

4 Alternatives considered and identification of the preferred option

4.1 Options considered

As stated in Chapter 5 of the EIS, the EIS assessed an indicative concept design that would continue to be refined, where relevant, to improve road network and safety performance, minimise impacts on receivers and the environment, and in response to feedback from stakeholders. Chapter 5 also notes that the EIS has been prepared prior to the appointment of a design and construction contractor and as such, the construction strategy presented and assessed in the EIS aimed to provide an assessment of probable construction methodologies. The EIS concludes that this means the detail of the design and construction approach presented in the EIS concept design is indicative only and is subject to the detailed design carried out by the design and construction contractor.

Further concept design development was undertaken for the MOC4 including the extent of surface works, in particular, the size of the aboveground MOC4 building structure and the underground connection between the ventilation outlet and MOC4. Further design considerations were analysed against the following constraints:

- Design and construction considerations including:
 - available land
 - impacts on existing infrastructure
 - construction staging and program
 - impacts on utility corridors
 - efficient designs that resolve constructability challenges.
- Operation and maintenance considerations including:
 - performance requirements including required air flow rates
 - safe and efficient maintenance access.
- Environmental considerations including:
 - construction and operational noise and vibration impacts
 - visual impacts
 - urban and landscape amenity with emphasis on minimising impacts associated with the acquisition of residential and commercial properties.

Alternative design options considered including horizontal and vertical arrangements for the fans above ground, an underground arrangement within a ventilation building with a depth of about 40 metres, and the relocation of the ventilation facility to above the cut and cover structure on Victoria Road. Additional design development determined that there were further constructability issues to be resolved including:

- Insufficient surface work area available to construct both the cut and cover for the Iron Cove Link tunnel portal and the ventilation facilities in the location proposed in the EIS concept design without having a negative impact on Victoria Road traffic or adjacent properties. Potential constriction of Victoria Road traffic (Drummoyne bound) to accommodate the construction footprint while constructing a ventilation link between an above ground ventilation facility and the ventilation outlet. This potential impact would have a significant effect on traffic flow by reducing the Drummoyne bound lanes available to traffic
- Increased safety risks for construction personnel working in close proximity to live traffic on Victoria Road
- Potential to alter the construction sequence at Iron Cove, associated traffic staging, the extent of night works required and the time required to construct the project
- Long duration of excavation at the MOC4 site: This excavation would likely be undertaken by excavators with rock hammers. As this is directly adjacent to residential properties, rock hammering impacts including potential property damage, high vibration, high intensive noise and dust are avoided. It is estimated that such an excavation would take approximately eight months using rock hammers

- The bulk and scale of the ventilation building, particularly noting the potential solar access and overshadowing impacts on surrounding residences and the requirement of Planning Approval Condition E138
- Minimisation of operational noise impacts, given the significant exceedances of the night-time design criteria of 45dB(A) identified in the EIS
- Maintenance access during operation, which was compromised due to space constraints.

4.2 Identification of the preferred option

It was identified that these challenges could be addressed by undergrounding the ventilation and substation infrastructure and the following were considered in developing this design:

- Avoidance of any significant alterations to the complex Iron Cove Link cut and cover arrangement
- Proximity to the Iron Cove ventilation outlet location illustrated in the EIS
- Need for separate caverns due to space requirements
- Location of the substation cavern close to the ventilation cavern
- The need for the ventilation tunnel to connect to the end of the vent cavern (A design where a ventilation tunnel connects to the middle of the ventilation cavern is not possible)
- Alignment in sound rock (i.e. sandstone)
- Consideration of the topography of the land on the surface
- Need for safe operational and maintenance access from the road tunnel and from the surface
- Avoidance of any increase in the duration of the construction program
- The ability to excavate the ventilation tunnel and caverns from beneath the Iron Cove Link cut and cover structure.

Based on these requirements, the concept design for relocating MOC4, including the electrical substation and ventilation facilities, underground (the ventilation outlet would remain above ground in the same location shown in the EIS) was developed and includes:

- Construction of a ventilation tunnel about 340 metres in length that connects the Iron Cove Link tunnel, at an underground location between Cambridge and Waterloo Streets, with the Iron Cove cut and cover structure near Callan Street
- The ventilation tunnel that includes two caverns for the housing of ventilation equipment and the electrical substation, along with access tunnels for maintenance
- The extension of the Iron Cove cut and cover area on the southwestern side of Victoria Road to facilitate connection to the ventilation tunnel.

No change in tunnel excavation methodology would be required, however an additional surface tunnel support site would need to be established within the Iron Cove cut and cover. All plant, equipment and materials required to construct the proposed new ventilation tunnel and caverns would be supported from the Iron Cove civil site (C8), with the potential for some tunnelling to be supported from the Rozelle civil and tunnel site (C5) later in the construction program.

The only remaining surface permanent infrastructure would be a switch room, high voltage regulators, an alternative Operational Motorway Control System (OMCS) room and a separate access staircase located where the above-ground substation was shown in the EIS and within the boundaries of the Iron Cove civil site (C8). It is not possible to locate this infrastructure underground because:

- Maintenance access from the surface to the tunnel is required at this location
- The switch room must be readily accessible for frequent maintenance access during operations
- The high voltage regulators need to be located as close to the switch room as possible. The transformers with suitable capacity for the Rozelle Interchange are only available with oil insulation which would not be suitable to locate underground
- The alternative OMCS room would be used in the event of an incident to control and operate the tunnel. This is an essential backup system that is required to ensure the safe operation of the motorway.