



M12 Motorway Wallgrove Road / M7 / M12 interchange

Design development and options report

December 2020

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1 Background

1.1 Introduction

Transport for NSW (Transport), formerly Roads and Maritime Services are currently planning the new 16 km M12 Motorway that will provide direct access between the planned Western Sydney International Airport at Badgerys Creek and Sydney's motorway network.

The M12 Motorway forms part of the Western Sydney Infrastructure Plan (WSIP). WSIP was announced in April 2014 as a joint initiative of the Australian and NSW governments to fund a \$4.1 billion road investment program for Western Sydney.

The M12 Motorway will provide increased road capacity and reduce congestion and travel times. It will also improve the movement of freight into and through Western Sydney and is expected to serve the Western Sydney Aerotropolis and the Western Sydney Employment Area.

In December 2015 the then Roads and Maritime, carried out a strategic route options analysis to identify a preferred route corridor. This involved identifying a longlist of route options that was narrowed to a shortlist in February 2016. In 2017 we selected preferred route corridor, known as the 'Orange corridor', following an extensive options assessment and community and stakeholder engagement. The 'orange corridor' route option was favoured as it seemed to impact the least number of properties and was expected to have less impact on Elizabeth Drive during construction.

The Orange corridor was then further refined in consultation with the Greater Sydney Commission (GSC) and the Western Sydney Parklands Trust. The consultation led to us reducing the impact on the Western Sydney Parklands and integrating with the GSC's draft South West District Plan and the Southern Parklands Framework of the Western Sydney Parklands Trust. It was this design that developed into the 'preliminary design' which was the focus of the Environmental Impact Assessment (EIS) displayed in October and November 2019.

All of the submissions received during the EIS exhibition were reviewed and responses are included in the Submissions Report now available on the M12 Motorway portal.

After considering the submissions received Transport proposed a number of amendments to the M12 Motorway design.

The environmental impacts of the amendments needed to be assessed in the same way the other components of the design were during the EIS exhibition. Each amendment must be considered in relation to its potential benefits and/or impacts.

This assessment forms the basis of the Amendment Report which was on exhibition from Wednesday 21 October until Wednesday 4 November 2020.

1.2 Environmental Impact Assessment

During the EIS exhibition, fifty submissions were received, categorised and reviewed. Many of the submissions focused on these key issues:

1. Lane numbers
2. Lack of non-tolled route options
3. Connection at The Northern Road
4. Public transport links
5. Cecil Hills light, visual and noise impacts
6. Impacts to the Parklands including the Wylde Mountain Bike Trail
7. Fauna and flora impacts

Community and government agency submissions received shared concerns about the lack of non-tolled route options to connect to the M12 Motorway. The perceived alternative for motorists residing in suburbs east of the M7 Motorway /Elizabeth Drive interchange, was that they either had to pay the M7 Motorway toll to then access the M12 Motorway, or avoid the M12 Motorway altogether and access the new airport via Elizabeth Drive. Many submissions requested an M12 Motorway connection with Elizabeth Drive to enable a genuine toll-free connection to the M12 Motorway.



EIS Community information session

1.3 Project as described in the EIS

A motorway-to motorway interchange between the M12 Motorway and the M7 Motorway was described in Section 5.10.1 of the EIS as a grade-separated interchange to provide a free-flowing connection to and from the M7 Motorway.

This interchange in turn, links to the wider Sydney motorway network that includes the M5 Motorway, the M4 Motorway and the M2 Motorway. Proposed M12 Motorway exit and entry ramps were included as follows and can be seen in Figure 1:

- Entry and exit ramps between the M7 Motorway and Elizabeth Drive
- Entry and exit ramps between the M7 Motorway and the M12 Motorway
- Realignment of a Wallgrove Road connection to the M7 Motorway from Elizabeth Drive, with a G-loop on-ramp

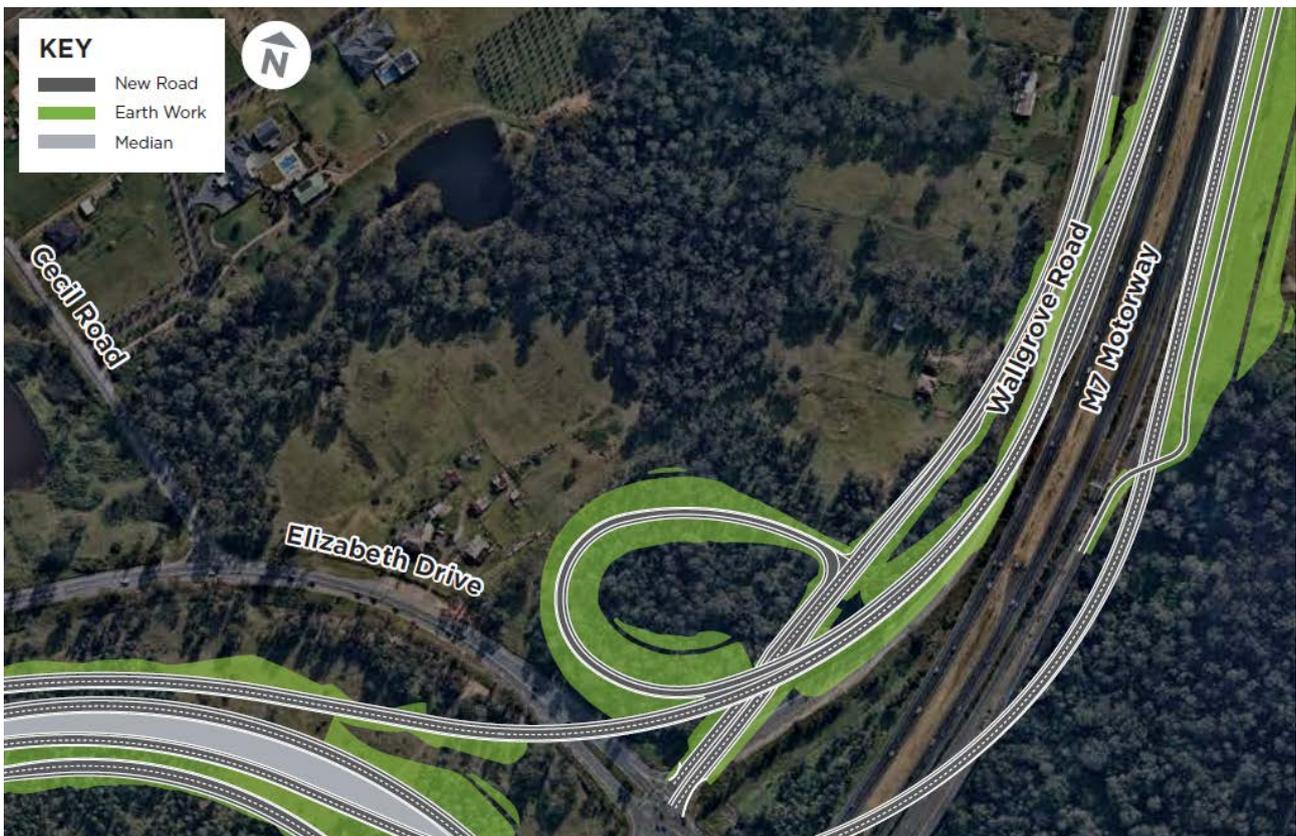


Figure 1 M12 / M7 Interchange northern ramps - EIS design

1.4 Amendment Report

After considering the submissions received during the EIS, a number of changes to the project have been proposed which may have environmental impacts that differ from the EIS. As per guidance from the Department of Planning, Industry and Environment, these impacts need to be adequately assessed in an 'Amendment Report' which is released publicly for comment.

The submissions regarding the lack of toll-free options required the project team to consider a viable connection from Elizabeth Drive on and off the M12 Motorway near the M7 Motorway. This report details the assessment of various options for the interfaces between the M12 Motorway and Elizabeth Drive in response to these EIS submissions and include connections to and from Elizabeth Drive in the vicinity of the Wallgrove Road / M12 / M7 / Elizabeth Drive Interchange.

The Amendment Report for the M12 Motorway addresses proposed key design changes including an option to provide a connection between Elizabeth Drive and the M12 Motorway near the M7 Motorway. The amendments also include:

- Changes to Elizabeth Drive and Cecil Road intersections, proposed exit ramps, the Wallgrove Road connection to Elizabeth Drive and proposed shared user path realignments
- The widening of Elizabeth Drive under the M7 Motorway and approaches
- Two new signalised intersections into the Western Sydney International Airport, with provisions for future connection to potential developments north of the Western Sydney International Airport; the delivery of these will be subject to funding from the WSA Co and adjoining developers
- Additional ancillary facilities to support the delivery of the project.

1.5 Project objectives

As outlined in the M12 Motorway EIS, the project specific objectives for the M12 Motorway are to:

- Provide sufficient road capacity to meet traffic demand generated by the planned western Sydney urban development
- Provide a high standard connection to the airport with capacity to meet future freight and passenger needs
- Provide a road which supports and integrates with the broader transport network
- Support the provision of an integrated regional and local public transport system
- Preserve the access function of Elizabeth Drive
- Provide active local transport within the east-west corridor
- Make provision for connection to the future Outer Sydney Orbital.

1.6 Additional strategic design considerations

Additional strategic design considerations for the M12 Motorway and Elizabeth Drive connectivity strategic design include:

- Improve community connectivity and journey time reliability for road users travelling along the corridor.
- Provide connectivity to local users and alternate route options.
- Investigate proposed connection options between the proposed M12 Motorway and adjacent roads.

- Ensure suitable connectivity and weaving are considered for all movements
- Ensure motorist user safety by including infrastructure design necessary to avoid merge connections on the offside lane
- Avoid relocation of the high voltage powerlines along the road corridor
- Ensure pedestrian/cyclist safety by including infrastructure design to allow uninterrupted or safe crossing of the shared path along the M12 Motorway
- Provide minimal congestion or limit potential delay impacts at proposed connections.
- Consider road connection options that can provide traffic flow efficiency and reduce delays during incidents. Intersection line markings must be shown on all strategic design plans
- Consider road function, local land use activity and access needs. Four way intersections are assumed to need some form of pedestrian crossing where the interchanges cross over the shared path
- Minimise potential environmental impacts
- Consider utility impacts (both future and existing lines), and constructability in the vicinity of such areas
- Minimising earthworks with the cut and fill balanced where practical.
- Fit for purpose design to meet the required design life for the identified need and that maximises the project 'value for money'
- Design that meets work health safety legislation and in particular is safe, efficient and practical for workers and those in the vicinity during temporary traffic changes and general roadwork.

1.7 Purpose of this report

This report aims to outline and document the process which led to the current design of an option to connect Elizabeth Drive to the M12 Motorway near the M7.

Specifically this report:

- Lists the objectives for the M12 Motorway and Elizabeth Drive connectivity at strategic design
- Summaries the key changes included in the Amendment Report following the EIS exhibition
- Describes the constraints, design challenges and assessment criteria associated with the development of the various design options
- Outlines other designs considered but not progressed.

Chapter 2 outlines the initial development of design options considered in response to the submissions received during the EIS calling for a M12 Motorway/Elizabeth Drive connection.

Chapter 3 outlines the design included in the Amendment Report and details its possibilities in design improvements and challenges presented through design.

Chapter 4 describes the further investigations of design options and refinements of the Amendment Report design which has resulted in the current design.

Chapters 5 and 6 outline the next steps and conclude the report.

2. Developing an Elizabeth Drive / M12 Motorway connection

2.1 Design challenges

While the Elizabeth Drive / M12 Motorway connection near the M7 Motorway responds to EIS submissions requesting a genuine toll-free route option at the eastern end of the M12 Motorway, it also creates the need for increased capacity at the intersection at Wallgrove Road and Elizabeth Drive as more vehicles will access the new motorway this way.

Subsequently, the connection design has to:

- Consider peak hour traffic volumes
- Minimise the modification of the current proposed EIS M12 Motorway concept design
- Minimise impact to the gas pipeline easement in the land north of the existing Wallgrove Road and Elizabeth Drive intersection
- Avoid creating weaving traffic movements along Elizabeth Drive
- Ensure all movements to Wallgrove Road are retained
- Appropriately space signalised intersections to cater for future traffic volumes to ensure the efficient operation of the road network in this area.

The designs explored in this chapter share the same impacts, risks and constraints, as outlined below.

2.1.1. Impacts and risks

- New impact on private landowners not previously identified in the EIS
- Additional impacts to Western Sydney Parklands
- Increased impact on biodiversity including Threatened Ecological Communities such as Cumberland Plain woodland and threatened species
- Likelihood of residual risks associated with the widening of Elizabeth Drive under the existing M7 Motorway overpass
- Any changes to forecast traffic volumes in this area may impact the capacity of this scheme and exceed certain traffic performance criteria
- Potential for unidentified clashes with existing infrastructure as the connection has not been fully developed in 3D
- The impact of potential future ramp metering of the M7 Motorway ramps is unknown
- Future possible widening of M7 Motorway.

2.1.2 Constraints

There are a number of constraints that impact the overall design of the M12 Motorway. The constraints below apply to the various design options developed for the connection between Elizabeth Drive and the M12 Motorway near the M7 Motorway:

- The project must be delivered by 2026 to align with the airport opening (six months prior to opening)
- The high voltage powerline to the west of the intersection of Elizabeth Drive and Mamre Road is not to be moved, and therefore dictates the maximum height of the alignment
- The existing road network and access to properties must be preserved. Only controlled access off the motorway will be permitted
- The WaterNSW Upper Canal and Tunnel must not be impacted
- Major gas pipelines must be protected or avoided
- The M12 Motorway will be a surface road (i.e. there will be no tunnel construction)
- There will be a motorway to motorway (free flow) interchange between the M7 and M12 motorways.

2.1.2 Assessment criteria

Criteria used throughout the M12 Motorway project development for options assessments were applied to the assessment of options for the Elizabeth Drive/ M12 Motorway near the M7 Motorway connection. These included:

- Project delivery:
 - Timelines to plan and deliver, identify design risks, organise project approvals, arrange land acquisitions, avoid risks or other issues
 - Construction staging, constructability, lead time for relocations or specific items and construction risk
- Land use
 - Minimising impact and integration with current land use and proposed land use (that is, non-sterilising);
 - Consideration of the future proposed Cecil Road corridor by Fairfield Council
- Community impact:
 - Number of properties impacted (partial and or full acquisition) and area of acquisition
 - Community connectivity to the M12 Motorway and local road network
 - Visual and noise impacts
- Environmental and heritage:
 - Number of Aboriginal and non-Aboriginal heritage sites affected
 - Total area of native vegetation affected
 - Area of endangered ecological community/critically endangered ecological community affected
 - Impact to creeks, drainage lines and dams
- Road design and functionality:

- Road and intersection design - geometry, grades, speeds, length
- Road safety- weaving, design standards
- Traffic flow efficiency, network connectivity
- Ability of Elizabeth Drive to operate as an arterial road in the future
- Impact on the M7 Motorway and the rest of the road network

2.2 Interchange design options

2.2.1 Interchange Option A - Grade Separation

In response to the comments received during the EIS display, a design incorporating connections to Elizabeth Drive was developed. The design contained only a few sets of traffic lights and instead relied on grade separation to facilitate traffic flow. Grade separation is the purpose of underpasses or overpasses to separate traffic flowing in different directions. See Figure 2 below.

The objective of this design was to test the potential of implementing the Elizabeth Drive connections, with minimal increases to the original EIS boundary.

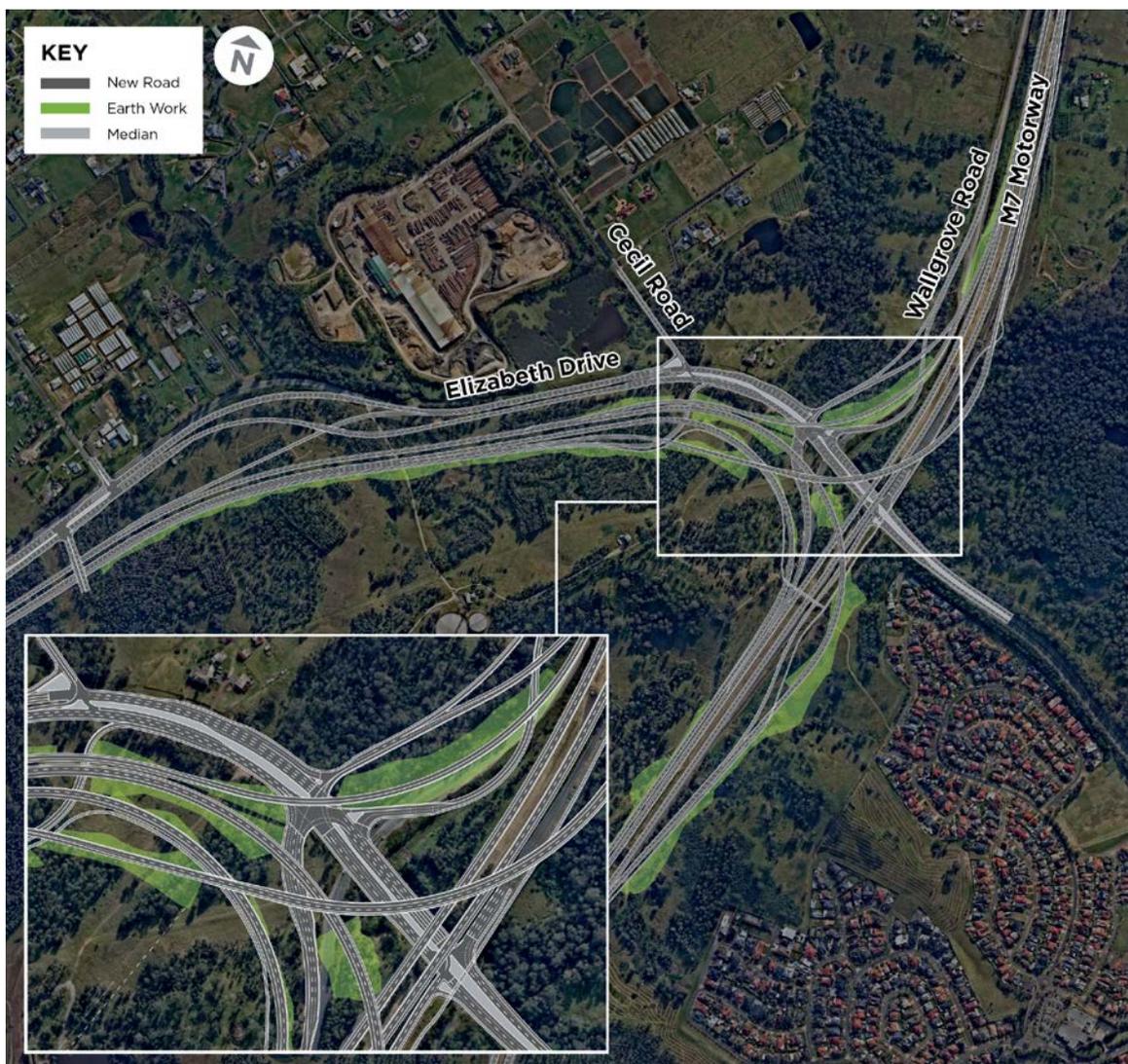


Figure 2 Interchange Option A – -Grade separation

Key advantages:

- Minimal additional impact to the EIS proposal or on proposed future land use
- Allows for the development of the future Cecil Road corridor, proposed by Fairfield City Council, independent of the M12 Motorway, and has the potential to include a link road between Wallgrove Road and Cecil Road which could be built at a future time when the interchange needed upgrading
- Overall reduction in the land required for acquisition, with the potential to only impact one additional private land owner
- Project footprint remains within the EIS boundary
- No additional impacts to native vegetation from the EIS.
- No additional impact to heritage from the EIS

Key disadvantages:

- More complex construction staging and constructability due to the grade separation sections of Wallgrove Road
- Complex road geometry at the Elizabeth Drive / Wallgrove Road connections
- Complexity in the braiding of the multiple ramps which reduces the road user comfort and has the potential to create driver confusion
- Decrease in the efficiency of traffic flow on the existing Elizabeth Drive and Wallgrove Road
- Road safety risks due to the absence of traffic signals and the in and out movement to and from the upgraded Cecil Road and Elizabeth Drive intersection
- Traffic modelling indicates this design performs well initially and then performance declines meaning the interchange will require an upgrade after 2036
- Requires building a ramp over a portion of a trunk gas main with limited accessibility.

Despite the advantages, particularly in that the project footprint was unchanged, the main issue with this design was that it was only effective in the short-term.

Although it performs well initially, an upgrade would be required shortly after 2036 which is considered unsatisfactory and not meeting the project's 'value for money' objective. There were also road user safety concerns this option was dismissed and therefore it was dismissed.

2.2.2 Interchange Option B- Grade separated interchange over Elizabeth Drive

Following the decision not to pursue the design outlined in section 2.2.1, Transport for NSW (Transport) continued to develop a design that would separate Wallgrove Road traffic from the Elizabeth Drive / M7 Motorway interchange. The development of the design continued to factor the minimisation of traffic lights.

As seen in in Figure 3 below, this new design featured an overpass over Elizabeth Drive to reduce the number of traffic movements at each set of traffic lights which improved overall efficiency.

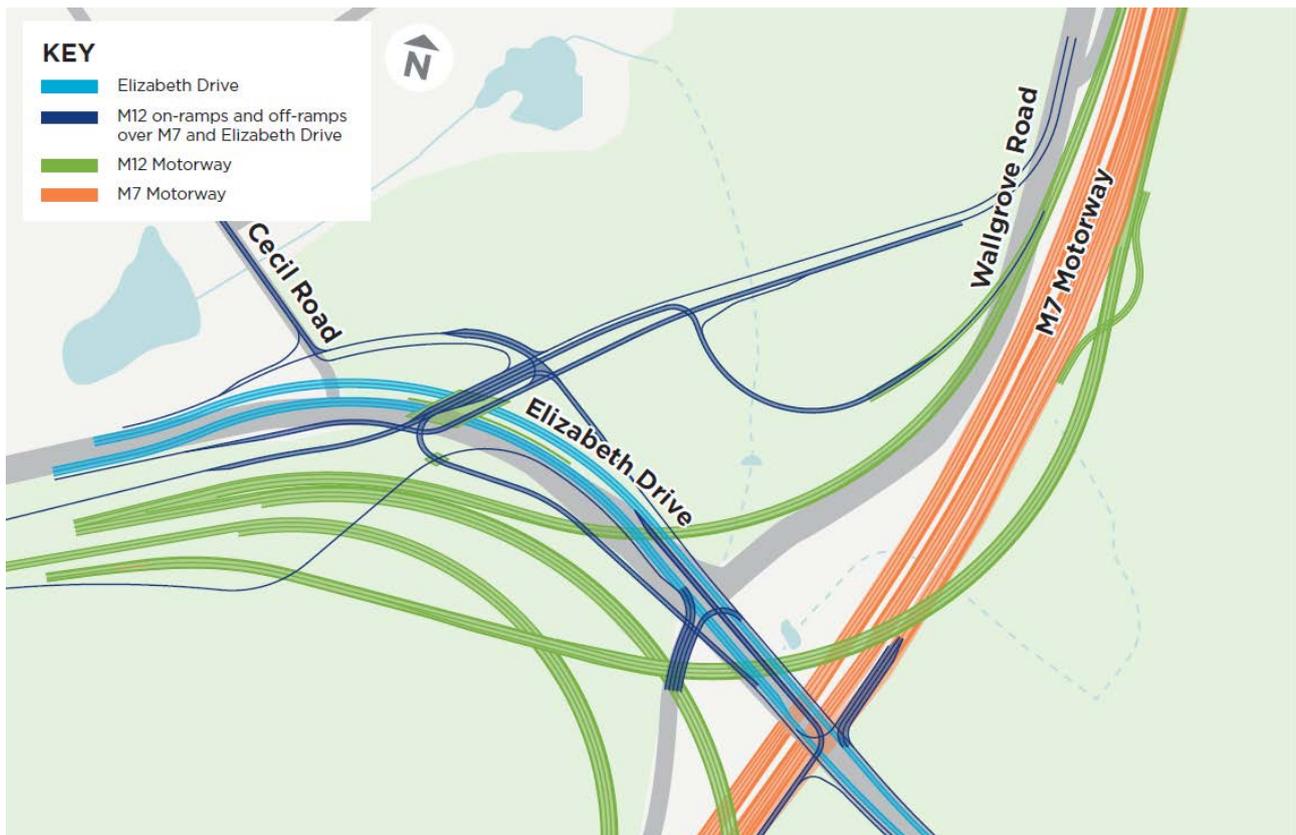


Figure 3 Interchange Option B-Grade separated interchange over Elizabeth Drive

Advantages:

- Minimising intersections and traffic lights
- Provides operational benefits, particularly along Elizabeth Drive
- Reduction in native vegetation clearing compared to Option A
- When compared to the EIS, there is no additional heritage impacts

Disadvantages:

Significant increase in cost compared to Option A

- Constructability challenges (such as building over existing roads, realigning Elizabeth Drive under live traffic, staging construction and managing traffic during construction)
- Significant impact on the proposed future land use (including cutting off access to several property lots), especially to Western Sydney Parklands
- Substantial increase in property acquisition
- Uncertainty in vertical grade on the Elizabeth Drive westbound exit ramp
- Significant impacts to services and utilities and limited possibilities in relocate utilities
- Traffic modelling indicates that beyond 2036, westbound to northbound traffic movements from Elizabeth Drive to M7 beyond 2036 are severely impacted
- Geometry of the ramps could cause road safety issues.

Given the number of significant disadvantages and this option's failure to satisfy some the key project objectives and design considerations including road user safety, road function and value for money, this option was not pursued.

Although Option A as seen in section 2.2.1 was ruled out, its development identified the benefits of separating the Wallgrove Road and Elizabeth Drive intersection and realigning Wallgrove Road to connect to Cecil Road elsewhere.

This would reduce or eliminate challenges during construction, improve driver comfort (by eliminating or reducing traffic weaving manoeuvres) and most importantly, satisfy the long term traffic performance and travel demand requirements necessary for the project.

2.3 Strategic locations for the Wallgrove Road corridor and Cecil Road connection

Before a design option which realigned Wallgrove Road could be further developed, Transport had to identify and assess potential new corridor options for a realigned Wallgrove Road as well identify a connection point at Cecil Road. Four possible corridor options were identified as shown below in Figure 4. They are referred to as Options 1, 2 3 and 4.

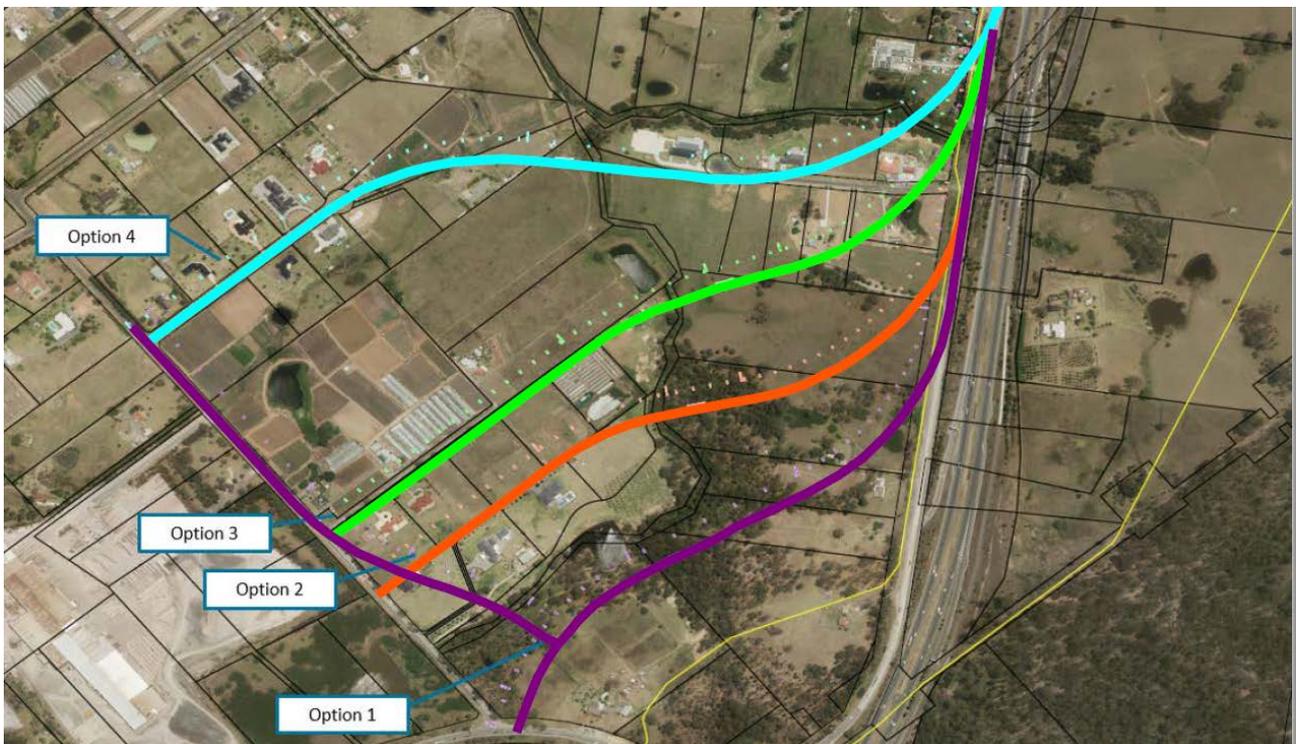


Figure 4 Strategic Wallgrove Road / Cecil Road realignment options

A comparative assessment of the four options was completed using the assessment criteria outlined in section 2.1.2.

Project delivery

In terms of project delivery criteria Option 1 was determined to be the best option.

Option 1 has the least project approval and land acquisition risks compared to the other options. In terms of constructability staging and constructions risks, Option 1 was only marginally less compared to best option in this regards being Option 3.

Option 2 and 3 are very similar, in terms of project approval and land acquisition risks, however Option 3 had the least constructability staging and constructions risks and was determined to be the second best option.

The option with greatest impact and risks in term of project delivery is Option 4, as it has the highest land acquisition risks and the highest comparable construability risks of the options.

Land use

The assessment identified Option 4 has having the least impact on current and future land use compared to the other options.

Option 2 and 3 had similar additional land use impacts compared to option 4. Option 2 impacted Western Sydney Parklands and severed two lots, whereas Option 3 reduced the impact to Western Sydney Parklands but severed a large private lot.

Although Option 1 provided a slightly better location for the newly aligned Wallgrove Road and Cecil Road intersection as it was closest to the existing Cecil Road and Elizabeth Drive intersection, it presented the greatest land use impact to Western Sydney Parklands. It also severed three lots and another large private lot which is subject to a State Significant Development Application (SSD DA).

All options catered for Fairfield City Council's future proposed Cecil Road corridor.

Community impact

The assessment identified Option 1 has having the least impact.

As shown below table, Option 1 had the least area of land acquisition required and impacted the least number of new property owners compared to the EIS. The number of new additional lots being impacted was very similar to Option 3, and better than Option 2.

Option 4 resulted in the largest area of new acquisition land required and impacted the greatest number of lots and new property owners compared to the EIS.

Options	Distance (approx.)	Corridor Area (approx.)	Numbers of additional Lots impacted compared to EIS	Number of new property owners Impacted compared to EIS	Numbers of Full Acquisitions (residents)	Corridor Area (approx.)
1	780m	76,600m ²	12	5	1	76,600m ²
2	1,000m	83,600m ²	14	~11	~1-3	83,600m ²
3	1,2000m	93,600m ²	11	~10	~1	93,600m ²
4	1,400m	98,000m ²	~22	~20	~1-2	98,000m ²

Table1 Approximant Land acquisitions impacts

Connection to the local community for all four options was very similar, with Option 1 being sighter better as it had shortest distance and connected directly back into Elizabeth Drive.

In terms of visual and noise impacts, Option 1 was determined to have the least potential impact, as it affected twelve new lots (one more than Option 3) and impacted the fewest new property owners compared to the EIS. It is also the furthest away from the majority of sensitive receivers likely to be impacted by noise and visual amenity.

Environmental and heritage

All four options were determined to have zero or negligible impacts on Aboriginal and Non-Aboriginal Heritage.

However, in terms of the amount of native vegetation clearing and area of affected Endangered Ecological Community (EEC) and Critically Endangered Ecological Community (CECC), there were differences between the options. Option 3 was determined to have the least impact as it had the least overall clearing of native vegetation and had minimal vegetation clearing and impact to EEC/CECC across a minor drainage line and Ropes Creek.

The next best option was Option 4. It had similar impacts to the minor drainage line however did require more vegetation clearing at Ropes Creek.

Option 2 had less impact to native vegetation clearing and of EEC/CECC where it crossed the drainage line, and had some minor impacts to the vegetation at Ropes Creek.

Option 1 had the largest impact to vegetation clearing and crossed two drainage lines, but did not impact Ropes Creek.

When evaluating the impact on creeks, drainage lines and dams, Option 2 was determined to have least impact as it only crossed one minor drainage line and had no impact to Ropes Creek or any existing dams. Option 3 was the next best option with impact to one minor drainage line, minimal impact to Ropes Creek and the potential to impact one dam. Option 1 had slightly more overall impact compared to Option 3 as it impacted two minor drainage lines, but had no impact to Ropes Creek. The option with the greatest impact was determined to be Option 4. Although it only impacted one minor drainage line it had the greatest impact on Ropes Creek.

After completion of the assessment of all the above sub-criteria, Option 3 was determined to be best option, closely followed by option 4 and 3. Option 1 was determined to have the greatest overall impact to Environment and Heritage when compared to the other options.

Road design and functionality

Upon review of the corridor options and sub-criteria, it was determined that this road design and functionality criteria was very similar for all four options. As a result this criteria was considered to be a less important criteria, especially compared to land use, community impact and environmental and heritage which were considered be the most important criteria.

All options fully satisfied the 'Road design and functionality' sub-criteria. Option 2 was determined to be the best option, with the other three options of equal or very similar measure.

Overall evaluation

Based on the comparative assessment of the four options using the criteria, Option 1 was determined to provide the best overall solution, followed by options 3, 2 and 4.

Although Option 1 had a greater impact on land use, environmental and heritage considerations compared to the other options, it had substantially less impact on the community compared to the other options, as it affected the least number of property lots and property owners. Option 1 is also the furthest away from the majority of sensitive receivers that would otherwise be subject to noise and visual impacts.

During the assessment process, it was noted that further refinements to the Option 1 corridor could potentially further reduce the number of impacted lots, the amount of land required for acquisition and land use impacts on private land and Western Sydney Parklands.

2.3.1 Further development of Strategic Option 1 Wallgrove Road/ Cecil Road corridor

As described above, although Option 1, seen in purple in Figure 4, was determined to be the preferred strategic Wallgrove Road corridor and connection to Cecil Road, additional refinements were examined to potentially further reduce the land use and community impact.

One of the main issues with the Option 1 corridor was the realignment of Cecil Road. The realignment resulted in major acquisition of 36 Cecil Road and required full acquisition and demolition of 28 Cecil Road. Significant frontage acquisition of 16, 20-22, 24, 26 Cecil Road would have also been required.

The realigned Wallgrove Road also resulted in major property impacts to 1111-1141 Elizabeth Drive as it severed the property in to three parts. This severing would most likely lead to the

acquisition of a large portion of residual land of a private property which would be rendered unsuitable for further development and difficult to access and maintain.

The realignment of Wallgrove Road also severed Western Sydney Parklands lots and again would likely result in additional acquisition of residual land and impact future use land use and development potential.

Transport initially intended to reduce the impact on private properties owners on Cecil Road. The alignment of Cecil Road was modified as shown in Figure 5 below. The new alignment eliminated the need to acquire 36 Cecil Road and also avoided the need to fully acquire and demolish 28 Cecil Road. There was also a reduction in frontage acquisition required for 16, 20-22, 24 and 26 Cecil Road.

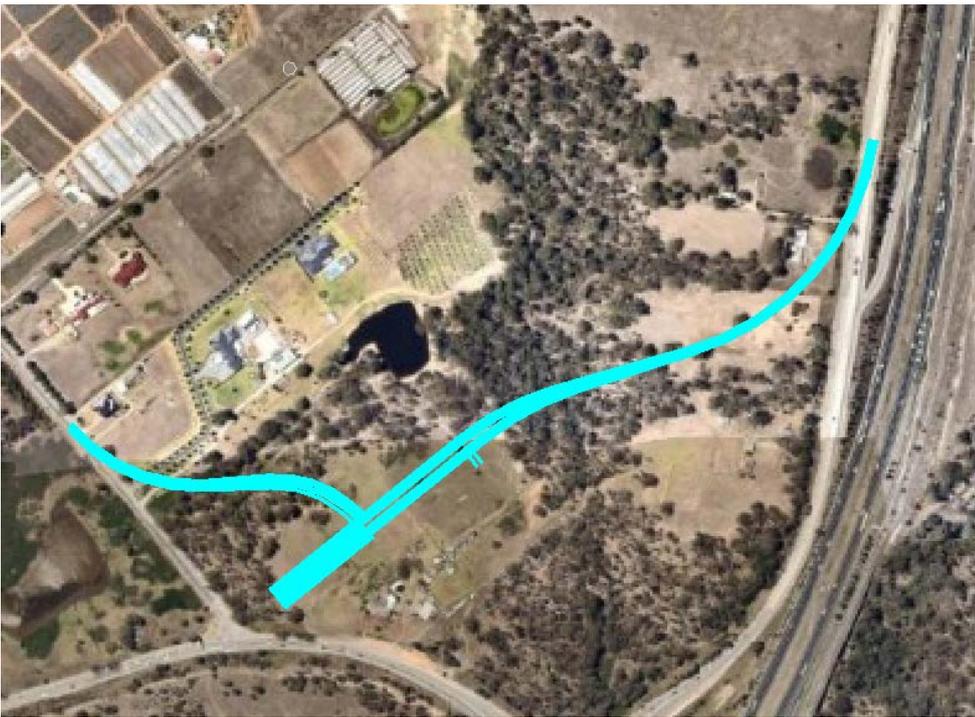


Figure 5 Refined Option 1 of Strategic Wallgrove Road/Cecil Road realignment options

However, the alignment of Wallgrove Road still resulted in major impacts to 1111-1141 Elizabeth Drive and Western Sydney Parkland lots with respect to acquisition and land use impacts.

The alignment of Wallgrove Road also resulted in deficiencies with respect to the approaching road geometry design Wallgrove Road and Elizabeth Drive intersection.

Therefore, Transport continued to further develop the preferred strategic alignment to reduce property acquisition and land use impacts to both private land and Western Sydney Parklands.

2.3.1 Re-positioning of the preferred strategic alignment

As shown in Figure 6, the alignment of Wallgrove Road was moved further north and the position of the Cecil Road intersection with Wallgrove Road was also modified.

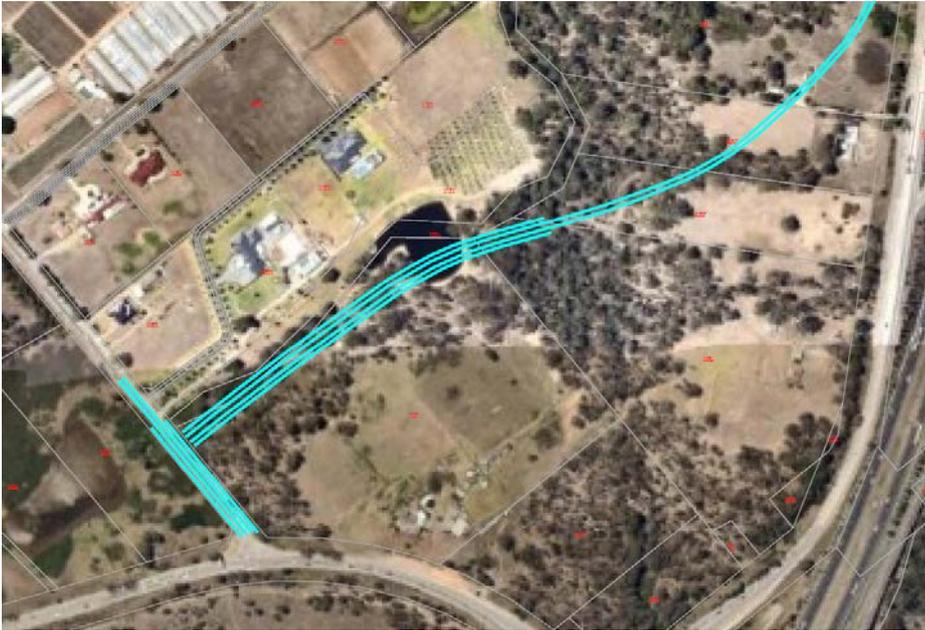


Figure 6 Further refined Option 1 of Strategic Wallgrove Road/Cecil Road realignment options

This design refinement significantly reduced the property acquisition and land use impacts to 1111-1141 Elizabeth Drive. The road geometry approach to Elizabeth Drive and the intersection design of Wallgrove and Elizabeth Drive was also modified to meet an acceptable design standard.

The alignment of the northern section of Wallgrove Road was also modified to avoid or minimise the severing of lots and reduce land acquisition and residual land acquisition on the Western Sydney Parklands lots.

In summary, the refinement of the preferred Option 1 strategic Wallgrove Road corridor and connection to Cecil Road resulted in the key advantages:

- Minimised impacts to the current and future land use and development potential of 1111-1141 Elizabeth Drive and the Western Sydney Parklands lots
- Overall reduction in property acquisition area
- Reduced the number of private property impacted by acquisition from six to five
- Avoided the demolition and full acquisition of 28 Cecil Road
- Provided an acceptable and safe road design approach and Wallgrove and Elizabeth Drive intersection design.

However, moving the southern section of the alignment of Wallgrove Road as close to the drainage line as possible had the following disadvantages:

- Increased difficulty to construct due to embankment construction, steeper and more difficult terrain and the potential need for steeper batters or retaining walls
- Increased amenity impacts from noise and visual impact to 18, 20-22, 24, 28 Cecil Road
- Increased native vegetation clearing
- Impacted the drainage line and the existing dam

3. The EIS Amendment Report design

3.1 Integration of the designs

Following the selection of the preferred Wallgrove Road alignment corridor Option 1 and the preferred interchange Option 2.2.1, the project team proceeded to integrate and further develop the designs. Refinements were made the interchange design addressing some of the deficiencies as detailed in section 2.

3.2 The EIS Amendment Report design

Following the refinements and design integration, what is now referred to as the EIS Amendment Report design (Figure 7) was completed and was exhibited for community feedback from 21 October until 4 November 2020.

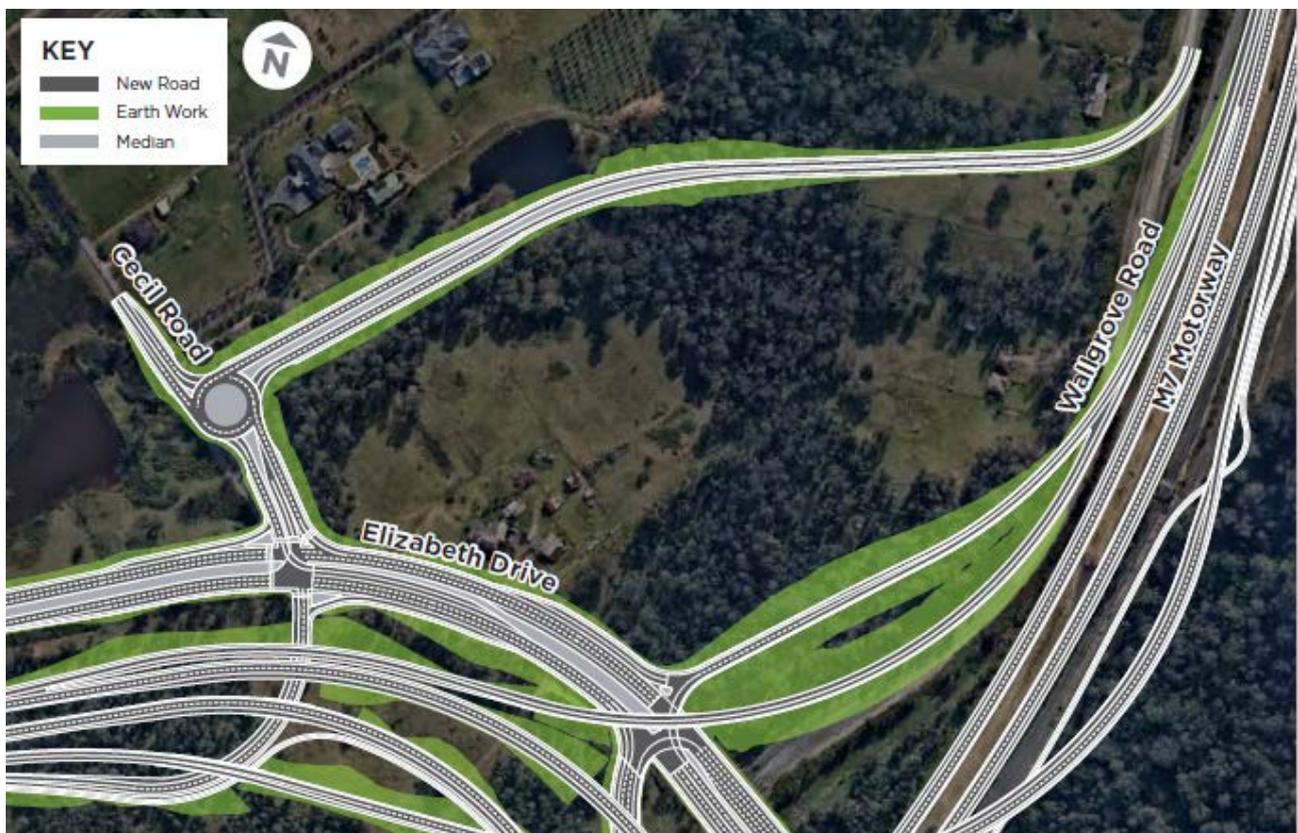


Figure 7 Amendment Report design connecting Elizabeth Drive to the M12 Motorway

This design places a realigned Wallgrove Road in the preferred realignment corridor and features a roundabout at the intersection with Cecil Road. It retains a signalised intersection at the Elizabeth Drive and Cecil Road which facilitates the proposed westbound entry ramp onto the M12 Motorway. This design also simplifies the Elizabeth Drive/M7 Motorway off-ramp and the Wallgrove Road intersection when compared to Figure 3.

The design also facilitates complementary, co-ordinated three-phase signalised intersections, which means there can be three different directions of traffic moving simultaneously, to cater for the multiple traffic movements expected at this location.

This design also eliminated sections of grade separated road from the existing Wallgrove Road and the Elizabeth Drive on-ramps to the M7 and the M12 Motorway westbound exit ramp to the M7. The realignment of Wallgrove Road also reduced complex interwoven ramps which may be difficult for drivers to navigate. Most importantly the design caters for predicted traffic volumes up until 2036.

The position of the realigned Wallgrove and Cecil Roads as shown in this design was further refined to address issues identified in section 2. The alignment of Cecil Road was changed so that it maintained its existing location and a roundabout intersection to the newly aligned Wallgrove Road was added. This eliminated the need to acquire any land at the front of 36 Cecil Road and the need to demolish and fully acquire 28 Cecil Road. However, there is still minor frontage acquisition needed as well as within Western Sydney Parklands land along the western side of Cecil Road.

The refined realignment of Wallgrove Road also significantly reduced the property acquisition required at 1111-1141 Elizabeth Drive and meant the property was not severed or cut off from access roads.

This design also minimised property acquisition within Western Sydney Parklands and avoided severing lots inside the Parklands, protecting future land use and development potential.

3.2.1 Amendment Report design/ EIS construction footprints compared

The addition of an interchange connecting Elizabeth Drive to the M12 Motorway near the M7 Motorway requires a 233,950 square metre increase in land needed for the project. This includes the connection interchange itself and a wider Elizabeth Drive, necessary to cater for both motorists accessing the M12 via Elizabeth Drive as well as expected local traffic growth.

The majority of the additional land required is comprised of private property on Elizabeth Drive, Cecil Road and Western Sydney Parklands and is needed to realign Wallgrove Road and create the M12/ Elizabeth Drive connection.

The remaining land needed is situated along both sides of Elizabeth Drive and more than a third lies within the existing road reserve.

The additional land needed for the Amendment Report design is marked in orange in Figure 8.

Although there is an increase in footprint overall, the Elizabeth Drive /M12 Motorway interchange design meant that the G-Loop featured in the EIS design was no longer needed. This resulted in a land saving of about 19,940 square metres in this area.

Land no longer required appears in aqua in Figure 8. This land contains high quality vegetation within Western Sydney Parklands.

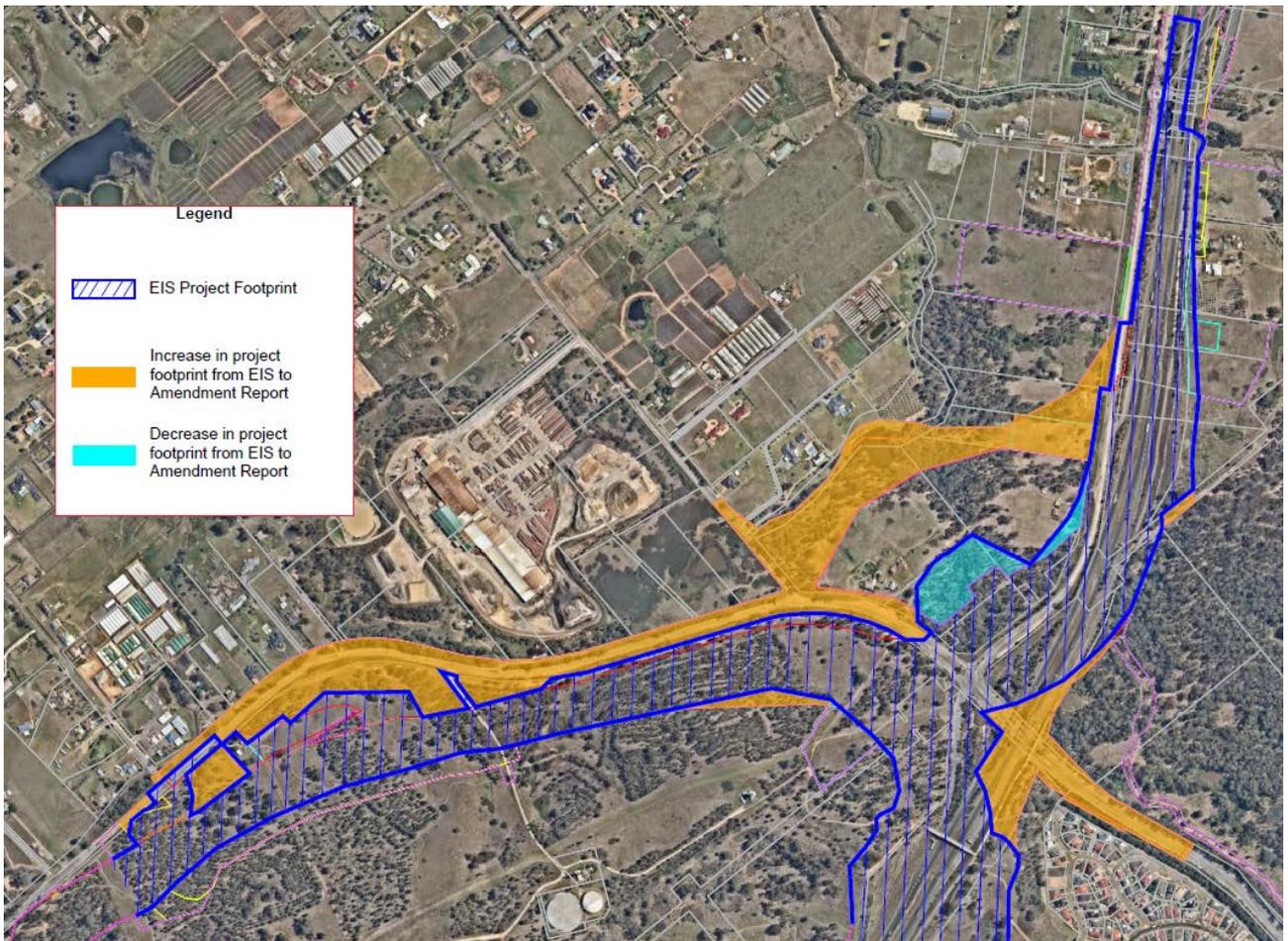


Figure 8 Property impacts – land required for the EIS design and land required for the Amendment Report design.

4. Post Amendment Report design development and the Current Design

4.1 Further development of the EIS Amendment Report Design

Although the updated design of the interchange as shown in Chapter 3 was developed in response to EIS submissions and included in the EIS amendment report, Transport continued development and refinement of the design.

Updated traffic modelling data revealed a major traffic flow issue at Cecil Road and Wallgrove Road roundabout and identified the potential for traffic queues when traffic volumes increased in the future. The limited distance between the roundabout and the traffic signals at Elizabeth Drive and Wallgrove Road would eventually result in lengthy delays and have a negative flow on effect on other major traffic movements in the area.

The Amendment Report design also still contained the following issues which were yet to be fully addressed:

- The realigned Wallgrove Road had a large construction footprint
- The geometry of the realigned Wallgrove Road where it deviates from the existing Wallgrove Road needed improvement
- The short distance between the Cecil Road /Wallgrove Road round about intersection to the Elizabeth Drive/Wallgrove Road intersection was unlikely to provide sufficient capacity in the future
- Although reduced since strategic Option 1, there were still private property impacts
- Low level impacts to the drainage line and major impact to the existing dam

These impacts meant modifications and design refinements were required to the Amendment Report design, particularly in regards to future traffic conditions.

In response, a series of designs were put forward and became known as the 'post-Amendment Report' designs. Each design was assessed using the same criteria detailed in section 2.2.1. and weighed up the benefits of future proofing the functionality of the interchange at the compromise of impacts to private properties. This design process eventually led to the 'current design' described in section 4.2.

4.2 Post-Amendment Report design options

4.2.1 Option A – Left in left out intersection at Cecil Road and Wallgrove Road and relocated roundabout

Option A pictured below (Figure 9), includes a left in-left out intersection layout at the Cecil Road and Wallgrove Road intersection and a dual-lane roundabout further east on Wallgrove Road. This design focused on the modification of the intersection and traffic flow arrangements on Cecil and Wallgrove roads. By limiting the movements to and from Cecil Rd to left in and left out and moving the dual lane roundabout further east along Wallgrove Road, the poor performance of the roundabout intersection in the Amendment Report Design would be significantly improved.

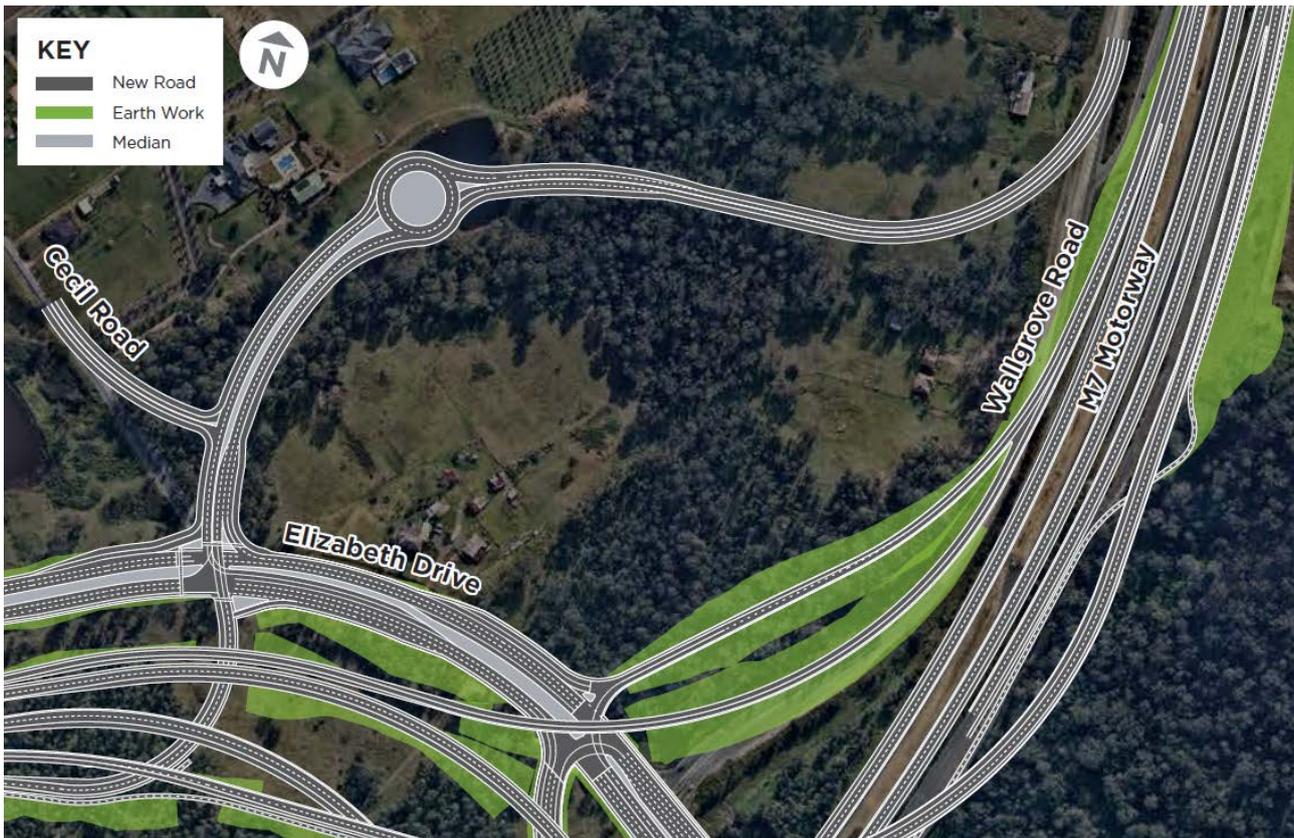


Figure 9 Option A - Left in left out intersection at Cecil Road and Wallgrove Road and relocated roundabout

Despite advantages such as improvements in the traffic flow performance and reduction in land use impact, the design contained deficiencies as explained below.

Key advantages:

- Reduced the impact on the current and future land use and development potential of the Western Sydney Parkland lots (less severing of lots)
- Decreased the property acquisition of Western Sydney Parklands along the western side of Cecil Road
- Improves road geometry on the northern section of Wallgrove Road.

Key disadvantages:

- More difficult to construct and manage the drainage work
- Greater noise and visual impacts to 16, 18 and 20-22 Cecil Road
- Increased the impact on the current and future land use and development potential of the 1111-1141 Elizabeth Drive
- Increased property acquisition at 16 and 20-22 Cecil Road
- Increased property acquisition at 1111-1141 Elizabeth Drive
- Increased impact to the drainage line and requirements for drainage line realignment
- Complete removal of the dam
- No right turn movement in or out of Cecil Road increasing community inconvenience and travel time.

Given that the negative impacts outweighed the improvements, it was not progressed.

4.2.3 Option B – Seagull intersection at Cecil Road and Wallgrove Road and the removal of the roundabout

A modified version of Option B above was developed which converted the Cecil Road and Wallgrove Road intersection from a left in-left out arrangement to a seagull intersection. The roundabout was also removed as seen in Figure 10.

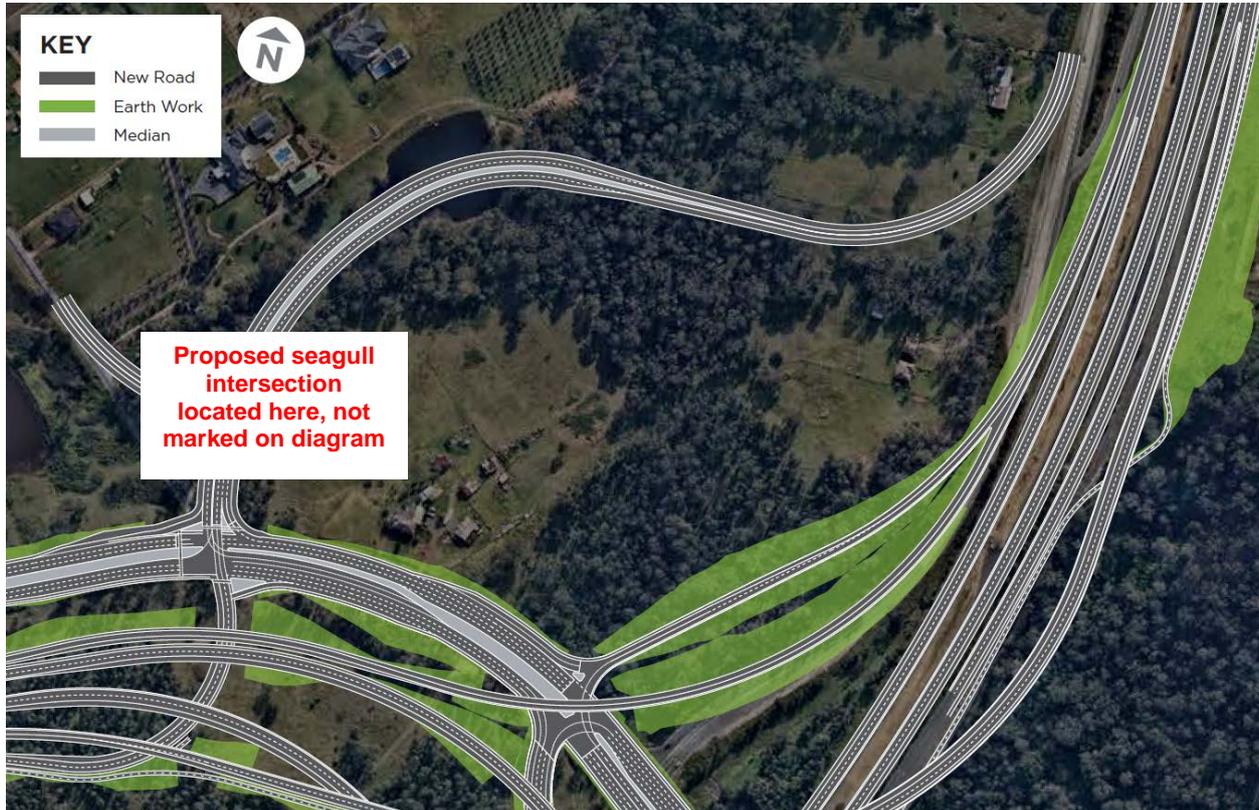


Figure 10 Option B – Seagull intersection at Cecil Road and Wallgrove Road and the removal of the roundabout

In comparison to Option A, this version had the advantage of allowing all traffic movements from the Cecil Road and Wallgrove Road intersection eliminating community inconvenience and additional travel time.

However, a seagull intersection does not provide the best option for driver safety and is generally best suited to low traffic environments. When featured in a high traffic environment, safety risks may become apparent. The alternative would be a signalised intersection, however, the distance between this intersection and the Wallgrove Road and Elizabeth Drive intersection is not enough to allow for future traffic growth.

Although this design was not progressed, its conception identified that traffic lights at the Cecil Road and Wallgrove Road intersection would be the most suitable solution at this location and had the potential to resolve many of the issues identified with the current design.

4.2.4 Option C – Signalled intersection Cecil Road / Wallgrove Road and Elizabeth Drive intersection shifted west

A modified version of Option B was developed, see Figure 11. This option replaced the seagull intersection between Cecil Road and Wallgrove Road with traffic lights.

To increase the distance between the two intersections, the Elizabeth Drive / Wallgrove Road intersection was moved further west. This also meant less realignment for Cecil Road as was required in Option B.

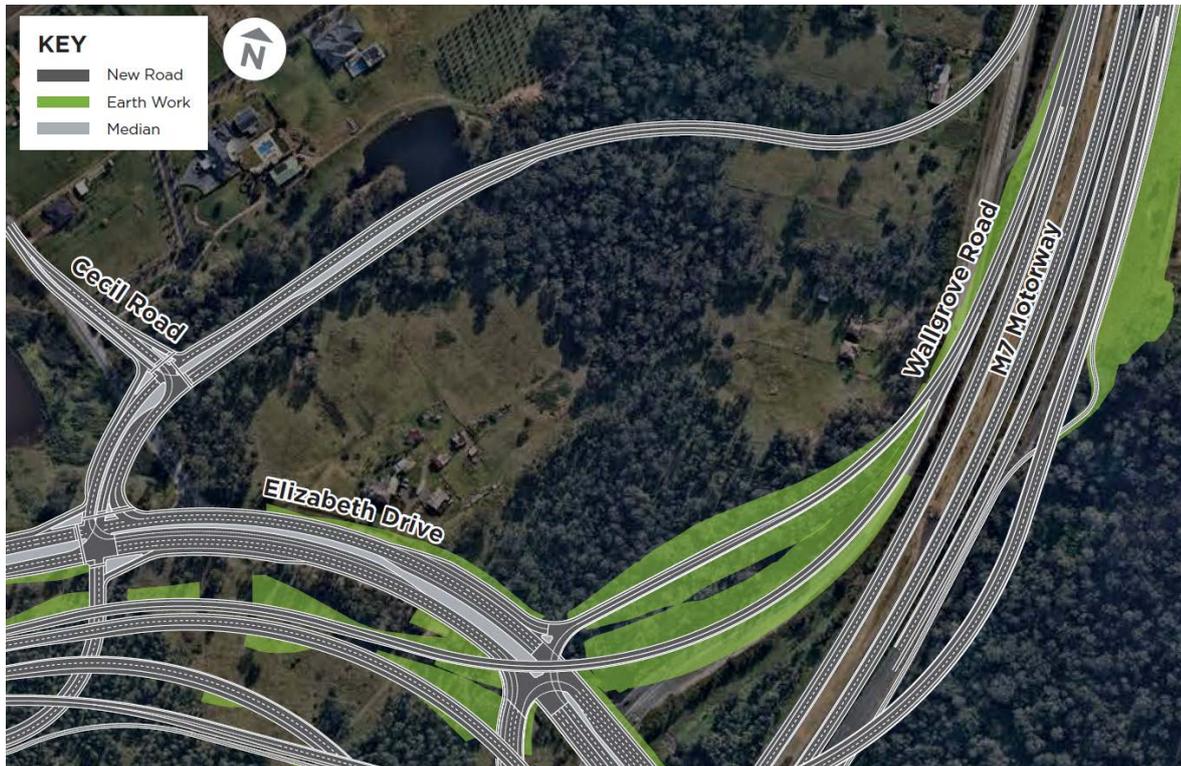


Figure 11 Option C - Signalled intersection Cecil Road / Wallgrove Road and Elizabeth Drive intersection shifted west

Key advantages (compared to Option A and B):

- Easier to build
- Less drainage work required and less impact on the drainage line
- Significant reduction in the current and future land use and development of 1111-1141 Elizabeth Drive
- Decreased property acquisition for 1111-1141 Elizabeth Drive
- Decreased property acquisitions for 16, 18 and 20-22 Cecil Road
- Decreased visual and amenity impact to 16, 18 and 20-22 Cecil Road
- Elimination of the seagull intersection in a high traffic environment
- All traffic movements now possible from the Cecil Road and Wallgrove Road intersection to meet the future traffic performance and efficiency targets.

Key disadvantages (compared to Option A and Option B):

- Demolition of an existing tenanted property owned by Western Sydney Parklands at 95 Wallgrove Road
- Increased property acquisition to Western Sydney Parklands lots at the western corner Cecil Road and Elizabeth Drive
- Increased impact on the current and future land use on Western Sydney Parklands lots at the western corner Cecil Road and Elizabeth Drive
- Challenging road geometry from Wallgrove Road to the repositioned Wallgrove Road / Elizabeth Drive intersection
- Increased safety concerns caused by traffic weaving resulting from the reduced distance between the new location of the Wallgrove Road / Elizabeth Drive intersection to the M12 Motorway eastbound exit ramp to Elizabeth Drive located approximately 500m to the west.
- The repositioned Wallgrove Road / Elizabeth Drive intersection (further west) would result in vertical geometry and design constraints on the design of M12 Motorway interchange ramps

This option created a number of improvements when compared to Options A and Option B, particularly in relation to reduced visual impacts and property impacts to 16, 18, 20-22 and 28 Cecil Road. The property acquisition and land use impact to 1111-1141 Elizabeth Drive was also significantly decreased. The design also led to the acquisition and demolition of 95 Wallgrove Road.

Further investigation and development determined that the location of the Wallgrove Road / Elizabeth Drive intersection could not move further west from its current location without imposing critical constraints and lack of flexibility on the vertical geometry and design of the M12 Motorway ramps and interchange design.

It was also determined that if this intersection was shifted further west, the distance between this intersection and the M12 Motorway eastbound exit ramp would be reduced. This would increase the already less than desirable traffic weaving safety concerns on this section of Elizabeth Drive. The other issue with the design is the less than ideal road geometry approach of Wallgrove Road to the repositioned Wallgrove Road / Elizabeth Drive intersection.

Due the design constraints imposed on the future design and development of the M12 Motorway ramps and intersections, safety and road design deficiencies, this design option with the modified western position of the Wallgrove Road / Elizabeth Drive intersection was not progressed.

4.2.5 Option D – Curvature at the Elizabeth Drive and Wallgrove Road intersection

The development of Option C, identified a key constraint. The location of the Wallgrove Road / Elizabeth Drive intersection as shown in the Amendment Report design (see Figure 7), had to be maintained, otherwise it would lead to design constraints for the M12 Motorway ramps, impact the road geometry of Wallgrove Road approach and increase road safety issues. As a result, Option D was developed.

As detailed above, the design Option D as shown in Figure 12, retained the location of the Wallgrove Road / Elizabeth Drive intersection. The alignment of Cecil Road was also modified to achieve a satisfactory intersection separation and to improve the road geometry of the approach to Wallgrove Road. This increased the curvature of Cecil Road and shifted it in a north-easterly direction.

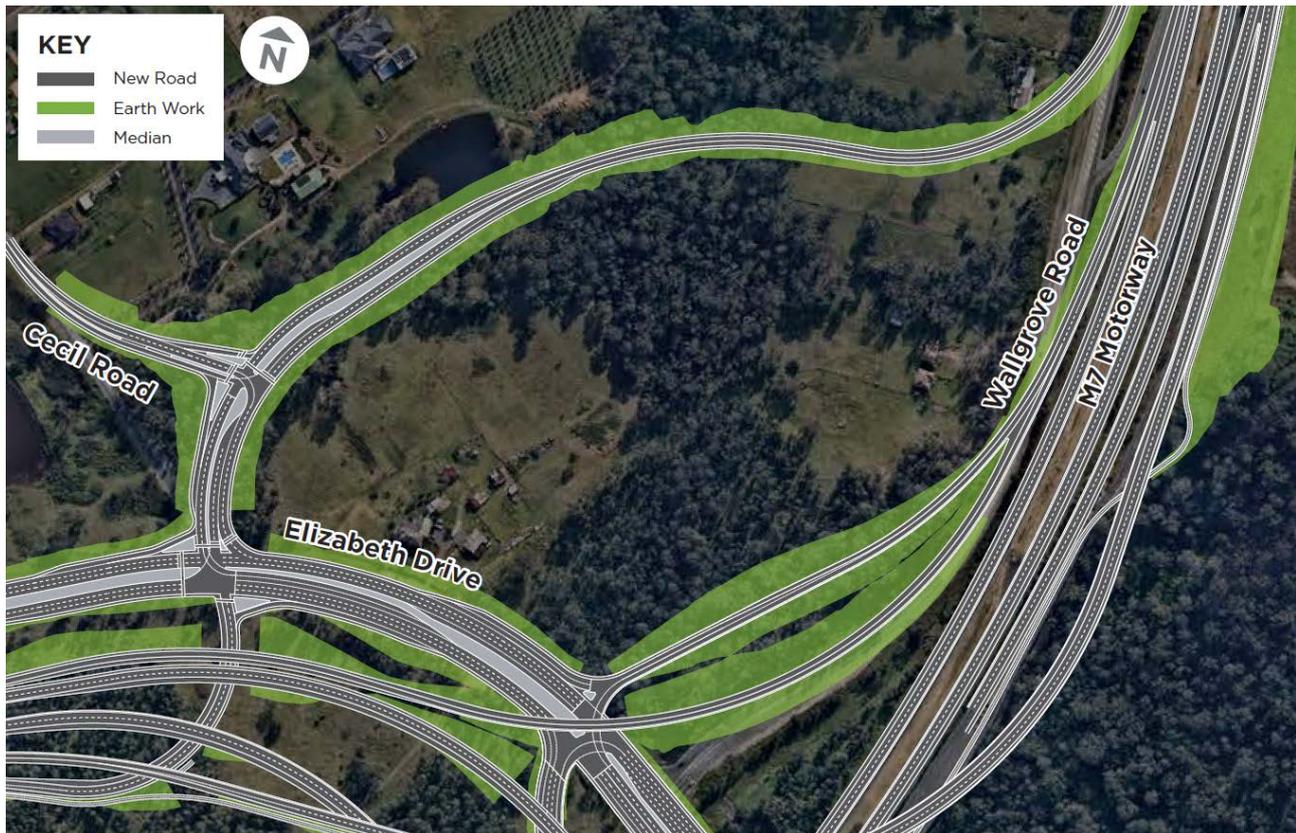


Figure 12 Option D - Curvature at the Elizabeth Drive and Wallgrove Road intersection

Key advantages (compared to Option C):

- Reduced property acquisition to Western Sydney Parklands lots at the western corner of Cecil Road and Elizabeth Drive.
- Reduced impact on the current and future land use on Western Sydney Parklands lots at the western corner of Cecil Road and Elizabeth Drive.
- Acceptable road geometry on the Wallgrove Road approach to the Wallgrove Road / Elizabeth Drive intersection.
- Safety concerns regarding traffic weaving on Elizabeth Drive were eliminated.
- No significant vertical geometry and design constraints imposed on the future design development of M12 Motorway interchange ramps.

Key disadvantages (compared to Option C):

- Increased impacts to the current and future land use and development of 1111-1141 Elizabeth Drive
- Increased property acquisition at 1111-1141 Elizabeth Drive
Increased property acquisition at the frontages of 18, 20-22, 24 and 28 Cecil Road properties.
- Increased native vegetation clearing at the corner of Cecil Road and Elizabeth Drive.

Although disadvantages remained, following the development and assessment of the design options in this chapter, Option D was determined to be the best overall comprised solution.

4.2.6 Option 1 E – Proposed alternative route by property owner

As detailed above, Option D was determined to be the best overall comprised solution. However, as part of ongoing consultation with directly affected property owners and stakeholders, an alternative route to Option E was proposed by an impacted property owner, as shown below.

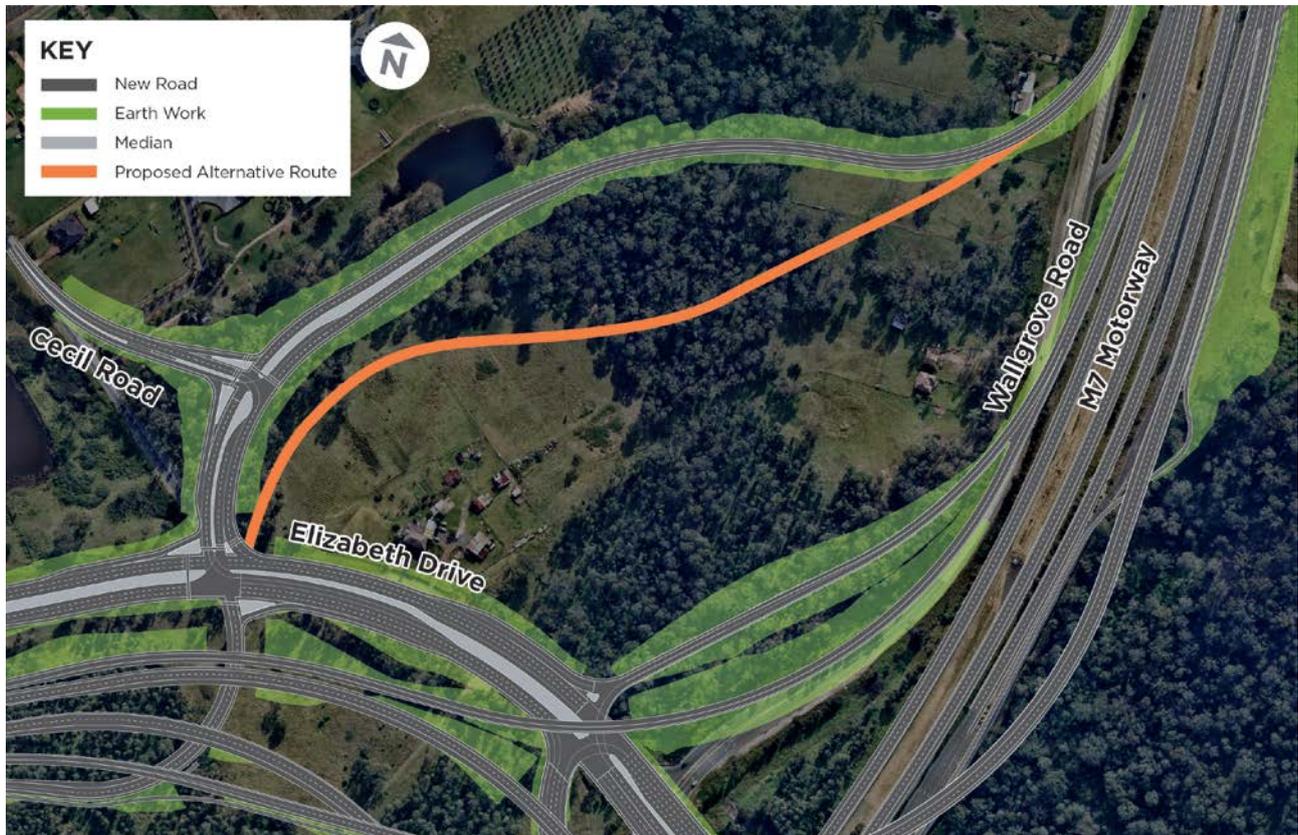


Figure 13 Proposed alternative route by property owner

Transport agreed to consider the landowner's design as part of the options assessment.

The proposed alternative route was further developed as a road design by Transport, see Option E below. The Option E design attempted to match the alignment of the proposed sketch.

However due to road design standards, criteria and constraints the road design and alignment of the approach of Wallgrove Road into Elizabeth Drive is the same design as Option D.

The design of Option E was able to be modified and moved the remaining section of the Wallgrove Road alignment further south.

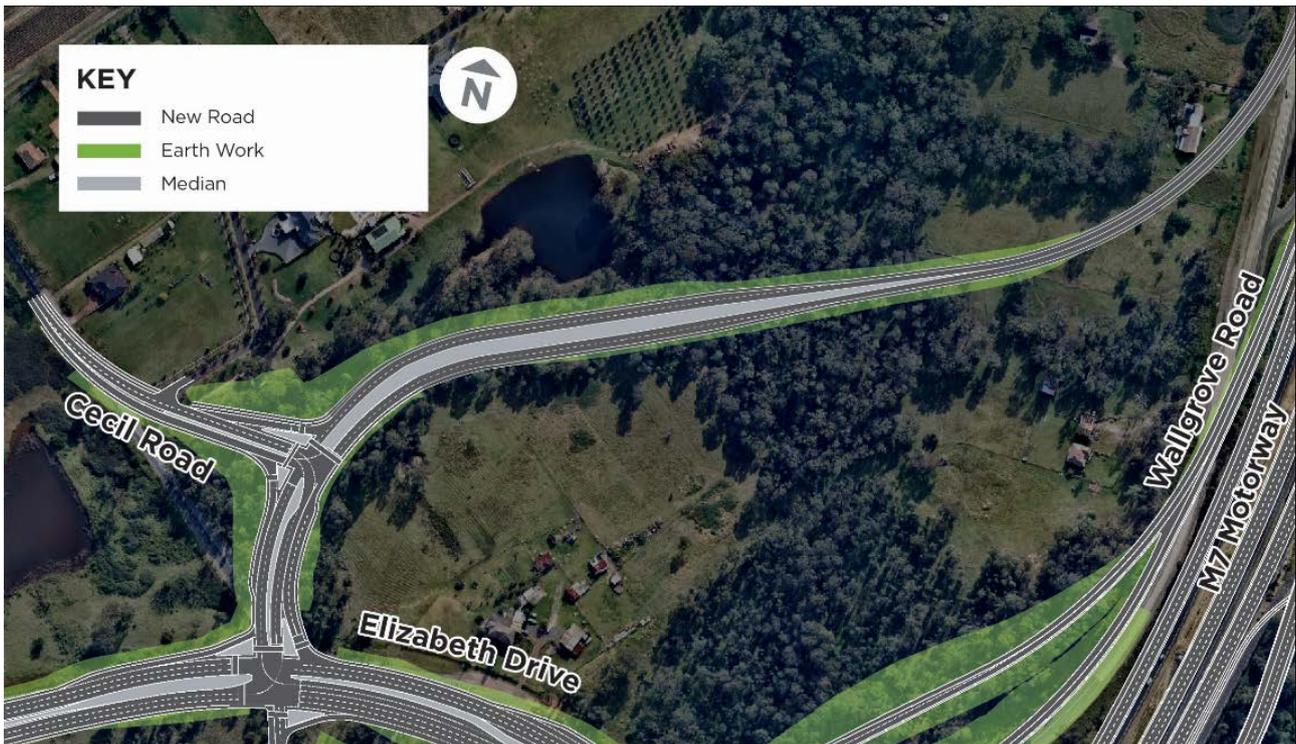


Figure 14 Transport for NSW amended alternative route by property owner

A comparative assessment of this option was completed against Option D using the same criteria as detailed in section 2.12, to determine which of these two options resulted in the best overall compromised solution.

As the two options are very similar in their alignment, the delivery and functional assessment criteria and the environmental and heritage sub criteria of Aboriginal and non-Aboriginal assessment was very similar and resulted in a negligible effect on the overall assessment.

Below is summary of the assessment:

Key advantages (compared Option D):

- Reduced visual impacts 18, 20-22, 24 and 28 Cecil Road properties.
- Reduced impact to the drainage line. Although the road footprint avoids or minimises direct impact the existing dam, it will still need to be completely drained, backfilled and reshaped or modified for construction purposes and because it would be located partially with the road reserve and private property.

Key disadvantages (compared to Option D):

- Increase the total area of acquisition required by approximately 8210m² or 14 percent due to the increase in the severance of properties where access cannot be provided to the severed portion of land.
- Greater impact of the current and future land use of 1111-1141 Elizabeth Drive and Western Sydney Parklands.
- Increase of area of vegetation clearing of ECC/CECC approximately 4185m² or 12 percent.

Although the alternative Option E did result in reduced visual impacts to the Cecil Road properties and a reduction to the impacts on the drainage line, it did result in greater negative impacts on land use, increased land acquisition and an overall increase in the removal of native vegetation.

The comparative assessment which takes into account all of the criteria, determined that Option D still resulted in the best overall comprised solution. As a result of the considered analysis of the all the options, Option D has is now the Transport current design.

4.3 Current design compared to EIS Amendment Report Design

Option D was then compared to the original EIS Amendment Report design (Figure 15) to ensure it resolved the road design and traffic flow deficiencies and assessed the change in impacts when compared to the Amendment Report design (Figure 15).



Figure 15 EIS Amendment Report design

Current Design

Key advantages (current design compared to EIS Amendment Report design):

- Provision of a Cecil Road / Wallgrove Road intersection with traffic lights that creates satisfactory traffic flow and efficiently performance targets for future predicated growth
- Improved long term solution for Fairfield City Council's proposed Cecil Road corridor
- Improved geometry on the northern section of the realigned Wallgrove Road.

Key disadvantages (current design compared to EIS Amendment report):

- Demolition of Western Sydney Parklands property at 95 Wallgrove Road
- Increased impacts to the current and future land use and development of 1111-1141 Elizabeth Drive
- Increased property acquisition at 1111-1141 Elizabeth Drive
- Increased property acquisition at the frontages of 18, 20-22, 24 and 28 Cecil Road properties.

The comparison and assessment of the current design and the EIS Amendment Report design determined the road and intersection design and resolved the traffic flow deficiencies.

The current design results in close to the same amount of native vegetation clearing and impacts to the drainage line and dam, compared the Amendment Report design. The visual and noise impacts to the Cecil Road properties is also negligible when the designs are compared.

The current design does increase acquisition required at 1111-1141 Elizabeth Drive and impacts on the current land and future land use and development potential at this location. There is also an increase in property acquisition required at 18, 20-22, 24 and 28 Cecil Road.

However the current design option when compared to other post amendment design options did perform the best when assessed against the key assessment criteria as detailed in section 2.1.1.

4.3.1 Property impacts of the current design compared to the Amendment Report design

When comparing the Amendment Report design to the current design, an additional 12,935 square metres of land was required, however, there was a decrease of 25,985 square metres which resulted in an overall reduction of approximately 13,210 m² of land acquisition. See Figure 16.

The decrease is most noticeable to the Western Sydney Parklands as a result of refinement of the road alignment and the elimination of a sediment basin at the corner of the existing Wallgrove Road / Elizabeth Drive intersection.

There is also reduction in land acquisition of 1111-1141 Elizabeth and to the Cecil Road properties around the existing dam and drainage line. At this stage, the intent is to backfill the existing dam, however, Transport will continue to consider options and continue consultation with land owners, to minimise impact to the dame and reduce amount of vegetation clearing where possible.

The increase was largely due to the removal of the roundabout seen in the Amendment Report design and the inclusion of traffic lights as an alternative.

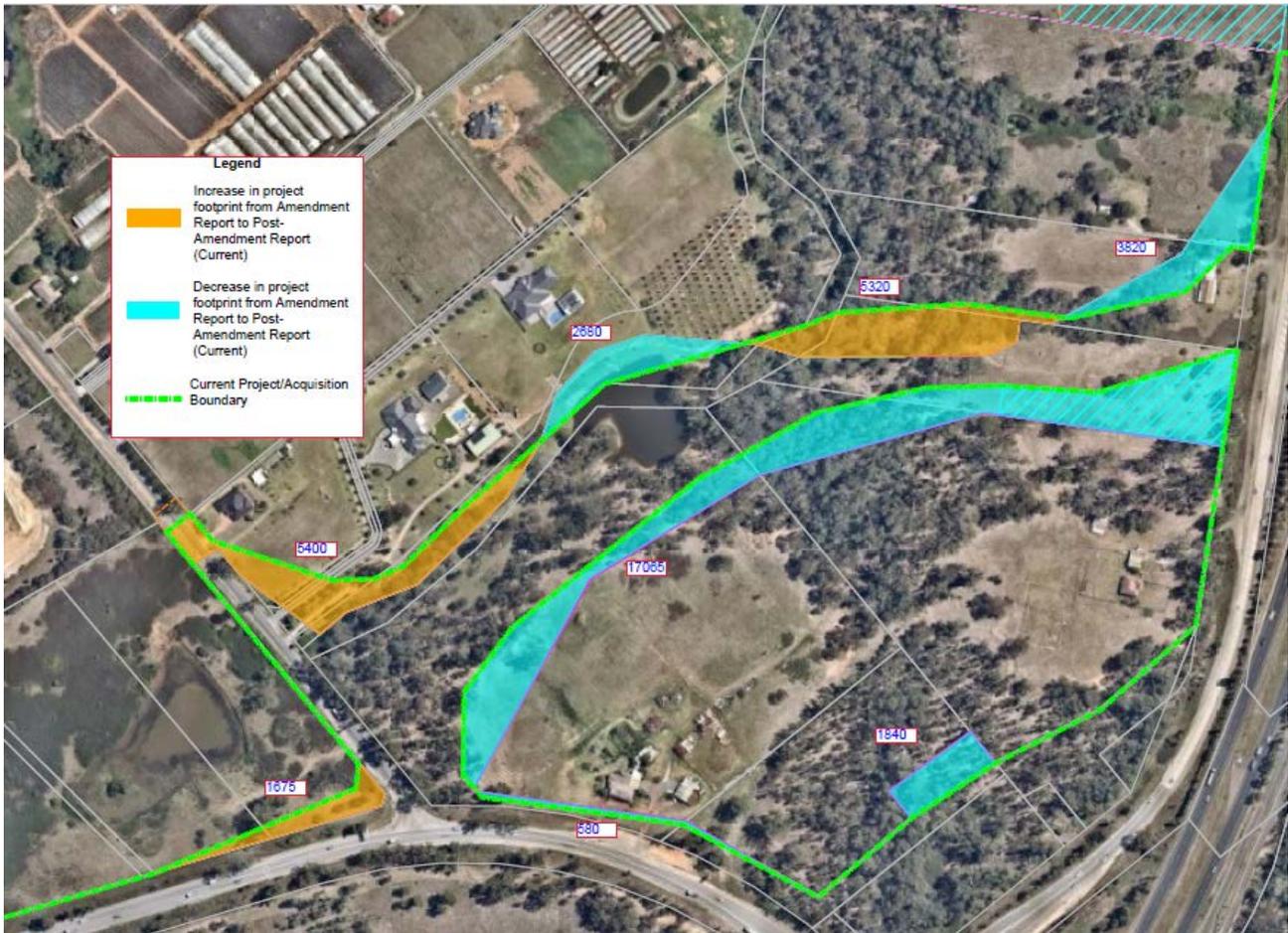


Figure 16 Property acquisition – increases and decreases from the Amendment Report design to the current design

5. Next steps

Following consultation with private land owners impacted by the Amendment Report design including impacts such as acquisition, the extent of native vegetation clearing, impact to the drainage line and dam, access issues and visual and noise impacts, refinements to the current design are still being explored with the intent of minimising them if possible during the detailed design phase.

The refinement of the design will investigate but not be limited to strategies such as vertical road alignment, steepening of batters and/or the use of retaining wall structures. The horizontal alignment of Wallgrove Road will also be refined to position it as close to as possible to the new proposed southern road boundary. These strategies will reduce the construction footprint area and will result in less clearing of native vegetation and impacts to the drainage line.

The detailed design process is also an opportunity for the project team to more accurately consider the impacts of the design on underground utilities, future traffic volume predictions and local development plans.

6. Conclusion

The intention of this report is to document the design evolution of the proposed M12 Motorway / Elizabeth Drive connection near the M7 Motorway.

The addition of the connection as part of the M12 Motorway's Amendment Report design is in response to submissions received during the EIS exhibition. One of the main concerns raised during the EIS exhibition both by community members and local and state government representatives was the need for a genuine toll-free route option allowing commuters to access the M12 Motorway without first paying the M7 Motorway toll. The EIS design has undergone a number of amendments including this connection which are now assessed as part of the Amendment Report.

There are a multitude of complexities to consider whenever road infrastructure of this scale is developed and the impacts to different stakeholder groups vary.

This report and its inclusion of the designs options each with their own unique design challenges and impacts aims to demonstrate the efforts made to consider the impacts on local private landowners and Western Sydney Parklands in context of the wider strategic importance of the M12 Motorway.

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