

## MINUTES

### Great Western Highway Upgrade: Blackheath Co-Design Committee

<b>Date</b>	1 July 2020	
<b>Time</b>	6.00pm – 9.30pm	
<b>Venue</b>	Hydro Majestic, Medlow Bath and Webex Webinar	
<b>Chairperson</b>	Kirstin Fischer – TfNSW (Acting Chair)	
<b>Committee members</b>	Kirstin Fischer Kate Walsh Iain MacLeod Fire & Rescue NSW – Katoomba Glenn Sherlock (online) Gary Parsons (online) Peter Chudek Ally Drinkwater Ross Ingram Damien Mah Gary Moore Eva Johnstone (online) Juliet Bourke Sally Hollis Adele Colman George Vergotis Gary McCue Mick Beltran (online) Greg Nankervis	TfNSW TfNSW TfNSW NSW Fire & Rescue Blue Mountains City Council Blue Mountains City Council Blue Mountains City Council Blackheath Public School P&C Blue Mountains Historical Society Blue Mountains Cycling Safety Forum Blackheath Area Neighbourhood Centre Blackheath Area Community Alliance Save Centennial Glen Save Station Street Blackheath Streetscape Group Blackheath Chamber of Commerce Blackheath Highway Action Group Community Representative Community Representative
<b>Additional attendees</b>	Paul Peters Tricia Wunsch (Facilitator) Veronica Kooyman Caroline Boyd Adam Hillard (Design) Jonathan Blizzard (Environment - online) Nigel Casey (Tunnels) Andrew Mattes (Ventilation)	TfNSW KJA KJA TfNSW TfNSW TfNSW TfNSW TfNSW
<b>Apologies:</b>	Alistair Lunn NSW Ambulance – Katoomba NSW Police – Springwood	TfNSW NSW Ambulance NSW Police

1.	<b>Meeting agenda – Tricia Wunsch (Facilitator)</b>
1.1	<ul style="list-style-type: none"> <li>• Acknowledgement of Country</li> <li>• Thanks the committee for joining us in person and especially those online</li> <li>• Notes Alistair Lunn in unable to join the meeting as there was an unavoidable clash of events and sends his apologies. Introduces Kirstin Fischer as delegated Chair.</li> <li>• Outlines agenda and logistics – following requests to change the order of the agenda a vote will be taken on the order of presentations.</li> <li>• Current agenda: <ul style="list-style-type: none"> <li>○ <b>Meeting agenda</b> – Tricia Wunsch (5 minutes)</li> <li>○ <b>Welcome</b> – Kirstin Fischer (10 minutes)</li> <li>○ <b>Overview of the option to widen the existing Great Western Highway route</b> – Presentation (10 minutes)</li> <li>○ <b>Plenary Q&amp;A and discussion about the widening option</b> (20 minutes)</li> <li>○ <b>Break</b> (15 minutes)</li> <li>○ <b>Overview of tunnel options</b> presentation (20 minutes)</li> <li>○ <b>Plenary Q&amp;A and discussion about the tunnel options</b> (60 minutes)</li> <li>○ <b>Other route options</b> (15 minutes)</li> <li>○ <b>Assessment criteria and weightings</b> plenary discussion (30 minutes) as long as time allows. If not this will be dealt with at Meeting 4.</li> </ul> </li> <li>• The challenges of running the meeting both in person and online to satisfy Covid requirements were noted. A roving mic will be used so those asking questions in the room can be heard by those online. This mic will be cleaned in between each use.</li> <li>• Introduces the subject matter experts, both in the room and online. In the room is Nigel Casey (tunnel expert) and Andrew Mattes (senior expert in air quality). Online is environment expert Jonathan Blizzard.</li> <li>• As this is the first face-to-face meeting TfNSW staff and BCC members each introduce themselves.</li> <li>• Option presentations tonight include widening of the existing Great Western Highway and tunnel options (3). Vote taken on which presentation first with those in the room and online. <b>Widening first – 8, Tunnels first – 6.</b></li> </ul>
2.	<b>Welcome – Kirstin Fischer (Acting Chair)</b>
2.1	<ul style="list-style-type: none"> <li>• Notes Alistair Lunn’s apologies for the meeting, attending the opening of the newly sealed highway upgrade for the Silver City Highway near Broken Hill and Tibooburra – a recently delivered project by TfNSW.</li> <li>• Reminds members of the BCC of the confidentiality requirement for this process and the code of conduct signed.</li> <li>• Thanks those that attended the site visits held on 19 and 20 June. Noted this was a useful process to better understand the impacts on the local area. Minutes were requested on the day of the tours and took some time to pull together, they have been distributed this afternoon before the meeting.</li> <li>• While there are some preferences emerging, there has been discussion among some members of the BCC to formally request that two options are taken ‘off the table’. Noted that at this point we are not in a position to do this and it is important that a robust process is followed to demonstrate that there is a defensible evidence base to present and progress this through to the next stage. Kirstin urges the committee to continue to contribute with their knowledge and information, providing TfNSW with qualitative and quantitative feedback and assessment.</li> <li>• <b>BCC member 1:</b> Good. Please note formally that we sought to take the Centennial Glen and Station Street options off the table. Noted and acknowledged.</li> <li>• <b>BCC member 2:</b> noted their disappointment that Alistair couldn’t join for this important meeting. While they have faith in the acting chair, raised concern that Alistair is in charge of the overall project and is not present for what is discussed and asked what assurances can be given that Alistair will be able to respond to our concerns and questions fully.</li> </ul>

	<ul style="list-style-type: none"> <li>• <b>BCC member 3:</b> We only received the minutes of those site visits this afternoon and have not had time to review them; the group I represent will have questions once I have taken the minutes to them and I may not be able to progress any decisions about the preferred options until I have shown them the minutes.</li> </ul>
<b>3.</b>	<b>Overview of option to widen the existing Great Western Highway route</b>
3.1	<p>Presentation from Paul Peters / Adam Hillard which outline the option for widening the existing GWH. Presenters noted this was a preliminary design. They noted further work was needed to resolve the challenge of the squeeze point at the intersection at Govetts Leap Road, especially with the rail, traffic lights and commercial building.</p> <p>One BCC member online noted difficulty hearing the presentation. An offer to repeat the presentation again was offered and accepted.</p>
<b>4.</b>	<b>Q&amp;A session – Tricia Wunsch (facilitator)</b>
4.1	<p><b>Is there only one set of traffic lights in this option?</b></p> <p>TfNSW response: At the moment we have one set of traffic lights shown with different intersection treatments for side roads. Traffic modelling will inform how the intersections and access issues will be resolved. We also have a signalised crossing at the school.</p>
4.2	<p><b>Why does every option we are given to consider ignore the possibility of altering the railway? Disagrees that moving railways is difficult. Railway engineering is fundamentally straightforward – either a lateral or vertical re-alignment. Is bureaucracy and agencies not speaking to each other an issue?</b></p> <p>TfNSW: The options do regard the railway line as a constraint. Railways are sensitive to gradient and they aren't easy to move. The only example between Penrith and Lithgow where the rail line was moved was at Lawson. It is not about being overly bureaucratic, but rail accidents have significant consequences. There are also considerable requirements for rail authorities to ensure there aren't any impacts on their operations. Based on the feedback received from the BCC we do have an option to present at the next meeting that does include the movement of the rail line.</p>
4.3	<p><b>You talk about the approach on the western side of the railway line having less room for storage. Does that mean you are moving the railway line closer to the western side to accommodate the queues?</b></p> <p>TfNSW response: Katoomba bound and Lithgow bound traffic have a stop line on both the northern end of the intersection, and pedestrian crossings. The stop line for the level crossing is on the western side. We haven't yet worked out the intersection for the Bundara approach. In this option the road is pushed very close to the rail that it becomes a safety and traffic issue. The feasibility of this intersection at Govetts Leap Road and the level crossing is a real challenge, we are still working through options to resolve this.</p>
4.4	<p><b>Why wouldn't you consider a tunnel from Prince George Street? Is most of the widening done on the western side? What is the impact on the western side properties?</b></p> <p>TfNSW response: This option considers widening the highway west into the park, with the potential for some property acquisitions adjacent to the highway. These are very preliminary first pass designs to see what the footprint could look like. As we head towards Lithgow, we are widening to the western side towards the railway and using the railway as a constraint. At Sturt Street we would widen on the east side and utilise the road reserve without impacting private properties.</p>
4.5	<p><b>This option doesn't consider a tunnel or underpass at the Govetts Leap intersection. Why isn't there a way to get to the other side of Blackheath by going under the road? Is TfNSW committed to this as a genuine option?</b></p>

	TfNSW response: This is a preliminary design and we acknowledge there are significant issues at the Govetts Leap intersection. We have considered ideas that include underpasses and possible closures of the level crossing. Upgrading the existing route is an obvious option for consideration as it is what has been done generally through most parts of the mountains. However, as this doesn't offer any bypass option it will still result in heavy traffic volumes through the centre of the town.
4.6	<p><b>Questions were received about this option involving the removal of the existing parking on the Great Western Highway, both in the centre of town and at the cemetery.</b></p> <p>TfNSW response: This option does involve the removal of the existing parking on the Great Western Highway in the town centre. At this stage it is too early to know about the highway parking at the cemetery, but if this option progressed to the next stage of design we would look at options to retain parking in front of the cemetery or replace it somewhere else.</p>
4.7	<p><b>What noise abatement infrastructure would be used, especially for properties not resumed, and would it result in property loss due to lack of space.</b></p> <p>TfNSW response: Noise treatments are designed at a later stage of the process, if this option reaches that stage. Options could include measures such as noise walls or architectural treatments. Where feasible, we would also replace some of the batter slopes shown with retaining walls to avoid impacting property as much as possible. The property boundaries we are currently working with are not very accurate. Surveyors would carry out further work to improve the accuracy.</p>
4.8	<p><b>What are the medians for this option?</b></p> <p>TfNSW response: There would be a 1.5m median at the traffic lights for the pedestrian crossing and gutter, and a lower speed through town.</p>
4.9	<p><b>Discussion about what seagull intersections are, including involvement in recent accident in Wentworth Falls.</b></p> <p>TfNSW response: A seagull intersection, which is used in this option, is a common type of design that is delineated by an island and allows all manoeuvres. Right turning vehicles can pause in the intersection and pass through when clear. It also allows for a left turn in and out of the intersection or side streets. Vehicles can turn right from a side road without traffic lights. At this stage we don't have sufficient information about the recent accident at Wentworth Falls.</p>
4.10	<p><b>What is the speed limit for this option?</b></p> <p>TfNSW response: 60 km per hour.</p>
4.11	<p><b>Comments received on the social impacts of this option included:</b></p> <ul style="list-style-type: none"> <li>○ Massive impact on the ability of people being able to move from east to west</li> <li>○ Loss of trees</li> <li>○ Loss of some land at Neate Park</li> <li>○ People unlikely to use the footpath beside a major highway without a physical separation and trees and vegetation</li> <li>○ Social and business impact from reduced movement and accessibility between the east and west of Blackheath</li> <li>○ Impact on cemetery services and potential parking at the cemetery</li> <li>○ Significant volumes of traffic moving at 60km through the shopping centre with only a small shoulder</li> <li>○ This option doesn't necessarily speed up the trip across the mountains.</li> </ul> <p>TfNSW response: All options are presented for the committee's feedback and these impacts are noted. More innovative ways of dealing with the rail crossing and intersection are needed.</p>
4.12	<p><b>Is there enough space for a decent shoulder for vulnerable road users such as cyclists or cars that have broken down?</b></p>

	TfNSW response: This option include a 1.5 metre shoulder plus gutter, which is standard for a 60km zone.
4.13	<p><b>There were further discussions around access to and from the west side of Blackheath, difficult to assess without this information, noted the pressure on the side roads when the highway is busy.</b></p> <p>TfNSW response: the geometry for this option is difficult and there are several issues to resolve which will be considered further for presentation at a future meeting</p>
4.14	<p><b>Comments were received about safety needing to be a priority. Emergency services noted a need for two lanes in either direction so when there are accidents a contraflow can be established.</b></p> <p>TfNSW: noted.</p>
4.15	<p><b>Aside from cost, what does this option have going for it?</b></p> <p>TfNSW: All options have pros and cons. Upgrading the existing highway affects people who already live on a busy road and are subject to the issues that come with that. All other options for consideration are new options that affect a different set of people. At this stage TfNSW does not know if this is the cheaper option, it may initially appear so but costing has not yet been done. This option is likely to be easier to build.</p>
4.16	<p><b>What is the benefit for any road users, including trucks, for the 60km speed limit through town?</b></p> <p>TfNSW: The benefit isn't in the 60km per hour speed, it is about fixing the intersections and making it a more reliable route. We note this option has issues and the committee has helped identify those and additional ones.</p>
<b>5</b>	<p><b>Overview of long tunnel option</b> Presentation from Iain MacLeod and Adam Hillard</p>
5.1	<p>The 4.5km long tunnel option was presented to the committee. It would cross under the rail twice and has a 90km design speed. There are four portal locations that could be mixed and matched. The Katoomba end portal entrance around Evans Lookout Road, while the Lithgow end is near the heavy vehicle weigh station, which does have some heritage elements in the area to be considered and access to the weigh station stills needs to be resolved.</p> <p>It was noted that this was a preliminary design and a first pass alignment only. Further refinement is needed during the next phase of design, should this option progress.</p>
<b>6.</b>	<p><b>Q&amp;A session – Tricia Wunsch (facilitator)</b></p>
6.1	<p><b>What are the surface levels impacts from tunnelling?</b></p> <p>TfNSW response: The Department of Planning will stipulate the allowable ground movement in their conditions of approval and the contractor is obliged to meet those conditions. To allow an assessment of whether the contractor is meeting these conditions, prior to starting any excavation a dilapidation study will be undertaken for the alignment and zone of influence either side of the alignment.</p> <p>Grades and classifications of ground movement would be established and the conditions of approval would say, for example, the maximum ground movement is 10mm. The contractor is required to demonstrate that their methodology will not create movement of more than the stipulated amount. The contractor typically has a direct relationship with property owners (not through TfNSW) and the relationship will be based on the maximum permissible ground movement and the dilapidation survey. If there is a disagreement on ground movement between the contractor and the property owner, they can be referred to the Independent Property Impact Assessment Panel (IPIAP). This panel has some powerful tools at their disposal which includes satellite data which has an accuracy of 2-3mm to track any ground movement. This data has been used on Westconnex.</p>

6.2	<p><b>What are the best practice ventilation for tunnels, especially the 4.5 km tunnel option? Where would they be located and what are the quality requirements? What would be the potential impacts on our community?</b></p> <p>TfNSW response: As part of the planning process tunnel ventilation experts assess and estimate the emissions anticipated for the tunnel, using a calibrated estimation model that has been compared against existing tunnels. TfNSW believe this methodology achieves best practice in Australia and globally. The Environmental Impact Statement will propose how to ventilate the tunnel and TfNSW delivery requirements will define what the contractor construct, including system resilience and redundancy.</p> <p><b>Can you please explain what is meant by redundancy and resilience?</b></p> <p>Typically in a tunnel we would require a certain number of fans to undertake a certain task. Take the example of 10 fans as a starting point. We would include additional fans, perhaps two, which are designed as redundant fans to ensure there is sufficient capacity to continue the air flow task should there be any other requirements or if maintenance is undertaken on working fans. We also build in resilience in terms of air quality sensors, power supply and air ventilation sensors.</p> <p><u>In-tunnel air quality:</u> These tunnel options are twin tube tunnels with traffic flowing in only one direction. Because cars are so clean now, as long as traffic is free flowing at 40km or above the traffic flow draws in enough air with them and generates enough air flow that fans aren't really required. We only use these to augment the air flow when there is congestion, an accident or another reason traffic is not flowing.</p> <p>Australia is one of the only countries in the world with an in-tunnel nitrogen dioxide standard and is world's best practice. This was considered necessary as tunnel ventilation systems used to be sized on carbon-monoxide levels. However, emissions have reduced so much that this standard is easily achieved, and nitrogen dioxide increased in relative importance. When the uptake of electric vehicles occurs, this will reduce emissions even further – including nitrogen dioxide. The in-tunnel standard is health based and was developed through a whole-of-government process.</p> <p><u>Outside air quality and ventilation:</u> Air needs to leave the tunnels somewhere. In most tunnels around the world air flows through with the traffic and leaves the tunnel at the portal with the traffic. In Sydney, Melbourne and Brisbane over the last 20 years, long tunnels have been ventilated using ventilation outlets, with little or no emissions from the portals. This resulted in little or no increase in pollution levels in the surrounding community where people live, learn work and play. The long tunnel option may not require any ventilation outlets if the portals are located away from built up areas. The shorter tunnel options would probably need ventilation outlets as the portals are located in built up areas. These outlets take any pollution and disperse it high enough so it becomes untraceable. Alternatively, the portals could be located where there is no one to breathe it – so ventilation outlets would not deliver a benefit. A study and assessment would need to be undertaken and we would consult with NSW Health as they will need to accept the option and design.</p> <p>It should be noted that filtration is only used in a small number of tunnels around the world. The filters do not take out all of the pollutants and we would still need outlets anyway to mitigate some of the other pollutants that the filters don't address.</p>
6.3	<p><b>Considering this is a major freight route, how does ventilation apply with trucks that have heavy diesel engines?</b></p> <p>TfNSW response: Big heavy diesel engines do produce more pollution than regular cars and emissions standards across the fleet are lagging in comparison to Europe and the US by about 10 years. A new truck today is much cleaner than a truck from 20 years ago, and there are significant improvements to come. A similar example for in-tunnel air quality and truck</p>

	<p>movements would be NorthConnex, and with the traffic forecast to go through the tunnel we have designed it to meet those requirements. TfNSW will design for worst case scenario.</p>
6.4	<p><b>If there was an accident how will the ventilation deal with that?</b></p> <p>TfNSW response: There are two types of fans in the tunnel, jet fans and large axial fans (contained at the base of the ventilation outlets). Some of these axial fans can be in the range of 3m diameters. Jet fans are the primary fans for incident response, they provide the thrust to the air in the tunnel to help clear the air and any smoke in the tunnel in the event of a fire. For congestion, we will design a ventilation system for a plausible worst case scenario. The assessment of this plausible worst case scenario would be set out in the Environmental Impact Statement. If the tunnel proceeded there would be in-tunnel real time recording and monitoring to make sure we achieve the criteria under all operating conditions including congestion. The only exception might be during critical accidents.</p>
6.5	<p><b>Will the tunnels be built to standard to allow dangerous goods through tunnels? European examples demonstrate it is possible to build them, but you can't retrofit tunnels to accept dangerous goods. What do you do to make it accept dangerous goods?</b></p> <p>TfNSW response: In Europe there are tens of thousands of tunnels that range from very modern to up to 200 years old and have various construction methods. One example in Sweden is a 16km tunnel that has been designed to carry dangerous goods. Many other tunnels will not accept dangerous goods.</p> <p>All tunnels in Sydney do not allow the transit of dangerous goods, though there are some tunnels in non-metropolitan areas that do allow dangerous goods. One local example would be the underpass at Leura. The current policy position for TfNSW is that new tunnels will be designed to accommodate the transit of Dangerous Goods, however decisions on particular tunnels will be made using a risk based assessment that considers the different categories of DGs and the optimal movement of these goods through the community. We therefore do not yet have a policy that designates what the range of dangerous goods being carried along the Great Western Highway should/would be allowed through a tunnel if one is constructed.</p> <p>For Blackheath, we are at an early stage in considering a tunnel option but there are a number of measures that can be undertaken, and these are put into most tunnels. When compared internationally, Australian tunnels are built to a very good standard. We commissioned research across Australia that captured data from 8 billion vehicle kilometres travelled through tunnels and it identified in all that there were only 78 fire incidents in tunnels. The tunnels and in-built systems function very well and our base level of safety is very high. There were three fatalities from a single accident in 2007 which came from the crash rather than the subsequent fire. Beyond the base level of safety installed in all recently constructed tunnels, there may be additional elements needed to accommodate dangerous goods vehicles such as a change in the drainage systems so that any hydrocarbons that may leak from the will be captured closer to the incident to minimise its spread.</p>
6.6	<p><b>If this option were to proceed to further investigations, what kind of criteria might arise that would mean a tunnel would not be a feasible option for Blackheath?</b></p> <p>TfNSW: A tunnel is a feasible option for Blackheath and it is unlikely there are criteria that could be imposed to say that a tunnel could not be built. A key constraint would be about groundwater and the impact of de-watering through tunnelling and tunnel operations. However, you can design and deliver tunnels not to take in water. It is more costly and the need for it will depend on what further assessments find. That might be the most onerous issue but technically it can be done. Another consideration would be if heritage items that were found, then that might also divert the route.</p>
6.7	<p><b>There is a lot of groundwater, aquifers, hanging swamps and water movement from east to west. These are important features and a characteristic of the area. Would there</b></p>

	<p><b>be blocking of aquifers and disruption or damage to the environment? The water here flows into Warragamba Dam, will this compromise tunnel construction?</b></p> <p>TfNSW response: There is a specific process of assessing groundwater and any impact on it. There are different types of construction for tunnels. Typically during the Environmental Impact Statement (EIS) phase a hydrogeological model is developed and a number of tests are undertaken to calibrate that model to the location and identify where the groundwater is and the permeability of the rock. The Department of Planning will assess the EIS and using independent experts, they will then stipulate what the requirements are for managing the groundwater.</p> <p>In Sydney nearly all road tunnels use road headers for construction. Where there are areas that water ingress to the tunnel is identified at the excavation phase there is a range of mitigation activities undertaken. The criteria in Sydney is 1 litre per second ingress per kilometre of the tunnel. The tunnel being discussed here is 4 kilometres, which would equate to 2 litres per second.</p> <p>In Sydney, a lot of waterways have been adapted by culverts or channels. In Blackheath you have a pristine environment that is different to many areas of Sydney and we would expect this will be an important part of the EIS stage. One example from the Northern Beaches resulted in very stringent requirements around the treatment of groundwater. We are required to develop an option that has minimal harm or aquifer interference and this will be part of the assessment. The project does sit with a water catchment area and this triggers some legal requirements we are required to satisfy that demonstrate that there is no detrimental effect on the water supply and it either remains the same or is improved.</p>
6.8	<p><b>Tunnel construction produces a lot of spoil. How will this be moved and where will it go?</b></p> <p>TfNSW response: We would look for a suitable re-use location, preferably nearby, for the contractor to take it to. An ideal use would be a disused quarry that needs filling up. It would most likely come out of either end of the tunnel at the tunnel portals.</p>
6.9	<p><b>What will be the impact on the community of truck movements during the construction phase for any option, especially on secondary roads given the main route (GWH) will still be one way? Gave example of Westconnex and dislocation for inner west communities.</b></p> <p>TfNSW response: This is something that needs to be managed safely for any road project. For a project on the edge of a highway it will involve access ramps and temporary road construction for traffic management and site access. TfNSW will also consult extensively with the council and will restore the roads affected to their pre-construction state, or better. There will also be environmental constraints and requirements that will inform the routes and storage areas during the planning phase to make sure the environment is protected.</p>
6.10	<p><b>What are the other impacts the town would face?</b></p> <p>TfNSW response: We have already covered ground movement, spoil removal and groundwater. Other things to consider are:</p> <ul style="list-style-type: none"> <li>• <u>The method of excavation</u> – the road header method was preferred in Sydney due to the geometry and need to excavate off to the side. Typical rule of thumb for this for this would be a construction period of 2 years and excavation would be from both ends of the tunnel and possibly a middle access point. The overall construction including site preparation and tunnel fit-out may result in a construction period of approximately 4 years. The long tunnel option here has no merge or divergence, so a Tunnel Boring Machine (TBM) could be used instead.</li> </ul>



	<ul style="list-style-type: none"> <li>• <u>Noise and vibration during construction</u> – this is often a contentious and emotive issue. Data was recorded at the surface level during the road construction of Westconnex and the noise was about 30 decibels which is barely perceptible.</li> <li>• <u>The additional space needed during construction:</u> a big infrastructure project such as this requires a big workforce and there will be a need for locations for the workforce and various items of equipment associated with the construction. A Tunnel Boring Machine is a large machine.</li> <li>• <u>Portal formation:</u> typically we are excavating down into the dive structure that we can launch the excavation method. It is probably the noisiest of activities.</li> </ul>
6.11	<p><b>What is the depth of the long tunnel? Will it affect residents with bores that supply water for their gardens?</b></p> <p>TfNSW response: The depth of the tunnel would be 30-60m below the road surface. It would be 60m below the road surface at Hill 33. All existing bore holes would be assessed as part of the hydrogeological study.</p>
6.12	<p><b>How do the impacts on the town of these tunnel options, such as spoil removal compare to the impact of the construction of the Station Street option?</b></p> <p>TfNSW response: The length of time for construction of both options would be similar, up to 4 years in total (including tunnel fit out etc). Spoil needs to be removed from the tunnel and materials would also need to be removed from the Inner Western option. Any construction alongside a railway line needs to ensure there is no impact. Monitors would be attached to the railway line and if anything triggers them it would set off a series of alarms and notify the relevant Transport personnel.</p>
6.13	<p><b>How would a Tunnel Boring Machine start in the centre of the tunnel? Is that the middle of town?</b></p> <p>TfNSW response: A Tunnel Boring Machine is a quicker excavation method but it will produce 30% more spoil than a Road Header. For comparison, the Westconnex M4 East project created about 30-40% more spoil than would be created by the long tunnel option. The excavation method used for Westconnex M4 East included an intermediate access point (at Cintra Park). This allowed additional roadheaders to assist the excavation which sped up the construction process to minimise the extent of the tunnelling and disturbance. For Blackheath, that hasn't been assessed at this stage. A roadheader construction method at Blackheath could be used without intermediate access from closer to the centre of town though this would result in a much longer construction time.</p>
6.14	<p><b>There were several requests for costs for the tunnel, both overall and per kilometre and how these compare. Concerns raised there was not enough money to pay for the long tunnel option. There were also requests for costs for all options, including a request for per kilometre costs for other road tunnels already constructed in NSW.</b></p> <p>TfNSW response: The NSW Government has committed \$2.5 billion to the planning and some delivery of the Great Western Highway Upgrade. It will not cover the entirety of the program, which is long and the process will take time to complete. It is too early in the planning stage to provide costs for any option TfNSW will not be providing per kilometre costs for other road tunnels. The purpose of this process is to focus on what is best for the community. Costs are the responsibility of TfNSW and the Government to manage and will not be part of the deliberations of the BCC. It is early stages and we do not have cost estimates for the tunnel options.</p> <p>A BCC member also noted that safety for people travelling in and through the town was the priority and if it cost additional money that was an issue for the government to handle.</p>
6.15	<p><b>Who is the Minister responsible for this project?</b></p> <p>TfNSW response: Paul Toole, Minister for Regional Transport and Roads.</p>

6.16	At this point it was agreed with the committee to present the next two tunnel options together and take questions for both, with the discussion about assessment criteria, weightings and process to agree on outcomes would be held at the next meeting due to time constraints.
<b>7.</b>	<b>Overview of short and mid-length tunnel option</b> Presentation from Iain MacLeod and Adam Hillard
7.1	This presentation covered the short tunnel option as well as an additional mid-length tunnel option that emerged from discussions and suggestions made during the site tours held with the committee on 19 and 20 June.  It was noted that these are early preliminary designs and are a first pass alignment only. Further refinement is needed during the next phase of design, should either of these options progress. The short tunnel version has a length of 2.8km, involves residential and commercial property impacts, crosses once under the rail line and has access issues to be resolved. It was developed to consider the shortest possible tunnel and is only developed as far as the strategic alignment and footprint. The mid-length tunnel, suggested by members of the Co-Design Committee has a length of 3.4 kms, travels along under the existing highway and doesn't cross under the rail line.
<b>8.</b>	<b>Q&amp;A session – Tricia Wunsch (facilitator)</b>
8.1	<b>During the site tours held, there was concern the bend on the mid-length tunnel might be too tight. Is that still the case?</b>  TfNSW response: No, we have achieved a 90 km design speed on the curve.
8.2	<b>Can it be extended beyond any residences to the long tunnel portal? How much length does that add?</b>  TfNSW response: Yes, portals can be mixed and matched between any of the options. This suggestion would add approximately 600-800 metres.
8.3	<b>On the tour we discussed adding a bridge to this option on the east side ridge to meet up with the heavy vehicle weigh station. Can this be done?</b>  TfNSW response: This idea was considered and could be done, however it could have a noise and visual impact on the community. We therefore looked for and found an alignment that used just a tunnel rather than adding a bridge. This could also be more efficient to construct and would minimise any chance that the community is impacted by traffic noise that a bridge could bring.
8.4	<b>Is the vehicle checking station hard to move?</b>  TfNSW response: The difficulty is finding another suitable location for it with sufficient space. Ideally the location is somewhere between where it currently is and the Darling Causeway as it picks up trucks coming from there and Victoria Pass. We may also need to consider having one on either side of the road so trucks aren't required to cross a four-lane highway to access it.
8.5	<b>If the tunnel and bridge option was considered we should note the Rhododendron Garden is nearby. This is an important tourist attraction in the town run by volunteers. There are also bike trails in the area that are used by locals and tourists.</b>  TfNSW response: Yes, we noted there are a range of impacts there which is why we sought to keep it below ground.
8.6	<b>Q: Where would the ventilation stacks be? What size would they be?</b>  TfNSW response: This is at the very preliminary so everything can change. The most energy efficient location for ventilation is near the tunnel entrance and exit portals. But you can put them anywhere, for the M5 East they are located 1 km away. But the further away the ventilation is located the more energy is needed to move the air. The height of the ventilation

	outlets depends on the dispersion needed, typically they are between 10-30m. As for diameter, they are substantial and could be 8m across.
8.7	<p><b>Is there any property loss in the last two models?</b></p> <p>TfNSW response: A: The Sydney end of the short tunnel does have property impacts as we would need to widen for the portal. The alignment of the on ramp governs the footprint. At the Lithgow end there are substantial property impacts on the short option. The hybrid option does not require property impacts – we would need to acquire some rail land.</p> <p>Elements that still need to be considered for these options include the additional footprint that comes with a tunnel. This includes locations for power substations, a local control centre (if needed), storage and water for any fire incidents that might occur, exhaust and ventilation. Where these are located is still to be determined.</p>
8.8	<p><b>What will the tunnel portals look like?</b></p> <p>TfNSW response: There are different elements to consider at the tunnel portal. There will be a gradual descent from the surface which will require a ‘dive structure’ and then cut and cover excavation for the first couple of hundred metres of tunnel. The carriageway width consists of two lanes each way plus a shoulder and wall construction. The best estimation at this point is around 20-22 metres. The distance between the carriageways for the different lane directions can be designed to be wider or tighter. The portal entrance may also have some design features for example, an operations centre.</p> <p>Consideration of tunnel options should also include the additional structures that would be required including a Control Centre (this could be remote from the tunnel), equipment space (ventilation plant, sub-stations and suppression water storage) as well as workshops, car parking and other hard-standing areas.</p>
8.9	<p><b>When tunnelling, can you start at each end and speed up the excavation process? Would there be a conveyor removing spoil?</b></p> <p>TfNSW response: Excavation could be done from both ends of the tunnel for any of these options, though further analysis is still required. There is also the option to excavate from the centre out, but that is a difficult option from the middle in Blackheath. Conveyors would be one option that might be considered.</p>
<b>9</b>	<b>Additional options – Tricia Wunsch</b>
9.1	<p>Next meeting (meeting 4 scheduled for 5 August) will include alternative options. We will talk about the assessment criteria and weightings. If there is time, we can then also assess the options – if not this will be done at meeting 5 which we agreed last meeting would be held two weeks after meeting 4.</p> <p>A request was received from a BCC member that the criteria of value for money be included at Meeting 4, acknowledging that the discussion on criteria was already completed in Meeting 2.</p>
9.2	<p><b>One suggestion put forward at the end of the meeting included a recommendation that TfNSW start looking at the big picture, taking climate change and its impact on the recent drought that caused such critical water shortages in the Central West into consideration with their transport plans. Pushing for a big highway upgrade to enable large fossil fuel consuming trucks to ply our mountain roads is not the future we want. TfNSW needs to start thinking out of the box, and consider the BCR of a Chunnel-style tunnel with an electric conveyor system under the Blue Mountains that takes trucks and cars on a fast conveyor with no issue of pollution or ventilation stacks. It’s the perfect big infrastructure project for TfNSW. And while we’re at it, an adjacent tunnel could be built to pump Sydney’s daily output of 3 gigalitres of waste water out to the Central West, where it could be treated and used for irrigation. This would be a game changer for the Central West.</b></p> <p>TfNSW response: Noted.</p>

<b>10</b>	<b>Meeting wrap up and close – Tricia Wunsch</b>
10.1	Tricia Wunsch thanked the committee for attending this session, both those in person and online.
10.2	The Blackheath Co-Design Committee thanked the project team for considering their feedback, additional options and the knowledge and information shared by the tunnel and air quality experts.
	<b>Next meeting 5 August 2020</b>