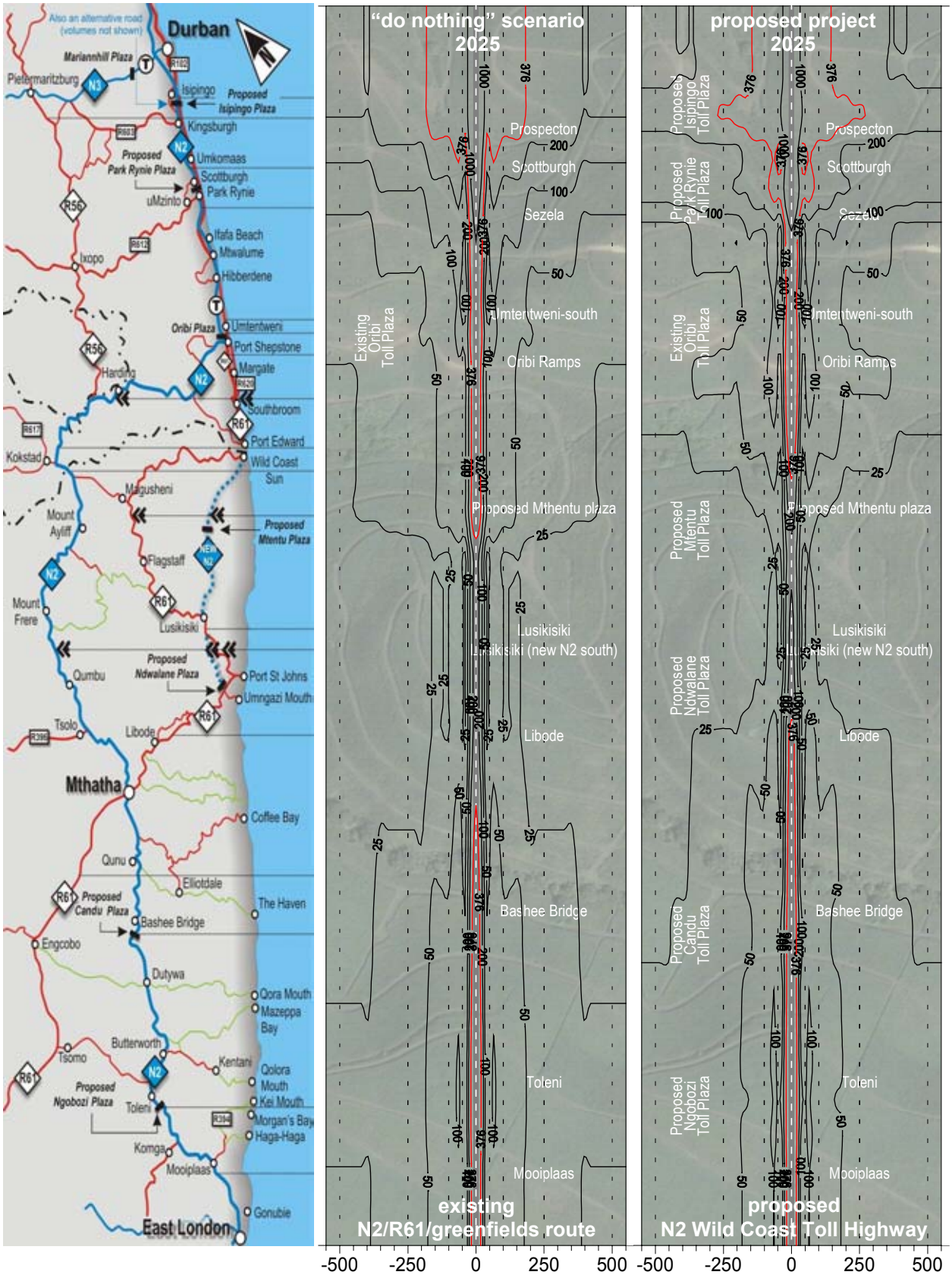


**Figure A6.19: Comparison of modelled ambient concentrations of $NO_x$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2025 for the existing N2/R61/greenfields route (proposed N2 Wild Coast Toll Highway). Red lines indicate predicted exceedances of the AQA standard (376 µg/m$^3$)**

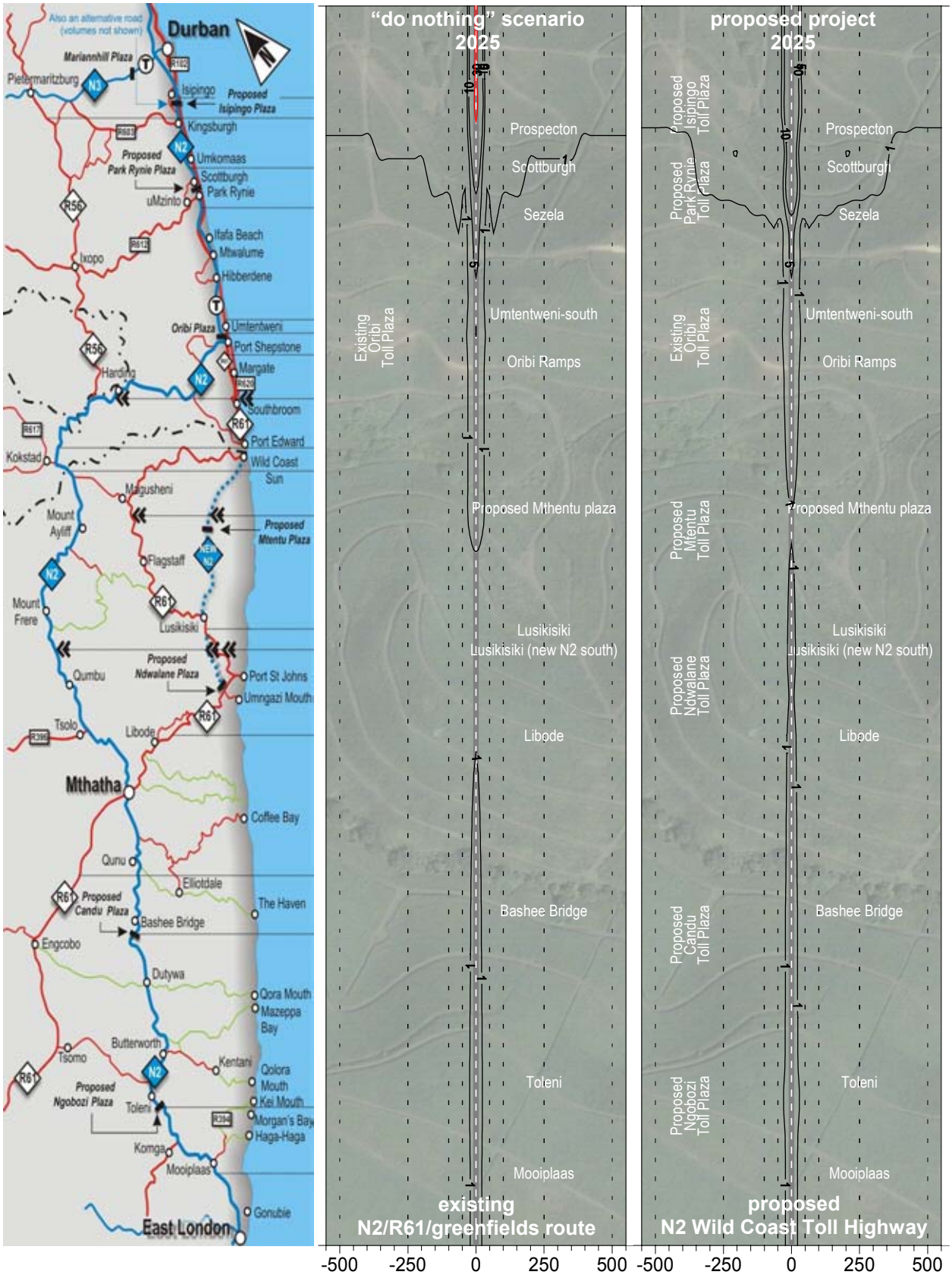


**Figure A6.20: Comparison of modelled ambient concentrations of CO for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2025 for the existing N2/R61/greenfields route (proposed N2 Wild Coast Toll Highway). Red lines indicate predicted exceedances of the SANS limit value (30 mg/m$^3$)**

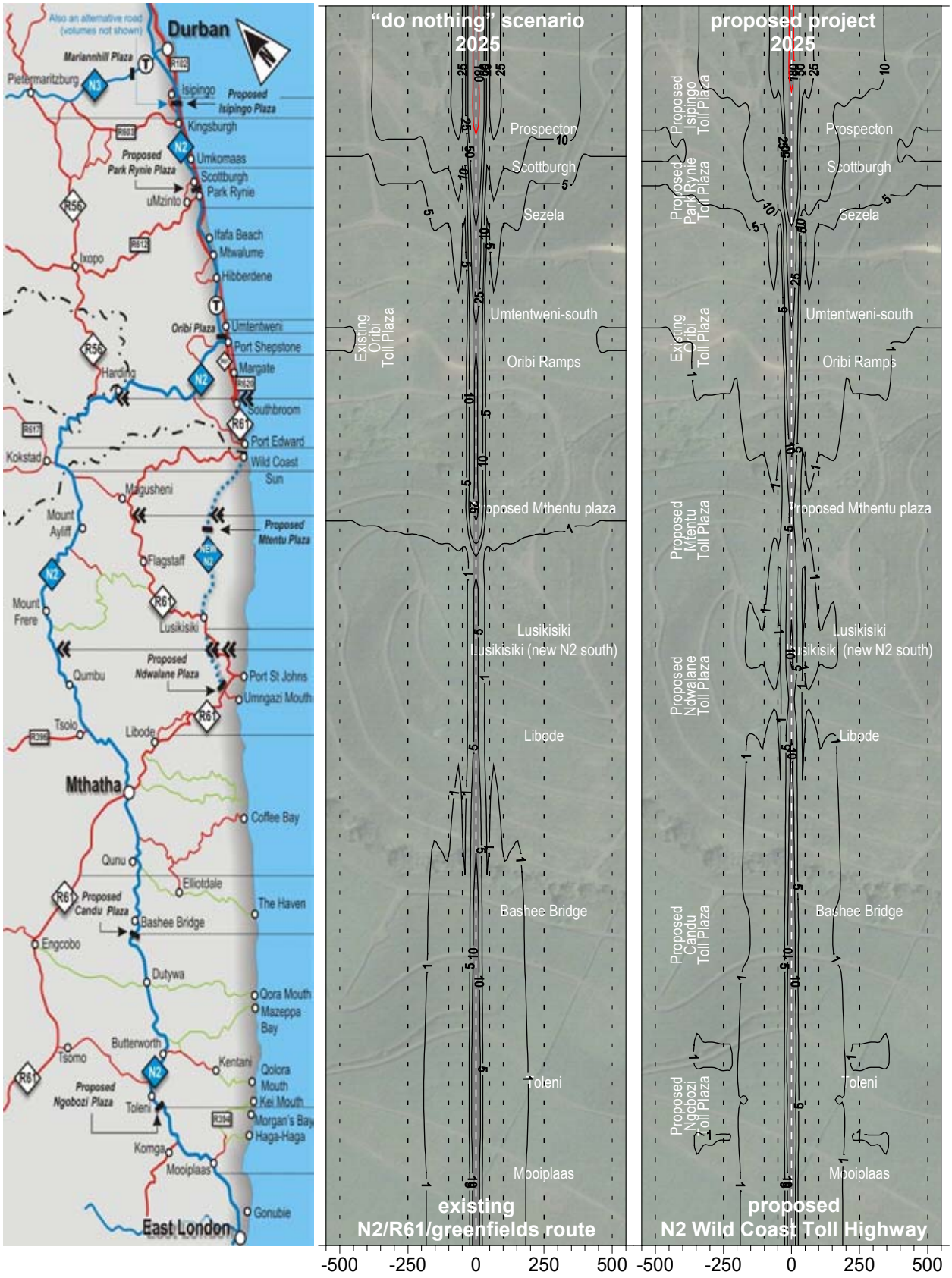


**Figure A6.21: Comparison of modelled ambient concentrations of $PM_{10}$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2025 for the existing N2/R61/greenfields route (proposed N2 Wild Coast Toll Highway). Red lines indicate predicted exceedances of the AQA standard (180 µg/m$^3$)**

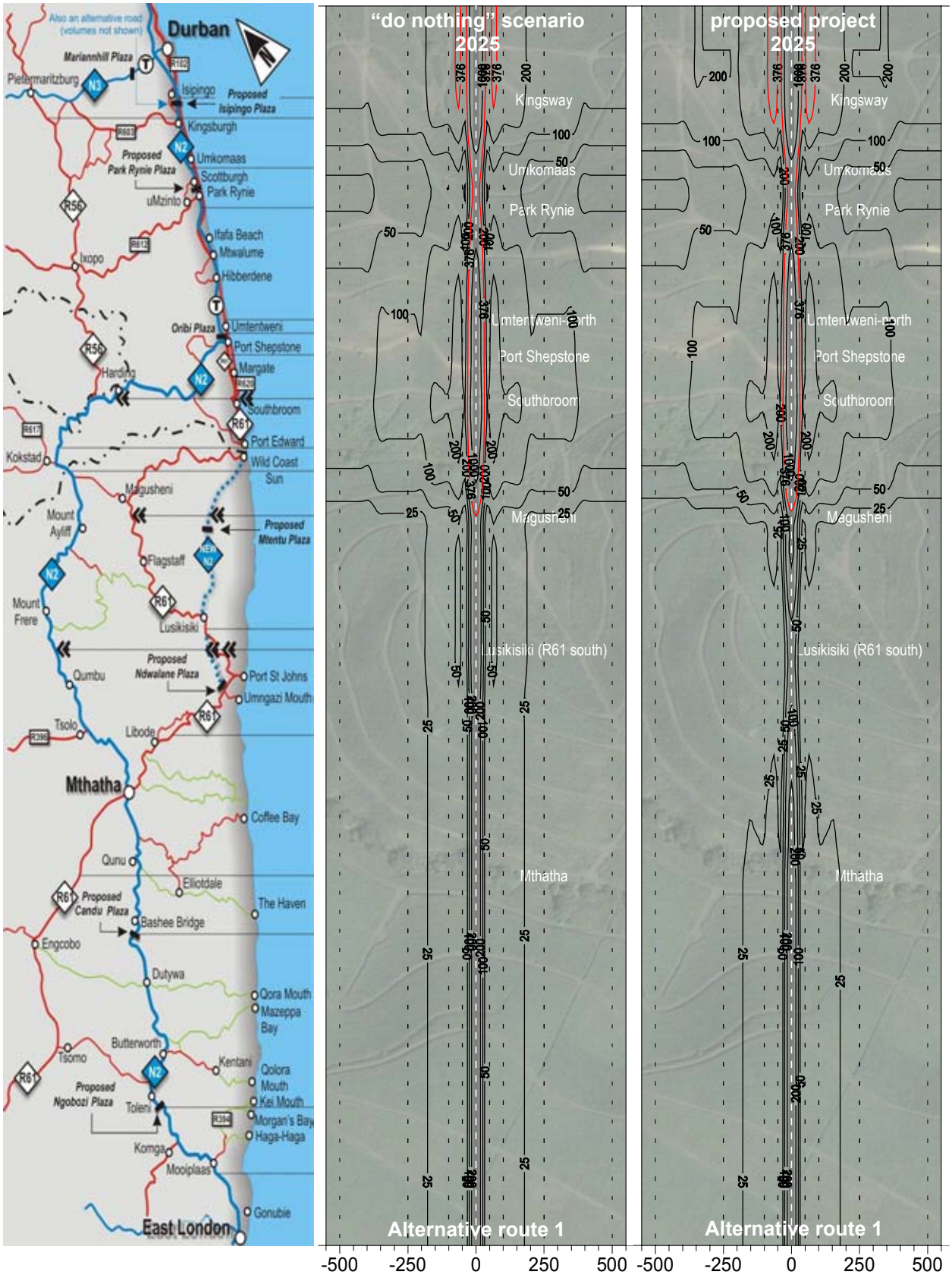


**Figure A6.22: Comparison of modelled ambient concentrations of $NO_x$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2025 for the existing route (Alternative) 1 (R102, R620 and R61). Red lines indicate predicted exceedances of the AQA standard (376 µg/m$^3$)**

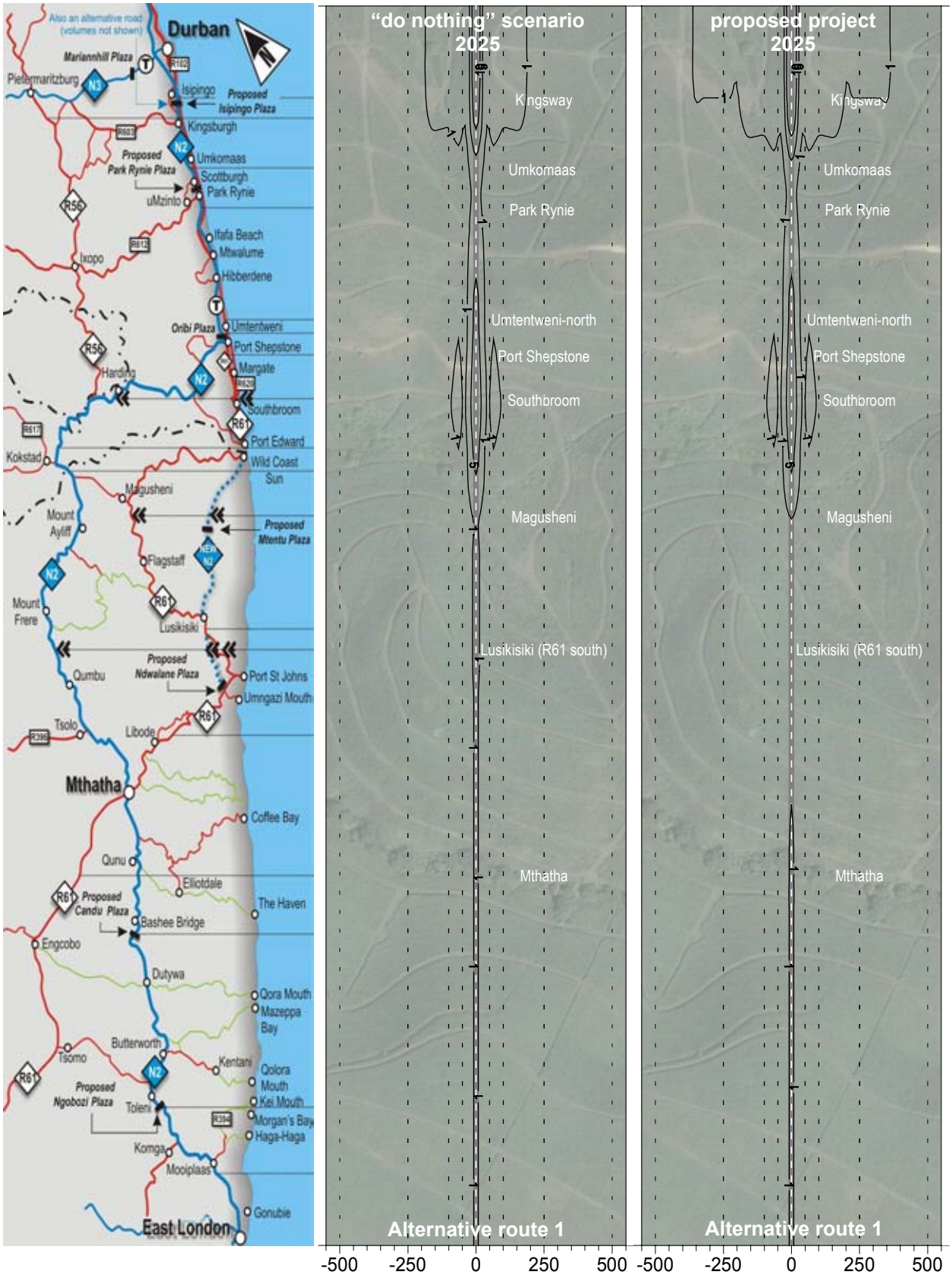


**Figure A6.23: Comparison of modelled ambient concentrations of CO for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2025 for the existing route (Alternative) 1 (R102, R620 and R61). Red lines indicate predicted exceedances of the SANS limit value (30 mg/m$^3$)**

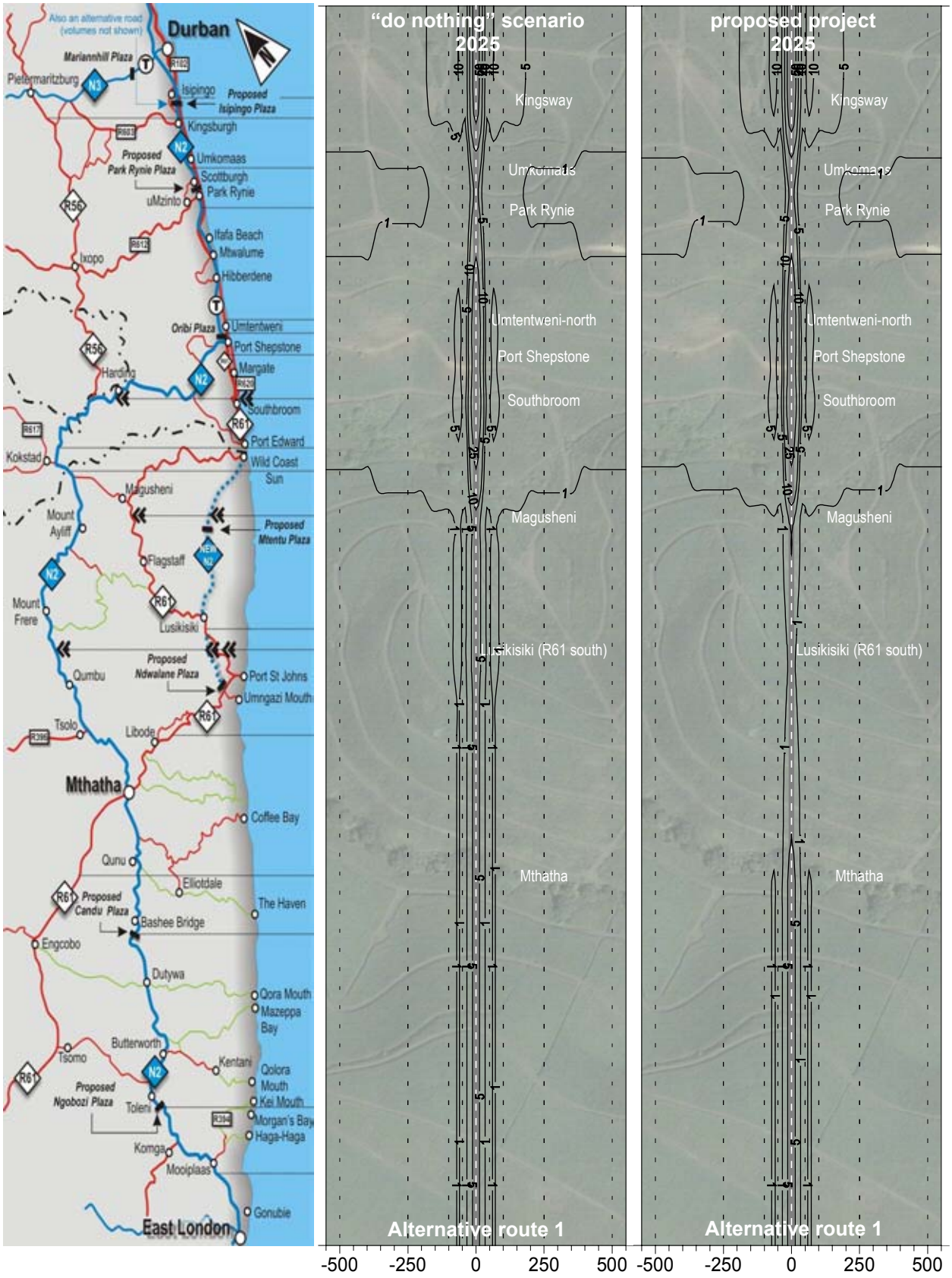


**Figure A6.24: Comparison of modelled ambient concentrations of $PM_{10}$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2025 for the existing route (Alternative) 1 (R102, R620 and R61). Red lines indicate predicted exceedances of the AQA standard (180 µg/m$^3$)**

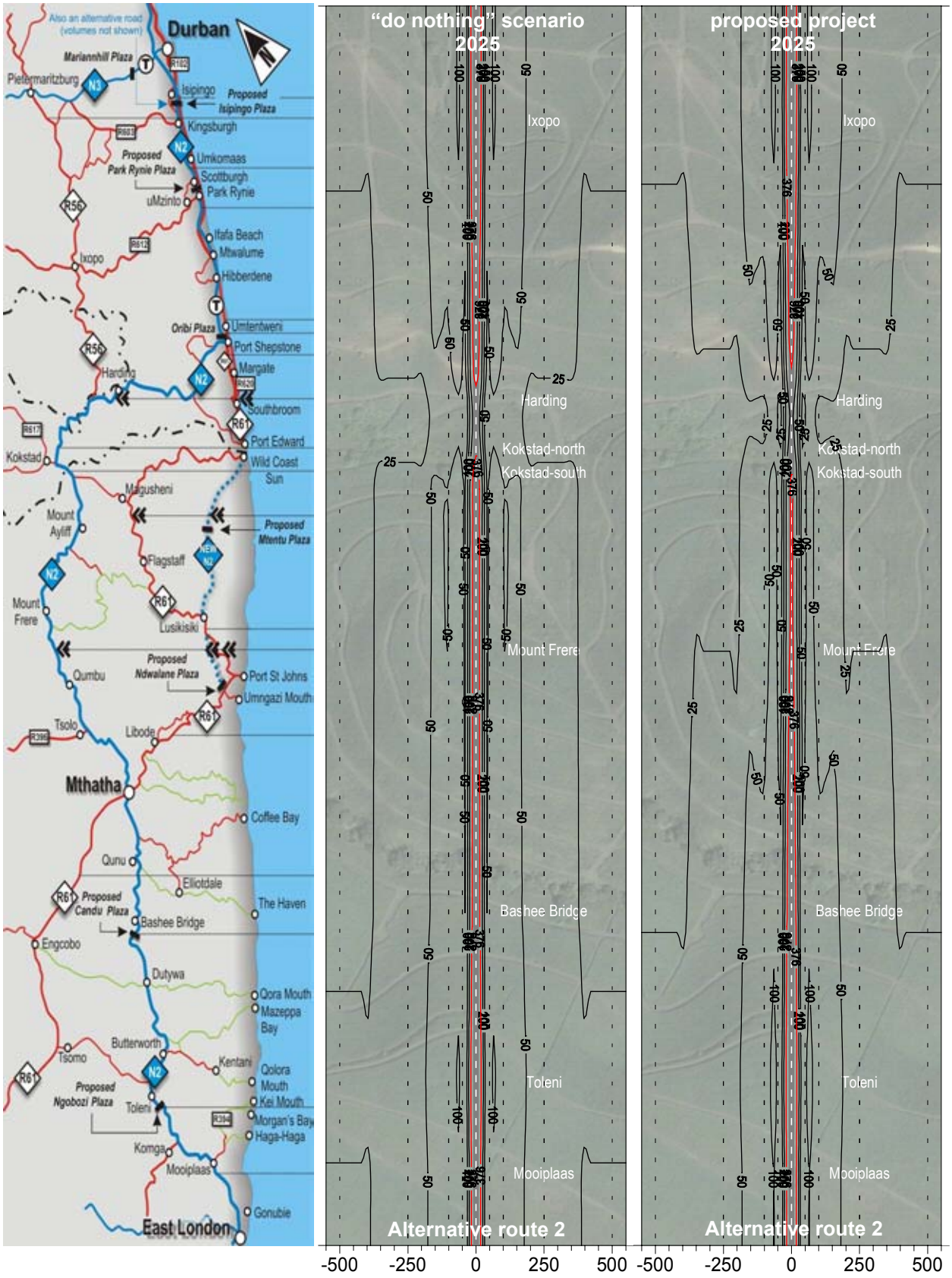


**Figure A6.25: Comparison of modelled ambient concentrations of $NO_x$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2025 for the existing route (Alternative) 2 (R56 and existing N2). Red lines indicate predicted exceedances of the AQA standard (376 µg/m$^3$)**

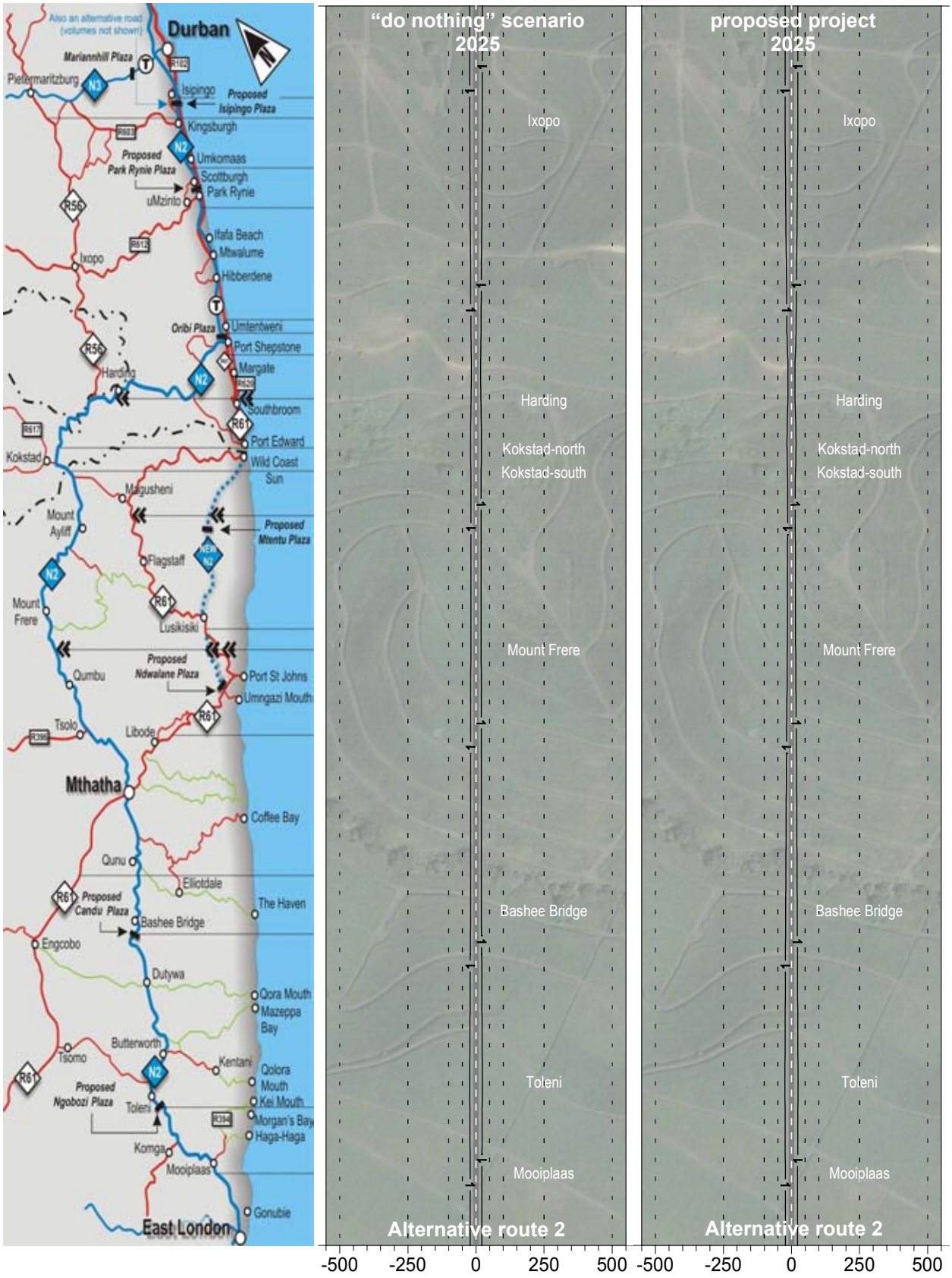


**Figure A6.26: Comparison of modelled ambient concentrations of CO for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2025 for the existing route (Alternative) 2 (R56 and existing N2). Red lines indicate predicted exceedances of the SANS limit value (30 mg/m$^3$)**

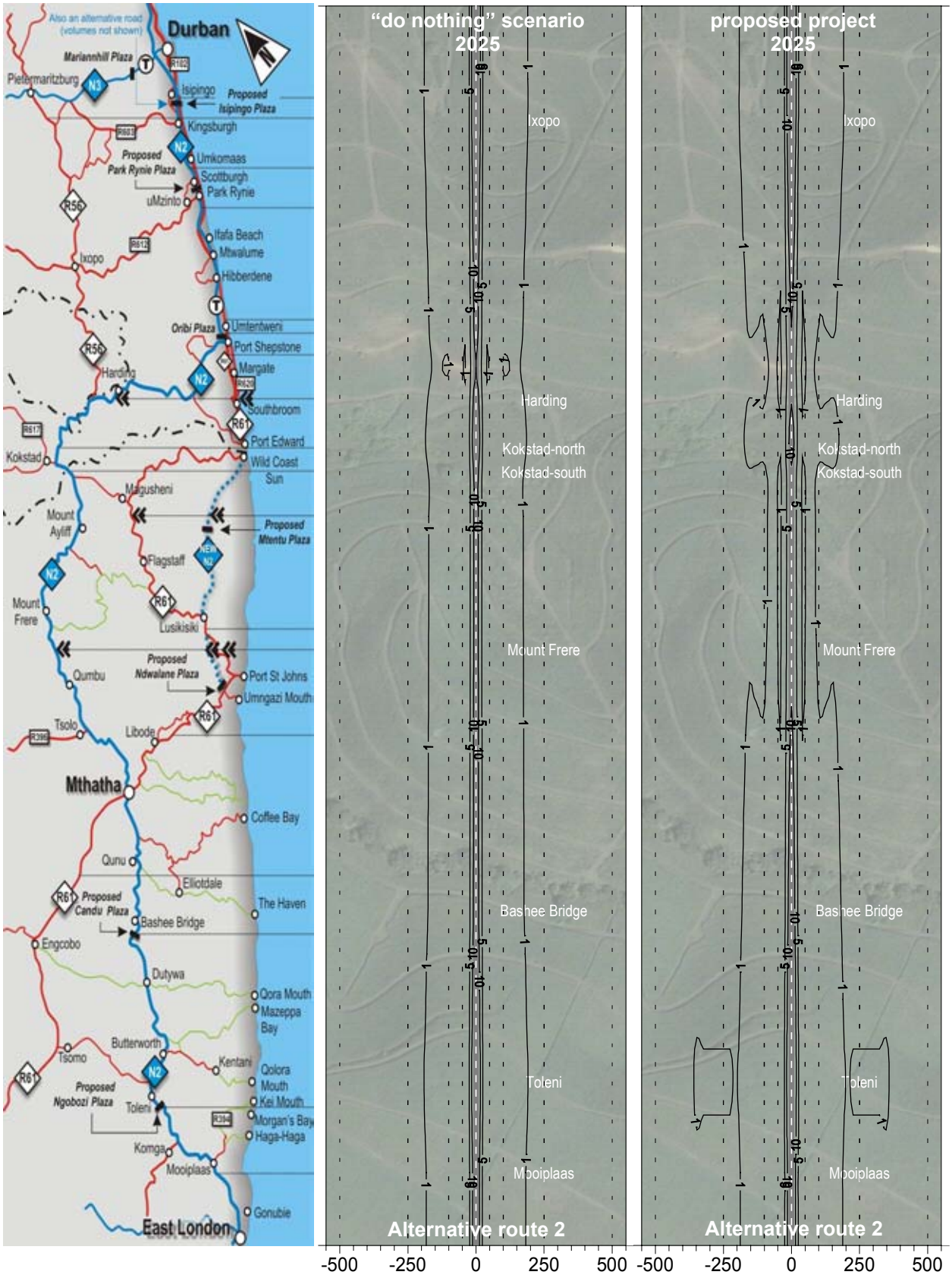


**Figure A6.27: Comparison of modelled ambient concentrations of $PM_{10}$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2025 for the existing route (Alternative) 2 (R56 and existing N2). Red lines indicate predicted exceedances of the AQA standard (180 µg/m$^3$)**

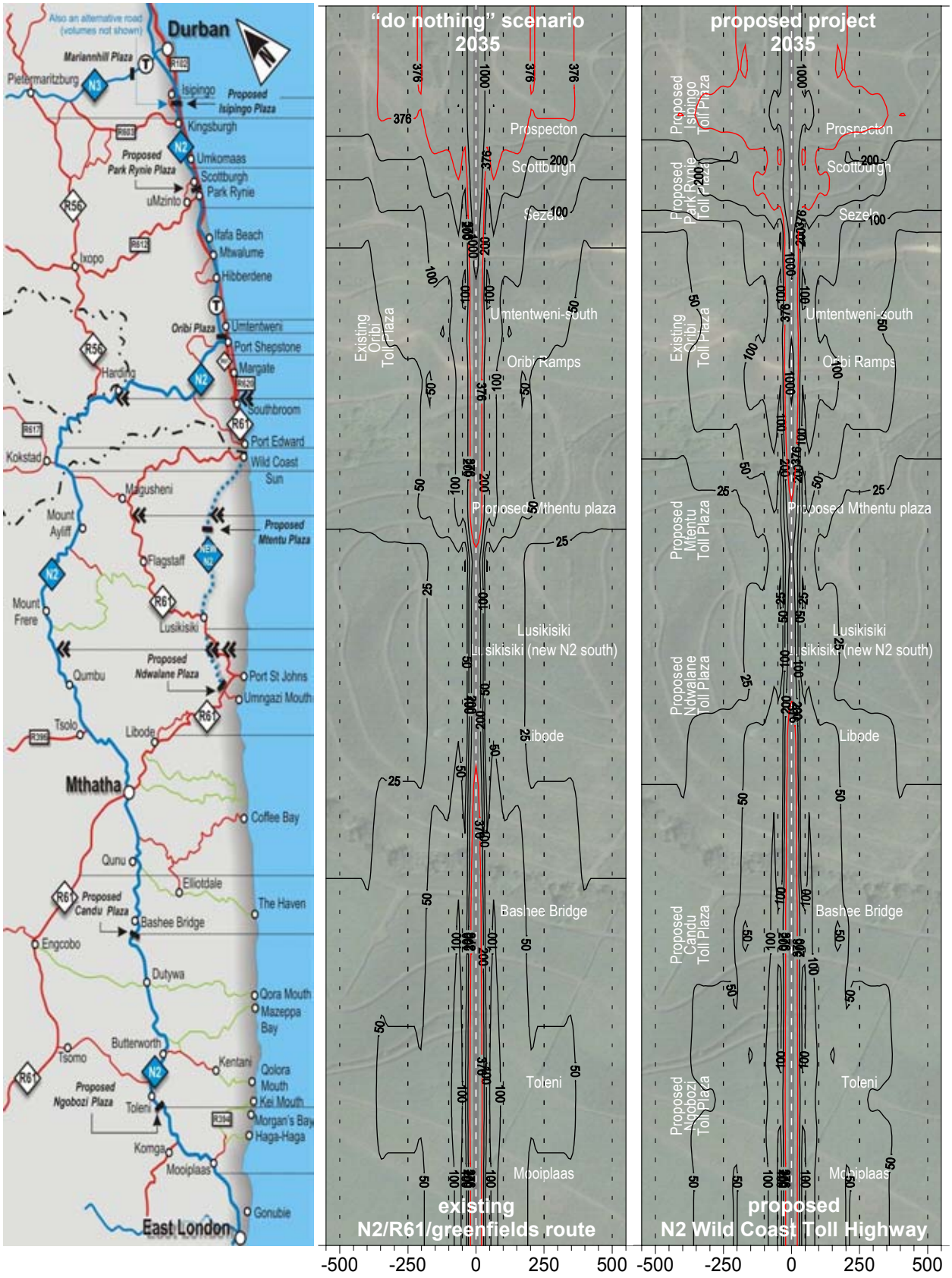


**Figure A6.28: Comparison of modelled ambient concentrations of $NO_x$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2035 for the existing N2/R61/greenfields route (proposed N2 Wild Coast Toll Highway). Red lines indicate predicted exceedances of the AQA standard (376 µg/m$^3$)**

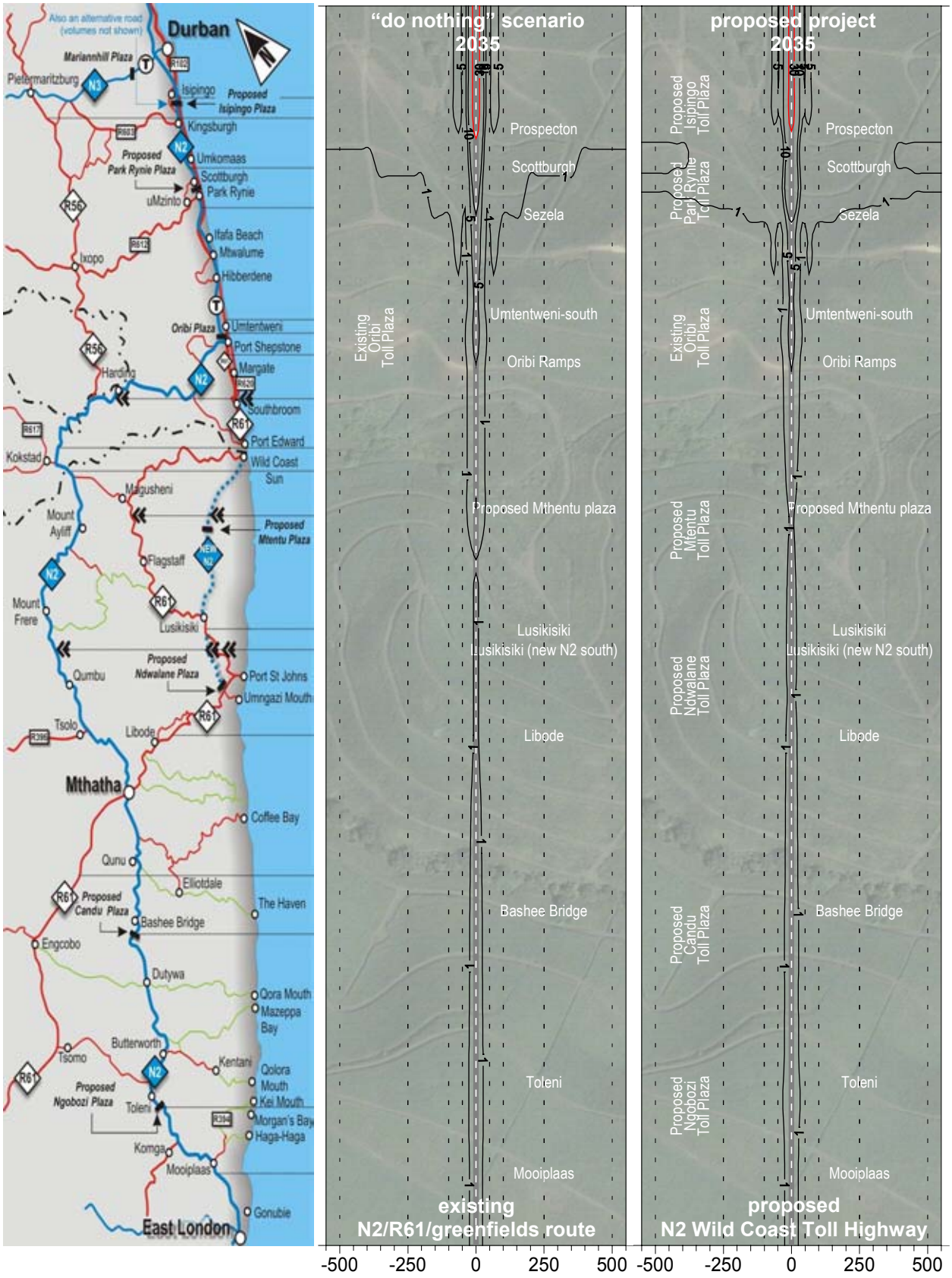


**Figure A6.29: Comparison of modelled ambient concentrations of CO for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2035 for the existing N2/R61/greenfields route (proposed N2 Wild Coast Toll Highway). Red lines indicate predicted exceedances of the SANS limit value (30 mg/m$^3$)**

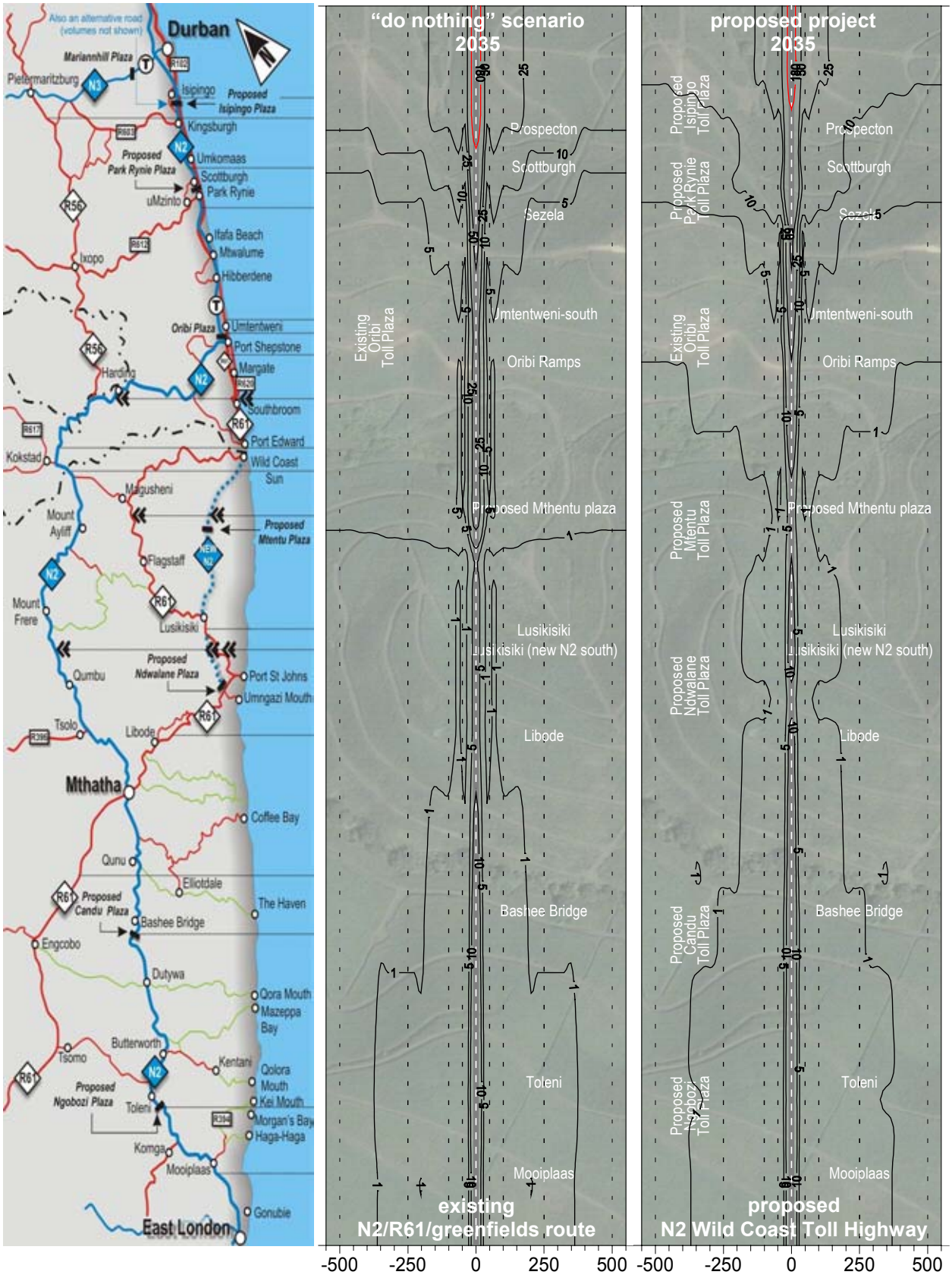


**Figure A6.30: Comparison of modelled ambient concentrations of $PM_{10}$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2035 for the existing N2/R61/greenfields route (proposed N2 Wild Coast Toll Highway). Red lines indicate predicted exceedances of the AQA standard (180 µg/m$^3$)**

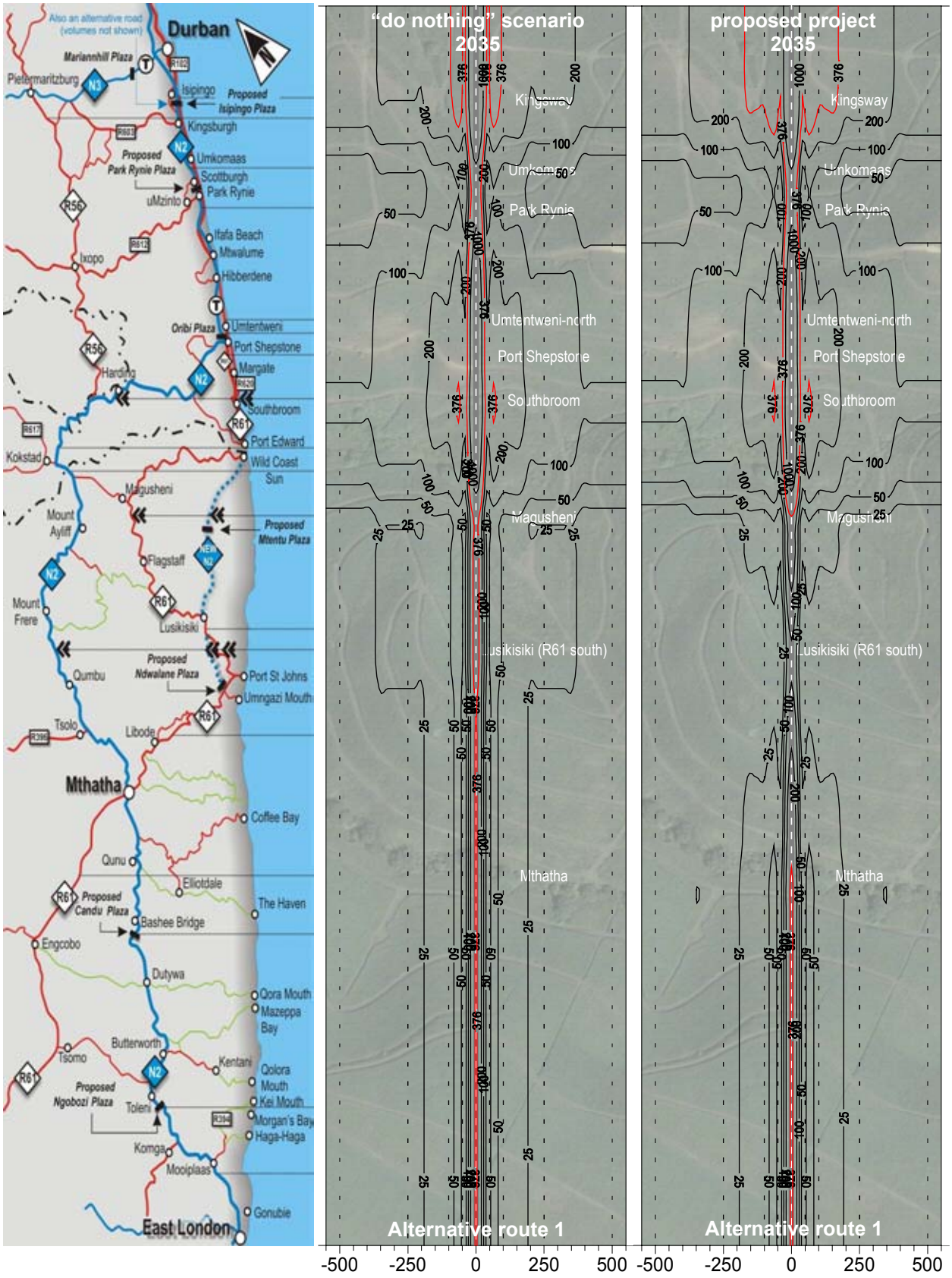


**Figure A6.31: Comparison of modelled ambient concentrations of $NO_x$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2035 for the existing route (Alternative) 1 (R102, R620 and R61). Red lines indicate predicted exceedances of the AQA standard (376 µg/m$^3$)**

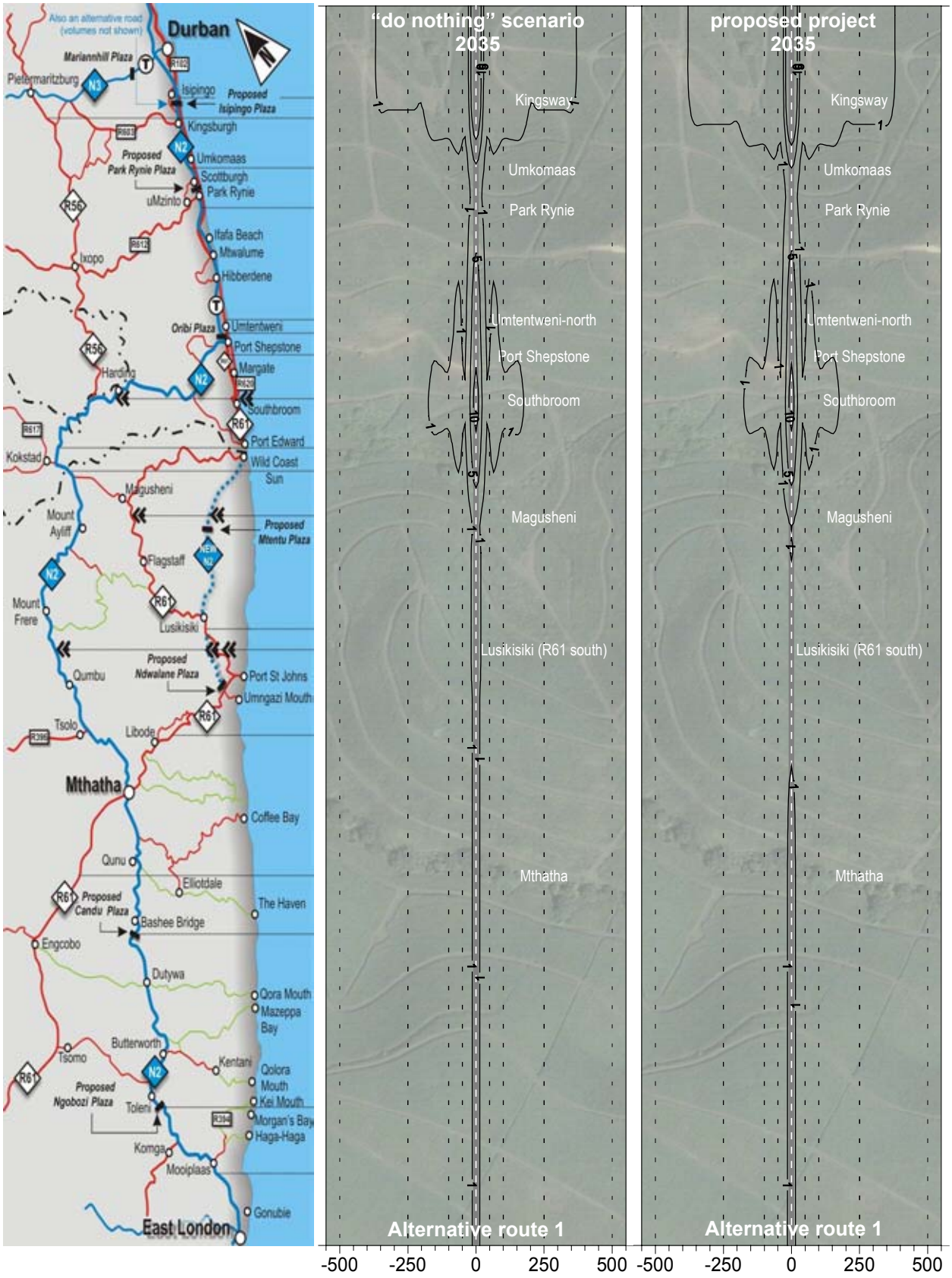


**Figure A6.32: Comparison of modelled ambient concentrations of CO for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2035 for the existing route (Alternative) 1 (R102, R620 and R61). Red lines indicate predicted exceedances of the SANS limit value (30 mg/m$^3$)**

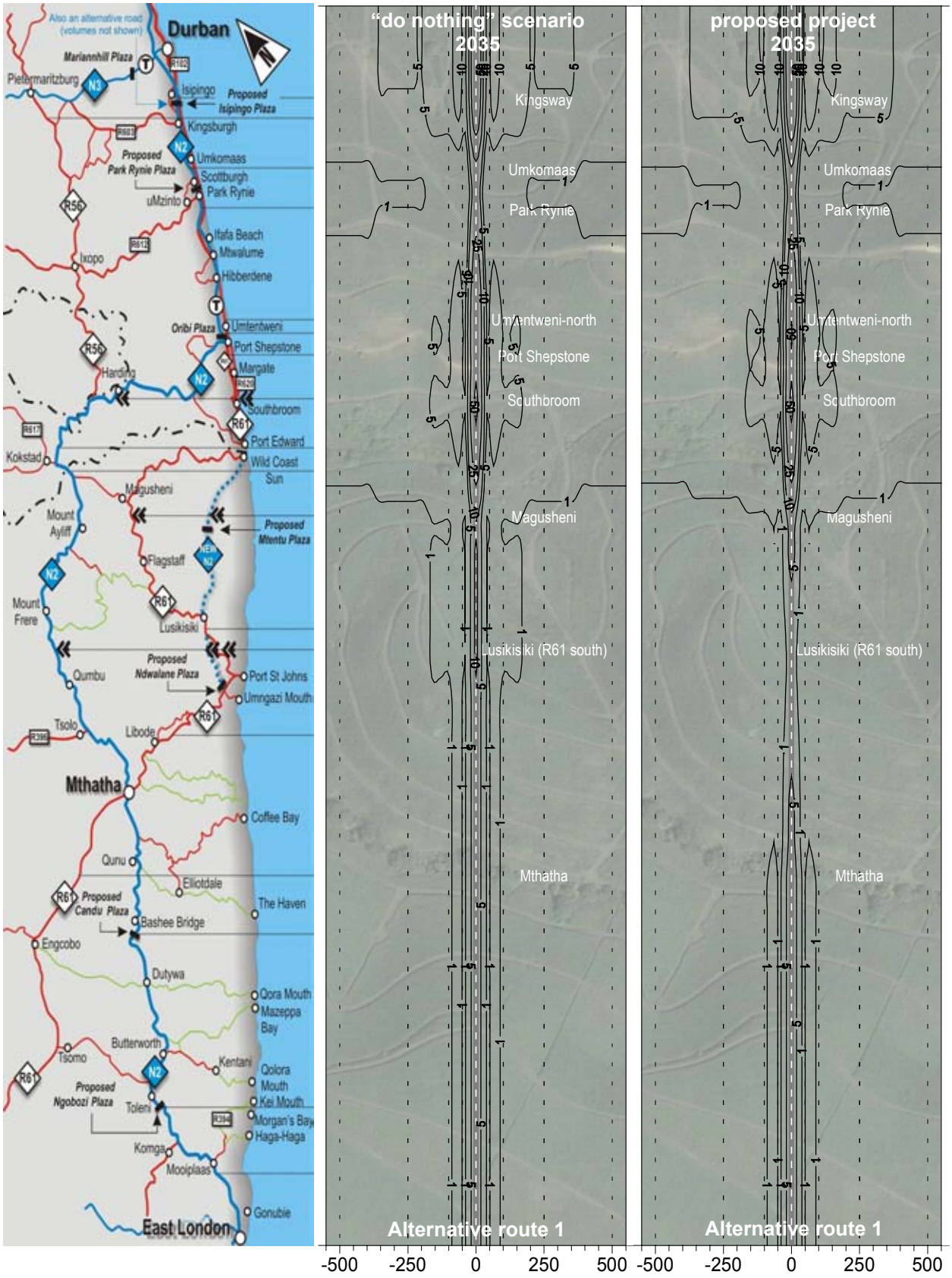


**Figure A6.33: Comparison of modelled ambient concentrations of $PM_{10}$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2035 for the existing route (Alternative) 1 (R102, R620 and R61). Red lines indicate predicted exceedances of the AQA standard (180 µg/m$^3$)**

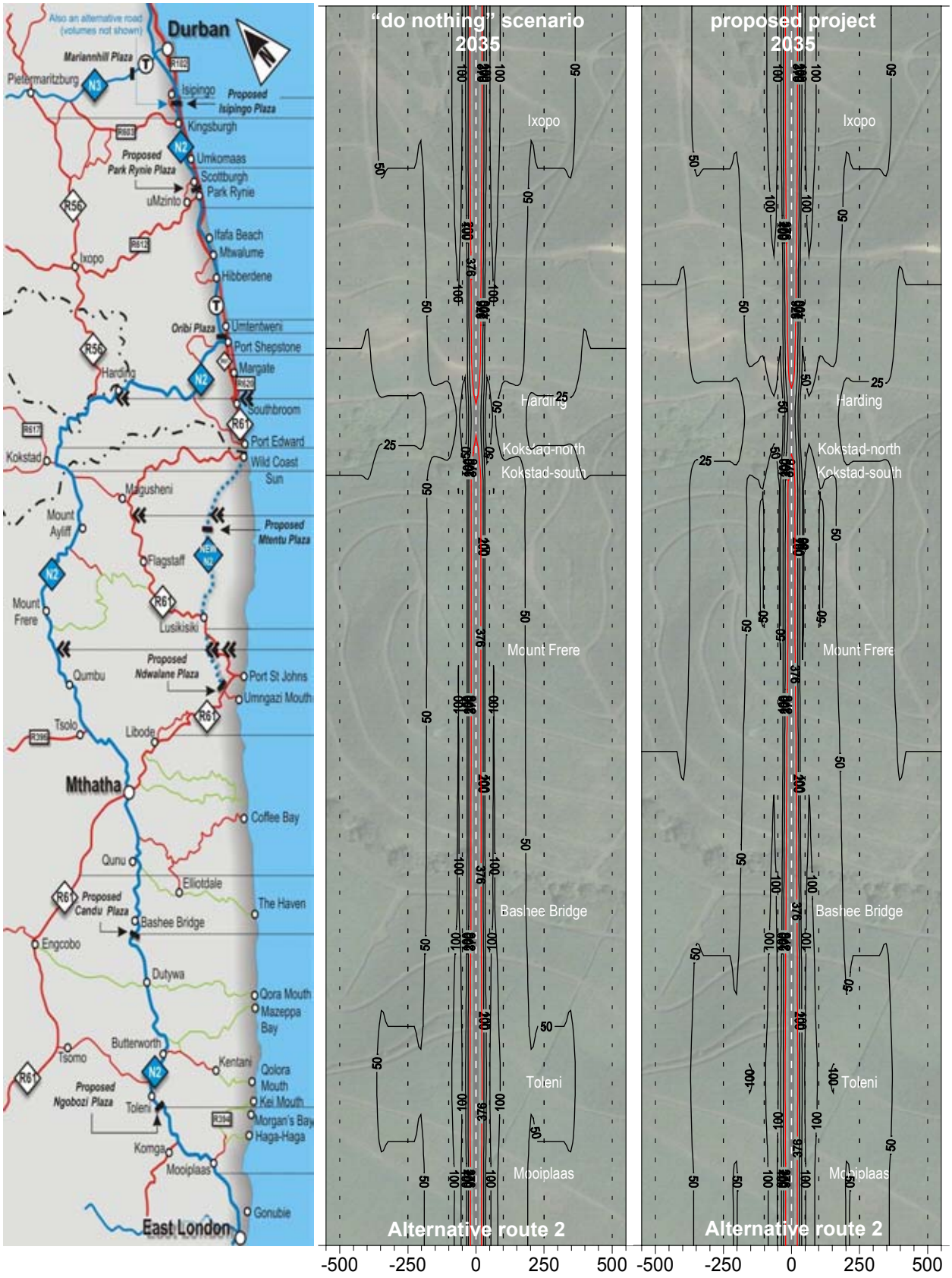


**Figure A6.34: Comparison of modelled ambient concentrations of $NO_x$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2035 for the existing route (Alternative) 2 (R56 and existing N2). Red lines indicate predicted exceedances of the AQA standard (376 µg/m$^3$)**

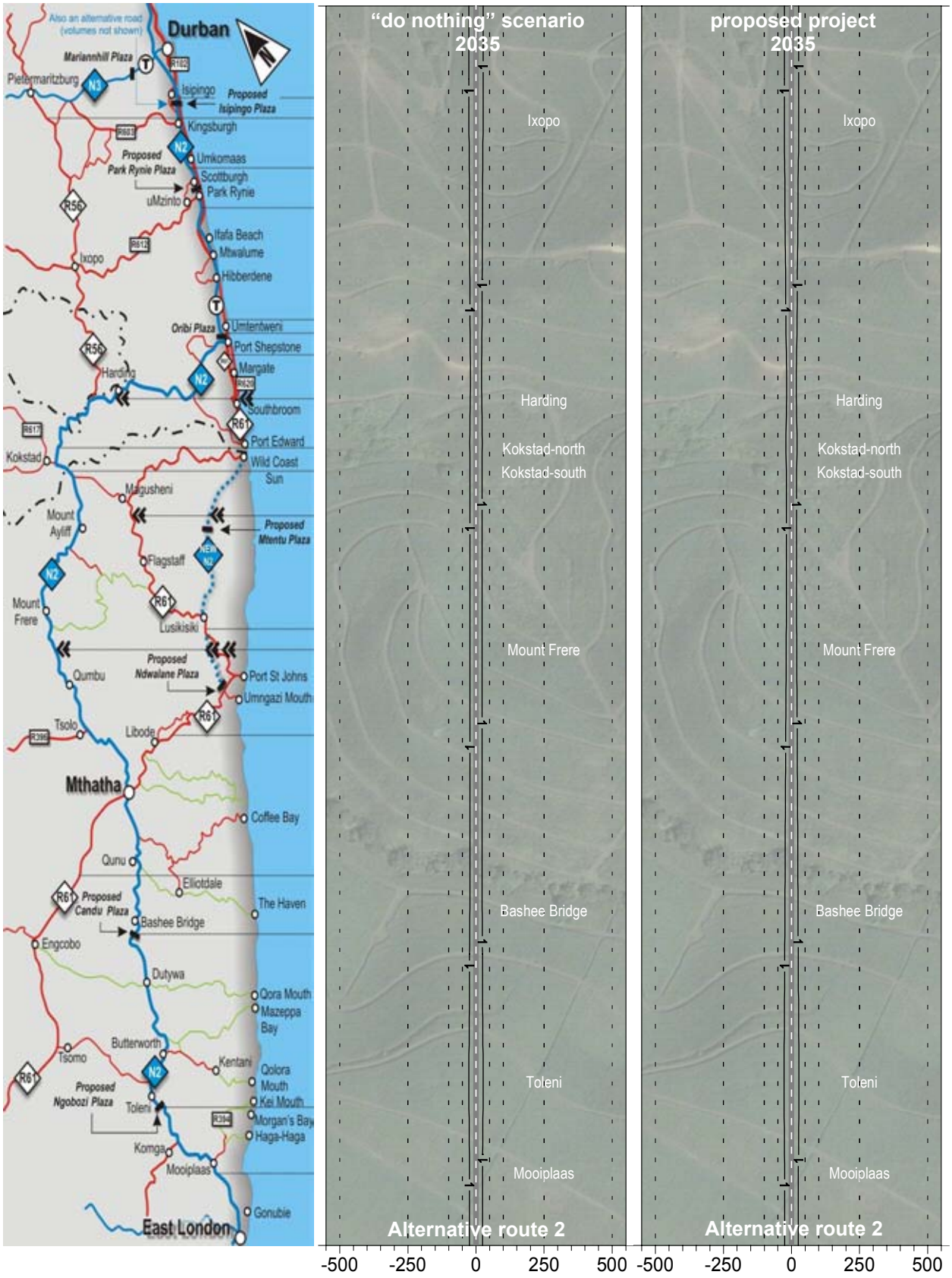


**Figure A6.35: Comparison of modelled ambient concentrations of CO for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2035 for the existing route (Alternative) 2 (R56 and existing N2). Red lines indicate predicted exceedances of the SANS limit value (30 mg/m$^3$)**

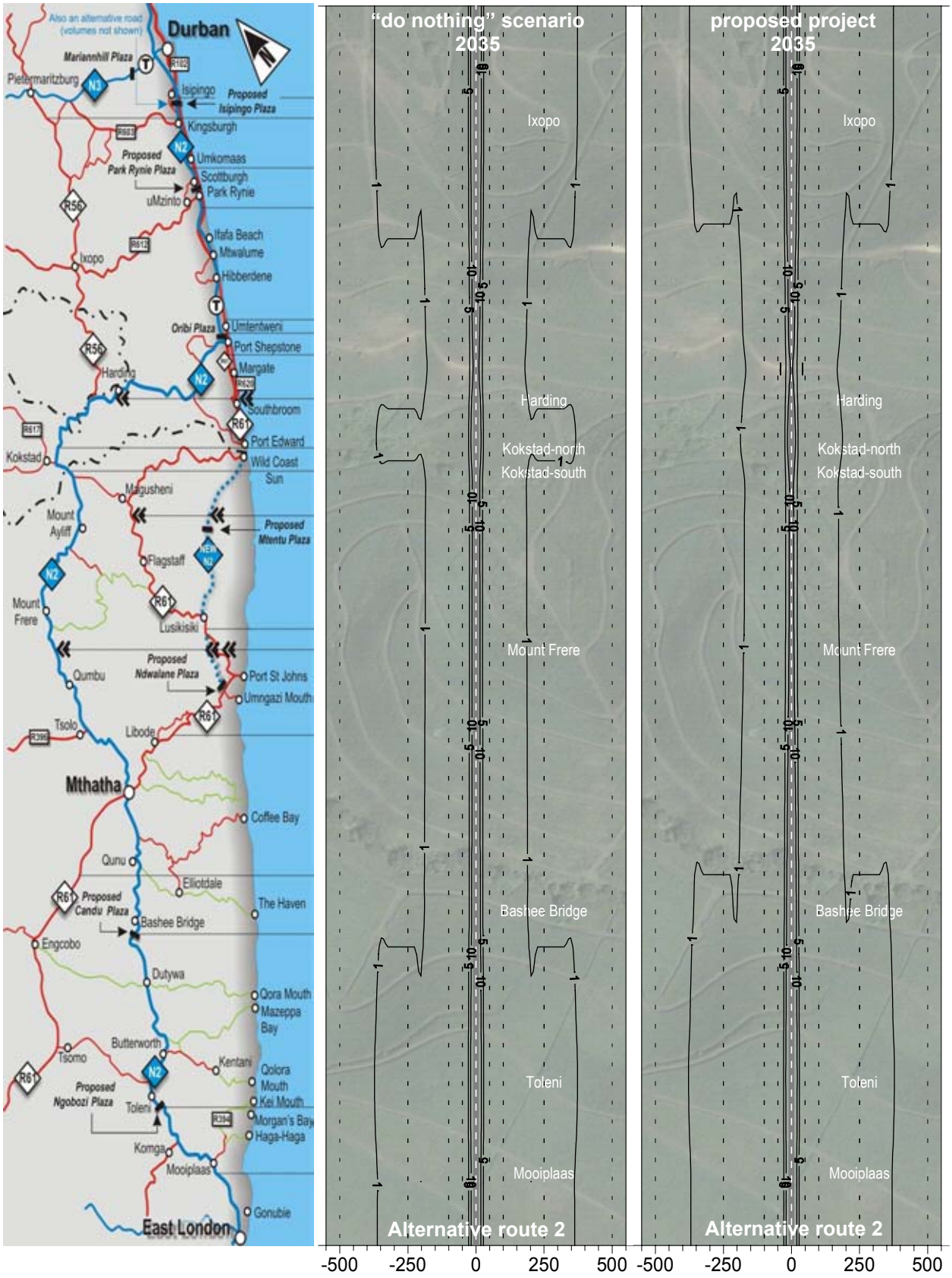


**Figure A6.36: Comparison of modelled ambient concentrations of $PM_{10}$ for the "do nothing" scenario ("existing routes"/without new roads and new tolls) against concentrations for the scenario "with new roads and new tolls" (the proposed project) in year 2035 for the existing route (Alternative) 2 (R56 and existing N2). Red lines indicate predicted exceedances of the AQA standard (180 µg/m$^3$)**

**APPENDIX 7**
**Proposed impact rating methodology**

The assessment of potential impacts will be based on the professional judgement of the specialists, fieldwork and desktop analysis, as appropriate. Potential impacts will be assessed according to the criteria and rating scales as set out in Table 1.

**Table 1: Impact assessment criteria and rating scales**

| CRITERIA | RATING SCALES |
|---|---|
| Intensity<br>(The expected magnitude or size of the impact) | • Negligible<br>• Low – where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected<br>• Medium – where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected<br>• High – where natural, cultural or social functions and processes are altered to the extent that it will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected |
| Extent<br>(The predicted scale of the impact) | • Site-specific<br>• Local (immediate surrounding areas)<br>• Regional (Eastern Cape or KwaZulu-Natal)<br>• National |
| Duration<br>(The predicted lifetime of the impact) | • Short-term (0 to 5 years)<br>• Medium term (6 to 15 years)<br>• Long term (16 to 30 years) - where the impact will cease after the operational life of the activity either because of natural processes or by human intervention<br>• Permanent - where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient |
| Probability<br>(The likelihood of the impact occurring) | • Improbable – where the possibility of the impact materialising is very low<br>• Probable – where there is a good possibility (<50% chance) that the impact will occur<br>• Highly probable – where it is most likely (50-90% chance) that the impact will occur<br>• Definite – where the impact will occur regardless of any prevention measures (>90% chance of occurring) |
| Status of the impact | Here it is stated whether the impact is positive (a “benefit”), negative (a “cost”) or neutral |
| Degree of confidence<br>(The specialist’s degree of confidence in the predictions and/or the information on which it is based) | • Low<br>• Medium<br>• High |

The significance of the potential impacts will be determined according to the core criteria for determining significance ratings, namely the extent, duration and intensity of the impacts to an affected party or the affected environment. Specialists will assign significance ratings to potential impacts before and after mitigation as per the convention for assigning significance ratings provided in Table 2 below.

**Table 2: Convention for assigning significance ratings**

| *SIGNIFICANCE RATING* | **DESCRIPTION (in terms of intensity, extent and duration)** |
|---|---|
| **VERY HIGH** Significance | Impacts could be:<br>EITHER of **high intensity** at a **regional level** and endure in the **long term**;<br>OR of **high intensity** at a **national level** in the **medium term**;<br>OR of **medium intensity** at a **national level** in the **long term.** |
| **HIGH** Significance | Impacts could be:<br>EITHER of **high intensity** at a **regional level** and endure in the **medium term**;<br>OR of **high intensity** at a **national level** in the **short term**;<br>OR of **medium intensity** at a **national level** in the **medium term**;<br>OR of **low intensity** at a **national level** in the **long term**;<br>OR of **high intensity** at a **local level** in the **long term**;<br>OR of **medium intensity** at a **regional level** in the **long term.** |
| **MEDIUM** Significance | Impacts could be:<br>EITHER of **high intensity** at a **local level** and endure in the **medium term**;<br>OR of **medium intensity** at a **regional level** in the **medium term**;<br>OR of **high intensity** at a **regional level** in the **short term**;<br>OR of **medium intensity** at a **national level** in the **short term**;<br>OR of **medium intensity** at a **local level** in the **long term**;<br>OR of **low intensity** at a **national level** in the **medium term**;<br>OR of **low intensity** at a **regional level** in the **long term.** |
| **LOW** Significance | Impacts could be:<br>EITHER of **low intensity** at a **regional level** and endure in the **medium term**;<br>OR of **low intensity** at a **national level** in the **short term**;<br>OR of **high intensity** at a **local level** and endure in the **short term**;<br>OR of **medium intensity** at a **regional level** in the **short term**;<br>OR of **low intensity** at a **local level** in the **long term**;<br>OR of **medium intensity** at a **local level** and endure in the **medium term.** |
| **VERY LOW** Significance | Impacts could be:<br>EITHER of **low intensity** at a **local level** and endure in the **medium term**;<br>OR of **low intensity** at a **regional level** and endure in the **short term**;<br>OR of **low to medium intensity** at a **local level** and endure in the **short term.** |
| **NOT APPLICABLE** | No impact. |

Additional criteria to be considered which could increase the significance rating of the potential impact, if deemed justified by the specialist, are the following:

- Permanent/irreversible impacts (as distinct from long term, reversible impacts);
- Potentially substantial cumulative effects; and
- High level of risk or uncertainty, with potentially substantial negative consequences.

Criteria to be considered which could decrease the significance rating if deemed justified by the specialist, with motivation, include:

- Improbable impacts, where the confidence level in the prediction is high.

The following procedure will be followed for assigning significance ratings to residual (after mitigation) impacts:

- Firstly, probable changes in intensity, extent and duration of the impact after mitigation will be considered, assuming effective implementation of mitigation measures, leading to a revised significance rating;
- Secondly, the significance rating will be moderated after taking into account the likelihood of proposed mitigation measures being effectively implemented. The following will be considered in this regard:
  - Any potentially significant risks or uncertainties associated with the effectiveness of mitigation measures;
  - The technical and financial ability of the proponent to implement the measure; and
  - The commitment of the proponent to implementing the measure, or guarantee over time that the measures would be implemented.

The significance ratings are based on largely objective criteria and inform decision-making at a project level as opposed to a community level. In some instances, therefore, whilst the significance rating of potential negative impacts might be “low” or “very low”, the importance of these impacts to local communities or individuals might be extremely high. The importance which I&APs attach to impacts must also be taken into consideration, and recommendations should be made as to ways of avoiding or minimising these negative impacts through appropriate project design, selection of appropriate alternatives and/or management.

The relationship between the residual significance ratings and decision-making can be broadly defined as follows:

- Very Low/Low – will not have an influence on the decision to proceed with the proposed project, provided that recommended mitigation measures to mitigate impacts are implemented;
- Medium – should influence the decision to proceed with the proposed project, provided that recommended measures to mitigate impacts are implemented; and
- High/Very High – would strongly influence the decision to proceed with the proposed project.

**APPENDIX 8**
**Peer review - Air quality specialist study for the proposed N2 Wild Coast Toll Highway**

The first draft air quality specialist study was reviewed in detail by Dr L W Burger (Airshed Planning Professionals). The compilation of this report is therefore informed by the peer review comments received.

This appendix consists of:

- The peer review report; and
- A comments and response table on the review.

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Our Ref: *CCAE/08/01_01_pn*

Your Ref: *NRA01/let Burger*

20 MARCH 2008

CCA Environmental (Pty) Ltd
P O Box 10145
Caledon Square
Cape Town
7905

Attention: Mr F Fredericks

**Subject:** ***Review of "AIR QUALITY SPECIALIST STUDY FOR THE PROPOSED N2 WILD COAST TOLL HIGHWAY"***

Dear Mr Fredericks,

Airshed Planning Professionals (Pty) Ltd was approached to provide a peer review of the air pollution impact assessment of the proposed N2 Wild Coast Toll Highway, linking East London and Durban. The investigation was completed for two vehicle emission scenarios, namely (a) the "do nothing" scenario and (b) the scenario with the proposed construction of new roads and toll plazas.

The review was based solely on the report:

***"AIR QUALITY SPECIALIST STUDY FOR THE PROPOSED N2 WILD COAST TOLL HIGHWAY" by M. Zunckel, W. Carter, M.A. Oosthuizen and A. Raghunandan, CSIR Natural Resources and the Environment, Congella, 12 February 2008.***

The *Terms of Reference for the Review* are as follows:

1. Assess whether the specialist has complied with its Terms of Reference.
2. Assess whether adequate consideration is given, whether appropriate, to the legal, policy, and /or planning context of direct relevance to the specialist study.
3. Assess the study approach, technical content and assessment methodology of the specialist study to determine whether it is credible.
4. Assess the adequacy of information used, and identify whether there are any obvious information gaps, omissions or inaccuracies which need to be addressed.
5. Assess whether the significance ratings given to potential impacts are reasonable and reliable.
6. Assess whether the recommendations of the study with regard to the most appropriate alternatives are sound and defensible.
7. State any alternative viewpoints concerning the issues presented in the report, if any, giving explicit reason for your particular stance.
8. State whether you believe that any key uncertainties or risks, and/ or assumptions underpinning the assessment, have been sufficiently highlighted in the study.
9. Submit a letter report (3-6 pages) containing the findings of your view.

It must be emphasized that the aim of this review is not to reflect negative criticism, but rather to highlight information gaps, ambiguities, unclear issues and to provide meaningful opinions.

**REVIEW**

The following is a summary of the review as guided by the Terms of Reference for the Reviewer:

1. ***Assess whether the specialist has complied with its Terms of Reference.***

Section 1.1. "*Background and Brief*", provides a brief discussion of the proposed project as well as the requirements and tasks for the investigation. The given scope of work for the air quality assessment was to focus on:

i. Construction phase; and
ii. Traffic related air pollution issues once the highway is completed.

The scope covers the activities typically required for a new development, albeit a road or industrial plant. The detail requirement to complete the investigation bearing in mind the above scope, was grouped into

i. Terms of Reference for *Reviewing the Previous Assessment*;
ii. *General Terms of Reference*; and
iii. *Specific Terms of Reference*.

It is not clear whether all three 'terms of reference' specifications were provided by CCA Environmental. Nonetheless, the completeness all if these will be reviewed.

The Terms of Reference for Reviewing the Previous Assessment were as follows:

i. Review previous independent specialist reports, where applicable, in order to determine the continued relevance thereof;

*Comment: Apart from referring to the emissions estimation methodology (page 9), no further review or discussion as to the relevance (and continued relevance) of any previous independent specialist reports where included.*

ii. Updating existing information, where applicable, in light of any relevant new information and current project details;

*Linked to the previous item, it is not clear which data were taken from the previous investigations, or which were updated, existing information, in light of any relevant new information and current project details.*

iii. Ensuring that all relevant issues/potential impacts and key shortcomings and/or gaps are adequately addressed.

*No review of the previous investigations or items from the issues trail have been included in the report thereby providing insurance that all relevant issues/potential impacts and key shortcomings and/or gaps are adequately addressed. These are often very specific queries associated with individuals and/or local impacts, which are not always captured by the 'general' terms of reference. Without perusing the Issues Trail and comparing it to the study, it is not clear whether these were addressed. It would have been useful to have a summary of air-related issues and specific responses from the specialist.*

iv. Potential impacts are to be assessed and rated in terms of an assessment methodology set out by CCA Environmental. This includes the consideration of uncertainty (e.g. lack of current knowledge or understanding of cause-effects) and potential cumulative effects in the assessment of impacts, as required by the EIA Regulations and National Environmental Management Act (NEMA) (Act No 107 of 1998).

*The potential impacts were assessed and rated according to the methodology set out by CCA Environmental (Section 5.4 and Appendix 7). However, it is not clear why impacts were only considered LOW to VERY HIGH when exceedances of the national ambient air quality standards were predicted beyond 500 m. For any exceedances within 500 m from the roadside, impacts were considered to be*

*VERY LOW. This clearly assumes that no sensitive receptors are located within 500 m from the road. From Section 3.3 (page 16), this is clearly not the case. Since any development along the highway would be allowed to exist up to the road reserve, this should be the criteria for determining the significance.*

*Although model uncertainties and the restriction to use daily average traffic volumes were discussed in the study, there is no section that summarises all assumptions and uncertainties. This section should also indicate the significance of these uncertainties and assumptions. For example, the acceptability of using Copert III emission factors for South African conditions were not discussed neither was the Euro emission type given.*

*Only a semi-quantitative assessment of potential cumulative effects was made due to the lack of detailed information along the affected roads. This was restricted to CO (hourly average), NOx (annual average) and PM10 (annual average). Nonetheless, it is expected that the NOx and CO impact near the roadways would predominantly originate from vehicles. PM10 and other pollutants such as sulphur dioxide may have other significant sources. No attempt to determine cumulative affects during construction period was made.*

v. The study should also recommend mitigation measures in light of their likely effectiveness and practicability.

*The study included generic mitigation measures for the construction phase. The effectiveness and practicability of these measures was not illustrated. It is understood that the construction phase of the project lacked adequate detail to accurately predict air pollution concentrations, and it was therefore not possible to illustrate the effectiveness. It is nonetheless believed that the mitigation measures should contain a more extensive list of controls for inclusion in the management plan, which is to be completed at a later stage.*

*Mitigation measures and air quality monitoring were recommended at all toll plazas. The monitoring was confined to worker exposure. No air pollution monitoring was recommended to measure impact on nearby communities. Although it is not expected that the project can influence the control of vehicle emissions directly, ambient air quality monitoring can provide invaluable information towards the development of the National Vehicle Emissions Regulations. It is proposed that areas shown to potentially experience elevated air concentrations (above national guidelines) be targeted for monitoring. Pollutants should include oxides of nitrogen, carbon monoxide and BETX (benzene, ethylbenzene, toluene and xylene).*

*Adequate information was provided to support the recommended location of toll plazas and separation distances for areas identified to potentially experience high heath risk. This was especially identified for areas already exposed to high air pollution. It is not clear whether these distances could practicably be imposed.*

In addition, the following General Terms of Reference were included:

vi. Describe the baseline conditions that exist in the study area and identify any sensitive areas that would need special consideration;

*Baseline conditions were described along the seven sections defined for the project. Sensitive receptors (human exposure) were identified, but not all distances between road and receptor were provided.*

vii. Ensure that all issues and concerns and potential environmental impacts relevant to the study are addressed and recommend the inclusion of any additional issues required in the Terms of Reference, based on professional expertise and experience. Also consider comments on the previous specialist study as per the review of the previous EIA process, appeals and Record of Decision (RoD) commissioned by the Minister of Environmental Affairs and Tourism (final report dated 29 October 2004), as appropriate;

*See Item iii, above.*

*Specific issues from Interested and Affected Parties were not explicitly included in the report.*

viii. Provide a brief outline of the approach used in the study including the assumptions, sources of information and clearly stating the strengths and weaknesses of the predictive models;

*An outline of the approach was provided. Assumptions were provided were necessary and the sources of information given. The strengths and weaknesses of the predictive models were included. The relevance of using Copert III to South African fleet should be discussed in more detail though.*

ix. Indicate the reliability of information used in the assessment, as well as any constraints/limitations applicable to the report (e.g. any areas of insufficient information or uncertainty);

*There is no section that summarises all assumptions and uncertainties. This section should also indicate the significance of these uncertainties and assumptions.*

*Although it is expected that there would be air pollution impacts from the associated operation of aggregate stockpiles and asphalt plants, it is understood that the operation of these would be the subject of separate Environmental Impact Assessments. It is therefore recommended that the report emphasise this, and it should perhaps be included in the "assumptions and limitations" section.*

x. Identify the potential sources of risk to the affected environment during the construction and operational phases of the proposed project;

*The potential sources of risk to human health were identified during construction and operational phases.*

xi. Identify and list relevant legislative and permit requirements applicable to the potential impacts of the proposed project;

*The relevant legislative and permit requirements were included in the investigation.*

xii. Include an assessment of the "do nothing" alternative and identified feasible alternatives;

*The assessment included the "do nothing" scenario and the scenario with the proposed construction of new roads and toll plazas.*

xiii. Assess and evaluate potential direct and indirect impacts during both the construction and operational phase of the proposed project;

*The assessment included a quantitative assessment of the operational phase, and a qualitative impact assessment for the construction.*

xiv. Identify and assess any cumulative effects arising from the proposed project;

*Only a semi-quantitative assessment of potential cumulative effects was made due to the lack of detailed information along the affected roads. Furthermore, this was restricted to CO (hourly average), NOx (annual average) and PM10 (annual average).*

xv. Undertake field surveys, as appropriate to the requirements of the specialist study;

*Field surveys were restricted to the description and identification of sensitive human receptors. No air monitoring was conducted.*

xvi. Identify areas where impacts could combine or interact with impacts likely to be covered by other specialists, resulting in aggravated or enhanced impacts and assess potential effects;

*The assessment was confined to the inhalation route of exposure. Ingestion through deposition was not included, albeit not considered to be a significant impact. The potential and likely significance of soiling of property during construction period must be included.*

xvii. Apply the precautionary principle in the assessment of impacts, in particular where there is major

uncertainty, low levels of confidence in predictions and poor data or information;

*Although the worst case meteorological data was used in the dispersion simulations, it is not clear from the study of the peak morning and afternoon traffic volumes were dealt with. This is especially relevant for oxides of nitrogen.*

xviii. Determine the significance of assessed impacts according to a Convention for Assigning Significance Ratings to Impacts;

*The impact was assessed according to the Convention for Assigning Significance Ratings to Impacts. Also see Item iv.*

*A rating of Very Low was given to all construction activities without mitigation.*

*The impact during the operational phase was given Low to all sections except at toll plazas, where a rating of Low-Medium or Medium was assigned.*

xix. Recommend practicable mitigation measures to minimise or eliminate negative impacts, enhance potential project benefits or to protect public and individual rights to compensation and indicate how these can be implemented in the final design, construction and operation of the proposed project;

*Refer to Item 1.v*

xx. Provide a revised significance rating of assessed impacts after the implementation of mitigation measures;

*A rating of Very Low was given to all construction activities with and without mitigation. It is not clear how mitigated impacts were quantified.*

*The assessment of mitigation during operational phase was rated, but it is not clear what this was based on.*

xxi. Identify ways to ensure that recommended mitigation measures would be implemented, as appropriate; and

*This was not included in the report. No requirements for the future management plan was discussed.*

xxii. Recommend an appropriate monitoring and review programme in order to track the effectiveness of proposed mitigation measures.

*Only the need for air quality monitoring at toll plazas were included. The actual detail of this monitoring programme was not provided.*

*No* monitoring and review programme to track the effectiveness of proposed mitigation measures *were provided.*

Lastly, the Specific Terms of Reference were listed as

xxiii. Predict and assess the potential air quality and health impacts associated with dust and fumes generated during the construction phase of the proposed project and identify feasible alternatives;

*Whilst the impacts of emissions from vehicles during the operational phase were quantitatively assessed, only a qualitative discussion was included for the construction phase. Although the semi-quantitative assessment of potential cumulative effects (and the recommended mitigation measures considered) is appropriate and adequate for the decision at hand, not enough emphasis is placed on the development of the management plan which would ensure procedures to control and the track effectiveness of the abatement measures.*

xxiv. Assess the potential cumulative effects and health implications of increased traffic volumes and the Isipingo Toll Plaza on the air quality of the South Durban Industrial Basin; and

*Only a semi-quantitative assessment of potential cumulative effects was made. This was restricted to CO (hourly average), NOx (annual average) and PM10 (annual average). This was not specific to the Isipingo Toll Plaza.*

*The list of pollutants in the assessment did not include the compounds of particular relevance in the South Durban Basin, such as sulphur dioxide and volatile organic compounds (e.g. benzene).*

xxv. Predict and assess the potential air quality and health impacts in areas where traffic could divert onto alternative roads in order to avoid toll plazas, especially in the KwaZulu-Natal section of the proposed route (in association with the traffic study).

*Two alternative routes were assessed.*

2. ***Assess whether adequate consideration is given, whether appropriate, to the legal, policy, and /or planning context of direct relevance to the specialist study.***

The legislation pertaining to ambient air quality standards were discussed and the limits provided.

The DME fuels formulation and vehicle emissions policies were not discussed.

3. ***Assess the study approach, technical content and assessment methodology of the specialist study to determine whether it is credible.***

The overall assessment followed the methodology generally regarded appropriate for air pollution impact assessments.

*Emission Inventory - Construction*

Calculations of fugitive dust during construction of the roads and emissions from asphalt plants were not quantified. Although not stated, this was presumably because of a lack of information.

*Emission Inventory - Operation*

Vehicle emission rates were estimated using emission factors contained in the COPERT III database. These emission factors are quite comprehensive and provide an acceptable alternative in the absence of detailed local (South African) emission factors and measurements. However, it is not clear which EURO vehicle emission standard was adopted in these calculations (i.e. EURO-pre, EURO-1, EURO-2, etc.)

It is unclear whether the PM10 emissions only include exhaust emissions (primarily diesel particulates) or also wheel entrainment.

Projected traffic volumes were projected for 30 years. The lack of data on morning and afternoon peaks were discussed, and the implication of under-estimating the short-term impacts given (Section 2.1.1.2, page 6). It is believed though, that the study could've assumed a typical 10% fraction of ADT for the morning/afternoon peak in the simulations, and these results used to illustrate the sensitivity of this under-prediction. If this was also used in the previous investigations, it should have been flagged as a short-coming in the assessment due the acute impacts posed by pollutants such as oxides of nitrogen and sulphur dioxide. This is especially true during peak morning and evening periods along congested sections such as the Isipingo – Amanzimtoti route.

Only oxides of nitrogen, carbon monoxide and inhalable particulates (particles with aerodynamic diameters of 10 micron and less, or PM10) were included in the assessment. Other pollutants of significance which should've been included are sulphur dioxide, diesel particulates, benzene and 1,3-butadiene. Historically

sulphur dioxide has been one of the criteria pollutants which have been regulated by DEAT, in addition to being a very significant pollutant in the Durban South region. The list of regulated pollutants has also been extended to include benzene (see SANS 1929), which is a confirmed human carcinogen. Diesel particulates and 1,3- butadiene have been identified as potential human carcinogens and it would be appropriate to include these for completion of the human health risk assessment.

Experience has shown that due the relatively low toxicity limits of benzene, diesel particulates and 1,3 – butadiene, it is not possible to exclude them from the investigation without further dispersion calculations. Impacts are often further than those predicted for oxides of nitrogen. It is recommended that a screening calculation exercise be initiated in areas with highest traffic volumes.

*Meteorological Parameters*

Although local meteorology along the route was discussed, it is understood from Section 2.1.2 that only one atmospheric condition was used in all simulations, i.e. wind speed of 1 m/s and a very stable (class G) atmospheric stability. These conditions would result in the worst-case concentrations, and would typically only occur during the night following the development of a very stable and deep inversion layer. Since it is not clear what the assumption for the diurnal/nocturnal traffic volumes were, this condition may not be realistic, i.e. using higher volumes than would normally be during these night-time hours. Although this follows the precautionary principle in the assessment of impacts, A more realistic worst-case would perhaps have been to assume stability class F (or even E).

*Dispersion Model*

The use of the US EPA's CALINE 4 model is considered to be adequate for the purposes of simulating road vehicle emissions.

*Analysis of Results*

In spite of the omission of pollutants such as sulphur dioxide, diesel particulates, benzene and 1,3 butadiene, the impact of oxides of nitrogen, carbon monoxide and inhalable particulates were compared to relevant standards and limits. Sections along the road where these limits were exceeded for the "do nothing" and "proposed changes" options were identified and distances of exceedances provided. These were correctly identified and the impact rating carried through to Section 5.4 Impact Assessment.

4. ***Assess the adequacy of information used, and identify whether there are any obvious information gaps, omissions or inaccuracies which need to be addressed.***

As indicated above, the use of night-time stability patterns using daily average traffic volumes may result in unrealistic worst-case conditions.

The most accurate predictions would result if meteorology for all hours of the year is employed in the model, using a realistic diurnal/nocturnal traffic volume profile, even if weekly and seasonal variations are excluded.

The exclusion of sulphur dioxide, diesel particulates, benzene and 1,3 butadiene in the assessment must be addressed. As discussed above, if the calculated PM10 emissions essentially only include diesel particles, the analysis should not be restricted to a comparison to inhalable health limits, but extended to health implications of being exposed to diesel particulates.

5. ***Assess whether the significance ratings given to potential impacts are reasonable and reliable.***

Sensitive receptors were identified within 500 m from the road (Section 3.3, page 16). It is therefore not clear how the definition of considering exceedances beyond 500 m as" LOW significance" was developed. Similarly, when the predicted concentrations do not exceed the limits within 500 m from the road, the

significance is considered VERY LOW.

Given this concern, the Significance Rating tables (Section 5.4) should be revised.

6. ***Assess whether the recommendations of the study with regard to the most appropriate alternatives are sound and defensible.***

The recommendation did not include alternatives.

7. ***State any alternative viewpoints concerning the issues presented in the report, if any, giving explicit reason for your particular stance.***

Apart from the concerns addressed above, there are no alternative viewpoints concerning the issues presented in the report.

8. ***State whether you believe that any key uncertainties or risks, and/ or assumptions underpinning the assessment, have been sufficiently highlighted in the study.***

Although information gaps were discussed, there is a lack of depth on how these were dealt with and the resulting sensitivity of the predicted impacts.

**CONCLUSIONS**

According to the terms of reference for the review, the air quality specialist study requires some clarification and elaboration on a number of aspects, and the inclusion of some tasks which, although required by the terms of reference, were not adequately addressed. The details are provided in the review above.

Most importantly, it is believed that (a) the emissions during peak morning/afternoon traffic volumes be assessed for oxides of nitrogen, (b) the pollutants extended to include sulphur dioxide and volatile organic compounds such as benzene, (c) more emphasis be given to the preparation of a fugitive dust minimisation management plan as part of the construction phase, and (d) the definition of the assessment of impacts should be reconsidered (see Review item 1.iv).

It is not clear whether any specific issues were raised by the Interested and Affected parties during the previous assessment since this was not included in the revised assessment. It is therefore difficult to provide an opinion on the completeness of the assessment.

I trust that the views expressed will be taken in good faith and that the proposed recommendations would be given due consideration.

Yours sincerely,

Dr L W Burger
AIRSHED PLANNING PROFESSIONALS (PTY) LTD

**Table A8.1: Comments and response table based on the peer review by Airshed Planning Professionals**

| Review comments | Responses |
|---|---|
| 1.i Apart from referring to the emissions estimation methodology (page 9), no further review or discussion as to the relevance (and continued relevance) of any previous independent specialist reports were included. | Where applicable, a short discussion to reiterate the relevance of information used from the previous study for this study is now pointed out where required, particularly in Section 2 of the report. |
| 1.ii Linked to the previous item, it is not clear which data were taken from the previous investigations, or which were updated, existing information, in light of any relevant new information and current project details. | Data which was taken from the initial assessment or which were updated in this study is now pointed out where applicable. All terms of reference which encapsulate the requirements of the current project are now addressed by this specialist study. |
| 1.iii No review of the previous investigations or items from the issues trail have been included in the report thereby providing insurance that all relevant issues/potential impacts and key shortcomings and/or gaps are adequately addressed. These are often very specific queries associated with individuals and/or local impacts, which are not always captured by the 'general' terms of reference. Without perusing the Issues Trail and comparing it to the study, it is not clear whether these were addressed. It would have been useful to have a summary of air-related issues and specific responses from the specialist. | Suggestion noted - a summary of air-related issues and concerns raised by interested and affected parties (I&APs) during the previous EIA process as well as those raised during the current Scoping Study, and responses from the air quality team is now provided in Section 1.2 of the report. |
| 1.iv (a) The potential impacts were assessed and rated according to the methodology set out by CCA Environmental (Section 5.4 and Appendix 7). However, it is not clear why impacts were only considered LOW to VERY HIGH when exceedances of the national ambient air quality standards were predicted beyond 500 m. For any exceedances within 500 m from the roadside, impacts were considered to be VERY LOW. This clearly assumes that no sensitive receptors are located within 500 m from the road. From Section 3.3 (page 16), this is clearly not the case. Since any development along the highway would be allowed to exist up to the road reserve, this should be the criteria for determining the significance.<br><br>1.iv (b) Although model uncertainties and the restriction to use daily average traffic volumes were discussed in the study, there is no section that summarises all assumptions and uncertainties. This section should also indicate the significance of these uncertainties and assumptions. For example, the acceptability of using Copert III emission factors for South African conditions were not discussed neither was the Euro emission type given.<br><br>1.iv (c) Only a semi-quantitative assessment of potential cumulative effects was made due to the lack of detailed information along the affected roads. This was restricted to CO (hourly average), | (a)This makes sense and we agree that the distance up to the road reserve (80 m) should be the criteria for determining the significance – this has been adjusted accordingly in Section 3.3 and in the significance ratings table (now Table 5.4, Section 5.5: Impact assessment). Impacts were considered LOW to VERY HIGH due to the significantly higher numbers of vehicles at Isipingo (and northern-most sections) compared to the rest of the route.<br><br>(b) All assumptions and uncertainties have been summarised in Section 2.3, with their significance to the study. The acceptability of using COPERT III emission factors for South African conditions is now discussed and the Euro emission type stated (Section 2.1.1.3: Emission factors, and in Section 2.3: Summary of assumptions, uncertainties and limitations of the study).<br><br>(c) Other than the Prospecton/Isipingo area, motor vehicles are the only source of emissions. The focus of the cumulative impacts in this study was therefore only considered at Prospecton/Isipingo. |

| Review comments | Responses |
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| $NO_x$ (annual average and $PM_{10}$ (annual average). Nonetheless, it is expected that the $NO_x$ and CO impact near the roadways would predominantly originate from vehicles. $PM_{10}$ and other pollutants such as sulphur dioxide may have other significant sources. No attempt to determine cumulative affects during construction period was made. | However, there are many limitations with this kind of assessment and these have been highlighted in Section 5.4: Isipingo case study – impact assessment and health risks. A cumulative assessment requires a study where all sources of pollution are modelled at the same time, which takes account of prevailing meteorological conditions, etc. CALINE4 is specifically designed to model emissions from vehicles only and hence cannot account for emissions from other source types in the area. In addition, the contribution of different sources to the measurements at any one monitoring station is not easily quantifiable. It is also not possible to find an appropriate background level for the SDIB, since there is such a diverse mix of sources at play at any given time. Due to these specific issues pertaining to the available data, it is not possible to simply sum modelled data and measured data to obtain a cumulative concentration at any location as this will result in a distorted perception of cumulative impacts. An alternative "assessment" has therefore been provided.<br><br>This study did not address the cumulative impacts of $SO_2$ and PM during construction since these events are very short-lived and temporary, lasting only few months. It is also expected that the construction team will adhere to a strict management plan with the aim at keeping a tight control of emissions. In addition, there is a lack of data for assessing impacts during construction. |
| 1.v (a) The study included generic mitigation measures for the construction phase. The effectiveness and practicability of these measures was not illustrated. It is understood that the construction phase of the project lacked adequate detail to accurately predict air pollution concentrations, and it was therefore not possible to illustrate the effectiveness. It is nonetheless believed that the mitigation measures should contain a more extensive list of controls for inclusion in the management plan, which is to be completed at a later stage.<br><br>1.v (b) Mitigation measures and air quality monitoring were recommended at all toll plazas. The monitoring was confined to worker exposure. No air pollution monitoring was recommended to measure impact on nearby communities. Although it is not expected that the project can influence the control of vehicle emissions directly, ambient air quality monitoring can provide invaluable information towards the development of the National Vehicle Emissions Regulations. It is proposed that areas shown to potentially experience elevated air concentrations (above national guidelines) be targeted for monitoring. | (a) The section on mitigation measures for the construction phase of the project (Section 6.2) has been revised and now contains a more practicable list of control measures, which will feed well into the dust management plan.<br><br>(b) A recommendation for air quality monitoring of $NO_x$, CO and BTEX in areas which are shown to potentially experience elevated air pollution concentrations is included in Section 6.1. |

| Review comments | Responses |
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| Pollutants should include oxides of nitrogen, carbon monoxide and BETX (benzene, ethylbenzene, toluene and xylene).<br><br>1.v (c) Adequate information was provided to support the recommended location of toll plazas and separation distances for areas identified to potentially experience high heath risk. This was especially identified for areas already exposed to high air pollution. It is not clear whether these distances could practicably be imposed. | (c) We agree - It is not possible to determine whether these distances could practicably be imposed (particularly in well built-up areas), and this is now stated at several points in the report. |
| 1.vi Baseline conditions were described along the seven sections defined for the project. Sensitive receptors (human exposure) were identified, but not all distances between road and receptor were provided. | A comprehensive list of schools, hospitals and clinics (and their relative distance from the route) (included in Appendix 2) was made available to the air quality team by Neville Bews & Associates. Schools within 500 m and hospitals/clinics within 1000 m are regarded as being potentially susceptible based on their close proximity to the proposed Highway. This is highlighted in Sections 3.3: Identification of sensitive receptors. |
| 1.v.ii See Item iii, above.<br>Specific issues from Interested and Affected Parties were not explicitly included in the report. | A summary of air-related issues and concerns raised by interested and affected parties (I&APs) during the previous EIA process as well as those raised during the current Scoping Study, and responses from the air quality team is provided in Section 1.2 of the report. All terms of reference which encapsulate the requirements of the current project have been addressed by this specialist study. |
| 1.viii An outline of the approach was provided. Assumptions were provided were necessary and the sources of information given. The strengths and weaknesses of the predictive models were included. The relevance of using Copert III to South African fleet should be discussed in more detail though. | As mentioned above, the acceptability of using COPERT III emission factors for South African conditions is now discussed in Section 2.1.1.3. |
| 1.ix (a) There is no section that summarises all assumptions and uncertainties. This section should also indicate the significance of these uncertainties and assumptions.<br><br>1.ix (b) Although it is expected that there would be air pollution impacts from the associated operation of aggregate stockpiles and asphalt plants, it is understood that the operation of these would be the subject of separate Environmental Impact Assessments. It is therefore recommended that the report emphasise this, and it should perhaps be included in the “assumptions and limitations” section. | (a) As mentioned above, all assumptions and uncertainties have been summarised in Section 2.3: Summary of assumptions, uncertainties and limitations of the study.<br><br>(b) The report has now highlighted that air pollution impacts from the associated operation of aggregate stockpiles and asphalt plants would be the subject of separate Environmental Impact Assessments and this is also included in the “assumptions and limitations” section. |
| 1.x The potential sources of risk to human health were identified during construction and operational phases. | No further remarks. |

| Review comments | Responses |
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| 1.xi The relevant legislative and permit requirements were included in the investigation. | No further remarks. |
| 1.xii The assessment included the "do nothing" scenario and the scenario with the proposed construction of new roads and toll plazas. | No further remarks. |
| 1.xiii The assessment included a quantitative assessment of the operational phase, and a qualitative impact assessment for the construction. | No further remarks. |
| 1.xiv Only a semi-quantitative assessment of potential cumulative effects was made due to the lack of detailed information along the affected roads. Furthermore, this was restricted to CO (hourly average), $NO_x$ (annual average) and $PM_{10}$ (annual average). | As mentioned above, there are many limitations with this kind of assessment and these have been highlighted in Section 5.4. An alternative "assessment" has therefore been provided. |
| 1.xv Field surveys were restricted to the description and identification of sensitive human receptors. No air monitoring was conducted. | Air monitoring is beyond the scope of this project. However, a recommendation is made for such a study in Section 6.1.1: Traffic-related emissions. |
| 1.xvi The assessment was confined to the inhalation route of exposure. Ingestion through deposition was not included, albeit not considered to be a significant impact. The potential and likely significance of soiling of property during construction period must be included. | The potential for soiling of property during construction is short lived, localised and does not need to be considered. This is stated in the "assumptions and limitations" section (Section 2.3). |
| 1.xvii Although the worst case meteorological data was used in the dispersion simulations, it is not clear from the study of the peak morning and afternoon traffic volumes were dealt with. This is especially relevant for oxides of nitrogen. | In the first draft version of the report (which was submitted to reviewer), two errors were noted in the database where (i) formulae did not take into account a factor for conversion of emissions from g/km to g/miles and (ii) formulae did not convert the total daily traffic counts into hourly counts. These have been rectified and impacts for all pollutants (originally assessed) are now five times lower, but still based on a worst-case scenario. In the revised report, peak traffic volumes are assumed to occur at 07h00 and constitute 11.5% of the AADT for all traffic stations (based on the traffic profiles at Prospecton). This is a conservative assumption particularly for stations in the southern section of the route where peak traffic is less than 11.5% of the daily traffic. |
| 1.xviii (a) The impact was assessed according to the Convention for Assigning Significance Ratings to Impacts. Also see Item iv.<br><br>1.xviii (b) A rating of Very Low was given to all construction activities without mitigation.<br><br>1.xviii (c) The impact during the operational phase was given Low to all sections except at toll plazas, where a rating of Low-Medium or Medium was assigned. | (a) No further remarks.<br><br>(b) This is a typographical error and has been rectified: A rating of LOW is given to all construction activities without mitigation, and VERY LOW with mitigation.<br><br>(c) This is correct - compared to the rest of the route, impacts are higher at toll plazas because of the higher emission rates from slow moving vehicles. Impacts are greatest at the Isipingo toll |

| Review comments | Responses |
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| | where the largest traffic volumes are experienced. |
| 1.xix Refer to Item 1.v | This comment is addressed under 1.v: The section on mitigation measures for the construction phase of the project (Section 6.2) has been revised and now contains a more practicable list of control measures, which will feed well in the dust management plan. In addition, a recommendation for air quality monitoring of $NO_x$, CO and BETX in areas which are shown to potentially experience elevated air concentrations is included in Section 6.1.1. |
| 1.xx (a) A rating of Very Low was given to all construction activities with and without mitigation. It is not clear how mitigated impacts were quantified.<br><br>1.xx (b) The assessment of mitigation during operational phase was rated, but it is not clear what this was based on. | (a) As mentioned above, this is a typographical error and has been rectified: A rating of LOW is given to all construction activities without mitigation, and VERY LOW with mitigation. Mitigation is based on adherence to correct dust management practices.<br><br>(b) There is little or no change in impacts before and after mitigation since there is nothing that can be done to mitigate this growth in vehicle numbers, nor the impact on air quality. |
| 1.xxi This was not included in the report. No requirements for the future management plan was discussed. | The section on mitigation measures for the construction phase of the project have been revised and now contains a more practicable list of control measures, which will feed well into the dust management plan. |
| 1.xxii Only the need for air quality monitoring at toll plazas were included. The actual detail of this monitoring programme was not provided.<br>No monitoring and review programme to track the effectiveness of proposed mitigation measures were provided. | The details of the monitoring and review programme at toll plazas to track the effectiveness of proposed mitigation measures are now included under 6.1.1: Traffic-related emissions. |
| 1.xxiii Whilst the impacts of emissions from vehicles during the operational phase were quantitatively assessed, only a qualitative discussion was included for the construction phase. Although the semi-quantitative assessment of potential cumulative effects (and the recommended mitigation measures considered) is appropriate and adequate for the decision at hand, not enough emphasis is placed on the development of the management plan which would ensure procedures to control and the track effectiveness of the abatement measures. | The section on mitigation measures for the construction phase of the project (Section 6.2) has been revised and now contains a more practicable list of control measures, which will feed well in the dust management plan which would ensure procedures to control and the track effectiveness of the abatement measures. |
| 1. xxiv Only a semi-quantitative assessment of potential cumulative effects was made. This was restricted to CO (hourly average), $NO_x$ (annual average) and $PM_{10}$ (annual average). This was not specific to the Isipingo Toll Plaza.<br><br>The list of pollutants in the assessment did not include the compounds of particular relevance in | An attempt was made to assess the cumulative impacts of pollutants at Isipingo (Section 5.4: Cumulative effects), but as mentioned above, there are many limitations with this kind of assessment. An alternative “assessment” has therefore been provided where it is inferred that ambient concentrations measured at certain monitoring stations (specifically those where vehicle emissions |

| Review comments | Responses |
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| the South Durban Basin, such as sulphur dioxide and volatile organic compounds (e.g. benzene). | are the main influence) may be indicative of air quality that may be experienced at times at the proposed Isipingo Toll Plaza under similar driving conditions. Although the Ganges monitoring station is closest to Isipingo, only a few pollutants are measured here. It is therefore assumed that maximum concentrations measured at other stations in the monitoring may be used to provide an indication of a possible background value. In most cases, it is noted that the assumed background values are already above health guidelines (WHO or ATSDR) and that any additional pollution from vehicle emissions will further increase pollution impacts in this area. |
| 1.xxv Two alternative routes were assessed. | No further remarks |
| 2 (a) The legislation pertaining to ambient air quality standards were discussed and the limits provided.<br><br>2 (b) The DME fuels formulation and vehicle emissions policies were not discussed. | (a) No further remarks.<br><br>(b) The DME fuels formulation and vehicle emissions policies is now discussed in Section 4.2.3: National Policy development process on vehicle emissions. |
| 3 (a) The overall assessment followed the methodology generally regarded appropriate for air pollution impact assessments.<br><br>3 (b) Emission Inventory - Construction<br>Calculations of fugitive dust during construction of the roads and emissions from asphalt plants were not quantified. Although not stated, this was presumably because of a lack of information.<br><br>3 (c) Emission Inventory - Operation<br>Vehicle emission rates were estimated using emission factors contained in the COPERT III database. These emission factors are quite comprehensive and provide an acceptable alternative in the absence of detailed local (South African) emission factors and measurements. However, it is not clear which EURO vehicle emission standard was adopted in these calculations (i.e. EURO-pre, EURO-1, EURO-2, etc.)<br><br>3 (d) It is unclear whether the $PM_{10}$ emissions only include exhaust emissions (primarily diesel particulates) or also wheel entrainment.<br><br>3 (e) Projected traffic volumes were projected for 30 years. The lack of data on morning and afternoon peaks were discussed, and the implication of under-estimating the short-term impacts given (Section 2.1.1.2, page 6). It is believed though, that the study could've assumed a | (a) No further remarks.<br><br>(b) This study did not address the impacts of fugitive dust during construction since these events are very short-lived and temporary, lasting only few months. In addition, there is a lack of data for assessing impacts during construction.<br><br>(c) As a precaution, pre-Euro vehicle emission standards were adopted in these calculations. This has been stated where necessary, but particularly in Section 2.1.1.3: Emission factors.<br><br>(d) The $PM_{10}$ emissions only include exhaust emissions from petrol and diesel driven motor vehicles. $PM_{10}$ from wheel entrainment was not modelled, but it has been discussed in the report.<br><br>(e) As mentioned above, in the revised report, peak traffic volumes are assumed to occur at 07h00 and constitute 11.5% of the AADT for all traffic stations (based on the traffic profiles at Prospecton). This is a conservative assumption particularly for stations in the southern section of the route where peak |

| Review comments | Responses |
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| typical 10% fraction of ADT for the morning/afternoon peak in the simulations, and these results used to illustrate the sensitivity of this underprediction. If this was also used in the previous investigations, it should have been flagged as a shortcoming in the assessment due the acute impacts posed by pollutants such as oxides of nitrogen and sulphur dioxide. This is especially true during peak morning and evening periods along congested sections such as the Isipingo – Amanzimtoti route. | traffic is less than 11.5% of the daily traffic. |
| 3 (f) Only oxides of nitrogen, carbon monoxide and inhalable particulates (particles with aerodynamic diameters of 10 micron and less, or $PM_{10}$) were included in the assessment. Other pollutants of significance which should've been included are sulphur dioxide, diesel particulates, benzene and 1,3-butadiene. Historically sulphur dioxide has been one of the criteria pollutants which have been regulated by DEAT, in addition to being a very significant pollutant in the Durban South region. The list of regulated pollutants has also been extended to include benzene (see SANS 1929), which is a confirmed human carcinogen. Diesel particulates and 1,3- butadiene have been identified as potential human carcinogens and it would be appropriate to include these for completion of the human health risk assessment.<br><br>Experience has shown that due the relatively low toxicity limits of benzene, diesel particulates and 1,3 – butadiene, it is not possible to exclude them from the investigation without further dispersion calculations. Impacts are often further than those predicted for oxides of nitrogen. It is recommended that a screening calculation exercise be initiated in areas with highest traffic volumes. | (f) We agree with the recommendation, however, it is not possible to use a screening model such as Screen3 since it cannot model line sources. The dispersion calculations for all additional pollutant were therefore based on CALINE4. A case study for Isipingo is presented in Section 5.3 where benzene, toluene, ethylbenzene, xylene, 1,3 butadiene, $SO_2$ and diesel particulates are modelled. Isipingo is chosen since it is expected to experience the highest number of vehicles on a daily basis and it is located in the South Durban region. It is assumed that impacts south of Isipingo are significantly lower since traffic volumes are almost a third or below a third than at Isipingo. Emission factors are based on congested traffic flows for all additional pollutants except for $SO_2$, which is based on data from the FRIDGE study. In the absence of local data, a Californian tunnel study was used, where it is assumed that the VOC emission speciation from vehicle exhaust is as follows: benzene (4.07%); toluene (9.93%); ethylbenzene (1.42%); xylene (7.41%), where o-xylene is 1.14% and m/p xylene is 6.27%; 1.3 butadiene (0.71%). |
| 3 (g) Meteorological Parameters<br>Although local meteorology along the route was discussed, it is understood from Section 2.1.2 that only one atmospheric condition was used in all simulations, i.e. wind speed of 1 m/s and a very stable (class G) atmospheric stability. These conditions would result in the worst-case concentrations, and would typically only occur during the night following the development of a very stable and deep inversion layer. Since it is not clear what the assumption for the diurnal/nocturnal traffic volumes were, this condition may not be realistic, i.e. using higher volumes than would normally be during these night-time hours. Although this follows the precautionary principle in the assessment of impacts, A more realistic worst-case would perhaps have been to assume stability class F (or even E). | (g) Atmospheric stability is important in determination of lateral and vertical horizontal dispersion parameters. The most commonly used classification is that of Pasquill (1961), later modified by Gifford (1961), and referred to as the Pasquill-Gifford (P-G) stability class. Unstable conditions are represented by the letter 'A' (or the number 1), while increasingly more stable conditions are denoted with successive letters of the alphabet, such that extremely stable conditions are represented by 'F' and/or 'G' (6 and/or 7). Neutral atmospheric conditions are given by the 'D' (4) classification. According to the CALINE4 user guide, a stability class of 7 (which represents the most stable conditions or "the worst-case stability") is recommended for a model run where traffic-related emissions are assessed between 06h00-10h00. The selected stability class chosen for this particular study is therefore regarded appropriate since peak traffic volumes (particularly in the |

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| | northern sections of the route) occur at 07h00. This dispels the argument that resultant ambient concentrations may be unrealistically high when peak traffic volumes are combined with worst-case meteorological conditions. However, this study is subject to application of the precautionary principle in the assessment of impacts and given the issues raised by I&APs (for example "some assumptions are questionable and worst-case scenarios have not been used"), any other approach other than a worst-case approach would be questionable. The merit of modelling emissions during peak traffic under worst-case meteorological conditions is that it would account for any underestimations that may be present in the model input data, for example emission factors. |
| 3 (h) Dispersion Model<br>The use of the US EPA's CALINE 4 model is considered to be adequate for the purposes of simulating road vehicle emissions. | (h) No further comment. |
| 3 (i) Analysis of Results<br>In spite of the omission of pollutants such as sulphur dioxide, diesel particulates, benzene and 1,3 butadiene, the impact of oxides of nitrogen, carbon monoxide and inhalable particulates were compared to relevant standards and limits. Sections along the road where these limits were exceeded for the "do nothing" and "proposed changes" options were identified and distances of exceedances provided. These were correctly identified and the impact rating carried through to Section 5.4 Impact Assessment. | (i) As mentioned above, a case study for Isipingo (Section 5.3) is presented where benzene, toluene, ethylbenzene, xylene, 1,3 butadiene, $SO_2$ and diesel particulates are modelled. A chronic human health risk assessment and an acute non-cancer human health risk are determined for the additional pollutants under four scenarios. However, these are not carried through to the section on Impact Assessment since these pollutants were not assessed for the entire route. |
| 4 (a) As indicated above, the use of night-time stability patterns using daily average traffic volumes may result in unrealistic worst-case conditions. | (a) As mentioned above, a worse-case stability class is recommended for a model run where traffic-related emissions are assessed between 06h00-10h00, which coincides with the time when peak traffic volumes are experienced particularly in the northern sections of the route. |
| 4 (b) The most accurate predictions would result if meteorology for all hours of the year is employed in the model, using a realistic diurnal/nocturnal traffic volume profile, even if weekly and seasonal variations are excluded. | (b) We agree – but even under worse-case conditions, results indicate that ambient concentrations for $NO_x$, PM and CO are generally compliant throughout the route except at Isipingo. |
| 4 (c) The exclusion of sulphur dioxide, diesel particulates, benzene and 1,3 butadiene in the assessment must be addressed. As discussed above, if the calculated $PM_{10}$ emissions essentially only include diesel particles, the analysis should not be restricted to a comparison to inhalable health limits, but extended to health implications of being exposed to diesel particulates. | (c) As mentioned above, the modelled $PM_{10}$ emissions include exhaust emissions from both petrol and diesel driven motor vehicles. However, a case study for Isipingo (Section 5.3) is presented where benzene, toluene, ethylbenzene, xylene, 1,3 butadiene, $SO_2$ and diesel particulates are modelled. A chronic human health risk assessment and an acute non-cancer human health risk are determined for the additional pollutants under four scenarios. |

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| 5. Sensitive receptors were identified within 500 m from the road (Section 3.3, page 16). It is therefore not clear how the definition of considering exceedances beyond 500 m as" LOW significance" was developed. Similarly, when the predicted concentrations do not exceed the limits within 500 m from the road, the significance is considered VERY LOW.<br><br>Given this concern, the Significance Rating tables (Section 5.4) should be revised. | As is 1.v above, the significance rating in Section 3.3 and in the significance ratings table (now Table 5.4, Section 5.5: Impact assessment) has been revised - the distance up to the road reserve (80 m) is the new criteria for determining the significance. |
| 6. The recommendation did not include alternatives. | There are no alternatives other than "alternative routes". |
| 7. Apart from the concerns addressed above, there are no alternative viewpoints concerning the issues presented in the report. | The concerns raised above have been addressed as far as possible. |
| 8. Although information gaps were discussed, there is a lack of depth on how these were dealt with and the resulting sensitivity of the predicted impacts. | Information gaps have been addressed and more detail is provided in the report where necessary. All assumptions and uncertainties have been summarised in Section 2.3. |
| Conclusion (a): According to the terms of reference for the review, the air quality specialist study requires some clarification and elaboration on a number of aspects, and the inclusion of some tasks which, although required by the terms of reference, were not adequately addressed. The details are provided in the review above.<br><br>Conclusion (b): Most importantly, it is believed that (a) the emissions during peak morning/afternoon traffic volumes be assessed for oxides of nitrogen, (b) the pollutants extended to include sulphur dioxide and volatile organic compounds such as benzene, (c) more emphasis be given to the preparation of a fugitive dust minimisation management plan as part of the construction phase, and (d) the definition of the assessment of impacts should be reconsidered (see Review item 1.iv).<br><br>Conclusion (c): It is not clear whether any specific issues were raised by the Interested and Affected parties during the previous assessment since this was not included in the revised assessment. It is therefore difficult to provide an opinion on the completeness of the assessment.<br><br>Conclusion (d): I trust that the views expressed will be taken in good faith and that the proposed recommendations would be given due consideration. | (a) All terms of reference for the study have now been adequately addressed in the revised report.<br><br>(b) These issues have been addressed in the revised report.<br><br>(c) As mentioned above, all issues raised by I&APs during the previous EIA process as well as those raised during the current Scoping Study have now been addressed. A summary of air-related issues and concerns and responses from the air quality team is provided in Section 1.2 of the report.<br><br>(d) The co-authors thank the Reviewer for his comments. The co-authors have changed the revised version of the report according to Reviewer's requests, in most instances. Each of the proposed recommendations have been given due consideration. |