(88,549)*	*(94,360)*	WT's rate based on 45m x 1.5m wide x 150mm thk concrete protection slab including non-destructive digging & gas authority costs
	Allowance for additional protection for conservation area				-		-	1	Item	10,000.00	10,000	11,069	11,795	*(11,069)*	*(11,795)*	Allowance for additional protection during construction
					-		-									
Delivery	Surveying & Design	1	%	5.00	88,370	5.00	98,684	1	%	5.00	415,354	$ 454,753.41	$ 484,594.38	*(366,384)*	*(385,910)*	% driven item
	Contingency	1	%	15.00	265,109	15.00	296,052	1	%	15.00	1,246,063	$ 1,364,260.23	$ 1,453,783.15	*(1,099,151)*	*(1,157,731)*	% driven item
	Traffic Management	1	%	5.00	88,370	5.00	98,684	1	%	5.00	415,354	$ 454,753.41	$ 484,594.38	*(366,384)*	*(385,910)*	% driven item
	Supervision & Project Management	1	%	9.00	159,065	9.00	177,631	1	%	9.00	747,638	$ 818,556.14	$ 872,269.89	*(659,491)*	*(694,639)*	% driven item
	Council Fees	1	%	3.25	57,440	3.25	64,145	1	%	3.25	269,980	$ 295,589.72	$ 314,986.35	*(238,149)*	*(250,842)*	% driven item
	Vic Roads Fees	1	%	1.00	17,674	1.00	19,737	1	%	1.00	83,071	$ 90,950.68	$ 96,918.88	*(73,277)*	*(77,182)*	% driven item
	Environmental Management	1	%	0.50	8,837	0.50	9,868	1	%	0.50	41,535	$ 45,475.34	$ 48,459.44	*(36,638)*	*(38,591)*	% driven item
	Site Establishment	1	%	2.50	44,185	2.50	49,342	1	%	2.50	207,677	$ 227,376.70	$ 242,297.19	*(183,192)*	*(192,955)*	% driven item
TOTAL	Excluding Delivery				**1,767,394**		**1,973,679**				**8,307,085**	**9,095,068**	**9,691,888**	***(7,327,674)***	***(7,718,209)***	
	Including Delivery				**2,496,445**		**2,787,821**				**11,733,758**	**12,846,784**	**13,689,791**	***(10,350,339)***	***(10,901,970)***	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

RD-03 - Patterson Drive: Donnybrook Road to Merri Creek – Construction of 2 lane carriageway, excluding intersections (interim treatment)

WT PARTNERSHIP

31.10.2018

1,862 m

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-	%	2.39	-	2.70	-	70,384	m2	2.50	175,959	194,795	207,214	(194,795)	(207,214)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Demolition of existing pavements								m2	25.00	0			-	-	
	Earthworks	11,982	m3	35.43	424,461	40.63	486,793.70	8,277	m3	39.00	322,787	357,340	380,122	67,121	106,671	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	171.71	-		m2	155.00	0			-	-	
	Secondary Arterial Pavement	16,758	m2	123.23	2,065,070	130.48	2,186,544.71	13,034	m2	141.00	1,837,794	2,034,523	2,164,234	30,546	22,311	Quantity is low based upon WT measured areas; pavement area assume to include chevron and on road bike path areas (2 lane carriageway only with provision to extend to 4 lane in the future, excluding local frontage road as per Patterson Dr Interim Cross Section) Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-		m2	126.00	0			-	-	
	Subgrade preparation	-	%	15.21	-	17.86	-	13,034	m2	2.50	32,585	36,073	38,373	(36,073)	(38,373)	Quantity missing; cost item required.
	Pavement rehab	-	m2	45.90	-	45.90	-		m2		0			-	-	
	Pavement other	-	m2	-	-	-	-		m2		0			-	-	
Concrete Works	Kerb & channel	3,724	m	50.42	187,761	56.78	211,463.93	7,448	m	55.00	409,640	435,597	463,369	(247,837)	(251,905)	Quantity is low based upon WT measured lengths; assume kerb / channel on both sides of each carriageway
	Cycle path	-	m2	59.60	-	69.63	-		m2	50.00	0			-	-	
	SUP / Footpath	3,724	m2	58.44	217,645	68.10	253,594.97	11,172	m2	60.00	670,320	712,796	758,240	(495,151)	(504,645)	Quantity is low based upon WT measured areas; pavement area assume to 3m wide SUP on both side of road Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	-	m2	71.43	-	76.92	-		m2	60.00	0			-	-	
Drainage	Drainage pipe - 300mm CR backfilled	233	m	162.30	37,775	176.53	41,087.18	233	m	225.00	52,369	57,975	61,671	(20,199)	(20,584)	Rate appears to be low
	Drainage pipe - 375mm CR backfilled	815	m	226.68	184,661	247.84	201,893.33	815	m	260.00	211,803	234,475	249,424	(49,814)	(47,531)	
	Drainage pipe - 450mm CR backfilled	815	m	291.67	237,599	322.90	263,043.45	815	m	290.00	236,241	261,530	278,204	(23,931)	(15,160)	
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	404.67	-		m	355.00	0			-	-	
	Drainage - pits	37	no.	2,325.57	86,604	2,510.70	93,498.56	38	no.	2,150.00	81,700	97,596	103,819	(10,992)	(10,320)	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,724	m	23.05	85,827	26.77	99,677.43	7,448	m	45.00	335,160	371,038	394,693	(285,211)	(295,016)	Quantitiy & rate low - allowances include for pits and risers
	Drainage - culvert	-	no.	-	-	-	-		no.		0			-	-	
Traffic	Traffic Signals	-	Item	88,375.88	-	100,881.35	-		Item	300,000.00	0			-	-	
	Traffic Signal conduit	-	m	45.71	-	53.99	-		m		0			-	-	
Landscape	Tree Planting	154	no.	259.62	40,067	322.72	49,806.00	375	no.	250.00	93,750	99,691	106,046	(59,624)	(56,240)	Quantity appears to be low; assumes trees @15m spacing along road length on median & nature strips (as per Patterson Dr Interim Cross Section)
	Landscaping	-	m2	20.72	-	23.48	-	9,236	m2	15.00	138,533	147,311	156,703	(147,311)	(156,703)	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding	5,586	m2	7.00	39,080	7.98	44,597.46	36,942	m2	5.50	203,181	216,056	229,831	(176,977)	(185,233)	Assume 20% landscape planting & 80% topsoil seeding
Street Lighting	Street lighting (all inclusive)	1,862	m	207.67	386,676	237.49	442,202.77	38	no.	12,000.00	456,000	504,813	536,997	(118,138)	(94,795)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	-	Item / pe	-	-	-	-		Item / per leg		0			-	-	
Misc.	Regulatory signage	-	Item	329.29	-	365.51	-		Item	350.00	0			-	-	
	Linemarking	16,758	m2 of pa	2.40	40,265	2.84	47,554.69	13,034	m2 of pa	2.50	32,585	34,650	36,859	5,615	10,696	Quantity appears to be low; based on new pavement quantity
	Landscape maintenance	-	Item	75,000.00	-	86,250.00	-	1	Item	104,000.00	104,000	106,066	112,828	(106,066)	(112,828)	Quantity missing
	Tactile pavers (hazard only)	-	Item	337.14	-	428.57	-		Item	320.00	0			-	-	
	Service relocation and local site conditions	1	Item	393,469.18	393,469	477,971.00	477,971.00		Item					393,469	477,971	Items below include for allowances for local site conditions & service protection

VPA Benchmarked Infrastructure Costings - Independent Peer Review

RD-03 - Patterson Drive: Donnybrook Road to Merri Creek – Construction of 2 lane carriageway, excluding intersections (interim treatment)

WT PARTNERSHIP

1,862 m

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Other	Extra over cost for excavation in rock				-		-	1	Item	290,000.00	290,000	321,043	341,512	(321,043)	(341,512)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	131,000.00	131,000	145,023	154,269	(145,023)	(154,269)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
	Allowance for additional protection for conservation area				-		-	1	Item	10,000.00	10,000	11,070	11,776	(11,070)	(11,776)	Allowance for additional protection during construction
					-		-							-	-	
Delivery	Surveying & Design	1	%	5.00	221,348	5.00	244,986	1	%	5.00	291,270	$ 318,973.12	$ 339,309.20	(97,625)	(94,323)	% driven item
	Contingency	1	%	15.00	664,044	15.00	734,959	1	%	15.00	873,811	$ 956,919.37	$ 1,017,927.61	(292,875)	(282,968)	% driven item
	Traffic Management	1	%	5.00	221,348	5.00	244,986	1	%	5.00	291,270	$ 318,973.12	$ 339,309.20	(97,625)	(94,323)	% driven item
	Supervision & Project Management	1	%	9.00	398,426	9.00	440,976	1	%	9.00	524,287	$ 574,151.62	$ 610,756.57	(175,725)	(169,781)	% driven item
	Council Fees	1	%	3.25	143,876	3.25	159,241	1	%	3.25	189,326	$ 207,332.53	$ 220,550.98	(63,456)	(61,310)	% driven item
	Vic Roads Fees	1	%	1.00	44,270	1.00	48,997	1	%	1.00	58,254	$ 63,794.62	$ 67,861.84	(19,525)	(18,865)	% driven item
	Environmental Management	1	%	0.50	22,135	0.50	24,499	1	%	0.50	29,127	$ 31,897.31	$ 33,930.92	(9,763)	(9,432)	% driven item
	Site Establishment	1	%	2.50	110,674	2.50	122,494	1	%	2.50	145,635	$ 159,486.56	$ 169,654.60	(48,813)	(47,161)	% driven item
TOTAL	Excluding Delivery				**4,426,959**		**4,899,729**				**5,825,407**	**$ 6,379,462**	**$ 6,786,184**	**(1,952,503)**	**(1,886,455)**	
	Including Delivery				**6,253,080**		**6,920,868**				**8,228,387**	**$ 9,010,991**	**$ 9,585,485**	**(2,757,911)**	**(2,664,618)**	

778 m

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-	%	2.39	-	2.70	-	29,408	m2	2.50	73,521	81,208	87,448	(81,208)	(87,448)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Demolition of existing pavements								m2	25.00	0			-	-	
	Earthworks	5,006	m3	35.43	177,352.78	40.63	203,397.15	5,434	m3	39.00	211,939	234,098	252,086	(56,745)	(48,689)	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	171.71	-		m2	155.00	0			-	-	
	Secondary Arterial Pavement	7,002	m2	123.23	862,848.68	130.48	913,604.61	8,558	m2	141.00	1,206,678	1,332,843	1,435,259	(469,994)	(521,654)	Quantity is low based upon WT measured areas; pavement area assume to include chevron and on road bike path areas (2 lane carriageway only with provision to extend to 4 lane in the future, excluding local frontage road as per Patterson Dr Interim Cross Section) Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-		m2	126.00	0			-	-	
	Subgrade preparation	-	%	15.21	-	17.86	-	8,558	m2	2.50	21,395	23,632	25,448	(23,632)	(25,448)	Quantity missing; cost item required.
	Pavement rehab	-	m2	45.90	-	45.90	-		m2		0			-	-	
	Pavement other	-	m2	-	-	-	-		m2		0			-	-	
Concrete Works	Kerb & channel	1,556	m	50.42	78,452.04	56.78	88,356.04	3,112	m	55.00	171,160	181,596	195,550	(103,144)	(107,194)	Quantity is low based upon WT measured lengths; assume kerb / channel on both sides of each carriageway
	Cycle path	-	m2	59.60	-	69.63	-		m2	50.00	0			-	-	
	SUP / Footpath	1,556	m2	58.44	90,938.57	68.10	105,959.66	4,668	m2	60.00	280,080	297,157	319,991	(206,219)	(214,032)	Quantity is low based upon WT measured areas; pavement area assume to 3m wide SUP on both side of road Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	-	m2	71.43	-	76.92	-		m2	60.00	0			-	-	
Drainage	Drainage pipe - 300mm CR backfilled	97	m	162.30	15,783.68	176.53	17,167.47	97	m	225.00	21,881	24,169	26,026	(8,385)	(8,859)	
	Drainage pipe - 375mm CR backfilled	340	m	226.68	77,157.01	247.84	84,357.15	340	m	260.00	88,498	97,750	105,262	(20,593)	(20,904)	
	Drainage pipe - 450mm CR backfilled	340	m	291.67	99,276.04	322.90	109,907.52	340	m	290.00	98,709	109,029	117,407	(9,753)	(7,500)	
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	404.67	-		m	355.00	0			-	-	
	Drainage - pits	16	no.	2,325.57	36,185.89	2,510.70	39,066.53	16	no.	2,150.00	34,400	41,001	44,151	(4,815)	(5,085)	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	1,556	m	23.05	35,861.13	26.77	41,648.25	3,112	m	45.00	140,040	154,682	166,568	(118,821)	(124,920)	Quantitiy & rate low - allowances include for pits and risers
	Drainage - culvert	-	no.	-	-	-	-		no.		0			-	-	
Traffic	Traffic Signals	-	Item	88,375.88	-	100,881.35	-		Item	300,000.00	0			-	-	
	Traffic Signal conduit	-	m	45.71	-	53.99	-		m		0			-	-	
Landscape	Tree Planting	105	no.	259.62	27,267.40	322.72	33,895.22	156	no.	250.00	39,000	41,378	44,557	(14,111)	(10,662)	Quantity appears to be low; assumes trees @15m spacing along road length on median & nature strips (as per Patterson Dr Interim Cross Section)
	Landscaping	-	m2	20.72	-	23.48	-	3,236	m2	15.00	48,547	51,507	55,465	(51,507)	(55,465)	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding	2,334	m2	7.00	16,328.66	7.98	18,634.17	12,946	m2	5.50	71,203	75,544	81,349	(59,215)	(62,715)	Assume 20% landscape planting & 80% topsoil seeding
Street Lighting	Street lighting (all inclusive)	778	m	207.67	161,564.80	237.49	184,765.71	16	no.	12,000.00	192,000	212,075	228,371	(50,510)	(43,605)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	-	Item / pe	-	-	-	-		Item / per leg		0			-	-	
Misc.	Regulatory signage	-	Item	329.29	-	365.51	-		Item	350.00	0			-	-	
	Linemarking	7,002	m2 of pa	2.40	16,823.90	2.84	19,869.79	8,558	m2 of pa	2.50	21,395	22,700	24,444	(5,876)	(4,574)	Quantity appears to be low; based on new pavement quantity
	Landscape maintenance	-	Item	75,000.00	-	86,250.00	-	1	Item	104,000.00	104,000	105,827	113,959	(105,827)	(113,959)	Quantity missing
	Tactile pavers (hazard only)	-	Item	337.14	-	428.57	-		Item	320.00	0			-	-	
er	Service relocation and local site conditions	1	Item	158,974.31	158,974.31	192,465.00	192,465.00		Item					158,974	192,465	Items below include for allowances for local site conditions

VPA Benchmarked Infrastructure Costings - Independent Peer Review

RD-04 - Patterson Drive: Merri creek to OMR/E6 reservation – Construction of 2 lane carriageway, excluding intersections (interim treatment)

778 m

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Othe	Extra over cost for excavation in rock				-		-	1	Item	191,000.00	191,000	210,970	227,181	(210,970)	(227,181)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	86,000.00	86,000	94,992	102,291	(94,992)	(102,291)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
					-		-							-	-	
Delivery	Surveying & Design	1	%	5.00	92,741	5.00	102,655	1	%	5.00	155,072	$ 169,607.93	$ 182,640.67	(76,867)	(79,986)	% driven item
	Contingency	1	%	15.00	278,222	15.00	307,964	1	%	15.00	465,217	$ 508,823.78	$ 547,922.02	(230,602)	(239,958)	% driven item
	Traffic Management	1	%	5.00	92,741	5.00	102,655	1	%	5.00	155,072	$ 169,607.93	$ 182,640.67	(76,867)	(79,986)	% driven item
	Supervision & Project Management	1	%	9.00	166,933	9.00	184,778	1	%	9.00	279,130	$ 305,294.27	$ 328,753.21	(138,361)	(143,975)	% driven item
	Council Fees	1	%	3.25	60,281	3.25	66,726	1	%	3.25	100,797	$ 110,245.15	$ 118,716.44	(49,964)	(51,991)	% driven item
	Vic Roads Fees	1	%	1.00	18,548	1.00	20,531	1	%	1.00	31,014	$ 33,921.59	$ 36,528.13	(15,373)	(15,997)	% driven item
	Environmental Management	1	%	0.50	9,274	0.50	10,265	1	%	0.50	15,507	$ 16,960.79	$ 18,264.07	(7,699)	(7,999)	% driven item
	Site Establishment	1	%	2.50	46,370	2.50	51,327	1	%	2.50	77,536	$ 84,803.96	$ 91,320.34	(38,434)	(39,993)	% driven item
TOTAL	Excluding Delivery				**1,854,815**		**2,053,094**				**3,101,445**	**$ 3,392,159**	**$ 3,652,813**	**(1,537,344)**	**(1,599,719)**	
	Including Delivery				**2,619,926**		**2,899,995**				**4,380,791**	**$ 4,791,424**	**$ 5,159,599**	**(2,171,498)**	**(2,259,603)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

RD-05 - Koukoura Drive: Donnybrook Road to Gunns Gully Road – Construction of 2 lane carriageway, excluding intersections (interim treatment)

Benchmark Item 2

1,136 m

31.10.2018

		VPA (Qty & Cost Basd on Benchmark Item 2)						WTP (Qty based on Koukoura Dr Cross Section - Interim)						Difference (Indicative only as VAP has based project on Benchmark Item make up only - total estimated cost differs)		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount (P50)	Amount (P90)		(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-		2.39	-	2.70	-	38,624	m2	2.50	96,560	106,987	113,687	(106,987)	(113,687)	Quantity missing; Quantity based on Koukoura Dr Cross section - interim (2 lanes only with provision to extend to 4 lanes in the future, excluding local frontage rd). Rate includes for site clearance & topsoil removal to suit Interim design standard from edge of road reserve through centre verge.
	Earthworks	5,148	m3	35.43	182,368	40.63	209,149	7,606	m3	39.00	296,615	328,646	349,227	(146,278)	(140,078)	Quantity based on Koukoura Dr Cross section - interim (2 lanes only with provision to extend to 4 lanes in the future, excluding local frontage rd).
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	171.71	-		m2	155.00	0			-	-	
	Secondary Arterial Pavement	7,200	m2	123.23	887,248	130.48	939,439	7,952	m2	141.00	1,121,232	1,242,312	1,320,108	(355,064)	(380,668)	Quantity based on Koukoura Dr Cross section - interim (2 lanes only with provision to extend to 4 lanes in the future). Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-		m2	126.00	0			-	-	
	Subgrade preparation	-	%	15.21	-	17.86	-	7,952	m2	2.50	19,880	22,027	23,406	(22,027)	(23,406)	Quantity based on Koukoura Dr Cross section - interim (2 lanes only with provision to extend to 4 lanes in the future).
	Pavement rehab	-	m2	45.90	-	45.90	-		m2		0			-	-	
	Pavement other	-	m2	-	-	-	-		m2		0			-	-	
Concrete Works	Kerb & channel	1,600	m	50.42	80,670	56.78	90,855	4,544	m	55.00	249,920	265,983	282,639	(185,312)	(191,784)	WT measured lengths; assume kerb / channel on both sides of each carriageway
	Cycle path	-	m2	59.60	-	69.63	-		m2	50.00	0			-	-	
	SUP / Footpath	1,600	m2	58.44	93,510	68.10	108,956	8,520	m2	60.00	511,200	544,056	578,125	(450,545)	(469,169)	Quantity based on Koukoura Dr Cross section - interim. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	-	m2	71.43	-	76.92	-		m2	60.00	0			-	-	
Drainage	Drainage pipe - 300mm CR backfilled	100	m	162.30	16,230	176.53	17,653	142	m	225.00	31,950	35,400	37,617	(19,170)	(19,964)	Quantity based on overall road alignment length of 1136m
	Drainage pipe - 375mm CR backfilled	350	m	226.68	79,339	247.84	86,743	497	m	260.00	129,220	143,174	152,140	(63,835)	(65,397)	
	Drainage pipe - 450mm CR backfilled	350	m	291.67	102,083	322.90	113,015	497	m	290.00	144,130	159,694	169,695	(57,611)	(56,679)	
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	404.67	-		m	355.00	0			-	-	
	Drainage - pits	16	no.	2,325.57	37,209	2,510.70	40,171	23	no.	2,150.00	49,450	59,122	62,824	(21,913)	(22,653)	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	1,600	m	23.05	36,875	26.77	42,826	4,544	m	45.00	204,480	226,562	240,749	(189,686)	(197,923)	Quantity based on kerb length measured. Rate low - allowances include for pits and risers
	Drainage - culvert	-	no.	-	-	-	-		no.					-	-	
Traffic	Traffic Signals	-	Item	88,375.88	-	100,881.35	-		Item	260,000.00				-	-	
	Traffic Signal conduit	-	m	45.71	-	53.99	-		m					-	-	
Landscape	Tree Planting	108	no.	259.62	28,038	322.72	34,854	228	no.	250.00	57,000	60,663	64,462	(32,625)	(29,609)	Quantity assumes trees @15m spacing along road length on median & nature strips (as per Koukoura Dr Interim Cross Section)
	Landscaping	-	m2	20.72	-	23.48	-	4,430	m2	15.00	66,456	70,727	75,156	(70,727)	(75,156)	Quantity assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding	2,400	m2	7.00	16,790	7.98	19,161	17,722	m2	5.50	97,469	103,733	110,229	(86,943)	(91,068)	
Street Lighting	Street lighting (all inclusive)	800	m	207.67	166,133	237.49	189,990	23	no.	12,000.00	276,000	305,805	324,955	(139,671)	(134,964)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	-	Item / p	-	-	-	-		Item / per leg		0			-	-	
Misc.	Regulatory signage	-	Item	329.29	-	365.51	-		Item	350.00	0			-	-	
	Linemarking	7,200	m2 of pa	2.40	17,300	2.84	20,432	7,952	m2 of pa	2.50	19,880	21,158	22,483	(3,858)	(2,051)	Quantity based on Koukoura Dr Cross section - interim (2 lanes only with provision to extend to 4 lanes in the future).
	Landscape maintenance	-	Item	75,000.00	-	86,250.00	-	1	Item	104,000.00	104,000	106,156	112,804	(106,156)	(112,804)	Quantity missing
	Tactile pavers (hazard only)	-		337.14	-	428.57	-		Item		0			-	-	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

RD-05 - Koukoura Drive: Donnybrook Road to Gunns Gully Road – Construction of 2 lane carriageway, excluding intersections (interim treatment)

Benchmark Item 2

1,136 m

31.10.2018

		VPA (Qty & Cost Basd on Benchmark Item 2)						WTP (Qty based on Koukoura Dr Cross Section - Interim)								
Item	**Sub Item**	**Qty**	**Unit**	**Rate (P50)**	**Amount (P50)**	**Rate (P90)**	**Amount (P90)**	**Qty**	**Unit**	**Rate**	**Amount**	**Amount (P50)**	**Amount (P90)**	***Difference (Indicative only as VAP has based project on Benchmark Item make up only - total estimated cost differs) (P50)***	***(P90)***	**Comments**
Other	Extra over cost for excavation in rock				-		-	1	Item	267,000.00	267,000	295,833	314,358	*(295,833)*	*(314,358)*	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	80,000.00	80,000	88,639	94,190	*(88,639)*	*(94,190)*	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
					-		-									
Delivery	Surveying & Design	1	%	5.00	87,190	5.00	95,662	1	%	5.00	191,122	$ 209,333.90	$ 222,442.68	*(122,144)*	*(126,781)*	% driven item
	Contingency	1	%	15.00	261,569	15.00	286,987	1	%	15.00	573,366	$ 628,001.69	$ 667,328.03	*(366,432)*	*(380,342)*	% driven item
	Traffic Management	1	%	5.00	87,190	5.00	95,662	1	%	5.00	191,122	$ 209,333.90	$ 222,442.68	*(122,144)*	*(126,781)*	% driven item
	Supervision & Project Management	1	%	9.00	156,942	9.00	172,192	1	%	9.00	344,020	$ 376,801.02	$ 400,396.82	*(219,859)*	*(228,205)*	% driven item
	Council Fees	1	%	3.25	56,673	3.25	62,180	1	%	3.25	124,229	$ 136,067.03	$ 144,587.74	*(79,394)*	*(82,407)*	% driven item
	Vic Roads Fees	1	%	1.00	17,438	1.00	19,132	1	%	1.00	38,224	$ 41,866.78	$ 44,488.54	*(24,429)*	*(25,356)*	% driven item
	Environmental Management	1	%	0.50	8,719	0.50	9,566	1	%	0.50	19,112	$ 20,933.39	$ 22,244.27	*(12,214)*	*(12,678)*	% driven item
	Site Establishment	1	%	2.50	43,595	2.50	47,831	1	%	2.50	95,561	$ 104,666.95	$ 111,221.34	*(61,072)*	*(63,390)*	% driven item
TOTAL	Excluding Delivery				**1,743,795**		**1,913,243**				**3,822,442**	**4,186,678**	**4,448,854**	***(2,442,883)***	***(2,535,610)***	
	Including Delivery				**2,463,110**		**2,702,456**				**5,399,199**	**5,913,683**	**6,284,006**	***(3,450,572)***	***(3,581,549)***	

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-	%	2.39	-	2.60	-	29,335	m2	2.50	73,338	81,212	86,424	(81,212)	(86,424)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Demolition of existing pavements							5,676	m2	25.00	141,900	157,137	167,221	(157,137)	(167,221)	New item - Demolition of Existing Donnybrook Rd
	Earthworks	6,106	m3	35.43	216,309	39.04	238,367	6,646	m3	39.00	259,181	287,011	305,429	(70,703)	(67,062)	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	5,250	m2	157.08	824,687	167.24	878,025	7,638	m2	155.00	1,183,890	1,311,014	1,395,143	(486,327)	(517,118)	Quantity is low based upon WT measured areas; Donnybrook Rd measured as primary arterial road. Rate is low based upon nominated pavement depth.
	Secondary Arterial Pavement	-	m2	123.23	-	128.26	-	0	m2	141.00	0			-	-	
	Collector Arterial Pavement	3,290	m2	91.07	299,625	100.18	329,587	2,214	m2	126.00	278,964	308,919	328,742	(9,294)	845	Quantity is high
	Subgrade preparation	-	%	15.21	-	17.05	-	9,852	m2	2.50	24,630	27,275	29,025	(27,275)	(29,025)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	2,950	m	50.42	148,736	54.84	161,775	2,614	m	55.00	143,770	152,926	162,739	(4,190)	(964)	Quantity is low based upon WT measured lengths
	Cycle path	2,370	m2	59.60	141,252	66.57	157,765		m2	50.00	0			141,252	157,765	
	SUP / Footpath	1,120	m2	58.44	65,457	65.15	72,965	4,628	m2	60.00	277,680	295,364	314,318	(229,907)	(241,353)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	2,890	m2	71.43	206,442	75.24	217,446	220	m2	60.00	13,200	14,041	14,942	192,402	202,505	Quantity high; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	290	m	162.30	47,067	172.18	49,932	278	m	225.00	62,550	69,267	73,711	(22,200)	(23,779)	Quantity assumed to run through Collector Arterial
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	241.37	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	730	m	291.67	212,917	313.36	228,750	537	m	290.00	155,730	172,452	183,518	40,465	45,232	Quantity assumed to run through Primary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	395.82	-		m	355.00	0			-	-	
	Drainage - pits	33	no.	2,325.57	76,744	2,454.13	80,986	16	no.	2,150.00	34,400	41,106	43,743	35,638	37,243	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,440	m	23.05	79,282	25.63	88,166	2,614	m	45.00	117,630	130,261	138,620	(50,979)	(50,454)	rate low - allowances include for pits and risers. Quantity quite high
	Drainage - culvert	-	no.	-	-		-		no.		0			-	-	
Traffic	Traffic Signals	4	Item	88,375.88	353,504	97,059.82	388,239	1	Item	300,000.00	300,000	332,214	353,532	21,290	34,707	X-Intersection
	Traffic Signal conduit	-	m	45.71	-	51.46	-		m		0			-	-	
Landscape	Tree Planting	98	no.	259.62	25,442	303.44	29,737	58	no.	250.00	14,500	15,423	16,413	10,019	13,324	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	5,000	m2	20.72	103,583	22.64	113,190	2,927	m2	15.00	43,905	46,701	49,698	56,882	63,492	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding	5,000	m2	7.00	34,980	7.68	38,410	11,708	m2	5.50	64,394	68,495	72,890	(33,515)	(34,481)	
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	228.38	-	24	no.	12,000.00	288,000	318,925	339,391	(318,925)	(339,391)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	4	Item / pe	-	-		-		Item / per leg		0			-	-	
Misc.	Regulatory signage	16	Item	329.29	5,269	354.44	5,671	16	Item	350.00	5,600	5,957	6,339	(688)	(668)	Quantity - ok
	Linemarking	8,540	m2 of pa	2.40	20,519	2.70	23,099	9,852	m2 of pa	2.50	24,630	26,199	27,880	(5,679)	(4,781)	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,357	115,310	(33,357)	(29,060)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	24	Item	337.14	8,091	400.63	9,615	16	Item	320.00	5,120	5,670	6,034	2,422	3,581	WT measure variance
Other	Service relocation	1	Item	125,373.07	125,373	142,200.87	142,201	1	Item	116,000.00	116,000	128,456	136,699	(3,083)	5,502	Rate appears to be high, WT's rate is based off 100m for OH Electrical power to be removed / relocated as well as relocation of comms during works to IN-01 (extent based on Donnybrook-Woodstock ICP Plan)
	Remove - existing fencing							1034	m	18.00	18,612	20,611	21,933	(20,611)	(21,933)	Quantiy missing - WT allowance
	Tie into existing pavements							2	no.	25,000.00	50,000	55,369	58,922	(55,369)	(58,922)	Assumes ties into both sides of Donnybrook Rd (East & West legs)
	Surveying & Design	1	%	5.00	153,514	5.00	167,009	1	%	5.00	190,081	$ 209,017.99	$ 222,430.72	(55,504)	(55,422)	% driven item
	Contingency	1	%	15.00	460,542	15.00	501,027	1	%	15.00	570,243	$ 627,053.98	$ 667,292.16	(166,512)	(166,266)	% driven item

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-01 - Donnybrook Road & Hayes Hill Boulevard/Langley Park Drive (N–S Blvd Connector) - Construction of an arterial to connector road 4-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Delivery	Traffic Management	1	%	5.00	153,514	5.00	167,009	1	%	5.00	190,081	$ 209,017.99	$ 222,430.72	(55,504)	(55,422)	% driven item
	Supervision & Project Management	1	%	9.00	276,325	9.00	300,616	1	%	9.00	342,146	$ 376,232.39	$ 400,375.30	(99,907)	(99,759)	% driven item
	Council Fees	1	%	3.25	99,784	3.25	108,556	1	%	3.25	123,553	$ 135,861.70	$ 144,579.97	(36,078)	(36,024)	% driven item
	Vic Roads Fees	1	%	1.00	30,703	1.00	33,402	1	%	1.00	38,016	$ 41,803.60	$ 44,486.14	(11,101)	(11,084)	% driven item
	Environmental Management	1	%	0.50	15,351	0.50	16,701	1	%	0.50	19,008	$ 20,901.80	$ 22,243.07	(5,550)	(5,542)	% driven item
	Site Establishment	1	%	2.50	76,757	2.50	83,504	1	%	2.50	95,041	$ 104,509.00	$ 111,215.36	(27,752)	(27,711)	% driven item
TOTAL	Excluding Delivery				**3,070,279**		**3,340,177**				**3,801,623**	**$ 4,180,360**	**$ 4,448,614**	**(1,110,080)**	**(1,108,437)**	
	Including Delivery				**4,336,770**		**4,718,000**				**5,369,793**	**$ 5,904,758**	**$ 6,283,668**	**(1,567,989)**	**(1,565,668)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-02 - Donnybrook Road & Connector Street (N–S Connector) – Construction of an arterial to connector road 4-way intersection (interim treatment)

WT PARTNERSHIP

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-	%	2.39	-	2.60	-	35,101	m2	2.50	87,753	97,149	103,341	(97,149)	(103,341)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Demolition of existing pavements							6,721	m2	25.00	168,025	186,017	197,873	(186,017)	(197,873)	New item - Demolition of Existing Donnybrook Rd
	Earthworks	6,106	m3	35.43	216,309	39.04	238,367	7,698	m3	39.00	300,221	332,369	353,553	(116,061)	(115,186)	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	5,250	m2	157.08	824,687	167.24	878,025	8,479	m2	155.00	1,314,245	1,454,976	1,547,708	(630,288)	(669,684)	Quantity is low based upon WT measured areas; Donnybrook Rd measured as primary arterial road. Rate is low based upon nominated pavement depth.
	Secondary Arterial Pavement	-	m2	123.23	-	128.26	-		m2	141.00	0			-	-	
	Collector Arterial Pavement	3,290	m2	91.07	299,625	100.18	329,587	3,057	m2	126.00	385,182	426,428	453,606	(126,803)	(124,018)	Quantities almost match
	Subgrade preparation	-	%	15.21	-	17.05	-	11,536	m2	2.50	28,840	31,928	33,963	(31,928)	(33,963)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	2,950	m	50.42	148,736	54.84	161,775	2,685	m	55.00	147,675	157,038	167,046	(8,301)	(5,271)	Quantity is low based upon WT measured lengths
	Cycle path	2,370	m2	59.60	141,252	66.57	157,765		m2	50.00	0			141,252	157,765	
	SUP / Footpath	1,120	m2	58.44	65,457	65.15	72,965	5,751	m2	60.00	345,060	366,937	390,323	(301,480)	(317,358)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	2,890	m2	71.43	206,442	75.24	217,446	202	m2	60.00	12,120	12,888	13,710	193,554	203,736	Quantity high; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	290	m	162.30	47,067	172.18	49,932	365	m	225.00	82,125	90,919	96,714	(43,852)	(46,781)	Quantity assumed to run through Collector Arterial
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	241.37	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	730	m	291.67	212,917	313.36	228,750	621	m	290.00	180,090	199,374	212,081	13,542	16,669	Quantity assumed to run through Primary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	395.82	-		m	355.00	0			-	-	
	Drainage - pits	33	no.	2,325.57	76,744	2,454.13	80,986	20	no.	2,150.00	43,000	51,368	54,642	25,376	26,344	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,440	m	23.05	79,282	25.63	88,166	2,685	m	45.00	120,825	133,763	142,288	(54,481)	(54,122)	rate low - allowances include for pits and risers. Quantity quite high
	Drainage - culvert	-	no.	-	-		-		no.		0			-	-	
Traffic	Traffic Signals	4	Item	88,375.88	353,504	97,059.82	388,239	1	Item	300,000.00	300,000	332,124	353,292	21,379	34,947	X-Intersection
	Traffic Signal conduit	-	m	45.71	-	51.46	-		m		0			-	-	
Landscape	Tree Planting	98	no.	259.62	25,442	303.44	29,737	89	no.	250.00	22,250	23,661	25,169	1,782	4,568	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	5,000	m2	20.72	103,583	22.64	113,190	3,522	m2	15.00	52,836	56,186	59,767	47,398	53,424	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding	5,000	m2	7.00	34,980	7.68	38,410	14,090	m2	5.50	77,493	82,406	87,658	(47,426)	(49,248)	
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	228.38	-	27	no.	12,000.00	324,000	358,694	381,556	(358,694)	(381,556)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	4	Item / pe	-	-		-		Item / per leg		0			-	-	
Misc.	Regulatory signage	16	Item	329.29	5,269	354.44	5,671	16	Item	350.00	5,600	5,955	6,335	(686)	(664)	Quantity - ok
	Linemarking	8,540	m2 of pa	2.40	20,519	2.70	23,099	11,536	m2 of pa	2.50	28,840	30,668	32,623	(10,149)	(9,524)	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,328	115,232	(33,328)	(28,982)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	24	Item	337.14	8,091	400.63	9,615	16	Item	320.00	5,120	5,668	6,030	2,423	3,586	WT measure variance
Other	Service relocation	1	Item	125,373.07	125,373	142,200.87	142,201	1	Item	116,000.00	116,000	128,421	136,606	(3,048)	5,595	Rate appears to be high, WT's rate is based off 100m for OH Electrical power to be removed / relocated as well as relocation of comms during works to IN-02 (extent based on Donnybrook-Woodstock ICP Plan)
	Remove - existing fencing				-		-	1200	m	18.00	21,600	23,913	25,437	(23,913)	(25,437)	Quantiy missing - WT allowance
	Tie into existing pavements							2	no.	25,000.00	50,000	55,354	58,882	(55,354)	(58,882)	Assumes ties into both sides of Donnybrook Rd (East & West legs)
	Surveying & Design	1	%	5.00	153,514	5.00	167,009	1	%	5.00	216,145	$ 237,626.63	$ 252,771.69	(84,113)	(85,763)	% driven item
	Contingency	1	%	15.00	460,542	15.00	501,027	1	%	15.00	648,435	$ 712,879.89	$ 758,315.08	(252,338)	(257,289)	% driven item

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-02 - Donnybrook Road & Connector Street (N–S Connector) – Construction of an arterial to connector road 4-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Delivery	Traffic Management	1	%	5.00	153,514	5.00	167,009	1	%	5.00	216,145	$ 237,626.63	$ 252,771.69	(84,113)	(85,763)	% driven item
	Supervision & Project Management	1	%	9.00	276,325	9.00	300,616	1	%	9.00	389,061	$ 427,727.93	$ 454,989.05	(151,403)	(154,373)	% driven item
	Council Fees	1	%	3.25	99,784	3.25	108,556	1	%	3.25	140,494	$ 154,457.31	$ 164,301.60	(54,673)	(55,746)	% driven item
	Vic Roads Fees	1	%	1.00	30,703	1.00	33,402	1	%	1.00	43,229	$ 47,525.33	$ 50,554.34	(16,823)	(17,153)	% driven item
	Environmental Management	1	%	0.50	15,351	0.50	16,701	1	%	0.50	21,614	$ 23,762.66	$ 25,277.17	(8,411)	(8,576)	% driven item
	Site Establishment	1	%	2.50	76,757	2.50	83,504	1	%	2.50	108,072	$ 118,813.31	$ 126,385.85	(42,056)	(42,881)	% driven item
TOTAL	Excluding Delivery				**3,070,279**		**3,340,177**				**4,322,900**	**$ 4,752,533**	**$ 5,055,434**	**(1,682,253)**	**(1,715,257)**	
	Including Delivery				**4,336,770**		**4,718,000**				**6,106,096**	**$ 6,712,952**	**$ 7,140,800**	**(2,376,183)**	**(2,422,800)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-03 - Donnybrook Road & Patterson Drive – Construction of an arterial to arterial road 4-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-	%	2.39	-	2.68	-	45,794	m2	2.50	114,485	126,839	135,005	(126,839)	(135,005)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Demolition of existing pavements							6,776	m2	25.00	169,400	187,679	199,763	(187,679)	(199,763)	New item - Demolition of Existing Donnybrook Rd
	Earthworks	10,003	m3	35.43	354,351	40.30	403,141	10,535	m3	39.00	410,864	455,198	484,507	(100,847)	(81,366)	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	6,840	m2	157.08	1,074,450	170.80	1,168,277	9,902	m2	155.00	1,534,810	1,700,426	1,809,909	(625,976)	(641,632)	Quantity is low based upon WT measured areas; Donnybrook Rd measured as primary arterial road. Rate is low based upon nominated pavement depth.
	Secondary Arterial Pavement	7,150	m2	123.23	881,087	130.03	929,681	5,441	m2	141.00	767,181	849,965	904,690	31,122	24,991	Quantity is high
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-		m2	126.00	0			-	-	
	Subgrade preparation	-	%	15.21	-	17.70	-	15,343	m2	2.50	38,358	42,497	45,233	(42,497)	(45,233)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	1,900	m	50.42	95,796	56.39	107,135	1,463	m	55.00	80,465	85,630	91,144	10,166	15,992	Quantity is high based upon WT measured lengths
	Cycle path	1,120	m2	59.60	66,752	69.01	77,288		m2	50.00	0			66,752	77,288	
	SUP / Footpath	735	m2	58.44	42,956	67.50	49,609	5,921	m2	60.00	355,260	378,065	402,407	(335,109)	(352,798)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	850	m2	71.43	60,718	76.57	65,088	711	m2	60.00	42,660	45,398	48,321	15,320	16,767	Quantity high; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	260	m	162.30	42,198	175.64	45,667	509	m	225.00	114,525	126,883	135,052	(84,685)	(89,386)	Quantity assumed to run through Secondary Arterial
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	870	m	291.67	253,750	320.95	279,228	624	m	290.00	180,960	200,487	213,395	53,263	65,833	Quantity assumed to run through Primary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	39	no.	2,325.57	90,697	2,499.15	97,467	23	no.	2,150.00	49,450	59,117	62,924	31,580	34,543	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,000	m	23.05	69,141	26.53	79,602	1,463	m	45.00	65,835	72,939	77,635	(3,798)	1,967	rate low - allowances include for pits and risers. Quantity quite high
	Drainage - culvert	-	no.	-	-		-		no.		0			-	-	
Traffic	Traffic Signals	4	Item	88,375.88	353,504	100,101.03	400,404	1	Item	300,000.00	300,000	332,372	353,772	21,132	46,632	X-Intersection
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	62	no.	259.62	16,096	318.78	19,764	98	no.	250.00	24,500	26,073	27,751	(9,977)	(7,987)	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	2,600	m2	20.72	53,863	23.31	60,609	4,764	m2	15.00	71,457	76,044	80,940	(22,181)	(20,332)	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding	2,600	m2	7.00	18,190	7.92	20,598	19,055	m2	5.50	104,804	111,531	118,712	(93,342)	(98,115)	
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	29	no.	12,000.00	348,000	385,551	410,375	(385,551)	(410,375)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	4	Item / pe	-	-		-		Item / per leg		0			-	-	
Misc.	Regulatory signage	16	Item	329.29	5,269	363.25	5,812	16	Item	350.00	5,600	5,959	6,343	(691)	(531)	Quantity - ok
	Linemarking	13,990	m2 of pa	2.40	33,614	2.81	39,320	15,343	m2 of pa	2.50	38,358	40,820	43,448	(7,206)	(4,128)	WT measure variance
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,408	115,388	(33,408)	(29,138)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	24	Item	337.14	8,091	422.86	10,149	24	no.	320.00	7,680	8,509	9,057	(417)	1,092	Quantity - ok
Other	Service relocation	1	Item	154,713.77	154,714	177,388.39	177,388	1	Item	116,000.00	116,000	128,517	136,792	26,197	40,597	Rate appears to be high, WT's rate is based off 100m for OH Electrical power to be removed / relocated as well as relocation of comms during works to IN-03 (extent based on Donnybrook-Woodstock ICP Plan)
	Remove - existing fencing				-		-	1190	m	18.00	21,420	23,731	25,259	(23,731)	(25,259)	Quantiy missing - WT allowance
	Tie into existing pavements							2	no.	25,000.00	50,000	55,395	58,962	(55,395)	(58,962)	Assumes ties into both sides of Donnybrook Rd (East & West legs)
	Surveying & Design	1	%	5.00	187,512	5.00	206,124	1	%	5.00	255,804	$ 281,701.72	$ 299,839.32	(94,190)	(93,715)	% driven item

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-03 - Donnybrook Road & Patterson Drive – Construction of an arterial to arterial road 4-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Delivery	Contingency	1	%	15.00	562,536	15.00	618,372	1	%	15.00	767,411	$ 845,105.15	$ 899,517.96	(282,570)	(281,146)	% driven item
	Traffic Management	1	%	5.00	187,512	5.00	206,124	1	%	5.00	255,804	$ 281,701.72	$ 299,839.32	(94,190)	(93,715)	% driven item
	Supervision & Project Management	1	%	9.00	337,521	9.00	371,023	1	%	9.00	460,446	$ 507,063.09	$ 539,710.78	(169,542)	(168,688)	% driven item
	Council Fees	1	%	3.25	121,883	3.25	133,981	1	%	3.25	166,272	$ 183,106.12	$ 194,895.56	(61,223)	(60,915)	% driven item
	Vic Roads Fees	1	%	1.00	37,502	1.00	41,225	1	%	1.00	51,161	$ 56,340.34	$ 59,967.86	(18,838)	(18,743)	% driven item
	Environmental Management	1	%	0.50	18,751	0.50	20,612	1	%	0.50	25,580	$ 28,170.17	$ 29,983.93	(9,419)	(9,372)	% driven item
	Site Establishment	1	%	2.50	93,756	2.50	103,062	1	%	2.50	127,902	$ 140,850.86	$ 149,919.66	(47,095)	(46,858)	% driven item
TOTAL	Excluding Delivery				**3,750,237**		**4,122,478**				**5,116,070**	**$ 5,634,034**	**$ 5,996,786**	**(1,883,797)**	**(1,874,309)**	
	Including Delivery				**5,297,210**		**5,823,000**				**7,226,449**	**$ 7,958,074**	**$ 8,470,461**	**(2,660,864)**	**(2,647,461)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-04 - Donnybrook Road & Koukoura Drive – Construction of an arterial to arterial road 4-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount (P50)	Amount (P90)		(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-	%	2.39	-	2.68	-	46,008	m2	2.50	115,020	126,842	138,247	(126,842)	(138,247)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Demolition of existing pavements							6,600	m2	25.00	165,000	181,959	198,321	(181,959)	(198,321)	New item - Demolition of Existing Donnybrook Rd
	Earthworks	10,003	m3	35.43	354,351	40.30	403,141	11,419	m3	39.00	445,351	491,124	535,287	(136,774)	(132,146)	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	6,840	m2	157.08	1,074,450	170.80	1,168,277	15,971	m2	155.00	2,475,505	2,729,937	2,975,415	(1,655,487)	(1,807,138)	Quantity is low based upon WT measured areas; Donnybrook Rd & Koukoura Drive measured as primary arterial road. Rate is low based upon nominated pavement depth.
	Secondary Arterial Pavement	7,150	m2	123.23	881,087	130.03	929,681		m2	141.00	0			881,087	929,681	
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-		m2	126.00	0			-	-	
	Subgrade preparation	-	%	15.21	-	17.70	-	15,971	m2	2.50	39,928	44,031	47,991	(44,031)	(47,991)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	1,900	m	50.42	95,796	56.39	107,135	3,663	m	55.00	201,465	213,405	232,595	(117,609)	(125,460)	Quantity is low based upon WT measured lengths
	Cycle path	1,120	m2	59.60	66,752	69.01	77,288		m2	50.00	0			66,752	77,288	
	SUP / Footpath	735	m2	58.44	42,956	67.50	49,609	2,912	m2	60.00	174,720	185,075	201,717	(142,119)	(152,109)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	850	m2	71.43	60,718	76.57	65,088	712	m2	60.00	42,720	45,252	49,321	15,466	15,767	Quantity - ok compared to WT measure
Drainage	Drainage pipe - 300mm CR backfilled	260	m	162.30	42,198	175.64	45,667		m	225.00	0			42,198	45,667	
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	870	m	291.67	253,750	320.95	279,228	1,148	m	290.00	332,920	367,137	400,151	(113,387)	(120,922)	Quantity assumed to run through Primary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	39	no.	2,325.57	90,697	2,499.15	97,467	23	no.	2,150.00	49,450	58,844	64,135	31,853	33,332	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,000	m	23.05	69,141	26.53	79,602	3,663	m	45.00	164,835	181,777	198,122	(112,636)	(118,520)	rate low - allowances include for pits and risers. Quantity low
	Drainage - culvert	-	no.	-	-		-		no.					-	-	
Traffic	Traffic Signals	4	Item	88,375.88	353,504	100,101.03	400,404	1	Item	300,000.00	300,000	330,834	360,583	22,670	39,821	X-Intersection
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	62	no.	259.62	16,096	318.78	19,764	84	no.	250.00	21,000	22,245	24,245	(6,148)	(4,480)	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	2,600	m2	20.72	53,863	23.31	60,609	5,283	m2	15.00	79,239	83,935	91,483	(30,072)	(30,874)	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding	2,600	m2	7.00	18,190	7.92	20,598	21,130	m2	5.50	116,217	123,105	134,175	(104,916)	(113,577)	Assume 20% landscape planting & 80% topsoil seeding
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	31	no.	12,000.00	372,000	410,234	447,123	(410,234)	(447,123)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	4	Item / p	-	-		-		Item / per leg		0			-	-	
Misc.	Regulatory signage	16	Item	329.29	5,269	363.25	5,812	16	Item	350.00	5,600	5,932	6,465	(663)	(653)	Quantity appears to be low
	Linemarking	13,990	m2 of pa	2.40	33,614	2.81	39,320	15,971	m2 of pa	2.50	39,928	42,294	46,097	(8,680)	(6,777)	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	107,907	117,610	(32,907)	(31,360)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	24	Item	337.14	8,091	422.86	10,149	24	no.	320.00	7,680	8,469	9,231	(378)	918	Quantity - okay
Other	Service relocation	1	Item	154,713.77	154,714	177,388.39	177,388	1	Item	116,000.00	116,000	127,922	139,425	26,791	37,963	Rate appears to be high, WT's rate is based off 100m for OH Electrical power to be removed / relocated as well as relocation of comms during works to IN-04 (extent based on Donnybrook-Woodstock ICP Plan)
	Remove - existing fencing				-		-	1190	m	18.00	21,420	23,622	25,746	(23,622)	(25,746)	Quantiy missing - WT allowance
	Tie into existing pavements				-		-	2	no.	25,000.00	50,000	55,139	60,097	(55,139)	(60,097)	Assumes ties into both sides of Donnybrook Rd (East & West legs)

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-04 - Donnybrook Road & Koukoura Drive – Construction of an arterial to arterial road 4-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount (P50)	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Delivery	Surveying & Design	1	%	5.00	187,512	5.00	206,124	1	%	5.00	272,000	$ 298,351.10	$ 325,179.07	(110,839)	(119,055)	% driven item
	Contingency	1	%	15.00	562,536	15.00	618,372	1	%	15.00	816,000	$ 895,053.31	$ 975,537.22	(332,518)	(357,166)	% driven item
	Traffic Management	1	%	5.00	187,512	5.00	206,124	1	%	5.00	272,000	$ 298,351.10	$ 325,179.07	(110,839)	(119,055)	% driven item
	Supervision & Project Management	1	%	9.00	337,521	9.00	371,023	1	%	9.00	489,600	$ 537,031.99	$ 585,322.33	(199,511)	(214,299)	% driven item
	Council Fees	1	%	3.25	121,883	3.25	133,981	1	%	3.25	176,800	$ 193,928.22	$ 211,366.40	(72,046)	(77,386)	% driven item
	Vic Roads Fees	1	%	1.00	37,502	1.00	41,225	1	%	1.00	54,400	$ 59,670.22	$ 65,035.81	(22,168)	(23,811)	% driven item
	Environmental Management	1	%	0.50	18,751	0.50	20,612	1	%	0.50	27,200	$ 29,835.11	$ 32,517.91	(11,084)	(11,906)	% driven item
	Site Establishment	1	%	2.50	93,756	2.50	103,062	1	%	2.50	136,000	$ 149,175.55	$ 162,589.54	(55,420)	(59,528)	% driven item
TOTAL	Excluding Delivery				**3,750,237**		**4,122,478**				**5,439,998**	**$ 5,967,022**	**$ 6,503,581**	**(2,216,785)**	**(2,381,104)**	
	Including Delivery				**5,297,210**		**5,823,000**				**7,683,997**	**$ 8,428,419**	**$ 9,186,309**	**(3,131,209)**	**(3,363,309)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-05 - Donnybrook Road & Connector Street (Nth-Sth Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount (P50)	Amount (P90)		(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-	%	2.39	-	2.60	-	28,727	m2	2.50	71,818	79,480	84,808	(79,480)	(84,808)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Demolition of existing pavements							6,380	m2	25.00	159,500	176,517	188,351	(176,517)	(188,351)	New item - Demolition of Existing Donnybrook Rd
	Earthworks	5,031	m3	35.43	178,239	39.04	196,415	6,352	m3	39.00	247,734	274,165	292,546	(95,926)	(96,131)	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	5,295	m2	157.08	831,756	167.24	885,550	7,553	m2	155.00	1,170,715	1,295,619	1,382,482	(463,863)	(496,932)	Quantity is low based upon WT measured areas; Donnybrook Rd measured as primary arterial road. Rate is low based upon nominated pavement depth.
	Secondary Arterial Pavement	1,742	m2	123.23	214,665	128.26	223,433		m2	141.00	0			214,665	223,433	
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-	1,779	m2	126.00	224,154	248,069	264,701	(248,069)	(264,701)	WT measure North portion of T-Intersection as Collector Arterial
	Subgrade preparation	-	%	15.21	-	17.05	-	9,332	m2	2.50	23,330	25,819	27,550	(25,819)	(27,550)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	2,127	m	50.42	107,241	54.84	116,643	2,328	m	55.00	128,040	136,110	145,235	(28,868)	(28,592)	Quantity is low based upon WT measured lengths
	Cycle path	1,615	m2	59.60	96,254	66.57	107,507		m2	50.00	0			96,254	107,507	
	SUP / Footpath	510	m2	58.44	29,806	65.15	33,225	3,765	m2	60.00	225,900	240,137	256,237	(210,331)	(223,012)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	675	m2	71.43	48,217	75.24	50,788	103	m2	60.00	6,180	6,569	7,010	41,648	43,778	Quantity high; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	205	m	162.30	33,272	172.18	35,297	231	m	225.00	51,975	57,520	61,377	(24,249)	(26,080)	Quantity assumed to run through Collector Arterial
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	241.37	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	540	m	291.67	157,500	313.36	169,212	596	m	290.00	172,840	191,280	204,105	(33,780)	(34,892)	Quantity assumed to run through Primary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	395.82	-		m	355.00	0			-	-	
	Drainage - pits	25	no.	2,325.57	58,139	2,454.13	61,353	17	no.	2,150.00	36,550	43,648	46,574	14,492	14,779	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	2,627	m	23.05	60,544	25.63	67,329	2,328	m	45.00	104,760	115,937	123,710	(55,392)	(56,381)	rate low - allowances include for pits and risers. Quantity quite high
	Drainage - culvert	-	no.	-	-		-		no.					-	-	
Traffic	Traffic Signals	3	Item	88,375.88	265,128	97,059.82	291,179	1	Item	250,000.00	250,000	276,673	295,222	(11,545)	(4,042)	T-Intersection
	Traffic Signal conduit	-	m	45.71	-	51.46	-		m		0			-	-	
Landscape	Tree Planting	78	no.	259.62	20,250	303.44	23,668	87	no.	250.00	21,750	23,121	24,671	(2,871)	(1,003)	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	4,250	m2	20.72	88,046	22.64	96,212	3,105	m2	15.00	46,581	49,517	52,837	38,529	43,375	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding	4,250	m2	7.00	29,733	7.68	32,648	12,422	m2	5.50	68,319	72,625	77,494	(42,892)	(44,845)	Assume 20% landscape planting & 80% topsoil seeding
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	228.38	-	20	no.	12,000.00	240,000	265,606	283,413	(265,606)	(283,413)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	3	Item / p	-	-		-		Item / per leg		0			-	-	
Misc.	Regulatory signage	6	Item	329.29	1,976	354.44	2,127	6	Item	350.00	2,100	2,232	2,382	(257)	(255)	Quantity - ok
	Linemarking	7,037	m2 of pa	2.40	16,908	2.70	19,034	9,332	m2 of pa	2.50	23,330	24,800	26,463	(7,892)	(7,429)	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,289	115,549	(33,289)	(29,299)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	18	Item	337.14	6,069	400.63	7,211	8	no.	320.00	2,560	2,833	3,023	3,235	4,188	WT measure variance
ther	Service relocation	1	Item	173,721.98	173,722	202,882.72	202,883	1	Item	116,000.00	116,000	128,376	136,983	45,346	65,900	Rate appears to be high, WT's rate is based off 100m for OH Electrical power to be removed / relocated as well as relocation of comms during works to IN-05 (extent based on Donnybrook-Woodstock ICP Plan) - No allowance for high pressure gas protection slab

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-05 - Donnybrook Road & Connector Street (Nth-Sth Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
O	Allowance for Cultural Heritage Works				-		-	1	Item	30,000.00	30,000	33,201	35,427	(33,201)	(35,427)	Allowance for cultural heritage works
	Remove - existing fencing				-		-	1160	m	18.00	20,880	23,108	24,657	(23,108)	(24,657)	Quantiy missing - WT allowance
	Tie into existing pavements							2	no.	25,000.00	50,000	55,335	59,044	(55,335)	(59,044)	Assumes ties into both sides of Donnybrook Rd (East & West legs)
Delivery	Surveying & Design	1	%	5.00	124,623	5.00	135,398	1	%	5.00	179,951	$ 197,829.30	$ 211,092.46	(73,206)	(75,694)	% driven item
	Contingency	1	%	15.00	373,870	15.00	406,195	1	%	15.00	539,852	$ 593,487.89	$ 633,277.39	(219,618)	(227,083)	% driven item
	Traffic Management	1	%	5.00	124,623	5.00	135,398	1	%	5.00	179,951	$ 197,829.30	$ 211,092.46	(73,206)	(75,694)	% driven item
	Supervision & Project Management	1	%	9.00	224,322	9.00	243,717	1	%	9.00	323,911	$ 356,092.74	$ 379,966.43	(131,771)	(136,250)	% driven item
	Council Fees	1	%	3.25	81,005	3.25	88,009	1	%	3.25	116,968	$ 128,589.04	$ 137,210.10	(47,584)	(49,201)	% driven item
	Vic Roads Fees	1	%	1.00	24,925	1.00	27,080	1	%	1.00	35,990	$ 39,565.86	$ 42,218.49	(14,641)	(15,139)	% driven item
	Environmental Management	1	%	0.50	12,462	0.50	13,540	1	%	0.50	17,995	$ 19,782.93	$ 21,109.25	(7,321)	(7,569)	% driven item
	Site Establishment	1	%	2.50	62,312	2.50	67,699	1	%	2.50	89,975	$ 98,914.65	$ 105,546.23	(36,603)	(37,847)	% driven item
TOTAL	Excluding Delivery				**2,492,465**		**2,707,965**				**3,599,016**	**$ 3,956,586**	**$ 4,221,849**	**(1,464,121)**	**(1,513,885)**	
	Including Delivery				**3,520,607**		**3,825,000**				**5,083,609**	**$ 5,588,678**	**$ 5,963,362**	**(2,068,070)**	**(2,138,362)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-06 - Hayes Hill Boulevard & Patterson Drive – Construction of an arterial to blvd connector road 4-way intersection (interim treatment)

Benchmark Item 9

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount (P50)	Amount (P90)	Amount	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation			2.39	-	2.68	-	34,970	m2	2.50	87,425	96,949	102,594	(96,949)	(102,594)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Earthworks	6,266	m3	35.43	221,985	40.30	252,550	7,625	m3	39.00	297,381	329,778	348,980	(107,793)	(96,430)	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	170.80	-	0	m2	155.00	0			-	-	
	Secondary Arterial Pavement	6,970	m2	123.23	858,905	130.03	906,277	8,772	m2	141.00	1,236,852	1,371,596	1,451,458	(512,690)	(545,182)	Quantity is low based upon WT measured areas; Patterson Dr measured as Secondary arterial road. Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	3,440	m2	91.07	313,286	100.18	344,614	3,841	m2	126.00	483,966	536,690	567,939	(223,404)	(223,325)	Quantities almost match
	Subgrade preparation	-	%	15.21	-	17.70	-	12,613	m2	2.50	31,533	34,968	37,004	(34,968)	(37,004)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-	-	-		m2		0			-	-	
	Pavement other	-	m2	-	-	-	-		m2		0			-	-	
Concrete Works	Kerb & channel	3,000	m	50.42	151,257	56.39	169,161	3,319	m	55.00	182,545	194,444	205,766	(43,187)	(36,605)	Quantity is low based upon WT measured lengths
	Cycle path	1,090	m2	59.60	64,964	69.01	75,218		m2	50.00	0			64,964	75,218	
	SUP / Footpath	1,910	m2	58.44	111,628	67.50	128,916	6,474	m2	60.00	388,440	413,761	437,853	(302,133)	(308,937)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	105	m2	71.43	7,500	76.57	8,040	219	m2	60.00	13,140	13,997	14,812	(6,496)	(6,771)	Quantity low; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	280	m	162.30	45,444	175.64	49,180	408	m	225.00	91,800	101,801	107,728	(56,357)	(58,549)	Quantity assumed to run through Collector Arterial
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	790	m	291.67	230,417	320.95	253,552	716	m	290.00	207,640	230,260	243,668	156	9,885	Quantity assumed to run through Secondary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	32	no.	2,325.57	74,418	2,499.15	79,973	22	no.	2,150.00	47,300	56,600	59,896	17,818	20,077	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,540	m	23.05	81,586	26.53	93,931	3,319	m	45.00	149,355	165,626	175,270	(84,039)	(81,339)	rate low - allowances include for pits and risers. Quantity almost matches
	Drainage - swale								m	25.00	0			-	-	
	Drainage - culvert		no.	-	-	-	-		no.		0			-	-	
Traffic	Traffic Signals	4	Item	88,375.88	353,504	100,101.03	400,404	1	Item	300,000.00	300,000	332,682	352,053	20,821	48,351	X-Intersection
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	88	no.	259.62	22,846	318.78	28,053	94	no.	250.00	23,500	25,032	26,489	(2,186)	1,563	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	5,890	m2	20.72	122,021	23.31	137,302	3,133	m2	15.00	46,992	50,055	52,970	71,966	84,332	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding	5,890	m2	7.00	41,206	7.92	46,661	12,531	m2	5.50	68,922	73,414	77,689	(32,208)	(31,027)	
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	35	no.	12,000.00	420,000	465,755	492,874	(465,755)	(492,874)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	4	Item / p	-	-	-	-		Item / per leg		0			-	-	
Misc.	Regulatory signage	10	Item	329.29	3,293	363.25	3,632	10	Item	350.00	3,500	3,728	3,945	(435)	(313)	Quantity - ok
	Linemarking	10,410	m2 of p	2.40	25,012	2.81	29,258	12,613	m2 of pa	2.50	31,533	33,588	35,544	(8,576)	(6,285)	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,510	114,828	(33,510)	(28,578)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	24	Item	337.14	8,091	422.86	10,149	16	Item	320.00	5,120	5,678	6,008	2,414	4,140	WT measure variance
Other	Extra over cost for excavation in rock				-		-	1	Item	267,000.00	267,000	296,087	313,327	(296,087)	(313,327)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	127,000.00	127,000	140,835.50	149,035.77	(140,835)	(149,036)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
	Surveying & Design	1	%	5.00	140,618	5.00	155,156	1	%	5.00	230,747	$ 254,091.72	$ 268,886.44	(113,473)	(113,730)	% driven item
	Contingency	1	%	15.00	421,855	15.00	465,468	1	%	15.00	692,241	$ 762,275.16	$ 806,659.33	(340,420)	(341,191)	% driven item

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-06 - Hayes Hill Boulevard & Patterson Drive – Construction of an arterial to blvd connector road 4-way intersection (interim treatment)

Benchmark Item 9

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Delivery	Traffic Management	1	%	5.00	140,618	5.00	155,156	1	%	5.00	230,747	$ 254,091.72	$ 268,886.44	(113,473)	(113,730)	% driven item
	Supervision & Project Management	1	%	9.00	253,113	9.00	279,281	1	%	9.00	415,345	$ 457,365.10	$ 483,995.60	(204,252)	(204,715)	% driven item
	Council Fees	1	%	3.25	91,402	3.25	100,851	1	%	3.25	149,986	$ 165,159.62	$ 174,776.19	(73,758)	(73,925)	% driven item
	Vic Roads Fees	1	%	1.00	28,124	1.00	31,031	1	%	1.00	46,149	$ 50,818.34	$ 53,777.29	(22,695)	(22,746)	% driven item
	Environmental Management	1	%	0.50	14,062	0.50	15,516	1	%	0.50	23,075	$ 25,409.17	$ 26,888.64	(11,347)	(11,373)	% driven item
	Site Establishment	1	%	2.50	70,309	2.50	77,578	1	%	2.50	115,374	$ 127,045.86	$ 134,443.22	(56,737)	(56,865)	% driven item
TOTAL	Excluding Delivery				**2,812,365**		**3,103,121**				**4,614,943**	**$ 5,081,834**	**$ 5,377,729**	**(2,269,469)**	**(2,274,608)**	
	Including Delivery				**3,972,466**		**4,383,158**				**6,518,606**	**$ 7,178,091**	**$ 7,596,042**	**(3,205,625)**	**(3,212,884)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-07 - Hayes Hill Boulevard & Koukoura Drive – Construction of an arterial to blvd connector road 4-way intersection (interim treatment)

Benchmark Item 9

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount (P50)	Amount (P90)	Amount	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation			2.39	-	2.68	-	27,585	m2	2.50	68,963	76,352	81,590	(76,352)	(81,590)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Demolition of existing property							0	m2	0.00	0			-	-	This has been excluded from WT's assessment
	Earthworks	6,266	m3	35.43	221,985	40.30	252,550	6,897	m3	39.00	268,976	297,797	318,226	(75,811)	(65,676)	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	170.80	-	8,534	m2	155.00	1,322,770	1,464,505	1,564,971	(1,464,505)	(1,564,971)	Quantity is low based upon WT measured areas; Koukoura Drive measured as Primaryarterial road. Rate is low based upon nominated pavement depth.
	Secondary Arterial Pavement	6,970	m2	123.23	858,905	130.03	906,277		m2	141.00	0			858,905	906,277	
	Collector Arterial Pavement	3,440	m2	91.07	313,286	100.18	344,614	1,486	m2	126.00	187,236	207,298	221,519	105,987	123,095	Quantity is high based upon WT measured area
	Subgrade preparation	-	%	15.21	-	17.70	-	10,020	m2	2.50	25,050	27,734	29,637	(27,734)	(29,637)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-	-	-		m2		0			-	-	
	Pavement other	-	m2	-	-	-	-		m2		0			-	-	
Concrete Works	Kerb & channel	3,000	m	50.42	151,257	56.39	169,161	2,356	m	55.00	129,580	137,804	147,257	13,453	21,903	Quantity is high based upon WT measured lengths
	Cycle path	1,090	m2	59.60	64,964	69.01	75,218		m2	50.00	0			64,964	75,218	
	SUP / Footpath	1,910	m2	58.44	111,628	67.50	128,916	4,808	m2	60.00	288,480	306,789	327,835	(195,161)	(198,919)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	105	m2	71.43	7,500	76.57	8,040	246	m2	60.00	14,760	15,697	16,774	(8,196)	(8,733)	Quantity low; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	280	m	162.30	45,444	175.64	49,180	213	m	225.00	47,925	53,060	56,700	(7,616)	(7,521)	Quantity assumed to run through Collector Arterial
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	790	m	291.67	230,417	320.95	253,552	620	m	290.00	179,800	199,066	212,722	31,351	40,831	Quantity assumed to run through Primary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	32	no.	2,325.57	74,418	2,499.15	79,973	17	no.	2,150.00	36,550	43,666	46,661	30,753	33,312	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,540	m	23.05	81,586	26.53	93,931	2,356	m	45.00	106,020	117,380	125,432	(35,794)	(31,501)	rate low - allowances include for pits and risers. Quantity high
	Drainage - swale								m	25.00	0			-	-	
	Drainage - culvert		no.	-	-	-	-		no.		0			-	-	
Traffic	Traffic Signals	4	Item	88,375.88	353,504	100,101.03	400,404	1	Item	300,000.00	300,000	332,145	354,930	21,359	45,474	X-Intersection
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	88	no.	259.62	22,846	318.78	28,053	66	no.	250.00	16,500	17,547	18,751	5,299	9,302	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	5,890	m2	20.72	122,021	23.31	137,302	2,502	m2	15.00	37,533	39,915	42,653	82,106	94,648	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding	5,890	m2	7.00	41,206	7.92	46,661	10,009	m2	5.50	55,048	58,542	62,558	(17,336)	(15,897)	
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	24	no.	12,000.00	288,000	318,859	340,733	(318,859)	(340,733)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	4	Item / p	-	-	-	-		Item / per leg		0			-	-	
Misc.	Regulatory signage	10	Item	329.29	3,293	363.25	3,632	10	Item	350.00	3,500	3,722	3,977	(429)	(345)	Quantity - ok
	Linemarking	10,410	m2 of p	2.40	25,012	2.81	29,258	10,020	m2 of pa	2.50	25,050	26,640	28,467	(1,627)	791	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,334	115,766	(33,334)	(29,516)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	24	Item	337.14	8,091	422.86	10,149	16	Item	320.00	5,120	5,669	6,057	2,423	4,091	WT measure variance
Other	Extra over cost for excavation in rock				-		-	1	Item	242,000.00	242,000	267,930	286,310	(267,930)	(286,310)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	101,000.00	101,000	111,822.14	119,493.21	(111,822)	(119,493)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-07 - Hayes Hill Boulevard & Koukoura Drive – Construction of an arterial to blvd connector road 4-way intersection (interim treatment)

Benchmark Item 9

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
					-		-				0	-	-			
Delivery	Surveying & Design	1	%	5.00	140,618	5.00	155,156	1	%	5.00	192,693	$ 211,913.60	$ 226,451.01	(71,295)	(71,295)	% driven item
	Contingency	1	%	15.00	421,855	15.00	465,468	1	%	15.00	578,079	$ 635,740.79	$ 679,353.04	(213,886)	(213,885)	% driven item
	Traffic Management	1	%	5.00	140,618	5.00	155,156	1	%	5.00	192,693	$ 211,913.60	$ 226,451.01	(71,295)	(71,295)	% driven item
	Supervision & Project Management	1	%	9.00	253,113	9.00	279,281	1	%	9.00	346,847	$ 381,444.47	$ 407,611.83	(128,332)	(128,331)	% driven item
	Council Fees	1	%	3.25	91,402	3.25	100,851	1	%	3.25	125,250	$ 137,743.84	$ 147,193.16	(46,342)	(46,342)	% driven item
	Vic Roads Fees	1	%	1.00	28,124	1.00	31,031	1	%	1.00	38,539	$ 42,382.72	$ 45,290.20	(14,259)	(14,259)	% driven item
	Environmental Management	1	%	0.50	14,062	0.50	15,516	1	%	0.50	19,269	$ 21,191.36	$ 22,645.10	(7,130)	(7,129)	% driven item
	Site Establishment	1	%	2.50	70,309	2.50	77,578	1	%	2.50	96,347	$ 105,956.80	$ 113,225.51	(35,648)	(35,647)	% driven item
TOTAL	Excluding Delivery				**2,812,365**		**3,103,121**				**3,853,861**	**$ 4,238,272**	**$ 4,529,020**	**(1,425,907)**	**(1,425,899)**	
	Including Delivery				**3,972,466**		**4,383,158**				**5,443,578**	**$ 5,986,559**	**$ 6,397,241**	**(2,014,093)**	**(2,014,083)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-08 - Hayes Hill Boulevard & Merriang Road – Construction of an arterial to arterial 3-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation			2.39	-	2.60	-	12,902	m2	2.50	32,255	35,706	37,977	(35,706)	(37,977)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Demolition of existing pavements							3,190	m2	25.00	79,750	88,282	93,898	(88,282)	(93,898)	New item - Demolition of Existing Merriang Rd
	Earthworks	5,556	m3	35.43	196,805	39.04	216,875	3,006	m3	39.00	117,240	129,783	138,040	67,022	78,835	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	167.24	-		m2	155.00	0			-	-	
	Secondary Arterial Pavement	5,915	m2	123.23	728,899	128.26	758,673		m2	141.00	0			728,899	758,673	
	Collector Arterial Pavement	1,855	m2	91.07	168,937	100.18	185,831	5,619	m2	126.00	707,994	783,737	833,598	(614,800)	(647,766)	Quantity is high based upon WT measured areas; Hayes Hill Rd & Merriang Rd measured as Collector arterials. Rate is low based upon nominated pavement depth.
	Subgrade preparation	-	%	15.21	-	17.05	-	5,619	m2	2.50	14,048	15,550	16,540	(15,550)	(16,540)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	1,980	m	50.42	99,830	54.84	108,581	1,245	m	55.00	68,475	72,810	77,442	27,020	31,139	Quantity is low based upon WT measured lengths
	Cycle path	560	m2	59.60	33,376	66.57	37,278		m2	50.00	0			33,376	37,278	
	SUP / Footpath	1,330	m2	58.44	77,730	65.15	86,646	2,203	m2	60.00	132,180	140,548	149,489	(62,817)	(62,843)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	485	m2	71.43	34,645	75.24	36,492	102	m2	60.00	6,120	6,507	6,921	28,138	29,570	Quantity high; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	-	m	162.30	-	172.18	-		m	225.00	0			-	-	
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	241.37	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	580	m	291.67	169,167	313.36	181,747	500	m	290.00	145,000	160,513	170,724	8,654	11,023	Quantity assumed to run through Collector Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	395.82	-		m	355.00	0			-	-	
	Drainage - pits	27	no.	2,325.57	62,790	2,454.13	66,261	10	no.	2,150.00	21,500	25,682	27,316	37,109	38,946	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	2,480	m	23.05	57,157	25.63	63,562	1,245	m	45.00	56,025	62,019	65,964	(4,862)	(2,403)	rate low - allowances include for pits and risers. Quantity quite high
	Drainage - culvert	-	no.	-	-		-		no.		0			-	-	
Traffic	Traffic Signals	3	Item	88,375.88	265,128	97,059.82	291,179	1	Item	250,000.00	250,000	276,746	294,352	(11,618)	(3,172)	T-Intersection
	Traffic Signal conduit	-	m	45.71	-	51.46	-		m		0			-	-	
Landscape	Tree Planting	66	no.	259.62	17,135	303.44	20,027	66	no.	250.00	16,500	17,545	18,661	(410)	1,366	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	4,180	m2	20.72	86,596	22.64	94,627	996	m2	15.00	14,934	15,879	16,890	70,716	77,738	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding	4,180	m2	7.00	29,243	7.68	32,110	3,982	m2	5.50	21,903	23,290	24,771	5,953	7,339	
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	228.38	-	14	no.	12,000.00	168,000	185,973	197,804	(185,973)	(197,804)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	3	Item / p	-	-		-		Item / per leg		0			-	-	
Misc.	Regulatory signage	5	Item	329.29	1,646	354.44	1,772	5	Item	350.00	1,750	1,861	1,979	(214)	(207)	Quantity - ok
	Linemarking	7,770	m2 of p	2.40	18,669	2.70	21,016	5,619	m2 of pa	2.50	14,048	14,937	15,887	3,732	5,129	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,318	115,209	(33,318)	(28,959)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	18	Item	337.14	6,069	400.63	7,211	4	Item	320.00	1,280	1,417	1,507	4,652	5,704	WT measure variance
ther	Service Relocation	1	Item	94,526.02	94,526	106,692.87	106,693	1	Item	116,000.00	116,000	128,410	136,579	(33,884)	(29,886)	Rate appears to be low, WT's rate is based off 100m for OH Electrical power to be removed / relocated as well as relocation of comms during works to IN-08 along Merriang Rd (extent based on Donnybrook-Woodstock ICP Plan)
	Extra over cost for excavation in rock				-		-	1	Item	113,000.00	113,000	11,557	12,292	(11,557)	(12,292)	Additional site specific item. Assume 35% of total excavated volume to be in rock

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-08 - Hayes Hill Boulevard & Merriang Road – Construction of an arterial to arterial 3-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
O	Extra over cost for subgrade preparation				-		-	1	Item	57,000.00	57,000	55,349	58,870	(55,349)	(58,870)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
	Remove - existing fencing							580	m	18.00	10,440	125,089	133,047	(125,089)	(133,047)	Quantiy missing - WT allowance
	Tie into existing pavements				-		-	2	no.	25,000.00	50,000	63,098	67,112	(63,098)	(67,112)	Assumes ties into both sides of Merriang Rd (North & South legs)
Delivery	Surveying & Design	1	%	5.00	111,167	5.00	120,142	1	%	5.00	115,972	$ 127,530.26	$ 135,643.54	(16,363)	(15,502)	% driven item
	Contingency	1	%	15.00	333,502	15.00	360,425	1	%	15.00	347,916	$ 382,590.77	$ 406,930.62	(49,089)	(46,506)	% driven item
	Traffic Management	1	%	5.00	111,167	5.00	120,142	1	%	5.00	115,972	$ 127,530.26	$ 135,643.54	(16,363)	(15,502)	% driven item
	Supervision & Project Management	1	%	9.00	200,101	9.00	216,255	1	%	9.00	208,750	$ 229,554.46	$ 244,158.37	(29,453)	(27,904)	% driven item
	Council Fees	1	%	3.25	72,259	3.25	78,092	1	%	3.25	75,382	$ 82,894.67	$ 88,168.30	(10,636)	(10,076)	% driven item
	Vic Roads Fees	1	%	1.00	22,233	1.00	24,028	1	%	1.00	23,194	$ 25,506.05	$ 27,128.71	(3,273)	(3,100)	% driven item
	Environmental Management	1	%	0.50	11,117	0.50	12,014	1	%	0.50	11,597	$ 12,753.03	$ 13,564.35	(1,636)	(1,550)	% driven item
	Site Establishment	1	%	2.50	55,584	2.50	60,071	1	%	2.50	57,986	$ 63,765.13	$ 67,821.77	(8,181)	(7,751)	% driven item
TOTAL	Excluding Delivery				**2,223,348**		**2,402,832**				**2,319,442**	**$ 2,550,605**	**$ 2,712,871**	**(327,257)**	**(310,039)**	
	Including Delivery				**3,140,479**		**3,394,000**				**3,276,211**	**$ 3,602,730**	**$ 3,831,930**	**(462,251)**	**(437,930)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-09 - Cameron Street / Connector Street (Nth–Sth Connector) – Construction of an arterial to connector road 4-way intersection (interim treatment)

Benchmark Item 9

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount (P50)	Amount (P90)	Amount	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation			2.39	-	2.68	-	23,038	m2	2.50	57,595	63,905	67,435	(63,905)	(67,435)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Earthworks	6,266	m3	35.43	221,985	40.30	252,550	5,373	m3	39.00	209,553	232,512	245,353	(10,526)	7,197	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	170.80	-	0	m2	155.00	0			-	-	
	Secondary Arterial Pavement	6,970	m2	123.23	858,905	130.03	906,277	5,710	m2	141.00	805,110	893,317	942,655	(34,411)	(36,378)	Quantity is low based upon WT measured areas; Cameron St measured as Secondary arterial road. Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	3,440	m2	91.07	313,286	100.18	344,614	3,266	m2	126.00	411,516	456,601	481,819	(143,315)	(137,205)	Quantities almost match
	Subgrade preparation	-	%	15.21	-	17.70	-	8,976	m2	2.50	22,440	24,898	26,274	(24,898)	(26,274)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-	-	-		m2		0			-	-	
	Pavement other	-	m2	-	-	-	-		m2		0			-	-	
Concrete Works	Kerb & channel	3,000	m	50.42	151,257	56.39	169,161	2,019	m	55.00	111,045	118,349	124,886	32,908	44,275	Quantity is high based upon WT measured lengths
	Cycle path	1,090	m2	59.60	64,964	69.01	75,218		m2	50.00	0			64,964	75,218	
	SUP / Footpath	1,910	m2	58.44	111,628	67.50	128,916	4,610	m2	60.00	276,600	294,795	311,076	(183,167)	(182,161)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	105	m2	71.43	7,500	76.57	8,040	207	m2	60.00	12,420	13,237	13,968	(5,736)	(5,928)	Quantity low; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	280	m	162.30	45,444	175.64	49,180	371	m	225.00	83,475	92,620	97,736	(47,176)	(48,556)	Quantity assumed to run through Collector Arterial
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	790	m	291.67	230,417	320.95	253,552	427	m	290.00	123,830	137,397	144,985	93,020	108,567	Quantity assumed to run through Secondary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	32	no.	2,325.57	74,418	2,499.15	79,973	16	no.	2,150.00	34,400	41,187	43,461	33,232	36,512	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,540	m	23.05	81,586	26.53	93,931	2,019	m	45.00	90,855	100,809	106,377	(19,223)	(12,446)	rate low - allowances include for pits and risers. Quantity almost matches
	Drainage - swale								m	25.00	0			-	-	
	Drainage - culvert		no.	-	-	-	-		no.		0			-	-	
Traffic	Traffic Signals	4	Item	88,375.88	353,504	100,101.03	400,404	1	Item	300,000.00	300,000	332,868	351,252	20,636	49,152	X-Intersection
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	88	no.	259.62	22,846	318.78	28,053	68	no.	250.00	17,000	18,118	19,119	4,728	8,934	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	5,890	m2	20.72	122,021	23.31	137,302	1,849	m2	15.00	27,735	29,559	31,192	92,462	106,110	Quantity is high - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding	5,890	m2	7.00	41,206	7.92	46,661	7,396	m2	5.50	40,678	43,354	45,748	(2,147)	913	Assume 20% landscape planting & 80% topsoil seeding
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	23	no.	12,000.00	276,000	306,238	323,152	(306,238)	(323,152)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	4	Item / p	-	-	-	-		Item / per leg		0			-	-	
Misc.	Regulatory signage	10	Item	329.29	3,293	363.25	3,632	10	Item	350.00	3,500	3,730	3,936	(437)	(304)	Quantity - ok
	Linemarking	10,410	m2 of p	2.40	25,012	2.81	29,258	8,976	m2 of pa	2.50	22,440	23,916	25,237	1,096	4,021	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,570	114,566	(33,570)	(28,316)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	24	Item	337.14	8,091	422.86	10,149	16	Item	320.00	5,120	5,681	5,995	2,410	4,154	WT measure variance
ther	Extra over cost for excavation in rock				-		-	1	Item	189,000.00	189,000	209,707	221,289	(209,707)	(221,289)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	90,000.00	90,000	99,860.26	105,375.57	(99,860)	(105,376)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-09 - Cameron Street / Connector Street (Nth–Sth Connector) – Construction of an arterial to connector road 4-way intersection (interim treatment)

Benchmark Item 9

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
O	Allowance for temporary protection during construction (drainage corridor on the Northern side of the western leg)				-		-	1	Item	15,000.00	15,000	16,643.38	17,562.59	(16,643)	(17,563)	Allowance for temporary protection during construction only (drainage corridor to be built on the northern side of the western leg)
Delivery	Surveying & Design	1	%	5.00	140,618	5.00	155,156	1	%	5.00	166,466	$ 183,393.53	$ 193,522.40	(42,775)	(38,366)	% driven item
	Contingency	1	%	15.00	421,855	15.00	465,468	1	%	15.00	499,397	$ 550,180.58	$ 580,567.21	(128,326)	(115,099)	% driven item
	Traffic Management	1	%	5.00	140,618	5.00	155,156	1	%	5.00	166,466	$ 183,393.53	$ 193,522.40	(42,775)	(38,366)	% driven item
	Supervision & Project Management	1	%	9.00	253,113	9.00	279,281	1	%	9.00	299,638	$ 330,108.35	$ 348,340.33	(76,995)	(69,059)	% driven item
	Council Fees	1	%	3.25	91,402	3.25	100,851	1	%	3.25	108,203	$ 119,205.79	$ 125,789.56	(27,804)	(24,938)	% driven item
	Vic Roads Fees	1	%	1.00	28,124	1.00	31,031	1	%	1.00	33,293	$ 36,678.71	$ 38,704.48	(8,555)	(7,673)	% driven item
	Environmental Management	1	%	0.50	14,062	0.50	15,516	1	%	0.50	16,647	$ 18,339.35	$ 19,352.24	(4,278)	(3,837)	% driven item
	Site Establishment	1	%	2.50	70,309	2.50	77,578	1	%	2.50	83,233	$ 91,696.76	$ 96,761.20	(21,388)	(19,183)	% driven item
TOTAL	Excluding Delivery				**2,812,365**		**3,103,121**				**$ 3,329,312**	**$ 3,667,871**	**$ 3,870,448**	**(855,505)**	**(767,327)**	
	Including Delivery				**3,972,466**		**4,383,158**				**4,702,654**	**$ 5,180,867**	**$ 5,467,008**	**(1,208,401)**	**(1,083,849)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-10 - Cameron Street (arterial west/blvd connector east) & Patterson Drive (arterial) – Construction of an arterial to arterial/blvd connector road 4-way intersection (interim treatment)

Benchmark Item 8

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-		2.39	-	2.68	-	42,334	m2	2.50	105,835	117,016	125,939	(117,016)	(125,939)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Earthworks	9,867	m3	35.43	349,538	40.30	397,666	9,141	m3	39.00	356,492	394,154	424,209	(44,615)	(26,543)	Quantity high based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	170.80	-			155.00	0			-	-	
	Secondary Arterial Pavement	13,800	m2	123.23	1,700,559	130.03	1,794,350	14,395	m2	141.00	2,029,695	2,244,123	2,415,240	(543,564)	(620,890)	Quantity is low based upon WT measured areas; Patterson Dr & Cameron St measured as Secondary arterial road. Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-		m2	126.00	0			-	-	
	Subgrade preparation	-	%	15.21	-	17.70	-	14,395	m2	2.50	35,988	39,789	42,823	(39,789)	(42,823)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-	-	-		m2		0			-	-	
	Pavement other	-	m2	-	-	-	-		m2		0			-	-	
Concrete Works	Kerb & channel	2,000	m	50.42	100,838	56.39	112,774	3,584	m	55.00	197,120	209,346	225,308	(108,507)	(112,535)	Quantity is low based upon WT measured lengths
	Cycle path	-	m2	59.60	-	69.01	-		m2	50.00	0			-	-	
	SUP / Footpath	1,700	m2	58.44	99,354	67.50	114,742	6,434	m2	60.00	386,040	409,982	441,244	(310,628)	(326,502)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	680	m2	71.43	48,575	76.57	52,071	710	m2	60.00	42,600	45,242	48,692	3,333	3,379	Quantity almost match
Drainage	Drainage pipe - 300mm CR backfilled	260	m	162.30	42,198	175.64	45,667		m	225.00	0			42,198	45,667	
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	900	m	291.67	262,500	320.95	288,857	1,195	m	290.00	346,550	383,161	412,378	(120,661)	(123,521)	Quantity assumed to run through Secondary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	40	no.	2,325.57	93,023	2,499.15	99,966	24	no.	2,150.00	51,600	61,562	66,256	31,461	33,710	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,100	m	23.05	71,446	26.53	82,256	3,584	m	45.00	161,280	178,318	191,915	(106,873)	(109,660)	rate low - allowances include for pits and risers. Quantity low
	Drainage - swale								m	25.00	0			-	-	
	Drainage - culvert	-	no.	-	-	-	-		no.		0			-	-	
Traffic	Traffic Signals	4	Item	88,375.88	353,504	100,101.03	400,404	1	Item	300,000.00	300,000	331,694	356,986	21,810	43,418	X-Intersection
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	60	no.	259.62	15,577	318.78	19,127	81	no.	250.00	20,250	21,506	23,146	(5,929)	(4,019)	assumes trees @15m spacing along nature strip length >3m
	Landscaping	3,000	m2	20.72	62,150	23.31	69,933	4,159	m2	15.00	62,385	66,254	71,306	(4,104)	(1,373)	Quantity is quite low - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding	3,000	m2	7.00	20,988	7.92	23,766	16,636	m2	5.50	91,498	97,173	104,582	(76,185)	(80,816)	Assume 20% landscape planting & 80% topsoil seeding
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	32	no.	12,000.00	384,000	424,568	456,942	(424,568)	(456,942)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	4	Item / p	-	-	-	-		Item / per leg		0			-	-	
Misc.	Regulatory signage	16	Item	329.29	5,269	363.25	5,812	16	Item	350.00	5,600	5,947	6,401	(679)	(589)	Quantity - ok
	Linemarking	13,800	m2 of p	2.40	33,158	2.81	38,786	14,395	m2 of pa	2.50	35,988	38,219	41,134	(5,062)	(2,348)	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,187	116,436	(33,187)	(30,186)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	24		337.14	8,091	422.86	10,149	24	Item	320.00	7,680	8,491	9,139	(400)	1,010	WT measure variance
Other	Extra over cost for excavation in rock				-		-	1	Item	320,000.00	320,000	353,807	380,785	(353,807)	(380,785)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	144,000.00	144,000	159,212.94	171,353.12	(159,213)	(171,353)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
	Surveying & Design	1	%	5.00	167,088	5.00	182,129	1	%	5.00	259,430	$ 284,887.65	$ 306,610.69	(117,799)	(124,482)	% driven item

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-10 - Cameron Street (arterial west/blvd connector east) & Patterson Drive (arterial) – Construction of an arterial to arterial/blvd connector road 4-way intersection (interim treatment)

Benchmark Item 8

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Delivery	Contingency	1	%	15.00	501,265	15.00	546,386	1	%	15.00	778,290	$ 854,662.95	$ 919,832.07	(353,398)	(373,446)	% driven item
	Traffic Management	1	%	5.00	167,088	5.00	182,129	1	%	5.00	259,430	$ 284,887.65	$ 306,610.69	(117,799)	(124,482)	% driven item
	Supervision & Project Management	1	%	9.00	300,759	9.00	327,832	1	%	9.00	466,974	$ 512,797.77	$ 551,899.24	(212,039)	(224,068)	% driven item
	Council Fees	1	%	3.25	108,607	3.25	118,384	1	%	3.25	168,630	$ 185,176.97	$ 199,296.95	(76,570)	(80,913)	% driven item
	Vic Roads Fees	1	%	1.00	33,418	1.00	36,426	1	%	1.00	51,886	$ 56,977.53	$ 61,322.14	(23,560)	(24,896)	% driven item
	Environmental Management	1	%	0.50	16,709	0.50	18,213	1	%	0.50	25,943	$ 28,488.76	$ 30,661.07	(11,780)	(12,448)	% driven item
	Site Establishment	1	%	2.50	83,544	2.50	91,064	1	%	2.50	129,715	$ 142,443.82	$ 153,305.35	(58,900)	(62,241)	% driven item
TOTAL	Excluding Delivery				**3,341,767**		**3,642,574**				**5,188,600**	**$ 5,697,753**	**$ 6,132,214**	**(2,355,986)**	**(2,489,640)**	
	Including Delivery				**4,720,246**		**5,145,136**				**7,328,898**	**$ 8,048,076**	**$ 8,661,752**	**(3,327,830)**	**(3,516,616)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-11 - Cameron Street (blvd connector west/town centre connector east) & Koukoura Drive (arterial) – Construction of an arterial to connector road 4-way intersection (interim treatment)

Benchmark Item 8

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-		2.39	-	2.68	-	37,835	m2	2.50	94,588	104,725	111,405	(104,725)	(111,405)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Earthworks	9,867	m3	35.43	349,538	40.30	397,666	9,162	m3	39.00	357,331	395,629	420,864	(46,091)	(23,199)	Quantity high based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	170.80	-	9,651	m2	155.00	1,495,905	1,656,234	1,761,876	(1,656,234)	(1,761,876)	Koukoura Drive measured as Primary arterial road. Rate is low based upon nominated pavement depth.
	Secondary Arterial Pavement	13,800	m2	123.23	1,700,559	130.03	1,794,350	3,562	m2	141.00	502,242	556,072	591,540	1,144,487	1,202,810	Quantity is high based upon WT measured areas; Cameron St measured as Secondary arterial road. Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-		m2	126.00	0			-	-	
	Subgrade preparation	-	%	15.21	-	17.70	-	13,213	m2	2.50	33,033	36,573	38,906	(36,573)	(38,906)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-	-	-		m2		0			-	-	
	Pavement other	-	m2	-	-	-	-		m2		0			-	-	
Concrete Works	Kerb & channel	2,000	m	50.42	100,838	56.39	112,774	3,129	m	55.00	172,095	183,022	194,696	(82,184)	(81,922)	Quantity is low based upon WT measured lengths
	Cycle path	-	m2	59.60	-	69.01	-		m2	50.00	0			-	-	
	SUP / Footpath	1,700	m2	58.44	99,354	67.50	114,742	5,909	m2	60.00	354,540	377,051	401,101	(277,696)	(286,359)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	680	m2	71.43	48,575	76.57	52,071	267	m2	60.00	16,020	17,037	18,124	31,538	33,947	Quantity is low, Traffic Island scope to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	260	m	162.30	42,198	175.64	45,667	446	m	225.00	100,350	111,105	118,192	(68,907)	(72,525)	Quantity assumed to run through Secondary Arterial
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	900	m	291.67	262,500	320.95	288,857	626	m	290.00	181,540	200,997	213,818	61,503	75,039	Quantity assumed to run through Primary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	40	no.	2,325.57	93,023	2,499.15	99,966	21	no.	2,150.00	45,150	53,941	57,382	39,082	42,584	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,100	m	23.05	71,446	26.53	82,256	3,129	m	45.00	140,805	155,896	165,840	(84,451)	(83,584)	rate low - allowances include for pits and risers. Quantity almost matches
	Drainage - swale								m	25.00	0			-	-	
	Drainage - culvert	-	no.	-	-	-	-		no.		0			-	-	
Traffic	Traffic Signals	4	Item	88,375.88	353,504	100,101.03	400,404	1	Item	300,000.00	300,000	332,154	353,340	21,350	47,064	X-Intersection
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	60	no.	259.62	15,577	318.78	19,127	122	no.	250.00	30,500	32,437	34,505	(16,860)	(15,379)	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	3,000	m2	20.72	62,150	23.31	69,933	3,689	m2	15.00	55,338	58,852	62,605	3,298	7,328	Quantity is quite low - area used assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding	3,000	m2	7.00	20,988	7.92	23,766	14,757	m2	5.50	81,162	86,316	91,821	(65,328)	(68,055)	
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	29	no.	12,000.00	348,000	385,298	409,874	(385,298)	(409,874)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	4	Item / p	-	-	-	-		Item / per leg		0			-	-	
Misc.	Regulatory signage	16	Item	329.29	5,269	363.25	5,812	16	Item	350.00	5,600	5,956	6,335	(687)	(523)	Quantity - ok
	Linemarking	13,800	m2 of p	2.40	33,158	2.81	38,786	13,213	m2 of pa	2.50	33,033	35,130	37,371	(1,972)	1,416	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,337	115,247	(33,337)	(28,997)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	24		337.14	8,091	422.86	10,149	24	Item	320.00	7,680	8,503	9,045	(412)	1,103	Quantity - ok
er	Extra over cost for excavation in rock				-		-	1	Item	321,000.00	321,000	355,404	378,074	(355,404)	(378,074)	Additional site specific item. Assume 35% of total excavated volume to be in rock

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-11 - Cameron Street (blvd connector west/town centre connector east) & Koukoura Drive (arterial) – Construction of an arterial to connector road 4-way intersection (interim treatment)

Benchmark Item 8

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Othe	Extra over cost for subgrade preparation				-		-	1	Item	133,000.00	133,000	147,254.76	156,647.30	(147,255)	(156,647)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
Delivery	Surveying & Design	1	%	5.00	167,088	5.00	182,129	1	%	5.00	245,646	$ 270,196.19	$ 287,430.46	(103,108)	(105,302)	% driven item
	Contingency	1	%	15.00	501,265	15.00	546,386	1	%	15.00	736,937	$ 810,588.58	$ 862,291.37	(309,324)	(315,905)	% driven item
	Traffic Management	1	%	5.00	167,088	5.00	182,129	1	%	5.00	245,646	$ 270,196.19	$ 287,430.46	(103,108)	(105,302)	% driven item
	Supervision & Project Management	1	%	9.00	300,759	9.00	327,832	1	%	9.00	442,162	$ 486,353.15	$ 517,374.82	(185,594)	(189,543)	% driven item
	Council Fees	1	%	3.25	108,607	3.25	118,384	1	%	3.25	159,670	$ 175,627.52	$ 186,829.80	(67,020)	(68,446)	% driven item
	Vic Roads Fees	1	%	1.00	33,418	1.00	36,426	1	%	1.00	49,129	$ 54,039.24	$ 57,486.09	(20,622)	(21,060)	% driven item
	Environmental Management	1	%	0.50	16,709	0.50	18,213	1	%	0.50	24,565	$ 27,019.62	$ 28,743.05	(10,311)	(10,530)	% driven item
	Site Establishment	1	%	2.50	83,544	2.50	91,064	1	%	2.50	122,823	$ 135,098.10	$ 143,715.23	(51,554)	(52,651)	% driven item
TOTAL	Excluding Delivery				**3,341,767**		**3,642,574**				**4,912,911**	**$ 5,403,924**	**$ 5,748,609**	**(2,062,157)**	**(2,106,035)**	
	Including Delivery				**4,720,246**		**5,145,136**				**6,939,487**	**$ 7,633,042**	**$ 8,119,910**	**(2,912,797)**	**(2,974,774)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-12 - Cameron Street / Merriang Road – Construction of an connector to arterial road 3-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount (P50)	Amount (P90)	Amount	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation			2.39	-	2.60	-	12,628	m2	2.50	31,570	35,057	36,807	(35,057)	(36,807)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Demolition of existing pavements							3,190	m2	25.00	79,750	88,559	92,979	(88,559)	(92,979)	New item - Demolition of Existing Merriang Rd
	Earthworks	5,556	m3	35.43	196,805	39.04	216,875	3,349	m3	39.00	130,611	145,037	152,277	51,768	64,598	Quantity high based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	167.24	-		m2	155.00	0			-	-	
	Secondary Arterial Pavement	5,915	m2	123.23	728,899	128.26	758,673	1,957	m2	141.00	275,937	306,416	321,710	422,483	436,963	Quantity is high based upon WT measured areas; Cameron St measured as Secondary arterials. Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	1,855	m2	91.07	168,937	100.18	185,831	3,937	m2	126.00	496,062	550,855	578,350	(381,918)	(392,519)	Quantity is low based upon WT measured areas; Merriang Rd measured as Collector arterials. Rate is low based upon nominated pavement depth.
	Subgrade preparation	-	%	15.21	-	17.05	-	5,894	m2	2.50	14,735	16,363	17,179	(16,363)	(17,179)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	1,980	m	50.42	99,830	54.84	108,581	1,038	m	55.00	57,090	60,895	63,934	38,935	44,647	Quantity is high based upon WT measured lengths
	Cycle path	560	m2	59.60	33,376	66.57	37,278		m2	50.00	0			33,376	37,278	
	SUP / Footpath	1,330	m2	58.44	77,730	65.15	86,646	2,343	m2	60.00	140,580	149,948	157,433	(72,218)	(70,787)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	485	m2	71.43	34,645	75.24	36,492	100	m2	60.00	6,000	6,400	6,719	28,245	29,773	Quantity high; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	-	m	162.30	-	172.18	-		m	225.00	0			-	-	
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	241.37	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	580	m	291.67	169,167	313.36	181,747	517	m	290.00	149,930	166,491	174,801	2,676	6,946	Quantity assumed to run through Secondary & Collector Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	395.82	-		m	355.00	0			-	-	
	Drainage - pits	27	no.	2,325.57	62,790	2,454.13	66,261	10	no.	2,150.00	21,500	25,762	27,048	37,028	39,213	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	2,480	m	23.05	57,157	25.63	63,562	1,038	m	45.00	46,710	51,869	54,458	5,287	9,103	rate low - allowances include for pits and risers. Quantity quite high
	Drainage - culvert	-	no.	-	-		-		no.		0			-	-	
Traffic	Traffic Signals	3	Item	88,375.88	265,128	97,059.82	291,179	1	Item	250,000.00	250,000	277,614	291,471	(12,486)	(291)	T-Intersection
	Traffic Signal conduit	-	m	45.71	-	51.46	-		m		0			-	-	
Landscape	Tree Planting	66	no.	259.62	17,135	303.44	20,027	58	no.	250.00	14,500	15,466	16,238	1,668	3,788	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	4,180	m2	20.72	86,596	22.64	94,627	858	m2	15.00	12,873	13,731	14,416	72,865	80,211	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding	4,180	m2	7.00	29,243	7.68	32,110	3,433	m2	5.50	18,880	20,139	21,144	9,105	10,967	Assume 20% landscape planting & 80% topsoil seeding
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	228.38	-	14	no.	12,000.00	168,000	186,557	195,868	(186,557)	(195,868)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	3	Item / p	-	-		-		Item / per leg		0			-	-	
Misc.	Regulatory signage	5	Item	329.29	1,646	354.44	1,772	5	Item	350.00	1,750	1,867	1,960	(220)	(188)	Quantity - ok
	Linemarking	7,770	m2 of p	2.40	18,669	2.70	21,016	5,894	m2 of pa	2.50	14,735	15,717	16,501	2,952	4,515	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,658	114,081	(33,658)	(27,831)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	18	Item	337.14	6,069	400.63	7,211	4	Item	320.00	1,280	1,421	1,492	4,647	5,719	WT measure variance

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-12 - Cameron Street / Merriang Road – Construction of an connector to arterial road 3-way intersection (interim treatment)

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Other	Service Relocation	1	Item	94,526.02	94,526	106,692.87	106,693	1	Item	116,000.00	116,000	128,813	135,242	(34,287)	(28,550)	Rate appears to be low, WT's rate is based off 100m for OH Electrical power to be removed / relocated as well as relocation of comms during works to IN-12 along Merriang Rd (extent based on Donnybrook-Woodstock ICP Plan)
	Extra over cost for excavation in rock				-		-	1	Item	125,000.00	125,000	138,807	145,735	(138,807)	(145,735)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	59,000.00	59,000	65,517	68,787	(65,517)	(68,787)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
	Remove - existing fencing				-		-	580	m	18.00	10,440	11,593	12,172	(11,593)	(12,172)	Quantity missing - WT allowance
	Tie into existing pavements				-		-	2	no.	25,000.00	50,000	55,523	58,294	(55,523)	(58,294)	Assumes ties into both sides of Merriang Rd (North & South legs)
Delivery	Surveying & Design	1	%	5.00	111,167	5.00	120,142	1	%	5.00	119,847	$ 132,253.72	$ 138,855.00	(21,086)	(18,713)	% driven item
	Contingency	1	%	15.00	333,502	15.00	360,425	1	%	15.00	359,540	$ 396,761.17	$ 416,564.99	(63,259)	(56,140)	% driven item
	Traffic Management	1	%	5.00	111,167	5.00	120,142	1	%	5.00	119,847	$ 132,253.72	$ 138,855.00	(21,086)	(18,713)	% driven item
	Supervision & Project Management	1	%	9.00	200,101	9.00	216,255	1	%	9.00	215,724	$ 238,056.70	$ 249,939.00	(37,955)	(33,684)	% driven item
	Council Fees	1	%	3.25	72,259	3.25	78,092	1	%	3.25	77,900	$ 85,964.92	$ 90,255.75	(13,706)	(12,164)	% driven item
	Vic Roads Fees	1	%	1.00	22,233	1.00	24,028	1	%	1.00	23,969	$ 26,450.74	$ 27,771.00	(4,217)	(3,743)	% driven item
	Environmental Management	1	%	0.50	11,117	0.50	12,014	1	%	0.50	11,985	$ 13,225.37	$ 13,885.50	(2,109)	(1,871)	% driven item
	Site Establishment	1	%	2.50	55,584	2.50	60,071	1	%	2.50	59,923	$ 66,126.86	$ 69,427.50	(10,543)	(9,357)	% driven item
TOTAL	Excluding Delivery				**2,223,348**		**2,402,832**				**2,396,933**	**$ 2,645,074**	**$ 2,777,100**	**(421,727)**	**(374,268)**	
	Including Delivery				**3,140,479**		**3,394,000**				**3,385,668**	**$ 3,736,168**	**$ 3,922,654**	**(595,689)**	**(528,654)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-13 - Gunns Gully Road & Connector St (Nth–Sth Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)

Benchmark Item 13

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation			2.39	-	2.68	-	32,064	m2	2.50	80,160	88,717	94,704	(88,717)	(94,704)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Earthworks	5,031	m3	35.43	178,239	40.30	202,781	6,666	m3	39.00	259,964	287,714	307,130	(109,474)	(104,349)	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	5,295	m2	157.08	831,756	170.80	904,390	7,812	m2	155.00	1,210,860	1,340,112	1,430,549	(508,356)	(526,160)	Quantity is low based upon WT measured areas; Gunns Gulley Road measured as Primary arterials Rate is low based upon nominated pavement depth.
	Secondary Arterial Pavement	1,742	m2	123.23	214,665	130.03	226,504	0	m2	141.00	0			214,665	226,504	
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-	2,019	m2	126.00	254,394	281,549	300,549	(281,549)	(300,549)	Side road measured as Collector arterials. Rate is low based upon nominated pavement depth.
	Subgrade preparation	-	%	15.21	-	17.70	-	9,831	m2	2.50	24,578	27,201	29,037	(27,201)	(29,037)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	2,127	m	50.42	107,241	56.39	119,935	1,412	m	55.00	77,660	82,558	88,130	24,683	31,805	Quantity is high based upon WT measured lengths
	Cycle path	1,615	m2	59.60	96,254	69.01	111,447		m2	50.00	0			96,254	111,447	
	SUP / Footpath	510	m2	58.44	29,806	67.50	34,422	4,951	m2	60.00	297,060	315,797	337,109	(285,991)	(302,686)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	675	m2	71.43	48,217	76.57	51,688	96	m2	60.00	5,760	6,123	6,537	42,094	45,151	Quantity high; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	205	m	162.30	33,272	175.64	36,006	252	m	225.00	56,700	62,752	66,987	(29,481)	(30,981)	Quantity assumed to run through Collector Arterial
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	540	m	291.67	157,500	320.95	173,314	650	m	290.00	188,500	208,621	222,700	(51,121)	(49,386)	Quantity assumed to run through Primary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	25	no.	2,325.57	58,139	2,499.15	62,479	18	no.	2,150.00	38,700	46,217	49,336	11,922	13,143	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	2,627	m	23.05	60,544	26.53	69,705	1,412	m	45.00	63,540	70,323	75,068	(9,778)	(5,363)	rate low - allowances include for pits and risers. Quantity quite high
	Drainage - culvert	-	no.	-	-		-		no.		0			-	-	
Traffic	Traffic Signals	3	Item	88,375.88	265,128	100,101.03	300,303	1	Item	250,000.00	250,000	276,686	295,358	(11,558)	4,945	T-intersection
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	78	no.	259.62	20,250	318.78	24,865	97	no.	250.00	24,250	25,780	27,519	(5,530)	(2,654)	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	4,250	m2	20.72	88,046	23.31	99,072	3,437	m2	15.00	51,558	54,810	58,509	33,236	40,563	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding	4,250	m2	7.00	29,733	7.92	33,669	13,749	m2	5.50	75,618	80,388	85,813	(50,655)	(52,144)	Assume 20% landscape planting & 80% topsoil seeding
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	21	no.	12,000.00	252,000	278,899	297,721	(278,899)	(297,721)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	3	Item / p	-	-		-		Item / per leg		0			-	-	
Misc.	Regulatory signage	6	Item	329.29	1,976	363.25	2,179	6	Item	350.00	2,100	2,232	2,383	(257)	(204)	Quantity - ok
	Linemarking	7,037	m2 of p	2.40	16,908	2.81	19,778	9,831	m2 of pa	2.50	24,578	26,128	27,891	(9,220)	(8,113)	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,295	115,603	(33,295)	(29,353)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	18	Item	337.14	6,069	422.86	7,612	8	Item	320.00	2,560	2,833	3,024	3,235	4,587	WT measure variance
Other	Extra over cost for excavation in rock				-		-	1	Item	234,000.00	234,000	258,978	276,455	(258,978)	(276,455)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	99,000.00	99,000	109,567.65	116,961.81	(109,568)	(116,962)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-13 - Gunns Gully Road & Connector St (Nth–Sth Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)

Benchmark Item 13

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
	Allowance for additional protection for conservation area				-		-	1	Item	10,000.00	10,000	11,067.44	11,814.32	(11,067)	(11,814)	Allowance for additional protection during construction
Delivery	Surveying & Design	1	%	5.00	115,937	5.00	128,320	1	%	5.00	184,377	$ 202,667.45	$ 216,344.45	(86,730)	(88,024)	% driven item
	Contingency	1	%	15.00	347,812	15.00	384,960	1	%	15.00	553,131	$ 608,002.36	$ 649,033.35	(260,191)	(264,073)	% driven item
	Traffic Management	1	%	5.00	115,937	5.00	128,320	1	%	5.00	184,377	$ 202,667.45	$ 216,344.45	(86,730)	(88,024)	% driven item
	Supervision & Project Management	1	%	9.00	208,687	9.00	230,976	1	%	9.00	331,879	$ 364,801.41	$ 389,420.01	(156,115)	(158,444)	% driven item
	Council Fees	1	%	3.25	75,359	3.25	83,408	1	%	3.25	119,845	$ 131,733.84	$ 140,623.89	(56,375)	(57,216)	% driven item
	Vic Roads Fees	1	%	1.00	23,187	1.00	25,664	1	%	1.00	36,875	$ 40,533.49	$ 43,268.89	(17,346)	(17,605)	% driven item
	Environmental Management	1	%	0.50	11,594	0.50	12,832	1	%	0.50	18,438	$ 20,266.75	$ 21,634.44	(8,673)	(8,802)	% driven item
	Site Establishment	1	%	2.50	57,969	2.50	64,160	1	%	2.50	92,188	$ 101,333.73	$ 108,172.22	(43,365)	(44,012)	% driven item
TOTAL	Excluding Delivery				**2,318,743**		**2,566,400**				**3,687,539**	**$ 4,053,349**	**$ 4,326,889**	**(1,734,606)**	**(1,760,489)**	
	Including Delivery				**3,275,225**		**3,625,039**				**5,208,649**	**$ 5,725,356**	**$ 6,111,731**	**(2,450,130)**	**(2,486,691)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-14 - Gunns Gully Road & Patterson Drive – Construction of an arterial to arterial road 4-way intersection (interim treatment)

Benchmark Item 6

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation			2.39	-	2.68	-	44,488	m2	2.50	111,220	123,227	130,993	(123,227)	(130,993)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Earthworks	10,003	m3	35.43	354,351	40.30	403,141	10,368	m3	39.00	404,361	448,013	476,248	(93,662)	(73,108)	Quantity low based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	6,840	m2	157.08	1,074,450	170.80	1,168,277	10,596	m2	155.00	1,642,380	1,819,680	1,934,362	(745,230)	(766,085)	Quantity is low based upon WT measured areas; Gunns Gulley Road measured as Primary arterials Rate is low based upon nominated pavement depth.
	Secondary Arterial Pavement	7,150	m2	123.23	881,087	130.03	929,681	4,397	m2	141.00	619,977	686,905	730,196	194,181	199,485	Quantity is low based upon WT measured areas; Patterson Dr measured as Secondary arterial. Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-	0	m2	126.00	0			-	-	
	Subgrade preparation	-	%	15.21	-	17.70	-	14,993	m2	2.50	37,483	41,529	44,146	(41,529)	(44,146)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	1,900	m	50.42	95,796	56.39	107,135	3,639	m	55.00	200,145	213,002	226,426	(117,206)	(119,291)	Quantity is low based upon WT measured lengths
	Cycle path	1,120	m2	59.60	66,752	69.01	77,288		m2	50.00	0			66,752	77,288	
	SUP / Footpath	735	m2	58.44	42,956	67.50	49,609	5,815	m2	60.00	348,900	371,312	394,714	(328,356)	(345,105)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	850	m2	71.43	60,718	76.57	65,088	609	m2	60.00	36,540	38,887	41,338	21,831	23,750	Quantity high; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	260	m	162.30	42,198	175.64	45,667	512	m	225.00	115,200	127,636	135,680	(85,438)	(90,013)	Quantity assumed to run through Secondary Arterial
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	870	m	291.67	253,750	320.95	279,228	626	m	290.00	181,540	201,138	213,814	52,612	65,414	Quantity assumed to run through Primary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	39	no.	2,325.57	90,697	2,499.15	97,467	23	no.	2,150.00	49,450	59,120	62,846	31,577	34,621	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,000	m	23.05	69,141	26.53	79,602	3,639	m	45.00	163,755	181,433	192,867	(112,292)	(113,265)	rate low - allowances include for pits and risers. Quantity low
	Drainage - culvert	-	no.	-	-		-		no.		0			-	-	
Traffic	Traffic Signals	4	Item	88,375.88	353,504	100,101.03	400,404	1	Item	300,000.00	300,000	332,386	353,334	21,118	47,070	X-intersection
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	62	no.	259.62	16,096	318.78	19,764	95	no.	250.00	23,750	25,276	26,869	(9,179)	(7,104)	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	2,600	m2	20.72	53,863	23.31	60,609	4,614	m2	15.00	69,213	73,659	78,301	(19,796)	(17,693)	Quantity is quite low - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding	2,600	m2	7.00	18,190	7.92	20,598	18,457	m2	5.50	101,512	108,033	114,842	(89,844)	(94,244)	Assume 20% landscape planting & 80% topsoil seeding
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	30	no.	12,000.00	360,000	398,863	424,001	(398,863)	(424,001)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	4	Item / p	-	-		-		Item / per leg		0			-	-	
Misc.	Regulatory signage	16	Item	329.29	5,269	363.25	5,812	16	Item	350.00	5,600	5,960	6,335	(691)	(523)	Quantity - ok
	Linemarking	13,990	m2 of p	2.40	33,614	2.81	39,320	14,993	m2 of pa	2.50	37,483	39,890	42,404	(6,276)	(3,084)	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,413	115,245	(33,413)	(28,995)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	24	Item	337.14	8,091	422.86	10,149	24	Item	320.00	7,680	8,509	9,045	(418)	1,103	Quantity - ok
	Extra over cost for excavation in rock				-		-	1	Item	363,000.00	363,000	402,187	427,534	(402,187)	(427,534)	Additional site specific item. Assume 35% of total excavated volume to be in rock

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-14 - Gunns Gully Road & Patterson Drive – Construction of an arterial to arterial road 4-way intersection (interim treatment)

Benchmark Item 6

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Other	Extra over cost for subgrade preparation				-		-	1	Item	150,000.00	150,000	166,192.98	176,666.96	(166,193)	(176,667)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
	Allowance for additional protection for conservation area				-		-	1	Item	10,000.00	10,000	11,079.53	11,777.80	(11,080)	(11,778)	Allowance for additional protection during construction
Delivery	Surveying & Design	1	%	5.00	179,776	5.00	197,254	1	%	5.00	272,159	$ 299,616.56	$ 318,499.29	(119,840)	(121,245)	% driven item
	Contingency	1	%	15.00	539,328	15.00	591,763	1	%	15.00	816,478	$ 898,849.67	$ 955,497.88	(359,521)	(363,734)	% driven item
	Traffic Management	1	%	5.00	179,776	5.00	197,254	1	%	5.00	272,159	$ 299,616.56	$ 318,499.29	(119,840)	(121,245)	% driven item
	Supervision & Project Management	1	%	9.00	323,597	9.00	355,058	1	%	9.00	489,887	$ 539,309.80	$ 573,298.73	(215,713)	(218,241)	% driven item
	Council Fees	1	%	3.25	116,855	3.25	128,215	1	%	3.25	176,904	$ 194,750.76	$ 207,024.54	(77,896)	(78,809)	% driven item
	Vic Roads Fees	1	%	1.00	35,955	1.00	39,451	1	%	1.00	54,432	$ 59,923.31	$ 63,699.86	(23,968)	(24,249)	% driven item
	Environmental Management	1	%	0.50	17,978	0.50	19,725	1	%	0.50	27,216	$ 29,961.66	$ 31,849.93	(11,984)	(12,124)	% driven item
	Site Establishment	1	%	2.50	89,888	2.50	98,627	1	%	2.50	136,080	$ 149,808.28	$ 159,249.65	(59,920)	(60,622)	% driven item
TOTAL	Excluding Delivery				**3,595,523**		**3,945,089**				**5,443,189**	**$ 5,992,331**	**$ 6,369,986**	**(2,396,808)**	**(2,424,896)**	
	Including Delivery				**5,078,677**		**5,572,439**				**7,688,504**	**$ 8,464,168**	**$ 8,997,605**	**(3,385,491)**	**(3,425,166)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-15 - Gunns Gully Road & Koukoura Drive – Construction of an arterial to arterial road 4-way intersection (Connector road north of Gunns Gully Road) (interim treatment)

Benchmark Item 6

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation			2.39	-	2.68	-	34,474	m2	2.50	86,185	95,230	102,666	(95,230)	(102,666)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Earthworks	10,003	m3	35.43	354,351	40.30	403,141	7,457	m3	39.00	290,841	321,364	346,457	32,987	56,684	Quantity high based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	6,840	m2	157.08	1,074,450	170.80	1,168,277	10,430	m2	155.00	1,616,650	1,786,314	1,925,796	(711,864)	(757,519)	Quantity is low based upon WT measured areas; Gunns Gully Road & Koukoura Road measured as Primary arterials. Rate is low based upon nominated pavement depth.
	Secondary Arterial Pavement	7,150	m2	123.23	881,087	130.03	929,681	0	m2	141.00	0			881,087	929,681	
	Collector Arterial Pavement	-	m2	91.07	-	100.18	-	0	m2	126.00	0			-	-	
	Subgrade preparation	-	%	15.21	-	17.70	-	10,430	m2	2.50	26,075	28,812	31,061	(28,812)	(31,061)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	1,900	m	50.42	95,796	56.39	107,135	2,684	m	55.00	147,620	156,677	168,910	(60,880)	(61,775)	Quantity is low based upon WT measured lengths
	Cycle path	1,120	m2	59.60	66,752	69.01	77,288		m2	50.00	0			66,752	77,288	
	SUP / Footpath	735	m2	58.44	42,956	67.50	49,609	4,806	m2	60.00	288,360	306,051	329,949	(263,095)	(280,340)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	850	m2	71.43	60,718	76.57	65,088	309	m2	60.00	18,540	19,677	21,214	41,041	43,874	Quantity high; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	260	m	162.30	42,198	175.64	45,667		m	225.00	0			42,198	45,667	
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	870	m	291.67	253,750	320.95	279,228	889	m	290.00	257,810	273,627	294,993	(19,877)	(15,764)	Quantity assumed to run through Primary Arterials
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	39	no.	2,325.57	90,697	2,499.15	97,467	18	no.	2,150.00	38,700	46,142	49,745	44,555	47,722	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	3,000	m	23.05	69,141	26.53	79,602	2,684	m	45.00	120,780	133,456	143,876	(64,315)	(64,274)	rate low - allowances include for pits and risers. Quantity quite high
	Drainage - culvert	-	no.	-	-		-		no.		0			-	-	
Traffic	Traffic Signals	4	Item	88,375.88	353,504	100,101.03	400,404	1	Item	250,000.00	250,000	276,237	297,807	77,267	102,598	T-intersection
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	62	no.	259.62	16,096	318.78	19,764	63	no.	250.00	15,750	16,716	18,022	(620)	1,743	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	2,600	m2	20.72	53,863	23.31	60,609	3,786	m2	15.00	56,787	60,271	64,977	(6,408)	(4,369)	Quantity is quite low - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding	2,600	m2	7.00	18,190	7.92	20,598	15,143	m2	5.50	83,288	88,397	95,300	(70,208)	(74,702)	Assume 20% landscape planting & 80% topsoil seeding
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	25	no.	12,000.00	300,000	331,484	357,368	(331,484)	(357,368)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	4	Item / p	-	-		-		Item / per leg		0			-	-	
Misc.	Regulatory signage	16	Item	329.29	5,269	363.25	5,812	16	Item	350.00	5,600	5,944	6,408	(675)	(596)	Quantity - ok
	Linemarking	13,990	m2 of p	2.40	33,614	2.81	39,320	10,430	m2 of pa	2.50	26,075	28,812	31,061	4,803	8,259	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,119	116,561	(33,119)	(30,311)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	24	Item	337.14	8,091	422.86	10,149	12	Item	320.00	3,840	4,243	4,574	3,848	5,574	WT measure variance
Other	Extra over cost for excavation in rock				-		-	1	Item	262,000.00	262,000	289,496	312,101	(289,496)	(312,101)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	105,000.00	105,000	116,019.53	125,078.76	(116,020)	(125,079)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works
					-		-					-	-			
	Surveying & Design	1	%	5.00	179,776	5.00	197,254	1	%	5.00	205,195	$ 224,654.38	$ 242,196.22	(44,878)	(44,942)	% driven item

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-15 - Gunns Gully Road & Koukoura Drive – Construction of an arterial to arterial road 4-way intersection (Connector road north of Gunns Gully Road) (interim treatment)

Benchmark Item 6

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Delivery	Contingency	1	%	15.00	539,328	15.00	591,763	1	%	15.00	615,585	$ 673,963.13	$ 726,588.67	(134,635)	(134,825)	% driven item
	Traffic Management	1	%	5.00	179,776	5.00	197,254	1	%	5.00	205,195	$ 224,654.38	$ 242,196.22	(44,878)	(44,942)	% driven item
	Supervision & Project Management	1	%	9.00	323,597	9.00	355,058	1	%	9.00	369,351	$ 404,377.88	$ 435,953.20	(80,781)	(80,895)	% driven item
	Council Fees	1	%	3.25	116,855	3.25	128,215	1	%	3.25	133,377	$ 146,025.35	$ 157,427.55	(29,171)	(29,212)	% driven item
	Vic Roads Fees	1	%	1.00	35,955	1.00	39,451	1	%	1.00	41,039	$ 44,930.88	$ 48,439.24	(8,976)	(8,988)	% driven item
	Environmental Management	1	%	0.50	17,978	0.50	19,725	1	%	0.50	20,520	$ 22,465.44	$ 24,219.62	(4,488)	(4,494)	% driven item
	Site Establishment	1	%	2.50	89,888	2.50	98,627	1	%	2.50	102,598	$ 112,327.19	$ 121,098.11	(22,439)	(22,471)	% driven item
TOTAL	Excluding Delivery				**3,595,523**		**3,945,089**				**4,103,900**	**$ 4,493,088**	**$ 4,843,924**	**(897,564)**	**(898,835)**	
	Including Delivery				**5,078,677**		**5,572,439**				**5,796,759**	**$ 6,346,486**	**$ 6,842,043**	**(1,267,810)**	**(1,269,604)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-16 - Patterson Drive / Connector St (East–West Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)

Benchmark Item 15

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation			2.39	-	2.68	-	23,546	m2	2.50	58,865	65,280	69,079	(65,280)	(69,079)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Earthworks	5,556	m3	35.43	196,805	40.30	223,903	5,339	m3	39.00	208,231	230,923	244,364	(34,117)	(20,461)	Quantity slightly high based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	170.80	-	0	m2	155.00	0			-	-	
	Secondary Arterial Pavement	5,915	m2	123.23	728,899	130.03	769,100	6,366	m2	141.00	897,606	995,423	1,053,361	(266,524)	(284,261)	Quantity is low based upon WT measured areas; Patterson Dr measured as Secondary arterial. Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	1,855	m2	91.07	168,937	100.18	185,831	2,424	m2	126.00	305,424	338,708	358,422	(169,770)	(172,591)	Side road measured as Collector arterials. Rate is low based upon nominated pavement depth.
	Subgrade preparation	-	%	15.21	-	17.70	-	8,790	m2	2.50	21,975	24,370	25,788	(24,370)	(25,788)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	1,980	m	50.42	99,830	56.39	111,646	2,008	m	55.00	110,440	117,643	124,490	(17,813)	(12,844)	Quantity is low based upon WT measured lengths
	Cycle path	560	m2	59.60	33,376	69.01	38,644		m2	50.00	0			33,376	38,644	
	SUP / Footpath	1,330	m2	58.44	77,730	67.50	89,768	4,532	m2	60.00	271,920	289,654	306,514	(211,924)	(216,745)	Quantity is very low, scope to be confirmed. Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	485	m2	71.43	34,645	76.57	37,139	99	m2	60.00	5,940	6,327	6,696	28,318	30,443	Quantity high; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	-	m	162.30	-	175.64	-		m	225.00	0			-	-	
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	580	m	291.67	169,167	320.95	186,152	783	m	290.00	227,070	241,879	255,958	(72,713)	(69,805)	Quantity assumed to run through Collector & Secondary Arterial
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	27	no.	2,325.57	62,790	2,499.15	67,477	16	no.	2,150.00	34,400	41,165	43,561	21,626	23,916	Quantity assumes pits @ 50m centres based upon length of pipework; Rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	2,480	m	23.05	57,157	26.53	65,805	2,008	m	45.00	90,360	100,207	106,040	(43,050)	(40,235)	rate low - allowances include for pits and risers. Quantity quite high
	Drainage - culvert	-	no.	-	-		-		no.		0			-	-	
Traffic	Traffic Signals	3	Item	88,375.88	265,128	100,101.03	300,303	1	Item	250,000.00	250,000	277,244	293,381	(12,116)	6,922	T-intersection
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	66	no.	259.62	17,135	318.78	21,040	66	no.	250.00	16,500	17,576	18,599	(441)	2,440	assumes trees @15m spacing along nature strip length >3m wide
	Landscaping	4,180	m2	20.72	86,596	23.31	97,440	2,025	m2	15.00	30,375	32,356	34,239	54,240	63,201	Quantity is quite low - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding	4,180	m2	7.00	29,243	7.92	33,115	8,100	m2	5.50	44,550	47,456	50,218	(18,212)	(17,103)	Assume 20% landscape planting & 80% topsoil seeding
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	23	no.	12,000.00	276,000	306,077	323,892	(306,077)	(323,892)	Rate - pricing methodology differs; Quantity based upon 50m spacing along road length + intersection; Note: lighting requirements to Cycle path & SUP is excluded
	Street lighting - Intersections	3	Item / p	-	-		-		Item / per leg		0			-	-	
Misc.	Regulatory signage	5	Item	329.29	1,646	363.25	1,816	5	Item	350.00	1,750	1,864	1,973	(218)	(156)	Quantity - ok
	Linemarking	7,770	m2 of p	2.40	18,669	2.81	21,838	8,790	m2 of pa	2.50	21,975	24,370	25,788	(5,701)	(3,950)	
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,513	114,829	(33,513)	(28,579)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	18	Item	337.14	6,069	422.86	7,612	8	Item	320.00	2,560	2,839	3,004	3,230	4,607	WT measure variance
Other	Extra over cost for excavation in rock				-		-	1	Item	187,000.00	187,000	207,378	219,449	(207,378)	(219,449)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Extra over cost for subgrade preparation				-		-	1	Item	88,000.00	88,000	97,589.82	103,270.01	(97,590)	(103,270)	Additional site specific item. Assume 25% of pavement area requires additional subgrade preparation works

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-16 - Patterson Drive / Connector St (East–West Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)

Benchmark Item 15

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
	Allowance for additional protection for conservation area				-		-	1	Item	10,000.00	10,000	11,089.75	11,735.23	(11,090)	(11,735)	Allowance for additional protection during construction
Delivery	Surveying & Design	1	%	5.00	106,441	5.00	117,244	1	%	5.00	163,247	$ 179,296.54	$ 189,732.44	(72,855)	(72,488)	% driven item
	Contingency	1	%	15.00	319,323	15.00	351,732	1	%	15.00	489,741	$ 537,889.61	$ 569,197.32	(218,566)	(217,465)	% driven item
	Traffic Management	1	%	5.00	106,441	5.00	117,244	1	%	5.00	163,247	$ 179,296.54	$ 189,732.44	(72,855)	(72,488)	% driven item
	Supervision & Project Management	1	%	9.00	191,594	9.00	211,039	1	%	9.00	293,845	$ 322,733.77	$ 341,518.39	(131,140)	(130,479)	% driven item
	Council Fees	1	%	3.25	69,187	3.25	76,209	1	%	3.25	106,111	$ 116,542.75	$ 123,326.09	(47,356)	(47,118)	% driven item
	Vic Roads Fees	1	%	1.00	21,288	1.00	23,449	1	%	1.00	32,649	$ 35,859.31	$ 37,946.49	(14,571)	(14,498)	% driven item
	Environmental Management	1	%	0.50	10,644	0.50	11,724	1	%	0.50	16,325	$ 17,929.65	$ 18,973.24	(7,286)	(7,249)	% driven item
	Site Establishment	1	%	2.50	53,221	2.50	58,622	1	%	2.50	81,624	$ 89,648.27	$ 94,866.22	(36,428)	(36,244)	% driven item
TOTAL	Excluding Delivery				**2,128,822**		**2,344,879**				**3,264,941**	**$ 3,585,931**	**$ 3,794,649**	**(1,457,109)**	**(1,449,770)**	
	Including Delivery				**3,006,961**		**3,312,141**				**4,611,729**	**$ 5,065,127**	**$ 5,359,941**	**(2,058,166)**	**(2,047,800)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-17 - Patterson Drive / Connector St (East–West Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)

Benchmark Item 15

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation			2.39	-	2.68	-	18,550	m2	2.50	46,375	51,507	54,273	(51,507)	(54,273)	Quantity missing; Rate includes for site clearance & topsoil removal to suit Ultimate design standard to full width of road reserve.
	Earthworks	5,556	m3	35.43	196,805	40.30	223,903	4,588	m3	39.00	178,947	198,749	209,421	(1,944)	14,482	Quantity high based upon differences to pavement areas (refer comments below)
Road Pavements	Primary Arterial Pavement	-	m2	157.08	-	170.80	-		m2	155.00	0			-	-	
	Secondary Arterial Pavement	5,915	m2	123.23	728,899	130.03	769,100	3,490	m2	141.00	492,090	546,545	575,892	182,354	193,208	Quantity high based upon WT measurement of areas; Rate is low based upon nominated pavement depth.
	Collector Arterial Pavement	1,855	m2	91.07	168,937	100.18	185,831	3,335	m2	126.00	420,210	466,711	491,771	(297,773)	(305,940)	Quantity high based upon WT measurement of areas; Rate is low based upon nominated pavement depth.
	Subgrade preparation	-	%	15.21	-	17.70	-	6,825	m2	2.50	17,063	18,951	19,968	(18,951)	(19,968)	Quantity missing; Rate - pricing methodology differs, m2 v %
	Pavement rehab	-	m2	45.90	-		-		m2		0			-	-	
	Pavement other	-	m2	-	-		-		m2		0			-	-	
Concrete Works	Kerb & channel	1,980	m	50.42	99,830	56.39	111,646	2,135	m	55.00	117,425	125,273	132,000	(25,444)	(20,354)	Quantity is low compared to WT measured lengths
	Cycle path	560	m2	59.60	33,376	69.01	38,644	610	m2	50.00	30,500	32,539	34,286	837	4,359	
	SUP / Footpath	1,330	m2	58.44	77,730	67.50	89,768	1,350	m2	60.00	81,000	86,414	91,054	(8,684)	(1,285)	Rate is low (WT has based rate on 120mm thk concrete pavement with SL72 mesh as advised by Whittlesea City Council).
	Traffic Island	485	m2	71.43	34,645	76.57	37,139	380	m2	60.00	22,800	24,324	25,630	10,321	11,509	Quantity high; extent of islands at intersection to be confirmed
Drainage	Drainage pipe - 300mm CR backfilled	-	m	162.30	-	175.64	-	195	m	225.00	43,875	48,730	51,347	(48,730)	(51,347)	Quantity missing;
	Drainage pipe - 375mm CR backfilled	-	m	226.68	-	246.52	-		m	260.00	0			-	-	
	Drainage pipe - 450mm CR backfilled	580	m	291.67	169,167	320.95	186,152	560	m	290.00	162,400	180,371	190,056	(11,205)	(3,904)	Minimal difference in quantity
	Drainage pipe - 525mm CR backfilled	-	m	375.71	-	402.87	-		m	355.00	0			-	-	
	Drainage - pits	27	no.	2,325.57	62,790	2,499.15	67,477	28	no.	2,150.00	60,200	72,148	76,022	(9,358)	(8,545)	Quantity low; rate assumes for 600 x 900 JP, max depth 1.5m.
	Drainage - Subsoil drainage	2,480	m	23.05	57,157	26.53	65,805	2,135	m	45.00	96,075	106,707	112,436	(49,550)	(46,632)	Quantity high - refer to new item included for swale drainage Rate low - allowances include for pits and risers
	Drainage - swale	-	no.	-	-		-	290	no.	25.00	7,250	8,052	8,485	(8,052)	(8,485)	New item; swales indicated on drawings
	Drainage - culvert	-	no.	-	-		-		no.		0			-	-	
Traffic	Traffic Signals	3	Item	88,375.88	265,128	100,101.03	300,303	1	Item	250,000.00	250,000	277,665	292,574	(12,538)	7,729	Rate - pricing methodology differs
	Traffic Signal conduit	-	m	45.71	-	53.47	-		m		0			-	-	
Landscape	Tree Planting	66	no.	259.62	17,135	318.78	21,040	38	no.	250.00	9,500	10,135	10,679	7,000	10,360	
	Landscaping	4,180	m2	20.72	86,596	23.31	97,440	1,877	m2	15.00	28,155	30,037	31,650	56,559	65,790	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding	4,180	m2	7.00	29,243	7.92	33,115	7,508	m2	5.50	41,294	44,054	46,420	(14,811)	(13,305)	
Street Lighting	Street lighting (all inclusive)	-	m	207.67	-	235.63	-	13	no.	12,000.00	156,000	173,263	182,566	(173,263)	(182,566)	Rate - pricing methodology differs
	Street lighting - Intersections	3	Item / p	-	-		-		Item / per leg		0			-	-	Rate missing - refer item above
Misc.	Regulatory signage	5	Item	329.29	1,646	363.25	1,816	4	Item	350.00	1,400	1,555	1,638	92	178	
	Linemarking	7,770	m2 of p	2.40	18,669	2.81	21,838	6,825	m2 of pa	2.50	17,063	18,203	19,180	466	2,658	Quantity is low based upon differences to pavement areas
	Landscape maintenance	1	Item	75,000.00	75,000	86,250.00	86,250	1	Item	104,000.00	104,000	108,678	114,513	(33,678)	(28,263)	allowance for maintenance during DLP assumes 104 wks x $1000 (assumes 1 man + vehicle x 1 day/wk)
	Tactile pavers (hazard only)	18	Item	337.14	6,069	422.86	7,612	24	Item	320.00	7,680	8,530	8,988	(2,461)	(1,376)	WT measure variance
Other	Protection slab for high pressure gas line				-		-	1	Item	210,000.00	210,000	251,679	265,193	(251,679)	(265,193)	WT's rate based on 90m x 1.5m wide x 150mm thk concrete protection slab including non-destructive digging & gas authority costs
	Allowance for additional protection for conservation area				-		-	1	Item	10,000.00	10,000	11,107	11,703	(11,107)	(11,703)	Allowance for additional protection during construction
					-		-									
	Surveying & Design	1	%	5.00	106,441	5.00	117,244	1	%	5.00	130,565	$ 145,096.32	$ 152,887.28	(38,655)	(35,643)	% driven item

VPA Benchmarked Infrastructure Costings - Independent Peer Review

IN-17 - Patterson Drive / Connector St (East–West Connector) – Construction of an arterial to connector road 3-way intersection (interim treatment)

Benchmark Item 15

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Delivery	Contingency	1	%	15.00	319,323	15.00	351,732	1	%	15.00	391,695	$ 435,288.96	$ 458,661.84	(115,966)	(106,930)	% driven item
	Traffic Management	1	%	5.00	106,441	5.00	117,244	1	%	5.00	130,565	$ 145,096.32	$ 152,887.28	(38,655)	(35,643)	% driven item
	Supervision & Project Management	1	%	9.00	191,594	9.00	211,039	1	%	9.00	235,017	$ 261,173.38	$ 275,197.10	(69,579)	(64,158)	% driven item
	Council Fees	1	%	3.25	69,187	3.25	76,209	1	%	3.25	84,867	$ 94,312.61	$ 99,376.73	(25,126)	(23,168)	% driven item
	Vic Roads Fees	1	%	1.00	21,288	1.00	23,449	1	%	1.00	26,113	$ 29,019.26	$ 30,577.46	(7,731)	(7,129)	% driven item
	Environmental Management	1	%	0.50	10,644	0.50	11,724	1	%	0.50	13,057	$ 14,509.63	$ 15,288.73	(3,866)	(3,564)	% driven item
	Site Establishment	1	%	2.50	53,221	2.50	58,622	1	%	2.50	65,283	$ 72,548.16	$ 76,443.64	(19,328)	(17,822)	% driven item
TOTAL	Excluding Delivery				**2,128,822**		**2,344,879**				**2,611,301**	**$ 2,901,926**	**$ 3,057,746**	**(773,105)**	**(712,867)**	
	Including Delivery				**3,006,961**		**3,312,141**				**3,688,462**	**$ 4,098,971**	**$ 4,319,066**	**(1,092,010)**	**(1,006,924)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

BR-01 - Cameron Street: Construct a 2 lane interim road bridge spanning Merri Creek and Melbourne-Sydney Railway

WT PARTNERSHIP

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-		37.08	-	57.52	-	1	Item	10,000.00	10,000	11,001	12,276	(11,001)	(12,276)	assumes 1 crew x 1 day for site clearance & topsoil removal
	Earthworks	-	m3	46.78	-	51.50	-	9,600	m3	45.00	432,000	475,238	530,334	(475,238)	(530,334)	- imported fill to bridge abutments; behind reinforced earth wall - quantity includes for imported fill of 30m wide x 20m long x up to 8m depth for each abutment - Note: any preloading requirements are excluded
On Structure Works	Retaining walls, abutments, footings	8	No.	238,163.38	1,905,307	354,810.89	2,838,487		m2		incl			1,905,307	2,838,487	
	Bridge deck	-	m2	1,080.00	-	1,826.52	-		m2					-	-	
	Guard rails / balustrade	352	Item	2,385.00	839,520	2,949.31	1,038,157		Item		incl			839,520	1,038,157	
	Transistion slab	2	No	30,000.00	60,000	30,000.00	60,000		No		incl			60,000	60,000	
	Asphalt	-	m2	40.00	-	40.00	-		m2		incl			-	-	
	Concrete footway	-	m2	38.46	-	50.86	-		m2		incl			-	-	
	Kerb & channel	176	m	42.50	7,480	46.16	8,125		m		incl			7,480	8,125	
	Overall Super T Cost - main span	2,410	m2	4,352.00	10,488,320	4,848.72	11,685,418	2,781	m2	3,700.00	10,288,960	10,872,154	12,132,621	(383,834)	(447,202)	- Bridge deck area based on 176m span x 15.8m width (to face of barriers) - Super-T rate appears to be high
	Overall Super T Cost - Ramps								m2					-	-	
	Ramps on embankment								m2		0			-	-	
Off Structure Works	Anti Throw Barrier	52	m	200.00	10,400	184.24	9,580	52	m	2,600.00	135,200	142,863	159,426	(132,463)	(149,846)	Rate is low (WT's rate based on 2.4m high anti-throw barrier)
	Scour protection	-	Item	-	-	-	-		Item	350.00	0			-	-	
	GREAT terminal	4	No.	5,050.00	20,200	5,109.84	20,439	4	No.	15,000.00	60,000	63,401	70,751	(43,201)	(50,312)	rate is low for road bridge
	Off structure barrier		Item	1,395.56	-	2,301.98	-		m	1,550.00	0			-	-	guard rails assumed sufficient however may be a requirement for concrete barrier
	Pier protection barriers				-		-	30	m	3,600.00	108,000	114,122	127,352	(114,122)	(127,352)	Allow rail impact barriers @ up to 1400 wide x 2000 high x 2 No.
														-	-	
Other	Reinforced Earth Embankment	1	Item	337,469.90	337,470	337,469.90	337,470	1	Item	360,000.00	360,000	396,031	441,945	(58,561)	(104,475)	Assume reinforced earth walls (30m long x up to 8m high) at bridge abutments (imported fill included above in Earthworks)
	Allowance for Occupations Cost				-		-	1	Item	750,000.00	750,000	890,296	993,513	(890,296)	(993,513)	Allownace for 3 weekends only for Vline occupations
	Allowance for Native Flora / Fauna Protection				-		-	1	Item	100,000.00	100,000	118,706	132,468	(118,706)	(132,468)	Allowance for protection of Growling Grass Frog habitat
	Allowance for Cultural Heritage Works				-		-	1	Item	50,000.00	50,000	59,353	66,234	(59,353)	(66,234)	Allowance for cultural heritage works
Delivery	Surveying & Design	1	%	5.00	683,435	5.00	799,884	1	%	5.00	614,708	$ 657,158.27	$ 733,346.12	26,277	66,538	% driven item
	Contingency	1	%	20.00	2,733,739	20.00	3,199,535	1	%	20.00	2,458,832	$ 2,628,633.08	$ 2,933,384.47	105,106	266,151	% driven item
	Traffic Management	1	%	3.25	444,233	3.25	519,924	1	%	3.25	399,560	$ 427,152.88	$ 476,674.98	17,080	43,250	% driven item
	Supervision & Project Management	1	%	13.00	1,776,931	9.00	1,439,791	1	%	13.00	1,598,241	$ 1,708,611.50	$ 1,906,699.90	68,319	(466,909)	% driven item (amended to 13%, inline with VPA costing, due to complexities of construction over existing rail corridor)
	Council Fees	1	%	3.25	444,233	3.25	519,924	1	%	3.25	399,560	$ 427,152.88	$ 476,674.98	17,080	43,250	% driven item
	Vic Roads Fees	1	%	1.00	136,687	1.00	159,977	1	%	1.00	122,942	$ 131,431.65	$ 146,669.22	5,255	13,308	% driven item
	Environmental Management	1	%	0.50	68,343	0.50	79,988	1	%	0.50	61,471	$ 65,715.83	$ 73,334.61	2,628	6,654	% driven item
	Site Establishment	1	%	2.50	341,717	2.50	399,942	1	%	2.50	307,354	$ 328,579.14	$ 366,673.06	13,138	33,269	% driven item
TOTAL	Excluding Delivery				**13,668,697**		**15,997,677**				**12,294,160**	**13,143,165**	**14,666,922**	**525,531**	**1,330,754**	
	Including Delivery				**20,298,015**		**23,116,643**				**18,256,828**	**$ 19,517,601**	**$ 21,780,380**	**$ 780,414**	**$ 1,336,263**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review
BR-02 - Patterson Drive: Construct a 2 lane interim culvert crossing of constructed waterway
Benchmark Item 27

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	1	Item	20,000.00	20,000	23,000.00	23,000	1	Item	11,100.00	11,100	12,331	12,900	7,669	10,100	
	Diversion Works	1	Item	15,000.00	15,000	17,250.00	17,250	1	Item	15,000.00	15,000	16,663	17,433	(1,663)	(183)	assume 1 crew x 2 days
	Waterway reshaping	1	Item	3,000.00	3,000	3,450.00	3,450	1	Item	3,000.00	3,000	3,333	3,487	(333)	(37)	
	Stripping of topsoil	485	m2	5.00	2,425	5.75	2,789	740	m2	2.80	2,072	2,211	2,313	214	476	Quantity is low but rate is high - would appear that no allowance has been made for area taken up by batters
	Excavation	2,300	m3	35.00	80,500	40.25	92,575	2,201	m3	39.00	85,839	95,356	99,760	(14,856)	(7,185)	
	Formation of batters	320	m3	14.00	4,480	16.10	5,152	1,004	m3	16.00	16,064	17,845	18,669	(13,365)	(13,517)	reuse of stockpiled material assumed
Drainage Structures	Box Culverts units 1800 x 3000	32	No.	3,630.00	116,160	4,174.50	133,584	32	No	4,770.00	152,640	162,873	170,395	(46,713)	(36,811)	Rate is low
	Link slab 1800 x 3000	16	No.	2,018.00	32,288	2,320.70	37,131	16	No	2,920.00	46,720	49,852	52,154	(17,564)	(15,023)	Rate is low
	Foundation slab (250mm)	560	m2	200.00	112,000	230.00	128,800	392	m2	224.00	87,808	93,695	98,022	18,305	30,778	Quantity is high
	Granular bedding 150mm thick crushed r	560	m2	18.00	10,080	20.70	11,592	392	m2	16.50	6,468	6,902	7,220	3,178	4,372	Quantity is high
	Apron slab	40	m2	200.00	8,000	230.00	9,200	164	m2	240.50	39,442	42,086	44,030	(34,086)	(34,830)	Quantity is low - would appear to be only 1 No.
	Wing wall	32	m2	500.00	16,000	575.00	18,400	59	m2	900.00	53,100	56,660	59,276	(40,660)	(40,876)	Quantity is low - would appear to be only 1 No. Rate is low - walls assumed as 350 thick & reo @ 350kg/m3
	Head wall	26	m2	500.00	13,000	575.00	14,950	41	m2	900.00	36,900	39,374	41,192	(26,374)	(26,242)	Quantity is low - would appear to be only 1 No. head wall measured
On Structure Works	Structural fill	640	m3	70.00	44,800	80.50	51,520	430	m3	80.00	34,400	36,706	38,401	8,094	13,119	Rate is low
	Vehicle barrier	52	lm	145.00	7,540	166.75	8,671	41	lm	350.00	14,350	15,312	16,019	(7,772)	(7,348)	Rate allows for guardrail and end terminals
	Signs	1	Item	2,500.00	2,500	2,875.00	2,875	1	Item	1,100.00	1,100	1,174	1,228	1,326	1,647	
	Line marking	485	m2/pave	2.40	1,164	2.76	1,339	740	m2/pave	5.50	4,070	4,343	4,543	(3,179)	(3,205)	is this required? Road is measured separately?
					-		-							-	-	
Delivery	Surveying & Design	1	%	5.00	24,446.85	5.00	28,113.88	1	%	5.00	30,504	$ 32,835.77	$ 34,352.12	(8,389)	(6,238)	% driven item
	Contingency	1	%	15.00	73,340.55	15.00	84,341.63	1	%	15.00	91,511	$ 98,507.32	$ 103,056.36	(25,167)	(18,715)	% driven item
	Traffic Management	1	%	5.00	24,446.85	5.00	28,113.88	1	%	5.00	30,504	$ 32,835.77	$ 34,352.12	(8,389)	(6,238)	% driven item
	Supervision & Project Management	1	%	9.00	44,004.33	9.00	50,604.98	1	%	9.00	54,907	$ 59,104.39	$ 61,833.81	(15,100)	(11,229)	% driven item
	Council Fees	1	%	3.25	15,890.45	3.25	18,274.02	1	%	3.25	19,827	$ 21,343.25	$ 22,328.88	(5,453)	(4,055)	% driven item
	Vic Roads Fees	1	%	1.00	4,889.37	1.00	5,622.78	1	%	1.00	6,101	$ 6,567.15	$ 6,870.42	(1,678)	(1,248)	% driven item, should this not be Melbourne Water in lieu of Vic Roads?
	Environmental Management	1	%	0.50	2,444.69	0.50	2,811.39	1	%	0.50	3,050	$ 3,283.58	$ 3,435.21	(839)	(624)	% driven item
	Site Establishment	1	%	2.50	12,223.43	2.50	14,056.94	1	%	2.50	15,252	$ 16,417.89	$ 17,176.06	(4,194)	(3,119)	% driven item
TOTAL	Excluding Delivery				**488,937**		**562,278**				**610,073**	**$ 656,715**	**$ 687,042**	**(167,778)**	**(124,765)**	
	Including Delivery				**690,624**		**794,217**				**861,728**	**$ 927,611**	**$ 970,447**	**(236,987)**	**(176,230)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

BR-03 - Hayes Hill Boulevard: Construct a Growling Grass Frog Habitat suitable culvert/bridge crossing of Darebin Creek – 2 lane culvert crossing

Benchmark Item 27

31.10.2018

		VPA						WTP								
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	Difference (WT has based the Bridge Design on a Bebo Arch structure as per the Peppercorn Hill ICP - as advised by Whittlesea City Council) (P50)	Difference (WT has based the Bridge Design on a Bebo Arch structure as per the Peppercorn Hill ICP - as advised by Whittlesea City Council) (P90)	Comments
Siteworks & Earthworks	Site Preparation	1	Item	20,000.00	20,000	23,000.00	23,000	1	Item	30,000.00	30,000	33,354	34,638	(13,354)	(11,638)	
	Diversion Works	1	Item	15,000.00	15,000	17,250.00	17,250	1	Item	75,000.00	75,000	83,385	86,595	(68,385)	(69,345)	assume 2 crew x 5 days
	Waterway reshaping	1	Item	3,000.00	3,000	3,450.00	3,450	1	Item	15,000.00	15,000	16,677	17,319	(13,677)	(13,869)	
	Stripping of topsoil	485	m2	5.00	2,425	5.75	2,789	5,454	m2	2.80	15,271	16,309	16,936	(13,884)	(14,148)	Quantity appears to be low but rate appears to be high (based on Bebo arch design - Peppercorn Hill ICP)
	Bulk Excavation	2,300	m3	35.00	80,500	40.25	92,575	2,520	m3	39.00	98,280	109,268	113,474	(28,768)	(20,899)	Quantity appears to be slightly low
	Detail Excvation (strip footings)							117	m3	80.00	9,386	10,435	10,837	(10,435)	(10,837)	New item for excavation of strip footing for precast arches (Assume 1000mm wide x 700mm deep)
	Formation of batters	320	m3	14.00	4,480	16.10	5,152	832	m3	16.00	13,313	14,802	15,372	(10,322)	(10,220)	reuse of stockpiled material assumed
Road Pavements & Concrete Works	Collector Arterial Pavement							941	m2	126.00	118,548	131,802	136,876	(131,802)	(136,876)	Assume Hayes Hill Blvd to be a collector arterial road
	Subgrade preparation							941	m2	2.50	2,352	2,615	2,716	(2,615)	(2,716)	
	Kerb & channel							420	m	55.00	23,100	24,669	25,619	(24,669)	(25,619)	New items (based on Bebo arch design - Peppercorn Hill ICP as advised by Whittlesea City Council)
	SUP / Footpath							418	m2	60.00	25,090	26,794	27,826	(26,794)	(27,826)	
	Traffic Island							251	m2	60.00	15,054	16,076	16,695	(16,076)	(16,695)	
Drainage Structures	Box Culverts units 1800 x 3000	32	No.	3,630.00	116,160	4,174.50	133,584		No	4,770.00	0			116,160	133,584	
	Link slab 1800 x 3000	16	No.	2,018.00	32,288	2,320.70	37,131		No	2,920.00	0			32,288	37,131	Not applicable (WT has based review on Bebo arch design - Peppercorn Hill ICP as advised by Whittlesea City Council)
	Foundation slab (250mm)	560	m2	200.00	112,000	230.00	128,800		m2	224.00	0			112,000	128,800	
	Granular bedding 150mm thick crushed rock	560	m2	18.00	10,080	20.70	11,592		m2	16.50	0			10,080	11,592	
	Strip footing for arches (assume 1m wide x 700mm deep)							168	m	350.00	58,660	62,645	65,057	(62,645)	(65,057)	New item (based on Bebo arch design - Peppercorn Hill ICP)
	Supply Humes Bebo Arch 6210s (11no. X 2.5m wide units); 1 unit = 11.9t							131	t	1,100.00	143,990	153,772	159,692	(153,772)	(159,692)	
	Supply Humes Bebo Arch 6210s (11no. X 2.5m wide units); 1 unit = 11.9t							131	t	1,100.00	143,990	153,772	159,692	(153,772)	(159,692)	
	Supply Humes Bebo Arch 12300s (16no. X 1.8m wide units); 1 unit = 16.8t							269	t	1,100.00	295,680	315,766	327,923	(315,766)	(327,923)	
	Installation of arch							1	Item	195,000.00	195,000	208,247	216,264	(208,247)	(216,264)	Allow installation of 3 units / day (including stitching & temporary propping works)
	Supply & install pre-cast plain concrete spandrel wall for 6210s (4 units) 1 unit = 8.2t							33	t	1,250.00	41,000	43,785	45,471	(43,785)	(45,471)	New item (based on Bebo arch design - Peppercorn Hill ICP)
	Supply & install pre-cast plain concrete spandrel wall for 1230s (2 units) 1 unit = 17.2t							34	t	1,250.00	43,000	45,921	47,689	(45,921)	(47,689)	
	Rock beaching (at ends of crossing)							510	m3	130.00	66,300	73,712	76,550	(73,712)	(76,550)	
	Apron slab	40	m2	200.00	8,000	230.00	9,200		m2	240.50	0			8,000	9,200	
	Wing wall	32	m2	500.00	16,000	575.00	18,400		m2	900.00	0			16,000	18,400	Not applicable (WT has based review on Bebo arch design - Peppercorn Hill ICP as advised by Whittlesea City Council)
	Head wall	26	m2	500.00	13,000	575.00	14,950		m2	900.00	0			13,000	14,950	
	Allowance for Drainage pipe - 375mm CR backfilled							105	m	260.00	27,300	30,352	31,521	(30,352)	(31,521)	
	Allowance for Drainage - pits							3.00	No.	2,150.00	6,450	7,171	7,447	(7,171)	(7,447)	New items - allowance for drainage
	Allowance for Drainage - Subsoil drainage							420	m	45.00	18,900	21,013	21,822	(21,013)	(21,822)	
On Structure Works	Structural fill	640	m3	70.00	44,800	80.50	51,520	4,208	m3	80.00	336,640	374,276	388,685	(329,476)	(337,165)	Quantity & Rate appears to be low (based on Bebo arch design - Peppercorn Hill ICP)
	Vehicle barrier	52	lm	145.00	7,540	166.75	8,671	230	lm	350.00	80,500	85,969	89,278	(78,429)	(80,607)	Rate allows for guardrail and end terminals (based on Bebo arch design - Peppercorn Hill ICP)
	Signs	1	Item	2,500.00	2,500	2,875.00	2,875	1	Item	1,100.00	1,100	1,175	1,220	1,325	1,655	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

BR-03 - Hayes Hill Boulevard: Construct a Growling Grass Frog Habitat suitable culvert/bridge crossing of Darebin Creek – 2 lane culvert crossing

Benchmark Item 27

31.10.2018

		VPA						WTP								
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	Difference (WT has based the Bridge Design on a Bebo Arch structure as per the Peppercorn Hill ICP - as advised by Whittlesea City Council) (P50)	Difference (WT has based the Bridge Design on a Bebo Arch structure as per the Peppercorn Hill ICP - as advised by Whittlesea City Council) (P90)	Comments
	Line marking	485	m2/pave	2.40	1,164	2.76	1,339	941	m2/pave	5.50	5,175	5,526	5,739	(4,362)	(4,400)	
Other	Landscaping							832	m2	15.00	12,481	13,329	13,842	(13,329)	(13,842)	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas;
	Topsoil seeding							3,328	m2	5.50	18,306	19,549	20,302	(19,549)	(20,302)	Assume 20% landscape planting & 80% topsoil seeding
	Allowance for street lighting							1	Item	50,000.00	50,000	55,590	57,730	(55,590)	(57,730)	Allowance for street lighting
	Extra over cost for excavation in rock allowance							1	Item	89,000.00	89,000	98,950	102,760	(98,950)	(102,760)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Allowance for Native Flora / Fauna Protection							1	Item	100,000.00	100,000	119,970	124,589	(119,970)	(124,589)	Allowance for protection of Growling Grass Frog habitat (provisional allowance)
	Allowance for Cultural Heritage Works							1	Item	50,000.00	50,000	59,985	62,294	(59,985)	(62,294)	Allowance for cultural heritage works (provisional allowance)
					-		-							-	-	
Delivery	Surveying & Design	1	%	5.00	24,446.85	5.00	28,113.88	1	%	5.00	111,193	$ 121,833.12	$ 126,523.43	(97,386)	(98,410)	% driven item
	Contingency	1	%	15.00	73,340.55	15.00	84,341.63	1	%	15.00	333,580	$ 365,499.35	$ 379,570.28	(292,159)	(295,229)	% driven item
	Traffic Management	1	%	5.00	24,446.85	5.00	28,113.88	1	%	5.00	111,193	$ 121,833.12	$ 126,523.43	(97,386)	(98,410)	% driven item
	Supervision & Project Management	1	%	9.00	44,004.33	9.00	50,604.98	1	%	9.00	200,148	$ 219,299.61	$ 227,742.17	(175,295)	(177,137)	% driven item
	Council Fees	1	%	3.25	15,890.45	3.25	18,274.02	1	%	3.25	72,276	$ 79,191.53	$ 82,240.23	(63,301)	(63,966)	% driven item
	Vic Roads Fees	1	%	1.00	4,889.37	1.00	5,622.78	1	%	1.00	22,239	$ 24,366.62	$ 25,304.69	(19,477)	(19,682)	% driven item, should this not be Melbourne Water in lieu of Vic Roads?
	Environmental Management	1	%	0.50	2,444.69	0.50	2,811.39	1	%	0.50	11,119	$ 12,183.31	$ 12,652.34	(9,739)	(9,841)	% driven item
	Site Establishment	1	%	2.50	12,223.43	2.50	14,056.94	1	%	2.50	55,597	$ 60,916.56	$ 63,261.71	(48,693)	(49,205)	% driven item
TOTAL	Excluding Delivery				488,937		562,278				2,223,866	$ 2,436,662	$ 2,530,469	(1,947,725)	(1,968,191)	
	Including Delivery				690,624		794,217				3,141,210	$ 3,441,786	$ 3,574,287	(2,751,162)	(2,780,070)	

VPA Benchmarked Infrastructure Costings - Independent Peer Review
BR-04 - Cameron Street: Construct a Growling Grass Frog Habitat suitable culvert/bridge crossing of Darebin Creek – 2 lane culvert crossing
Benchmark Item 27

WT PARTNERSHIP

31.10.2018

		VPA						WTP							
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount (P50)	Amount (P90)	Amount (P90)	Difference (WT has based the Bridge Design on a Bebo Arch structure as per the Peppercorn Hill ICP - as advised by Whittlesea City Council) (P50)	Difference (WT has based the Bridge Design on a Bebo Arch structure as per the Peppercorn Hill ICP - as advised by Whittlesea City Council) (P90)	Comments
Siteworks & Earthworks	Site Preparation	1	Item	20,000.00	20,000	23,000.00	23,000	1	Item	30,000.00	30,000	33,343	34,699	(13,343)	(11,699)	
	Diversion Works	1	Item	15,000.00	15,000	17,250.00	17,250	1	Item	75,000.00	75,000	83,358	86,746	(68,358)	(69,496)	assume 2 crew x 5 days
	Waterway reshaping	1	Item	3,000.00	3,000	3,450.00	3,450	1	Item	15,000.00	15,000	16,672	17,349	(13,672)	(13,899)	
	Stripping of topsoil	485	m2	5.00	2,425	5.75	2,789	4,822	m2	2.80	13,502	14,414	15,000	(11,989)	(12,211)	Quantity appears to be low but rate appears to be high (based on Bebo arch design - Peppercorn Hill ICP)
	Bulk Excavation	2,300	m3	35.00	80,500	40.25	92,575	2,366	m3	39.00	92,274	102,557	106,726	(22,057)	(14,151)	
	Detail Excvation (strip footings)							105	m3	80.00	8,422	9,361	9,742	(9,361)	(9,742)	New item for excavation of strip footing for precast arches (Assume 1000mm wide x 700mm deep)
	Formation of batters	320	m3	14.00	4,480	16.10	5,152	748	m3	16.00	11,974	13,309	13,850	(8,829)	(8,698)	reuse of stockpiled material assumed
Road Pavements & Concrete Works	Secondary Arterial Pavement							918	m2	141.00	129,438	143,863	149,710	(143,863)	(149,710)	Assume Cameron St to be a secondary arterial road
	Subgrade preparation							918	m2	2.50	2,295	2,551	2,654	(2,551)	(2,654)	New items (based on Bebo arch design - Peppercorn Hill ICP as advised by Whittlesea City Council)
	Kerb & channel							204	m	55.00	11,220	11,978	12,465	(11,978)	(12,465)	
	SUP / Footpath							459	m2	60.00	27,540	29,401	30,596	(29,401)	(30,596)	
	Traffic Island							-	m2	60.00	0			-	-	
Drainage Structures	Box Culverts units 1800 x 3000	32	No.	3,630.00	116,160	4,174.50	133,584		No	4,770.00	0			116,160	133,584	Not applicable (WT has based review on Bebo arch design - Peppercorn Hill ICP as advised by Whittlesea City Council)
	Link slab 1800 x 3000	16	No.	2,018.00	32,288	2,320.70	37,131		No	2,920.00	0			32,288	37,131	
	Foundation slab (250mm)	560	m2	200.00	112,000	230.00	128,800		m2	224.00	0			112,000	128,800	
	Granular bedding 150mm thick crushed r	560	m2	18.00	10,080	20.70	11,592		m2	16.50	0			10,080	11,592	
	Strip footing for arches (assume 1m wide x 700mm deep)							150	m	350.00	52,640	56,198	58,482	(56,198)	(58,482)	New item (based on Bebo arch design - Peppercorn Hill ICP)
	Supply Humes Bebo Arch 6210s (10no. X 2.5m wide units); 1 unit = 11.9t							119	t	1,100.00	130,900	139,747	145,428	(139,747)	(145,428)	
	Supply Humes Bebo Arch 6210s (10no. X 2.5m wide units); 1 unit = 11.9t							119	t	1,100.00	130,900	139,747	145,428	(139,747)	(145,428)	
	Supply Humes Bebo Arch 12300s (14no. X 1.8m wide units); 1 unit = 16.8t							235	t	1,100.00	258,720	276,207	287,433	(276,207)	(287,433)	
	Installation of arch							1	Item	180,000.00	180,000	192,166	199,977	(192,166)	(199,977)	Allow installation of 3 units / day (including stitching & temporary propping works)
	Supply & install pre-cast plain concrete spandrel wall for 62100s (4 units) 1 unit = 8.2t							33	t	1,250.00	41,000	43,771	45,550	(43,771)	(45,550)	New item (based on Bebo arch design - Peppercorn Hill ICP)
	Supply & install pre-cast plain concrete spandrel wall for 12300s (2 units) 1 unit = 17.2t							34	t	1,250.00	43,000	45,906	47,772	(45,906)	(47,772)	
	Rock beaching (at ends of crossing)							450	m3	150.00	67,500	75,022	78,072	(75,022)	(78,072)	
	Apron slab	40	m2	200.00	8,000	230.00	9,200		m2	240.50	0			8,000	9,200	Not applicable (WT has based review on Bebo arch design - Peppercorn Hill ICP as advised by Whittlesea City Council)
	Wing wall	32	m2	500.00	16,000	575.00	18,400		m2	900.00	0			16,000	18,400	
	Head wall	26	m2	500.00	13,000	575.00	14,950		m2	900.00	0			13,000	14,950	
	Allowance for Drainage pipe - 375mm CR backfilled							102	m	260.00	26,520	29,475	30,674	(29,475)	(30,674)	New items - allowance for drainage
	Allowance for Drainage - pits							3.00	No.	2,150.00	6,450	7,169	7,460	(7,169)	(7,460)	
	Allowance for Drainage - Subsoil drainage							204	m	45.00	9,180	10,203	10,618	(10,203)	(10,618)	
On Structure Works	Structural fill	640	m3	70.00	44,800	80.50	51,520	4,088	m3	80.00	327,040	363,486	378,261	(318,686)	(326,741)	Quantity & Rate appears to be low (based on Bebo arch design - Peppercorn Hill ICP)
	Vehicle barrier	52	lm	145.00	7,540	166.75	8,671	224	lm	350.00	78,400	83,699	87,101	(76,159)	(78,430)	Rate allows for guardrail and end terminals (based on Bebo arch design - Peppercorn Hill ICP)
	Signs	1	Item	2,500.00	2,500	2,875.00	2,875	1	Item	1,100.00	1,100	1,174	1,222	1,326	1,653	
	Line marking	485	m2/pave	2.40	1,164	2.76	1,339	918	m2/pave	5.50	5,049	5,390	5,609	(4,226)	(4,271)	is this required? Road is measured separately?

VPA Benchmarked Infrastructure Costings - Independent Peer Review
BR-04 - Cameron Street: Construct a Growling Grass Frog Habitat suitable culvert/bridge crossing of Darebin Creek – 2 lane culvert crossing
Benchmark Item 27

WT PARTNERSHIP

31.10.2018

		VPA						WTP						Difference (WT has based the Bridge Design on a Bebo Arch structure as per the Peppercorn Hill ICP - as advised by Whittlesea City Council)		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount (P50)	Amount (P90)		(P50)	(P90)	Comments
Other	Landscaping							748	m2	15.00	11,226	11,985	12,472	(11,985)	(12,472)	Quantity is low - area used assumes overall site area (as per Site Preparation) less paved areas; Assume 20% landscape planting & 80% topsoil seeding
	Topsoil seeding							2,994	m2	5.50	16,465	17,578	18,292	(17,578)	(18,292)	
	Allowance for street lighting							1	Item	50,000.00	50,000	55,572	57,831	(55,572)	(57,831)	Allowance for street lighting
	Extra over cost for excavation in rock allowance							1	Item	83,000.00	83,000	99,543	103,589	(99,543)	(103,589)	Additional site specific item. Assume 35% of total excavated volume to be in rock
	Allowance for Native Flora / Fauna Protection							1	Item	100,000.00	100,000	119,932	124,806	(119,932)	(124,806)	Allowance for protection of Growling Grass Frog habitat (provisional allowance)
	Allowance for Cultural Heritage Works							1	Item	50,000.00	50,000	59,966	62,403	(59,966)	(62,403)	Allowance for cultural heritage works (provisional allowance)
					-		-							-	-	
Delivery	Surveying & Design	1	%	5.00	24,446.85	5.00	28,113.88	1	%	5.00	104,288	$ 114,737.25	$ 119,400.93	(90,290)	(91,287)	% driven item
	Contingency	1	%	15.00	73,340.55	15.00	84,341.63	1	%	15.00	312,863	$ 344,211.76	$ 358,202.79	(270,871)	(273,861)	% driven item
	Traffic Management	1	%	5.00	24,446.85	5.00	28,113.88	1	%	5.00	104,288	$ 114,737.25	$ 119,400.93	(90,290)	(91,287)	% driven item
	Supervision & Project Management	1	%	9.00	44,004.33	9.00	50,604.98	1	%	9.00	187,718	$ 206,527.05	$ 214,921.67	(162,523)	(164,317)	% driven item
	Council Fees	1	%	3.25	15,890.45	3.25	18,274.02	1	%	3.25	67,787	$ 74,579.21	$ 77,610.60	(58,689)	(59,337)	% driven item
	Vic Roads Fees	1	%	1.00	4,889.37	1.00	5,622.78	1	%	1.00	20,858	$ 22,947.45	$ 23,880.19	(18,058)	(18,257)	% driven item, should this not be Melbourne Water in lieu of Vic Roads?
	Environmental Management	1	%	0.50	2,444.69	0.50	2,811.39	1	%	0.50	10,429	$ 11,473.73	$ 11,940.09	(9,029)	(9,129)	% driven item
	Site Establishment	1	%	2.50	12,223.43	2.50	14,056.94	1	%	2.50	52,144	$ 57,368.63	$ 59,700.47	(45,145)	(45,644)	% driven item
TOTAL	Excluding Delivery				**488,937**		**562,278**				**2,085,755**	**$ 2,294,745**	**$ 2,388,019**	**(1,805,808)**	**(1,825,741)**	
	Including Delivery				**690,624**		**794,217**				**2,946,129**	**$ 3,241,327**	**$ 3,373,076**	**(2,550,704)**	**(2,578,859)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review
BR-05 - Patterson Drive: Construct a 2 lane interim bridge crossing of Merri Creek
Benchmark Item 19

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
Siteworks & Earthworks	Site Preparation	-		37.08	-	55.13	-	1	Item	10,000.00	10,000	10,996	12,277	(10,996)	(12,277)	assumes 1 crew x 1 day for site clearance & topsoil removal
	Earthworks	12,960	m3	46.78	606,269	50.95	660,298	12,000	m3	45.00	540,000	593,795	662,931	12,474	(2,634)	- imported fill to bridge abutments; behind reinforced earth wall - quantity includes for imported fill of 75m wide x 20m long x up to 4m depth for each abutment - Note: any preloading requirements are excluded
On Structure Works	Retaining walls, abutments, footings	-	No.	238,163.38	-	341,185.01	-	-	No.		incl			-	-	
	Bridge deck	-	m2	1,080.00	-	1,739.32	-	-	m2		incl			-	-	
	Guard rails / balustrade	-	Item	2,385.00	-	2,883.39	-	-	Item		incl			-	-	
	Transition slab	2	No	30,000.00	60,000	34,500.00	69,000		No		incl			60,000	69,000	
	Asphalt	-	m2	40.00	-	40.00	-	-	m2		incl			-	-	
	Concrete footway	-	m2	38.46	-	49.41	-	-	m2		incl			-	-	
	Kerb & channel	-	m	42.50	-	45.74	-	-	m					-	-	
	Overall Super T Cost	750	m2	4,352.00	3,264,000	4,790.70	3,593,024	1,742	m2	3,850.00	6,704,775	7,081,802	7,906,350	(3,817,802)	(4,313,327)	Bridge area based on 50m long span x deck width of 34.83m
Off Structure Works	Guard rails / balustrade	240	m	145.00	34,800	179.66	43,117	120	m	220.00	26,400	27,885	31,131	6,915	11,986	- Rate is low for road bridge - WT quantity based on 50m span road bridge (+ 5m each side of abutment)
	Scour protection	-	Item	-	-	-	-	-	Item	350.00	0			-	-	
	GREAT terminal	4	No.	5,050.00	20,200	5,102.85	20,411	4	No.	15,000.00	60,000	63,374	70,753	(43,174)	(50,341)	Rate is low for road bridge
	Off structure barrier	-	Item	1,395.56	-	2,196.10	-	-	m	1,550.00	0			-	-	Guard rails assumed sufficient however may be a requirement for concrete barrier
	Rock beaching				-		-		m2	220.00				-	-	
Misc.	Reinforced Earth Wall (Abutment)							1	Item	450,000.00	450,000	494,829	552,443	(494,829)	(552,443)	Assume reinforced earth walls (75m long x up to 4m high) at bridge abutments (imported fill included above in Earthworks)
	Allowance for Native Flora / Fauna Protection							1	Item	100,000.00	100,000	118,656	132,471	(118,656)	(132,471)	Allowance for protection of Growling Grass Frog habitat
	Allowance for Cultural Heritage Works							1	Item	50,000.00	50,000	59,328	66,236	(59,328)	(66,236)	Allowance for cultural heritage works
														-	-	
Delivery	Surveying & Design	1	%	5.00	199,263	5.00	219,292	1	%	5.00	397,059	$ 422,533.22	$ 471,729.56	(223,270)	(252,437)	% driven item
	Contingency	1	%	20.00	797,054	20.00	877,170	1	%	20.00	1,588,235	$ 1,690,132.86	$ 1,886,918.26	(893,079)	(1,009,748)	% driven item
	Traffic Management	1	%	5.00	199,263	5.00	219,292	1	%	5.00	397,059	$ 422,533.22	$ 471,729.56	(223,270)	(252,437)	% driven item
	Supervision & Project Management	1	%	9.00	358,674	9.00	394,726	1	%	9.00	714,706	$ 760,559.79	$ 849,113.22	(401,886)	(454,387)	% driven item
	Council Fees	1	%	3.25	129,521	3.25	142,540	1	%	3.25	258,088	$ 274,646.59	$ 306,624.22	(145,125)	(164,084)	% driven item
	Vic Roads Fees	1	%	1.00	39,853	1.00	43,858	1	%	1.00	79,412	$ 84,506.64	$ 94,345.91	(44,654)	(50,487)	% driven item
	Environmental Management	1	%	0.50	19,926	0.50	21,929	1	%	0.50	39,706	$ 42,253.32	$ 47,172.96	(22,327)	(25,244)	% driven item
	Site Establishment	1	%	2.50	99,632	2.50	109,646	1	%	2.50	198,529	$ 211,266.61	$ 235,864.78	(111,635)	(126,219)	% driven item
TOTAL	Excluding Delivery				**3,985,269**		**4,385,850**				**7,941,175**	**8,450,664**	**9,434,591**	**(4,465,396)**	**(5,048,742)**	
	Including Delivery				**5,828,456**		**6,414,305**				**11,613,968**	**$ 12,359,097**	**$ 13,798,090**	**(6,530,641)**	**(7,383,785)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

Ped-01 - Crossing Patterson Drive between Donnybrook Road and Hayes Hill Boulevard associated with the key local access street connecting Donnybrook Station to the Non Gov't. P–12 school campus and SR-02

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
	Crossing construction / materials	1	Item		-	183,832.92	183,832.92	1	Item	138,900.00	138,900	144,322	157,409	(144,322)	26,424	Rate appears to be high
	Testing & Commissioning	1	Item		-	12,000.00	12,000.00	1	Item	10,000.00	10,000	10,390	11,333	(10,390)	667	
Other	Extra over cost for excavation in rock (signal post footings / conduits etc)							1	Item	20,000.00	20,000	21,651	23,614	(21,651)	(23,614)	Allowance for rock excavation included (signal post footings / conduits etc)
														-	-	
Delivery	Surveying & Design	1	%	5.00	-	5.00	9,792	1	%	5.00	8,445	$ 8,818.17	$ 9,617.77	(8,818)	174	% driven item
	Contingency	1	%	15.00	-	15.00	29,375	1	%	15.00	25,335	$ 26,454.50	$ 28,853.31	(26,455)	522	% driven item
	Traffic Management	1	%	5.00	-	5.00	9,792	1	%	5.00	8,445	$ 8,818.17	$ 9,617.77	(8,818)	174	% driven item
	Supervision & Project Management	1	%	9.00	-	9.00	17,625	1	%	9.00	15,201	$ 15,872.70	$ 17,311.98	(15,873)	313	% driven item
	Council Fees	1	%	3.25	-	3.25	6,365	1	%	3.25	5,489	$ 5,731.81	$ 6,251.55	(5,732)	113	% driven item
	Vic Roads Fees	1	%	1.00	-	1.00	1,958	1	%	1.00	1,689	$ 1,763.63	$ 1,923.55	(1,764)	35	% driven item
	Environmental Management	1	%	0.50	-	0.50	979	1	%	0.50	845	$ 881.82	$ 961.78	(882)	17	% driven item
	Site Establishment	1	%	2.50	-	2.50	4,896	1	%	2.50	4,223	$ 4,409.08	$ 4,808.88	(4,409)	87	% driven item
TOTAL	Excluding Delivery				**-**		**195,832.92**				**168,900**	**176,363**	**192,355**	**-176,363**	**3,478**	
	Including Delivery				**-**		**276,614.00**				**238,571**	**$ 249,113**	**$ 271,702**	**$ (249,113)**	**$ 4,912**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

Ped-02 - Crossing Gunns Gully Road between Koukoura Drive and Patterson Drive associated with the shared path along the gas pipeline easement

WT PARTNERSHIP

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
	Crossing construction / materials	1	Item		-	183,832.92	183,832.92	1	Item	138,900.00	138,900	144,442	156,175	(144,442)	27,658	Rate appears to be high
	Testing & Commissioning	1	Item		-	12,000.00	12,000.00	1	Item	10,000.00	10,000	10,399	11,244	(10,399)	756	
Other	Extra over cost for excavation in rock (signal post footings / conduits etc)							1	Item	20,000.00	20,000	21,669	23,429	(21,669)	(23,429)	Allowance for rock excavation included (signal post footings / conduits etc)
	Additional protection works for APA transmission gas line							1	Item	20,000.00	20,000	21,669	23,429	(21,669)	(23,429)	Allowance for protection of existing APA tranmission gas line included (temporary works during construction only)
											0					
Delivery	Surveying & Design	1	%	5.00	-	5.00	9,792	1	%	5.00	9,445	$ 9,908.95	$ 10,713.81	(9,909)	(922)	% driven item
	Contingency	1	%	15.00	-	15.00	29,375	1	%	15.00	28,335	$ 29,726.86	$ 32,141.44	(29,727)	(2,767)	% driven item
	Traffic Management	1	%	5.00	-	5.00	9,792	1	%	5.00	9,445	$ 9,908.95	$ 10,713.81	(9,909)	(922)	% driven item
	Supervision & Project Management	1	%	9.00	-	9.00	17,625	1	%	9.00	17,001	$ 17,836.12	$ 19,284.86	(17,836)	(1,660)	% driven item
	Council Fees	1	%	3.25	-	3.25	6,365	1	%	3.25	6,139	$ 6,440.82	$ 6,963.98	(6,441)	(599)	% driven item
	Vic Roads Fees	1	%	1.00	-	1.00	1,958	1	%	1.00	1,889	$ 1,981.79	$ 2,142.76	(1,982)	(184)	% driven item
	Environmental Management	1	%	0.50	-	0.50	979	1	%	0.50	945	$ 990.90	$ 1,071.38	(991)	(92)	% driven item
	Site Establishment	1	%	2.50	-	2.50	4,896	1	%	2.50	4,723	$ 4,954.48	$ 5,356.91	(4,954)	(461)	% driven item
TOTAL	Excluding Delivery				**-**		**195,832.92**				**188,900**	**198,179**	**214,276**	**-198,179**	**-18,443**	
	Including Delivery				**-**		**276,614.00**				**266,821**	**$ 279,928**	**$ 302,665**	**$ (279,928)**	**$ (26,051)**	

VPA Benchmarked Infrastructure Costings - Independent Peer Review

Ped-03 - Crossing Donnybrook Road between Koukoura Drive and Patterson Drive associated with the shared path along the gas pipeline easement connecting south to Northern Quarries PSP

31.10.2018

		VPA						WTP						Difference		
Item	Sub Item	Qty	Unit	Rate (P50)	Amount (P50)	Rate (P90)	Amount (P90)	Qty	Unit	Rate	Amount	Amount (P50)	Amount (P90)	(P50)	(P90)	Comments
	Crossing construction / materials	1	Item		-	183,832.92	183,832.92	1	Item	138,900.00	138,900	144,442	156,175	(144,442)	27,658	Rate appears to be high
	Testing & Commissioning	1	Item		-	12,000.00	12,000.00	1	Item	10,000.00	10,000	10,399	11,244	(10,399)	756	
Other	Extra over cost for excavation in rock (signal post footings / conduits etc)							1	Item	20,000.00	20,000	21,669	23,429	(21,669)	(23,429)	Allowance for rock excavation included (signal post footings / conduits etc)
	Additional protection works for APA transmission gas line							1	Item	20,000.00	20,000	21,669	23,429	(21,669)	(23,429)	Allowance for protection of existing APA tranmission gas line included (temporary works during construction only)
Delivery	Surveying & Design	1	%	5.00	-	5.00	9,792	1	%	5.00	9,445	$ 9,908.95	$ 10,713.81	(9,909)	(922)	% driven item
	Contingency	1	%	15.00	-	15.00	29,375	1	%	15.00	28,335	$ 29,726.86	$ 32,141.44	(29,727)	(2,767)	% driven item
	Traffic Management	1	%	5.00	-	5.00	9,792	1	%	5.00	9,445	$ 9,908.95	$ 10,713.81	(9,909)	(922)	% driven item
	Supervision & Project Management	1	%	9.00	-	9.00	17,625	1	%	9.00	17,001	$ 17,836.12	$ 19,284.86	(17,836)	(1,660)	% driven item
	Council Fees	1	%	3.25	-	3.25	6,365	1	%	3.25	6,139	$ 6,440.82	$ 6,963.98	(6,441)	(599)	% driven item
	Vic Roads Fees	1	%	1.00	-	1.00	1,958	1	%	1.00	1,889	$ 1,981.79	$ 2,142.76	(1,982)	(184)	% driven item
	Environmental Management	1	%	0.50	-	0.50	979	1	%	0.50	945	$ 990.90	$ 1,071.38	(991)	(92)	% driven item
	Site Establishment	1	%	2.50	-	2.50	4,896	1	%	2.50	4,723	$ 4,954.48	$ 5,356.91	(4,954)	(461)	% driven item
TOTAL	Excluding Delivery				**-**		**195,832.92**				**188,900**	**198,179**	**214,276**	**-198,179**	**-18,443**	
	Including Delivery				**-**		**276,614.00**				**266,821**	**$ 279,928**	**$ 302,665**	**$ (279,928)**	**$ (26,051)**	

APPENDIX B
CURRICULUM VITAE

WT PARTNERSHIP

www.wtpartnership.com.au

ANDREW LOH

ASSOCIATE

ANDREW BRINGS EXCEPTIONAL SKILLS IN THE FIELDS OF PROJECT AND COST MANAGEMENT FOR BUILDING AND INFRASTRUCTURE PROJECTS.

PERSONAL DETAILS

YEARS OF EXPERIENCE: 13

COUNTRIES WORKED: Australia, Singapore

QUALIFICATIONS & AFFILIATIONS:
Bachelor Degree in Property & Construction, University of Melbourne

Bachelor Degree in Architecture, University of Melbourne

Bachelor of Planning and Design, University of Melbourne

Andrew's extensive experience focuses on measurement and cost management of major infrastructure and heavy engineering projects. He is an expert in a number of key sectors including water, rail, oil and gas, health, commercial and residential.

He has provided an array of quantity surveying services including feasibility studies, preparation of tender documentation and analysis, bills of quantities and independent estimator advice to a wide variety of clients.

PROFESSIONAL EXPERIENCE

MAJOR PROJECTS:

Engineering

'us' Alliance

Angelsea Power Station Desulphurisation Project

Asia Pacific LNG Condabri

Barwon Water Alliance

Braidwood Gas Networks

Esso Australia LIP Laboratory

Port Capacity Project

Program Alliances

QAL Gladstone Fines Reduction Project

South East Recycled Water Alliance

UGL Kaefer, Esso Bass Strait Maintenance Works Contract

Water Resources Alliance

Waterways Alliance

Health

Nathalia District Hospital Redevelopment

Shepparton Multicultural Aged Care Facility

Rail

Level Crossing Removals

Melbourne Metro

Metro Trains Melbourne Infrastructure Renewals Programme

Regional Rail Link Package C

Retail

Dandenong Market Refurbishment

Roads

Melton Amendment C145 – Rockbank PSP & DCP

Melton Amendment C146 & C147 – Plumpton & Kororoit PSP

CityLink Tulla Widening (CTW)

Transurban Western Distributor Proposal

Water

Colac WEB Project

Air Treatment Facility NSP Stage 2

Edgars Creek Intercepting Sewer

Icon Water Regulatory Submission (Capital Works Estimates)

Northern Water Plant

Painkalac Reservoir Upgrade

Pakenham and Somers RWTP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POTENTIAL DEVELOPMENT SEQUENCING
NORTHERN GROWTH CORRIDOR
FINAL VERSION
APRIL 2016

MITCHELL SHIRE COUNCIL

PATCH.
DESIGN+PLAN

Project Northern Growth Corridor
Development Sequencing
Mitchell Shire Council

Ref No. 015-010

Date issued 11 May 2016

Version 05 - FINAL VERSION

Endorsed by Mitchell Council 16 May 2016.

Prepared by AB

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CONTENTS

INTRODUCTION

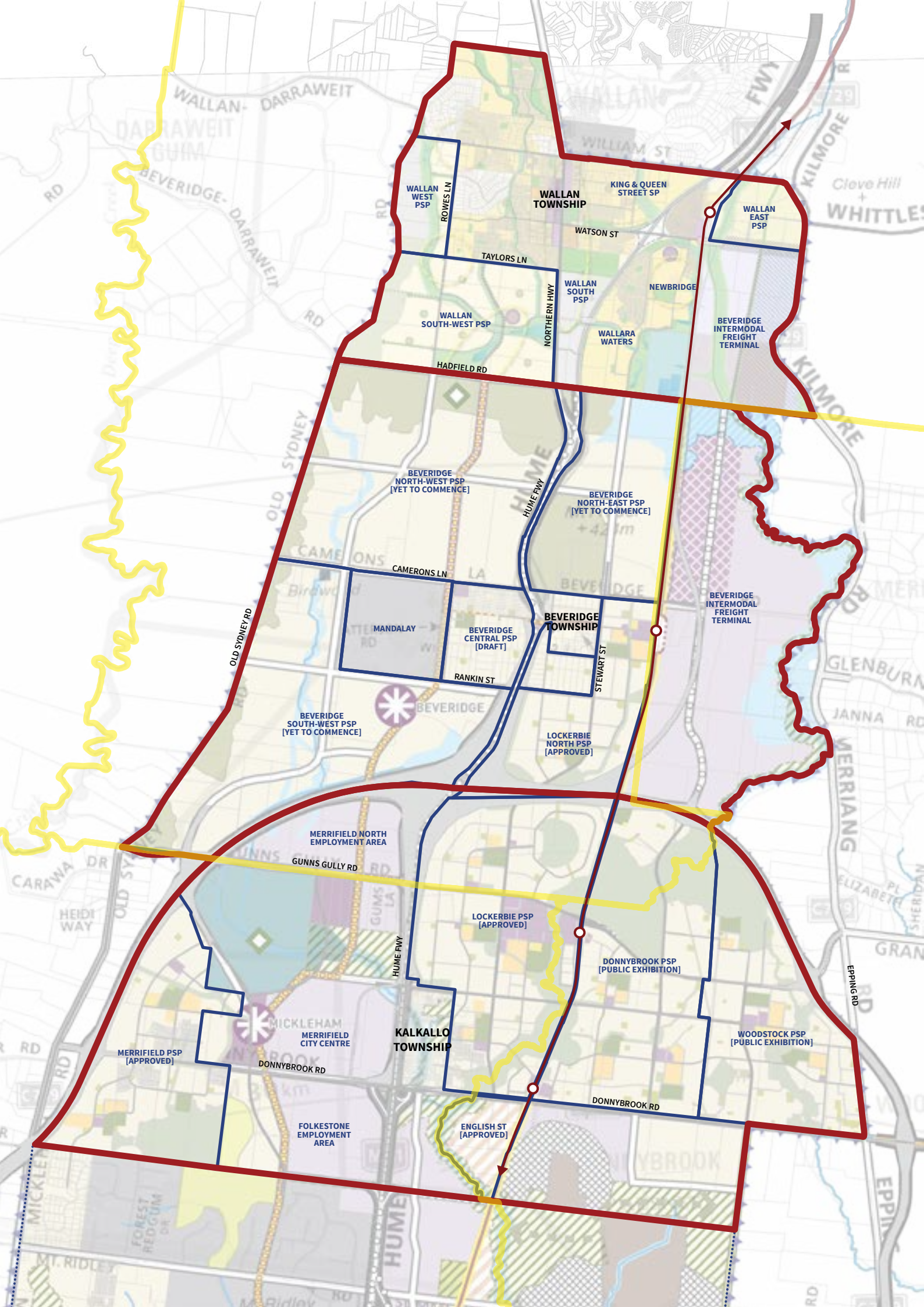
The Northern Growth Corridor (NGC) will experience a rapid change in growth over the next 50 years. It is estimated that the NGC will accommodate an additional 80,000 homes by 2060 which equates to approximately an additional 250,000 people. This growth will require significant investment in infrastructure in order to support the new communities being created.

Given that large areas of the NGC are rural communities and predominantly farmland, the existing infrastructure is mainly rural standard. As the corridor develops, the existing infrastructure will come under increased pressure as it tries to deal with growth that it was not intended for.

The purpose of undertaking this development sequencing analysis is to gain an understanding of how and where growth patterns are likely to take shape over a set time sequence. This exercise will assist with identifying when the existing infrastructure will be at capacity and where key new infrastructure will be required to support the future communities within the growth corridor.

There are a number of differing factors that will influence the rate of growth and the location of development fronts within the corridor. For the purpose of determining the sequencing in this document, a number of assumptions have been made to guide and inform the data. These assumptions are explained throughout the document.

It is important to understand that the sequencing put forward in this document is one of many different scenarios that may take place. It should be utilised as a guide only and not taken as a literal account of how the NGC will develop.


WALLAN WEST PSP
ROWES LN
WALLAN TOWNSHIP
KING & QUEEN STREET SP
WALLAN EAST PSP
WATSON ST
TAYLORS LN
WALLAN SOUTH PSP
NEWBRIDGE
WALLAN SOUTH-WEST PSP
NORTHERN HWY
WALLARA WATERS
BEVERIDGE INTERMODAL FREIGHT TERMINAL
HADFIELD RD
BEVERIDGE NORTH-WEST PSP [YET TO COMMENCE]
HUME FWY
BEVERIDGE NORTH-EAST PSP [YET TO COMMENCE]
CAMERONS LN
OLD SYDNEY RD
MANDALAY
BEVERIDGE CENTRAL PSP [DRAFT]
BEVERIDGE TOWNSHIP
STEWART ST
RANKIN ST
BEVERIDGE SOUTH-WEST PSP [YET TO COMMENCE]
LOCKERBIE NORTH PSP [APPROVED]
MERRIFIELD NORTH EMPLOYMENT AREA
GUNNS GULLY RD
LOCKERBIE PSP [APPROVED]
DONNYBROOK PSP [PUBLIC EXHIBITION]
EPPING RD
MERRIFIELD CITY CENTRE
KALKALLO TOWNSHIP
WOODSTOCK PSP [PUBLIC EXHIBITION]
MERRIFIELD PSP [APPROVED]
DONNYBROOK RD
FOLKESTONE EMPLOYMENT AREA
ENGLISH ST [APPROVED]

NORTHERN GROWTH CORRIDOR (STUDY AREA)

The NGC study area traverses the municipalities of Mitchell, Whittlesea and Hume and encompasses all of the land within the Urban Growth Boundary from Donnybrook Road to the existing Wallan Township.

There are a number of existing communities located within the NGC that will be integrated with the future growth. The largest of these communities is the Wallan Township which accounts for the majority of the 15,450 people that currently reside in the NGC. A detailed breakdown of the existing population is included in Table 1.

In order to gain a more accurate depiction of where the growth will occur through the NGC, the area has been divided into three localities:

- *Wallan*
- *Beveridge*
- *Donnybrook/Kalkallo*

For the purpose of this document, other land within the Hume and Whittlesea growth areas, such as Craigieburn and Wollert, have been excluded from the study area.

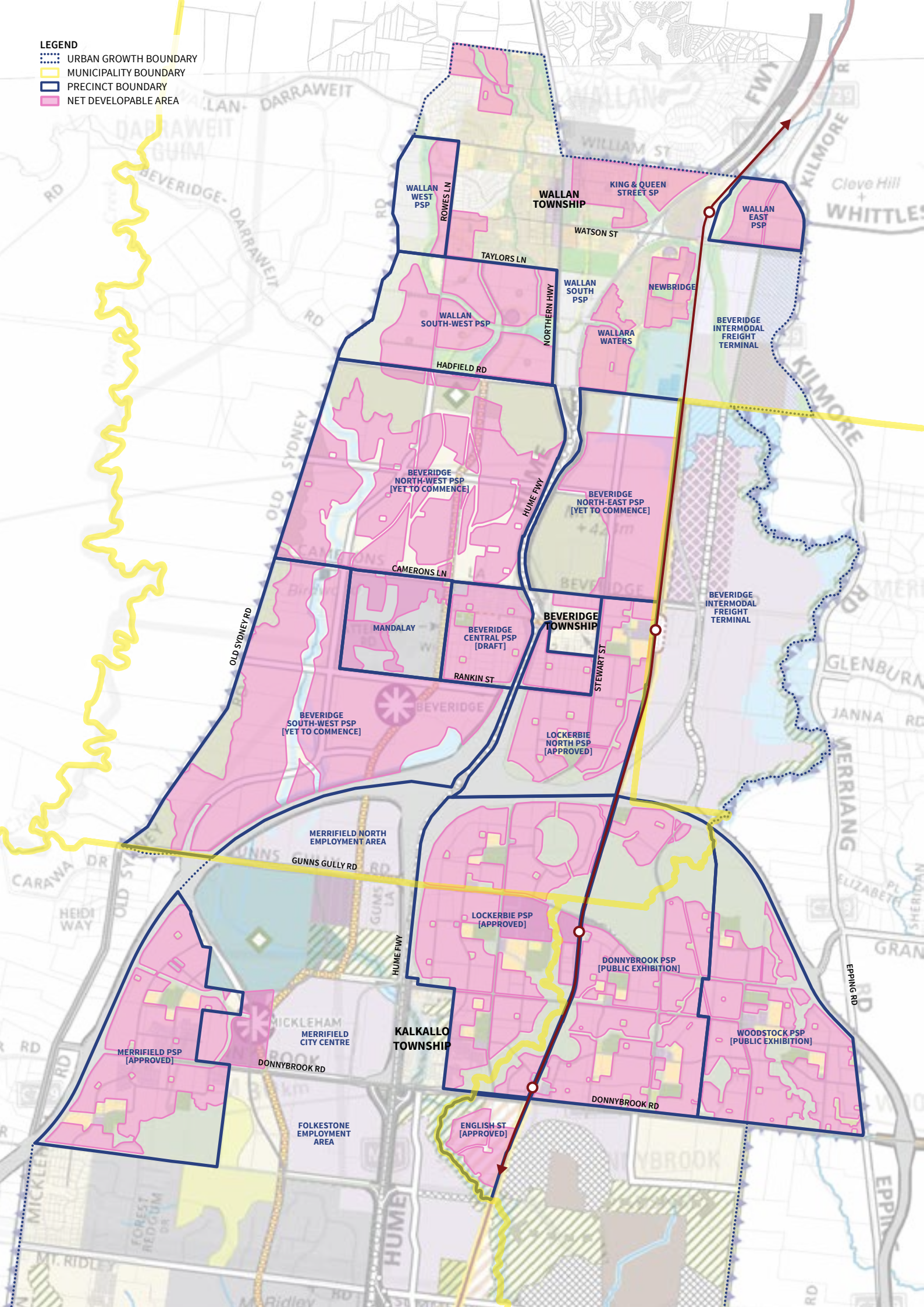
Whilst these areas have been left out, assumptions have been made to factor in the influence development of these areas will have on the sequencing of the study area.

The area included within the study area is identified in Figure 1.

Table 1: Current NGC Population Breakdown

	Existing Population
Wallan	11,536
Beveridge	1,710
Kalkallo/Donnybrook	2,204
LOCALITY TOTAL	**15,450**

(Source: ID. The Population Experts, 2016)


LEGEND
URBAN GROWTH BOUNDARY
MUNICIPALITY BOUNDARY
PRECINCT BOUNDARY
NET DEVELOPABLE AREA
WALLAN WEST PSP
ROWES LN
WALLAN TOWNSHIP
KING & QUEEN STREET SP
WALLAN EAST PSP
WATSON ST
TAYLORS LN
WALLAN SOUTH PSP
NEWBRIDGE
WALLAN SOUTH-WEST PSP
NORTHERN HWY
WALLARA WATERS
BEVERIDGE INTERMODAL FREIGHT TERMINAL
HADFIELD RD
BEVERIDGE NORTH-WEST PSP [YET TO COMMENCE]
HUME FWY
BEVERIDGE NORTH-EAST PSP [YET TO COMMENCE]
CAMERONS LN
OLD SYDNEY RD
MANDALAY
BEVERIDGE CENTRAL PSP [DRAFT]
BEVERIDGE TOWNSHIP
STEWART ST
RANKIN ST
BEVERIDGE SOUTH-WEST PSP [YET TO COMMENCE]
LOCKERBIE NORTH PSP [APPROVED]
MERRIFIELD NORTH EMPLOYMENT AREA
GUNNS GULLY RD
LOCKERBIE PSP [APPROVED]
HUME FWY
DONNYBROOK PSP [PUBLIC EXHIBITION]
EPPING RD
MERRIFIELD CITY CENTRE
KALKALLO TOWNSHIP
WOODSTOCK PSP [PUBLIC EXHIBITION]
MERRIFIELD PSP [APPROVED]
DONNYBROOK RD
DONNYBROOK RD
FOLKESTONE EMPLOYMENT AREA
ENGLISH ST [APPROVED]

CALCULATING NET DEVELOPABLE AREA & PROJECTED YIELD

In order to determine the extent of the growth that will eventuate over the next 50 years within the NGC, an analysis was undertaken to determine what land within the Urban Growth Boundary is considered developable.

The definition of Net Developable Area (NDA) as determined by the Metropolitan Planning Authority, is defined as all land that will be developed as residential and commercial, excluding land required for education & community facilities, all forms of open space and land required for higher order transport infrastructure.

The NDA calculation has utilised existing planning strategies and plans that have been undertaken by the Metropolitan Planning Authority and Mitchell Shire Council, such as Precinct Structure Plans, Local Structure Plans and Growth Corridor Plans, to inform the figures.

The land that has been identified as NDA is shown in Figure 2 and a detailed breakdown of these areas is included in Table 2.

KEY ASSUMPTIONS

- *Where a PSP has been prepared (draft/approved), the NDA figure has been taken from the associated land budget;*
- *Where a PSP has not commenced, the NDA has been based on the land which has been identified for growth in either the Northern Growth Corridor Plan or the Wallan Structure plan. The land zoned Urban Growth Zone (or equivalent in Wallan) has been tallied and 70% of this total has been determined as the NDA. The other 30% accounts for all other uses that will be determined through the PSP process;*
- *The projected yield calculation has been based on the current State Government objective of achieving a density of 16 dwellings per NDA to ensure consistency between the figures;*
- *The projected population has been based on a rate of 3.1 persons per household (p/ph). This differs from the MPA standard of 2.8 p/ph but is a more accurate reflection of household size within the growth areas;*
- *Local Town Centres have been excluded from the yield calculation;*
- *Higher order town centres, such as Merrifield and Donnybrook have been included within the yield calculation;*
- *Existing population in established townships have not been included in the projected figures;*
- *Additional growth within established townships that is not included within any approved or proposed structure plans have not been factored in the projected figures.*

Table 2: Breakdown of NDA & Projected Yield

	NDA (Hectares)	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)
DONNYBROOK/KALKALLO			
Lockerbie PSP	690.16	10,980	34,038
Merrifield PSP	454.10	7,067	21,908
Donnybrook/Woodstock	1007.02	15,782	48,924
English Street	90.72	1,172	3,634
Merrifield City Centre		1,500	4,650
LOCALITY TOTAL		**36,501**	**113,153**
BEVERIDGE			
Lockerbie North PSP	296.26	4,558	14,129
Beveridge North-West	752.65	11,856	36,755
Beveridge Central	223.76	3,510	10,881
Mandalay		1,550	4,805
Beveridge South-West	635.07	10,161	31,499
Beveridge North-East	228.235	3,652	11,320
Beveridge Township		300	930
LOCALITY TOTAL		**35,587**	**110,320**
WALLAN			
Wallan West PSP	34.72	556	1,722
Wallan South-West PSP	213.5	3,416	10,590
Wallan East PSP	67.55	1,081	3,350
Established Wallan Areas		4,280	13,268
LOCALITY TOTAL		**9,332**	**28,930**

NORTHERN GROWTH CORRIDOR TOTALS	**Projected Yield (16dw/ha)**	**Projected Population (3.1 PPH)**
	81,420	**252,403**

DEVELOPMENT RATE & PATTERNS

Melbourne's growth areas have experienced significant growth over the past decade. According to the March 2016 release of the Urban Development Institute of Australia's '2016 UDIA State of the Land' report, in 2015, 19,774 new lots were released across all growth areas. Since 2010, an average of approximately 12,000 lots have been released per annum, with a large portion of these attributed to the Northern Growth Area.

These figures provide an insight to the combined overall growth that has occurred in the growth areas.

In order to obtain an accurate understanding of the current growth rate specifically within the Northern Growth Area, ID 'The Population Experts' were engaged to provide actual growth data for both the Hume and Whittlesea growth areas over the past four years.

This dataset was limited to these growth areas as they were considered to be the most accurate reflection of 'Greenfield' growth that is currently occurring within the Donnybrook/Kalkallo locality. The figures excluded any increase in dwellings from development within established suburbs to ensure that the growth data provided was not skewed.

As shown in Table 3, there has been consistent growth in both the Hume and Whittlesea growth areas over the past four years. These areas have grown by a combined 13,175 dwellings over the timeframe with an average increase of 3,293 dwellings per year.

Whilst it is difficult to predict whether this growth rate will be maintained, it is assumed that a conservative average of 3,000 lots will be released each year across the entire NGC.

KEY ASSUMPTIONS:

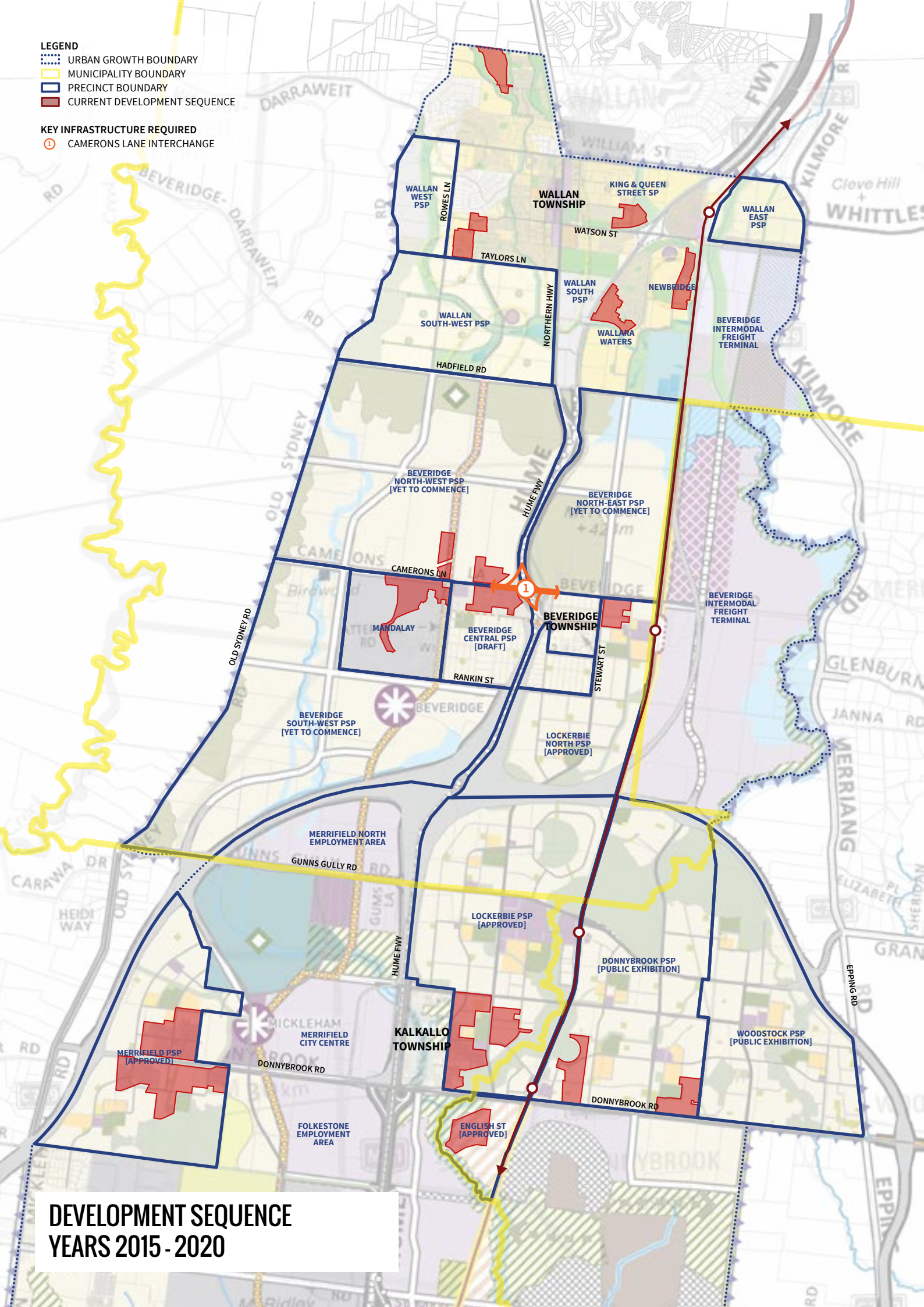
- *An average of 3,000 will be released per annum in the NGC;*
- *Initially growth within the NGC will be less than the 3,000 dwellings per annum average due to the existing land supply in Wollert, Craigieburn/Mickleham and Mernda corridors;*
- *There will be multiple development fronts across the NGC once applications are approved through the planning system;*
- *Larger consolidated land holdings will guide the development fronts;*
- *The location of existing access and transport infrastructure will play a significant role in influencing the development fronts;*
- *New development will leverage off existing communities such as Wallan, Beveridge and Kalkallo;*
- *Differing rates of development have been applied dependent on the scale of land holding, location and stakeholders;*

Table 3: Actual Dwelling Growth for Hume & Whittlesea Growth Areas (2012 - 2015)

	2012 Actual Growth (Dwellings)	2013 Actual Growth (Dwellings)	2014 Actual Growth (Dwellings)	2015 Actual Growth (Dwellings)
WHITTLESEA GROWTH AREA				
Wollert/Epping	934	911	930	765
Mernda/Doreen/South Morang	1698	1579	995	988
LOCALITY ANNUAL TOTAL	**2632**	**2490**	**1925**	**1753**
HUME GROWTH AREA				
Greenvale/Craigieburn	1011	865	1208	1291
LOCALITY ANNUAL TOTAL	**1011**	**865**	**1208**	**1291**
COMBINED ANNUAL TOTAL	**3643**	**3355**	**3133**	**3044**

(Source: ID. The Population Experts, 2016)

POTENTIAL DEVELOPMENT SEQUENCING 2015 - 2060


LEGEND
URBAN GROWTH BOUNDARY
MUNICIPALITY BOUNDARY
PRECINCT BOUNDARY
CURRENT DEVELOPMENT SEQUENCE
KEY INFRASTRUCTURE REQUIRED
1 CAMERONS LANE INTERCHANGE
WALLAN WEST PSP
ROWES LN
WALLAN TOWNSHIP
KING & QUEEN STREET SP
WATSON ST
WALLAN EAST PSP
TAYLORS LN
WALLAN SOUTH PSP
NEWBRIDGE
NORTHERN HWY
WALLAN SOUTH-WEST PSP
WALLARA WATERS
BEVERIDGE INTERMODAL FREIGHT TERMINAL
HADFIELD RD
BEVERIDGE NORTH-WEST PSP [YET TO COMMENCE]
HUME FWY
BEVERIDGE NORTH-EAST PSP [YET TO COMMENCE]
CAMERONS LN
OLD SYDNEY RD
MANDALAY
BEVERIDGE CENTRAL PSP [DRAFT]
BEVERIDGE TOWNSHIP
STEWART ST
RANKIN ST
BEVERIDGE SOUTH-WEST PSP [YET TO COMMENCE]
LOCKERBIE NORTH PSP [APPROVED]
MERRIFIELD NORTH EMPLOYMENT AREA
GUNNS GULLY RD
LOCKERBIE PSP [APPROVED]
DONNYBROOK PSP [PUBLIC EXHIBITION]
MERRIFIELD CITY CENTRE
KALKALLO TOWNSHIP
WOODSTOCK PSP [PUBLIC EXHIBITION]
MERRIFIELD PSP [APPROVED]
DONNYBROOK RD
FOLKESTONE EMPLOYMENT AREA
ENGLISH ST [APPROVED]
EPPING RD
DEVELOPMENT SEQUENCE
YEARS 2015 - 2020

KEY ASSUMPTIONS:

- *Development within the Donnybrook/Kalkallo locality will extend from existing development front on Donnybrook Rd and head north;*
- *Development within the Beveridge locality will focus around the existing township extending off the existing access to the Hume Freeway via Lithgow Street. Development will be focused along Cameron's Lane in the Beveridge Central & North-West PSPs where consolidated land holdings are located;*
- *All growth in Wallan will be driven through existing developments surrounding the township. Development of land within the Wallan PSP areas will not commence during this period.*

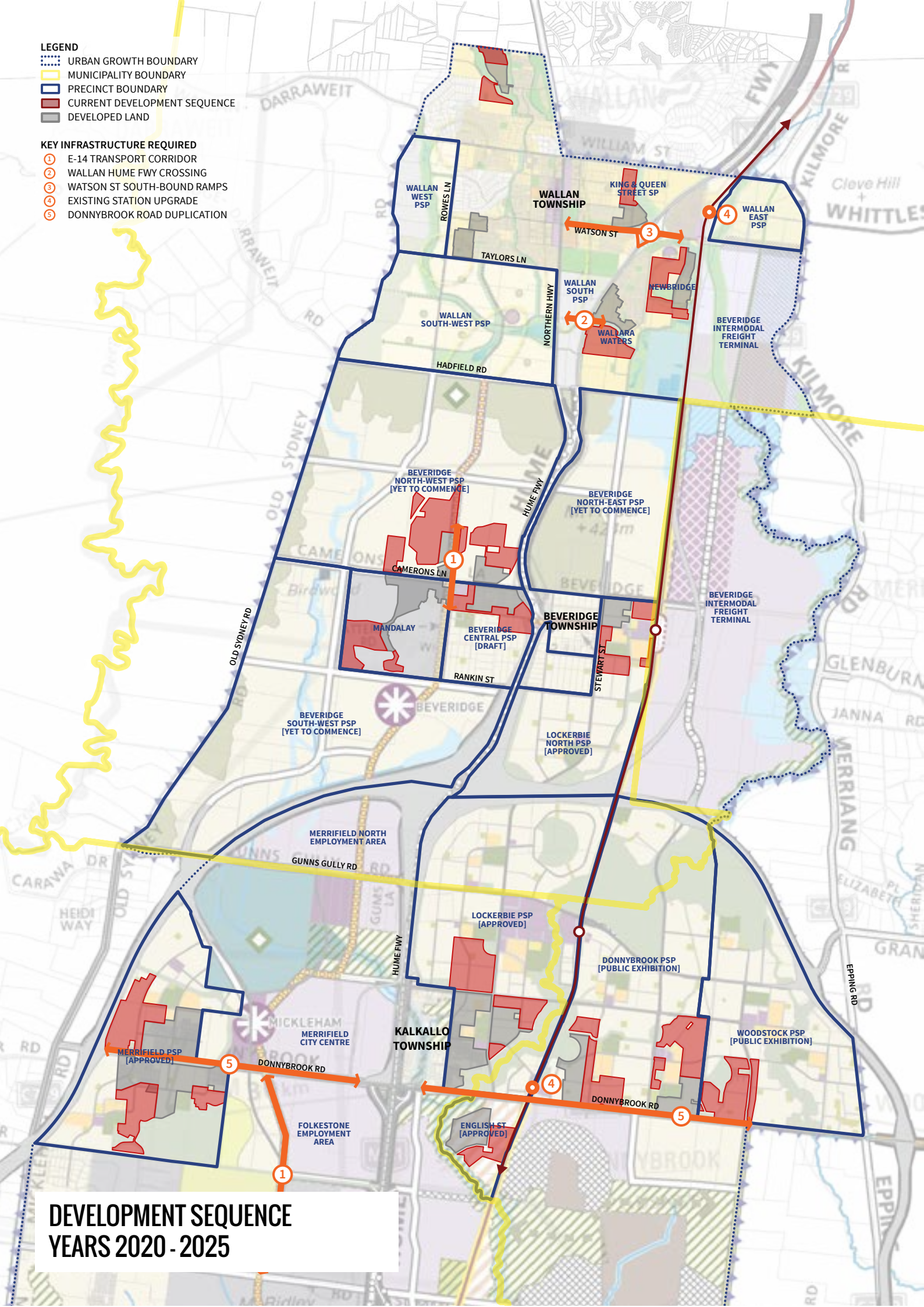
KEY FINDINGS:

- *Wallan will grow by an additional 1,080 dwellings during this period which will be able to utilise existing infrastructure in the township and support this existing town centre;*
- *An alternate access point to the Wallan East area will be required as Wallara Waters & Newbridge developments continue to grow;*
- *Growth around the Beveridge Township will reach approximately 1,675 dwellings by 2020. This may trigger the need for the new Camerons Lane interchange;*
- *Development along Donnybrook Rd will be the highest of the all of the areas within the NGC. Approximately 5,275 dwellings will be delivered during this period;*
- *Given the increase in population, traffic along sections of Donnybrook Road will increase significantly placing strain on the existing infrastructure. A large portion of the additional traffic will be utilising the Donnybrook Rd Interchange to access the Hume Freeway;*
- *Donnybrook Station will experience an increase in patronage.*

Table 4: Development Sequencing 2015 - 2020

	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)	Area (ND/Ha)
DONNYBROOK/KALKALLO			
Lockerbie PSP	1,400	4,340	88
Merrifield PSP	2,495	7,735	156
Donnybrook/Woodstock	900	2,790	56
English Street	480	1,488	30
Merrifield City Centre	0	0	0
LOCALITY TOTAL	**5,275**	**16,353**	**330**
ACCUMULATIVE TOTAL	**5,275**	**16,353**	
BEVERIDGE			
Lockerbie North PSP	275	853	17
Beveridge North-West	400	1,240	25
Beveridge Central	400	1,240	25
Mandalay	600	1,860	38
Beveridge South-West	0	0	0
Beveridge North-East	0	0	0
Beveridge Township	0	0	0
LOCALITY TOTAL	**1,675**	**5,193**	**105**
ACCUMULATIVE TOTAL	**1,675**	**5,193**	
WALLAN			
Wallan West PSP	0	0	0
Wallan South-West PSP	0	0	0
Wallan East PSP	0	0	0
Developing Wallan Areas	1,080	3,348	70
LOCALITY TOTAL	**1,080**	**3,348**	**70**
ACCUMULATIVE TOTAL	**1,080**	**3,348**	

NORTHERN GROWTH CORRIDOR TOTALS 2015-2020	**Projected Yield (16dw/ha)**	**Projected Population (3.1 PPH)**	**Area (ND/Ha)**
	8,030	**24,894**	**504**
ACCUMULATIVE TOTAL	**8,030**	**24,894**	


LEGEND
URBAN GROWTH BOUNDARY
MUNICIPALITY BOUNDARY
PRECINCT BOUNDARY
CURRENT DEVELOPMENT SEQUENCE
DEVELOPED LAND
KEY INFRASTRUCTURE REQUIRED
1 E-14 TRANSPORT CORRIDOR
2 WALLAN HUME FWY CROSSING
3 WATSON ST SOUTH-BOUND RAMPS
4 EXISTING STATION UPGRADE
5 DONNYBROOK ROAD DUPLICATION
WALLAN WEST PSP
ROWES LN
WALLAN TOWNSHIP
KING & QUEEN STREET SP
WATSON ST
WALLAN EAST PSP
TAYLORS LN
WALLAN SOUTH PSP
NEWBRIDGE
WALLAN SOUTH-WEST PSP
NORTHERN HWY
WALLARA WATERS
BEVERIDGE INTERMODAL FREIGHT TERMINAL
HADFIELD RD
BEVERIDGE NORTH-WEST PSP [YET TO COMMENCE]
HUME FWY
BEVERIDGE NORTH-EAST PSP [YET TO COMMENCE]
CAMERONS LN
OLD SYDNEY RD
MANDALAY
BEVERIDGE CENTRAL PSP [DRAFT]
BEVERIDGE TOWNSHIP
STEWART ST
RANKIN ST
BEVERIDGE SOUTH-WEST PSP [YET TO COMMENCE]
LOCKERBIE NORTH PSP [APPROVED]
MERRIFIELD NORTH EMPLOYMENT AREA
GUNNS GULLY RD
LOCKERBIE PSP [APPROVED]
HUME FWY
DONNYBROOK PSP [PUBLIC EXHIBITION]
EPPING RD
MERRIFIELD CITY CENTRE
KALKALLO TOWNSHIP
MERRIFIELD PSP [APPROVED]
DONNYBROOK RD
WOODSTOCK PSP [PUBLIC EXHIBITION]
FOLKESTONE EMPLOYMENT AREA
ENGLISH ST [APPROVED]
DEVELOPMENT SEQUENCE
YEARS 2020 - 2025

KEY ASSUMPTIONS:

- *Development within the Donnybrook/Kalkallo locality will continue to extend from existing development front on Donnybrook Rd and head north;*
- *Development within the Beveridge continue to grow around the Beveridge Township, leveraging off the new infrastructure built in the area;*
- *All growth in Wallan will continue to be driven through existing developments surrounding the township. Wallara Waters & Newbridge developments will accelerate with the delivery of new facilities to support the community. Development of land within the Wallan PSP areas will not commence during this period;*

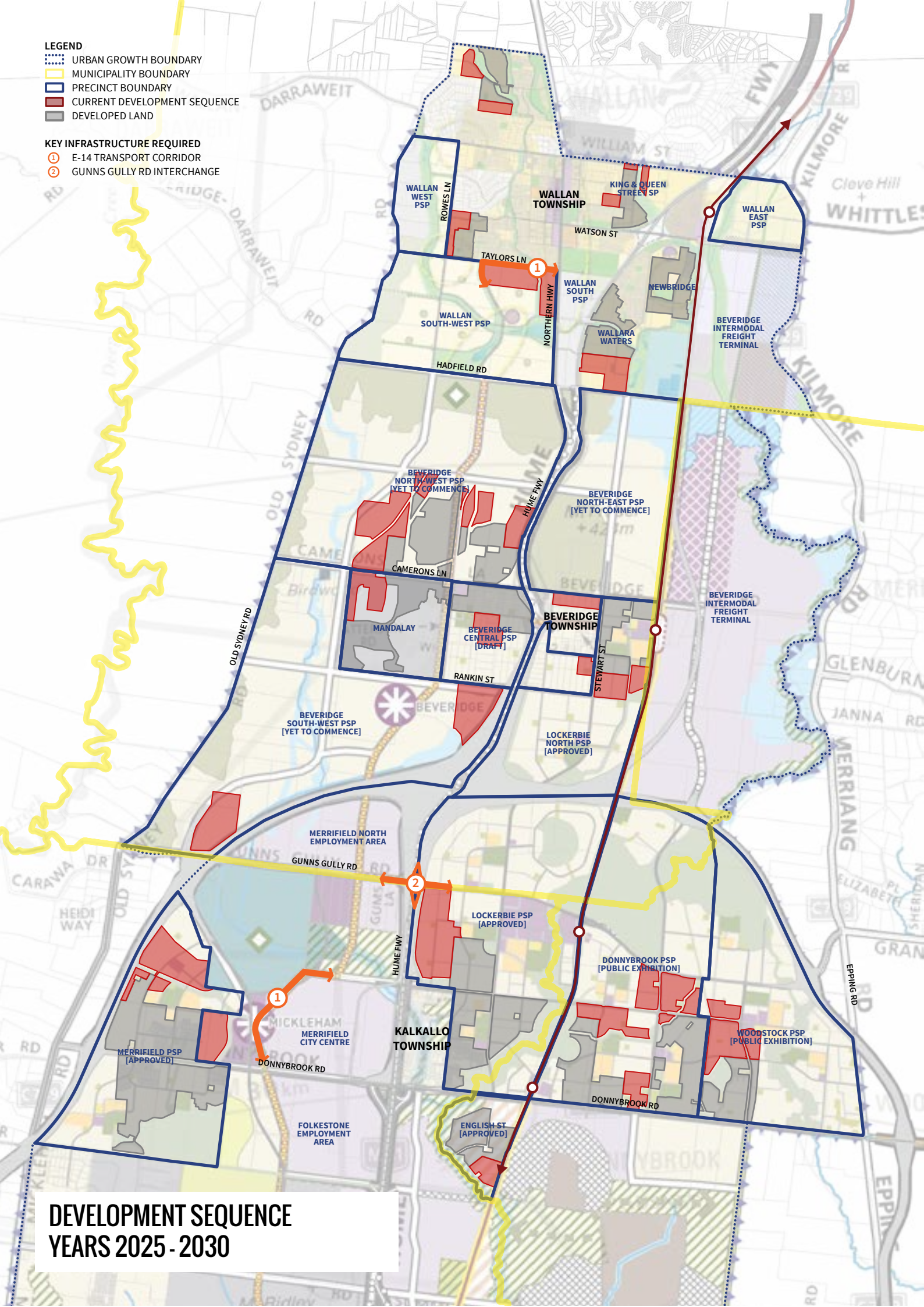
KEY FINDINGS:

- *Wallan will grow by an additional 1,488 dwellings during this period predominately east of the Hume Freeway. This community will be large enough to support a new local town centre and school;*
- *Beveridge Township will grow with an additional 3,500 dwellings by 2025. This will trigger the need for new schools and local town centres to support the community;*
- *Development along Donnybrook Rd will continue to be the highest of the all of the areas within the NGC. Approximately an additional 6,000 dwellings will be delivered during this period;*
- *New local town centres and schools will be require to support the communities within the Merrifield, Lockerbie and Donnybrook PSP areas;*
- *Traffic along Donnybrook Road will continue to increase exceeding the capacity of the existing infrastructure. Donnybrook Rd will require duplication to accommodate the additional growth;*
- *The Donnybrook Interchange will be under pressure during peak periods;*
- *Donnybrook & Wallan Station will experience an increase in patronage and facilities will require upgrade to support the growth;*
- *The first section of the E-14 corridor will be delivered within Beveridge North-West. This will be in addition to section of the E-14 between Mt Ridley Rd and Donnybrook Rd that will be constructed by 2021 connecting to Craigieburn.*

Table 5: Development Sequencing 2020 - 2025

	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)	Area (ND/Ha)
DONNYBROOK/KALKALLO			
Lockerbie PSP	1,276	3,957	80
Merrifield PSP	1,691	5,243	106
Donnybrook/Woodstock	2,580	7,998	161
English Street	480	1,488	30
Merrifield City Centre	0	0	0
LOCALITY TOTAL	**6,028**	**18,686**	**377**
ACCUMULATIVE TOTAL	**11,303**	**35,039**	
BEVERIDGE			
Lockerbie North PSP	600	1,860	38
Beveridge North-West	1,800	5,580	113
Beveridge Central	500	1,550	31
Mandalay	600	1,860	38
Beveridge South-West	0	0	0
Beveridge North-East	0	0	0
Beveridge Township	0	0	0
LOCALITY TOTAL	**3,500**	**10,850**	**219**
ACCUMULATIVE TOTAL	**5,175**	**16,043**	
WALLAN			
Wallan West PSP	0	0	0
Wallan South-West PSP	0	0	0
Wallan East PSP	0	0	0
Developing Wallan Areas	1,488	4,613	97
LOCALITY TOTAL	**1,488**	**4,613**	**97**
ACCUMULATIVE TOTAL	**2,568**	**7,961**	

NORTHERN GROWTH CORRIDOR TOTALS 2020-2025	**Projected Yield (16dw/ha)**	**Projected Population (3.1 PPH)**	**Area (ND/Ha)**
	11,016	**34,149**	**692**
ACCUMULATIVE TOTAL	**19,046**	**59,042**	


LEGEND
URBAN GROWTH BOUNDARY
MUNICIPALITY BOUNDARY
PRECINCT BOUNDARY
CURRENT DEVELOPMENT SEQUENCE
DEVELOPED LAND
KEY INFRASTRUCTURE REQUIRED
1 E-14 TRANSPORT CORRIDOR
2 GUNNS GULLY RD INTERCHANGE
WALLAN WEST PSP
ROWES LN
WALLAN TOWNSHIP
KING & QUEEN STREET SP
WALLAN EAST PSP
WATSON ST
TAYLORS LN
WALLAN SOUTH PSP
NEWBRIDGE
NORTHERN HWY
WALLAN SOUTH-WEST PSP
WALLARA WATERS
BEVERIDGE INTERMODAL FREIGHT TERMINAL
HADFIELD RD
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BEVERIDGE CENTRAL PSP [DRAFT]
BEVERIDGE TOWNSHIP
STEWART ST
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BEVERIDGE SOUTH-WEST PSP [YET TO COMMENCE]
LOCKERBIE NORTH PSP [APPROVED]
MERRIFIELD NORTH EMPLOYMENT AREA
GUNNS GULLY RD
LOCKERBIE PSP [APPROVED]
HUME FWY
DONNYBROOK PSP [PUBLIC EXHIBITION]
EPPING RD
MERRIFIELD CITY CENTRE
KALKALLO TOWNSHIP
MERRIFIELD PSP [APPROVED]
DONNYBROOK RD
WOODSTOCK PSP [PUBLIC EXHIBITION]
FOLKESTONE EMPLOYMENT AREA
ENGLISH ST [APPROVED]
DONNYBROOK RD
DEVELOPMENT SEQUENCE
YEARS 2025 - 2030

KEY ASSUMPTIONS:

- *The first residential offering will be delivered in the Merrifield Town Centre;*
- *The Eastern part of Beveridge Central PSP will commence development branching from Lockerbie North development front;*
- *Mandalay will be fully developed by 2030;*
- *Wallan South-West PSP will commence development extending from existing township;*
- *Development in Beveridge South-West will commence from two different development fronts. One utilising the access provided from Beveridge Township and the other developing from the access south of the OMR.;*
- *Development in the Lockerbie PSP will continue to develop northwards towards the new access point that will be provided from the Gunns Gully Rd interchange.*

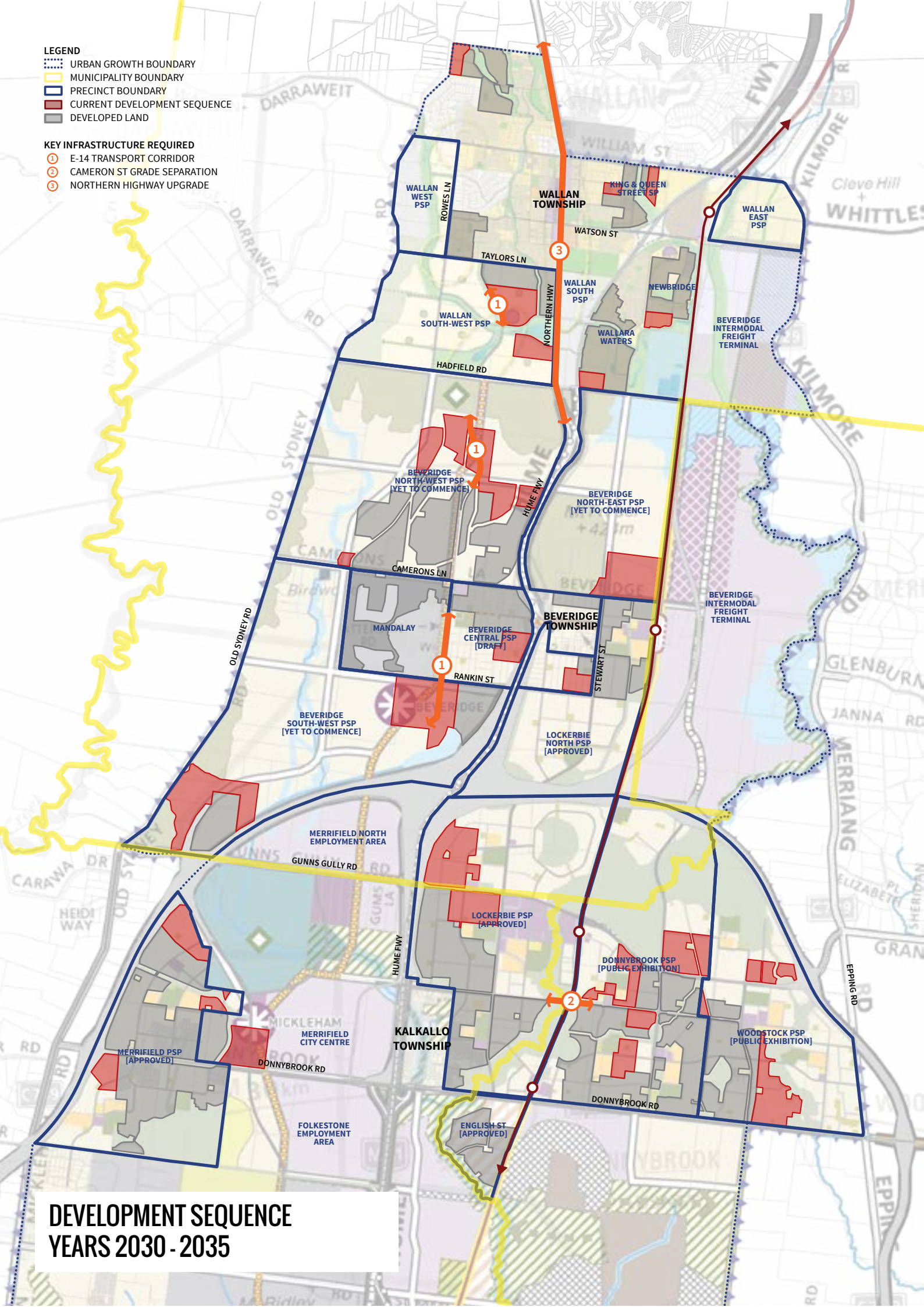
KEY FINDINGS:

- *The greater Beveridge Township will have an approximate population of 30,000 people and comparable in scale to Wallan by 2030;*
- *Gunns Gully Rd Interchange will be a critical piece of infrastructure required to provide an alternate access point to the Hume Freeway;*
- *Sections of the E-14 Transport corridor will continue to be delivered through the commencement of development within the Beveridge South-West PSP & greater establishment of the Merrifield Town Centre.*

Table 6: Development Sequencing 2025 - 2030

	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)	Area (ND/Ha)
DONNYBROOK/KALKALLO			
Lockerbie PSP	1,200	3,720	75
Merrifield PSP	1,029	3,189	64
Donnybrook/Woodstock	2,580	7,998	161
English Street	212	658	13
Merrifield City Centre	600	1,860	38
LOCALITY TOTAL	**5,621**	**17,424**	**351**
ACCUMULATIVE TOTAL	**16,924**	**52,463**	
BEVERIDGE			
Lockerbie North PSP	623	1,932	39
Beveridge North-West	1,800	5,580	113
Beveridge Central	400	1,240	25
Mandalay	350	1,085	22
Beveridge South-West	900	2,790	56
Beveridge North-East	0	0	0
Beveridge Township	300	930	19
LOCALITY TOTAL	**4,373**	**13,557**	**273**
ACCUMULATIVE TOTAL	**9,548**	**29,599**	
WALLAN			
Wallan West PSP	0	0	0
Wallan South-West PSP	600	1,860	38
Wallan East PSP	0	0	0
Developing Wallan Areas	860	2,666	56
LOCALITY TOTAL	**1,460**	**4,526**	**94**
ACCUMULATIVE TOTAL	**4,028**	**12,487**	

NORTHERN GROWTH CORRIDOR TOTALS 2025-2030	**Projected Yield (16dw/ha)**	**Projected Population (3.1 PPH)**	**Area (ND/Ha)**
	11,454	**35,507**	**718**
ACCUMULATIVE TOTAL	**30,500**	**94,549**	


LEGEND
URBAN GROWTH BOUNDARY
MUNICIPALITY BOUNDARY
PRECINCT BOUNDARY
CURRENT DEVELOPMENT SEQUENCE
DEVELOPED LAND
KEY INFRASTRUCTURE REQUIRED
1 E-14 TRANSPORT CORRIDOR
2 CAMERON ST GRADE SEPARATION
3 NORTHERN HIGHWAY UPGRADE
WALLAN WEST PSP
ROWES LN
WALLAN TOWNSHIP
KING & QUEEN STREET SP
WALLAN EAST PSP
WATSON ST
TAYLORS LN
WALLAN SOUTH PSP
NEWBRIDGE
NORTHERN HWY
WALLAN SOUTH-WEST PSP
WALLARA WATERS
BEVERIDGE INTERMODAL FREIGHT TERMINAL
HADFIELD RD
BEVERIDGE NORTH-WEST PSP [YET TO COMMENCE]
HUME FWY
BEVERIDGE NORTH-EAST PSP [YET TO COMMENCE]
CAMERONS LN
OLD SYDNEY RD
MANDALAY
BEVERIDGE CENTRAL PSP [DRAFT]
BEVERIDGE TOWNSHIP
STEWART ST
RANKIN ST
BEVERIDGE SOUTH-WEST PSP [YET TO COMMENCE]
LOCKERBIE NORTH PSP [APPROVED]
MERRIFIELD NORTH EMPLOYMENT AREA
GUNNS GULLY RD
LOCKERBIE PSP [APPROVED]
DONNYBROOK PSP [PUBLIC EXHIBITION]
EPPING RD
MERRIFIELD CITY CENTRE
KALKALLO TOWNSHIP
WOODSTOCK PSP [PUBLIC EXHIBITION]
MERRIFIELD PSP [APPROVED]
DONNYBROOK RD
FOLKESTONE EMPLOYMENT AREA
ENGLISH ST [APPROVED]
DEVELOPMENT SEQUENCE
YEARS 2030 - 2035

KEY ASSUMPTIONS:

- *Development within the Donnybrook PSP will grow towards the proposed train station and Metropolitan Activity Centre;*
- *The last of the areas within the established Wallan township will be completed, except for the King & Queen Street areas;*
- *Land within Beveridge North-East PSP will commence development anchored off Camerons Lane.*

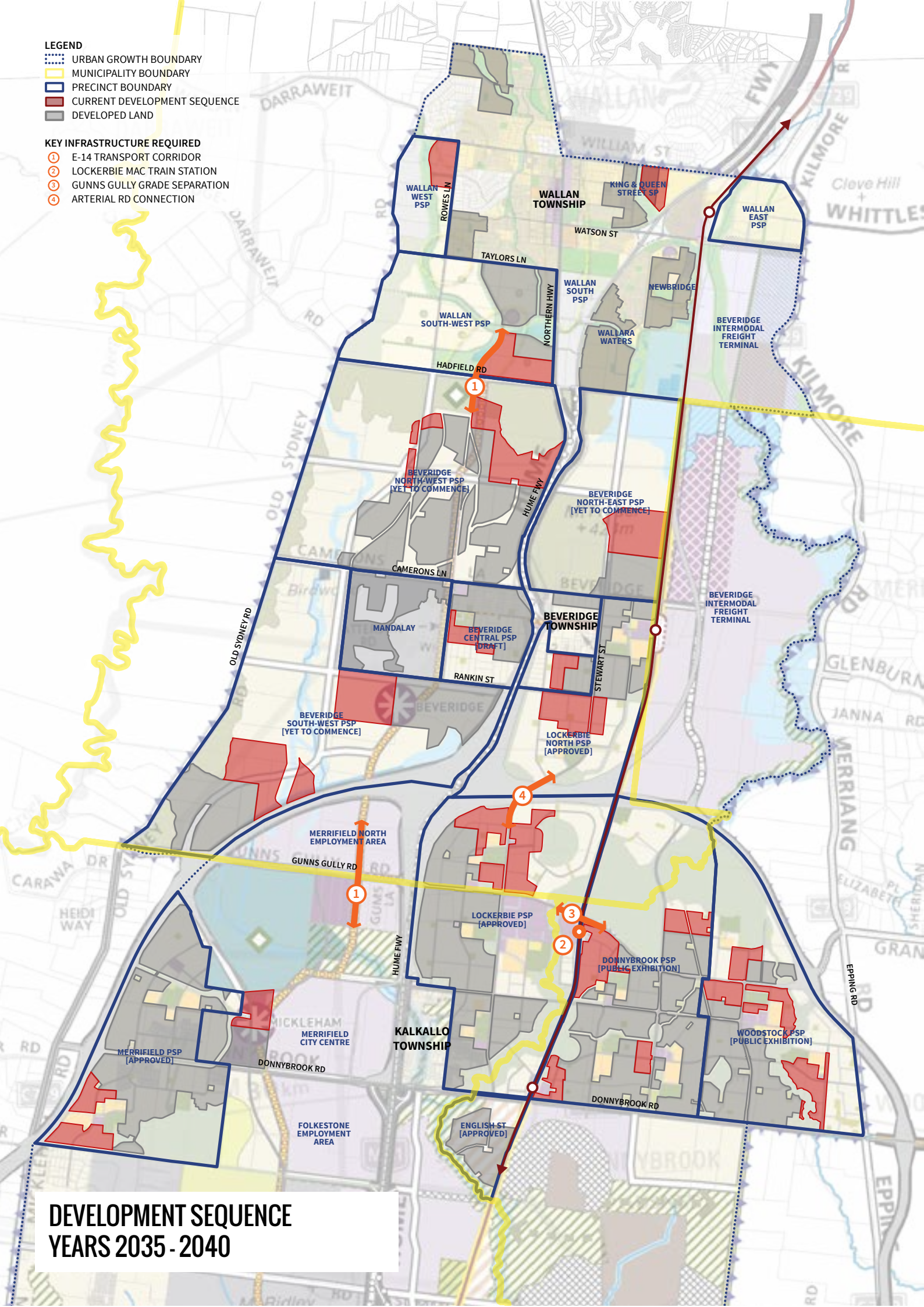
KEY FINDINGS:

- *The NGC will have grown by approximately 42,000 new dwellings by 2035;*
- *Both the Merrifield & Lockerbie higher order town centres will be well established and supported by the surrounding population;*
- *East-West crossings of the Melbourne-Sydney Railway will be required in order to complete the transport network and alleviate traffic congestion;*
- *Development within Wallan South West will place additional traffic on the Northern Highway. In order to cope with the growth of Wallan, the Northern Highway Duplication will need to be constructed during this timeframe.*

Table 7: Development Sequencing 2030 - 2035

	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)	Area (ND/Ha)
DONNYBROOK/KALKALLO			
Lockerbie PSP	1,560	4,836	98
Merrifield PSP	960	2,976	60
Donnybrook/Woodstock	2,880	8,928	180
English Street	0	0	0
Merrifield City Centre	600	1,860	38
LOCALITY TOTAL	**6,000**	**18,600**	**375**
ACCUMULATIVE TOTAL	**22,924**	**71,063**	
BEVERIDGE			
Lockerbie North PSP	0	0	0
Beveridge North-West	1,802	5,586	113
Beveridge Central	510	1,581	32
Mandalay	0	0	0
Beveridge South-West	1,800	5,580	113
Beveridge North-East	720	2,232	45
Beveridge Township	0	0	0
LOCALITY TOTAL	**4,832**	**14,979**	**302**
ACCUMULATIVE TOTAL	**14,380**	**44,578**	
WALLAN			
Wallan West PSP	0	0	0
Wallan South-West PSP	600	1,860	38
Wallan East PSP	0	0	0
Developing Wallan Areas	282	874	18
LOCALITY TOTAL	**882**	**2,734**	**56**
ACCUMULATIVE TOTAL	**4,910**	**15,221**	

NORTHERN GROWTH CORRIDOR TOTALS 2030-2035	**Projected Yield (16dw/ha)**	**Projected Population (3.1 PPH)**	**Area (ND/Ha)**
	11,714	**36,314**	**733**
ACCUMULATIVE TOTAL	**42,214**	**130,863**	


LEGEND
URBAN GROWTH BOUNDARY
MUNICIPALITY BOUNDARY
PRECINCT BOUNDARY
CURRENT DEVELOPMENT SEQUENCE
DEVELOPED LAND
KEY INFRASTRUCTURE REQUIRED
1 E-14 TRANSPORT CORRIDOR
2 LOCKERBIE MAC TRAIN STATION
3 GUNNS GULLY GRADE SEPARATION
4 ARTERIAL RD CONNECTION
WALLAN WEST PSP
ROWES LN
WALLAN TOWNSHIP
KING & QUEEN STREET SP
WALLAN EAST PSP
WATSON ST
TAYLORS LN
WALLAN SOUTH PSP
NEWBRIDGE
NORTHERN HWY
WALLAN SOUTH-WEST PSP
WALLARA WATERS
BEVERIDGE INTERMODAL FREIGHT TERMINAL
HADFIELD RD
BEVERIDGE NORTH-WEST PSP [YET TO COMMENCE]
HUME FWY
BEVERIDGE NORTH-EAST PSP [YET TO COMMENCE]
CAMERONS LN
OLD SYDNEY RD
MANDALAY
BEVERIDGE CENTRAL PSP [DRAFT]
BEVERIDGE TOWNSHIP
STEWART ST
RANKIN ST
BEVERIDGE SOUTH-WEST PSP [YET TO COMMENCE]
LOCKERBIE NORTH PSP [APPROVED]
MERRIFIELD NORTH EMPLOYMENT AREA
GUNNS GULLY RD
LOCKERBIE PSP [APPROVED]
DONNYBROOK PSP [PUBLIC EXHIBITION]
EPPING RD
MERRIFIELD CITY CENTRE
KALKALLO TOWNSHIP
WOODSTOCK PSP [PUBLIC EXHIBITION]
MERRIFIELD PSP [APPROVED]
DONNYBROOK RD
FOLKESTONE EMPLOYMENT AREA
ENGLISH ST [APPROVED]
DEVELOPMENT SEQUENCE
YEARS 2035 - 2040

KEY ASSUMPTIONS:

- *Land within the Wallan-West PSP will commence development;*
- *Land supply in both the Merrifield PSP and Town Centre will be exhausted;*
- *The second development front within the Lockerbie North PSP will commence. This plan assumes that the front will commence from Rankin Street, but it is possible that the growth may develop from South of the OMR;*
- *The development front of Wallan South-West will continue to extend South along the Northern Highway;*

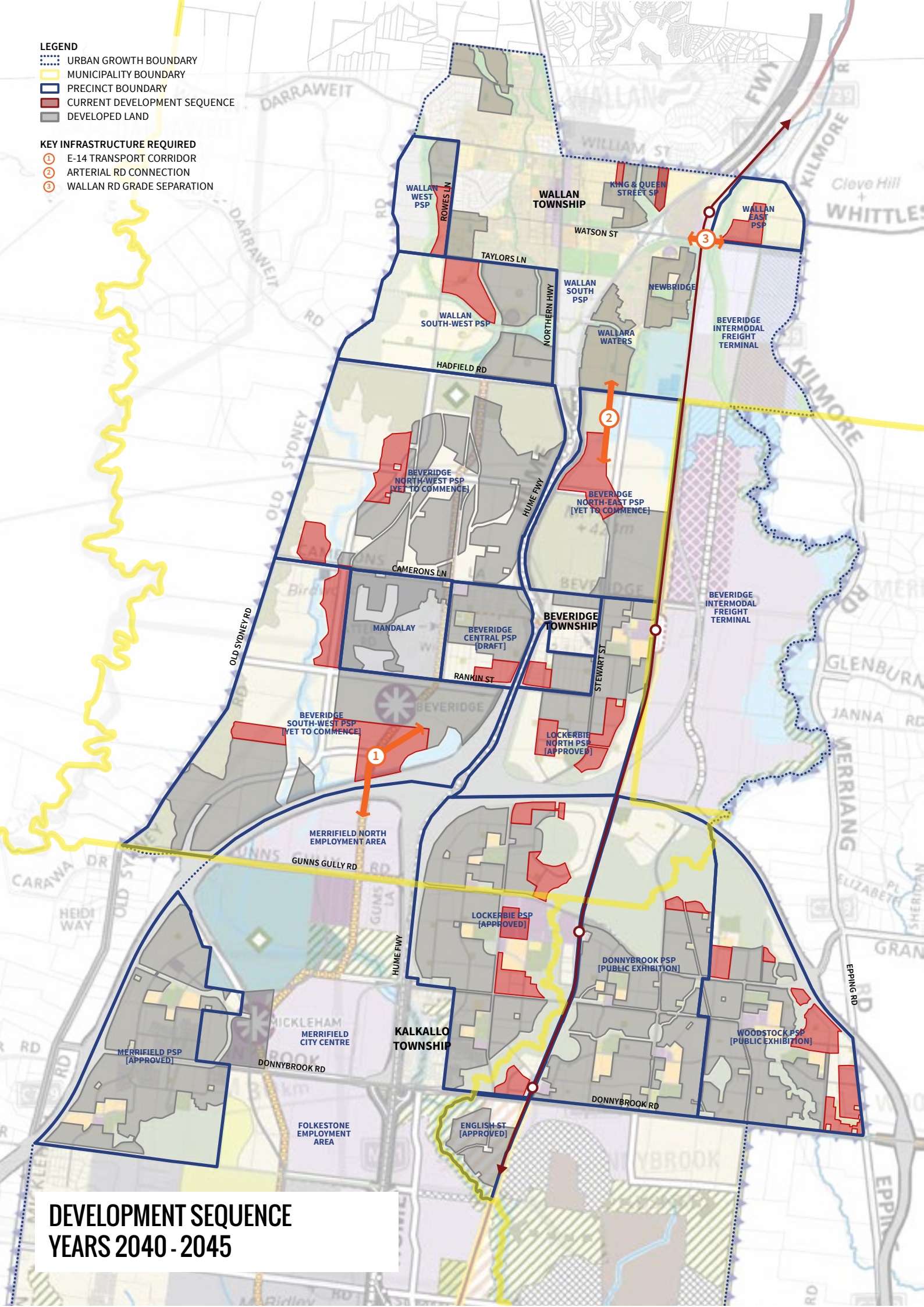
KEY FINDINGS:

- *This period will be the peak growth period for the NGC adding an additional 12,014 dwellings;*
- *By 2040 the population increase for the three different localities will be Donnybrook/Kalkallo (89,334), Beveridge (60,481) and Wallan (18,290)*
- *A new train station located at the Lockerbie MAC may be required to support increased population and reduce to reliance on Donnybrook Station;*
- *East-West crossings of the Melbourne-Sydney Railway will definitely be required in order to complete the transport network and alleviate congestion;*
- *The delivery of the Gunns Gully Interchange during the previous timeframe may trigger the development of Merrifield North employment area. This will assist with the delivery of an import connection of the E-14 transport corridor.*

Table 8: Development Sequencing 2035 - 2040

	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)	Area (ND/Ha)
DONNYBROOK/KALKALLO			
Lockerbie PSP	1,560	4,836	98
Merrifield PSP	892	2,766	56
Donnybrook/Woodstock	3,141	9,738	196
English Street	0	0	0
Merrifield City Centre	300	930	19
LOCALITY TOTAL	**5,894**	**18,270**	**368**
ACCUMULATIVE TOTAL	**28,817**	**89,334**	
BEVERIDGE			
Lockerbie North PSP	900	2,790	56
Beveridge North-West	1,200	3,720	75
Beveridge Central	510	1,581	32
Mandalay	0	0	0
Beveridge South-West	1,800	5,580	113
Beveridge North-East	720	2,232	45
Beveridge Township	0	0	0
LOCALITY TOTAL	**5,130**	**15,903**	**321**
ACCUMULATIVE TOTAL	**19,510**	**60,481**	
WALLAN			
Wallan West PSP	300	930	19
Wallan South-West PSP	600	1,860	38
Wallan East PSP	0	0	0
Developing Wallan Areas	90	279	6
LOCALITY TOTAL	**990**	**3,069**	**62**
ACCUMULATIVE TOTAL	**5,900**	**18,290**	

NORTHERN GROWTH CORRIDOR TOTALS 2035-2040	**Projected Yield (16dw/ha)**	**Projected Population (3.1 PPH)**	**Area (ND/Ha)**
	12,014	**37,242**	**751**
ACCUMULATIVE TOTAL	**54,227**	**168,105**	


LEGEND
URBAN GROWTH BOUNDARY
MUNICIPALITY BOUNDARY
PRECINCT BOUNDARY
CURRENT DEVELOPMENT SEQUENCE
DEVELOPED LAND
KEY INFRASTRUCTURE REQUIRED
1 E-14 TRANSPORT CORRIDOR
2 ARTERIAL RD CONNECTION
3 WALLAN RD GRADE SEPARATION
WALLAN WEST PSP
ROWES LN
WALLAN TOWNSHIP
KING & QUEEN STREET SP
WALLAN EAST PSP
WATSON ST
TAYLORS LN
WALLAN SOUTH PSP
NEWBRIDGE
WALLAN SOUTH-WEST PSP
NORTHERN HWY
WALLARA WATERS
BEVERIDGE INTERMODAL FREIGHT TERMINAL
HADFIELD RD
BEVERIDGE NORTH-WEST PSP [YET TO COMMENCE]
HUME FWY
BEVERIDGE NORTH-EAST PSP [YET TO COMMENCE]
CAMERONS LN
OLD SYDNEY RD
MANDALAY
BEVERIDGE CENTRAL PSP [DRAFT]
BEVERIDGE TOWNSHIP
STEWART ST
RANKIN ST
BEVERIDGE SOUTH-WEST PSP [YET TO COMMENCE]
LOCKERBIE NORTH PSP [APPROVED]
MERRIFIELD NORTH EMPLOYMENT AREA
GUNNS GULLY RD
LOCKERBIE PSP [APPROVED]
DONNYBROOK PSP [PUBLIC EXHIBITION]
EPPING RD
MERRIFIELD CITY CENTRE
KALKALLO TOWNSHIP
WOODSTOCK PSP [PUBLIC EXHIBITION]
MERRIFIELD PSP [APPROVED]
DONNYBROOK RD
FOLKESTONE EMPLOYMENT AREA
ENGLISH ST [APPROVED]
DEVELOPMENT SEQUENCE
YEARS 2040 - 2045

KEY ASSUMPTIONS:

- *Land within the Lockerbie MAC will commence development;*
- *Development will commence in the Wallan East PSP;*
- *A third development front will commence within the Beveridge South-West PSP, branching from Camerons Lane and heading in a southerly direction;*
- *The Wallan West PSP land supply will be exhausted;*

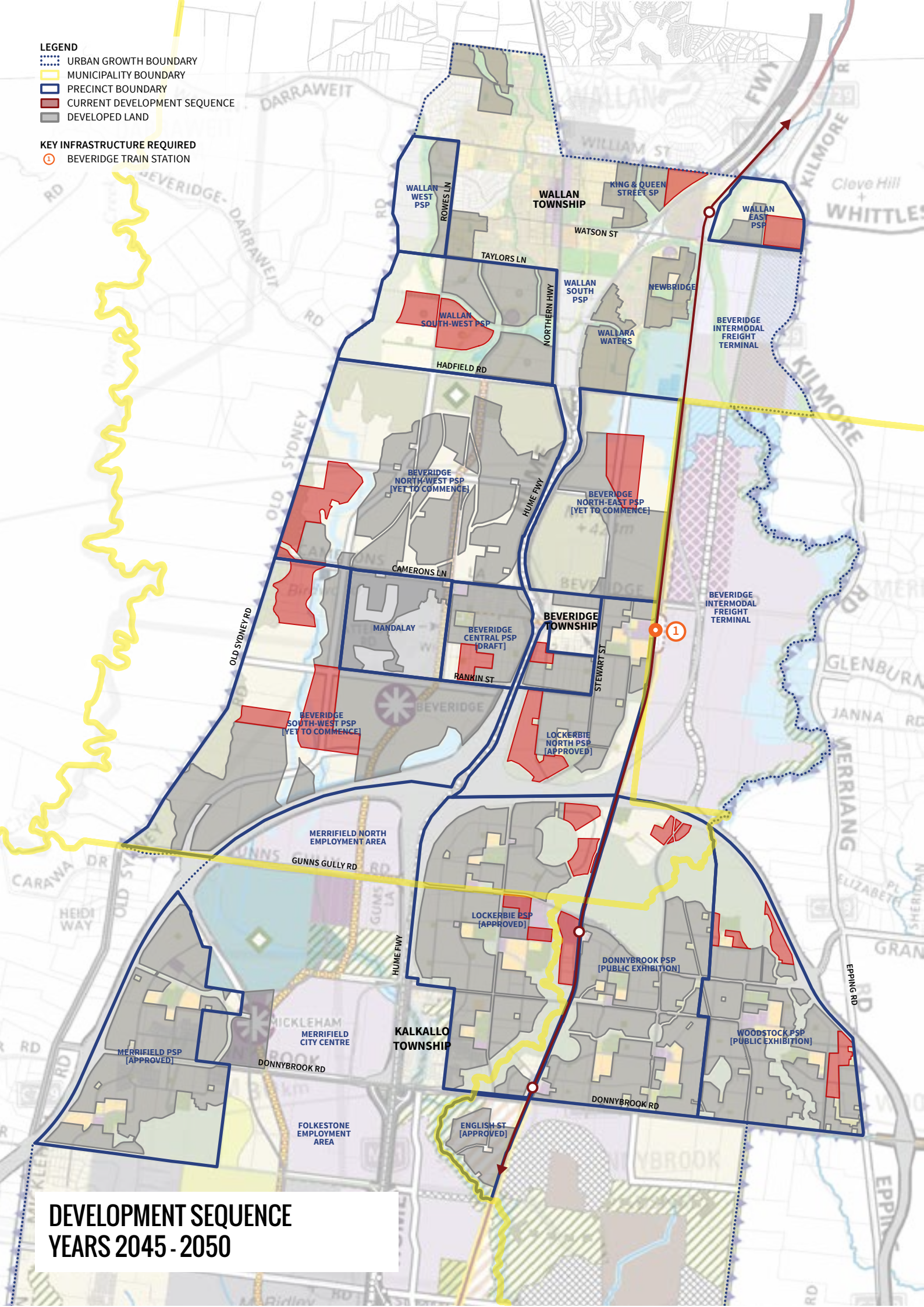
KEY FINDINGS:

- *The E-14 connection from Craigieburn to Wallan will be completed, except for the connection through the conservation area within the proposed employment area in Merrifield North;*
- *There may be potential for the North-South arterial road east of the Hume Freeway to be constructed, connecting East Wallan to Beveridge;*
- *The grade separation of Wallan-Whittlesea Rd will be required to support the commencement of development in Wallan East PSP;*

Table 9: Development Sequencing 2040 - 2045

	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)	Area (ND/Ha)
DONNYBROOK/KALKALLO			
Lockerbie PSP	1,860	5,766	116
Merrifield PSP	0	0	0
Donnybrook/Woodstock	1,951	6,048	122
English Street	0	0	0
Merrifield City Centre	0	0	0
LOCALITY TOTAL	**3,811**	**11,814**	**238**
ACCUMULATIVE TOTAL	**32,628**	**101,148**	
BEVERIDGE			
Lockerbie North PSP	900	2,790	56
Beveridge North-West	1,200	3,720	75
Beveridge Central	510	1,581	32
Mandalay	0	0	0
Beveridge South-West	1,800	5,580	113
Beveridge North-East	720	2,232	45
Beveridge Township	0	0	0
LOCALITY TOTAL	**5,130**	**15,903**	**321**
ACCUMULATIVE TOTAL	**24,640**	**76,384**	
WALLAN			
Wallan West PSP	256	792	16
Wallan South-West PSP	600	1,860	38
Wallan East PSP	300	930	19
Developing Wallan Areas	90	279	6
LOCALITY TOTAL	**1,246**	**3,861**	**78**
ACCUMULATIVE TOTAL	**7,146**	**22,151**	

NORTHERN GROWTH CORRIDOR TOTALS 2040-2045	**Projected Yield (16dw/ha)**	**Projected Population (3.1 PPH)**	**Area (ND/Ha)**
	10,186	**31,578**	**637**
ACCUMULATIVE TOTAL	**64,414**	**199,683**	


LEGEND
URBAN GROWTH BOUNDARY
MUNICIPALITY BOUNDARY
PRECINCT BOUNDARY
CURRENT DEVELOPMENT SEQUENCE
DEVELOPED LAND
KEY INFRASTRUCTURE REQUIRED
1 BEVERIDGE TRAIN STATION
WALLAN WEST PSP
ROWES LN
WALLAN TOWNSHIP
KING & QUEEN STREET SP
WALLAN EAST PSP
WATSON ST
TAYLORS LN
WALLAN SOUTH PSP
NEWBRIDGE
WALLAN SOUTH-WEST PSP
NORTHERN HWY
WALLARA WATERS
BEVERIDGE INTERMODAL FREIGHT TERMINAL
HADFIELD RD
BEVERIDGE NORTH-WEST PSP [YET TO COMMENCE]
HUME FWY
BEVERIDGE NORTH-EAST PSP [YET TO COMMENCE]
CAMERONS LN
OLD SYDNEY RD
MANDALAY
BEVERIDGE CENTRAL PSP [DRAFT]
BEVERIDGE TOWNSHIP
STEWART ST
RANKIN ST
BEVERIDGE SOUTH-WEST PSP [YET TO COMMENCE]
LOCKERBIE NORTH PSP [APPROVED]
MERRIFIELD NORTH EMPLOYMENT AREA
GUNNS GULLY RD
LOCKERBIE PSP [APPROVED]
DONNYBROOK PSP [PUBLIC EXHIBITION]
EPPING RD
MERRIFIELD CITY CENTRE
KALKALLO TOWNSHIP
WOODSTOCK PSP [PUBLIC EXHIBITION]
MERRIFIELD PSP [APPROVED]
DONNYBROOK RD
FOLKESTONE EMPLOYMENT AREA
ENGLISH ST [APPROVED]
DEVELOPMENT SEQUENCE
YEARS 2045 - 2050

KEY ASSUMPTIONS:

- *The development front in Wallan South-West will continue south and meet with the development front in Beveridge North-West,*
- *The majority of land within the Donnybrook/Kalkallo locality will be developed by 2050;*

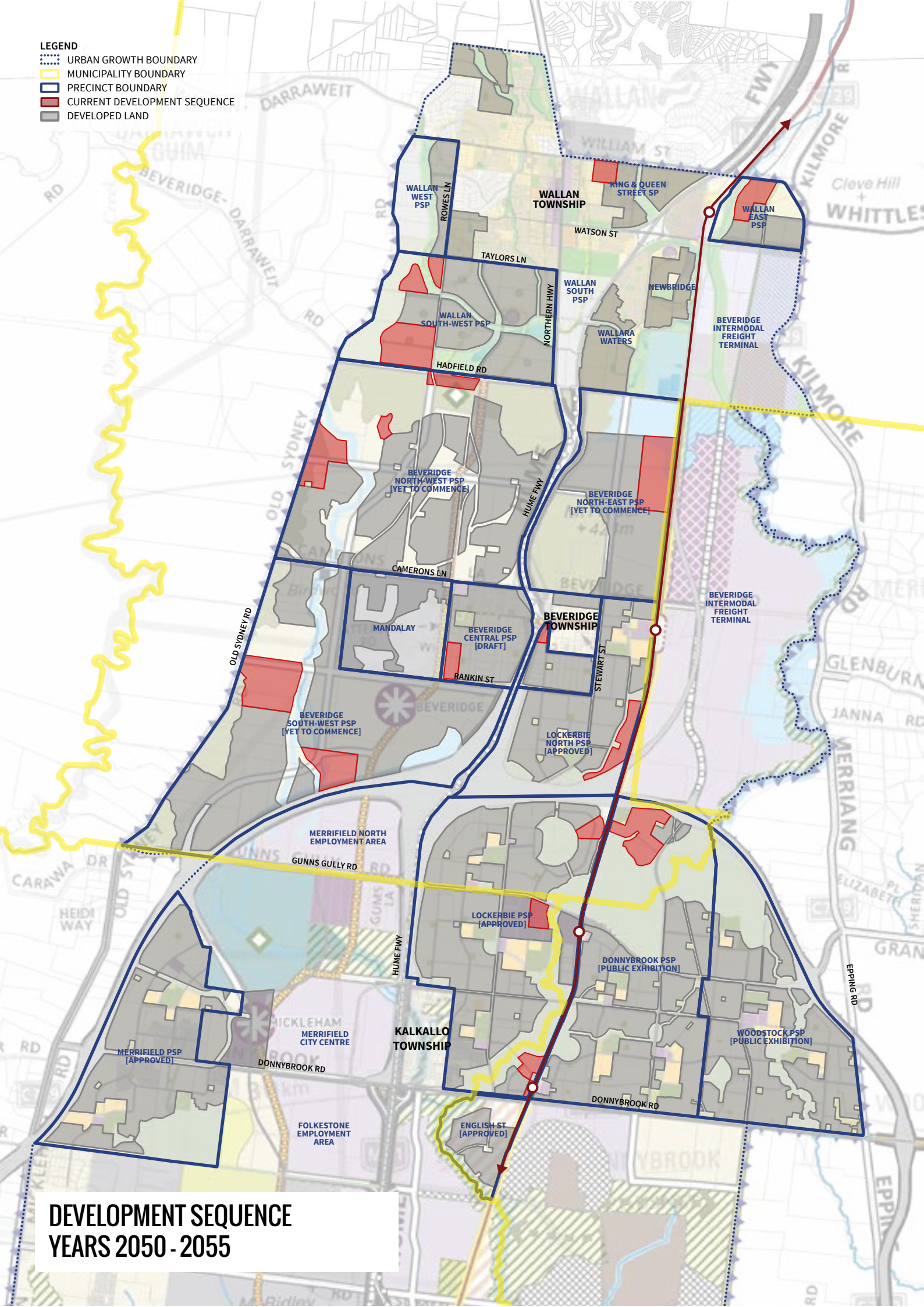
KEY FINDINGS:

- *The population of Beveridge will be close to 100,000 people and may justify the construction of the new train station at Beveridge;*

Table 10: Development Sequencing 2045 - 2050

	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)	Area (ND/Ha)
DONNYBROOK/KALKALLO			
Lockerbie PSP	1,342	4,160	84
Merrifield PSP	0	0	0
Donnybrook/Woodstock	1,157	3,587	72
English Street	0	0	0
Merrifield City Centre	0	0	0
LOCALITY TOTAL	**2,499**	**7,747**	**156**
ACCUMULATIVE TOTAL	**35,127**	**108,895**	
BEVERIDGE			
Lockerbie North PSP	900	2,790	56
Beveridge North-West	1,200	3,720	75
Beveridge Central	510	1,581	32
Mandalay	0	0	0
Beveridge South-West	1,800	5,580	113
Beveridge North-East	720	2,232	45
Beveridge Township	0	0	0
LOCALITY TOTAL	**5,130**	**15,903**	**321**
ACCUMULATIVE TOTAL	**29,770**	**92,287**	
WALLAN			
Wallan West PSP	0	0	0
Wallan South-West PSP	600	1,860	38
Wallan East PSP	300	930	19
Developing Wallan Areas	90	279	6
LOCALITY TOTAL	**990**	**3,069**	**62**
ACCUMULATIVE TOTAL	**8,136**	**25,220**	

NORTHERN GROWTH CORRIDOR TOTALS 2045-2050	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)	Area (ND/Ha)
	8,619	**26,719**	**539**
ACCUMULATIVE TOTAL	**73,033**	**226,402**	


LEGEND
URBAN GROWTH BOUNDARY
MUNICIPALITY BOUNDARY
PRECINCT BOUNDARY
CURRENT DEVELOPMENT SEQUENCE
DEVELOPED LAND
WALLAN WEST PSP
ROWES LN
WALLAN TOWNSHIP
KING & QUEEN STREET SP
WALLAN EAST PSP
WATSON ST
TAYLORS LN
WALLAN SOUTH PSP
NEWBRIDGE
WALLAN SOUTH-WEST PSP
NORTHERN HWY
WALLARA WATERS
BEVERIDGE INTERMODAL FREIGHT TERMINAL
HADFIELD RD
BEVERIDGE NORTH-WEST PSP [YET TO COMMENCE]
HUME FWY
BEVERIDGE NORTH-EAST PSP [YET TO COMMENCE]
CAMERONS LN
OLD SYDNEY RD
MANDALAY
BEVERIDGE CENTRAL PSP [DRAFT]
BEVERIDGE TOWNSHIP
STEWART ST
RANKIN ST
BEVERIDGE SOUTH-WEST PSP [YET TO COMMENCE]
LOCKERBIE NORTH PSP [APPROVED]
MERRIFIELD NORTH EMPLOYMENT AREA
GUNNS GULLY RD
LOCKERBIE PSP [APPROVED]
DONNYBROOK PSP [PUBLIC EXHIBITION]
EPPING RD
MERRIFIELD CITY CENTRE
KALKALLO TOWNSHIP
WOODSTOCK PSP [PUBLIC EXHIBITION]
MERRIFIELD PSP [APPROVED]
DONNYBROOK RD
FOLKESTONE EMPLOYMENT AREA
ENGLISH ST [APPROVED]
DEVELOPMENT SEQUENCE
YEARS 2050 - 2055

KEY ASSUMPTIONS:

- *The majority of land supply within the NGC will be exhausted by 2055 except for some small infill areas within Beveridge and Wallan;*

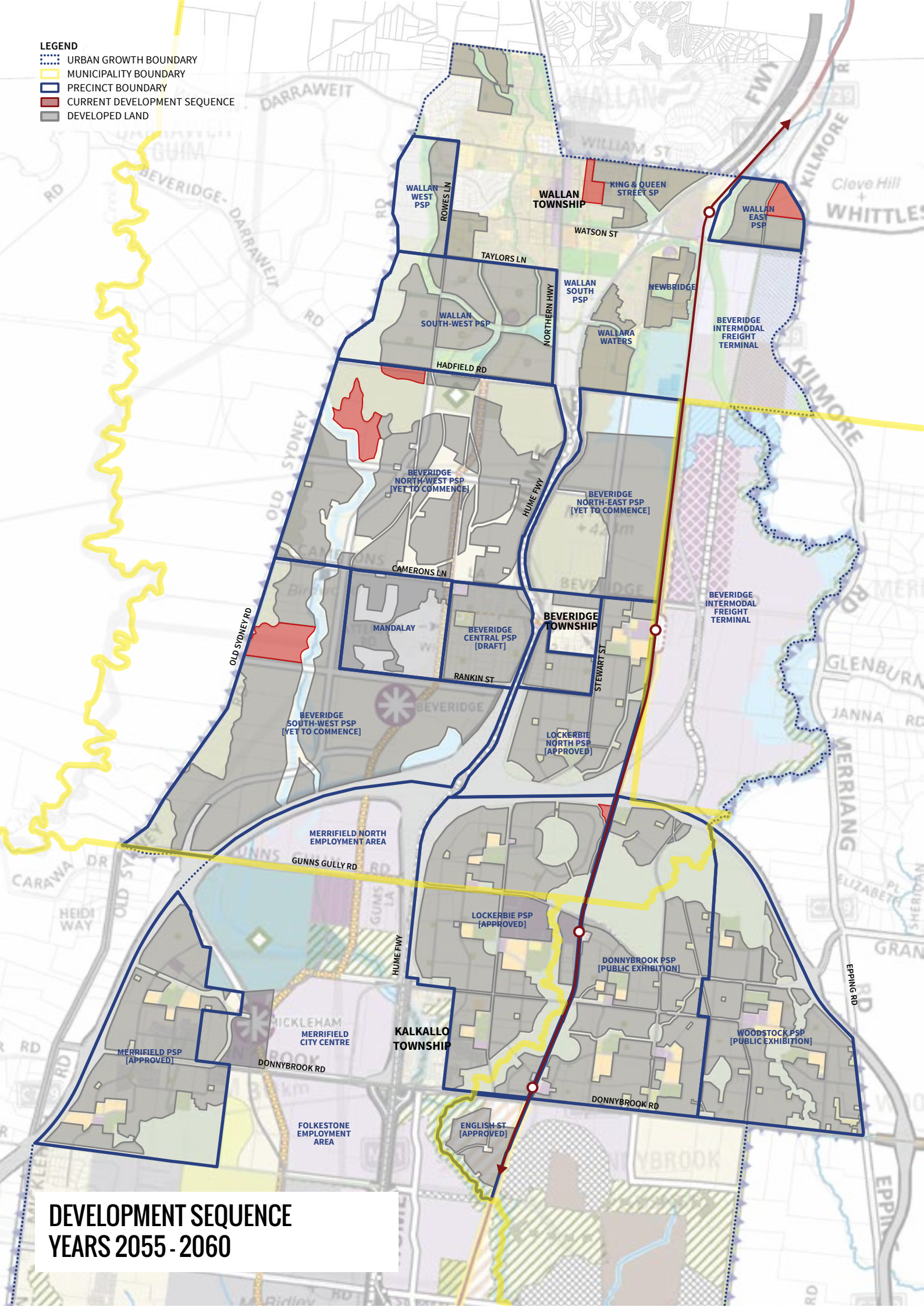
KEY FINDINGS:

- *The NGC will accommodate an 78,907 additional homes by 2055 and will experience a population increase of 244,612 people;*
- *Donnybrook/Kalkallo and Beveridge will be similar in population by 2055 with each locality accommodating greater than 100,000 people;*
- It is assumed higher order projects, the Outer Metropolitan Ring Road and the Beveridge Inter-modal Freight Terminal (BIFT) are yet to commence by 2055.

Table 11: Development Sequencing 2050 - 2055

	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)	Area (ND/Ha)
DONNYBROOK/KALKALLO			
Lockerbie PSP	676	2,096	42
Merrifield PSP	0	0	0
Donnybrook/Woodstock	592	1,837	37
English Street	0	0	0
Merrifield City Centre	0	0	0
LOCALITY TOTAL	**1,268**	**3,932**	**79**
ACCUMULATIVE TOTAL	**36,396**	**112,827**	
BEVERIDGE			
Lockerbie North PSP	360	1,115	22
Beveridge North-West	1,200	3,720	75
Beveridge Central	170	527	11
Mandalay	0	0	0
Beveridge South-West	1,350	4,185	84
Beveridge North-East	720	2,232	45
Beveridge Township	0	0	0
LOCALITY TOTAL	**3,800**	**11,779**	**237**
ACCUMULATIVE TOTAL	**33,570**	**104,066**	
WALLAN			
Wallan West PSP	0	0	0
Wallan South-West PSP	416	1,290	26
Wallan East PSP	300	930	19
Developing Wallan Areas	90	279	6
LOCALITY TOTAL	**806**	**2,499**	**50**
ACCUMULATIVE TOTAL	**8,942**	**27,719**	

NORTHERN GROWTH CORRIDOR TOTALS 2050-2055	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)	Area (ND/Ha)
	5,874	**18,210**	**367**
ACCUMULATIVE TOTAL	**78,907**	**244,612**	



DEVELOPMENT SEQUENCE YEARS 2055 - 2060

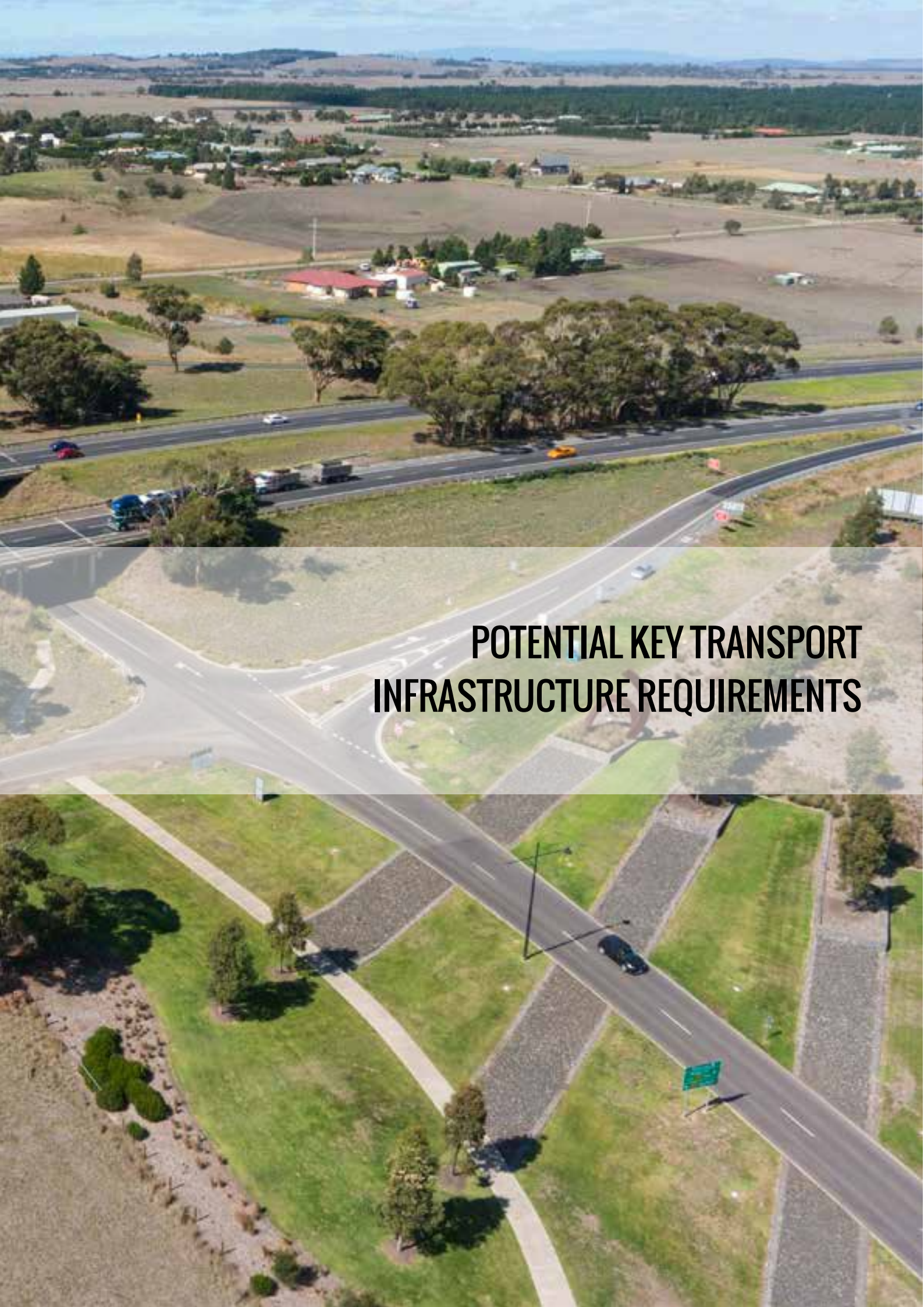
KEY ASSUMPTIONS:

- *The final areas within the NGC will be developed by the year 2060;*

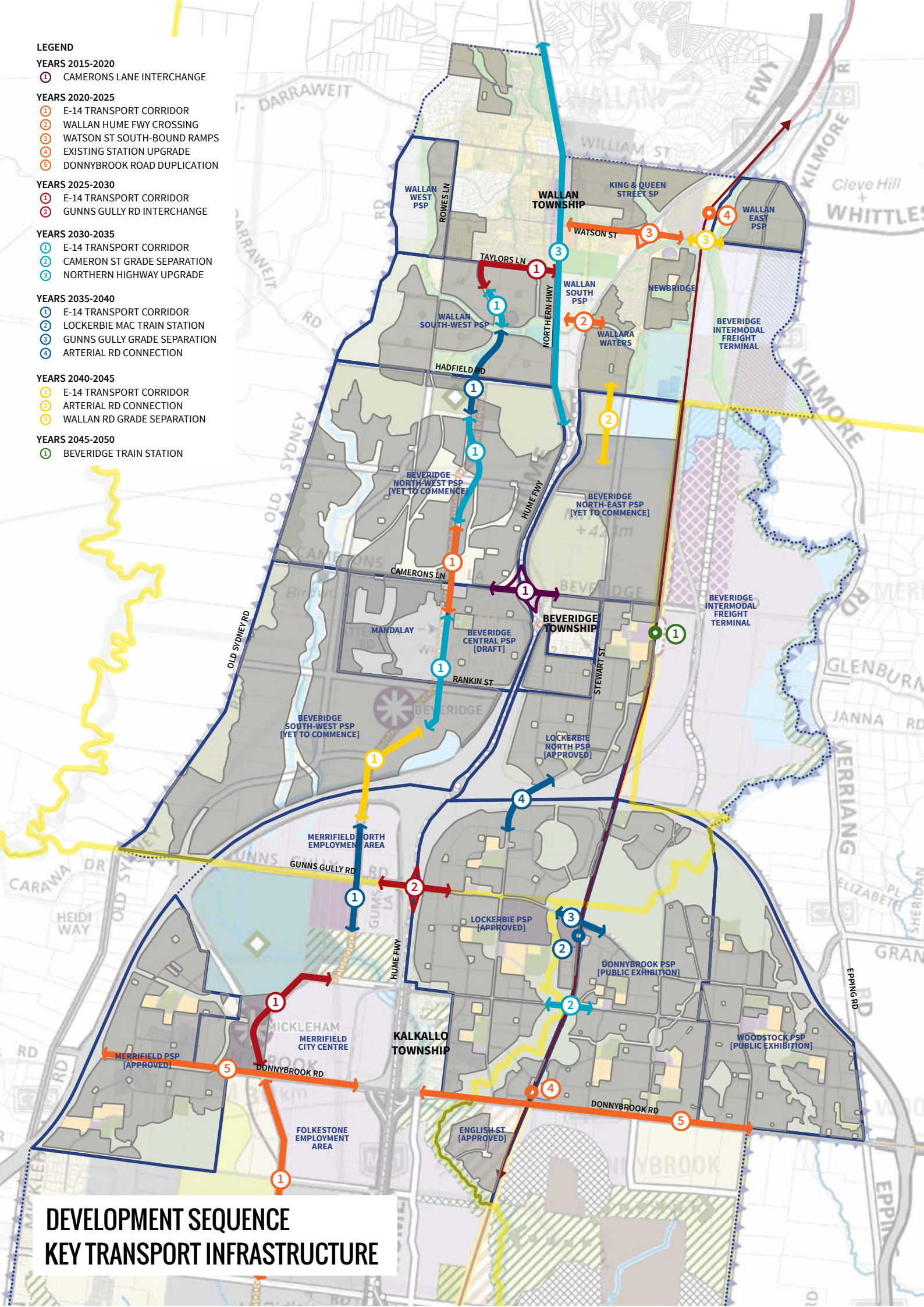
Table 12: Development Sequencing 2055 - 2060

	Projected Yield (16dw/ha)	Projected Population (3.1 PPH)	Area (ND/Ha)
DONNYBROOK/KALKALLO			
Lockerbie PSP	105	327	7
Merrifield PSP	0	0	0
Donnybrook/Woodstock	0	0	0
English Street	0	0	0
Merrifield City Centre	0	0	0
LOCALITY TOTAL	**105**	**327**	**7**
ACCUMULATIVE TOTAL	**36,501**	**113,153**	
BEVERIDGE			
Lockerbie North PSP	0	0	0
Beveridge North-West	1,254	3,889	78
Beveridge Central	0	0	0
Mandalay	0	0	0
Beveridge South-West	711	2,204	44
Beveridge North-East	52	160	3
Beveridge Township	0	0	0
LOCALITY TOTAL	**2,017**	**6,253**	**126**
ACCUMULATIVE TOTAL	**35,587**	**110,320**	
WALLAN			
Wallan West PSP	0	0	0
Wallan South-West PSP	0	0	0
Wallan East PSP	181	560	11
Developing Wallan Areas	210	651	13
LOCALITY TOTAL	**391**	**1,211**	**24**
ACCUMULATIVE TOTAL	**9,332**	**28,930**	

NORTHERN GROWTH CORRIDOR TOTALS 2055-2060	**Projected Yield (16dw/ha)**	**Projected Population (3.1 PPH)**	**Area (ND/Ha)**
	2,513	**7,792**	**157**
ACCUMULATIVE TOTAL	**81,420**	**252,403**	



POTENTIAL KEY TRANSPORT INFRASTRUCTURE REQUIREMENTS


LEGEND
YEARS 2015-2020
1 CAMERONS LANE INTERCHANGE
YEARS 2020-2025
1 E-14 TRANSPORT CORRIDOR
2 WALLAN HUME FWY CROSSING
3 WATSON ST SOUTH-BOUND RAMPS
4 EXISTING STATION UPGRADE
5 DONNYBROOK ROAD DUPLICATION
YEARS 2025-2030
1 E-14 TRANSPORT CORRIDOR
2 GUNNS GULLY RD INTERCHANGE
YEARS 2030-2035
1 E-14 TRANSPORT CORRIDOR
2 CAMERON ST GRADE SEPARATION
3 NORTHERN HIGHWAY UPGRADE
YEARS 2035-2040
1 E-14 TRANSPORT CORRIDOR
2 LOCKERBIE MAC TRAIN STATION
3 GUNNS GULLY GRADE SEPARATION
4 ARTERIAL RD CONNECTION
YEARS 2040-2045
1 E-14 TRANSPORT CORRIDOR
2 ARTERIAL RD CONNECTION
3 WALLAN RD GRADE SEPARATION
YEARS 2045-2050
1 BEVERIDGE TRAIN STATION
WALLAN WEST PSP
ROWES LN
WALLAN TOWNSHIP
KING & QUEEN STREET SP
WALLAN EAST PSP
WATSON ST
TAYLORS LN
WALLAN SOUTH PSP
NEWBRIDGE
NORTHERN HWY
WALLAN SOUTH-WEST PSP
WALLARA WATERS
BEVERIDGE INTERMODAL FREIGHT TERMINAL
HADFIELD RD
BEVERIDGE NORTH-WEST PSP [YET TO COMMENCE]
HUME FWY
BEVERIDGE NORTH-EAST PSP [YET TO COMMENCE]
CAMERONS LN
OLD SYDNEY RD
MANDALAY
BEVERIDGE CENTRAL PSP [DRAFT]
BEVERIDGE TOWNSHIP
STEWART ST
RANKIN ST
BEVERIDGE SOUTH-WEST PSP [YET TO COMMENCE]
LOCKERBIE NORTH PSP [APPROVED]
MERRIFIELD NORTH EMPLOYMENT AREA
GUNNS GULLY RD
LOCKERBIE PSP [APPROVED]
DONNYBROOK PSP [PUBLIC EXHIBITION]
HUME FWY
EPPING RD
MERRIFIELD CITY CENTRE
KALKALLO TOWNSHIP
WOODSTOCK PSP [PUBLIC EXHIBITION]
MERRIFIELD PSP [APPROVED]
DONNYBROOK RD
FOLKESTONE EMPLOYMENT AREA
ENGLISH ST [APPROVED]
DONNYBROOK RD
DEVELOPMENT SEQUENCE
KEY TRANSPORT INFRASTRUCTURE

POTENTIAL KEY TRANSPORT INFRASTRUCTURE REQUIREMENTS

As the Northern Growth Corridor develops and the population increases, significant investment in key infrastructure projects will be required to support the future communities.

Through-out the sequencing in this document, key high level infrastructure has been identified and associated with particular growth patterns and timeframes.

The Development Sequence Infrastructure plan consolidates all of the potential projects identified to demonstrate their relationship to each other and also their need over a timeframe.

All of these projects have been identified through discussions with Mitchell Shire Council.

PATCH.

DESIGN+PLAN

URBAN DESIGN | GRAPHIC DESIGN
PLANNING | PROJECT MANAGEMENT

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