WestConnex M4-M5 Link

Rozelle Interchange – Modification: The Crescent overpass and active transport links

Modification report

Appendix D

Air quality assessment

Roads and Maritime Services

WestConnex M4-M5 Link

Rozelle Interchange – Modification: The Crescent overpass and active transport links

Modification Report

Appendix D Air quality assessment

August 2019

Prepared for

NSW Roads and Maritime Services

Prepared by

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1 Introduction

NSW Roads and Maritime Services (Roads and Maritime) is seeking to modify the existing project approval for the construction and operation of the WestConnex M4-M5 Link project (the project), as shown in **Figure 1-1**. Approval for the construction and operation of the project was granted on 17 April 2018 by the former NSW Minister for Planning (application number SSI 7485).

1.1 Overview of M4-M5 Link project

The EIS for the project described construction and operation of the M4-M5 Link project in two stages:

- Stage 1[1]: A new multi-lane road link between the M4 East Motorway at Haberfield and the New M5 Motorway at St Peters (Mainline Tunnels)
- Stage 2[2]: An interchange at Lilyfield and Rozelle (the Rozelle Interchange) and a tunnel connection between Anzac Bridge and Victoria Road, east of Iron Cove Bridge (Iron Cove Link).

Stage 2 works commenced in 2019 with these components of the project anticipated to open to traffic in 2023.

A more comprehensive overview of the M4-M5 Link project, as well as other aspects of the WestConnex program of works is provided within the Environmental Impact Statement (EIS) and the Submissions and Preferred Infrastructure Report (SPIR).

[1] M4-M5 Link Stage 1 (the Mainline Tunnels)
[2] M4-M5 Link Stage 2 (the Rozelle Interchange and Iron Cove Link)

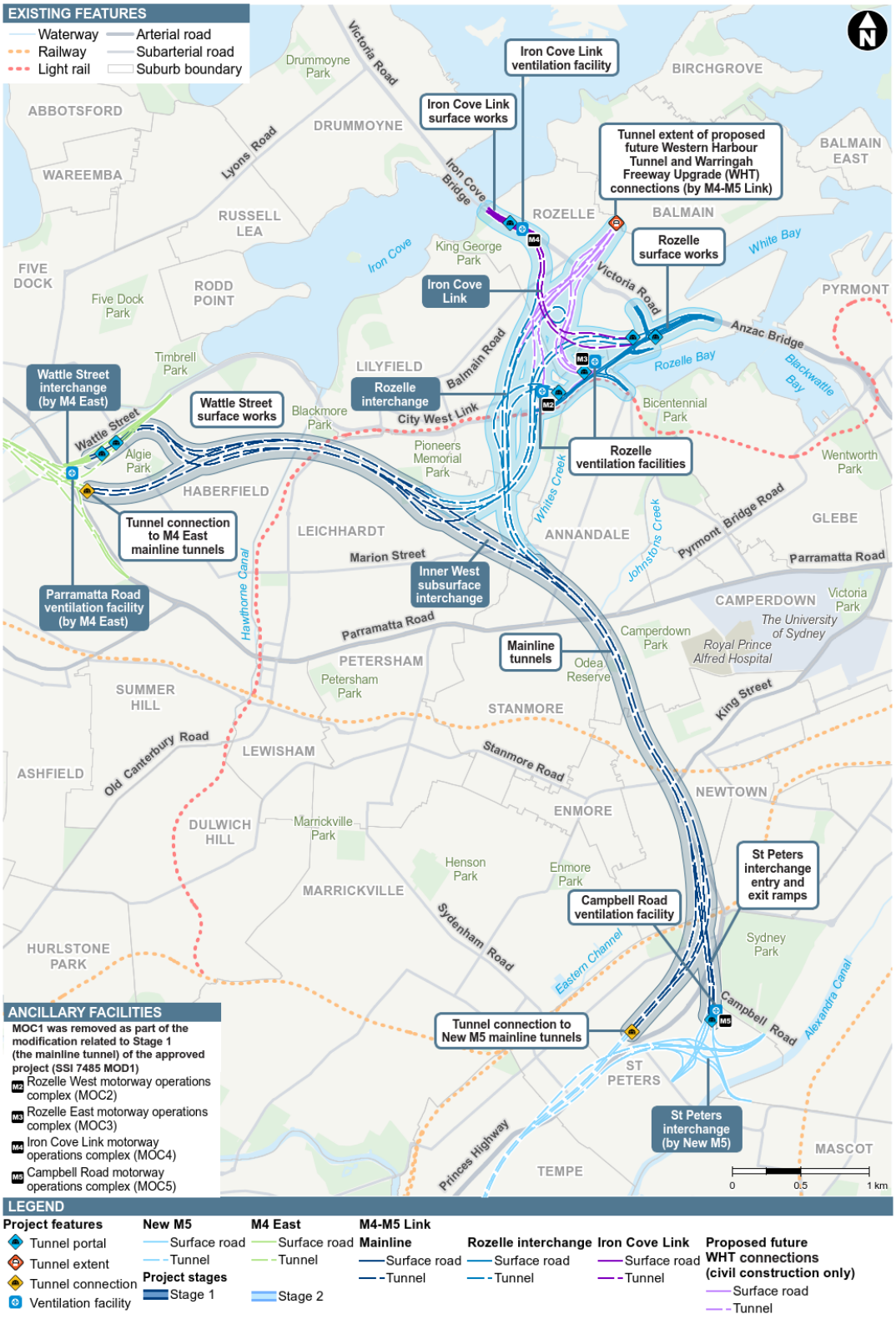

Figure 1-1 Overview of the M4-M5 Link project

1.2 Overview of proposed modification

Since Planning Approval (April 2018 Infrastructure Approval) was granted, a contractor has been appointed to construct Stage 2 of the approved project on behalf of Roads and Maritime. The contractor has reviewed the concept design for the approved project and in discussions with Roads and Maritime has identified a number of potential design and constructability improvements.

The proposed modification relates to Stage 2 of the approved project. The following key components are proposed as part of the proposed modification (refer to **Figure 1-2**):

- A new elevated vehicular overpass ('The Crescent overpass') that would allow eastbound traffic heading north on The Crescent from Annandale to bypass the signalised intersection at The Crescent / City West Link junction and continue east on The Crescent towards Victoria Road and the Anzac Bridge
- Modifications to the eastbound lanes of the City West Link and The Crescent on either side of the intersection and northbound lanes on The Crescent at Annandale to provide space for the tie-in of The Crescent overpass
- Upgrades to the intersection of The Crescent/Johnston Street/Chapman Road (including lane reconfiguration and marking, signal phasing, adjusting positions of traffic signals kerb works etc.)
- Realignment of the Pedestrian and Cycling Green Link ('green link') to the west of The Crescent, providing a connection between the Rozelle Rail Yards and the Rozelle Bay light rail stop
- A new shared user path bridge spanning The Crescent to the east of The Crescent / City West Link intersection. The shared user path bridge provides a connection between Rozelle Rail Yards and the shared user path to Bicentennial Park along the east side of The Crescent and adjacent to Rozelle Bay. The shared user path bridge and shared user path would provide the pedestrian and cyclist connectivity required by Conditions E120 and E121, albeit in a different arrangement to that shown in the EIS
- Minor changes to the layout of the approach roads leading to the Anzac Bridge from Victoria Road, The Crescent and the Rozelle Interchange to improve traffic merging arrangements
- Use of a minor construction ancillary facility, established in accordance with Condition C24, as a construction ancillary facility. The proposed construction ancillary facility (C6a) is located on the south side of The Crescent to the west of James Craig Road and adjacent to Rozelle Bay. The proposed modification would allow use of the site for a limited number of additional purposes which are not permitted by Condition C24 including:
  - Light vehicle parking for workers (around 9 spaces) and
  - Material laydown areas and a limited number of associated vehicle movements (small delivery vans and rigid trucks).

  These additional purposes would support the various construction activities at the C6 civil site.

As outlined in Chapter 1 (Introduction) of the Modification report, the proposed modification would:

- Improve intersection performance on this congested section of the road network including at the City West Link/The Crescent and The Crescent/Johnston Street/Chapman Road intersections
- Adjust the alignment of active transport links to avoid conflict with The Crescent overpass while still improving the overall connectivity proposed within the EIS and Conditions of Approval (CoA) for the project by providing a direct connection between the suburbs of Rozelle and Annandale and public transport infrastructure including the Rozelle Bay light rail stop
- Improve the efficiency of construction and minimise the duration of construction impacts on nearby residents by reducing the need for further construction activities to accommodate the proposed Western Harbour Tunnel and Warringah Freeway Upgrade project (Western Harbour Tunnel project) at City West Link and The Crescent

- Improve capacity at the intersections so that they can maintain performance with traffic generation from future development proposed in the vicinity of the project including the Western Harbour Tunnel project if that future development proceeds.

1.3 Assessment requirements

In preparing this assessment, the Secretary's Environmental Assessment Requirements (SEARs), issued for the proposed modification have been reviewed.

Environmental assessment requirements as proposed by RMS for the M4-M5 Link Rozelle Interchange Modification: The Crescent overpass and active transport links which are relevant to the Air Quality Assessment are presented below.

- Assessment of potential air quality impacts during the construction period. This would be a risk-based assessment consistent with the assessment prepared for the EIS.
- Consideration of potential changes to the predicted operational air quality impacts for the approved project as a result of the proposed modification.

These requirements are addressed in Chapter 2, 5 and 6 of this report.

1.4 Purpose of this report

The purpose of this report is to assess the potential air quality impacts related to the proposed modification. Specifically, the assessment includes the following:

- Discussion of air quality impacts and standard practice mitigation measures during construction.
- Discussion of air quality impacts ($PM_{2.5}$ and NO_2) at the nearest residents to the City West Link, as reported in the EIS Air Quality Technical Report (Pacific Environment, 2017). The area considered is that bordered by City West Link, The Crescent and Johnston Street.
- Quantitative assessment of changes in $PM_{2.5}$ and NO_2 concentrations at these receptors due to the proposed modification.

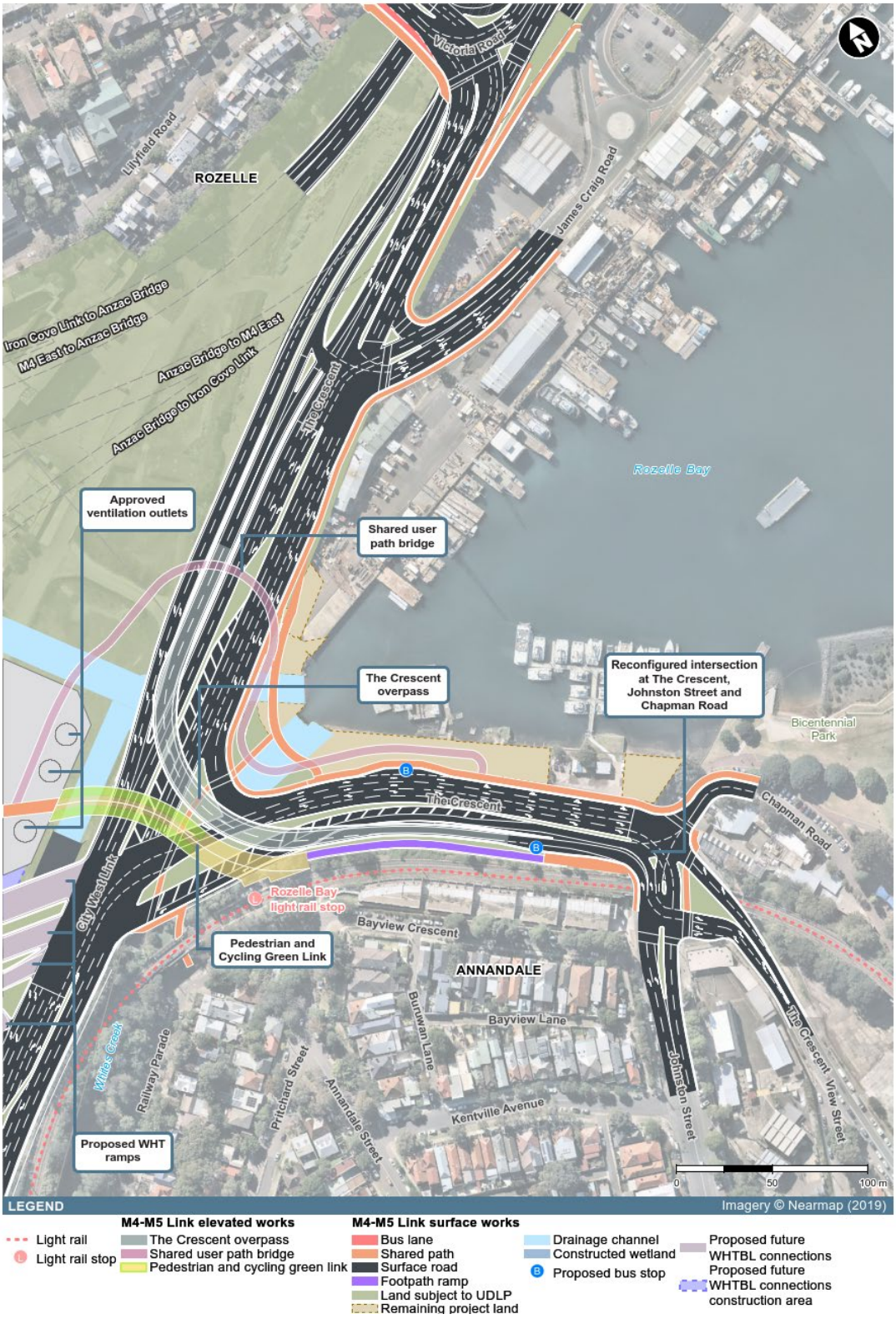

Figure 1-2 Overview of the proposed modification

2 Assessment methodology

2.1 Key assumptions

The following assumptions were made in the assessment:

- The assumptions in the WestConnex Road Traffic Model (WRTM) – the strategic traffic model used by Roads and Maritime to forecast traffic demands for future scenarios – were retained
- All vehicle emissions assumptions for 2033 used in the EIS were retained
- Emissions from ventilation outlets that were used in the EIS remained the same
- Meteorological modelling data used for the EIS was retained.

2.2 Approach

2.2.1 Construction

The changes to construction are minor and are described in Section 3. The EIS provided an assessment of risk of impacts due to construction dust based on a precinct approach which included a number of construction sites including the Rozelle civil and tunnel site (C5), The Crescent civil site (C6) and The Victoria Road civil site (C7). The construction activities proposed at these sites included building demolition, significant earthworks, tunnelling and civil works.

Based on this the EIS assessment concluded that the risks without mitigation were in the range of medium to high and so a number of mitigation measures were recommended. It is not anticipated that any additional measures will be required given that the proposed modification does not substantially alter the scope, nature and footprint of the construction works and the comprehensive mitigation measures to be implemented under the CoA.

2.2.2 Operation

The operational impacts of the proposed modification were assessed using existing the GRAL[3] dispersion model. The GRAL model was previously used to assess operational impacts for the Rozelle Interchange in the EIS. Predicted impacts were assessed at the nearest 400 RWR[4] receptors surrounding the Rozelle Interchange.

Four future year project scenarios were modelled in the EIS and these are listed below:

- **Do Something – 2023 (DS-2023)**: With the M4 Widening, M4 East, New M5 and the King Georges Road Interchange Upgrade projects completed and the M4-M5 Link complete and open to traffic.
- **Do Something Cumulative – 2023 (DSC-2023)**: As for DS-2023, the M4-M5 Link complete and open to traffic, and in addition, the proposed future Sydney Gateway and the Western Harbour Tunnel project complete and operational.
- **Do Something – 2033 (DS-2033)**: With the M4 Widening, M4 East, New M5 and the King Georges Road Interchange Upgrade projects completed and the M4-M5 Link complete and open to traffic.
- **Do Something Cumulative – 2033 (DSC-2033)**: As for DS-2033, the M4-M5 Link complete and open to traffic, and in addition, the proposed future Sydney Gateway, Western Harbour Tunnel project and Beaches Link and F6 Extension complete and operational.

The DSC-2033 scenario is the focus of this assessment as this was the worst-case scenario for operational impacts in the EIS. This scenario has been remodelled using the updated traffic inputs,

[3] The Graz Lagrangian Model air quality dispersion modelling package used in the EIS and for this assessment
[4] Residential, workplace and recreational receptors. This term refers to all discrete receptor locations along the project corridor, and mainly covers residential and commercial land uses

provided by AECOM, following changes to the road network (new overpass) resulting from the proposed modification.

No changes to the locations or design of the ventilation outlets are proposed as part of the proposed modification and emissions from these outlets remain as per the EIS. The only changes resulting from the proposed modification are those related to the surface roads which reflect the altered road layout.

Results from the EIS have focused on the nearest RWR receptors (predominantly along Bayview Crescent and nearby streets in Annandale). These RWR receptors are a subset of those reported in the EIS and are shown in **Figure 2-1**. Contour plots across the domain are provided.

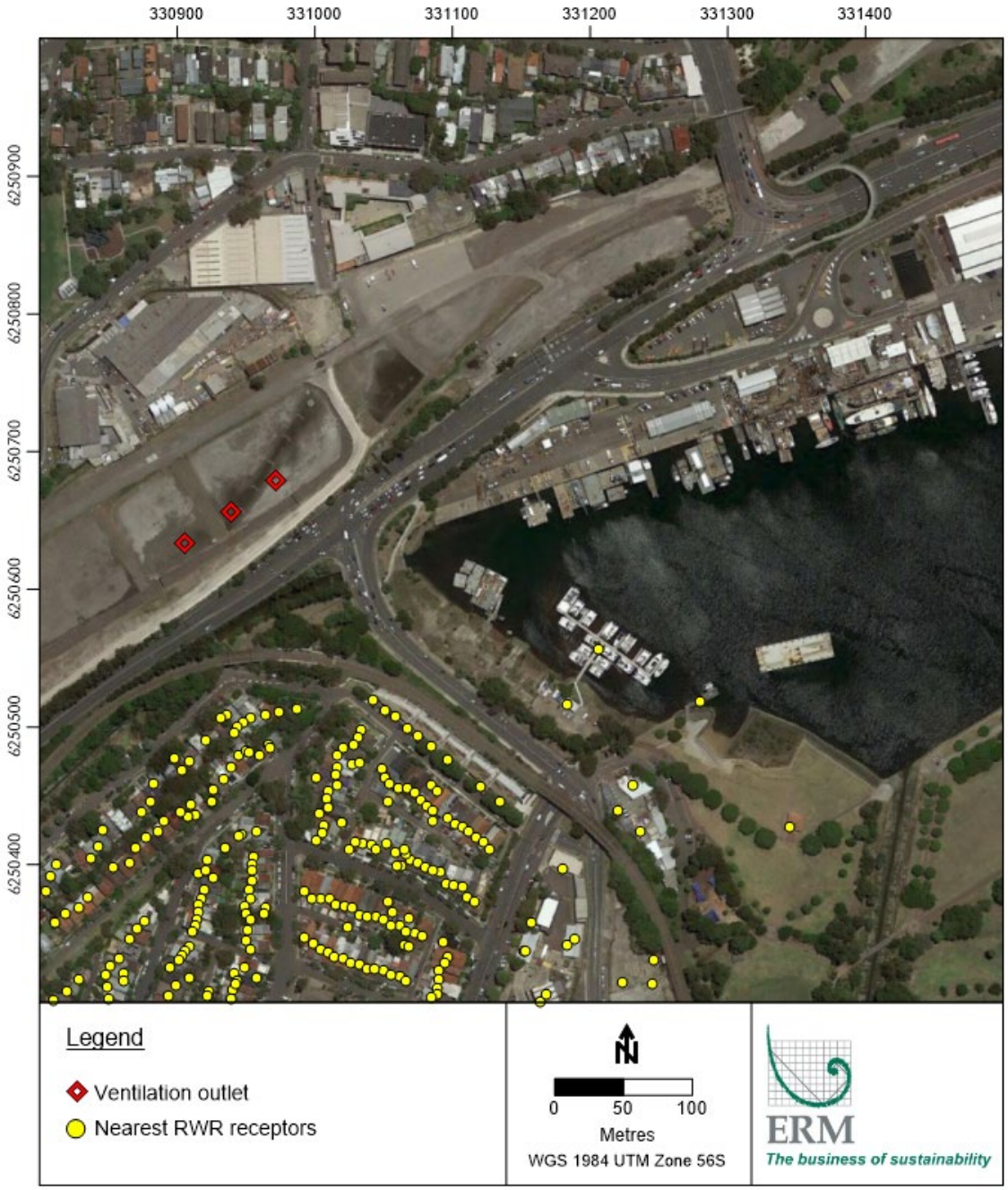

Figure 2-1 RWR receptors assessed

The EIS presented plots showing the changes due to the project for a number of pollutants. These changes were calculated by subtracting the Do Minimum (DM) scenarios from the Do Something

Cumulative (DSC) scenarios. The difference represented the change due to the project. A negative value represented a decrease in concentration (improvement in air quality), while a positive value indicated an increase in concentrations.

This assessment will present the original changes due to the project shown in the EIS, and compare them to the predicted changes due to the proposed modification.

3 Construction

A detailed assessment of potential construction impacts for the project was carried out in the EIS. This was a qualitative risk assessment based on a precinct wide approach, with the precinct including a number of construction sites including the Rozelle civil and tunnel site (C5), The Crescent civil site (C6) and The Victoria Road civil site (C7).

The EIS assessment identified areas at risk of potential impacts based on their proximity to works and sensitivity to dust and the potential magnitude of dust generating construction activities proposed at these sites. Due to the high dust generating potential of the construction activities which included building demolition, significant earthworks, tunneling and civil works, risks were categorized in the EIS as in the range of medium to high within the Rozelle precinct.

The key elements of the proposed modification includes the construction of a new overpass, realignment of active transport links, upgrade of The Crescent/Johnston Street intersection and use of a minor construction ancillary facility, established in accordance with Condition C24, as a construction ancillary facility. The proposed construction ancillary facility (C6a) would support the approved construction activities at The Crescent civil site (C6). Both construction sites are shown on **Figure 3-1.**

As the proposed modification is generally within the same footprint as the approved project, with minor extensions of footprint limited to areas within existing road reservations on The Crescent and Johnston Street, it is not anticipated that the construction dust risk profile would be different to that assessed in the EIS. Activities occurring in the limited extended footprint areas would include such things such as re-sheeting, kerb adjustments and line marking, which are not significant generators of dust. As such, the mitigation measures proposed in the EIS would remain unchanged for the proposed modification.

These measures are standard practice for construction dust and are listed in significant detail in the EIS. Relevant Revised Environmental Mitigation Measures (REMMs) from the Submissions and Preferred Infrastructure Report (SPIR) include:

Impact	Ref #	Environmental Management Measure	Timing
Impacts on ambient air quality and human health from dust generation and plant emissions during construction	AQ1	A Construction Air Quality Management Plan will be developed and implemented to monitor and manage potential air quality impacts associated with the construction for the project. The management plan will include controls required to reduce the emission of dust out of the door openings of acoustic sheds. The Plan will be implemented for the duration of construction.	Construction
	AQ2	Regular communication to be carried out with other WestConnex projects under construction in close proximity to ensure that measures are in place to manage cumulative dust impacts.	Construction
	AQ3	Regular site inspections will be conducted to monitor potential dust issues. The site inspections, required actions and ongoing issues, will be recorded and actioned appropriately within agreed timeframes by relevant project personnel.	Construction
	AQ4	Construction activities with the potential to generate dust will be modified or ceased during unfavourable weather conditions to reduce the potential for dust generation.	Construction
	AQ5	Measures to reduce potential dust generation, such as the use of water carts, sprinklers, dust screens and surface treatments, will be implemented within project sites as required.	Construction
	AQ6	Access roads within project sites will be maintained and managed to reduce dust generation.	Construction

Impact	Ref #	Environmental Management Measure	Timing
	AQ7	Where reasonable and feasible, appropriate control methods will be implemented to minimise dust emissions from the project site.	Construction
	AQ8	Storage of materials that have the potential to result in dust generation will be minimised within project sites at all times.	Construction
	AQ9	All construction vehicles and plant will be inspected regularly and maintained to ensure that they comply with relevant emission standards.	Construction
	AQ10	Engine idling will be minimised when plant is stationary, and plant will be switched off when not in use to reduce emissions.	Construction
	AQ11	The use of mains electricity will be favoured over diesel or petrol-powered generators where practicable to reduce site emissions.	Construction
	AQ12	Haul roads will be treated with water carts and monitored during earthworks operations, ceasing works if necessary during high winds where dust controls are not effective.	Construction
	AQ13	Suitable dust suppression and/or collection techniques will be used during cutting, grinding or sawing activities likely to generate dust in close proximity to sensitive receivers.	Construction
	AQ14	The potential for dust generation will be considered during the handling of loose materials. Equipment will be selected and handling protocols developed to minimise the potential for dust generation.	Construction
	AQ15	All loaded spoil haulage trucks and other project-related heavy vehicles carrying materials with the potential to result in dust generation will be covered to prevent dust emissions during transport in accordance with relevant road regulations.	Construction
	AQ19	Areas of soil exposed during construction will be minimised at all times to reduce the potential for dust generation.	Construction
	AQ20	Exposed soils will be temporarily stabilised during weather conditions conducive to dust generation and prior to extended periods of inactivity to minimise dust generation.	Construction
	AQ21	Exposed soils will be permanently stabilised as soon as practicable following disturbance to minimise the potential for ongoing dust generation.	Construction
	AQ22	Ensure that stockpiles of materials with the potential to result in dust emissions are adequately protected and managed to reduce potential dust generation.	Construction
	AQ23	Ensure fine materials are stored and handled to minimise dust.	Construction
	AQ24	All sealed surfaces within sites and site accesses will be managed to reduce dust generation and sediment tracking onto roads	Construction
	AQ25	At the commencement of establishment of project ancillary facilities, controls such as wheel washing systems and rumble grids will be installed at all site exits to prevent deposition of loose material on sealed surfaces outside project sites to reduce potential dust generation.	Construction

Relevant Infrastructure Approval Conditions include:

Ref #	Condition
C4 (d)	An Air Quality CEMP Sub-plan must be prepared in consultation with the EPA and relevant councils and be consistent with the CEMP referred to in the EIS.
C5	The CEMP Sub-plans must state how: (a) the environmental performance outcomes identified in the EIS and SPIR as modified by these conditions will be achieved; (b) the mitigation measures identified in the EIS and SPIR as modified by these conditions will be implemented; (c) the relevant terms of this approval will be complied with; and (d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed.
C6	The CEMP Sub-plans must be endorsed by the ER and then submitted to the Secretary for approval no later than one (1) month prior to the commencement of the construction activities to which they apply.
C7	Any of the CEMP Sub-plans may be submitted to the Secretary along with, or subsequent to, the submission of the CEMP.
C8	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Secretary. The CEMP and CEMP Sub-plans, as approved by the Secretary, including any minor amendments approved by the ER, must be implemented for the duration of construction. Where the CSSI is being staged, construction of that stage is not to commence until the relevant CEMP and CEMP sub-plans have been endorsed by the ER and approved by the Secretary.
C9 (e)	A Dust Deposition Monitoring Program must be prepared in consultation with the EPA to compare actual performance of construction of the CSSI against predicted performance.

It is not anticipated that any additional measures would be required given that the proposed modification does not substantially alter the scope, nature and footprint of construction works and given the comprehensive mitigation measures to be implemented under the Infrastructure Approval including the Air Quality CEMP Sub-plan (Condition C4(d)) and the Dust Deposition Monitoring Program (Condition C9(e)).

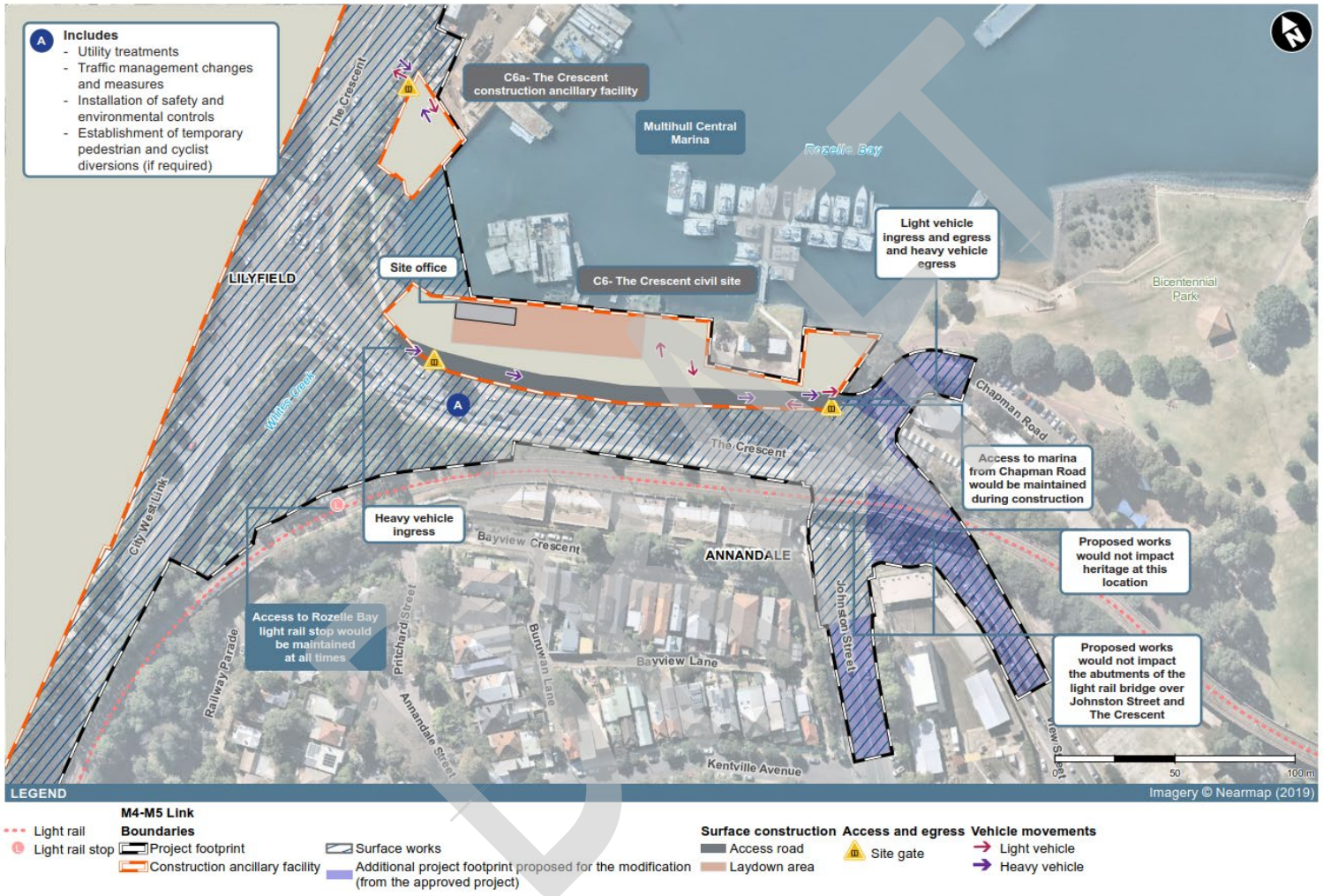

Figure 3-1 Proposed construction ancillary facility (C6a)

4 Air quality criteria

Air quality in the M4-M5 Link domain for the EIS, was assessed in relation to the criteria from the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (NSW EPA, 2016) (NSW Approved Methods). This is the same approach taken for the assessment of the proposed modification. The pollutants and criteria relevant for this study are summarised in **Table 4-1**. Most of these criteria apply to the cumulative concentration, that is, the existing background levels plus the project.

Table 4-1 Air quality criteria applicable to the project assessment

Pollutant/metric	Concentration	Averaging period
Cumulative concentrations		
NO_2	246 μg/m^3	1 hour
$PM_{2.5}$	25 μg/m^3	24 hours
	8 μg/m^3	1 year
Change in concentration		
$\Delta PM_{2.5}$	1.8 μg/m^3	1 year

Determining the cumulative NO_2 concentrations are not as simple as adding the background to the project contributions. Due to the chemical transformation that occurs to convert NO_X to NO_2, a different method is used. This empirical method is described in detail in Annexure G of the "*Technical working paper – air quality*" prepared for the EIS (Pacific Environment, 2017) and was used again here to calculate the 1-hour NO_2.

Given the high background levels for both maximum 24-hour and annual average $PM_{2.5}$, and that annual average levels already exceed the 8 μg/m^3 criterion across much of Sydney, assessing the project against these was problematic during the EIS process and the use of other metrics was investigated which were more meaningful from a health impact perspective.

The key metric that emerged during the assessment of the M4 East, New M5 and M4-M5 Link projects was the change in the annual mean $PM_{2.5}$ concentration ($\Delta PM_{2.5}$) (Pacific Environment, 2015a; Pacific Environment, 2015b; Pacific Environment, 2017). For the M4-M5 Link project EIS, the value for $PM_{2.5}$ was 1.8 μg/m^3, representing a risk threshold of 1 in 10,000 for all-cause mortality for ages 30 and over. A full description of the rationale and calculations used to determine this value can be found in the *"Technical working paper – air quality*" prepared for the EIS (Pacific Environment, 2017).

Each of these criteria will be discussed in relation to the modelling results in **Section 6**.

5 Operational traffic emissions

Total traffic emissions were calculated across the whole GRAL modelling domain shown in the EIS. However, a comparison between the EIS results and the proposed modification are based only on selected roads in the vicinity of the proposed modification. **Figure 5-1** presents the section of the model domain selected for comparison purposes.

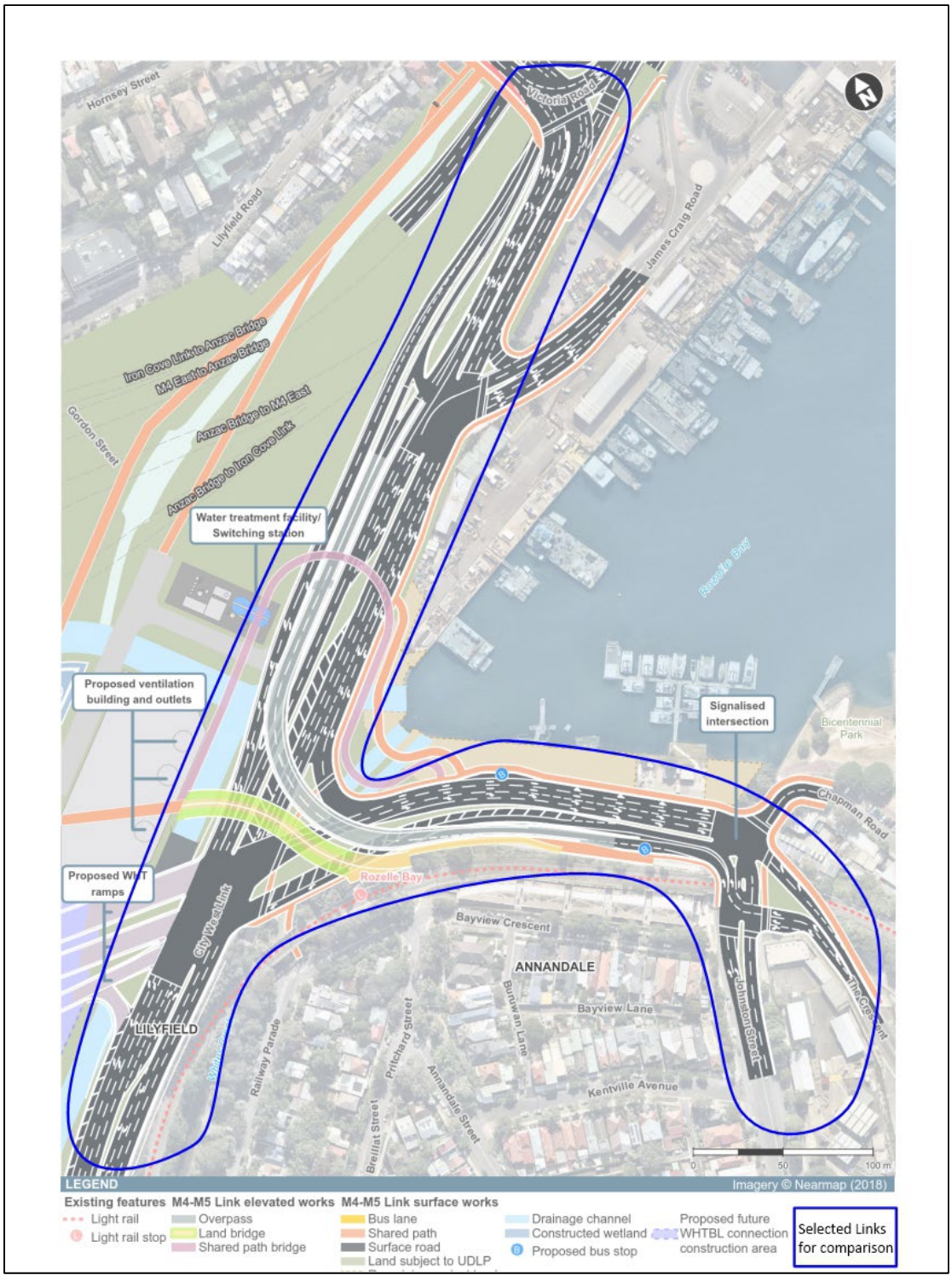

Figure 5-1 Total traffic emissions comparison area coverage

The total traffic emissions for selected road links in the EIS and the proposed modification modelling scenarios are presented in **Table 5-1** and are also presented in **Figure 5-2**. The change in emissions between scenarios for the selected links is shown in **Table 5-2**.

When compared to the Do Something Cumulative scenario in the EIS, there is an increase in NO_X and $PM_{2.5}$ emissions for the proposed modification. This is largely a result of the increased gradient due to introduction of the overpass which increases emissions. When compared to the Do Minimum scenario, both the EIS and Modification DSC scenarios show a reduction in emissions for both NO_X and $PM_{2.5}$.

Table 5-1 Total traffic emissions in the vicinity of the proposed project modification

Scenario code	Scenario description	Total emissions (tonnes/year)	
		NOx	$PM_{2.5}$
2033-DM EIS	2033 – Do Minimum (no M4-M5 Link)	76.5	4.0
2033-DSC EIS	2033 – Do Something Cumulative (with M4-M5 Link and all other projects)	36.0	2.4
2033-DSC MOD	2033 – Do Something Cumulative (with M4-M5 Link MOD and all other projects)	54.5	3.4

Table 5-2 Absolute changes in total traffic emissions in the vicinity of the proposed project modification

Scenario comparison	Change in total emissions (tonnes/year)	
	NOx	$PM_{2.5}$
Changes due to the project modification		
2033-DSC MOD vs 2033-DSC EIS	+18.4	+1.0
Changes due to the project in a given time		
2033-DSC EIS vs 2033-DM	-40.47	-1.62
2033-DSC MOD vs 2033-DM	-22.04	-0.63

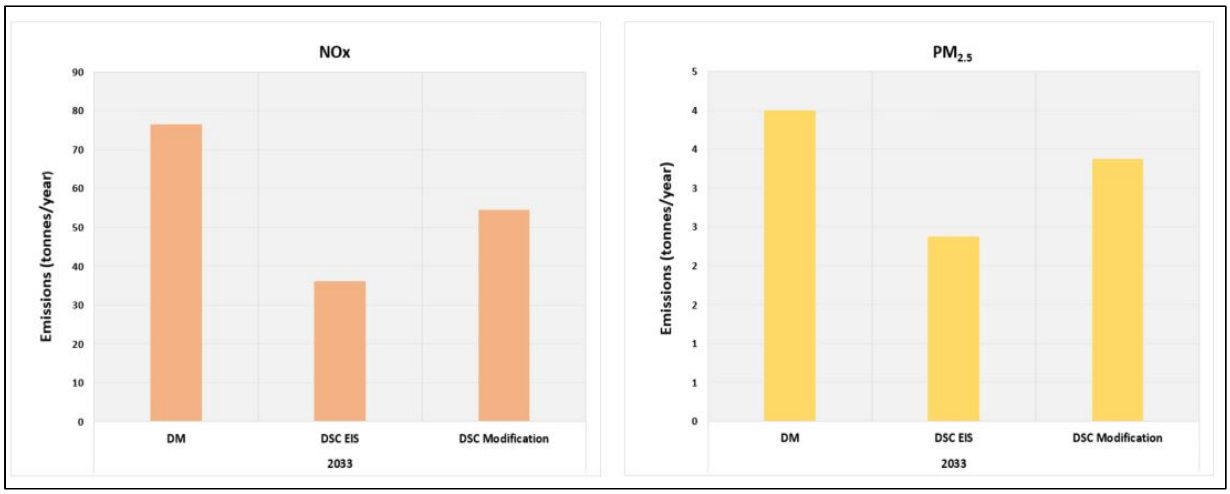

Figure 5-2 Total traffic emissions in the vicinity of the proposed project modification

6 Modelling results

This section compares the results from the EIS to the modelling predictions from the proposed modification at the nearest 400 RWR receptors. The comparison has only been done for the 2033 'cumulative scenario' (DSC-2033), which was the worst case for operational impacts in the EIS.

The pollutants assessed are consistent with the original Air Quality Impact Assessment in the EIS (Pacific Environment, 2017) and include:

- Maximum 24-hour average $PM_{2.5}$
- Annual average $PM_{2.5}$
- Maximum 1-hour average NO_2.

All the results presented in this section include all sources (roads and ventilation outlets). As previously mentioned, there were no changes to the locations or design of the ventilation outlets. Given that emissions from these outlets were also assumed to remain as per the EIS, the only changes resulting from the proposed modification are those related to the surface road emissions.

Background concentrations have also been included in the results for comparison against the NSW EPA criteria noted in the Approved Methods and discussed in **Section 4**. These concentrations are consistent with the EIS and they are listed below:

- Maximum 24-hour average $PM_{2.5}$: 25.1 $\mu g/m^3$
- Annual average $PM_{2.5}$: 8 $\mu g/m^3$
- Maximum 1-hour average NO_X: 769.6 $\mu g/m^3$ (used to convert NO_X results to NO_2).

Figure 6-1 and **Figure 6-2** compare the predictions for maximum 24-hour average $PM_{2.5}$ and annual average $PM_{2.5}$, respectively. These results are cumulative and include both background levels (as noted above) and the model predictions. The figures on the left present the results from the EIS modelling and the figures on the right show the proposed modification. Predicted maximum 1-hour average NO_2 concentrations for both the EIS and proposed modification are presented in **Figure 6-3**. As for the EIS, cumulative concentrations for each of the pollutants, exceed their relevant air quality criteria. As noted earlier, this is due to the high background values used.

No major changes can be identified between the EIS and the proposed modification. Differences can be attributed, in part, to the changes in elevation and the position of the traffic along The Crescent as it approaches the overpass from the southeast. The lanes are slightly closer to the light-rail line and Bayview Crescent for the proposed modification. There is also a gradient of around 6% as northbound traffic climbs the overpass which increases emissions at that location.

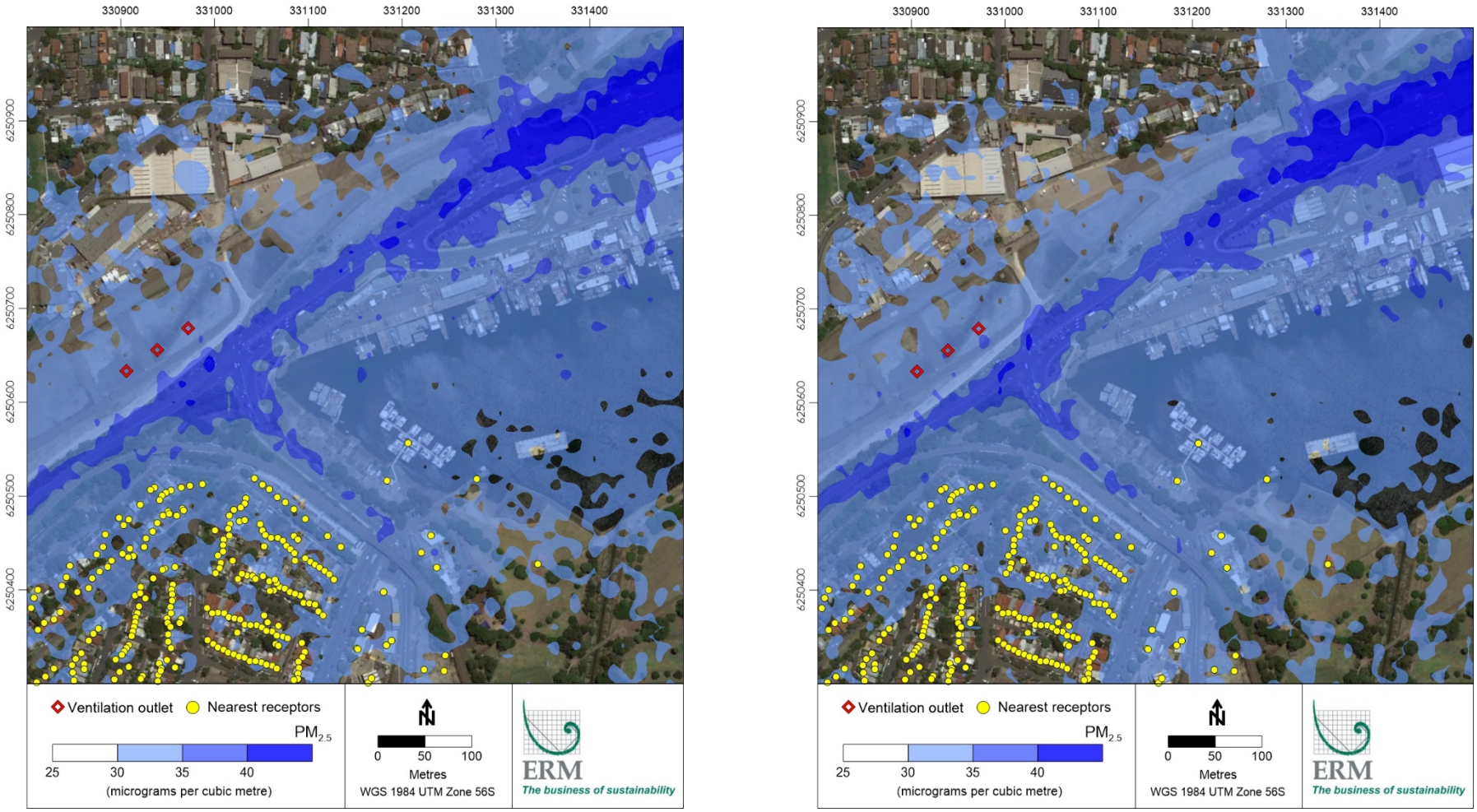

Figure 6-1 Predicted maximum 24-hour average $PM_{2.5}$ concentrations (including background) for the EIS (left) and proposed modification (right)

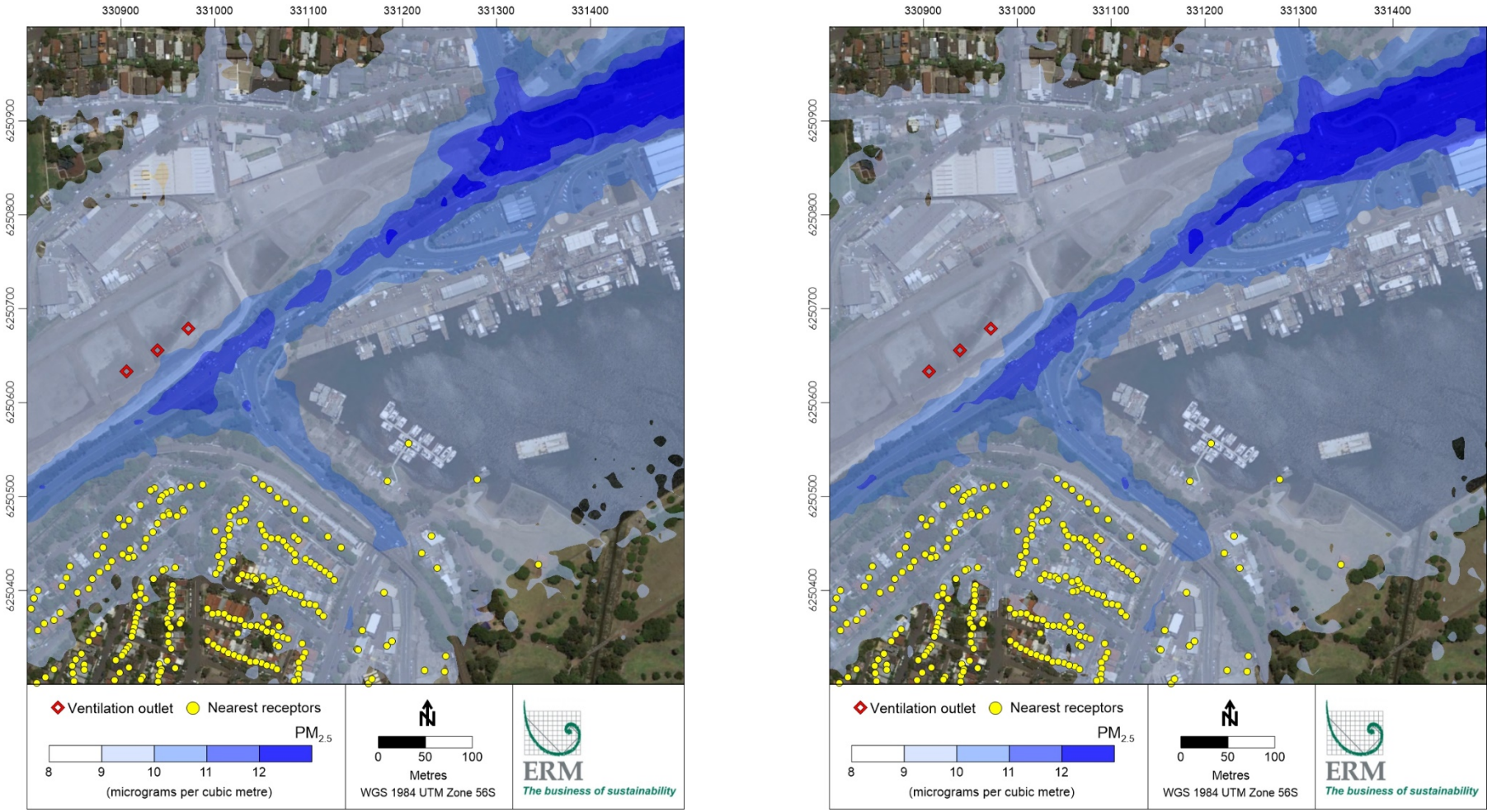

Figure 6-2 Predicted annual average $PM_{2.5}$ concentrations (including background) for the EIS (left) and proposed modification (right)

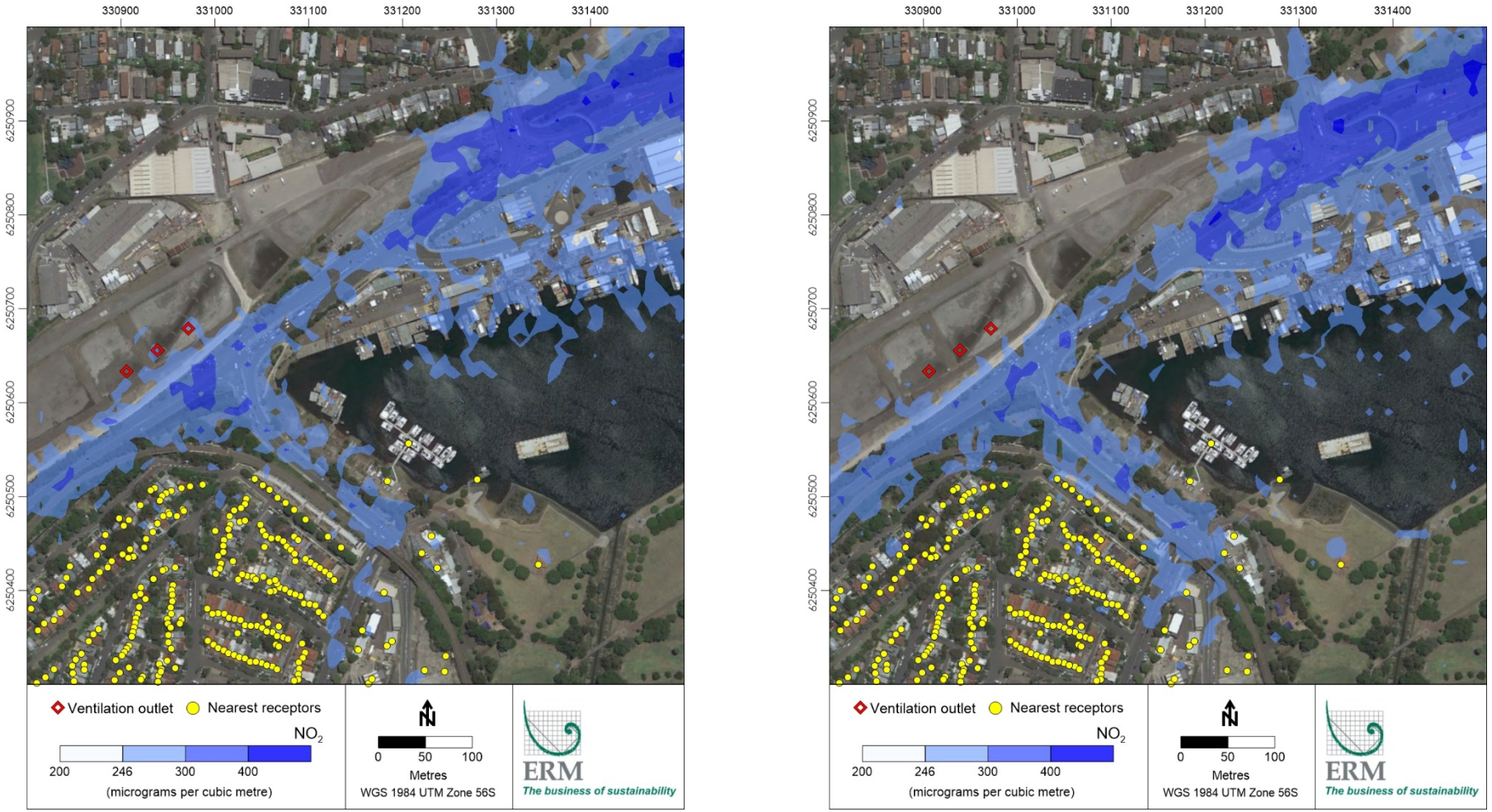

Figure 6-3 Predicted maximum 1-hour average NO_2 concentrations (including background) for surface roads for the EIS (left) and modification (right)

The EIS included a number of plots which showed the predicted changes in concentration due to the project. These have been repeated here for the proposed modification. The most relevant metric when predicting these changes and their significance for health impacts, is annual mean $PM_{2.5}$. As presented in the health risk assessment of the EIS, an increase in annual mean $PM_{2.5}$ of 1.8 µg/m3 is equivalent to a risk threshold of 1 in 10,000 for all cause mortality. When discussing the change (or increase) in annual mean $PM_{2.5}$, this represents the change due to the project. In other words, the difference between the DSC and DM scenarios for 2033.

Figure 6-4 shows the predicted changes in annual mean $PM_{2.5}$ for both the EIS (on the left) and the proposed modification (on the right). As anticipated, differences are discernible along Johnston Street and The Crescent where the main changes are associated with the proposed modification. Even though there is a larger area of increased annual mean $PM_{2.5}$ when compared to the EIS, these increases are well below 1.8 µg/m^3, with the largest increase in annual mean $PM_{2.5}$ at an RWR receptor being 0.32 µg/m^3. No change to potential health impacts are anticipated.

These increases in the Annandale area reflect changes in traffic, the movement of road links closer towards receptors along The Crescent, as well as the gradient of the overpass.

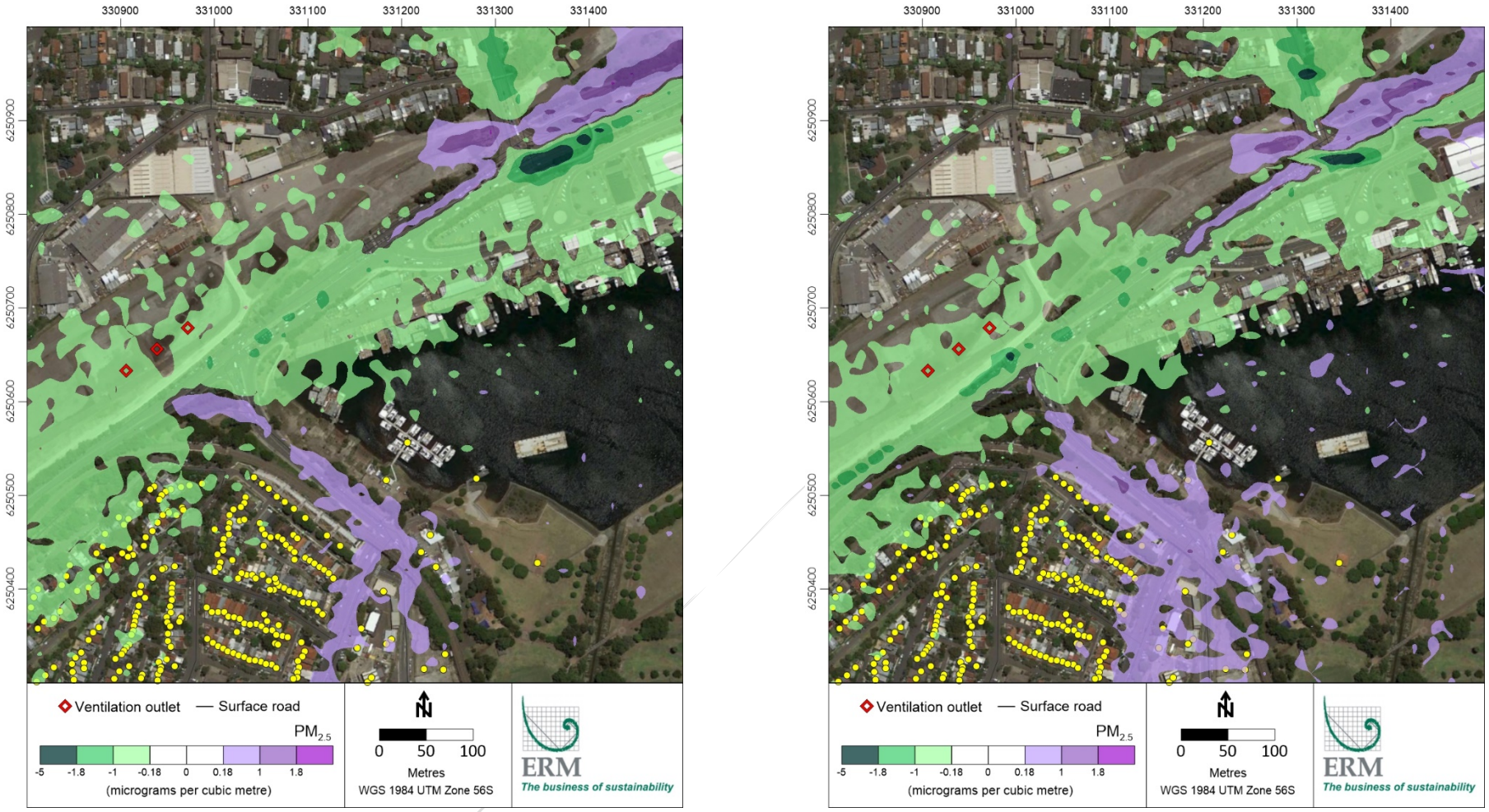

Figure 6-4 **Contour plot of change in annual average $PM_{2.5}$ concentrations for the EIS (2033-DSC minus 2033-DM) and proposed modification (2033-DSC minus 2033-DM)**

The plots above show the changes across the modelling domain, but changes at individual receptors can also be presented as follows. These figures show results for a subset (400) of the 86,375 RWR modelled in the EIS, and represent those receptors nearest to the proposed modification (shown in **Figure 2-1**).

Figure 6-5 and **Figure 6-6** show the predicted changes in maximum 24-hour average $PM_{2.5}$ due to the project as presented in the EIS and the proposed modification, respectively. It can be seen that while there are slightly more receptors that experience increases for the proposed modification, the maximum increases are still low. The maximum predicted change for these receptors in the EIS was 2.1 µg/m^3, compared to 2.9 µg/m^3 for the proposed modification.

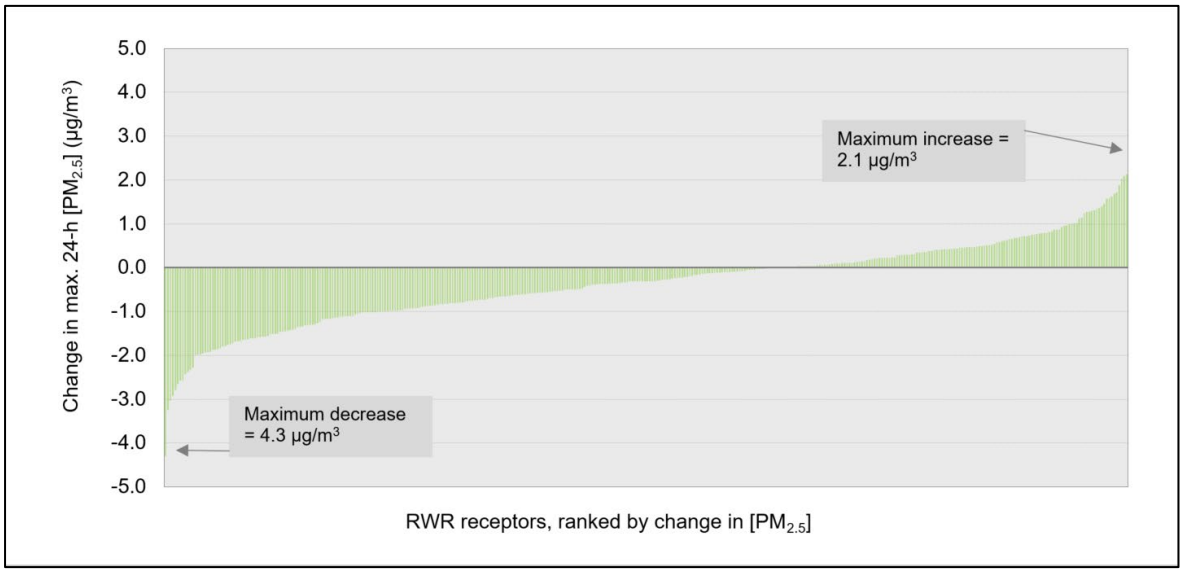

Figure 6-5 **Change in maximum 24-hour average $PM_{2.5}$ concentrations at the nearest RWR receptors for the EIS (2033-DSC minus 2033-DM)**

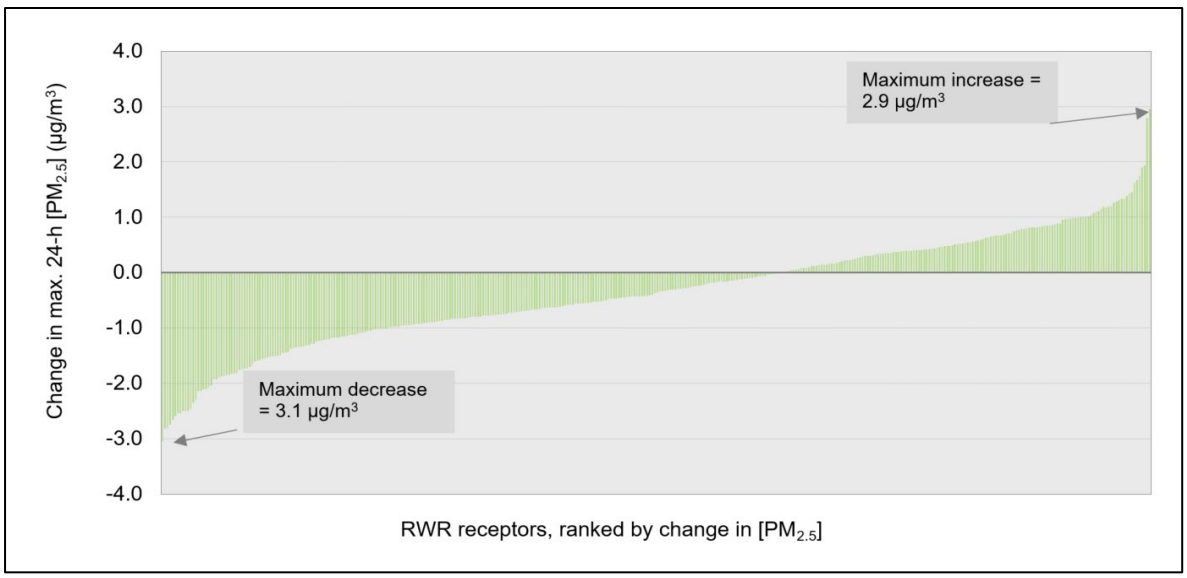

Figure 6-6 **Change in maximum 24-hour average $PM_{2.5}$ concentrations at the nearest RWR receptors for the proposed modification (2033-DSC minus 2033-DM)**

Results are similar for the changes in predicted annual mean $PM_{2.5}$ concentrations, with a maximum increase of 0.21 µg/m^3 for the EIS (**Figure 6-7**) and 0.32 µg/m^3 for the proposed modification (**Figure 6-8**), but not necessarily at the same receptor. There are more receptors which are predicted to experience an increase, but these increases are small and well below the value of 1.8 µg/m^3.

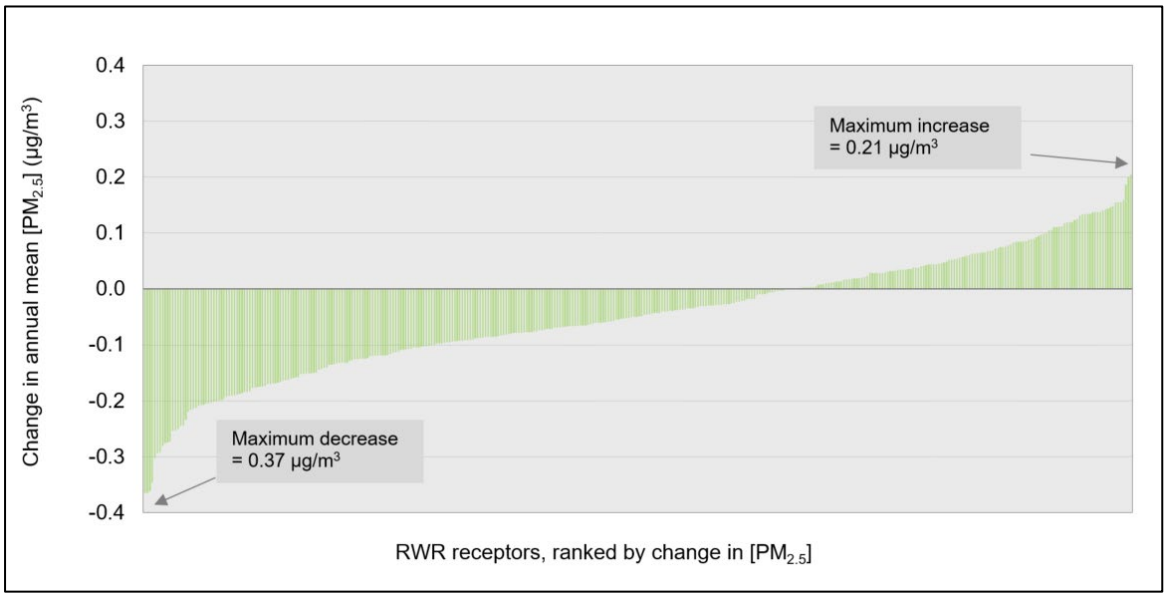

Figure 6-7 **Change in annual average $PM_{2.5}$ concentrations at the nearest RWR receptors for the EIS (2033-DSC minus 2033-DM)**

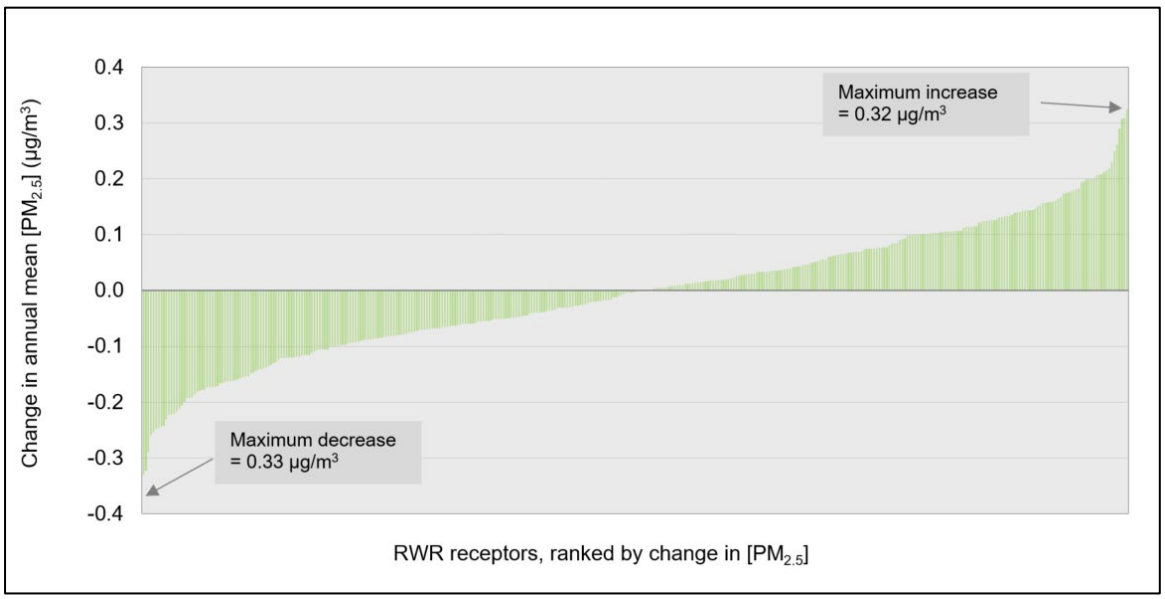

Figure 6-8 **Change in annual average $PM_{2.5}$ concentrations at the nearest RWR receptors for the proposed modification (2033-DSC minus 2033-DM)**

The results for changes in maximum 1-hour NO_2 concentrations for the EIS and proposed modification are shown in **Figure 6-9** and **Figure 6-10**, respectively. Again, there are more receptors showing a predicted increase for the proposed modification, but the increases are small.

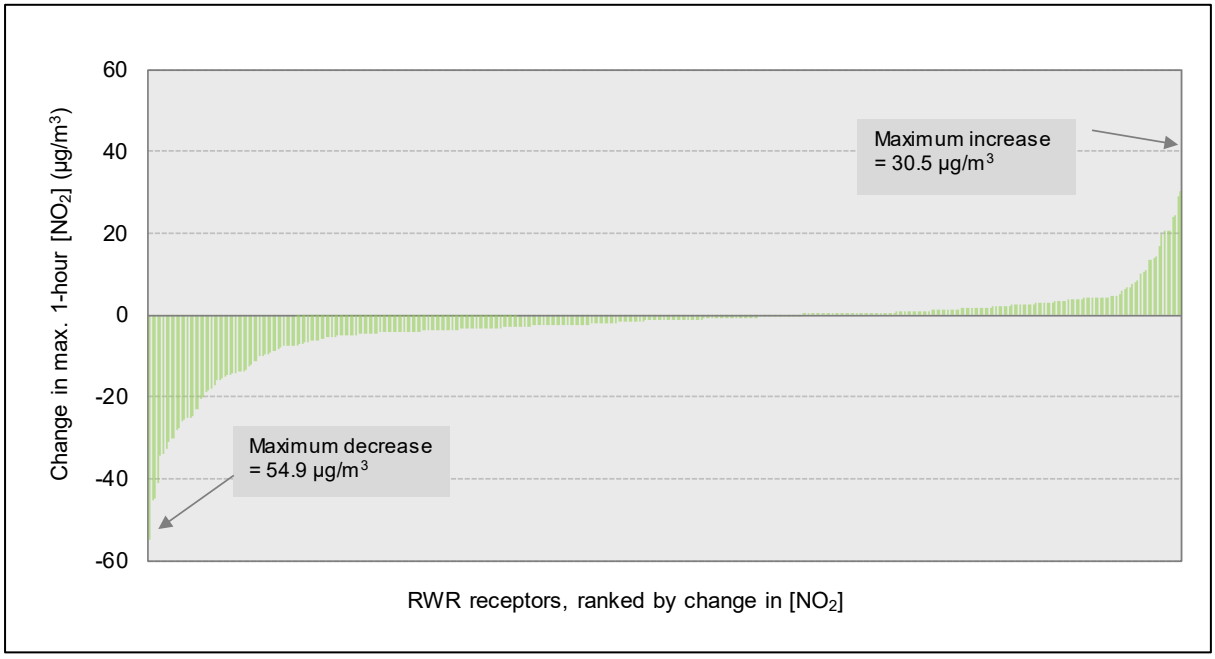

Figure 6-9 **Change in maximum 1-hour average NO_2 concentrations at the nearest RWR receptors for the EIS (2033-DSC minus 2033-DM)**

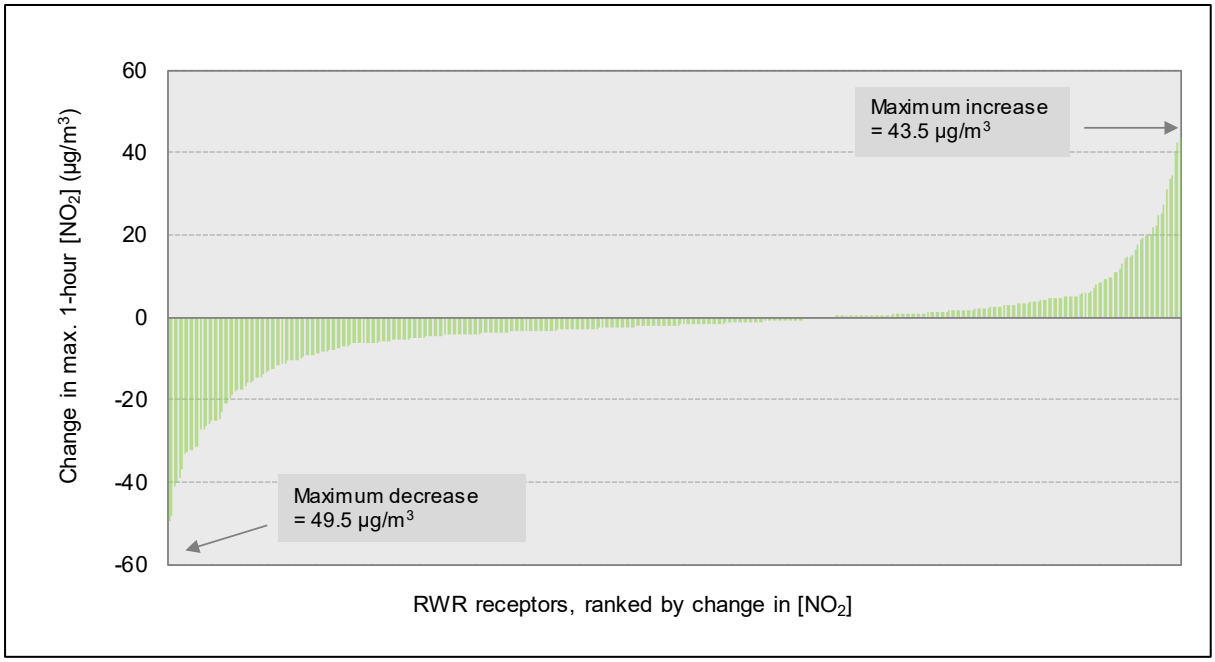

Figure 6-10 **Change in maximum 1-hour average NO_2 concentrations at the nearest RWR receptors for the proposed modification (2033-DSC minus 2033-DM)**

7 Conclusion

In relation to construction air quality impacts, the assessment has determined that the proposed modification does not substantially alter the scope, nature and footprint of the construction works assessed in the EIS. As a result it is not anticipated that the construction dust risk profile would be different to that assessed in the EIS. Therefore the construction mitigation measures proposed in the EIS would be appropriate for the proposed modification.

This assessment also shows the results of a dispersion modelling study for the proposed modification and compares them to the predictions made in the EIS. This assessment is focused on the area in the immediate vicinity of the proposed modification, that is, around the intersection of The Crescent and Johnston Street, and The Crescent overpass at the City West Link intersection.

Comparisons were made both across a small modelling domain and at 400 individual receptors closest to the proposed modification. These receptors were chosen to represent those most likely to be impacted by changes due to the proposed modification.

The results showed that while there are receptors predicted to experience increases due to the proposed modification when compared to the EIS, these increases are small. In addition, predictions for the most relevant metric when considering health impacts, the change in annual mean $PM_{2.5}$ concentrations, were well below the criterion used in the EIS. It is concluded that the differences in ground level concentrations due to the proposed modification when compared to the EIS, are minor, and do not change the outcomes of the EIS. No additional mitigation is considered necessary.

8 References

NSW EPA (2016). Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, Published in January 2017

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Pacific Environment (2015b). WestConnex New M5 – Environmental Impact Statement. Technical Working Paper: Air Quality. Appendix H, NSW Roads and Maritime Services, November 2015.

Pacific Environment (2017). WestConnex M4-M5 Link – Environmental Impact Statement. Technical Working Paper: Air Quality. Appendix I, NSW Roads and Maritime Services, August 2017.