NSW EPA

Your reference SSI 6307
Our reference: DOC15/422550
Contact: Mildi Palmer 9995 5187

Mary Garland
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Department of Planning and Environment
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Dear Ms Garland

SSI 6307 – WestConnex M4 East EIS

I refer to the request from the Department of Planning and Environment (DP&E) to the Environmental Protection Authority (EPA) (your reference SSI 6307), to provide comments on the Environmental Impact Statement (EIS) for the above project.

The EPA has reviewed the EIS and provided comments and recommendations in relation to the conditions of approval for the key issues of air and water quality and noise (see attached).

If you wish to discuss any of the issues raised in this letter, please contact Mildi Palmer on 9995 5187.

Yours sincerely

28-10-15

Frank Garofalow
Manager Metropolitan Infrastructure
NSW Environment Protection Authority

Encl. EPA's submission on the Environmental Impact Statement for the WestConnex m4 East Project (SSI 6307)

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EPA's submission on the Environmental Impact Statement for the WestConnex M4 East Project (SSI 6307)

NOISE AND VIBRATION

Comments

A number of issues have been identified by the EPA, which has the following comments on the Noise and Vibration Impact Assessment (NVIA) that forms Appendix I of Volume 2C of the EIS:

Construction Noise and Vibration Management Plan

- The NVIA predicts noise and vibration impacts from construction works that are typical for this type of significant infrastructure project. An appreciable portion of the surrounding community is expected to be significantly impacted from time to time by many of the project's construction activities including demolition, clearing, earthworks, tunnelling, etc. Worst case exceedances of the construction noise management levels of greater than 25 decibels are identified for some activities, with many receivers being highly noise affected, particularly when works are in close proximity. Impacts are also predicted from ground borne noise, vibration affecting human comfort, and disturbance to sleep.

- To address these impacts, the NVIA proposes mitigation and management measures in general terms, outlined in Section 14. The NVIA also proposes a range of general measures in Section 10.8. The NVIA states that a Construction Noise and Vibration Management Plan (CNVMP) is to be developed, which will provide further detail on how a range of noise and vibration issues will be addressed in terms of impacts, mitigation and management. These issues include (but are not limited to):
    - Ground-borne noise from tunnelling;
    - Cumulative construction noise;
    - Out-of-hours works;
    - Sleep disturbance; and
    - General construction works.

Recommendation

As the predicted impacts are significant, additional information on the impacts and mitigation measures should be provided prior to any approval, rather than deferred to a post-approval management plan to enable appropriate consent conditions to be developed. The information to be provided should include, at a minimum, specific noise and vibration mitigation and management measures to be implemented for each activity and location together with an assessment of their mitigation performance at sensitive receivers. Details are required for an appropriate level of assessment of the likely impacts of the project to be made, the feasibility and reasonableness of any proposed mitigation and management measures, and their effectiveness in reducing impacts.

Noise and Vibration Impact Assessment

- Recommendation

  The NVIA should clarify how the noise catchment boundaries were selected, as some catchments are quite large (e.g. NCA11) and others very small (e.g. NCA8).

- Noise monitoring has typically been carried out close to the alignment within each catchment, with the highest background noise levels in that catchment likely the basis for noise criteria. The EPA considers that varying background levels in some larger catchments may give rise to the potential for increased noise impacts at more distant locations where background noise levels may be lower, although it is acknowledged that source noise levels will also reduce with distance.

  Recommendation

  The NVIA should also provide additional information about how background noise levels change within each catchment to ensure that all sensitive receivers within a catchment are protected against noise impacts.

- The noise assessment considers only first and second floors of a multi-storey building for noise mitigation, whereas the NSW Road Noise Policy recommends the two floors most exposed to traffic noise be considered. For some receivers, e.g. multi-level apartments near an elevated roadway, this may mean that the potentially most-affected receivers are overlooked for mitigation while lower levels shielded by roadway structures are assessed and mitigation found to be not required.

  Recommendation

  The NVIA should explain why it is not appropriate to consider the most noise-exposed levels of a building for mitigation in such cases.

- The effect of using smart motorway ramps on noise levels is unclear; the noise assessment suggests no significant difference in comparison to free-flow traffic conditions over a daytime period.

  Recommendation

  The EPA considers the assessment should provide further information to support the assertion that signalised ramps do not significantly affect traffic noise levels

Queuing and idling construction vehicles

Community concerns may arise from noise impacts associated with the early arrival and idling of construction vehicles at the development site and in the area surrounding the site.

Recommendation

The proponent be required to ensure construction vehicles do not arrive at the project site or in surrounding areas outside approved construction hours.

Reversing and movement alarms

The EPA has identified the noise from 'beeper' type plant movement alarms to be particularly intrusive and is aware of feasible and reasonable alternatives. At other projects several contractors have undertaken safety risk assessments of alternatives to the traditional 'beeper' alarms. Each determined that adoption of 'quacker' type movement/reversing alarms instead of traditional beepers on all plant and vehicles would not only maintain a safe workplace but also deliver improved outcomes of reduced noise impacts on surrounding residents. Interim Construction Noise Guideline Appendix C provides additional background material on this issue.

Recommendation

The proponent be required to undertake a safety risk assessment of construction activities to determine whether it is practicable to use audible movement alarms of a type that would minimise the noise impact on surrounding noise sensitive receivers, without compromising safety.

Recommended Condition of Consent

Noise and vibration control measures must be developed and managed in accordance with:

- The Interim Construction Noise Guideline (2009);
- Assessing Vibration: a technical guideline (2006);
- NSW Road Noise Policy (2011)

AIR QUALITY

Comments

The EPA has reviewed the air quality impact assessment for the proposed M4 East.

There are certain inputs to the air quality assessment (for example, traffic modelling and the Graz Mesoscale Model/Graz Lagrangian model air dispersion model) where the EPA does not have relevant technical expertise to provide a meaningful review. For the purposes of the air quality assessment review, The EPA has assumed the traffic modelling for the project and air dispersion model system and configuration adopted is accurate.

The air quality assessment (WDA, 2015) has generally been conducted in accordance with the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* and indicates the following:

- For expected traffic scenarios, exceedances of EPA's impact assessment criteria were predicted for 1 hour average NO_2, 24 hour average PM_{10}, annual average $PM_{2.5}$ and 24 hour average $PM_{2.5}$. At some receptors exceedances were predicted with and without the project.
- For all pollutants, except air toxics, the predicted concentrations were usually dominated by the existing background contribution.
- For predicted NO_2 concentrations there was a significant contribution from the modelled surface road traffic.
- Under expected traffic conditions the contribution of tunnel ventilation outlets to pollutant concentrations was negligible for all receptors included in the assessment.

The assessment predicts general improvements in air quality along Parramatta Road as a result of the project. This is due to a reduction in traffic volumes along Parramatta Road and the improved dispersion of emissions through tunnel ventilation outlets.

The EPA has identified several issues with the air quality impact assessment which are detailed below.

Review of Air Dispersion Modelling

Meteorological data used is not fully justified

There is insufficient justification and validation regarding the selection of meteorological station for Graz Mesoscale Model (GRAMM) meteorological modelling. Canterbury Racecourse was used as it was close to

the centre of the WestConnex domain. This was stated to be beneficial for the modelling of the later stages of the project.

The validation of Canterbury Racecourse station influenced GRAMM showed poor correlation with the Sydney Olympic Park, Chullora and Rozelle stations. All three stations are located closer to the GRAL modelling domain in comparison with Canterbury Racecourse station. The rationale for not including Chullora and Rozelle stations in GRAMM is the stations are not compliant with Australian Standards.

It is inappropriate to use Canterbury Racecourse in the statistical analysis as this is the data that was used to drive GRAMM. It is unclear how it can be concluded that '*GRAMM simulates the meteorology with an acceptable degree of accuracy*' given the poor performance of the model at Sydney Olympic Park, Chullora and Rozelle stations.

Earlwood station is located close to Canterbury Racecourse and has 100% data recovery in 2014 compared to 90% at Canterbury Racecourse. However, Earlwood station was excluded from the validation with no justification provided for the exclusion.

Recommendation

The EPA recommends that the proponent provides justification for the choice of meteorological data used in the meteorological modelling. Further, The EPA considers the GRAMM modelling should be revised to more accurately simulate the meteorology.

1 hour average conversion of NO_X to NO_2

An empirical method was used to convert 1 hour average NO_x to NO_2 concentrations rather than one of the methods listed in the *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (the Approved Methods).

The empirical method is based on data collected at OEH background monitoring sites and RMS roadside sites. The validity of using the OEH background site monitoring data to develop the empirical method is questioned given the potential limitation of the method is that it is only useful for the general location it was developed. Further, Appendix G.4.2.3 of the assessment states empirical methods are more accurate for annual average concentrations where there is a clear dependence of NO_2 and NO_x concentrations.

Two different methods were used for community and other receptors:

- At the 'community receptors' (particularly sensitive locations within a zone (600 metres either side) along the project corridor, such as schools, child care centres and hospitals), predicted 1 hour NO_x concentrations from the ventilation outlets and surface road were added to a contemporaneous synthetic 1 hour NO_x background file. An upper bound function was then used to give the maximum likely 1 hour average NO_2 concentration for a given 1 hour average NO_X concentration. Upper bound function for 2014 was determined from monitoring data. For 2021 and 2031, an NO_2/NO_x ratio of 0.16 was assumed and a corresponding function was determined.

- At the 'residential, workplace and recreational (RWR) receptors' (all discrete receptor locations along the project corridor, and mainly covered residential and commercial land uses) the 98th percentile background was combined with the maximum predicted concentration. The conversion of NO_x to NO_2 was then based on the upper bound functions used for the community receptors.

The data from all Sydney monitoring sites between 2004 and 2014 were used to define the upper bound function. Approximately 16% of the data points were for roadside monitoring sites.

Considering the importance of spatial data in the upper bound method, the low quantity of roadside monitoring data could potentially skew results.

A comparison of the results of the 1 hour NO_2 impact assessment with other methods to convert NO_x to NO_2 concentrations was included in the air quality assessment (AQA). The results of the comparison concluded:

- ARM and OLM showed similar annual average impacts;
- OLM predicted higher impacts compared to the methods used in the Project; and
- OLM predicted exceedances of the 1-hour average NO_2 criterion whilst the Project specific method predicted no exceedances.

Background NO_x and NO_2 concentrations are important factors to determine the conversion of NO_x to NO_2. The air quality impact assessment does not provide enough justification for a number of assumptions made in the methodology and validation.

Recommendation

The EPA recommends that further analysis is provided to justify the background data used in the conversion methodology for NO_2. Analysis should include:

- Sensitivity analysis of using roadside data versus use of data from all monitoring stations to define the upper bound function; and
- Justification for the use of 98th percentile background.

Model validation indicates high predictions during night periods

Validation of the air dispersion modelling with the roadside monitoring stations RMS F1 and M1 (Appendix J.2.2) indicate that there are good agreements during peak traffic flows in the morning and evening for weekdays. The predicted impacts during the night time and early hours of the morning appears to be high even though traffic numbers are low.

Whilst it is noted that meteorological conditions driving dispersion is worst at night, the traffic numbers are expected to be much lower compared to peak periods. No explanation has been provided for predicted impacts during the night to be as high as peak traffic conditions.

Recommendation

The EPA recommends the proponent provides justification for the high predicted concentrations during night periods. The proponent should also review the air dispersion modelling to ensure any discrepancies have not been carried over.

Results for the regulatory worst case scenario are not presented for NO_2 and air toxics

Regulatory worst case modelling was completed to assess constant ventilation outlet concentrations (at the proposed discharge concentration limits) over a 24-hour period. Two scenarios were included in the regulatory worst case modelling: A) Project only and B) Project and M4-M5 link. The results of the regulatory worst case modelling were only presented at the RWR receptors.

The predicted incremental 1 hour NO_x concentration from the ventilation stacks for scenario A and B were 59.36 $\mu g/m^3$ and 114.82 $\mu g/m^3$, respectively. The corresponding 1-hour average NO_2 concentrations were not provided. Additionally, results for all pollutants are presented as contribution from the ventilation outlets alone. The total impact for all pollutants must be presented so that it can be assessed against the EPA's impact assessment criteria. Contour maps should also be presented for the ventilation outlet alone to demonstrate the area of impact of the ventilation outlets.

The predicted concentration for speciated air toxics (benzene, polycyclic aromatic hydrocarbons, formaldehyde and 1,3-butadiene) are provided in Appendix K.9 for scenarios not including the regulatory

worst case scenario. For the regulatory worst case scenario, the only air toxic results presented were for total hydrocarbon without speciation.

It is not appropriate to compare the change in speciated air toxics to the assessment criteria. The EPA impact assessment criteria for air toxics are incremental, however, this is in recognition of the generally very low levels in 'background' air quality. For this project it is appropriate to compare predicted ventilation outlet plus surface road speciated air toxic concentrations to the assessment criteria.

Recommendation

For the regulatory worst case scenario, The EPA recommends the proponent provide:

- 1-hour average NO_2 concentration from the ventilation outlet alone;
- total impact (ventilation outlet, surface road and background) at receptors for all pollutants except air toxics;
- predicted impact (ventilation outlet and surface road) at receptors of speciated air toxics; and
- contour maps for the ventilation outlet alone for all pollutants and all averaging periods.

Predicted hotspots on the contour map do not appear to match traffic volumes

The 1 hour average NO_2 contour plot (Figure 8-47) in the AQA shows hotspots where there are increases in 1-hour average NO_2 impacts. It is noted that the contour plot shows maximum predicted concentrations and are not an indication of temporal variations. However, the hotspots do not appear to correspond with the change in traffic volumes in Figure 8-7. Increases in predicted concentration at certain receptors were noted in the AQA but no rationale was provided for the increases.

Recommendation

The EPA recommends the proponent provide discussion in the AQA with rationale for the hotspots where there are increases in air quality impacts.

Review of Vehicle Emission Estimation Techniques

The surface road vehicle emission modelling adopted the EPA motor vehicle emissions inventory model and appears to have been conducted to a good standard and a good validation is provided.

The in-tunnel emissions modelling was conducted using the PIARC methodology which are said to provide emission estimates specifically developed for in-tunnel driving conditions. The methodology provided by PIARC is based on some key assumptions in terms of fleet fuel type composition and fleet turnover, and provides a projection to 2020 only. NO_2 emission factors are not provided by PIARC. Justification and validation of the base PIARC fleet fuel type composition, NO_2 and other key assumptions is not presented transparently in the EIS. (The traffic mix, passenger vehicles/LDV/HDV is presented and justified adequately). To aid in the transparency and validity of the assessment, information deficiencies set out below should be addressed in the context of the overall assessment methodology, assumption and results.

- The fleet fuel type mix for passenger vehicles for both the 2021 and 2031 assessment is not stated. The petrol/diesel mix for LDV adopts the PIARC default assumption of 50%/50% for both the 2021 and 2031 assessments. This is very likely to underestimate the proportion of light diesel vehicles in 2031, especially for LDV which the EPA estimates to be around 80% diesel in 2031 as compared to the base PIARC assumption of 50%.

Recommendation

Given the strong trends to diesel for both passenger vehicles (particularly SUV) and LDV, and the significantly higher NO_x and particularly NO_2 emissions from diesel light vehicles, the assessment should address the trends in real world fleet fuel mix based on the latest available NSW registration and vehicle sales data, and perform a sensitivity analysis to demonstrate the impact of this on the in-tunnel emissions estimation for both 2021 and 2031.

- The calculation of in-tunnel NO_2 in emissions applies a fixed NO_2 fraction (fNO_2) to the PIARC NO_x estimates, based on a single reference which provided a fleet average fNO_2 for each vehicle type measured from the UK fleet that may not be representative of the Australian fleet. This approach is not considered best practice as it will not respond to changing fleet technology into the future, or to changing fuel mixes.

  Recommendation

  Validation of the assumption should be provided in context of NSW projected trends in fuel type mix addressed above. It is noted that a more appropriate approach was taken for the surface road modelling which could have been adopted for the in-tunnel emission estimation.

- The heavy goods vehicle exhaust PM factors used in the in-tunnel emissions estimation are 80% below that provided by PIARC.

  Recommendation

  The reason for this variation should be provided and justified.

- Section 9.7.1 (In-tunnel air quality) – states that only **exhaust** $PM_{2.5}$ was assessed for in-tunnel air quality. However Appendix L to Appendix H presents non-exhaust PM emission factors. It is unclear whether the non-exhaust $PM_{2.5}$ was included in calculation of the stack emissions.

  Recommendation

  The above should be clarified, and if the non-exhaust PM was omitted, the impact on the assessment outcome provided.

- The PM_{10} stack emissions are taken to be the same as the $PM_{2.5}$ emissions calculated from PIARC (Table 9.20 of main body of EIS). This assumption omits the contribution of non-exhaust particles to the size fraction between $PM_{2.5}$ and PM_{10}. Non-exhaust particles are widely noted in the literature to be of significantly larger size than exhaust particles. The discussion in Appendix L of Appendix H, section 9.4 notes that European tunnel studies have found that around 70% of the PM_{10} is $PM_{2.5}$.

  Recommendation

  This justification of this assumption should be provided in terms of the impact of on the assessment.

Off-road diesel plant

Recommendation

The environmental impacts associated with off road diesel equipment can be a major source of fine particles. The EPA recommends that the proponent assess the environmental impacts associated with heavy vehicles

including off road diesel equipment and plant used in the construction of the project. This should include but is not limited to:

- Compliance with relevant and current emission standards as prescribed in Australian Design Rules for heavy duty engines and vehicles.
- Strategies for minimising air emissions from off road diesel equipment including but not limited to graders, bulldozers, loaders etc.
- Confirmation that all off road diesel equipment will meet best available diesel emissions standards or be fitted with an appropriate diesel exhaust treatment device where possible.

WATER QUALITY

Erosion and sediment control measures should be developed and managed in accordance with Managing Urban Stormwater Soils and Construction, 4th Edition published by Landcom (the 'Blue Book') and Volume 2D Main Road Construction published by DECC (2008). Volume 2D advises that main road construction requires a stronger emphasis on some management principles, particularly:

- *erosion control as a pollution prevention strategy*
- *runoff separation by diverting 'clean' stormwater runoff around the site or away from operational areas*
- *management and maintenance of long-term controls.*

Recommended Condition of Consent

- Erosion and sediment control measures must be developed and managed in accordance with Managing Urban Stormwater Soils and Construction, 4th Edition published by Landcom (the 'Blue Book') and Volume 2D Main Road Construction published by DECC (2008).

Recommended Condition of Consent

The Proponent shall not cause or permit any waters to be polluted, as defined under Section 120 of the *POEO Act.*