

7 References

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Carnovale, F., K. Tilly, A. Stuart, C. Carvalho, M. Summers and P. Eriksen 1996. Metropolitan Air Quality Study – Air Emissions Inventory.

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Appendix. Highest and 10th-highest 1-hour average ground-level concentrations

The scope of the original study was restricted to consideration of the annual averages, as presented in Figures 7–11. However, following submission of a draft of this report, NSW Health requested information on peak short-term averages predicted by the TAPM modelling. This appendix presents contour plots of the predicted highest and 10th highest 1-hour average concentrations of NO_x, PM10, and NMVOC due to emissions from the stack. These were computed from model output of the TAPM runs described in the main report.

Figures A1–A6 show the maximum and 10th-highest 1-hour average concentrations for PM10, NO_x and NMVOC. Table A1 lists the highest and 10th-highest concentrations for each of the pollutants. For each pollutant the highest pollutant concentrations occur during the daytime with the highest night-time concentrations about 40% of the daytime predictions.

The highest 1-hour average concentrations due to emissions from the stack are 7.4 µg m⁻³ for PM10, 78 µg m⁻³ for NO_x, and 54 µg m⁻³ for NMVOC. Figures A1, A3 and A5 show that the location of the maximum is the same for all pollutants and is about 2 km south-southwest from the stack (this event occurred in the modelling at 09:00 on 16 April 2002) with a smaller peak located 2 km southeast from the stack (09:00 on 3 December 2002).

However, the highest concentrations are extreme events. It was found that the 2nd-highest concentrations are about a factor of 2 lower (4.1 µg m⁻³ for PM10, 36 µg m⁻³ for NO_x, and 25 µg m⁻³ for NMVOC). As a more robust statistic we consider the 10th-highest concentrations (which correspond to the 99.9th percentile). These are all a factor of 2–3 lower than the maximum concentrations. Figures A2, A4, A6 also show that in contrast to the maximum values, the peaks in the 10th-highest contour plots are located in approximately the same places as the peaks in the annual averages (Figures 7–11), namely about 700 m east, west-southwest, and northwest from the stack.

In conclusion, apart from the once-a-year event, the contours of the 10th-highest 1-hour average concentrations (99.9th percentile) show a similar pattern to the annual averages but with concentrations that are about forty times larger.

Table A1. Maximum and 10th-highest 1-hour average concentrations due to emissions from the stack. All results from the TAPM simulations described in the body of the main report.

	PM10 (µg m ⁻³)		NO _x (µg m ⁻³)		NMVOC (µg m ⁻³)	
	Max.	10 th -highest	Max.	10 th -highest	Max.	10 th -highest
All hours (00:00–23:59)	7.4	3.2	78.4	27.5	54.1	19.0
Daytime (08:00–18:59)	7.4	3.2	78.4	27.5	54.1	19.0
Night-time (19:00–07:59)	2.9	1.3	35.0	17.1	24.2	11.8

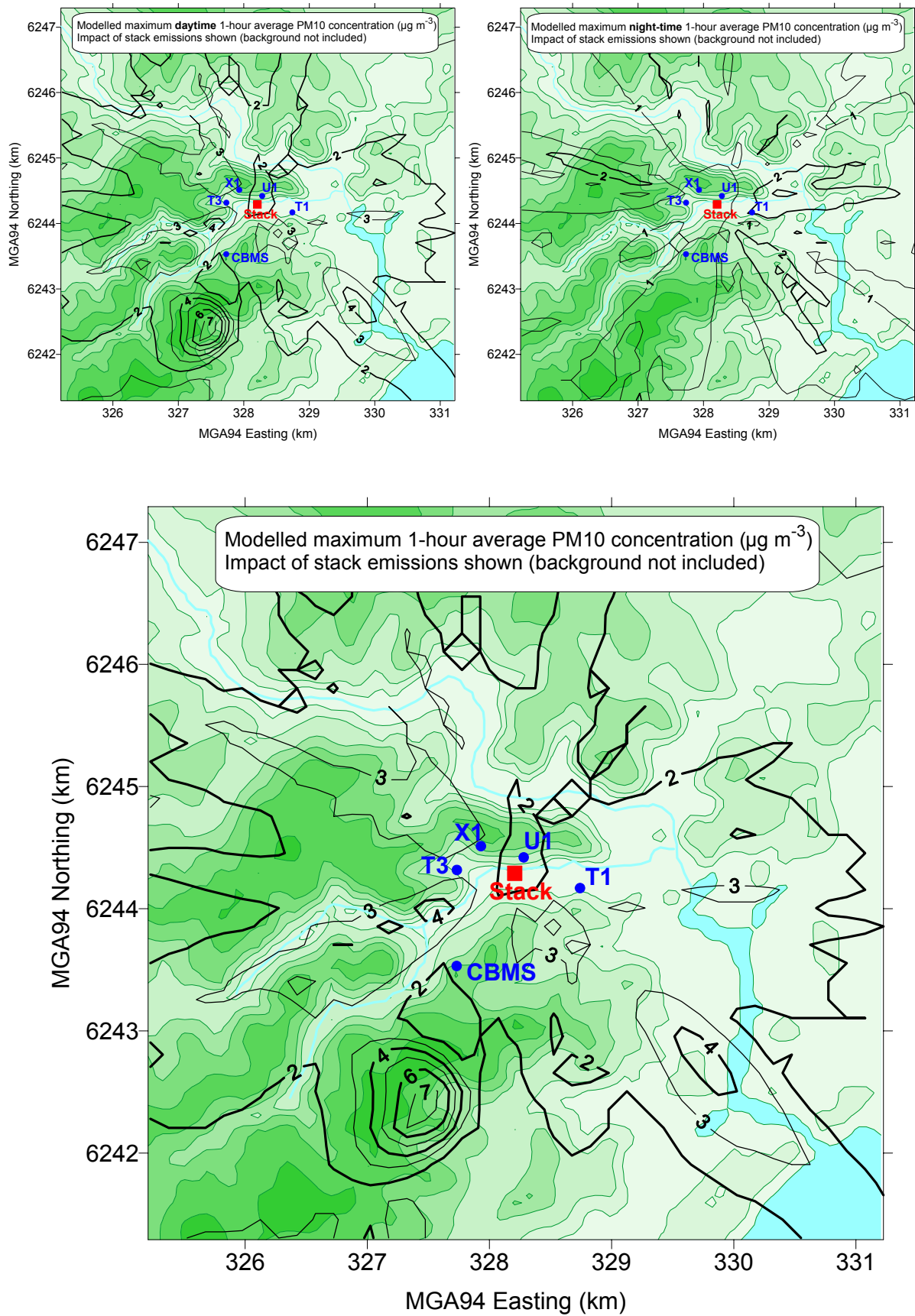


Figure A1. Contours of the modelled maximum 1-hour average ground-level concentrations of PM10 in the 6 x 6 km regions surrounding the M5 East stack. The lower panel shows the maximum for all hours of the year, the upper panels show the maximum of daytime (08:00–18:59) and night-time (19:00–07:59) hours.

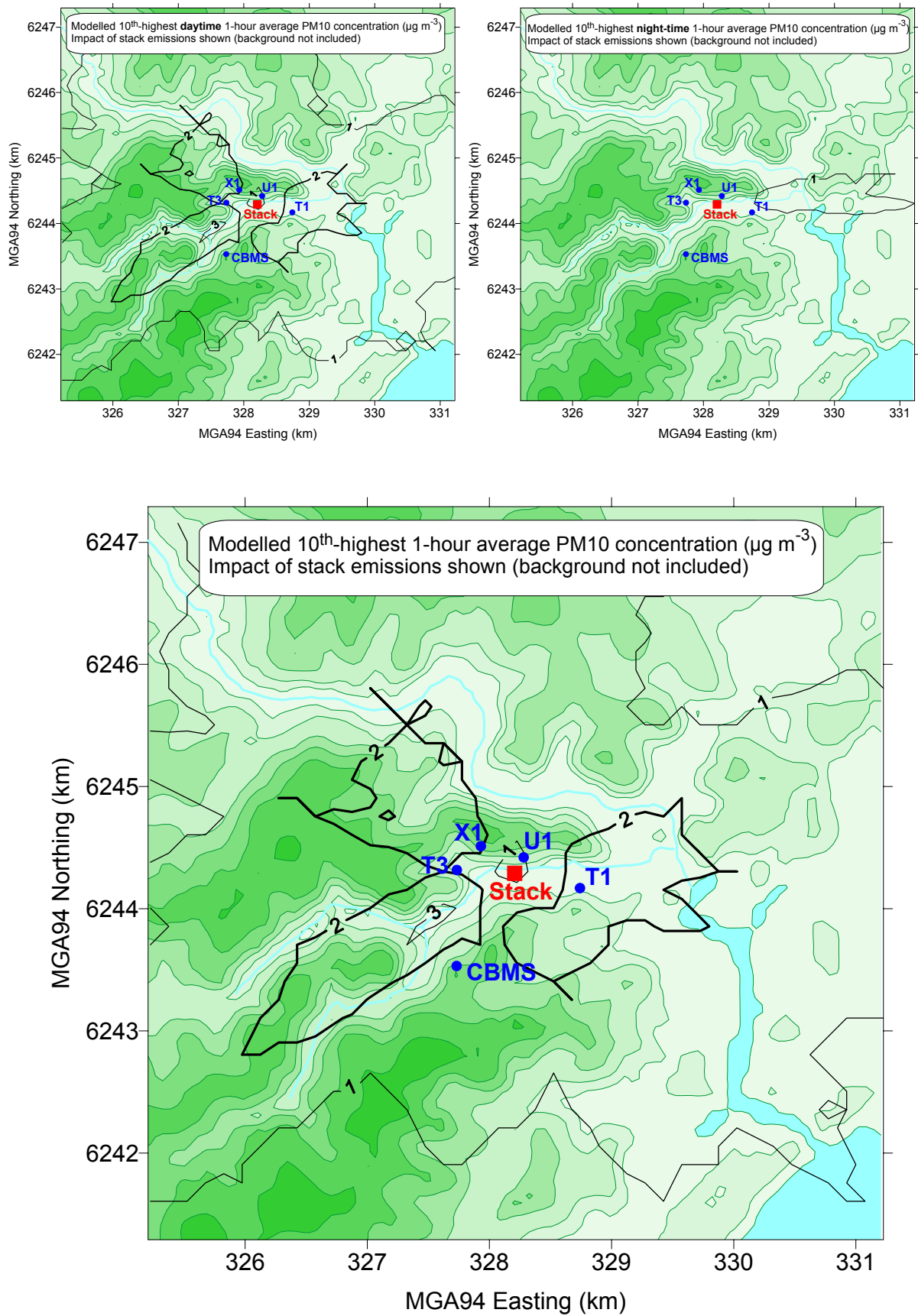


Figure A2. Contours of the modelled 10th-highest 1-hour average ground-level concentrations of PM10 in the 6 x 6 km regions surrounding the M5 East stack. The lower panel shows the 10th-highest for all hours of the year, the upper panels show the 10th-highest of daytime (08:00–18:59) and night-time (19:00–07:59) hours.

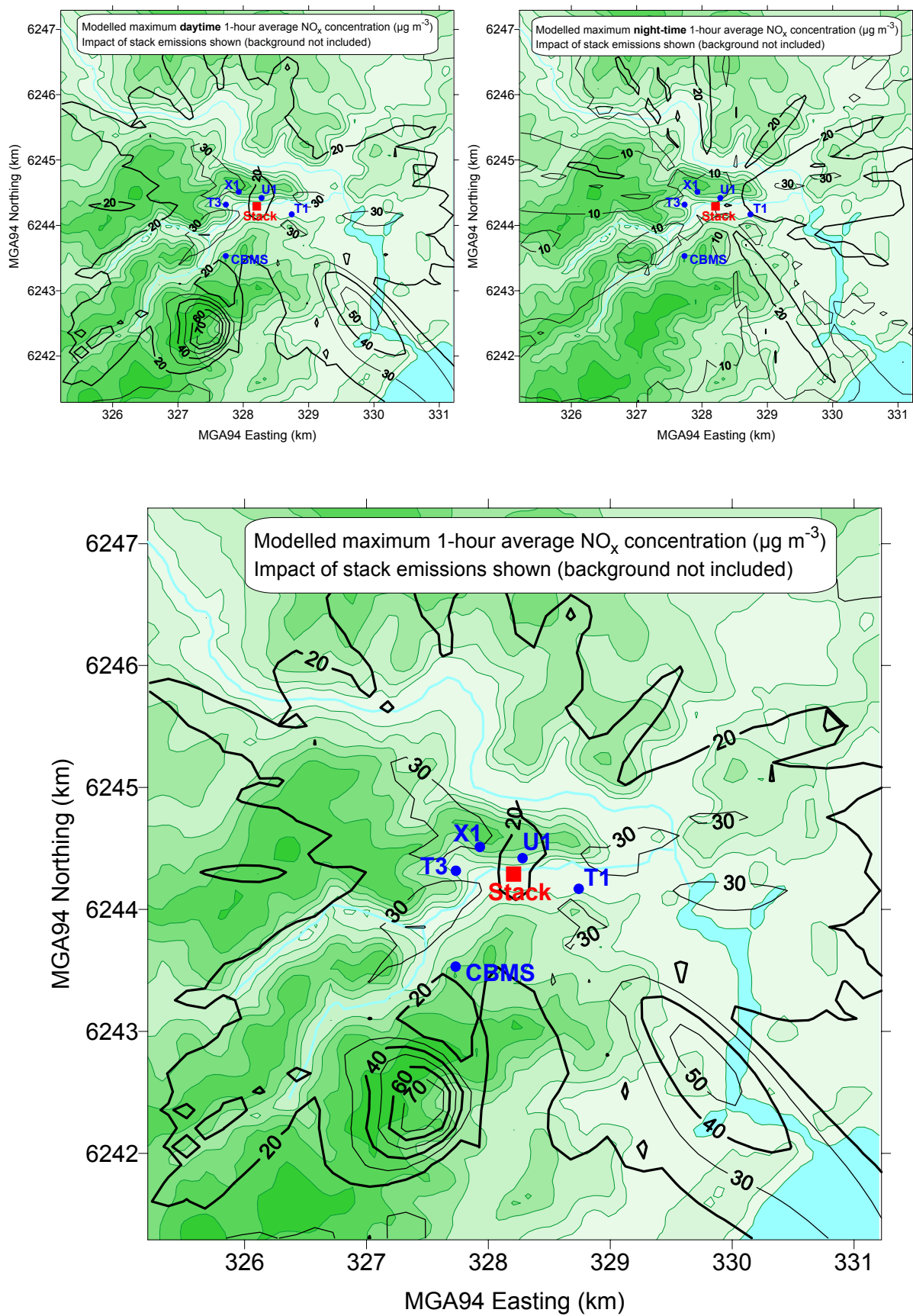


Figure A3. Contours of the modelled maximum 1-hour average ground-level concentrations of NO_x in the 6 x 6 km regions surrounding the M5 East stack. The lower panel shows the maximum for all hours of the year, the upper panels show the maximum of daytime (08:00–18:59) and night-time (19:00–07:59) hours.

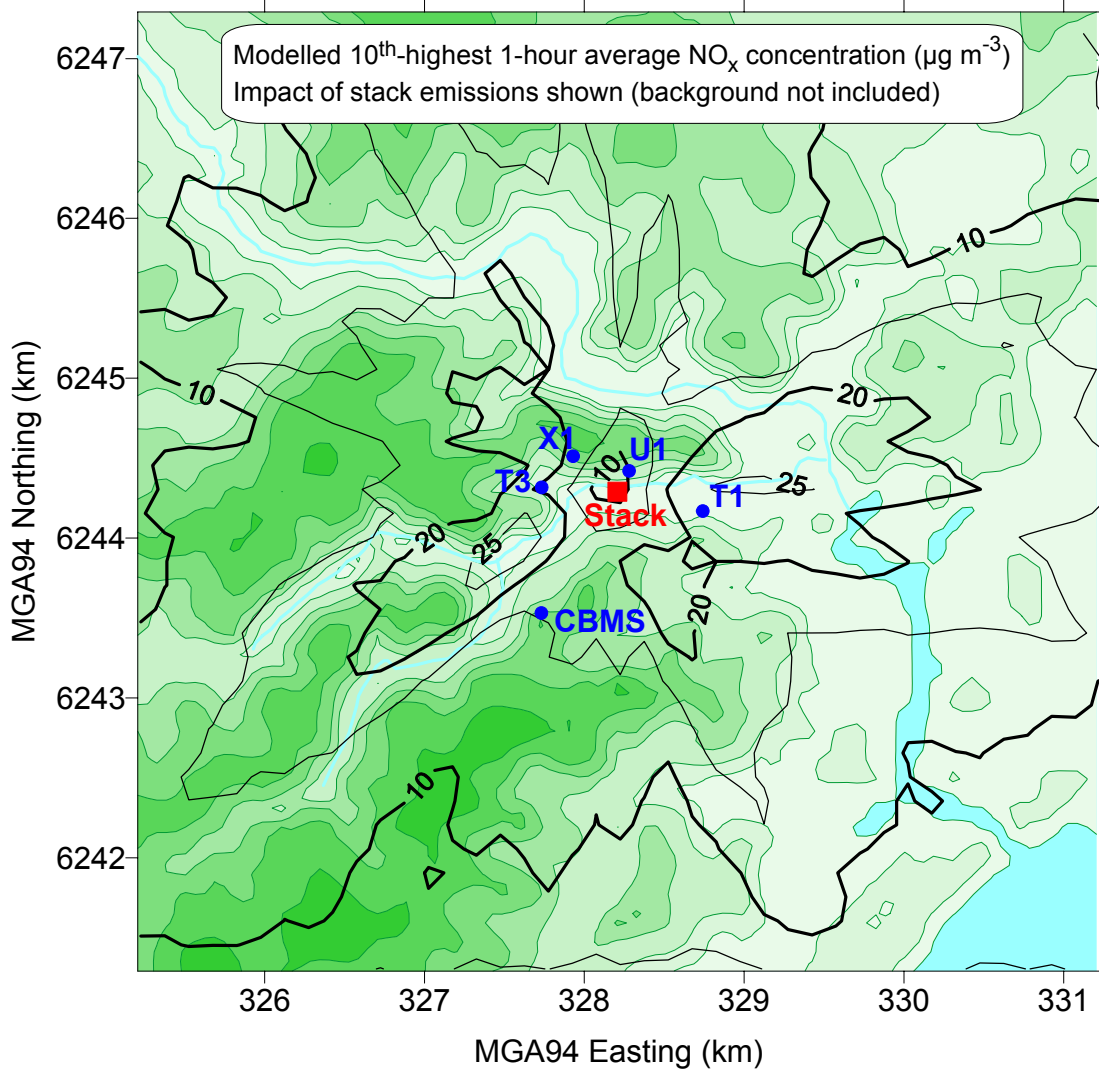
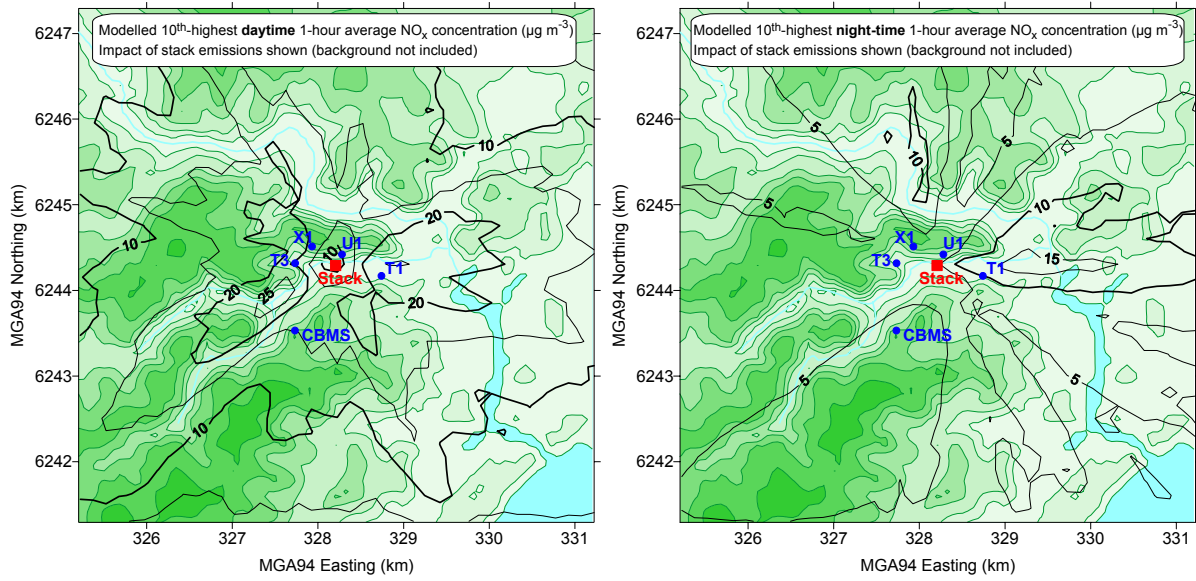


Figure A4. Contours of the modelled 10th-highest 1-hour average ground-level concentrations of NO_x in the 6 x 6 km regions surrounding the M5 East stack. The lower panel shows the 10th-highest for all hours of the year, the upper panels show the 10th-highest of daytime (08:00–18:59) and night-time (19:00–07:59) hours.

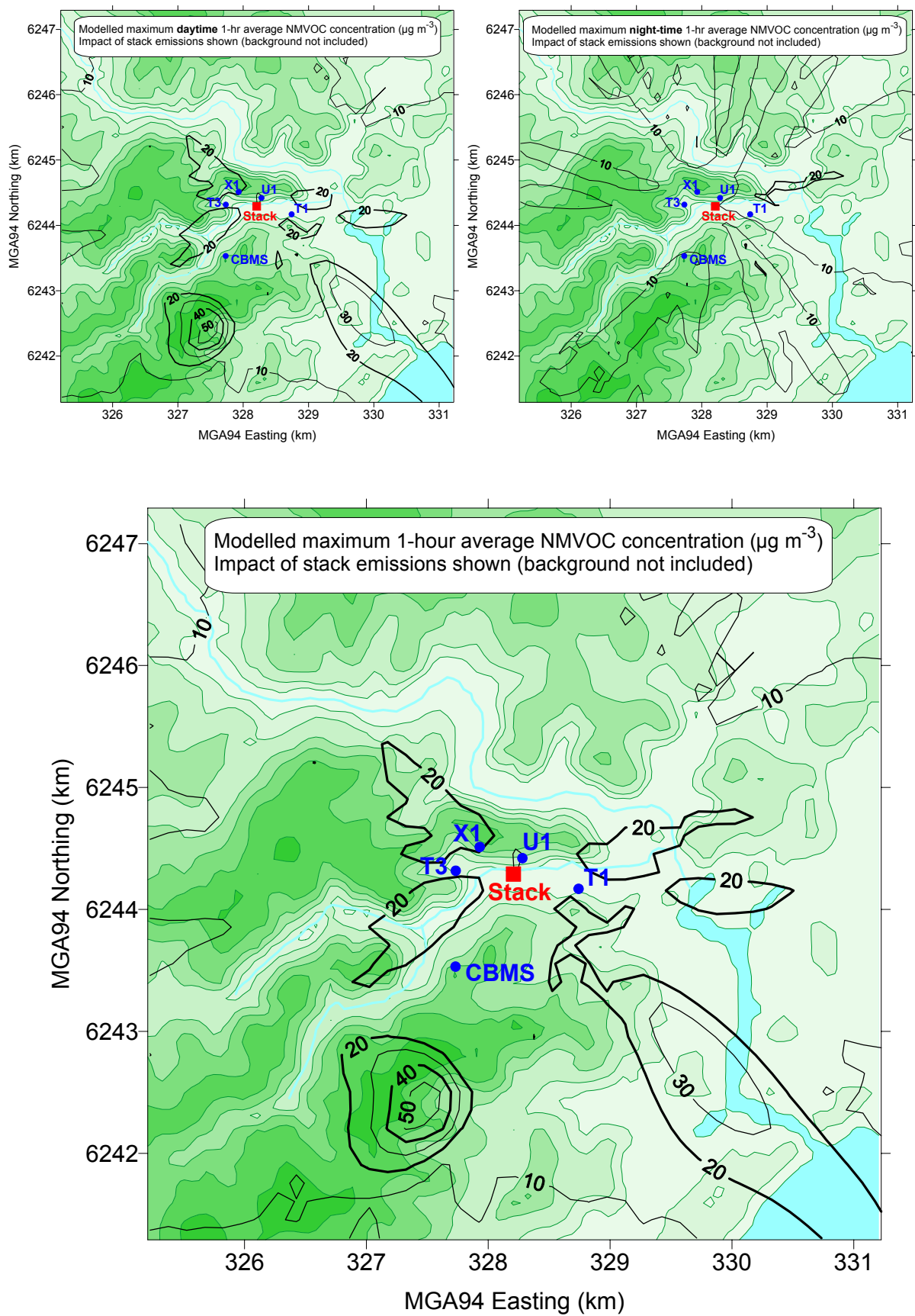


Figure A5. Contours of the modelled maximum 1-hour average ground-level concentrations of NMVOC (non-methane volatile organic compounds) in the 6 x 6 km regions surrounding the M5 East stack. The lower panel shows the maximum for all hours of the year, the upper panels show the maximum of daytime (08:00–18:59) and night-time (19:00–07:59) hours.

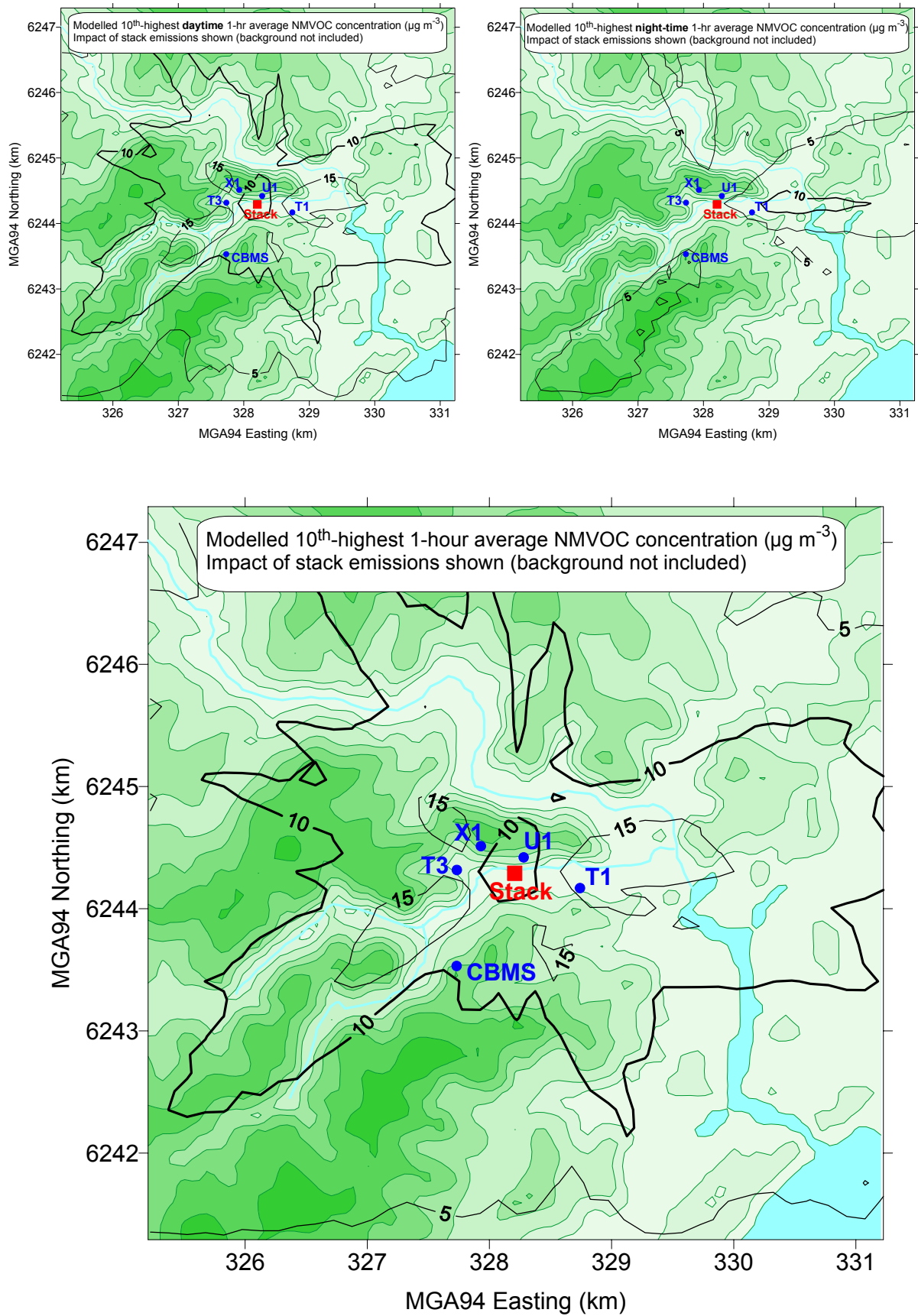


Figure A6. Contours of the modelled 10th-highest 1-hour average ground-level concentrations of NMVOC in the 6 x 6 km regions surrounding the M5 East stack. The lower panel shows the 10th-highest for all hours of the year, the upper panels show the 10th-highest of daytime (08:00–18:59) and night-time (19:00–07:59) hours.