Memorandum

Mott MacDonald

To Simon Deeble	From Aaron Carmichael	Our reference 359864
Office Mel	Date 05 January 2016	Your reference CP14038

Subject Project Zulu Construction Access Option Analysis

The follow memo has been developed to review the options available for access to the proposed Zulu Work site. This memo will assess the following access routes and options;

- Option 1 - Gate 22 (Existing Southern Access Point)
- Option 2 – Gate 22 (with Static WSO's at Crossings)
- Option 3 - Construction of New Northern Compound
- Option 4 – Northern Compound (unescorted from Gate to TWY Quebec)
- Option 5 - Northern Compound (with Static WSO's at Crossings)

We have assessed the use of WSO escorts on site to reflect our experience at other international airports where their use has been lessened without an impact to the level of incidents experienced.

In reviewing the above options we will provide sufficient information for Melbourne Airport to understand the impact of the proposed Northern Compound or Gate 22 utilisation, outline the impact to operations, taxiway and apron interfaces and potential safety issues each option is constrained by.

Executive Summary

It is the recommendation of this memo that, Option 4 be adopted over Option 1. Options 2 and 5 are considered to pose too much of a safety risk to the airports operation and Option 3 does not provide value for money to the project (when considered as a dedicated asset to the Zulu Project). It is advised that the works be undertaken prior to the Zulu works commencing as a standalone package.

The recommendation is based on the lessened possible impact to operations safety in travel times for construction vehicles from the gate to site. The higher level of safety offered to the airport of lessening the number of crossing locations and aircraft interactions are also considered.

The northern compound also offers the airport an ability to establish a new long term northern access point and review the ability to reduce the escorting of construction traffic outside of the operational aprons and taxiways to reduce the cost to future projects. Option 3 can be considered viable as an alternate option to Option 4 when viewed as a standalone project and asset for future works at the airport.

Key Considerations

In reviewing the two site entry locations we have used the following key criteria (which is reflective of the APAM Risk Matrix Guide heading) to assess the suitability and viability of five considered options.

- Safety
- Programme
- Operations
- Cost
- Reputation

Additional to these items we provide a short commentary on the options impact to Environment considerations. Business Interruption and Profit Impact are covered in the above items with additional notes provided as required.

Vehicle Movements

As a part of the option review we have considered two critical construction vehicle movements that are necessary to undertake the construction of the Zulu Works. These two vehicle movements being;

- Access to site from an airside security point and,
- Access from the same airside security point to the earthworks stockpile location.

The attached matrix considers these factors and their impact to the project.

Airside Access to Site

We have undertaken a review of the existing route options from Gate 22 to the Zulu works site and have recorded the following travel times through the peak morning period.

The attached sketch is provided to assist with visual representation of airside routes considered.

Time	Activity	Run Time	Notes
6.30am	Gate 22 - Zulu W	8.00mins	Along apron road under Pier D
6.45am	Zulu W - Gate 3	7.00mins	Along Twy Echo crossing Twy Papa and Quebec
6.52am	Gate 3 - Zulu E	4.00mins	Crossing Twy Papa and Quebec
6.57am	Zulu E - Gate 22	6.00mins	Twy Echo down Twy Alpha (simulated GSE area)
7.03am	Gate 22 - Zulu W	6.00mins	Twy Alpha (simulated GSE area) to Twy Echo
7.10am	Rwy 09/27 intersect Twy Papa and Quebec	9.00mins	4 queued at Quebec / Papa
7.19am	Rwy 09/27 intersect Twy Papa and Quebec	4.00mins	2 queued at Quebec / Papa
7.23am	Rwy 09/27 intersect Twy Papa and Quebec	Not recorded	3 queued at Quebec / Papa (left hold point)
7.25am	Twy Quebec Hold Point - Gate 22	10.00mins	Apron road along terminal 1, 2, 3 and SAE
7.35am	Gate 22 - Zulu W	9.00mins	Held up by two aircraft movements at Twy Julliet
7.44am	Rwy 09/27 intersect Twy Papa and Quebec	10.00mins	3 queued at Quebec / Papa
8.00am	Gate 2 - Zulu E	10.00mins	3 queued at Quebec / Papa
8.10am	Zulu W - Gate 22	6.00mins	Twy Echo down Twy Alpha (simulated GSE area)

Time	Activity	Run Time	Notes
8.16am	Gate 22 - Zulu W	8.30mins	SAE to T3, T2 Apron Road
8.25am	Rwy 09/27 intersect Twy Papa and Quebec	3.00mins	No aircraft queueing
8.26am	Zulu E - Gate 22	9.00mins	Twy Echo down Twy Alpha (simulated GSE area)
8.36am	Gate 22 - Gate 2 via Perimeter Road	20.00mins	Followed low loader around airfield
8.57am	Gate 2 - Gate 22	9.00mins	Apron road along terminal 1, 2, 3 and SAE
9.10am	Gate 22 - Zulu W	6.00mins	Twy Alpha (simulated GSE area) to Twy Echo
9.17am	Zulu W - Gate 22	6.00mins	Apron road along terminal 2, 3 and SAE

Table 1 – Airside Recorded Travel Times

The above information will be reviewed further within each option considered below.

Landside Access to Stockpile Location

During the execution of the project it is expected that approximately 27,000 heavy vehicle movements will be required to transport excavated spoil from the site to a stockpile location.

A survey was undertaken to assess the travel time from the two gate location options to the preferred stockpile location near Gate 4 (northern end of the airfield).

The attached plan (appendix A) is provided to assist with visual representation of airside and landside routes considered. Travel times were recorded during the day without consideration for possible traffic delays during peak hour.

Activity	Run Time (return)	Notes
Gate 22 – Stockpile Location (Sunbury Rd)	35.00mins	Travel off airport land onto Sunbury Road to Gate 4
Gate 22 – Stockpile Location (Operations Rd)	25.00mins (landside only)	Travel along Operations Rd (North) and around the airside fence to the West of RWY 09/27
Northern Compound to Gate 4	10.00mins	Crossing Twy Papa and Quebec

Table 2 – Landside Recorded Travel Times

Whilst other internal road routes were considered, they were discounted due to the extensive infrastructure upgrades required to facilitate the vehicle movement numbers.

The above travel times will be reviewed further within each option considered below.

Option 1 - Gate 22 (Existing Southern Access Point)

General

In 2014 Melbourne Airport formalised the existing Gate 22 to enable a greater volume of construction traffic to enter and exit from this location. The development of this gate and security screening location was undertaken to support existing construction projects (Southern Apron Extension and Taxiway Victor). Gate 22 provided an ideal location to access the Airside Terminal 3 and 4 precincts from Contractors compounds to the south of the airport.

To facilitate this option and improve safety it is recommended that improvements be made to remove aircraft / vehicle conflict points and create intermediate holding points alongside the existing GSE yard between taxiway Victor and Alpha.

See attached plan (Appendix A) for the proposed access route from Gate 22 to the Zulu Works Area.

Existing Infrastructure

Gate 22 consists of security personnel offices for the management of incoming and outgoing traffic, space for future personal and equipment security screening (as the requirement developments for greater screening of persons entering airside operations) and suitable parking space for WSO and marshalled vehicles awaiting escort.

Construction Works

The diversion for the existing Gate 22 routes (to further avoid operational aircraft and traffic) would require the construction of a new (part) airside haul road between taxiways Juliet and Golf and between Taxiway Uniform and the existing GSE Area. The rearrangement for the existing GSE area and the development of additional GSE area and access roads will enable construction traffic to bypass aircraft along the terminal 2 apron and safety travel towards the Zulu work site without interacting with aircraft on the apron.

Access to Zulu Works Area

To utilise the existing Gate 22 infrastructure and new haul road routes, construction traffic would be required to traverse crossings at TWY Whiskey, Juliet, Golf, Uniform, Tango and Foxtrot.

Travel Times from Gate 22 to Site

We have undertaken a review of the existing route options from Gate 22 to the Zulu works site and have recorded travel times (see Table 1) through the peak morning period.

Table 1 shows an average travel time from Gate 22 to the Zulu Work site of 7.00mins. However the travel time for this access can be as long as 9.00mins or greater during peak aircraft movement times.

The travel times recorded for Gate 22 were undertaken during dual runway operations. During single runway operations where RWY 16/34 is only in use, aircraft taking off and queuing to the south may cause disruption and subsequently delays to construction traffic.

Travel Times from Gate 22 to Stockpile

Table 2 shows an estimated travel time from the airside gate to (proposed) stockpile of 35.00mins. Assuming the current bulk excavation rate includes for a nominal 20mins travel and, based on a travel rate of a tipper of $90.00 hour, the extra over costs for travel from Gate 22 to stockpile is approximately $1.5M (for a 10.0m3 tipper).

Project Cost Impact for Utilising Existing Gate 22

It is recommended that should the project agree to use the existing Gate 22 as the main construction access points the following woks be undertaken to enhance the facility and enable better access and management of traffic.

Improvement	Order of Cost	Criticality to Project
Upgrades to existing landside road	$500,000.00	Medium
ICT Connection to Gate 22	$200,000.00	High
Facility Upgrades to ISS and WSO facilities	$100,000.00	Low
Airside Vehicle Marshalling Facilities (at Gate 22)	$100,000.00	Medium
Airside Vehicle Marshalling Facilities (at Gate 22)	Contractor Facility and Cost	N/A
Express vehicle lane through Airside Security gate	$200,000.00	Medium
Miscellaneous works	$100,000.00	TBC
New Access Road	$1,500,000.00	High
DSE Area expansion and re-arrangement for through traffic	$2,000,000.00	High
Miscellaneous works	$600,000.00	TBC
Total Project Cost	$5,300,000.00	

Table 3 – Gate 22 Order of Costs for Upgrades

This is within the existing Zulu Budget allowance for Northern Compound of $5.6M.

In considering the cost of WSO escorts to site from Gate 22 (and back) the current budget allowance of $26.0M would be utilised during the construction period.

This option is assessed in the attached matrix.

Option 1A – Alternate Haul Road (Operations Road to Gate 4)

At the request of Melbourne Airport, we have reviewed the ability to travel from Gate 22 along Operations Rd (North) and around the airside fence to the West of RWY 09/27 to Gate 4 where the (proposed) stockpile is located.

With a 25.00min travel time, an additional two airside security check points (Gate 8 and Gate 4) and the requirement for road infrastructure, installations and upgrades to support the expected 26,000 spoil vehicle movements for the project, the feasibility of this option was not considered viability against that proposed for the Northern Compound.

Option 2 – Gate 22 (with Static WSO's at Crossings)

This option investigates the opportunity to reduce the roaming WSO's by providing more drivers training to contractors and allowing them to traverse the haul route from Gate 22 to the Zulu works site without escort.

This option considers the balance between increased risk of unescorted vehicles airside and the mitigation of this risk through driver training vs. the potential cost savings by providing only static WSO's at major taxiway crossing points.

From the $26.0M (WSO Budget, Feasibility Phase) base case allowed for in option 1, we would see the possibility to reduce the day shift WSO numbers from 24 per shift to 16 (30% reduction) and apply the same ratio to night shifts, netting a cost saving of approximately $7.0M.

Works for infrastructure to Gate 22 and haul roads would be in line with Option 1 above.

The attached options assessment matrix considers the management and training of drivers required to facilitate unescorted movements across operational areas.

Option 3 - Construction of New Northern Compound

General

As a part of the Melbourne Airport Capital Improvement Plan access from the north of the airfield has been seen as a viable option to reduce the traffic load on the existing Gate 22 access point and provide a dedicated access point for the (amongst other projects) Zulu Program, T2 Transformation and Runway Development Program.

Construction Works

The new Northern Compound would be constructed with a similar layout to Gate 22 with contractor lay down facilities realigned airside security fence and manned security gate point.

The access to the northern compound work is provided with an additional spur off the Sunbury Rd roundabout to the north of the airfield and an 8.0m wide asphalt haul road to the new gate house. From the new security gate the existing gravel haul road will be upgraded to an 8.0m wide asphalt road generally following the existing access road alignment to the east of runway 09/27 down to the existing access road point at taxiway Quebec.

Access to Zulu Works Area

The new northern compound offer the least number of potential vehicle / aircraft interaction points to the Zulu Project site by reducing the need to use existing taxiway's and airside apron roads.

Intermediate access across taxiway Alpha, Echo, Victor and (where required) Tango can be managed with works staging.

Travel Times from Northern Compound to Site

We have undertaken a review of the existing access road from Gate 2 to the Zulu works site and have recorded travel times as shown in Table 1.

The table (Table 1) shows an average travel time from Gate 2 to the Zulu Work site of 7.00mins however, the travel times for this access can be as long as 10.00mins during peak aircraft movement times.

Travel Times from Northern Compound to Stockpile

Table 2 shows an estimated travel time from the airside gate to (proposed) stockpile of 10.00mins. Based on the same assumptions made in Option 1 that the current bulk excavation rate includes for a nominal 20mins travel and, based on a travel rate of a tipper of $90.00 hour, the savings in construction costs for travel from Northern Compound to stockpile is approximately $750,000 (for a 10.0m3 tipper).

Project Cost Impact for Constructing the Northern Compound

The northern compound project has progressed through Schematic Design and is current having its detail design finalised for a tender package to be developed from.

The current cost for the Northern Compound is $20.9M.

Currently the Zulu Program budget allows for a contribution to the Northern Compound works of approximately $5.6M. This contribution is made alongside other capital plan projects and would look to utilise the facility as a contractor staging area and airside screening and entry point.

The project team has been advised that concurrent funding for the Northern Compound is unlikely at this stage from other projects and that should the Zulu work require access from the north of the airfield the project will need to fund the balance of the construction costs (approximately $15.3M).

In considering the cost of WSO escorts to site from Northern Compound (and back) the current budget allowance of $26.0M would be utilised during the construction period.

This option is assessed in the attached matrix.

Option 4 – Northern Compound (unescorted from Gate to TWY Quebec)

As a value management option to the current Option 3, we have considered the ability for construction traffic to traverse the haul road from the security gate to a escorting marshalling yard setback from the TWY Quebec crossing point.

Due to the current haul road from the Northern Compound to TWY Quebec not crossing or interacting with live operational areas the risk of interaction with aircraft and operational vehicles is significantly reduced.

This reduction in interaction provides an opportunity to introduce a greater level of construction vehicle driver training and the elimination of WSO escorts from the airside gate to the relocated WSO marshalling point at TWY Quebec.

From the $26.0M base case allowed for in Option 1, we would see the possibility to reduce the day shift WSO numbers from 24 per shift to 12 (50% reduction) and apply the same ratio to night shifts, netting a cost saving of approximately $13.0M.

Works for infrastructure to construct the Northern Compound and haul roads would be in line with Option 3 above.

Option 5 - Northern Compound (with Static WSO's at Crossings)

This option provides an opportunity to further reduce the WSO costs for the project by providing for Static WSO's at key crossing locations. Being a mixture of Option 2 and Option 4, construction traffic would travel to the TWY Quebec crossing location and be directed on access to site by a static WSO marshal. Intermediate WSO's would be located along the route to site to ensure compliance.

This option (depending of the work site location within Zulu) could potential removal an additional 2 WSO's at an additional saving of $1.0M, netting a cost saving of approximately $14.0M.

Safety Considerations

In reviewing the above options several items of concern have been raised about the likelihood and consequent (risk) of vehicle and aircraft interactions and procedures that will need to be in place for the vehicle volumes expected to service the Zulu project.

The construction of the northern compound attends to a level of risks by removing a significant length of the access road off aprons and taxiways and into roads that run around the airfield.

In considering the above, the ability to lessen the number of WSO's with the northern compound route being away from active aircraft is a manageable risk and potential cost saving to the project.

With regards to access from the existing Gate 22 to the Zulu works site, a number of taxiway intersection points must be crossed to traverse the existing route adjacent terminal 4, 3 and 2. The option for improvements to this route provides for a path that has less intercedes with taxiways but does not wholly remove the risk associated with vehicle / aircraft interactions.

It is assumed that the airport will continue escorted construction traffic and traffic management procedures to manage the risk of airfield traffic movements throughout the projects term if access is required from Gate 22.

This may require a review of budget allocations for WSO escorts based on the travel times quoted above for occasions where single runway operations are in effect.

Environmental Impact

Two factors have been considered in understanding the environmental impact of both options. Firstly the impact of construction works to provide haul roads, and gate facilities followed by, the carbon impact of each option over the period of construction and operation.

	Gate 22			Northern Compound		
	Build	**Operation**	**WSO**	**Build**	**Operation**	**WSO**
Impact of construction works	Low Impact, minor works to upgrade existing facilities	Moderate Impact, haul road to be constructed	Moderate Impact, More WSO's to escort vehicles.	High Impact, large areas of green fill land required to provide facility.	Moderate Impact, long haul road to be constructed	Low Impact, most works are off operational areas.
Carbon footprint	Low Impact, no long term significant construction works.	High Impact, significant off site traffic movements to stockpile.	Moderate Impact, More WSO's to escort vehicles.	Moderate Impact, large facility to be built.	Low Impact, stockpile is located close to gate.	Dependant on option and travel distance of WSO's.

Table 4 – Environmental Impacts Review

Options Assessment Matrix

We have reviewed the five options against key considerations and influencing factors that will impact the viability of each option. This assessment is included in Appendix B.

The options assessed are;

- Option 1 - Gate 22 (Existing Southern Access Point)
- Option 2 – Gate 22 (with Static WSO's at Crossings)
- Option 3 - Construction of New Northern Compound
- Option 4 – Northern Compound (unescorted from Gate to TWY Quebec)
- Option 5 - Northern Compound (with Static WSO's at Crossings)

Option 1A was not assessed further as discussed above.

Assessment Rating

Project Impact Rating	Description
5	Significant Impact
4	High Impact
3	Moderate Impact
2	Low Impact
1	Negligible Impact

Table 5 – Options Matrix Rating Table

Cost Impact

Currently the Zulu Program budget allows for a contribution to the Northern Compound works of approximately $5.6M. This contribution was considered alongside other capital plan projects and would look to utilise the facility as a contractor staging area and airside screening and entry point.

With the source of additional funding not finalised at time of writing question has been raised as the value for money return of the Northern Compounds construction and the possibility of deferring construction and utilising the existing Gate 22 access point.

Should the Zulu program be required to fully fund the Northern Compound (and hold the decision as to the access point for the project) the following options cost impact is summarised as below;

Option	Capital Cost (indicative)	Zulu WSO (Budget)	Travel (to stockpile)	Total Indicative Cost (project life)
Option 1 - Gate 22 Access	$5,6000,000	$26,000,000	$1,500,000	$33,100,000
Option 2	$5,6000,000	$19,000,000	$1,500,000	$26,100,000
Option 3 - Northern Compound	$20,800,000	$26,000.000	-$750,000	$46,050,000
Option 4	$20,800,000	$13,000,000	-$750,000	$33,050,000
Option 5	$20,800,000	$12,000,000	-$750,000	$32,050,000

Table 6 – Option Cost Review

The significant difference in capital cost between the Gate 22 options and the new Northern Compound is reflective of the asset construction that the Northern Compound delivers and the establishment of a new construction access to the north of the airfield.

The gate 22 options costs reflect an asset improvement project. This scope of work would be procured with the main Zulu Project works and not as a separate package. The Northern Compound could be tendered as a standalone project if required.

Recommendation

The attached option assessment review has covered off on major considerations that each option has been assed against and the impact these assessment criteria have to APAM.

The outcomes of this assessment where

In considering the airports overall capital improvement plan and the future projects expected to coming in the coming years, the construction of the Northern Compound as a capital project provide the airport with the safest and most effective access point to northern projects.

In considering the economics of the Zulu works and the ability for the project to fund the works and a standalone project, access from the existing Gate 22 provides a feasibility option.

The improvements to the current Gate 22 access would increase the ability for vehicles to traverse the apron and taxiways between Gate 22 and the works site as well as provide a future GSE area to the west of Taxiway Alpha.

If the airport is able to fund the additional $15.3M required to build the northern compound it is recommended that the works be undertaken prior to the Zulu works commencing as a standalone package or the Zulu Program budget be updated to reflect the additional funding required.

If the above funding in not achievable then the access improvements to the existing Gate 22 route would be recommended by the project team.

Traffic Routes to Stockpile Locations

Taxiway Z Project

Site Access & Haul Route Options

Legend

- Gate
- Gate 3 to Stockpile Area 2
- Haul Route Start to Gate 3 (Northern Compound)
- Haul route start to Gate 22
- Stockpile Area 2

Gate 3 (Northern Compound)

Stockpile Area 2

New Gate (4A)

Gate 4

Taxiway Z Project Haul Route Start

Gate 8

Gate 22

N

2 km

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Haul and Site Access Route Distances

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4.13 Km - Haul route start to Gate 3 (Northern Compound)
3.29 Km - Haul route start to Gate 22
8.41 Km - Haul route start to Stockpile Area 2
9.94 Km - Haul route start via Gate 22, Gate 8 & Gate 4A to Stockpile Area 2
19.91 Km - Haul route start via Gate 22 to Stockpile Area 2

Option Assessment Matrix

Zulu Taxiway - Northern Compound Review

Project Title: CP14038 - Zulu Taxiway Program

Division: Victoria

Subject: Assessment of Options Against Impacts

Project no: 359864

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		Safety						
		exposure to aircraft movements	exposure to operational vehicles	FOD	Driver training	Out of Hour Management of Facility	Safety Total (xx/25)	Congestion
Option 1 - Gate 22 (Full WSO Escort) current operations				**Option 1 - Gate 22 (Full WSO Escort) current operations**				
Project Impact Rating		2	1	2	1	1		3
Issues and Management		visiting vehicles are escorted by fully trained staff who are familiar with the airports operations on a day to day basis. Vehicles have radios and monitor ASA transmissions.	construction traffic is moved away from the terminal to travel along the haul road between taxiways.	escorting vehicles provide an opportunity for WSO's to report material on operational pavements for action by the airport or contractor.	The ability for WSO's to manage construction traffic across operational areas leaves less reliance on the training provided to the drivers	The Gate is located away from public roads and not visible as an aircraft viewing position.	7	Crowding at the gate will occur if several capital works projects are underway at the same time. Construction traffic is located away from operational vehicles near Piers and airside roads.
Option 2 - Gate 22 (Static WSO)				**Option 2 - Gate 22 (Static WSO)**				
Project Impact Rating		4	1	3	2	1		3
Issues and Management		install WSO at taxiway crossing points with signals or similar management tool. Vehicles are unescorted on haul roads outside of wing tip clearances.	construction traffic is moved away from the terminal to travel along the haul road between taxiways.	A higher reliance is placed on the contractors drivers to report FOD on haul roads and have this actioned. The distance between static WSO's will impact the ability for FOD to be identified by them and action followed up.	increased driver training is required as drivers will be accessing live operational taxiways without escorts. The crossing locations limit possible diversions taken by drivers.	The Gate is located away from public roads and not visible as an aircraft viewing position.	11	Crowding at the gate will occur if several capital works projects are underway at the same time. Construction traffic is located away from operational vehicles near Piers and airside roads.
Option 3 - Northern Compound (Full WSO Escort)				**Option 3 - Northern Compound (Full WSO Escort)**				
Project Impact Rating		2	2	2	1	2		1
Issues and Management		visiting vehicles are escorted by full trained WSO's who are familiar with the airports operations on a day to day basis. Vehicles have radios and monitor ASA transmissions.	Although traffic uses airside apron roads, escorts are familiar with operational vehicle movements and can provide a greater level of anticipation than non-regular drivers.	escorting vehicles provide an opportunity for WSO's be report material on operational pavements for action by the airport or contractor.	The ability for WSO's to manage construction traffic across operational areas leaves less reliance on the training provided to the drivers	The gate is located off a major state road and the likelihood of access by the public is increased due to the visible proximity of the access and compound to the end of the runway.	9	Traffic is managed by WSO's so spacing of vehicles from operational vehicles is managed by operationally aware operators.
Option 4 - Northern Compound (Part WSO Escort)				**Option 4 - Northern Compound (Part WSO Escort)**				
Project Impact Rating		2	2	2	1	2		1
Issues and Management		visiting vehicles are allowed to travel down the haul road between the site compound and TWY Quebec. Once at operational areas they are escorted by full trained WSO's who are familiar with the airports operations on a day to day basis. Vehicles have radios and monitor ASA transmissions.	Although traffic uses airside apron roads, escorts are familiar with operational vehicle movements and can provide a greater level of anticipation than non-regular drivers.	escorting vehicles on operational areas provide an opportunity for WSO's to report material on operational pavements for action by the airport or contractor. The haul road is not an operational area and the impact of FOD on these roads is negligible.	The ability for WSO's to manage construction traffic across operational areas leaves less reliance on the training provided to the drivers. The haul road only offers a single avenue to travel.	The gate is located off a major state road and the likelihood of access by the public is increased due to the visible proximity of the access and compound to the end of the runway.	9	Traffic is managed by WSO's so spacing of vehicles from operational vehicles is managed by operationally aware operators.
Option 5 - Northern Compound (Static WSO)				**Option 5 - Northern Compound (Static WSO)**				
Project Impact Rating		4	3	3	3	2		3
Issues and Management		install WSO at taxiway crossing points with signals or similar management tool. Vehicles are unescorted on haul roads and apron roads.	Space between WSO's may have an impact on sightlines for marshals and increase the reliance on construction driver training.	A higher reliance is placed on the contractors drivers to report FOD on haul roads and have this actioned. The distance between static WSO's will impact the ability for FOD to be identified by them and action followed up.	increased driver training is required as drivers will be accessing live operational taxiways without escorts. The crossing locations can vary and as such the risk of interaction with aircraft and operational vehicles increases.	The gate is located off a major state road and the likelihood of access by the public is increased due to the visible proximity of the access and compound to the end of the runway.	15	The location of the airside route along airside roads creates a higher likelihood of conflict due to a reliance of construction drivers being highly aware of operational vehicle movements.

Zulu Taxiway - Northern Comp

Project Title: CP14

Subject: Asse

		Programme				Operations			
		Construction Vehicles Delays	Travel times to Spoil	Travel times to Site (from Gate)	Programme Total (xx/20)	Risk to Delay to Aircraft	Delay to Operational Vehicles	Management of Incidents	Operations Total (xx/15)
Option 1 - Gate 22 (Full WSO Escort) current operations		**Option 1 - Gate 22 (Full WSO Escort) current operations**					**Option 1 - Gate 22 (Full WSO Escort) current operations**		
Project Impact Rating		4	4	3		2	1	1	
Issues and Management		Whilst effective travel times have been recorded during a peak period survey, the likelihood of single runway operations impacting on construction traffic movements presents a high risk to this option.	Travel time to the spoil is likely to be inexcessof 35mins as a round trip. Alternate avenues to the spoil would required the construction of significant infrastructure.	The potential impact to travel times due to changes in operations will impact travel times as different stages of the project. The availability of WSO vehicles will also impact this travel time during busy periods.	14	Aircraft will have right of way in all instances. Impact occurs where a vehicle breakdowns on an operational area, however, taxiways can be bypassed if needed.	Airside traffic rules apply. Most traffic is away from Piers and Stands and outside of area of influence for operational traffic.	WSO's being with construction traffic will enable a faster response to incidents and resolution of actions.	4
Option 2 - Gate 22 (Static WSO)		**Option 2 - Gate 22 (Static WSO)**					**Option 2 - Gate 22 (Static WSO)**		
Project Impact Rating		4	4	2		2	1	3	
Issues and Management		Whilst effective travel times have been recorded during a peak period survey, the likelihood of single runway operations impacting on construction traffic movements presents a high risk to this option.	Travel time to the spoil is likely to be increase of 35mins as a round trip. Alternate avenues to the spoil would required the construction of significant infrastructure.	The potential impact to travel times due to changes in operations will impact travel times as different stages of the project. Static WSO's will reduce the likelihood of delays due to availability of escorts.	13	Aircraft will have right of way in all instances. Impact occurs where a vehicle breakdowns on an operational area, however, taxiways can be bypassed if needed.	Airside traffic rules apply. Most traffic is away from Piers and Stands and outside of area of influence for operational traffic.	reaction time by WSO's would be delayed due to proximity to travelling vehicles.	6
Option 3 - Northern Compound (Full WSO Escort)		**Option 3 - Northern Compound (Full WSO Escort)**					**Option 3 - Northern Compound (Full WSO Escort)**		
Project Impact Rating		1	1	2		3	1	1	
Issues and Management		The route travelled through operational areas requires vehicles to give way to 1 aircraft at a time and does not traverse areas where queuing is likely to occur.	The proposed spoil location is located 2.0kms from the compound and is accessed without significant traffic impacts.	The route travelled through operational areas requires vehicles to give way to 1 aircraft at a time and does not traverse areas where queuing is likely to occur.	5	Aircraft will have right of way in all instances. Impact occurs where a vehicle breakdowns on an operational area. Impact can be exacerbated if this occurs at the top of an apron crossing.	Airside traffic rules apply. WSO escort along operational route can manage traffic movements	WSO's being with construction traffic will enable a faster response to incidents and resolution of actions.	5
Option 4 - Northern Compound (Part WSO Escort)		**Option 4 - Northern Compound (Part WSO Escort)**					**Option 4 - Northern Compound (Part WSO Escort)**		
Project Impact Rating		1	1	2		3	1	1	
Issues and Management		The route travelled through operational areas requires vehicles to give way to 1 aircraft at a time and does not traverse areas where queuing is likely to occur.	The proposed spoil location is located 2.0kms from the compound and is accessed without significant traffic impacts.	The route travelled through operational areas requires vehicles to give way to 1 aircraft at a time and does not traverse areas where queuing is likely to occur.	5	Aircraft will have right of way in all instances. Impact occurs where a vehicle breakdowns on an operational area. Impact can be exacerbated if this occurs at the top of a apron crossing.	Airside traffic rules apply. WSO escort along operational route can manage traffic movements	WSO's being with construction traffic in operational areas will enable a faster response to incidents and resolution of actions. Not as critical along haul road.	5
Option 5 - Northern Compound (Static WSO)		**Option 5 - Northern Compound (Static WSO)**					**Option 5 - Northern Compound (Static WSO)**		
Project Impact Rating		1	1	2		3	2	3	
Issues and Management		The route travelled through operational areas requires vehicles to give way to 1 aircraft at a time and does not traverse areas where queuing is likely to occur.	The proposed spoil location is located 2.0kms from the compound and is accessed without significant traffic impacts.	The route travelled through operational areas requires vehicles to give way to 1 aircraft at a time and does not traverse areas where queuing is likely to occur.	7	Aircraft will have right of way in all instances. Impact occurs where a vehicle breakdowns on an operational area. Impact can be exacerbated if this occurs at the top of a apron crossing.	Airside traffic rules apply. Less ability for static WSO to manage traffic movements and diversions around operational traffic.	reaction time by WSO's would be delayed due to proximity to travelling vehicles.	8

Zulu Taxiway - Northern Comp

Project Title: CP14

Subject: Asse

		Cost						
		Cost of Infrastructure	Cost of Escort WSO	Cost of Static WSO	Ongoing OPEX for Facility	Airport Costs (other than WSO's)	Contractor Preliminary Costs (Management of Traffic)	Cost Total (xx/30)
Option 1 - Gate 22 (Full WSO Escort) current operations					**Option 1 - Gate 22 (Full WSO Escort) current operations**			
Project Impact Rating		2	5	1	2	2	2	
Issues and Management		Existing infrastructure that requires upgrade with new haul roads along route. Constructed outside of operational areas (apart from crossing locations that can be managed).	High load on WSO's to manage delays and travel back and forth from construction site along haul road and across live taxiway's.	Site boundary management only.	Expansion of existing facility that has an OPEX budget. New haul roads to be added to asset base.	Costs will be as budgeted with minimal impact on APAM costs for training and ASIC registrations.	With escorting via WSO's the contractor will have minimal work with site movements however, they will need to arrange marshalling landside and assist with scheduling of vehicles.	14
Option 2 - Gate 22 (Static WSO)					**Option 2 - Gate 22 (Static WSO)**			
Project Impact Rating		2	1	4	2	4	4	
Issues and Management		Existing infrastructure that requires upgrade with new haul roads along route. Constructed outside of operational areas (apart from crossing locations that can be managed).	Reliance on crossing management by static WSO's only. Escorts will be on an as need basis.	Crossing management at up to 6 crossing locations.	Expansion of existing facility that has an OPEX budget. New haul roads to be added to asset base.	Additional costs for the ongoing training and management of new airside drivers. Significant volume of drivers will be introduced into the system possibility requiring additional supervision by safety officers.	As with airside works, the contractor will need to resource managements for drivers and assist with training and verification checks. A heavy reliance will be placed on the contractor to assist with streamlining processes within the airport.	17
Option 3 - Northern Compound (Full WSO Escort)					**Option 3 - Northern Compound (Full WSO Escort)**			
Project Impact Rating		4	4	1	3	2	2	
Issues and Management		New facility and haul road. Significant cost impact to APAM Capex.	High load on WSO's to manage delays and travel back and forth from construction site along haul road less interface with operational traffic and aircraft.	Site boundary management only.	New facility and haul road will require ongoing OPEX after the projects completion	Costs will be as budgeted with minimal impact on APAM costs for training and ASIC registrations.	With escorting via WSO's the contractor will have minimal work with site movements however, they will need to arrange marshalling landside and assist with scheduling of vehicles.	16
Option 4 - Northern Compound (Part WSO Escort)					**Option 4 - Northern Compound (Part WSO Escort)**			
Project Impact Rating		4	2	1	3	2	3	
Issues and Management		New facility and haul road. Significant cost impact to APAM Capex.	WSO load is halved as a result of route being shorted to TWY Quebec	Site boundary management only.	New facility and haul road will require ongoing OPEX after the projects completion	Costs will be as budgeted with minimal impact on APAM costs for training and ASIC registrations.	This option sits between the two extremes of driver management with a balance between APAM and Contractor to ensure the continued management of airside traffic.	15
Option 5 - Northern Compound (Static WSO)					**Option 5 - Northern Compound (Static WSO)**			
Project Impact Rating		4	1	3	3	4	4	
Issues and Management		New facility and haul road. Significant cost impact to APAM Capex.	Reliance on crossing management by static WSO's only. Escorts will be on an as need basis.	Crossing management at up to 4 crossing locations.	New facility and haul road will require ongoing OPEX after the projects completion	Additional costs for the ongoing training and management of new airside drivers. Significant volume of drivers will be introduced into the system possibility requiring additional supervision by safety officers.	As with airside works, the contractor will need to resource managements for drivers and assist with training and verification checks. A heavy reliance will be placed on the contractor to assist with streamlining processes within the airport.	19

Zulu Taxiway - Northern Comp

Project Title: CP14

Subject: Asse

		Reputation			
		Public Disruption	Impact of Vehicles on ASA operations	Reputation Total (xx/10)	Reputation Total (xx/10)
Option 1 - Gate 22 (Full WSO Escort) current operations		**Option 1 - Gate 22 (Full WSO Escort) current operations**			
Project Impact Rating		1	2		
Issues and Management		The gate is located away from public roads and management of traffic flow to and from the site will regulate the impact on public roads. Some concern will remain regarding the transporting of spoil off site.	As vehicles are escorted by WSO's across operational areas and radio contact can be undertaken as necessary there is little impact to ASA Operations.	3	42
Option 2 - Gate 22 (Static WSO)		**Option 2 - Gate 22 (Static WSO)**			
Project Impact Rating		1	3		
Issues and Management		The gate is located away from public roads and management of traffic flow to and from the site will regulate the impact on public roads. Some concern will remain regarding the transporting of spoil off site.	A heavy reliance is placed on drivers and the contractor to manage education of drivers. No radio contact from ASA to vehicles can be achieved so WSO's must communicate with passing or marshalled vehicles.	4	51
Option 3 - Northern Compound (Full WSO Escort)		**Option 3 - Northern Compound (Full WSO Escort)**			
Project Impact Rating		2	1		
Issues and Management		The gate is located off Sunbury Road which has a high daily traffic volume. The impact of an additional 57,000 vehicle over the construction period may impact travel times along this route.	Construction vehicles are mostly off operational areas but on operational areas they are escorted.	3	38
Option 4 - Northern Compound (Part WSO Escort)		**Option 4 - Northern Compound (Part WSO Escort)**			
Project Impact Rating		2	1		
Issues and Management		The gate is located off Sunbury Road which has a high daily traffic volume. The impact of an additional 57,000 vehicle over the construction period may impact travel times along this route.	Construction vehicles are mostly off operational areas but on operational areas they are escorted.	3	37
Option 5 - Northern Compound (Static WSO)		**Option 5 - Northern Compound (Static WSO)**			
Project Impact Rating		2	3		
Issues and Management		The gate is located off Sunbury Road which has a high daily traffic volume. The impact of an additional 57,000 vehicle over the construction period may impact travel times along this route.	A heavy reliance is placed on drivers and the contractor to manage education of drivers. No radio contact from ASA to vehicles can be achieved so WSO's must communicate with passing or marshalled vehicles.	5	54