Modeling of water quality impacts from the Maitland River within the Lake Huron nearshore in the vicinity of Goderich in 2003;

in support of the
Great Lakes Nearshore Monitoring and Assessment Program

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Summary

One of the monitoring activities conducted by the Environmental Monitoring and Reporting Branch (EMRB) of the Ontario Ministry of the Environment (OME) is the "Great Lakes Nearshore Monitoring and Assessment" (GLNMA) program, as led by Dr. T. Howell. A key objective of the program is to gather relevant field data that can help describe nearshore water quality variations under changes in seasonal and meteorological conditions, at selected sites along the Great Lakes' shoreline. In 2003, an extensive field investigation in support of the program was conducted in the Lake Huron nearshore vicinity of the Saugeen, Maitland and Bayfield Rivers.

While the GLNMA program produces a great deal of very useful information, it is desirable to be able to extend its applicability both spatially and temporally within the GLNMA study areas, by developing appropriate techniques that can effectively interpolate / extrapolate the information, and assist in examining new or modified environmental impacts from various sources located within these areas. With the advancement of hydrodynamic and water quality modeling over the past few years, it is now more feasible to use them for this purpose.

EMRB acquired the "Delft3D" modeling package in 2002, which was developed and is supported by the WL/Delft Hydraulics Institute of the Netherlands. It is a 'state-of-the-art' water modeling package that is used (around the world) to study various phenomena within surface water bodies, such as: water flows and temperature-density structure, water quality, sediment transport, waves, morphology, and ecology. This is accomplished via use of 9 main modules within the overall package. Both 2D (i.e. depth-averaged but horizontally variable) and 3D simulations may be carried-out.

The "Flow" module of the program (i.e. "Delft3D-FLOW") is the key module since it is used to simulate complete flow and water temperature-density characteristics throughout the water body. This information is then used by this module to solve for water quality conditions, (within the water column only). Delft3D-FLOW simulates these flow characteristics by solving the Navier Stokes equations for an incompressible fluid, under the Boussinesq and shallow water assumptions, throughout the 2D or 3D user-defined grids. All key forcing functions, such as those created under time-variable wind and barotropic conditions, as well as other time-variable weather conditions (i.e. affecting the basic heat exchange at the water surface) are considered.

It was decided to apply the Delft3D model (FLOW module), using the 2003 GLNMA data collected in the vicinity of the Maitland River, to evaluate its potential to extend our understanding of water quality phenomena as obtained through the field data itself. As such, one of the key objectives of this initial modeling application was to develop appropriate modeling strategies for application to other GLNMA study areas in future years.

A two phased modeling application strategy was applied. The first involved the set-up, testing and application of the Delft3D model using a 2-dimensional configuration only, (i.e. where the water column within the lake is assumed to be well-mixed

vertically, but fully variable in both horizontal dimensions). The second involved the more complex step of using the fully 3-dimensional configuration. In both configurations, the model was fully 'dynamic', meaning that all simulated water parameters could vary as a function of time.

In both phases of the model application, 2 levels of modeling grid had to be applied. First of all, a 'whole-lake' modeling grid was developed. The purpose of this modeling grid is to simulate the large-scale (i.e. lake-wide) hydrodynamic phenomena which would affect the Maitand River nearshore study area. For example, these would include the development of lake-wide current patterns owing to the larger scale effects of wind and Coriolis force (i.e. the Earth's rotation).

The second level of modeling was through a 'nested' model. The 'nested' model used a very refined modeling grid to permit study of lake and water quality phenomena at a high level of detail within the Maitland River GLNMA study area itself, (which essentially represented only an approximate 8 by 13 kilometre section of the lake at Goderich). (For example, the grid size used by the 'whole-lake' and 'nested' models, although variable, averaged about: 1.5 km and 100 m, respectively, within the study area). The total number of grid cells used was: 10,772 and 4,599; for the 'whole-lake' and 'nested' 2d models, respectively. These 2d model grids are shown in Figures 3.1 through 3.4 of the report. The information obtained from the 'whole-lake' simulations, was saved at appropriate locations along the 3 'open' (i.e. water) boundaries of the 'nested' model, and then converted into 'boundary conditions' by separate algorithms included with the Delft3d software.

Considerable amounts of input data were gathered, and application strategies developed, in order to be able to apply the models. These included: an hourly wind function for Lake Huron during 2003; and an hydrologic water budget model for assigning inflows (from Lake Michigan (net), all major tributaries and precipitation), and outflows (from discharge to the St. Clair River and evaporation). The hydrologic water budget model was derived using NOAA-GLERL "Advanced Hydrologic Predictive System" data for 2003, along with various tributary flow data, etc.

Many of the other modeling input data were derived using various model testing and sensitivity procedures. These included wind and bottom friction coefficients, eddy viscosity as well as the simulation time-step size. The results from this testing is summarized in Tables 3.3 and 3.4 for the 2-dimensional modeling work.

The simulated water velocities were compared with those measured (by "Acoustic Doppler Current Profilers' (ADCPs)) at two sites in the study area. These were approximately 1.2 and 6.7 kilometres offshore from the Maitland River mouth. Based both on correlation and Fourier-norm analysis, (as shown in Table 3.5), it was concluded that the 2d model worked quite well, in simulation of the highly dynamic alongshore current velocity fields which develop, (according to field records between May and November of 2003, the alongshore currents reversed directions on average between 4 and 5 times per week).

Loading functions for conductivity and NO_2+NO_3 as discharged from the Maitland River to the lake, were developed for the March through November time period using available field data. (In addition, E. coli discharged during the spring runoff event was also estimated using the same field data). The 2-d models were used to estimate the levels of conductivity and NO_2+NO_3 throughout the lake study area for the entire field measurement period. However, for May 27, July 8, July 31 and November 23, it was possible to compare the simulated levels with more detailed field measurements. Although the comparison was more qualitative in nature, the modelled and measured concentration ranges seemed to match rather well, (as summarized in Table 3.12), considering the stated limitations.

The second phase of the project, involving the use of fully 3d modelling configurations, required a great deal of additional effort regarding all aspects of the model application, (i.e. input data acquisition / procedures, model testing, and application). The Delft3d modelling algorithm uses the "sigma (σ)" vertical layering system, to set-up grid points between the surface and bottom of the water column. In this scheme, the same number of vertical layers, (as defined by the user), are employed throughout the water body. Artificial vertical diffusion and flow is minimized via use of "anti-creep" numerical techniques within the model. This permits the use of a greater number of vertical layers in nearshore areas, thus enhancing vertical resolution.

In order to provide reasonable depth-variable simulation results, approximately 10 vertical layers (or more) were deemed necessary. However, having this number of vertical layers essentially increases the overall simulation time by a factor of 10 times. As such, a modified 'whole-lake' grid was developed, in order to permit reasonable 'turn-around' times for the numerous testing / sensitivity simulations that had to be made. The main adjustments included elimination of the Georgian Bay, North Channel and St. Clair River outlet areas, along with a 'de-refinement of the remaining grid by a factor of 2, (i.e. the cell lengths and widths were doubled in size). Several new boundary adjustments were necessary for this new 'whole-lake' 3d modelling grid. These were derived by analyzing the results of year-long simulations made with the original 'whole-lake' 3d grid, (e.g. the exchange of water between the main portion of Lake Huron and the North Channel and Georgian Bay, were derived using simulation results from the original 'whole-lake' model). The final modified 'whole-lake' grid used for the 3d applications is shown in Figure 4.2 and consists of 1,743 grid cells, (as opposed to the 10,772 used in the 2d 'whole-lake' modelling).

The greatest additional complexity for the 3-dimensional configuration involved the fact that water temperature now had to be simulated. This is because the variation of temperature throughout the lake, and particularly as a function of depth within the water column, affects the density of the water, and thus it affects the 3d characteristics of both the lake and the interaction of the Maitland River plume with the lake. In order for temperature to be simulated, one of the "heat-flux (sub-models)" incorporated within the Delft3d software had to be applied. This sub-model essentially simulates the increases of energy within the lake from the atmosphere as associated with the net short wave solar and long wave atmospheric radiations, and losses as caused by evaporation, back radiation and convection. Most of the input parameters were derived using the NOAA-GLERL “Advanced Hydrologic Predictive System” data for 2003, along with various other reference data. A summary of some of these data are provided in Table 4.4.

A simplified (i.e. coarser) whole-lake modelling grid, (with respect to that used for the final 3-dimensional ‘whole-lake modelling as described above), was used to assist in the sensitivity analysis and calibration of the vertical heat transfer coefficients used by the 3d model. (These are critical for the model to properly simulate the changes of temperature and associated vertical structure within the lake, throughout the year). The grid used, and the results obtained from the sensitivity analysis, are shown in Figure 4.3 and Table 4.5, respectively.

In order to be able to compare modelled and measured 3-dimensional data, a series of post-processing software had to be developed. The software was designed to be flexible so as to enable the direct comparison of temperature and current velocities at either the model layer depths or at the temperature / velocity measurement depths, as well as for depth-integrated averages within various segments of the water column. The bulk of the overall testing and sensitivity analysis required for the 3-dimensional simulations, utilized this post-processing software. The parameters considered are summarized in Table 4.7(a). The final set of parameters used by both the ‘whole-lake’ and ‘nested’ models for 3-dimensional simulations, are provided in Table 4.8.

Average differences and correlation coefficients were used in the comparison of modelled (from both ‘whole-lake’ and ‘nested’ models) versus measured water temperatures, (for the entire May 14 or 15 to November 27 measurement period). This comparison was made: at the surface and bottom thermistor (i.e. temperature measurement) depths, as well as on a depth-averaged basis between the surface and bottom thermistor depths; at both the Nearshore and Offshore Maitland ADCP stations. The results showed average temperature differences of generally under 0.5 degrees Celcius, as well as very good correlations, (see Table 4.9).

Fourier-norm analysis was used to compare modelled and measured water velocities at the surface and bottom ADCP bin depths, as well as for the equivalent depth-averaged value between these two bin depths. Again, the results (with values between 0.68 and 0.98 as provided in Table 4.9) showed that the models performed well, (and are comparable in accuracy to similar applications made by other agencies in the Great Lakes).

The 3d models were used to delineate lake conditions and Maitland River plume interactions during a few key hydraulic / lake events that occurred in 2003. The events chosen included:

(i) the large spring Maitland River runoff event between March 17 and April 6;
(ii) a large summer-time lake downwelling / upwelling cycle between July 20 and 30, but which only experienced base-flow discharge from the Maitland River;

(iii) a large summer-time runoff event from the Maitland River which occurred while a significant lake upwelling episode was underway, (between August 2 and 15); and

(iv) a large autumn runoff event from the Maitland River between November 12 and 28.

The various river and lake characteristics that existed during these episodes are summarized in Table 5.1. The simulated: water velocities and temperatures; and levels of conductivity and NO_2+NO_3; that existed at one or two day intervals throughout these episodes, are plotted in separate Figure-series (which are located within Appendix I). (It was only possible to examine E. coli during the spring runoff event). The temperature and water quality figures show the variation of levels near the surface of the water column (i.e. using the surface layer of the model) over a rectangular portion of the study area that lies within approximately 4 km of the Maitland River mouth. In addition, a series of 6 cross-sections, reveal the depth-variable nature of the same parameters along transects both parallel to, and perpendicular to, the shoreline, at both a near and far distance from the river mouth. As a whole, the figures provide a comprehensive picture of likely conditions during these events.

The 3-d model results were also used to examine the temporal nature of the impacts. This was performed at both the near surface and bottom of the water column at 25 locations, along 8 transects (running perpendicular to shore). The transects ranged in distance from about 6 km North to about 6 km South of the Maitland River mouth. The stations themselves varied in offshore distance from less than 0.1 km (i.e. at the shore itself) to up to 6.7 km from shore.

The temporal nature was examined by comparing the actual time series of impacts at these locations with selected water quality 'criterion'. The criterion level selected was: 400 umho/cm2 for conductivity (i.e. which represents a simple doubling of the general lake background value); 2,940 ug/L (as N) for NO_2+NO_3 (a CCME guideline value); and 100 CFU/100mL for E. coli (the OME swimming criterion).

A total of 6 statistical measures were derived and used to assess the nature of the impact during the given event time period. These included: average and maximum concentration ratio, (i.e. the actual level divided by the criterion level); the percentage of time that the criterion was exceeded; the number of exceedence episodes; the average concentration ratio during the exceedence episodes; and the longest exceedence episode length. This temporal analysis was applied not only to examine impacts during the 4 runoff and/or upwelling events as described above, but also during 3 'seasons' running from: March 16 to May 16, May 16 to September 16, and September 16 to December 1. As well, the overall temporal characteristics for 'all (three) seasons', (i.e. from the combined March 16 to December 1 time period), were calculated. All temporal results for conductivity, NO_2+NO_3 and E. coli are provided in Appendix II.

Both the spatial and temporal results reveal significant impacts of NO_2+NO_3 during the spring and autumn runoff events. For example the 2,940 ug/L guideline would have been exceeded over 40% of the time during the spring runoff event, within about 1 km of shore for a 3 kilometre stretch of the shoreline both to the north and south of the Maitland River mouth, (i.e. 6 km total length). Between March 16 and December 1 as a whole, the same criterion would have been exceeded approximately between 5 and 10% of the time, within the same zone.

A final temporal analysis was carried-out to examine the generic impact of the Maitland River within the study area, (using the same stations and transects as described above). Specifically, the dilution levels of Maitland River water that existed at these locations, during the same events and seasons, were estimated. In order to estimate dilutions, special simulations were made in which the Maitland River was assigned a constant discharge concentration, and assumed to behave conservatively. Input parameters were selected so as to ‘filter’ any contributions associated with other (long-range tributary) sources as well as the general lake background level. This time, instead of basing impact directly on a criterion (which did not exist), the time-frequency (probability distribution) of dilution-level occurrences at each location, during each event, was determined.

Again, the general dilution results showed that there were large impacts associated with the spring and autumn runoff events, which were significantly lower than the impacts associated with the two summer events. For the entire March 16 to December 1 time period, the relative amount of Maitland River water would have been expected to exceed 10% of the total water (i.e. the dilution ratio was less than 10) for more than 50% of the time at only two stations. These stations were both located within 500 m of the river mouth. The relative amount of Maitland River water would have been expected to exceed 1% of the total water (i.e. the dilution was less than 100) over 50% of the time at all lake stations within about 1 km of the entire 13 km shoreline of the study area.

It was concluded that this modeling study has accomplished its main goal of setting-up and successfully applying the state-of-the-art “Delft3d” hydrodynamic – dispersion model to delineate the impact of the Maitland River’s discharge upon the nearshore area of Lake Huron in the vicinity of Goderich. It is also reasonable to conclude, based upon this study as a whole, that the modeling approach described in this report can be utilized to successfully serve as an interpolation / extrapolation tool, to extend the knowledge already gained through the EMRB-GLMNA field monitoring program.

Some items which could be addressed in the future to improve model application results were identified. These include the need for more complete information regarding source loadings and wind variability. In is also important to develop appropriate impact evaluation criteria, so that the exact nature of the model application can be better devised.

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1. Background

As part of its “Great Lakes Nearshore Monitoring and Assessment” (GLMNA) program, the Environment Monitoring and Reporting Branch (EMRB) of the Ontario Ministry of the Environment (OME) conducted spatial surveys of nearshore water quality in south-eastern Lake Huron in 2003. The main areas of concern in terms of water quality involve around the discharge / resuspension and impact of nutrients and *Escherichia coli*. The objectives of the study included the description of nearshore water quality variations under changes in seasonal and meteorological conditions. A detailed description of this monitoring study is found in Howell, et al., (2004).

While extensive monitoring was carried-out as part of the study between May and November, 2003, owing to resource limitations and practical logistics, there are gaps in information (both temporally and spatially). Further, the GLMNA program can only be carried-out once every 3 years in Lake Huron. As such, it is desirable to develop a means to extend the utility of the analyzed GLMNA monitoring data, in order to answer water quality questions that exist, or will arise, which cannot be addressed via monitoring, (either in a timely manner or not at all).

It is hoped that numerical water quality modelling, which has become more feasible over the past few years, can be used to help address this need. As such, EMRB has initiated the development of a numerical water quality modeling strategy which will complement its Great Lakes Nearshore Monitoring program. Essentially, the purpose of this modeling is to provide mechanisms through which the meeting of various water quality goals of a particular nearshore monitoring study may be enhanced. If successful, this enhancement comes through the ability of water quality modeling to:
(i) serve as an interpolation / extrapolation tool, and thus extend the applicability of field data, which by nature is limited, (spatially and/or temporally); and
(ii) provide a means for examining impacts within the nearshore as might be caused by changes to water quality within nearby watersheds, or other identified sources. A model is particularly useful if these watershed or other source changes are projected to occur in the future, and as such, field monitoring simply can not be used to provide the information on the resulting nearshore water quality changes expected.

A considerable amount of field data was collected by EMRB during the 2003 field work in Lake Huron at three study areas, namely the nearshore zones impacted by the: Saugeen, Maitland and Bayfield Rivers. It was decided to focus the initial development of the numerical modeling development strategy on the Maitland River nearshore zone. The initial application needs to be limited to some degree, simply because of the large amount of development and testing which is necessary when a new procedure is being devised. A key purpose therefore of this initial application will be to develop appropriate modeling strategies for application not only to the Maitland River nearshore zone, but which can also subsequently be applied to other GLMNA study areas in the future.

EMRB acquired the “Delft3D” modeling package in 2002. Delft3D was developed and is technically supported by the WL / Delft Hydraulics Institute of the Netherlands. More comprehensive information on this package may be obtained via the institute’s web-site at: http://delftsoftware.wldelft.nl/ . The Delft3D modeling package may be used to simulate steady conditions or dynamic changes of various phenomena within surface water bodies (of any size), such as: flows, temperature-density structure, water quality, sediment transport, waves, morphology, and ecology. This is accomplished via use of 9 main modules within the overall package. Both 2D (i.e. depth-averaged but horizontally variable) and 3D simulations may be carried-out.

The “Flow” module of the program (i.e. “Delft3D-FLOW”) is the most important module in that it is used to simulate complete flow and water temperature-density characteristics throughout the water body, which are then used in the simulation of other phenomena, both within the module itself, and for export to the other modules. Delft3D-FLOW simulates these characteristics by solving the Navier Stokes equations for an incompressible fluid, under the Boussinesq and shallow water assumptions, throughout the 2D or 3D user-defined grids. All key forcing functions, such as those created under time-variable wind and barotropic conditions, as well as other time-variable weather conditions (i.e. affecting the basic heat exchange at the water surface) are considered.

For 3D simulations, the “sigma (σ)” vertical layering system is used. In this scheme, the same number of vertical layers, (as defined by the user), are employed throughout the water body. Artificial vertical diffusion and flow is minimized via use of “anti-creep” numerical techniques within the model. This permits the use of a greater number of vertical layers in nearshore areas, thus enhancing vertical resolution. (On the other hand, a fixed-depth vertical layered modeling scheme can become less effective when water depths vary near shore, as the assigned layer depth(s) may not match actual depths, etc.).

In terms of the horizontal spatial dimensions, (i.e. as would be viewed from above), a curvilinear grid system may be defined by the user. This permits the user to set-up grids which can vary both in terms of their spacing and which can fit the actual shoreline boundary conditions. Another Delft3d grid-feature is called “thin dams”, in which the effects of a relatively narrow breakwaters and piers (i.e. in preventing transverse flows) can be simulated, without having to use extremely small modeling segments. These features are particularly useful for application to the Goderich waterfront area, where shore curvatures and significant breakwater and pier structures are found. (On the other hand, a regular spaced rectangular grid is not capable of adequately replicating these features, at least without making the grid resolution extremely small).

Another key feature of Delft3D-FLOW, in terms of this project, is its ability to set-up nested modeling grids. Larger-scale phenomena may be simulated using a relatively coarse grid which covers the entire water body being studied. Then, these results can be imported into a separate relatively finer resolution grid which only covers the limited area of interest within the water body, in order to permit more detailed simulations. The Delft3D modeling package provides tools which are used to convert the coarser grid results into “boundary conditions” which can be used subsequently by the finer resolution grid.

The modeling work for this project will involve the use of the Delft3D-FLOW module. The application of the model for the present study is described in the following section.

2. Procedure

A two phased modeling application procedure is utilized. The first phase involves set-up and application of 2D modeling, in which the basic horizontal modeling grids are tested and implemented. Only a small nearshore portion of Lake Huron is of interest in this study, (the nearshore area within a few kilometers of the Maitland River mouth). In order to simulate the effects of lake-wide phenomena upon the study area, yet avoid excessively large model simulations times and/or loss of spatial resolution, the Delft3d model’s “nested” grid procedure is used. This involves applying 2 separate models, of significantly different spatial resolution. The basic steps involved in this procedure are summarized as follows:
(i) a “whole-lake” model is applied, in which all lake-wide phenomena can be simulated. This model utilizes a relatively coarse horizontal grid, which however, should be detailed enough to permit the simulation of key phenomena, (such as the development / variation of alongshore currents under various meteorological conditions throughout the year); (ii) a detailed “nested” model is developed which covers only the spatial extent of the study area, thus permitting a significantly finer horizontal grid resolution to be used, (i.e. down to the level which can be used to study the interaction of the Maitland River plume within the study area itself); (iii) special Delft3d open-boundary nesting programs are then run to generate the “open boundary conditions” for the detailed nested model; and (iv) the nested model is then run to simulate (in greater detail) conditions within the study area.

The second phase involves the extension of the 2D modeling to include 3D phenomena (i.e. depth-variable). The second phase requires significantly more effort to carry-out. The modeling simulations (of temperature, velocity and solute transport/dispersion) must be carried-out at multiple layers within the water column (at all horizontal grid locations). As such, several additional factors (contributing to variation in the modeled parameters) must be adequately parameterized. These factors include the dynamic transfer of: climate-related heat / solar radiation energies between the atmosphere and the lake, as well as the vertical transfer of this energy (via heat / momentum) within the vertical layers of the water column.

There are common procedural steps involved for both the whole-lake and nested model development of both modeling phases (2D and 3D). These include running sensitivity analysis and calibration where necessary, of key parameters. This step is used to produce “final” model data-sets. As part of this process, comparisons between measured and modeled parameters are made and reported using appropriate statistics. The “final” model data-sets are then used to examine flow patterns and plume characteristics within the study area during key limnological / meteorological events.

As a final step, conclusions and recommendations, particularly in relation to the ability of the modeling to provide assistance in the interpretation / extension of monitoring results, are made.

3. Details and Results of Phase 1 – 2D (depth-averaged) modeling

3.1 Model grids

3.1.1 Whole-lake model:

The 2D whole-lake modeling grid used is shown as Figure 3.1. It uses 10,772 modeling cells to represent the interconnected water surface areas and volumes of Lake Huron, Georgian Bay and the North Channel. The average horizontal dimension of the whole-lake model grid cell is about 2.3 km, and about 1.5 km in the nearshore vicinity of Goderich.

3.1.2 Nested model:

One of the key processes affecting water quality conditions within the nearshore zone of the Great Lakes is alongshore current reversals. Owing to the passing of meteorological systems, wind conditions can typically shift several times within a week, which in turn set-ups various dynamic current patterns in these lakes. At any given point along the shoreline, these dynamic wind changes will thus usually reflect themselves in the form of current reversals. This hydrodynamic phenomenon has implications in turns of setting up the modeling domain for a nested model. For example, material previously discharged and which has left the nested model domain under a given alongshore current, can, after a current reversal, be brought back into the nested model domain. To some degree at least, by using a whole-lake / nested water quality model strategy, the whole-lake model can help provide an estimate of this return flow of material, and thus help to account for mass balance and general alongshore plume gradients. This helps to prevent under prediction of water quality constituent levels in the study-area. However, it is desirable to minimize the degree to which the whole-lake model is relied upon for generating background concentrations, as some resolution is lost within the coarser whole-lake modeling grid, etc.

As such to some degree, there is always a “trade-off” as to where to define the nested model boundaries. If they are set too close to the major sources being assessed, (in this case the Maitland River), then the “returning plume” material may not be adequately simulated. On the other hand, situating the boundary a long ways away, can greatly increase the computational requirements for the high-resolution nested model, and may introduce additional difficulties owing to other nearby sources which may not have to be considered in greater detail.

Time and resources did not permit a detailed analysis of the sensitivity of the nested model's boundary locations. It is expected that the boundaries selected should provide reasonable mass-conservation of returning materials, as they are several kilometers from the Maitland River.

The location of the Maitland River-Goderich nested model is shown within the southern portion of the whole-lake model in Figure 3.2. The entire nested model itself, as well as an enlarged portion near Goderich, is shown as Figure 3.3 and 3.4, respectively. The nested model uses 4,599 horizontal cells to represent the approximate 13 km long by 8 km wide study area. The horizontal dimensions of the cells tend to increase from about 50 metres in the vicinity of the Goderich waterfront, to around 300 metres near the north, south and offshore open water boundaries.

As shown in Figure 3.4, the Delft3d nested model accounts for the harbor breakwaters, piers and curved geometry. These model capabilities should result in more accurate flow regime simulations in these areas.

3.2 Model input parameters

3.2.1 Wind data:

The Delft3d permits both dynamic and spatially-variable winds / air pressures to be input for simulations. While spatially-variable winds and air pressures (i.e. baroclinic assumption) are more realistic, particularly for examining nearshore conditions within a large lake, the availability of necessary data did not lend itself to the generation of spatially-variable wind conditions. This is partly because the closest available time-variable wind record sets are located in the same general area of the lake, (i.e. the main portion, well offshore). In any event, it is useful to initially determine how well the assumed simpler barotropic conditions will work, before adding additional modeling parameter complexities.

A total of 3 NOAA field collected data sets were considered in constructing the input dynamic wind function. These are:

(i) Moored Buoy 45003 located in the north-central portion of Lake Huron;
(ii) Moored Buoy 45008 located in the south-central portion of Lake Huron; and
(iii) C-MAN Station LSCM4 located near the centre of Lake St. Clair.

Based on review of the data records, a total of 4 conditions were used in assigning the hourly wind function value, as follows in prioritized order:

(1) Use the vector average of the 2 Lake Huron Buoys when both are available;
(2) Use Buoy 45008 data if Buoy 45003 data is not available, (as it is significantly closer to the study area);
(3) Use Buoy 45003 data if Buoy 45008 data is not available; and
(4) Use C-MAN 45147 data if neither Buoy 45003 nor Buoy 45008 data are available, (i.e. the Lake St. Clair data is a last resort for estimation of systemic wind conditions).

Condition 4 only occurred before April 12 and after November 30, for the 2003 wind data. This corresponded to the times when the 2 Lake Huron buoys could not be moored due to existing or upcoming winter conditions. Buoy 45008 data are not available for the entire month of May. As such, for the time period during which EMRB collected field data in the study area, (i.e. from about May 16 to November 27), May wind records are based on Condition 3 above, with the remainder (of June through November) being based on Condition 1.

3.2.2 Great Lakes inflows / outflows:

The “Advanced Hydrologic Predictive System” information produced by the National Oceanic and Atmospheric Administration’s Great Lakes Environmental Research Laboratory, (NOAA-GLERL). A description of this system is available through some of GLERL’s publications, (e.g. NOAA-GLERL, 1994). These data for 2003 (NOAA-GLERL, 2004) include, on a month by month basis: inflows from Lake Michigan and the St. Marys River, outflow to the St. Clair River, direct watershed inflows, precipitation, evaporation and mean Lake Huron water level. The GLERL data are balanced to assure that the net difference of the sum of all inflows and precipitation minus the sum of outflow and evaporative loss, equals the net change in storage as reflected in the monthly change in mean water level.

Inflow from the St. Marys River:

The monthly-average AHPS inflows to the North Channel for 2003 from the St. Marys River are used in the simulations. They are assumed to enter the whole-lake modeling grid at a total of 5 model-grid cells as follows:

(i) one cell for flow entering west of Neebish Island, at the south-end of the island;
(ii) one cell for flow entering to the east of Neebish island, at the south-end of the island; and
(iii) 3 cells for flow entering via the St. Joseph Channel, across a transect located about 6 km to the north-west of Gravel Point on St. Joseph Island.

Exchange with Lake Michigan:

An open boundary, consisting of 8 model grid cells, is used to represent the exchange location between Lakes Huron and Michigan. These model grid cells form a transect across the Strait of Mackinac at Mackinaw City, Michigan.

The GLERL-AHPS data was used to estimate the net, monthly-average exchange between Lakes Michigan and Huron, via use of the water budget equation for Lake Huron. However, over shorter time periods of hours to days within any given month of the year, water exchange between these two lakes can vary significantly depending upon their hydraulic / meteorological conditions, (Saylor et al., 1976). It was found that periods of high flow from Lake Michigan to Lake Huron occurred at times of high water levels in the north end of Lake Michigan, and conversely, high flow from Lake Huron to Lake Michigan occurred essentially out of phase with the high water levels in the north end of Lake Michigan. Further, these reversing currents are largely driven by seiche activity, with principle seethe time components in the 5 to 9 hour range.

Although not likely of significance in terms of impacting the Maitland River nearshore study area, an attempt was made to better simulate these shorter term Lake Michigan-Huron flow exchanges. The initial attempt consisted of the following steps and assumptions, as applied separately for each month:

(i) It is assumed that the monthly-average flow exchange between Lake Michigan and Lake Huron equals the water-budget equation value derived using the GLERL-AHPS monthly-average data (as discussed above),

(ii) Within each month, 8-hour incremental flow exchanges are estimated,

(iii) Using the 1973 field data of Saylor et al., 1976, an equivalent “control channel” is derived, based on Manning’s equation, to simulate 8-hour flow exchanges. (In effect, the “control channel” represents a simple mathematical representation of the Strait of Mackinac, for estimating flows between the 2 lakes). To produce the approximate maximum field estimated exchange flow of about 50,000 m^3/s, (over 8 hours), and considering the cross-sectional area of the strait, a water surface slope of about 1.2e-6 m/m is found,

(iv) Using this slope, and the approximate actual change in water level for the time period of this maximum flow of about 0.055m, the length of the “control channel” (i.e. the slope-run) of about 45 km is estimated. (This channel length is reasonable, in terms of the bathymetry of the strait),

(v) A 4th order function is derived / fit to match the hourly water elevation measured at Mackinaw (as a function of time in hours for the month),

(vi) The average hourly flow exchange between the lakes is then estimated by using the calibrated Manning equation for the “control channel”. It is assumed, that owing to the size of principle seiche time components, that the 8-hour running average will best represent hydraulic phenomena at the strait. As such, the “rise” of the water surface slope (as used by the Manning’s equation to generate a flow value) is set equal to the difference between the 8-hour running-average water elevation at Mackinaw, and the

4th order function representing the actual hourly water level. (The 8-hour running-average water level is derived by averaging the 8 individual average-hourly water levels as centered by the hour in the month).

(vii) As a final calibration of the approach, a small depth-adjustment is applied uniformly to all 4th order water level function values for the month, prior to their use within the Manning's equation. By this process, the sum of all hourly-average flow exchange values for a month as estimated to flow through the "control channel" (using Manning's equation) equaled that derived from the GLERL-AHPS monthly average estimate. It is found that the size of this required depth-adjustment calibration, although different from month to month, is quite small (just a few millimeters).

(viii) These final calibrated average-hourly flow exchanges, were then converted to 8-hour average values, which are used to describe the flow-exchange between the 2 lakes.

Outflow to the St. Clair River:

Lake Huron outflow to the St. Clair River is simulated using 30 model grid cells, which are located at the head of the river approximately 750 metres north of the Blue Water Bridge. (The river itself is about 300 metres wide at this location). These 30 model grids are grouped into 5 flow panels, (or "boundary-segments"), based on water depth, to better represent flow-variations across the river-head, although again, not likely of significance for conditions at the study area).

Initially, outflow to the St. Clair River was attempted via use of water elevations. Various combinations of the 2 most appropriate water elevations (i.e. Fort Gratiot and Black River Mouth) were considered, however the following problems could not be overcome in a consistent manner:

(i) By using the water elevation in the vicinity of Fort Gratiot, or "upstream" (e.g. Lakeport), flow reversals would occur, when wind-induced water level drops near the south-end of the lake developed, (i.e. since the local lake elevations were smaller than the Fort Gratiot or upstream elevation). This in turn, in addition to being unrealistic, (based upon a simple review of past estimated flow-rate in the St. Clair River), resulted frequently in numerical instability crashes in the model at the outlet, (likely because of the combination of the shape of the cells and the highly dynamic, and large flow reversals).

(ii) On the other-hand, by using a water level further downstream, (within the St. Clair River), to overcome the fictitious flow reversals, the outlet flow became erroneously too large, meaning that a complex cross-sectional area reduction-calibration procedure would become necessary to maintain the longer term flow water balance in the lake.

Both of these extremes are unrealistic, in terms of representing actual conditions and in terms of the modeling "logistics". As a result, since the long-term GLERL water mass balance values were available, it was decided to use a flow-based boundary condition to represent the St. Clair River outlet.

Based upon previous work at GLERL, (NOAA-GLERL 1982 and 1977), EMRB has derived a procedure to estimate daily-average flow-rate entering the St. Clair River. The methods are base upon water elevation differences between any of the following 3 sets of water elevation stations: Fort Gratiot and Mouth of Black River, Mouth of Black River and Dry Dock, and Fort Gratiot and Dry Dock. The Fort Gratiot and Dry Dock model was selected (mainly because of better data coverage).

To calibrate the estimated daily-average St. Clair River flow-rates, each daily value was adjusted by an equal amount in order that the total discharge for the month equaled that as estimated by the GLERL-AHPS data. Considering all 12 months in 2003, the magnitude (i.e. absolute size) of the required corrections with respect to the originally estimated daily-average flow-rates averaged around 2.5%.

3.2.3 Watershed river inflows:

Total monthly watershed runoff entering Lake Huron and Georgian Bay / North Channel, were based upon the 2003 GLERL-AHPS water budget data. However, these data are for the entire basins, and as such, need to be distributed among the major watershed rivers discharging to the basins themselves. A total of 18 major rivers were used to convey the watershed runoff to Lake Huron and Georgian Bay / North Channel, based partly upon the availability of historical watershed runoff data from Environment Canada and the U.S. Geological Survey.

The 2d whole-lake modeling cell closest to the river mouth is used to represent the entry point for a given watershed. The eighteen rivers considered, along with their approximate long-term percentages of basin watershed runoff are summarized in Table 3.1 below.

For each month in 2003, the long-term runoff ratios in Table 3.1 were combined with the GLERL-AHPS water budget basin total runoff, in order to obtain an estimate of the monthly-average runoff discharge for the 18 rivers. Except for the Maitland River, no variation in the discharge, within any given month, is considered. This would require a great deal more field data, most of which does not exist. Further, intra-month variations from these outside rivers are not likely of key significance to detailed flow regimes in the Maitland-Goderich study area. (They essentially are only considered in order to maintain the month-by-month water budget in the whole-lake model).

Table 3.1 Rivers considered in 2d whole-lake model and their long-term average total basin runoff percentages.

River	Percentage of total basin watershed runoff through river:	
	Lake Huron Basin	Georgian Bay / North Channel Basin
Ontario rivers:		
Ausable	0.40	
Bayfield	1.20	
Maitland	4.58	
Saugeen	11.35	
Sauble	2.79	
Sydenham		0.53
Bighead		0.88
Nottawasaga		4.40
Severn		5.28
Shawanagan		0.70
Magnetawan		7.93
French		32.04
Spanish		23.06
Serpent		3.70
Mississagi		21.48
Michigan rivers:		
Cheboygan	15.94	
Au Sable	7.17	
Saginaw	56.57	
Runoff % Totals:	*100.00*	*100.00*
Approx. long-term average watershed runoff in basin (m3/s)	*502*	*568*

Maitland River:

Obviously, the Maitland River required consideration in much greater detail, as the delineation of its potential impacts on the nearshore area of Lake Huron is the purpose of this study.

The discharge from the Maitland River can vary significantly. Figure 3.5 provides a plot of the daily-average discharge for 2003, as derived using data from Station 02FE015 of the Canadian Hydrological network of Environment Canada (the Maitland River at Benmiller, only about 10 km from Lake Huron).

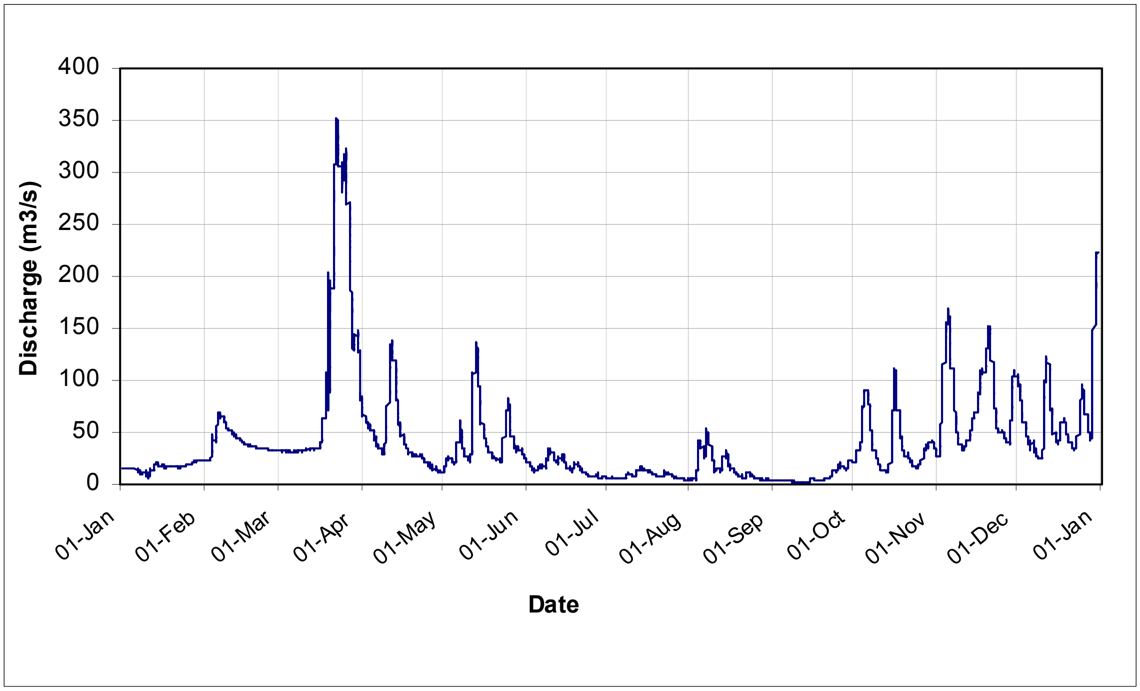


Figure 3.5 Daily-average discharge from the Maitland River in 2003.

Based on these data, a stage-discharge relationship has been previously developed for the Maitland River. It is provided as Equation 3.1 below:

$$Q = 198.54\, z_s^2 - 723.71\, z_s + 661.55 \qquad 3.1$$

where: z_s = measured river stage (m), and
Q = discharge, (m^3/s).

The relationship provides an excellent fit of discharge (r>.99) over a large range of estimated river discharge (of from about 0.5 to 650. m^3/s). Measured stage information was available at ½ hour increments throughout most of 2003 (about 95% of the time). As such, the stage-discharge relationship was used to provide average Maitland River discharge at ½ hour increments for the entire 2003 time period, (which required only minor interpolation to make up for the gaps that tended to be well scattered throughout the year).

3.3 Whole-lake model sensitivity analysis

The first step in setting up the model is to test and calibrate the hydrodynamics, (i.e. the various phenomena used in delineating the movement of water including the creation, transport and dissipation of momentum associated with this movement). For the 2d application, the depth-averaged water velocity is the parameter used to evaluate the calibration status. To perform a calibration, appropriately selected parameters are modified to create multiple values within a reasonable range, and the model predicted depth-averaged velocities are compared with actual field measured values.

In 2003, between May 16 and November 27, EMRB collected velocity data at two sites within the study area, using "Acoustic Doppler Current Profilers" (ADCPs). These two sites are referred to as the "(Maitland) Offshore ADCP" and the "(Maitland) Nearshore ADCP" (Stations). Their location is provided in Figures 3.3 and 3.4. A summary of information for these two locations is provided in Table 3.2.

Table 3.2 Details of ADCP measurement stations in the Maitland area in 2003.

	Offshore ADCP	Nearshore ADCP
Approx. distance from shore (km)	6.5	1.2
Approx. water depth (m)	16.4	9.4
Date-time of measurement: Starting	May 16 - 20:00	May 16 - 20:00
Ending	Nov. 27 - 16:00	Nov. 27 - 17:00
Length of sequential time measurement ensembles (minutes)	30	30
Number of measured ensembles	9,353	9,355
Vertical bin-size of measurements	2	1
Number of measurement bins	6	7
Approx. centre-depths of current measurement bins (from surface)	3, 5, 7, 9, 11, 13	1, 2, 3, 4, 5, 6, 7

3.3.1 Post-processing of 2d velocity data:

Post-processing software was developed In order to permit comparison of modeled and measured depth-averaged current velocities. This is accomplished by using a series of 3 MS Excel workfiles as follows:

(i) ADCP field data, (already downloaded and processed within an Excel work-file format by the field staff), is imported into a "measured depth-average velocity work-file". Within this work-file, for each time measurement ensemble of the entire deployment time period, the individual easterly and northerly velocity components from all vertical bins are depth-averaged, to obtain the final depth-average velocity components. These final measured velocity components are then imported into the "comparison work-file".

(ii) Delft3D model output, specifically the easterly and northerly velocity components of the depth-average velocity time series, are exported (using Delft3D post-processing software) into ASCII format and imported into a "model depth-average velocity workfile". Within this work-file, the data is time averaged as necessary, to produce comparison time-steps equal to the ADCP's measurement ensemble length. For the 2d whole-lake model simulations, depth-averaged velocity records were saved at the 2 ADCP locations every 10 minutes. As such, 3 consecutive Delft3d records were averaged together to produce modeled results at 30 minute time-steps, (i.e. equal to the ADCP measurement ensemble length). These final modeled velocity components are then imported into the "comparison work-file".

(iii) Within the "comparison work-file", algorithms are provided to permit both correlation and fourier-norm comparison analyses to be made on any velocity component, or total velocity vector (i.e. magnitude and direction), and for any time-period, all as selected by the user. Also, these comparisons can be visualized via plots provided on a separate worksheet.

This sequence of post-processing was followed to permit comparisons at both ADCP measurement locations, for all sensitivity analysis / calibration simulation runs discussed below.

3.3.2 Parameters considered for sensitivity analysis and calibration:

Simulated water velocities were compared with measured data, for the "near shore" and "offshore" ADCP measurement locations during the 2003 field season. It was generally noted that the modeled results from the initial simulations appeared to match relatively well, with no calibration, (i.e. based on initially using similar model parameter values as tested in other similar studies). However, to better understand the behaviour of the model, and to select optimum model parameter values for final simulations, a sensitivity analysis was carried-out.

From various past hydrodynamic work and study, there are a common set of parameters which are typically examined in performing sensitivity analysis and calibration. These include the primary parameters used by the modeling algorithms in the generation / decay of water velocities. In particular, these are the: wind stress coefficient, bottom friction and eddy viscosity.

Numerical models which use a relatively large number of grid cells, such as the case for this modeling study, require large amounts of time for simulating extended time periods of weeks and months. For example, the Delft3d-Flow user's manual provides the following equation for estimating computer CPU simulation performance, for planning simulation run-times:

$$T_{RUN} = CPU_P \cdot \alpha \cdot N \cdot M_{MX} \cdot N_{MX} \cdot K_{MX} \qquad \ldots 3.2$$

where: T_{RUN} = total simulation run time (seconds),

CPU_P = simulation-performance of PC's CPU, (seconds per grid point per time step). Example: CPU_P = 0.2E-04 for a Pentium based PC,

α = the fraction of active grid points,

N = the number of time steps to execute,

M_{MX} = *the number of grid points in the X-dimension,*
N_{MX} = *the number of grid points in the X-dimension, and*
K_{MX} = *the number of vertical layers (for 3d simulations).*

Using this equation, approximate total simulation run times were estimated for the whole-lake and nested models. Examples are provided in Table 3.3.

Table 3.3 Examples of potential simulation times for whole-lake and nested models.

		Whole-lake model:			Nested model:	
		2d	3d		2d	3d
M_{MX}		198	198		64	64
N_{MX}		159	159		88	88
K_{MX}		1	10		1	10
α		0.35	0.35		0.82	0.82
CPU_P (seconds) *{assumed}*		*0.00002*	*0.00002*		*0.00002*	*0.00002*
Total period simulated (years)		1	1		1	1
Time-step size (minutes)		5	5		1	1
N (based on 1 min. time-step)		105,120	105,120		525,600	525,600
T_{RUN} *{total sim. run time}* (hours)		6.4	64.		13.5	135.

As can be seen in Table 3.3, several hours would likely be needed to carry-out a single simulation using either the whole-lake or nested models. Since numerous simulations would be required, it becomes advantageous to use as large a time-step as possible, to minimize overall computer run times. As such, the sensitivity of the simulated results to variations in the size of the time-step size was also considered in the sensitivity analysis.

Table 3.4 provides the range of values considered for all sensitivity parameters, as well as the final set of parameters used, for subsequent water quality analyses with the whole-lake model.

3.4 Comparison of whole-lake modeled and measured velocity results

Predicted versus measured water velocities, total velocity magnitude and direction, as well as the alongshore (northerly) velocity component are compared. The results are summarized in Table 3.5, for the final selected modeling parameter set.

There is a high level of correlation between the predicted and measured velocities at both ADCP locations, (with well less than a 0.1% chance of error). As a test of the applicability of this statistical test, the correlations between the measured values, and a new set of randomly-derived values, (assumed to range between the originally predicted maximum and minimum values), were estimated. Correlation coefficients of approximately 0.005 are obtained in this case. As such, the randomly derived current velocities are not correlated to those measured, (i.e. as it could only be said that they are correlated with about a 50% chance of error).

Table 3.4 Parameter values used in the whole-lake sensitivity analysis.

Parameter	**Eddy viscosity (m2/sec)**	**Wind stress coefficient**	**Bottom friction (Mannings n)**	**Time step size (sec)**
Values considered in sensitivity analysis simulations	8	.0020	.0200	150
	32	.0025	.0250	300
		.0030	.0300	600
		.0025 to .0035		
		.0025 to .0030		
Final selected set	***32***	***.0025 to .0030*** [1]	***.0275***	***300***
1. The wind stress is assumed to increase in a linear manner from .0025 to .0030, as the wind speed increases from 0 to 10 m/s, remaining at .0030 at wind speeds above 10 m/s. The 10 m/s value represents the approximate 92nd percentile of wind speeds during 2003. The median wind speed for 2003 is about 4.8 m/s, (which would correspond to a wind stress coefficient of about 0.00274, based on this equation).				

Table 3.5 **Comparison of modeled and measured depth-averaged velocities for 2d whole-lake model.**

		Offshore ADCP		**Nearshore ADCP**
Number of data points for comparison		*9,353*		*9,355*
(a) correlation coefficient of:				
northerly (alongshore) velocity component		0.718		0.738
Total velocity magnitude		0.503		0.600
Total velocity direction		0.448		0.523
(b) Fourier-norm of:				
northerly (alongshore) velocity component only		0.719		0.694
Total velocity (both horizontal components)		0.733		0.716

Another used statistical comparison is through the use of Fourier norms, (i.e. the room-mean-square (rms) of the vector difference). Beletsky, et al., 2003, provide the following expressions for quantifying the Fourier norm, (which is normalized with respect to the observed current):

$$F_n = \left\| v_c, v_o \right\| / \left\| v_c, 0 \right\|$$

$$where: \qquad \ldots\ 3.3$$

$$\left\| v_o, v_c \right\| = \left(\frac{1}{M} \sum_{t-\Delta t}^{M \cdot \Delta t} \left| v_o - v_c \right|^2\right)^{1/2}$$

where: F_n = normalized, Fourier norm
v_o = observed velocity
v_c = modeled-computed velocity
M = number of comparison points in time-series

For example, it has been used previously in comparing modeled and observed water current velocities in Lake Michigan, (Beletsky, D. et al., 2003). A perfect model simulation would result in a F_n of 0. F_n, as normalized in this form, is an indication of the fraction of observed current variation that the model simulation can <u>not</u> account for. As such, values greater than 1 <u>imply</u> that the model simulation is no better than simply assuming a 0 (i.e. no) current flow condition. However, the validity of this implication are not always true, depending on the nature of the application, (i.e. values between 1 and 2 may still not negate the success of a model simulation, if other statistical indicators are favorable). However, F_n values between 0 and 1 are indicative of a generally favorable application.

For the 2d whole-lake simulation, using the “final selected model parameter set”, the resulting F_n values of approximately 0.73 indicate a relatively good quality match. Schwab, 1983, obtained F_n values ranging between 0.79 and 1.01 based upon April-November, 1976 field data collected at 8-hour increments, at a total of 22 field mooring-depth locations. The modeling configuration in Schwab’s study is relatively similar, as he used a 5 km grid size and barotropic depth-averaged conditions.

Although the results of the comparison are good at the “near shore” ADCP location, it is not clear as to the validity of the comparison here, since the size of the whole-lake grid cell is similar to the approximate distance offshore. Therefore in effect, the grid may be too coarse to permit a valid comparison at the nearshore location for the whole-lake model. Certainly it can be said that as far as it is reasonably possible to determine, the quality of the modeled velocities are good.

3.5 Water quality parameters

Two water quality parameters are selected for this initial modeling project, based on results of the EMRB field monitoring program, (Howell, et al., 2004). These are namely: conductivity since it was found to provide a good indication of Maitland River plume impacts of E. coli and NO_2+NO_3. NO_2+NO_3 themselves were also chosen, since they were found from principle component analysis to be a key indicator of nitrogen-nutrient impact.

The general background level, as assumed at the beginning for all model simulations, was estimated from historic information, (Environment Canada, 1985). The value used was 200 umho/cm^2 for conductivity and 290 ug/L for NO_2+NO_3.

3.6 Sources

Obviously the Maitland River is the key source of interest for this study, and as such, loadings of all selected water quality parameters from this river to Lake Huron are required, for all modeling phases.

The purpose of the whole-lake modeling is to provide information on lake-wide hydrodynamic processes which affect the Maitland study area. However, it also plays a useful role in a similar manner to provide information on larger-scale water quality conditions which will affect the Maitland study area. Of particular interest are the existences of water quality background concentration gradients that may exist / develop on a larger scale along the nearshore zone of the entire lake. In order to help simulate these background concentration gradients, loading from the other rivers (and watersheds) discharging to Lake Huron is also considered in the whole-lake model, (but not directly in the nested model, as they enter the lake outside of the nested modeling grid).

The Goderich Sewage Treatment Plant is also considered, since it discharges directly into the nested modeling grid. However, for the selected water quality parameters in this study, it is not expected to be of key importance.

3.6.1 Maitland River loadings:

In the Delft3d model, loading functions (which consist of separate flow-rate and water quality parameter concentration functions) are defined at time-steps equal to, or at integer-multiples of, the model simulation time-step. This means that for the whole-lake model, loading information could have been introduced at time-steps as frequent as every 5 minutes. Data this detailed are not, and perhaps rarely if ever are, available. There was however, a series of 13 measurements made between May and October. Since these data were collected under various Maitland River flow conditions, a simple approach of attempting to relate water quality parameter concentrations to Maitland River flow-rate was utilized.

The equations derived are described below:

$$C = 10 \text{ ^ } \{ 2.5923 + 0.09566 * \text{Log } Q \} \quad \ldots\ldots \textit{3.4} \text{ ; and}$$

NO_{2+3} = 10 ^ { 2.7376 + 0.64327 * Log Q } ……. 3.5

where:
C = conductivity (umho/cm^2),
NO_{2+3} = NO_2+NO_3 (ug/L), and
Q = daily-average discharge (m^3/s).

Both equations provided values that correlated well with the (13) measured values, (of 0.81 and 0.87 for conductivity and NO_2+NO_3, respectively). The root-mean-square error (rms) of the values obtained via these equations with respect to the measured values was also determined. The rms-error obtained is: 38 umho/cm^2 and 1,120 ug/L ; (for conductivity and NO_2+NO_3, respectively). The rms-error represents approximately: 7 and 23 %, of the measured average value for conductivity and NO_2+NO_3, respectively, (of 525 umho/cm^2 and 4,787 ug/L). A summary of the measured and equation-based conductivity and NO_2+NO_3 levels, are provided in Table 3.6 below.

Table 3.6 Summary of 2003 Maitland River discharge parameters used in the simulations.

Measured parameters:				**Equation-fit parameters[2]:**	
Sample Date	**Daily-ave flow[1] (m3/sec)**	**Conductivity (umho/cm2)**	**NO_2+NO_3 (ug/L)**	**Conductivity (umho/cm2)**	**NO_2+NO_3 (ug/L)**
May 7	54.8	572	7,030	574	7,182
May 14	113.9	570	10,500	615	11,497
May 21	24.6	509	5,710	531	4,289
May 27	40.2	596	8,360	557	5,884
June 9	31.2	515	5,560	543	4,994
July 8	7.0	465	1,170	471	1,909
July 24	10.3	471	4,130	489	2,442
July 31	4.6	438	1,650	453	1,463
August 19	8.8	510	2,580	482	2,219
September 4	3.3	434	824	439	1,183
September 24	12.6	494	2,370	498	2,789
October 16	97.0	584	6,140	606	10,370
October 29	36.9	667	6,210	552	5,568
Average of 13 samples	*34.3*	*525*	*4,787*	*524*	*4,753*

1. Daily-average flow-rate is the average of all stage-discharge equation-derived flow-rate values (as obtained at 30-minute intervals during the day).
2. Using Equations 2 and 3.

3.6.2 Loadings from other rivers:

Little information was available for the two water quality parameters for the other rivers considered by the whole-lake model. As such, generic equations of the form of

Eqs 3.4 and 3.5 were used to estimate monthly-average concentrations. In particular:

Conc = $10 \wedge \{ A + B * \text{Log } Q \}$ …… *3.6*

where: Conc = parameter concentration value, with;
A = $\log(\text{Conc}_{MAX}) - B * \log(Q_{MAX})$
B = $\log(\text{Conc}_{MAX}/\text{Conc}_{MIN}) / \log(Q_{MAX}/Q_{MIN})$
Conc_{MAX}, Conc_{MIN} = Maximum & minimum parameter concentration, and
Q_{MAX}, Q_{MIN} = maximum & minimum monthly-average river discharge.

While Q_{MAX} and Q_{MIN} could be estimated reasonably well, Conc_{MAX} and Conc_{MIN} could not. To provide a order of magnitude loading estimates, Conc_{MAX} and Conc_{MIN} were based upon measurements from the Maitland River. While these values will likely not be relevant to most rivers, it is assumed that they should tend to be at least order of magnitude accurate for the rivers discharging to the south-east portion of Lake Huron, which are the most important for establishing nearshore background parameter concentrations.

3.6.3 Goderich STP loading:

Monthly mean flows from the Goderich STP were taken from Table 9 of Howell, T. et al., 2005. Monthly sample analysis results for nitrates were provided by the EMRB-MISA group. No information could be found for conductivity. The effluent value used was simply assumed to equal about 175% of the general lake background value of 200 umho/cm^2. (This value is below the sample-average estimate for the Maitland River of 525 umho/cm^2).

A summary of the (assumed) monthly-average discharge conditions for the Goderich STP, is provided in Table 3.7.

The <u>largest</u> discharge from the Goderich STP represents only about 4% of the <u>smallest</u> discharge from the Maitland River, based on these limited data. As such, and considering that the levels for the two water quality parameters are generally similar, the Goderich STP should represent a minor contributor to levels measured within the overall Goderich near shore area.

Table 3.7 Goderich STP effluent conditions used for 2003.

Month	Monthly-average effluent		
	Discharge (m3/day)	**Conductivity (umho/cm2)**	**Nitrates (ug/L)**
January	5,217	350	8,630
February	5,463	350	6,240
March	8,020	350	7,710
April	9,566	350	11,220
May	9,720	350	8,570
June	8,592	350	3,770
July	5,942	350	4,110
August	5,227	350	2,200
September	6,467	350	3,190
October	8,503	350	4,720
November	10,960	350	7,540
December	10,435	350	6,960
Annual average	*7,843*	*350*	*6,238*

3.7 Set-up of 2d nested model

3.7.1 Open-boundary analysis:

As outlined in Section 2, all hydrodynamic and water quality boundary conditions used along the 3 (“open”) water boundaries of the nested model, must be generated before the model can be run. This is accomplished by running the final whole-lake model for the entire simulation period, (i.e. calendar year 2003), then processing the saved results at strings of *hypothetical monitoring stations* which are located along the 3 open boundaries. This process is accomplished by using a two-stage nesting program contained within the Delft3d software package.

There are various options, in terms of what parameters and assumptions to use in processing the whole-lake model data to derive the nested model open boundary conditions. In terms of the hydrodynamics, there are essentially two options for deriving the boundary conditions: water velocity based or water surface elevation based. Different options can be used along different open boundaries, (or different boundary-segments of the same open boundary).

Different options were examined including: all 3 velocity based, all 3 elevation based and a hybrid of: West elevation based, North/South velocity based. Basing all boundaries on velocity results in flow continuity failures in the nested model runs, (as it is not possible for the model to perfectly adjust the resulting flow rates into and out of the nested model volume under this option). The all elevation based option and the hybrid option both worked well. However, the all elevation was slightly more accurate and required less computation effort for the model input/output. As such, the all elevation based open boundary option was used.

For each open boundary segment defined, Delft3d requires that the water elevation or velocity for the 2 model grid cells representing the two-sides of the boundary segment be provided. It then carries-out a linear interpolation of these side grid cell values and applies the results to all internal model grid cells contained within the boundary segment. As such, the 3 main open boundaries, (which form the north, west and south sides of the nested model as shown in Figure 3.3), were subdivided into several segments. This was done to provide better interpolation results when deploying the nested model, since it is likely that velocity and concentration gradients, particularly along the north and south boundaries, are not linear in nature. The details of these open boundary segments are provided in Table 3.8.

Table 3.8 Open boundary segmentation used by the 2d nested model.

Segment #	**NORTH grid boundary *(segments ordered: East to West)***			**WEST grid boundary *(segments ordered: North to South)***			**SOUTH grid boundary *(segments ordered: East to West)***		
	Seg. Length (m)	**# of grid cells**	**Flow Option used**	**Seg. Length (m)**	**# of grid cells**	**Flow Option used**	**Seg. Length (m)**	**# of grid cells**	**Flow Option used**
1	500	5	w. elev.	1,820	6	w. elev.	400	6	w. elev.
2	520	5	w. elev.	1,550	6	w. elev.	450	6	w. elev.
3	660	6	w. elev.	1,430	6	w. elev.	570	7	w. elev.
4	810	6	w. elev.	1,060	6	w. elev.	940	8	w. elev.
5	1,330	7	w. elev.	730	6	w. elev.	1,000	6	w. elev.
6	1,210	6	w. elev.	550	6	w. elev.	1,430	7	w. elev.
7	1,390	7	w. elev.	420	6	w. elev.	1,400	7	w. elev.
8	1,750	8	w. elev.	280	7	w. elev.	1,750	8	w. elev.
9				240	7	w. elev.			
10				420	7	w. elev.			
11				580	6	w. elev.			
12				1,000	6	w. elev.			
13				1,410	6	w. elev.			
14				1,860	6	w. elev.			

3.7.2 Adjustment of other parameters for 2d nested model simulations

All model input parameters as outlined in Section 3.2 are applicable to the nested model, except as noted below.

Maitland river loading:

Having greater resolution within the nested model creates the possibility of making some adjustments to better simulate the interaction of the river with the lake. Approximately 200 metres or so of the Maitland River closest to the lake is included within the nested grid, (using a total of 8 grid cells). Within this Maitland River section, the river width is represented using 2 grid cells for a slight improvement of detail. The Maitland River flow and water quality parameter concentrations are assumed to enter the 2 model grid cells farthest (east) from the lake. The fraction of total Maitland River flow (as obtained from Equation 3.1 for each hour) that is assigned to these two model grid cells is: 0.54 and 0.46, for the north and south, respectively. These fractions are based upon the cross-sectional areas of the two grid cells, (i.e. so as the same river discharge velocity is seen in both cells, as the flow enters the lake). Overall, having the 8 grid cell extension into the Maitland River, (along with the detailed pier-breakwater coverage to the south), should help to better simulate the initial momentum interaction and associated plume development within the lake itself.

The level of NO_2+NO_3 and conductivity, (as obtained from Equation 3.4 and 3.5 respectively), is assumed equal at both the north and south entrance grid cells of the Maitland River, (i.e. a horizontally well-mixed concentration profile is assumed for the river flow as it enters the lake).

Other loading:

As with the whole-lake model, the Goderich WPCP discharges into a single cell within the nested model which best represents the actual outfall location.

Other than the Maitland River, all watershed rivers discharging to the lake are outside of the nested model’s grid domain, and therefore, they are not directly considered. However, any discernable larger scale nearshore plumes, particularly as might be created by the adjacent Bayfield and Saugeen River areas, would be simulated within the nested model via the nested boundary condition procedure outlined in Section 3.7.1.

3.8 Sensitivity analysis of the nested model

The same parameters as described in Section 3.3 for the whole-lake model are considered again for the nested model. However, since the spatial scales and lake characteristics are somewhat different within the limited nested model study area as compared with the whole-lake, values considered vary somewhat. Table 3.9 provides a summary of the sensitivity analysis for the nested model.

As in the case for the whole-lake model, the nested model is very robust in that while there are changes in model output, these are relatively small as compared with the magnitude of sensitivity parameter changes. The final selected set provided for the optimal simulation, however, this is largely a qualitative assessment, as again, quantitative differences were not conclusive.

Table 3.9 Nested model sensitivity parameters and values.

Parameter	Eddy viscosity (m2/sec)	Wind stress coefficient	Bottom friction (Mannings n)	Time step size (sec)	Number of Open Boundary segments used:
Values considered in sensitivity analysis simulations	1	.0013	.0100	30	3
	2	.0016	.0150	75	30
	4	.0020	.0200	150	
	8	.0025	.0225		
	16	.0030	.0250		
	32	.0035	.0275		
		.0040	.0300		
Final selected set	***8***	***.0025 to .0030*** [1]	***.0275***	***60***	***30*** [2]

1. The same wind stress equation is used for the nested model, as described above for the whole-lake model.

2. Although not found to be necessary for the hydrodynamics, the 30-segmented open boundary (14 along the offshore and 8 along both perpendicular-to-shore open boundaries) is used, to try to better replicate water-quality concentration gradients at the open boundaries.

3.9 Comparison of nested modeled and measured velocity results

The same measured data and velocity comparision procedure as outlined in Section 3.3 for the whole-lake modeling results, are considered for the nested model. This time, the modeled results (for the nested model) are available at a much higher spatial resolution (of approximately 200 and 80 m, for the Offshore and Nearshore ADCP, respectively).

As before, predicted versus measured water velocities, total velocity magnitude and direction, as well as the alongshore (northerly) velocity component are compared. The results are summarized in Table 3.10, as derived using the final selected modeling parameter set.

As in the case for the whole-lake model, the nested model provides depth-averaged velocities which match well those derived from the ADCP measurements.

3.10 Comparison of whole-lake and nested modeled 2-d velocities with field measured results

There are only slight differences in comparing the nested model results with those from the whole-lake model, (i.e. via comparison of Tables 3.10 and 3.5). It can be reasonably stated that the nested model and its open boundary configuration simulates well the impact of the larger-scale lake hydrodynamics within the study area.

Table 3.10 **Comparison of 2d nested modeled and measured depth-averaged velocities.**

		Offshore ADCP		**Nearshore ADCP**
Number of data points for comparison		*9,353*		*9,355*
(a) correlation coefficient of:				
northerly (alongshore) velocity component		0.743		0.727
Total velocity magnitude		0.548		0.607
Total velocity direction		0.513		0.495
(b) Fourier-norm of:				
northerly (alongshore) velocity component only		0.710		0.772
Total velocity (both horizontal components)		0.732		0.790

A comparison of whole-lake and nested modeled 2-d velocities, in the alongshore (northerly) direction, against each other and against the ADCP measured results, are provided in Figure series 3.6 and 3.7, for the Offshore and Nearshore locations, respectively. For the most part, as indicated by the statistics in Tables 3.5 and 3.10, there is strong match of modeled and measured depth-averaged velocities. There are however, a few limited periods of time where the modeled velocities appear significantly different than those measured, for example around Julian days 142 to 145 and 221 to 227. While not proven, it is suspected that the assumption of barotropic meteorological wind conditions, (i.e. spatially uniform), is particularly poor during these limited time periods. For the 3 cases outlined, one explanation could be that although the wind data from the buoys in the centre portion of the lake indicate winds were more from the West or North quadrants, (as reflected in the predicted alongshore currents towards the south), that instead there may have been a more localized South quadrant wind within the south-east nearshore portion of the lake, which actual created the northerly current in the study area.

3.11 Check of modeled water levels

Water level changes, at least on a whole-lake longer time-period basis, should reflect the basic changes in lake water volume as created by the summation of inflows and outflows to the lake. These inflows and outflows are prescribed input to the whole-lake model, (based upon the hydrological lake budget as outlined in Section 3.2.2), and are essentially at least, indirect input to the nested model, through the derivation of water level open boundary conditions from the whole lake model which are used by the nested model. As such in terms of the models, water level is not an independent variable. However, modeled water levels should be compared with those measured as a basic check of the validity of the hydrologic input data employed by the models. Generally speaking, modeled water levels would be expected to reflect those measured at the same location. Some variation is expected however, if the measured data is not at the same location or of a different temporal nature, since water level is both highly dynamic and spatially variable in Lake Huron.

Measured water levels were not available within the study area itself, however, measured hourly data for 2003 from two NOAA water-level stations, (NOAA, 2004), were selected for comparison purposes. These are namely the Harbor Beach and De Tour Village stations. Harbor Beach is located essentially on the west shore of Lake Huron directly opposite (i.e. west of) Goderich. De Tour Village is located near the north-west corner of the main body of Lake Huron, on the west shore of De Tour Passage, across from Drummond Island.

The basic monthly-average GLERL-AHPS lake water levels are also considered, since they are a function of the basic hydrologic budget, the results of which were used in establishing inflow-outflows, as described in Section 3.2.2. These are not measured values, but should be representative since they are derived considering pseudo-measured inflows / outflows and rainfall / evaporation to the whole-lake system.

The simulated water elevations, using the 2d model, are compared with those measured at Harbor Beach and De Tour Village in Figures 3.8(a) and 3.8(b), respectively. While there is a lot of variability in the hourly data due to the dynamic nature of hydrodynamics within the lake, the basic modeled results show good consistency with both the measured hourly values and with the GLERL-AHPS hydrologic budgeted values. The correlation coefficient between the simulated and measured time-series (at hourly intervals) for the year, is: 0.85 and 0.80; for Harbor Beach and De Tour Village.

3.12 Water quality modeling using the nested 2d model

As outlined in Section 3.6.1, loading of conductivity and NO_2+NO_3 from the Maitland River is based upon the concentrations obtained from Equations 3.4 and 3.5 respectively. These two equations are based on only 13 sample points. As such, the loadings obtained (i.e. by combining river flows and parameter concentrations) are likely only ‘somewhat quantitative’ of actual values.

Two types of results can be provided for the 2d water quality modeling. These include: “time series”, which focuses on the variation of the simulated impact (depth-averaged) concentration at a fixed monitoring location; and “spatial-field”, which provides a “snap-shot” at one instant of time, of the variation of depth-averaged concentration over the entire (or a portion of the entire) nested model domain.

3.12.1 Time-series results:

Simulated time-series concentrations of conductivity and NO_2+NO_3 were recorded at several monitoring stations within the nested modeling grid, at 30 minute intervals, throughout the year-long simulation period. For demonstration purposes, results have been processed for 3 locations, namely:

(i) SWMS Station 531, (located approximately 3.7 km north of the Maitland River);
(ii) SWMS Station 546, (located approximately 3.9 km south of the Maitland River); and
(iii) near the Goderich WTP intake, (located just south of the harbor’s outer breakwater).

These results are provided in Figure 3.9 and 3.10, for conductivity and NO_2+NO_3, respectively. In addition, only the May 1 to December 1 time period is presented, to coincide with the EMRB-GLMNA program’s field monitoring season in the study area during 2003.

3.12.2 Spatial-field results:

Depth-averaged water velocity, along with the concentrations of conductivity and NO_2+NO_3, were saved at 2-hour intervals for the entire spatial-field of the nested model, throughout the year-long simulation period. Modeling data has been processed on 4 dates during 2003, when the EMRB-GLMNA program collected detailed field data. These dates are namely:

(i) May 27;
(ii) July 8;
(iii) July 31; and
(iv) November 23.

The field measured conductivity and NO_2+NO_3 for these dates are provided in Howell, 2005 as Figures 56, A1, A2 and A3, respectively. In this report, the modeling results for the same dates are provided as Figure series 3.11, 3.12 and 3.13, for depth-averaged velocity, conductivity and NO_2+NO_3, respectively.

Water velocities:

For clarity, the depth-averaged velocity results of Figure series 3.11 are provided only for the portion of the nested model closest to the Maitland River and Goderich

Harbor. The 12:00 hour (12-noon) values were selected, in order to approximate the likely median time of field measurements. Also, the length of the depth-averaged water velocity arrows do not vary with current speed, (rather they provide direction only, with the speeds themselves represented by colored contours).

A list of simulated velocity and water elevation results, as well as characteristics of the Maitland River discharge and wind conditions are provided in Table 3.11, to assist with the interpretation of results. In addition, the same values are summarized for two additional times. These include at 24 hours before and 24 hours after, the 12:00 hour time on each of the 4 measurement dates.

Table 3.11 Nested 2d model velocity and water elevation; and Maitland River flow and wind conditions.

Model simulation results :		**May 27**	**July 8**	**July 31**	**Nov. 23**
Approximate alongshore current {speed (cm/s) // direction towards}	*24 hours BEFORE*	*3 // South*	*6 // North*	*6 // North*	*7 // South*
	@ 12:00 hrs ON DATE	5 // South	<2 // variable	7 // North	6 // North
	24 hours LATER	*3 // North*	*10 // South*	*10 // North*	*7 // North*
Water elevation {difference (cm) w.r.t. Lake low water level}	*24 hours BEFORE*	*-12.2*	*+2.4*	*+3.6*	*-12.3*
	@ 12:00 hrs ON DATE	-14.7	+6.3	+2.3	-13.8
	24 hours LATER	*-9.0*	*+2.5*	*+0.5*	*-8.8*
Discharge and wind conditions:		**May 27**	**July 8**	**July 31**	**Nov. 23**
Maitland River discharge (m^3/s)	*24 hours BEFORE*	*61.3*	*5.3*	*4.9*	*93.2*
	@ 12:00 hrs ON DATE	39.5	7.3	4.7	60.9
	24 hours LATER	*35.0*	*10.1*	*5.0*	*50.8*
Wind velocity {speed (m/s) // bearing angle from (degrees)}	*24 hours BEFORE*	*2.2 // 182*	*4.7 // 139*	*1.8 // 195*	*4.6 // 60*
	@ 12:00 hrs ON DATE	3.4 // 323	5.1 // 276	3.2 // 131	1.4 // 43
	24 hours LATER	*3.7 // 164*	*4.7 // 189*	*6.2 // 159*	*5.1 // 265*

The relatively large range in Maitland River discharge over the 4 dates is reflected in the size of the speed zones within the river mouth discharge area. *(Note: The portion of the Maitland River that has been included within the nested model grid, is relatively short, essentially just enough to simulate the momentum characteristics of the river's discharge into the lake).* Under the large discharge of November 23, a small re-circulation zone is generated just north of the river mouth, (as the river flow interacts with the relatively strong northward moving alongshore current). This pattern is absent on July 31, owing to the very weak inflow from the river.

Water quality parameters:

The simulated results for conductivity and NO_2+NO_3 are presented in Figures series 3.12 and 3.13, respectively. Again, these results are "snap-shots" of conditions at 12:00 hours on the 4 field measurement dates.

The Maitland River plume, as would be expected, is more dominate on the two dates when its discharge rate was significantly larger, namely May 27 and November 23, (since the water quality parameter loading rates have been assumed to be proportional to the river's discharge rate, as indicated by Equations 2 and 3). Also, the generally higher discharge rates during these two times of the year, (as compared with summer), has also resulted in generally higher local background levels of NO_2+NO_3 in particular, along the near shore zone on these two dates, (as compared with the 2 dates in July).

Owing to the spatial nature of the results, it is difficult to make a direct comparison of modeled plumes with those measured (and presented in Howell, 2005). As such, only an approximate comparison is provided below, in Tables 3.12 and 3.13, for conductivity and NO_2+NO_3, respectively. Specifically, levels are compared within near shore zones, (i.e. within about 1 km of shore). These zones are located along the shore line as follows:

(i) Zone 1: approximately 3 to 6 km North of the Maitland River, including SWMS Stations 530, 531 and 534;
(ii) Zone 2: within about 1 km to the North of the Maitland River mouth area, (i.e. not south of the southern retaining wall of the river). This would include SWMS Stations 535, 538 and 539;
(iii) Zone 3: within about 1 km to the South of the Maitland River mouth area, (i.e. South of the southern retaining wall of the river, including the area protected within the outer breakwaters, and as far South as SWMS Station 543); and
(iv) Zone 4: approximately 3 to 6 km South of the Maitland River, including SWMS Stations 546, 547 and 548.

It is difficult to conclude a lot from Tables 3.12 and 3.13, in terms of quantifying the accuracy of the model, as differences between modeled and measured results could be caused by various factors. These would include:

(i) Inaccuracies in the loading rates for conductivity and nitrates, introduced by their estimation via Equations 3.4 and 3.5, (as discussed at the beginning of Section 3.11). For example, it appears that the NO_2+NO_3 loading-rate is over-estimated during the 2 low Maitland River discharge dates in July.

Table 3.12 Summary comparison of nested 2d modeled / measured conductivity, in the near shore zone.

Near shore location by zone:	**Method:**	**Conductivity (umho/cm2) – approx. range in zone, on:**			
		May 27	**July 8**	**July 31**	**Nov. 23**
Zone 1: 3 to 6 km North of Maitland River	Modeled	200 - 225	225 - 250	225 - 250	225 - 250
	Measured	*200 - 250*	*<200 - 225*	*275 - 300*	*225 – 300*
Zone 2: within 1 km North of Maitland River	Modeled	225 - >500	250 - 450	250 – 425	325 - >500
	Measured	*250 - 400*	*250 - 375*	*325 – 375*	*300 – 450*
Zone 3: within 1 km South of Maitland River	Modeled	325 - 450	200 - 250	225 – 250	400 – 500
	Measured	*250 - 325*	*200 - 225*	*300 – 325*	*300 – 375*
Zone 4: 3 to 6 km South of Maitland River	Modeled	325 - 400	225 - 250	200 – 250	275 – 375
	Measured	*250 - 300*	*<200*	*300 – 325*	*200 – 300*

Table 3.13 Summary comparison of nested 2d modeled / measured NO_2+NO_3, in the near shore zone.

Near shore location by zone:	**Method:**	NO_2+NO_3 **(ug/L as N) – approx. range in zone, on:**			
		May 27	**July 8**	**July 31**	**Nov. 23**
Zone 1: 3 to 6 km North of Maitland River	Modeled	350 - 500	600 - 800	700 - 900	1400 – 1900
	Measured	*1400 - 1700*	*450 - 500*	*350 - 400*	*1500 – 2700*
Zone 2: within 1 km North of Maitland River	Modeled	450 – 6200	700 - 1900	700 - 1300	2000 - >7200
	Measured	*1700 – 8200*	*500 – 900*	*450 – 550*	*5000 – 7600*
Zone 3: within 1 km South of Maitland River	Modeled	3100 – 5200	600 – 700	600 – 800	5200 - >7200
	Measured	*1800 – 2400*	*450 – 600*	*350 – 400*	*1400 – 2100*
Zone 4: 3 to 6 km South of Maitland River	Modeled	2200 – 4500	600 – 800	600 – 700	2500 - 4500
	Measured	*1500 – 2600*	*450 – 500*	*350 – 400*	*1200 - 2100*

(ii) Spatial “distortions” in measured plume results, as introduced by the necessity of requiring several hours to measure water quality throughout the entire near shore area, during dynamic alongshore current conditions. For example, it appears from Table 5, that the alongshore currents were in reversal-transitions, within the 48 hour “window”, (i.e. the 48 hour period from 24 hours before to 24 hours after, the 12:00 hour result “snap-shot”), for all measurement dates except July 31.

(iii) The use of spatially-uniform wind conditions, (i.e. the barotropic meteorological wind condition assumption), to drive the hydrodynamic model. This may be of particular importance during the passing of systemic weather systems, which induce the alongshore current reversal episodes. For example, this could result in differences of a few hours in the timing between the predicted and actual alongshore current reversal events, (or even result in different alongshore current directions for short periods of time, as discussed in Section 3.10).

However, qualitatively at least, the model does appear to generally reflect the characteristics of the measured plumes on the given dates.

4. Details and Results of Phase 2 – 3D modeling

As outlined in Section 2, this second phase involves the extension of the 2D modeling to include 3D phenomena (i.e. depth-variable). The second phase requires significantly more effort to carry-out. This section outlines the various details and results involved in the set-up and application of the 3D modeling framework. This includes steps involved in defining the additional factors involved in simulating water densities and vertical movements within the water column, such as the dynamic transfer of: climate-related heat / solar radiation energies between the atmosphere and the lake, as well as the vertical transfer of heat and momentum within the vertical layers of the water column.

Obviously, since heat transfers / effects are now considered, the water temperature itself must become an independent parameter within all 3d simulations, (i.e. in addition to water velocities and surface elevations, and water quality concentrations). The 3d modeling must simulate the variability of all of these independent parameters within all 3 spatial dimensions, over time.

4.1 Modeling grids:

The 2d (horizontal) modeling grids discussed in Section 3.1 can be easily reused for 3d simulations. Since the σ-layering system is used by Delft3d, the horizontal 2d grid is converted to 3d grids by simply adding information regarding the number of vertical layers that the user wishes to use, along with the % of water column thickness to be assigned to each of these vertical layers. The program will then "stack" the vertical layers underneath the 2d grid layout, (proportioned according to the water depth at the modeling grid). There are however, some additional considerations in deriving a final 3d modeling grid.

4.1.1 Modified horizontal dimensions of the 3d whole-lake model:

As shown in Table 3.3, for planning purposes a 3d simulation utilizing 10 layers will essentially require 10 times more simulation run-time to complete. This meant that by using the complete 2d whole-lake model for a 10-layer 3d simulation, almost 3 days might be required to complete a simulation for the year. Numerous runs are necessary before a final 3d whole-lake model set can be developed, (i.e. for sensitivity testing of 3d modeling parameters, etc.). As such, it was desirable to modify the whole-lake model to reduce simulation times where possible, and still preserve accuracy for nested model boundary generation purposes. The following procedure was carried-out to derive the final whole-lake modeling grid for 3d assessment purposes:

(i) The 2d whole-lake modeling grid (which is shown in Figure 3.1) was modified where possible, by eliminating lake regions which where deemed not to be of direct significance to the Maitland River – Goderich study area. Three main regions were eliminated, namely: Georgian Bay, the North Channel and a semi-circle portion of Lake Huron within about 13 km of the St. Clair River. These eliminations reduced the number of horizontal grid cells by approximately a third, (from 10,772 to 7,219). This modified whole-lake grid is referred to as "LHWLkPt" and is shown in Figure 4.1.

(ii) The effects of these eliminated regions upon the remaining whole-lake grid had to be accounted for. This was accomplished by running the 2d model (which utilized the complete 10,772 cell grid), and saving the water flow and concentration fluxes passing through what would become the new open water boundaries of the reduced whole-lake grid. These new open water boundaries are shown in Figure 4.1.

(iii) The number of cells within the reduced "lhwlkpt" grid was reduced further by using an model-grid algorithm provided with the Delft3d software, called "derefinement". A derefinement factor of two was applied to the grid in both horizontal dimensions. This in effect merges together every other cell, in both dimensions which effectively doubles the linear dimensions of the cell, and thus increases cell areas by a factor of 4. This in turn means that the total number of cells required to cover the same modeling domain is reduced by a factor of 4. As such, the final horizontal grid used for the 3d simulations, (called "LHWLkPt**D**"), had a total number of horizontal cells of 1,743., (i.e. reduced from 7,219). This final reduced grid is shown as Figure 4.2.

This overall reduction strategy, (i.e. which reduced the total number of horizontal modeling cells from 10,772 to 1,743), meant that a 1-year 3d simulation would take approximately 11 hours instead of 64 hours. This is obviously a much more manageable number for multiple simulation analyses purposes.

4.1.2 Modified open boundaries for the 3d whole-lake model:

A total of 11 new open water boundary flow-channels were created through the reduction process, in deriving the final reduced whole-lake model. These include: 3 for Georgian Bay, 3 for the North Channel, and 5 for the exit to the excluded area of the lake bordering the St. Clair River. The location of the open boundary between Lakes Huron and Michigan, at the Straits of Mackinac as described in Section 3.2.2, did not change. However, the number of modeling cells at this open boundary was reduced from 8 to 3, owing to the coarser grid now used by the 3d whole-lake model. Details of all open boundaries used by the final (reduced) whole-lake model for 3d analyses are provided in Table 4.1.

Before this modified whole-lake grid was used, the effect of using a coarser whole-lake model upon the nested model (via open boundary generation) had to be shown to be satisfactory, (i.e. the predicted results within the nested model could not be sensitive to the change in whole-lake model grid size). This was done as part of the sensitivity analysis discussed later.

4.1.3 Horizontal dimensions of the nested model for 3d analyses:

In actuality, using the existing 2d nested modeling grid to make a 1-year, 3d simulation would require up to 5 or 6 days, which is even more restrictive than the whole-lake model. However, no modifications were used for the nested model for the following reasons:

(i) The high level of horizontal detail which existed in the original 2d modeling grid was still needed for 3d analyses purposes, (i.e. resolution is very important here, since the nested grid is used to simulate all phenomena of interest for this study).

(ii) Only a few year-long simulations of the nested model were anticipated, since the bulk of essential sensitivity / testing analyses would be carried-out via use of the whole-lake model. Thus only final simulations would be made with the nested model, using the final whole-lake model results.

Table 4.1 Modified open boundaries used by the 3d whole-lake model.

Open boundary location	Total length of open boundary *(as adjusted to fit grid)* (km)	Total number of grid cells used across boundary	Number of flow channels used for open boundary	Frequency of saved parameters at boundary:	
				Flow exchange[1]	Water quality[2]
St. Clair River	23.	15	5	6 hr ave	Monthly-ave
Georgian Bay:					
(i) South of Cove Island	4.1	1	1	6 hr ave	Monthly-ave
(ii) Between Cove and Fitz Islands	9.5	2	1	6 hr ave	Monthly-ave
(iii) north of Fitz Island	7.0	1	1	6 hr ave	Monthly-ave
North Channel:					
(i) Mississagi Strait	6.4	1	1	6 hr ave	Monthly-ave
(ii) False Detour Channel	5.6	1	1	6 hr ave	Monthly-ave
(iii) Detour Passage	3.8	1	1	6 hr ave	Monthly-ave
Straits of Mackinac	4.9	3	1	8 hr ave	Monthly-ave
Notes:	*1*	*Flow discharge both into or out of Lake Huron is considered, (i.e. the flow can be + / -).*			
	2	*The prescribed concentration at the open-boundary is only used to estimate mass flux coming into the lake (for periods of time when the flow is moving into the lake across the open boundary. When flow crosses the open boundary out of the lake, the actual simulated concentration at the boundary is used to estimate mass flux that moves out of the lake (and is therefore lost to the system).*			

4.1.4 Selection of vertical layers:

The Delft3d nesting algorithms, require that the same number of vertical layers be used for both the whole-lake and nested models.

Even an incomplete review of various past 3d studies reveals that the number of vertical layers used for large lake applications can vary significantly, say for example from 5 to 20. There is of course, a trade-off between accuracy and resource requirements when selecting the number of vertical layers to consider. For example, generally speaking, the greater number of layers used the more accurate vertical phenomena are likely to be simulated, at however, increasing "costs" for computer simulation and data input/output logistic requirements.

Typical water depths in the nearshore study area were in the 2 to 10 meter depth range. Thus by using 10 layers, the average thickness of the layers would be from 0.2 to 1 meter, which seemed reasonable, in terms of the typical vertical resolutions used in making field measurements. As such, 10 layers were considered to be the 'base' number. However, both the number of layers and the relative size of these layers with respect to the water column depth, were tested as part of the sensitivity analysis discussed later.

4.2 Open boundary and source input data:

In general, the same open boundary and source input data as described in Sections 3.2, 3.5 and 3.6 for the 2d application, are used again by the 3d models. However, there are some additional input parameter requirements as outlined below.

4.2.1 Water temperatures of sources and at open boundaries of the whole-lake 3d model:

Since temperature is an independent variable for the 3d modeling, its value must be prescribed for all sources (i.e. all rivers and the Goderich WPCP as identified in Section 3.6) and at all open boundaries (as described in Section 4.1.2).

Open Boundaries:

Temperatures used at the open boundaries are only used to estimate heat flux into the lake when the flow is coming into the lake (as described for the water quality parameters at the bottom of Table 4.1). Monthly-average temperatures, for the external water bodies (i.e. those beyond the open boundaries) were estimated using data from GLERL-AHPS, 2004 and Environment Canada, 1985. The boundary temperatures were simply set equal to the monthly-average estimated value of the external water body, (except for the St. Clair River region open-boundary, where the larger scale Lake Huron temperature itself was considered to be an accurate representation of the re-circulating water temperature).

The external water body assignments that were used are:

- St. Clair River (region) – Lake Huron / Georgian Bay temperatures
- Strait of Mackinac – Lake Michigan temperatures
- South of Cove Island, between Cove and Fitz Islands and north of Fitz Island – Lake Huron / Georgian Bay temperatures; and
- Mississagi Strait, False Detour Channel, and Detour Passage – North Channel temperatures.

Watershed-rivers:

There are 8 watershed-rivers directly discharging to the modified 3d whole-lake model (as shown in Figure 4.2). Obviously, the Maitland River is of key importance in this study. There was available, (as similar to the river stage as discussed in Section 3.2.3), good quality measured water temperatures near the mouth of the Maitland River at ½ - hourly increments for the time period between April 16 and November 23, 2003. These data were extended, using other available data (Environment Canada, 1985) to cover the periods before April 16 and after November 23. The ½ - hourly temperature data was used to describe water temperatures of the Maitland River for modeling purposes, (since the conductivity and NO_2+NO_3 data discussed in Section 3.2.3 are also available at ½ - hour increments).

The overall modeling results will not be sensitive to inaccuracies in the temperatures assigned to the other 7 rivers, since they represent extremely small potential energies in comparison with that associated with the large amount of water in the entire lake. As such, the same monthly-average temperature set was used to describe input for each of these 7 other watershed-rivers. The monthly-average values themselves were derived by simply averaging the ½ - hour incremental values from the measured Maitland River data, for each month.

A summary of the monthly-average temperatures for all boundaries and sources is provided in Table 4.2.

Table 4.2 Monthly-average water temperatures (°C) used for all rivers, open boundaries and the Goderich Sewage Treatment Plant.

Month	all Rivers	Open boundaries with:				Goderich Sewage Treatment Plant
		St. Clair River	Georgian Bay	North Channel	Lake Michigan	
January	2	0.8	0.8	1.5	1.7	13
February	1	0.4	0.4	0.7	0.9	13
March	2	2.0	2.0	1.2	1.4	14
April	6	3.2	3.2	2.3	2.8	16
May	10	7.7	7.7	3.8	6.3	18
June	19	13.9	13.9	7.5	12.5	20
July	25	17.9	17.9	12.3	18.2	21
August	27	17.4	17.4	14.2	19.1	22
September	22	11.6	11.6	11.7	15.6	20
October	14	8.5	8.5	8.4	10.8	18
November	6	6.5	6.5	5.8	7.0	16
December	2	4.1	4.1	3.5	3.3	15

The initial temperature (i.e. at the start of the simulations) assumed for the entire water mass within the whole-lake (and subsequently nested) 3d model(s) on January 1, 2003, was 4°C.

4.2.2 Vertical distribution used for sources and at open boundaries for the whole-lake 3d model:

For 3d simulations, the vertical distribution of all sources and open boundary interactions must be specified. With Delft3d this includes both an identification of which vertical layers are to be used, as well as the numerical distribution assumed to describe the variance of flow, temperature and water quality concentrations among these vertical layers.

For all river sources, the Goderich STP and all open boundaries, the exchange of water, temperature and water quality materials are considered to be vertically well-mixed for the whole-lake model. This means that all vertical profiles, (i.e. of velocity (and therefore flow), temperature and water quality concentrations), are constant over depth. The actual amount of flow exchanged between adjacent vertical layers (i.e. on opposing sides of the open boundary), per unit length of open boundary, is the product of the constant velocity and the layer's thickness.

This is a reasonable assumption for typical river flow, because of the relatively rapid rates of vertical mixing within rivers. Making this assumption for the Goderich STP, is of little consequence, since it is a very small shore-based discharge.

The assumption of vertically well-mixed exchange flows between Lakes Huron and Michigan are likely not correct during the stratified period of the year, based on 1973 observations by Saylor, et al., 1976. They found that a bi-modal flow sets-up between Lakes Huron and Michigan during the stratification period, (which in 1973, was from mid-June to mid-September). During this time, the exchange flow is not vertically well mixed, but rather, it has an eastern component in the upper 20 metres of the water column and a westward component below 20 m of depth. As such, simulated conditions as a function of depth in the Strait of Mackinac region during the stratification period of 2003, are not likely accurate. However, the overall 8-hour exchange flows between the 2 lakes should be relatively good, for all periods of the year, since they were derived (as discussed in Section 3.2.2) on actual exchange flow measurement results from the 1973 study, which does consider the effects of the bi-modal flow phenomenon. In other words, the exchange of flow volumes, heat energy and water quality mass between the two lakes should be adequately reflected by the assumed boundary condition, even though the results may not be accurate as a function of depth in the vicinity of the Strait of Mackinac itself. For the purposes of this study, it is this basic exchange of flow, heat and water quality mass that is important, and not detailed conditions within the Strait of Mackinac vicinity.

4.2.3 Open boundary conditions for the nested 3d model:

The changes necessary to be made to the 2d nested model as outlined in Section 3.7 were in a similar fashion, also required for the 3d nested model. However in addition to these modifications, once again, the nature of the vertical distribution of the nested open boundaries had to be prescribed. Since all simulated phenomena of interest for this study are generated through the nested model, it is desirable to prescribe as accurate open boundary conditions as possible. This was done by deriving fully 3-dimensional vertical distributions of all parameters (i.e. velocity, temperature and water quality concentrations), along all 3 open boundaries of the nested model. This simply means that the Delft3d nesting algorithms were used to provide an accurate description of all parameters in every vertical layer of the nested 3d model's boundaries, directly from every corresponding vertical layer within the appropriate cells of the whole-lake 3d model, (i.e. no assumed vertical distributions were used). These open boundary conditions for the 3d nested model are derived at the same frequency at which the simulated monitoring stations in the whole-lake 3d model were recorded (at the same *hypothetical monitoring stations*, as used previously, but now at all vertical layers instead of depth-averaged). The frequency used in this case was once every hour for the entire year. This made for very large open boundary input files for the 3d nested model simulations.

4.3 Heat flux model:

The version of Delft3d used by EMRB provides a choice of 3 heat flux models. These are described in detail within WL-Delft Hydraulics, 2001. The first heat flux model, ("Heat flux model 1"), provides for the greatest computational detail, as it considers all key solar radiations and heat loss exchanges, in estimating the overall heat flux between the air and water. The second heat flux model is a somewhat simplified version of the first. The third heat flux model, simply uses the temperature differential between background air temperature and surface water temperature, in estimating heat flux between the air and water.

4.3.1 Heat flux parameters:

"Heat flux model 1", was used in this study, both because of its greater computational detail and the availability of the necessary energy-related parameters from the GLERL-AHPS data base. A brief parameter description of "heat flux model 1" is provided in Table 4.3. It requires the net short wave solar radiation for a clear sky to be prescribed. The model then computes the other energy transfers, including: the net atmospheric (long wave) radiation and the heat losses due to evaporation, back radiation and convection.

4.3.2 Selection of input data for heat flux model:

Net short wave radiation for a clear day:

The net short wave radiation for a clear day is a function of the latitude on the earth's surface and the corresponding declination of the sun and angular speed of the earth's rotation. As such, within a given day it varies from zero to a maximum, the value of which is a function of the time of year. It is assumed that simulating variations in the short wave radiation within time periods of less than a month are not critical to the overall ability to predict larger scale / longer time period heating and cooling of the lake, owing to its large volume and heat capacity. However, it is necessary to use accurate monthly-average values. As such the following procedure was followed, to estimate the monthly-average value:

(i) The net short wave (clear sky) radiation is determined hourly, for the first day of each month in the year, using equations provided in the flow manual of the Delft3d Flow module (WL-Delft Hydraulics, 2001), as taken from Gill, 1982:

Table 4.3 Heat flux model parameters.

Parameter	Units	Scale of variability for parameter:	
		Spatially	Temporally
(i) Calculated by heat flux model:			
Net solar radiation	*$J / (m^2*s)$*	Grid	Time-step
Net atmospheric radiation	*$J / (m^2*s)$*	Grid	Time-step
Back radiation	*$J / (m^2*s)$*	Grid	Time-step
Heat loss due to evaporation	*$J / (m^2*s)$*	Grid	Time-step
Heat loss due to convection	*$J / (m^2*s)$*	Grid	Time-step
(ii) Required input to model:			
Net short wave radiation for a clear sky	*$J / (m^2*s)$*	Lake-wide	Monthly-average
Water surface area (effective area used for evaporation)	*(m^2)*	Lake-wide	Entire period
Sky cloudiness	*(%)*	Lake-wide	Entire period
Relative humidity of air	*(%)*	Lake-wide	Monthly-average
Air temperature	*(^oC)*	Lake-wide	Monthly-average
(iii) Optional input to model:			
Precipitation	*(mm/hr)*	Lake-wide	Monthly-average
Evaporation	*(mm/hr)*	Lake-wide	Monthly-average
Rain temperature	*(^oC)*	Lake-wide	Monthly-average

Note:

"Grid" means simulated throughout the grid;

"Lake-wide" means spatially uniform input for the entire grid;

"Time-step" means simulated each time-step;

"Monthly-average" means input provided on a monthly-average basis (although input can be input as frequently as the simulation time-step size ; and

"Entire period" means average input for the entire simulation period.

$$Q_{sc} = R_{atm} \cdot S \cdot \sin(\gamma) \quad \text{; when } \sin(\gamma) > 0$$

$$Q_{sc} = 0 \quad \text{; when } \sin(\gamma) > 0 \qquad \text{… 4.1a}$$

where:

$$\sin(\gamma) = \sin(\delta) \cdot \sin\left(\frac{\pi \cdot \Phi}{180}\right) - \cos(\delta) \cdot \cos\left(\frac{\pi \cdot \Phi}{180}\right) \cdot \cos(\omega_1 \cdot t) \qquad \text{…4.1b}$$

where:

$$\delta = \left(\frac{23.5 \cdot \pi}{180}\right) \cdot \cos(\omega_0 \cdot t - 2.95) \qquad \text{…4.1c}$$

where:

Q_{sc} = *net short wave radiation for a clear sky, (J/m^2/sec),*

t = *time in year (minutes),*

S = *the solar constant (average flux at mean earth radius) {= 1,368 (J/m^2/sec)},*

$Ratm$ = *remaining fraction of of "S" after traveling through atmosphere {= 0.76},*

γ = *the solar elevation angle, (degrees),*

δ = *correction factor for time of year,*

Φ = *the latitude (degrees), and*

ω_0 , ω_1 = *the frequency of variation on an : annual, diurnal; basis respectively, (degrees / minute)..*

(ii) The daily-average value for the first day of each month is calculated, (i.e. using the 24 individual hourly values) and

(iii) The average monthly value is set equal to the average of: the daily-average value at the beginning of the month and the daily-average value at the beginning of the following month.

Other parameters:

The other parameters were estimated using the GLERL-AHPS monthly-average heat flux data, (NOAA-GLERL, 2004). This information was input directly on a monthly-average time scale. Again, owing to the large volume and heat capacity of the lake, no time-scale adjustments were deemed necessary for the GLERL-AHPS data.

Under the normal mode of operation, the Delft3d “Heat flux model 1” does not directly consider precipitation and precipitation temperature, and estimates evaporation and evaporation heat loss internally, through a series of equations, (WL-Delft Hydraulics, 2001). However since external estimates are available for precipitation and evaporation in 2003, this information was also supplied as input to the heat flux model.

A summary of the values used for the heat flux parameters are provided in Table 4.4.

Table 4.4 Value of heat flux model input parameters.

Input parameter:	**Average value used for month in 2003:**											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Net short wave radiation for a clear sky *[J / (m^2*s)]*	108	153	222	296	353	378	366	318	247	172	116	95
Effective water surface area for evaporation *[m^2] :* *(i) whole-lake model* *(ii) nested model*	3.9x 10^{10} 1.1x 10^{8}											
Sky cloudiness *[%]*	66											
Relative humidity near water surface *[%]*	76	81	87	82	91	94	94	92	87	83	84	79
Air (and rain/snow) temperature *[°C]*	-3.4	-5.8	-1.5	0.7	2.9	5.9	13.9	18.2	19.6	13.3	7.0	2.5
Precipitation *[mm/mn]*	17	27	46	65	107	70	83	54	75	51	132	55
Evaporation *[mm/mn]*	127	71	31	17	0	0	1	17	65	77	77	96
Notes	*1*	*Separate monthly-average values were available for sky cloudiness, (ranging from about 51% in September to 80% in November), however Delft3d only permits a single (i.e. non-dynamic value). However, the modeled results did not show a great sensitivity to this variability (when indirectly incorporated through an adjustment of the monthly-average net clear-day solar radiation values). As such the annual average (i.e. the average of the 12 monthly-average values) is used.*										
	2	*The 3.9x10^{10} m^2 effective water surface area is for the final whole-lake model used for 3d simulations (excluding Georgian Bay, the North Channel and the St. Clair River outflow region)*										
	3	*The 3.9x10^{10} and 1.1x10^{8} m^2 effective water surface areas were the same throughout the year.*										

4.4 Sensitivity analyses and calibration of the 3d models:

Considerable time and effort was expended in carrying-out various steps of sensitivity analysis on the different 3d models. This was necessary to gain a better understanding of the relative role that various parameters, particularly those involved in the vertical transport / diffusion of heat and momentum within the water column, have upon predicted results. It also afforded an opportunity to gain a 'feeling' for the relative robustness of the 3d model results, to the likely uncertainty in the setting of final values for these parameters.

As an initial step, the various equations and input parameters involved in the heat flux models used by Delft3d, were programmed within an Excel work file. This was limited to examining the exchange between the air and a simple, single water column layer. As such, it was not 3d, but afforded a relatively simple but effective means of better understanding the basic sensitivity of air-water transfer parameters.

The remaining sensitivity analyses involved the actual running of 3d modeling grids, under various combinations of input parameters.

4.4.1 Initial test grid sensitivity analysis:

To fully evaluate the sensitivity of 3d models to heat flux phenomena which are induced on an annual cycle, several simulations of the entire 2003 time period is required. As discussed in Section 4.1.1, the final whole-lake modeling grid selected, ("LHWLkPtD"), although de-refined as much as reasonably possible, still would require significant time to complete several of these year-long simulations. Initially therefore, a simplified and coarser 3d modeling grid called "vtest" was established to provide basic heat flux response information for the lake, in a relatively rapid fashion. This grid is shown in Figure 4.3.

As can be seen, "vtest" approximates the area of the main body of Lake Huron in a simplified manner. Essentially, Georgian Bay, the North Channel and Saginaw Bay have been eliminated, and the extremity of lake at the St. Clair River and Lake Michigan, made into simple block-ends. The remaining water of the lake is represented by a simple 10 cell wide by 35 cell long grid, (i.e. a total of 350 cells). However, the total water surface area and volume are similar to the actual values for the final 3d whole-lake model grid, to assure that the basic heat-flux impacts would generally be well represented in simulations with the "vtest" grid. Further the actual bathymetric data for Lake Huron was used to generate the water depths for the test grid.

The coarseness of "vtest" reduced run times, for a year-long simulation with 10 vertical layers, to about 2 ½ hours, (using Equation 3.2). This permitted realistic turn around times, for sensitivity analysis purposes. For relative comparison purposes, the water's current magnitude and temperature were recorded within the top and bottom modeling layer at two locations, for each simulation. This was done at 2 times during the year long simulations, namely: August 8, to capture the likely peak of stratified conditions and on December 31, as a check of the final heat flux balance for the year. The first location was at the segment approximating the offshore Goderich area, and the other at the segment representing the deepest part of the lake. The depth at these two locations, as estimated for this coarse model, is: 25 and 132 m, respectively.

No open boundary flow exchanges (with Lake Michigan, the North Channel, Georgian Bay), outflow (to the St. Clair River), or watershed runoff to the lake are considered, as the purpose of this test grid is to gather approximate information on the sensitivity of the large-scale heat budget of the lake, to changes in the basic heat flux parameters.

A total of 24 simulation runs were made. The parameters considered in the sensitivity analysis using “vtest”, along with their range of values, and the range in predicted parameters, are provided in Table 4.5.

Table 4.5 shows that there are clear differences in the simulated results at a given location and time, under the range of parameters considered. However, it can be said, particularly based upon the simulated temperature results, that the model is rather robust, (i.e. since these differences are not large in comparison with the relative variation in parameter values used to generate them).

Although more qualitative in nature owing to the coarseness of the test 3d grid, these results provided useful background information for the subsequent sensitivity analysis of the final, (detailed), 3d whole-lake grid. This work is discussed in the next section.

4.4.2 Development of post-processing software for comparison purposes:

It is desirable to compare the simulated results from the “final” 3d models, with actual measured data, both as a means of providing a better sensitivity analysis yardstick tool, and for quantifying the accuracy of the model predictions, where possible. This required the development of additional post-processing software.

Post-processing of 3d velocity data:

A procedure is outlined in Section 3.3.1 for the development of a post-processing tool to provide comparisons of measured and modeled 2d depth-average velocity data. Extensive modifications were required to this series of 3 MS Excel work-files, in order to adapt them for 3d data use.

The following considerations are included within the modifications that were made to the work-file used to process the measured velocity data from the “Acoustic Doppler Current Profilers”, (ADCPs):

Table 4.5 Results of the sensitivity analysis, using the 3d whole-lake test grid.

Parameter:	Units:	Range of value for parameter:	
		Minimum	Maximum
Vertical grid structure:			
Number of layers		10	20
Water column distribution		*(see Note 1)*	*(see Note 1)*
Bottom friction: Manning's "n"		0.0275	0.0550
Horizontal turbulence:			
Viscosity	m^2/sec	8	160
Diffusivity	m^2/sec	1	160
Vertical turbulence:			
Viscosity	m^2/sec	$1.0\mathrm{x}10^{-6}$	$1.0\mathrm{x}10^{-4}$
Diffusivity	m^2/sec	$1.0\mathrm{x}10^{-6}$	$1.0\mathrm{x}10^{-4}$
Ozmidov length scale	m	0.001	0.100
Turbulence model		*(see Note 2)*	*(see Note 2)*
Cloud cover *(annual-average)*	%	66	73
Model results, on August 16, at:		Minimum	Maximum
(a) Goderich offshore *(depth 25 m)*:			
Temperature: top layer	^{o}C	14.6	18.7
bottom layer	^{o}C	8.5	12.9
Velocity magnitude: top layer	cm/sec	14.2	34.0
bottom layer	cm/sec	0.7	9.4
(b) deepest part of lake *(depth 132 m)*:			
Temperature: top layer	^{o}C	15.1	19.7
bottom layer	^{o}C	3.8	4.3
Velocity magnitude: top layer	cm/sec	5.4	25.1
bottom layer	cm/sec	0.5	4.5
Model results, on December 31, at:		Minimum	Maximum
(a) Goderich offshore *(depth 25 m)*:			
Temperature: top layer	^{o}C	5.1	7.5
bottom layer	^{o}C	5.1	7.5
Velocity magnitude: top layer	cm/sec	7.0	14.6
bottom layer	cm/sec	1.0	8.0
(b) deepest part of lake *(depth 132 m)*:			
Temperature: top layer	^{o}C	6.9	8.4
bottom layer	^{o}C	6.9	8.4
Velocity magnitude: top layer	cm/sec	0.9	5.7
bottom layer	cm/sec	3.1	7.0

Note 1: 2 options were considered for the 10 layer simulations, 1 for the 20 layer simulations. The % of water-column depth in the layers, from surface to bottom, are:
"a" : 2, 4, 8, 16, 20, 20, 16, 8, 4, 2 (for the 10-layer grid)
"b" : 2, 3, 4, 5, 5, 5, 5, 10, 20, 41 (for the 10-layer grid)
"c" : 1, 1, 2, 2, 4, 4, 8, 8, 10, 10, 10, 10, 8, 8, 4, 4, 2, 2, 1, 1 (for the 20-layer grid)

Note 2: 2 vertical turbulence sub-model options were examined: the "k-ε" and the "k-length scale".

Note 3: The "simulation performance, "CPU_P", (as defined in Equation 3.2), of the computer used to run the simulations, ranged between $1.3\mathrm{x}10^{-5}$ and $1.5\mathrm{x}10^{-5}$ (seconds per layer-grid point per time-step). This is approximately 25 to 35 % faster than the initially assumed value provided with the Delft3d documentation.

(i) The ADCP measurements do not provide results over the entire water-column. This is an unavoidable restriction, owing largely to acoustic noise and interference patterns which occurs in the immediate vicinity of the ADCPs, (which are situated on the lake bottom in this study), and also near the surface from sound reflections off the air-water interface, (RD Instruments, 1989). In addition, the ADCPs (and transducers) themselves are located a short distance off of the bottom to begin with. As such, there are vertical panels at the bottom and top of the water column where velocities can not be measured. The size of these vertical panels are estimated and taken into account, within the ADCP 3d processing work-file, by entering appropriate deployment information, (e.g. such as the height of the transducer off of the bottom, the vertical measurement bin size, the blanking distances used by the ADCP processing software, and the water column depth).

(ii) The velocities that exist within the two vertical panels at the top and bottom of the water column (which can not be measured by the ADCP), may be estimated by entering extrapolation factors.

(iii) Depth-average velocities are based on the depth-weighted averaging of the two sets of horizontal components obtained from the different vertical measurement-bins of the water column. These can also include the extrapolated top and bottom water column values.

(iv) Depth-average values are calculated both for: the entire water column, (i.e. including the two extrapolated velocity zones at the top and bottom of the water column); and for the “intra-bin zone” only, (i.e. the limited vertical section of the water column where measured ADCP data are available).

(v) Estimated velocities can also be made at the equivalent depths associated with the centre of the vertical layers used by the model, (by entering the number of model layers and their water-column distributions). For a given model layer, this is accomplished by simple linear interpolation using the measured ADCP velocities at the nearest depth above and below the model-layer’s depth.

(vi) The temporal spacing of all of these analyzed measured velocity records, as discussed in points (i) to (v) above, may then be adjusted if necessary to match the time-step size used by the Delft3d model. This permits direct measured to modeled comparisons to be made (within the modified “3d velocity comparision work-file”).

The modeled 3d velocities (from Delft3d) are processed in a generally similar fashion as the ADCP data, within a separate work-file. The Delft3d model post-processing software is used to export ASCII-formatted 3d velocity-components, for each vertical layer separately, at a selected monitoring location. These components are combined and processed to provide the velocities that are compared with those from the ADCP 3d processing work-file. The following features are included within the modeled 3d velocity work-file:

(i) By definition, the model layers cover the entire water-column, and as such, there are no vertical panel gaps at the surface and bottom of the water column.
(ii) Depth-average velocities are based on the depth-weighted averaging of the two sets of horizontal components obtained from the different vertical layers of the model, (which cover the entire water column).
(iii) Depth-average values are calculated both for: the entire water column, (i.e. as based upon Step (ii)); and for the "intra-bin zone" only, (i.e. the limited vertical section of the water column where measured ADCP data are available). This permits direct comparisons with the measured ADCP "intra-bin zone" depth-averaged values, and requires entering the ADCP measurement configuration information within this work-file.
(iv) Estimated velocities can also be made at the equivalent depths associated with the centre of the ADCP's vertical measurement-bins, using the entered ADCP measurement configuration information. For a given ADCP measurement-bin, this is accomplished by simple linear interpolation using the modeled velocities at the nearest model layer depth above and below the centre of the ADCP measurement-bin.
(v) The temporal spacing of all of these analyzed modeled velocity records, as discussed in points (i) to (iv) above, may then be adjusted if necessary to match the ensemble (i.e. recording) time-step size used by the ADCP. This permits direct modeled to measured comparisons to be made (within the "3d velocity comparision work-file").

The 3d velocity comparision work-file is where the modeled and measured 3d velocity data are compared. The final formatted worksheet within both the measured (ADCP) and modeled (Delft3d) 3d velocity processing work-files (which are imported into the comparison work-file), are identical. They both provide: depth-averaged velocities for the entire water column and "intra-bin zone"; depth-specific velocities at the centre of all model layer depths and at the centre of all ADCP vertical measurement-bin depths. In this manner, the comparisons can be made using either the measured or modeled data as the base-reference values.

The types of comparisons within the comparison work-file include:

(i) correlation coefficient;
(ii) 1 or 2 velocity component based, fourier-norm values (normalized to the measured data); and
(iii) plots of velocity versus time.

The comparisons that can be made are completely flexible, depending upon the information sought, (i.e. any combination of velocity-parameter from the two sets of depth-averaged or depth-specific velocities, may be compared). This comparison can also be provided from two velocity-parameters from the same modeled or measured processed data sets. As examples only, the following could be compared: the modeled / measured depth-averaged values, the modeled / measured velocities at the top ADCP bin depth, or even the velocities modeled at the top and bottom model layers.

Post-processing of 3d temperature data:

As discussed previously, water temperature is an independent variable which must be correctly simulated within the 3d models of this study. During 2003, EMRB measured water temperatures using strings of thermistors. Each thermistor-string, (which is attached to the lake bottom and floats in a vertical orientation), has several individual thermistors attached to it at different depths. Each thermistor on the string records temperature at a pre-defined time interval (at their respective depth within the water column) for the duration of the deployment.

The post-processing software developed to permit modeled and measured temperature comparisons, is very similar in general format to that developed for comparison of the 3d velocity data, described above. Specifically, two MS Excel work-files were developed to permit the processing of thermistor measured temperature data and Delft3d modeled temperatures, with a third work-file being used for comparing the two final processed data sets. There are similar considerations incorporated into the series of 3 work-files for temperature, as for velocity, including:

(i) Recognition and estimation of vertical panels at the near surface and bottom of the water column where temperature measurements could not be made. (In this case, these are due to practical limitations in positioning thermistors near the bottom and or surface). The sizes of these panels are determined from information regarding the specific thermistor installation at a given site.
(ii) The thermistor data is initially processed by field staff, and provided in MS Excel format, which is then imported into the temperature measured temperature work-file.
(iii) The modeled data which is imported to the modeled temperature work file for processing, is first exported on a layer by layer basis, using Delft3d post-processing software.
(iv) Within the measured temperature work-file, depth-averaged temperatures are estimated, based both upon total water column depth (by optionally extending top and bottom thermistor readings) and the “intra-thermistor zone”, which only considers the vertical extent of the water column covered by the thermistors.
(v) Depth-average modeled temperatures are calculated over both vertical zones, (i.e. total water column and “intra-thermistor zone”).
(vi) Depth-specific temperatures are estimated (using linear interpolation) at all thermistor and model layer depths, within both the measured and modeled work-files. Again, this permits direct depth-specific comparisons to be made within the comparison work-file.

(vii) Within the comparison work-file, the comparisons are reported in terms of: correlation coefficient, average temperature difference and plots of temperature versus time.

One simplification for the temperature comparison worksheets comes from the fact that temperature is a scalar-quantity parameter, (i.e. non-vector), and as such, all comparisons are of a single-component nature.

Locations of 3d temperature measurements:

There were several locations along the east coastal area of Lake Huron where EMRB set-up thermistor-strings during 2003. Two of these were at the approximately same locations where ADCP measurements were made in the Maitland River vicinity of the lake. Another two were set-up in the Saugeen River vicinity, (approximately 100 km north of the Maitland River). For both river vicinities, both an offshore and nearshore location is used. These 4 thermistor-string stations are used for comparison purposes within the sensitivity analysis / calibration of the 3d models, and are described in more detail in Table 4.6.

Table 4.6 Details of water temperature measurements (using thermistor chains) in the Maitland and Saugeen River vicinities in 2003.

	Maitland River		Saugeen River	
	Offshore	Nearshore	Offshore	Nearshore
Approx. distance from shore (km)	6.5	1.2	4.7	1.0
Approx. water depth (m)	16.0	11.4	24.7	15.1
Date-time of measurements:				
Starting	May 15 – 10:00	May 15 - 12:00	May 14 – 12:30	May 14 – 15:00
Ending	Nov. 27 - 16:00	Nov. 27 - 16:30	Nov 27 – 09:30	Nov 27 – 10:00
Time between sequential measurements (minutes)	30	30	30	30
Total number of measurements during time period	9,421	9,418	9,451	9,447
Vertical distance between thermistors on string	2	2	2	2
Number of thermistors	7	4	11	5
Approx. depths of thermistors from surface (m)	1, 3, 5, 7, 9, 11, 13	2, 4, 6, 8	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22	2, 4, 8, 10, 12

4.4.3 Sensitivity analysis / calibration of the final 3d whole lake model:

Although time consuming, as discussed in Section 4.4.1, a sensitivity analysis of the final whole-lake 3d model, (“LHWLkPtD”) was necessary, since it would be used to provide all simulated results for the study (in conjunction with the nested 3d model).

The sensitivity analysis results previously obtained for the “test” 3d grid, (see Section 4.4.1), provided background information for starting this phase of the testing.

The sensitivity analysis carried-out for the final whole-lake 3d model essentially served two purposes. First of all, it permitted a straight forward means of testing the simulation model under similar variations of parameters as identified for the “test” 3d grid. This would help confirm that the results of the sensitivity analysis results from the initial “test” model were still valid for the final 3d model. This confirmation was deemed necessary since, although similar in area and volume, the final model was quite different than the “test” grid, since it: utilized a much greater refined numerical grid and bathymetry, and included the effects of inflows / outflows with Georgian Bay, the North Channel and Lake Michigan, as well as outflow to the St. Clair River and inflow from the St. Marys River and the smaller 8 watershed rivers, (all of which are described in Sections 4.1 and 4.2).

The second purpose of the sensitivity analysis was to provide information from which the final modeling data set could be selected. As such, it acted as a pseudo-calibration, since as part of this sensitivity analysis, the modeled results were compared with measured values. Thus both the sensitivity and accuracy of the model, with respect to the value of key parameters, were evaluated through this process.

There was not a regimented procedure set-up for the actual comparison of modeled and measured results. However, one or more of the following types of comparisons were made for any given sensitivity analysis simulation:

(i) Modeled water velocity magnitude and temperature in the surface and bottom layer of the two modeling cells examined with the “test” 3d model: near the offshore Maitland ADCP deployment station and about 25 km offshore. This was done for two dates, namely: August 8 and December 31. This type of comparison provides only relative information in a similar fashion as that used by the sensitivity analysis carried-out with the “test” 3d model;

(ii) Depth-averaged temperature, within the “intra-thermistor zone”, on a monthly basis, at all 4 thermistor-chain locations (as described in Table 4.6);

(iii) Average temperatures, temperature differences and correlation coefficients, at the top and bottom thermistor depths, and for the depth-averaged “intra-thermistor zone”, at all 4 thermistor-chain locations; and

(iv) Normalized, fourier-norm values of east, north and total velocities, for: the “intra-bin zone” based depth-average, and at the top and bottom ADCP bin depths; at both Maitland River vicinity ADCP deployment locations (as described in Table 3.2).

A total of 34 simulation runs were made for the sensitivity analysis / calibration of the final 3d whole-lake model, ("LHWLkPtD"). The parameters considered, along with their values, are provided in Table 4.7(a).

The relative results of the sensitivity analysis, as described in comparison type (i) above, are also provided in Table 4.7(a). These results were based on a total of 20 of the 34 simulation runs, to help confirm the basic sensitivity of the final whole-lake 3d model with respect to that observed within the "test" 3d model.

The results of the sensitivity analysis of the final 3d whole-lake model, in terms of modeled versus measured water temperatures, (i.e. a summary of comparison types (ii) and (iii) discussed above), are provided in Table 4.7(b). These results were based on a total of between 19 sensitivity simulations for the two Saugeen River offshore sites and 25 for the two Maitland River offshore sites. These simulations provided results used for both model sensitivity analysis and calibration.

The results in Table 4.7(b), generally show that the whole-lake model is relatively insensitive to the input parameter variations within the ranges selected. They also indicate that the model performed very well in simulating temperatures in the lake, throughout the 6-month field measurement period in 2003.

It was generally observed that the velocity results were more sensitive to input parameter variation than the temperature results. As such, another group of 13 sensitivity analysis runs, (generally speaking the latter grouping of the 34 total), were used to provide information for carrying-out final calibration of the whole-lake 3d model. In particular, the modeled versus measured water velocity comparison parameters from these 13 simulations were used for this purpose. Only the results from the two Maitland River offshore ADCP sites were considered for this portion of the work since it is only these two that are located within the study area of this report, (i.e. the temperature based results revealed that the final 3d whole-lake model worked reasonably well along the eastern shore of the lake, and as such, the velocity results were used to fine-tune the calibration to the actual study area as represented by the nested model).

As a general observation, it is reasonable to conclude, (and was to some degree indicated by overall consideration of the temperature based sensitivity results), that to apply the whole-lake 3d model to another nested model, located elsewhere along the eastern shore of the lake, that a slightly different set of parameter values might be required to optimize performance. For example, water temperatures and velocity patterns would be altered to some degree in the Saugeen River vicinity of the lake, since heat-flux parameters and wind conditions there would not be exactly the same as for the Maitland River vicinity of the lake, since the whole-lake model assumes uniform weather forcing functions (as part of the barotropic model assumption).

Table 4.7(a) Sensitivity analysis parameters and values considered for the final 3d whole-lake model, “LHWLkPtD”, and relative comparative results.

Parameter:	Units:	Range of value for parameter:	
		Minimum	Maximum
Vertical grid structure:			
Number of layers		10	19[2]
Water column distribution		*(see Note 1)*	*(see Note 1)*
Bottom friction: Manning’s “n”		0.0150	0.0275
Wind drag coefficient		0.0015	0.0030
Horizontal turbulence:			
Viscosity	m^2/sec	3	160
Diffusivity	m^2/sec	3	160
Vertical turbulence:			
Viscosity	m^2/sec	1.0x10-6	1.2x10-5
Diffusivity	m^2/sec	2.0x10-7	4.0x10-5
Ozmidov length scale	m	0.005	0.200
Simulation time-step size	min	2	15
Model results, on August 8, at:		Minimum	Maximum
(a) Goderich offshore ADCP: *(depth 16 m)*			
Temperature: top layer	°C	21.4	25.6
bottom layer	°C	11.2	16.9
Velocity magnitude: top layer	cm/sec	6.8	18.1
bottom layer	cm/sec	0.6	3.2
(b) 25 km offshore of Goderich: *(depth 86 m)*			
Temperature: top layer	°C	20.9	26.1
bottom layer	°C	4.4	5.4
Velocity magnitude: top layer	cm/sec	2.9	21.6
bottom layer	cm/sec	2.3	8.7
Model results, on December 31, at:		Minimum	Maximum
(a) Goderich offshore ADCP: *(depth 16 m)*			
Temperature: top layer	°C	0.1	4.8
bottom layer	°C	0.1	4.8
Velocity magnitude: top layer	cm/sec	12.1	46.7
bottom layer	cm/sec	5.6	15.2
(b) 25 km offshore of Goderich: *(depth 86 m)*			
Temperature: top layer	°C	5.7	6.8
bottom layer	°C	5.7	6.8
Velocity magnitude: top layer	cm/sec	8.3	17.4
bottom layer	cm/sec	3.3	5.3

Note 1: 4 options were considered for the 10 layer simulations, 1 for the 19 layer simulations. The % of water-column depth in the layers, from surface to bottom, are:
“a” : 2, 4, 8, 16, 20, 20, 16, 8, 4, 2 … (for the 10-layer grid)
“d” : 10, 10, 10, 10, 10, 10, 10, 10, 10, 10 ...(for the 10-layer grid)
“e” : 4, 8, 10, 12, 16, 16, 12, 10, 8, 4 ...(for the 10-layer grid)
“g” : 4, 5, 5, 5, 6, 10, 20, 25, 15, 5 ...(for the 10-layer grid)
“f” : 2.27, 2.27, 2.27, 2.27, 2.27, 2.27, 2.27, 2.27, 2.27, 2.27,
4.54, 6.81, 9.08, 11.35, 13.62, 11.35, 9.08, 6.81, 4.66 …(for the 19-layer grid)
Note 2: The water column distribution used for the 19-layer grid, (i.e. option “f”), was the same as used in Lake Michigan modeling work by GLERL, (using the 3d Princeton Ocean Model).

Note 3: The “k-ε” vertical turbulence sub-model option was the only one used.

Note 4: The “simulation performance, “CPU_P “, (as defined in Equation 3.2), of the computer used to run the simulations, ranged between $1.1x10^{-5}$ and $1.5x10^{-5}$ (seconds per layer-grid point per time-step). This is approximately 25 to 45 % faster than the initially assumed value provided with the Delft3d documentation.

Table 4.7(b) Modeled versus measured water temperature results from the sensitivity analysis of the final 3d whole-lake model, “LHWLkPtD”.

Modeled versus Measured Comparison Parameter:	Location of comparison within the:		Range in values of Comparison Parameter:	
	water column:	Lake:	Minimum	Maximum
Average temperature difference, *(magnitude of average difference in ^{o}C, for the entire measurement period of May14 or 15 to Nov. 27)*	Surface thermistor depth	Maitland – Offshore	0.0	1.7
		Maitland – Nearshore	0.0	1.9
		Saugeen – Offshore	0.1	2.4
		Saugeen – Nearshore	0.2	1.7
	Bottom thermistor depth	Maitland – Offshore	0.1	2.5
		Maitland – Nearshore	0.1	1.5
		Saugeen – Offshore	1.2	2.2
		Saugeen – Nearshore	0.0	1.0
	Depth-averaged (intra-thermistor)	Maitland – Offshore	0.0	1.7
		Maitland – Nearshore	0.0	1.7
		Saugeen – Offshore	0.0	0.9
		Saugeen – Nearshore	0.1	1.3
Correlation coefficient *(for the entire measurement period of May14 or 15 to Nov. 27)*	Surface thermistor depth	Maitland – Offshore	0.869	0.968
		Maitland – Nearshore	0.875	0.936
		Saugeen – Offshore	0.570	0.730
		Saugeen – Nearshore	0.838	0.944
	Bottom thermistor depth	Maitland – Offshore	0.739	0.894
		Maitland – Nearshore	0.855	0.922
		Saugeen – Offshore	0.779	0.889
		Saugeen – Nearshore	0.838	0.926
	Depth-averaged (intra-thermistor)	Maitland – Offshore	0.853	0.955
		Maitland – Nearshore	0.875	0.931
		Saugeen – Offshore	0.872	0.966
		Saugeen – Nearshore	0.840	0.942
Note: The total number of comparison time-series points for each simulation is: 9,421 , 9,418 , 9,451 , and 9,447 ; for the Maitland-Offshore, Maitland-Nearshore, Saugeen-Offshore, and Saugeen-Nearshore stations, respectively, (see Table 4.6).				

Table 4.7(c) provides a summary of the sensitivity analysis results of the final 3d whole-lake model, in terms of modeled versus measured water velocities, as discussed in comparison type (iv) previously. These results are based on the group of 13 simulations.

4.4.4 Final model parameter values for the 3d models:

The final set of input parameters for use with the whole-lake 3d model, were selected based on the results of the sensitivity analysis and calibration as discussed in Section 4.4.3. These are provided in Table 4.8.

Table 4.7(c) Modeled versus measured water velocity results from the sensitivity analysis of the final 3d whole-lake model, “LHWLkPtD”.

Modeled versus Measured Fourier-norm[1] of:	Location of comparison within the:		Range in values of Comparison Parameter:	
	water column:	Lake:	Minimum	Maximum
Alongshore component of velocity-vector	Surface ADCP-bin depth	Maitland – Offshore	0.786	1.185
		Maitland – Nearshore	0.676	0.872
	Bottom ADCP-bin depth	Maitland – Offshore	0.711	1.415
		Maitland – Nearshore	0.756	1.156
	Depth-averaged (ADCP intra-bin)	Maitland – Offshore	0.696	1.209
		Maitland – Nearshore	0.682	0.930
Total velocity vector	Surface ADCP-bin depth	Maitland – Offshore	0.818	1.173
		Maitland – Nearshore	0.707	0.893
	Bottom ADCP-bin depth	Maitland – Offshore	0.760	1.361
		Maitland – Nearshore	0.803	1.135
	Depth-averaged (ADCP intra-bin)	Maitland – Offshore	0.713	1.206
		Maitland – Nearshore	0.707	0.941

(1) All Fourier-norm values are normalized based on the ADCP-measured value. The number of comparison time-series points is: 9,353 and 9,355 for the Offshore and Nearshore stations, respectively, (see Table 3.2).

Parameter adjustments for the nested 3d model:

The actual vertical structure of the grid for the nested model is required to be identical to that of the whole-lake model, to accommodate the various nested algorithms of Delft3d. Most of the selected whole-lake parameter values are also directly applicable to the nested model.

Owing to the large degree of insensitivity of the models to changes in input parameters, there was no justification for carrying-out additional sensitivity analysis on the nested model, particularly for the vertical turbulence parameters. However, some changes were made to improve simulation results from the nested model. These involved adjustments to the horizontal turbulence parameters and simulation time-step size.

For lake models, the horizontal turbulence parameters are usually more a function of the length-scale of the phenomenon being study, as opposed to mean current flow characteristics. In this case, the typical size of the model’s grid becomes the significant length-scale, in terms of how this turbulence affects the simulated results. As such, the horizontal turbulence used for the nested model, was based upon the ratio of typical cell dimensions within the nested and whole-lake models, as follows:

$$e_n = (L_n / L_w)^{\Phi} \qquad \ldots 4.2$$

where: e = horizontal turbulence parameter,
L = typical model grid dimension,
n, w = reference to the nested and whole-lake grids, respectively, and
Φ = scale factor.

The value used for scale factor, Φ, was 1.33 based upon the commonly used 4/3 power law used for scaling horizontal turbulence in lakes, (U.S. EPA, 1985).

The nested model uses significantly smaller grid cell sizes by design, to provide better spatial resolution. However, a downside to this advantage is that a greatly reduced amount of time is required for typical advective flow to pass through these cells. The Delft3d documentation provides approximately 5 key time-step limitation criterion for 3d applications, which are based upon the accuracy of the numerical integration scheme. It was found that by using an approximate maximum time-step size of 1 minute that satisfactory numerical integration performance would still be assured. Also, a 1 minute time-step represented a practical minimum value, to make sure that integer-multiples of the simulation time step, (as required to save model results), could be set equal to the times associated with field measurements, (e.g. by using a 1 minute time-step, the actual time associated with every 30th simulated result would correspond precisely to a measured value from both the ADCP and themistors, since they recorded at 30-minute intervals).

Open boundary configuration for the nested 3d model:

The configuration used to prescribe the value of the simulation parameters, (i.e. the 3d current velocities, temperature and water quality concentrations), at the three open boundaries of the nested model is important to accurately allow the simulation of lake-wide influences within the nested model domain. It was therefore necessary to test the performance of the nested model under various whole-lake model nesting configurations.

The 3d nested model used the same horizontal configuration as used by the 2d nested model. As such, the same horizontal open boundary segmentation scheme, (as detailed in Table 3.8), is used again for the nested 3d model. This time however, 10 layers exist along all open boundaries instead of just 1 (fully-mixed) layer.

A total of three basic open boundary configurations were tested. These are described in terms of what type of flow control (i.e. used to describe flow into and out of the nested model) is used in deriving the open boundary conditions. The cases considered include:

(1) water elevation control, at all open boundaries;

(2) current velocity control along the north and south open boundaries, and water elevation control along the west open boundary; and

(3) alternating water elevation and current velocity controls, (i.e. from segment to segment within each of the 3 open boundaries).

The ability of the nested 3d model to replicate water temperature and current velocity measurements at the two monitoring sites within the nested model's domain, (i.e. the Maitland offshore and nearshore sites), were used as the criteria to select the appropriate open boundary configuration. It was found that the simulated temperatures from all 3 configurations were quite consistent, (e.g. all three cases provided simulated temperatures with average annual temperature difference magnitudes of less than 0.5 oC from those measured, and with correlation coefficients of over 0.91).

In terms of simulated current velocities, Cases 2 and 3 provided lower normalized Fourier-norm values, particularly at the offshore site, with Case 2 being slightly better than Case 3.

The open boundary configuration of Case 2 was therefore selected, for deriving the hydrodynamic boundary conditions for the 3d nested model. For the water quality parameters, a 3d profile was assumed. This means simply that the values for each layer are directly taken from the whole-lake 3d model's simulated value in the corresponding vertical layer, (i.e. no vertical distribution curve-fitting assumptions were made to simplify the overall process).

These open boundary conditions for the 3d nested model are derived at the same frequency at which the simulated monitoring stations in the whole-lake 3d model were recorded. The frequency used in this case was once every hour, for the entire year. This made for very large open boundary input files for the 3d nested model simulations.

4.4.5 Comparison of modeled and measured results for water temperatures and velocities

The comparison of water temperatures and velocities modeled by the 3d nested model with those measured, utilized the same procedures and tools as outlined for the 3d whole lake model in Section 4.4.2. These procedures and tools were used to quantify the ability of the two final 3d models (i.e. whole-lake and nested) to simulate measured conditions. A summary of these results are listed in Table 4.9.

Table 4.8 The final set of input parameters selected for use with the whole-lake and nested 3d models.

Parameter:	Units:	Value used for 3d model:	
		Whole-lake	Nested
Vertical grid structure:			
Number of layers		10	10
Water column distribution		*“e”*[1]	*“e”*[2]
Bottom friction: Manning’s “n”		0.0250	0.0250
Wind drag coefficient		0.0020	0.0020
Horizontal turbulence:			
Viscosity	m^2/sec	4	0.1
Diffusivity	m^2/sec	4	0.1
Vertical turbulence:			
Viscosity	m^2/sec	4.0x10-6	4.0x10-6
Diffusivity	m^2/sec	8.0x10-7	8.0x10-7
Ozmidov length scale	m	0.010	0.010
Simulation time-step size	min	5	1

Note 1: The % of water-column depth in the layers, from surface to bottom, for configuration “e” are: 4, 8, 10, 12, 16, 16, 12, 10, 8, 4 .

Note 2: Delft3d requires the whole-lake and nested models to have the identical vertical layering structure.

Note 3: The “k-ε” vertical turbulence sub-model option was the only one used.

Note 4: The “simulation performance, “CPU_P“, (as defined in Equation 3.2), of the computer used to run the simulations, ranged between $1.1x10^{-5}$ and $1.5x10^{-5}$ (seconds per layer-grid point per time-step). This is approximately 25 to 45 % faster than the initially assumed value provided with the Delft3d documentation.

These comparison results are provided visually through a series of figures as follows:

(i) three water temperature related, namely: intra-thermistor bin depth-averaged, at the top thermistor depth and at the bottom thermistor depth; for the Maitland Offshore station; in Figures 4.4(a), 4.4(b) and 4.4(c); respectively;

(ii) the same three water temperatures at the Maitland Nearshore station in Figures 4.5(a), 4.5(b) and 4.5(c), respectively;

(iii) three alongshore water velocities, namely: intra-ADCP bin depth averaged, at the top ADCP bin depth and at the bottom ADCP bin depth; for the Maitland Offshore station; in Figures 4.6(a), 4.6(b) and 4.6(c); respectively; and

(iv) the same three alongshore water velocities for the Maitland Nearshore station in Figures 4.7(a), 4.7(b) and 4.7(c), respectively.

Table 4.9 Comparison of simulated results, (from the “final” 3d models), versus those measured.

Modeled versus Measured Comparison[1] Parameter:	Location of comparison point within the:		3d Model:	
	water column:	lake:	Whole-lake	Nested
(i) Water Temperature:				
Average temperature difference, *(modeled-measured; °C)*	Surface thermistor depth	Maitland – Offshore	-0.3	-0.5
		Maitland – Nearshore	-0.6	-0.5
	Bottom thermistor depth	Maitland – Offshore	1.2	0.2
		Maitland – Nearshore	-0.2	-0.3
	Depth-averaged (intra-thermistor)	Maitland – Offshore	0.2	-0.4
		Maitland – Nearshore	-0.4	-0.4
Correlation coefficient for temperature	Surface thermistor depth	Maitland – Offshore	0.917	0.927
		Maitland – Nearshore	0.892	0.911
	Bottom thermistor depth	Maitland – Offshore	0.884	0.869
		Maitland – Nearshore	0.876	0.903
	Depth-averaged (intra-thermistor)	Maitland – Offshore	0.933	0.928
		Maitland – Nearshore	0.891	0.913
(ii) Water Velocity:				
Fourier-norm of the Alongshore component of the velocity-vector	Surface ADCP-bin depth	Maitland – Offshore	0.808	0.829
		Maitland – Nearshore	0.684	0.796
	Bottom ADCP-bin depth	Maitland – Offshore	0.750	0.790
		Maitland – Nearshore	0.773	0.998
	Depth-averaged (ADCP intra-bin)	Maitland – Offshore	0.730	0.760
		Maitland – Nearshore	0.687	0.830
Fourier-norm of the Total velocity vector	Surface ADCP-bin depth	Maitland – Offshore	0.839	0.876
		Maitland – Nearshore	0.715	0.846
	Bottom ADCP-bin depth	Maitland – Offshore	0.790	0.848
		Maitland – Nearshore	0.807	0.983
	Depth-averaged (ADCP intra-bin)	Maitland – Offshore	0.746	0.781
		Maitland – Nearshore	0.712	0.850

Notes:

1. *The time-period of comparison is the entire field season in 2003. The number of time-series comparison points for: water temperature at the Maitland Offshore & Nearshore stations; is: 9,421 and 9,418; respectively, (see Table 4.6 for details). The number of time-series comparison points for: water velocity the Maitland Offshore & Nearshore stations; is: 9,353 and 9,355; respectively, (see Table 3.2 for details).*
2. *All Fourier-norm values are normalized based on the ADCP-measured value.*

4.5 Check of modeled water levels

In a similar fashion as described in Section 3.11 for the 2d model, the water level simulated by the 3d model is compared with that measured at Harbor Beach and De Tour Village, Michigan. The results are shown in Figures 4.8(a) and 4.8(b).

The modeled results generally show good consistency with both the measured hourly values and with the GLERL-AHPS hydrologic budgeted values. Overall, the correlation coefficient for the fit is: 0.84 and 0.80; for Harbor Beach and De Tour Village, respectively.

Interestingly, the average simulated water levels at these two Michigan locations (along the West and North-West sides of the lake), average about 2 cm lower for the 3-d simulation, than for the 2-d simulation. It is likely that the 3-d simulation tends to provide a better replication of water surface tilting, which owing to predominant wind directions, results typically in slightly lower levels along the sides of the lake represented by the two Michigan stations.

5. Application of 3D modeling to examine impacts during 2003

One of the main purposes of application of the 3D model, as discussed in Section 1, is to extend the utility of various data collected via the "Great Lakes Nearshore Monitoring and Assessment" (GLMNA) program. To help demonstrate this capability, results of the model simulations were evaluated for selected events during 2003. The events selected included chronologically:

(i) the annual spring runoff event, between March 17 and April 6;

(ii) a large lake upwelling event only, (with no simultaneous significant Maitland River runoff event), between July 20 and 30;

(iii) a combined large lake upwelling and Maitland River runoff event between August 2 and 15; and

(iv) a late autumn Maitland River runoff event, between November 12 and 28.

To assist with the interpretation of simulated results, some of the river, lake and wind characteristics as measured and / or estimated during these 4 events are provided in Table 5.1. Some details to assist with the characterization of the 4 events as provided in the table follow:

- The average measured wind speed, (i.e. magnitude only), provides an indication of the relative energy that was being applied to the lake, in the generation of currents, at the time of the episodes, (from wind friction). As can be seen, the wind speeds were approximately the same during the spring and autumn runoff events, which were about double that during the August runoff event and 50% larger than that during the July upwelling event.

- The lake background parameter values were measured / modeled at the offshore Maitland ADCP station, about 6.5 km from shore. A value at both the surface and bottom are provided, (as located approximately 2 and 98 % of the water column depth, respectively). This corresponds to water depths of about 0.3 and 15.7 m, (in the 16 m deep location). As can be seen, the water column was stratified during the 2 summer events, (based on temperature, and to a lesser extent, NO2+NO3. Conductivity appears to be more consistent year round at this location. The difference between NO2+NO3 and conductivity is likely due to the relative magnitude of loadings from the Maitland (and other) River(s), as compared with lake background quantities.
- The Maitland River flow-rate during the July event likely tends to represent summer base-flow (i.e. largely groundwater) conditions. It can be seen that the relative magnitudes of the storm runoff event was approximately: 3, 10 and 20 times larger, for the August, November and March-April event, respectively. This is obviously an important factor for ranking the potential impacts of these events upon the Lake Huron near shore.
- The parameter loadings, represent the total "amount" of each parameter that entered the lake (from the Maitland River) during the event. These were obtained by simply multiplying the average parameter level within the Maitland River's water during the entire event, by the total amount of water discharged by the Maitland River during the event. The values for temperature are based on net temperature, (i.e. River water temperature – Lake background water temperature). As can be seen, the relative size of the 4 events, in terms of total loading of conductivity and NO2+NO3, is quite different. Again, if the July event, with the smallest total loading, is used as the base case, then the size of the loading associated with the August, November and March-April event, is about: 5, 20 and 39 times larger, based on conductivity, respectively; and about: 9, 73, 157 times larger, based on NO2+NO3, respectively.
- The impact upon the near-shore is a simple "yardstick" calculation, which treats the entire near shore volume within 4 km of the mouth of the Maitland River as a "mixed tank". (This "tank" represents a rectangle of the near shore portion of the lake within 4 kilometres to the North and South of the river mouth and 4 kilometres offshore (i.e. to the West of the Maitland River mouth). It is assumed that the total runoff water volume during the event, displaces lake background water volume within this "tank". The relative size of this displacement is given by the first row in this table section. For example, the amount of water entering the lake during the spring runoff event virtually matches the estimated near shore lake volume (within 4 km of the Maitland River mouth) of about 280 million m^3. The last 4 rows in the table provide the expected increase of parameter levels, (i.e. above initial lake background levels), assuming that the final near shore "tank" volume is well-mixed.

Table 5.1 River and lake conditions during the 4 simulated events in 2003.

		Event 1 **(Spring runoff)**	**Event 2** **(Summer upwelling – no runoff)**	**Event 3** **(Summer upwelling – with runoff)**	**Event 4** **(Autumn runoff)**
Starting / ending dates		Mar. 17 / Apr. 6	July 20 / 30	August 2 / 15	Nov. 12 / 28
Ave. wind speed (kph):		23.3	16.4	11.4	23.0
Lake background (at start):					
Temperature (^{o}C) :	*Surface*	1.0	21.6	21.4	9.7
	Bottom	1.0	12.8	14.7	9.7
Conductivity (umho / cm2)	*Surface*	203	201	200	200
	Bottom	203	201	201	200
NO_2+NO_3 (ug / L as N)	*Surface*	302	352	330	321
	Bottom	302	325	324	321
E. coli (CFU / 100mL)	*Surface*	1	n.a.	n.a.	n.a.
	Bottom	1	n.a.	n.a.	n.a.
Maitland River: (a) Flow					
Average for event (m^3 / s)		162.	8.0	24.9	77.6
MAX daily-ave flow (m^3 / s)		335.	11.0	46.4	143.
TOTAL volume released (m^3)		280. x 10^6	6.87 x 10^6	27.9 x 10^6	107. x 10^6
(b) Parameter level		*Event ave. / max.*	*Event ave. / max.*	*Event ave. / max.*	*Event ave. / max.*
Temperature (^{o}C)		3.0 / 6	25 / 25	27 / 27	6 / 6
Conductivity (umho / cm^2)		478 / 531	479 / 495	528 / 568	592 / 633
NO_2+NO_3 (ug / L as N)		7,830. / 8,620.	2,060. / 2,550.	4,170. / 6,430.	8,790. / 13,300.
E. coli (CFU / 100mL)		63.5 / 240	n.a.	n.a.	n.a.
(c) Parameter Loading, Total:					
ΔTemp. {river – lake} (^{o}C * m^3)		185. x 10^6	51.4 x 10^6	333. x 10^6	-236. x 10^6
Conductivity ((umho / cm^2) * m^3)		12.9 x 10^{10}	0.331 x 10^{10}	1.51 x 10^{10}	6.46 x 10^{10}
NO_2+NO_3 (tonnes as N)		2,290.	14.6	136.	1,060.
E. coli (CFU)		2.07 x 10^{14}	n.a.	n.a.	n.a.
(d) Impact upon near-shore:					
% (Total river release volume / lake near-shore volume)		100.	2.46	9.97	38.3
Δ temperature (^{o}C)		0.66	0.18	1.19	-0.84
Δ conductivity (umho / cm^2)		461.	11.8	54.1	231.
Δ NO_2+NO_3 (ug / L as N)		8,180.	52.3	487.	3,780.
Δ E. coli (CFU /100mL)		74	n.a.	n.a.	n.a.

Notes:

1. *Lake background is based on est. conditions at the "offshore ADCP station", (located about 6.5 km from shore).*
2. *Parameter loadings are the product of ave. parameter levels and the total released volume of Maitland River water.*
3. *The impact upon the near-shore is a simple "yardstick" calculation based on the lake volume within 4 km of the river.*
4. *The Δ parameter impacts, are derived using a mass-balance equation, assuming that the portion of the initial "near-shore lake volume" is displaced with the volume of water released from the Maitland River during the event.*

- It was assumed that there was no exchange of the 4 km near shore volume, with any of the other water in the lake, (i.e. with lake water beyond 4 km from the Maitland River). As such, the ratio of: differences between the Table 5.1 increase values with those actually simulated by the model; will provide an approximate estimate of the larger scale (i.e. beyond 4 km) near-shore dilution during the event.

The model results for the 4 scenarios are assessed in two general modes, namely: spatially and temporally. The spatial assessment involves the derivation of simulated impacts throughout the Maitland nearshore study area (i.e. as represented by the nested 3d model), at selected times during each of the four event interval periods. As such, these results represent "snap-shots" of conditions, which as a group, help to delineate the extent of impacts as well as various lake phenomena which occurred during these events.

The temporal assessment involves analyses of the impact time series at selected points of interest within the study area. The results of these analyses provide an indication of the magnitude and length of impacts, which in turn can be useful for providing an overview of the nature of the influence of the Maitland River upon various water uses within the study area.

5.1 Spatial impacts from the selected 2003 events

As discussed previously, 10 vertical layers were used to represent the water column throughout the nested model grid of the study area. While it is possible to produce 3-dimensional plots for all spatial impact results, their utilitarian value is somewhat limited since it is difficult to discern impact details, (in terms of showing variations with depth in conjunction with precise lateral / vertical locations). As such the following presentation format is used for providing the spatial results:

(i) For current velocity: two plan-views showing velocities within the surface and near bottom layers only. (These correspond to Layers 1 and 8, with vertical centres located 2 and 83 %, respectively, from the water surface). Further, to make it easier to discern these results, the velocities are displayed using uniform arrows to describe direction, (i.e. the arrows point the direction of the current movement, but are all of equal length, regardless of current speed), and colour contours to represent the magnitude of the velocity, (i.e. the water speed). A single figure with two side-by-side plots is used to show the surface and near bottom velocities for each time "snap-shot" of every event. Between these 2 plots is a small rectangular box within which, the hourly-wind velocity at the same time is provided. (Note that similarly to the water current directions, the arrow used for the wind velocity represents the direction that the wind is moving towards) ;

(ii) For temperature and water quality parameters: a plan-view showing levels in the surface layer within the entire study area, along with a series of 6 cross-sections. These cross-sections show the vertical depth of conditions at distances of approximately: 400 m and 1.2 km from shore (as measured from the mouth of the Maitland River), along the North-South extent of the area; as well as 1 and 3 km to the North and South of the mouth of the river, across the East-West extent of the area. As such, each figure provides a "snap-shot" of conditions at relative "near" and "far" distances from the mouth of the Maitland River in both horizontal dimensions.

The water quality parameters simulated include: conductivity and NO2+NO3 for all 4 events, plus E. coli for the spring runoff event only.

For both formats described above, the results are presented for the lake zone region within about 4 kilometres of the mouth of the Maitland River. This is a somewhat arbitrary value, however this scale tends to be small enough to reveal sufficient detail on the influence that harbour structures have upon the discharged Maitland River flow as it enters the lake. Conversely this scale is large enough to provide some useful information regarding the behaviour of lake flow within the near shore zone under different wind and seasonal conditions. This 4 kilometre distance also corresponds to the near shore "mixed tank" used in the Table 5.1 impact calculations, meaning that the 'average' result from any given parameter level figure can be directly compared with the corresponding "yardstick" calculated estimate as provided in Table 5.1.

Using these presentation formats a large number of figures were produced. For easier reference, they have been placed within figure-series, (corresponding to event and parameter type), within Appendix I. The nomenclature used to identify the figure-series is provided at the beginning of each event in Appendix I. The actual results contained within the figure-series are discussed in the remainder of this chapter.

5.1.1 Spring runoff event

Based on the daily-average discharge from the Maitland River (see Figure 3.5), the bulk of the spring runoff event during 2003 occurred over 21 days between March 17 and April 6. As shown in Table 5.1, the total runoff volume during this event was much larger than those associated with the other events in 2003. The discharge rate from the Maitland River peaked at about 335 m^3/s on March 22, and averaged about 162 m^3/s for the entire event time period. In fact, it is estimated that the total amount of water discharged from the Maitland River during this event, was equal in size to the entire nearshore volume of the lake within 4 km of the Maitland River mouth.

In terms of water quality parameters, the loading functions used in deriving Equations 3.4 and 3.5 for conductivity and NO_2+NO_3, respectively, were not derived for spring conditions and as such were not used. However, there were a total of 5 samples collected during the spring runoff event period, (on March 18, 20, 24, 27 and 31), as well as another on April 15. These measured levels were used to describe conductivity, NO_2+NO_3 and E. coli as discharged from the Maitland River into the lake, (with the assumption of a simple linear variation in between the sample dates themselves). There were no water temperatures measured within the Maitland River during spring runoff. As such, the numbers previously estimated as listed in Table 4.2 were used.

A total of 11 “snap-shots” of spatial results were produced for each of the water parameters described above, at 2 day intervals starting at 00:00 hours on March 17, running to 00:00 hrs on April 6.

Water velocities:

Figure 5.1U(a) to 5.1U(k) provides the results for simulated current velocities for the spring runoff event. The results show the effects of a wide variety of wind conditions upon the interaction of the Maitland River’s discharge with the flow in the lake. It should be noted however, that the wind shown in each figure is an instantaneous (hourly) wind condition at the same time as the simulated water current velocity. As such, since there may be significant systemic-weather transitions underway, the resulting lake currents will not always coincide to the measured wind velocity at a given time. For example, there appears to have been a significant transition in wind velocity underway on April 2, (see Fig 5.1U(i)). This effect tends to be more noticeable during periods of weaker wind conditions, when the velocity field in the lake is still reflecting the integrating effects of previously stronger winds over the past few days.

There are clear examples of relatively strong alongshore currents towards the South and North resulting from strong winds from the North and South on March 19 and 29, respectively, (i.e. see Figures 5.1U(b) and 5.1U(g)). Similarly, the effects of relatively strong offshore winds, (i.e. from the East), are shown in Figure 5.1U(c).

As a general observation, it is clear that larger alongshore current speeds are generated under stronger Northerly and Southerly winds as compared with stronger onshore winds. A significantly greater proportion of the transferred wind energy is dissipated during wave breaking and / or vertical turbulence during onshore wind conditions.

Water temperatures:

The results provided in Figures 5.1T(a) through 5.1T(k), provides the snap-shot of water temperatures simulated at the same 11 times throughout the runoff period. These results are more qualitative in nature, since only estimated Maitland River water temperatures were used. Also, the difference between assumed river water temperature and simulated lake water temperature typically would not have varied by more than about 2 degrees C. Under these conditions, the results for any given day generally show a vertically well-mixed river plume with little temperature variation with respect to the lake ambient condition on that day. During the 21 day time period, there is a slight warming trend of about 2 degrees C that occurs within the lake (owing largely to a net energy flux from the atmosphere into the lake during this spring time period).

Conductivity and NO_2+NO_3:

The Maitland River plume during the large spring runoff event is well delineated by conductivity and NO_2+NO_3, as shown in Figure series 5.1C and 5.1N, respectively. For example, the influence of strong Northerly winds (pushing along shore currents towards the South is shown in Figures 5.1C(b) and 5.1N(b). Likewise, the influence of strong Southerly winds (pushing along shore currents towards the North is shown in Figures 5.1C(g) and 5.1N(g). The effects of a relatively strong offshore wind, in pushing the plume further offshore, is shown in Figures 5.1C(c) and 5.1N(c). This offshore effect is also shown to a lesser extent on March 27, (see Figures 5.1C(f) and 5.1N(f)).

A couple of other interesting observations are seen:

(i) on March 23, even though surface currents are coming in towards shore, a secondary circulation pattern appears to develop moving the Maitland River plume further offshore that otherwise would be expected, (see Figures 5.1U/C/N(d)); and

(ii) on and after March 31, the larger scale effects from the large quantity of NO_2+NO_3 discharged during the peak period of the runoff event, begins to show up as localized alongshore lake background concentrations, (i.e. as shown in Figures 5.1N(h) through 5.1N(k)). Essentially, the back-and-forth alongshore currents have brought back larger amounts of previously discharged NO_2+NO_3 into the 4 km Maitland River area, as reflected in larger zones of impact at somewhat lower concentrations in the further offshore regions. This is worth noting, since if one was to monitor the Maitland River plume during this time period, its zone of direct effect would tend to be over-stated, thus making it more difficult to directly correlate measured river concentrations with those throughout the lake.

The large quantity of NO_2+NO_3 discharged from the Maitland River during the spring runoff event, (estimated at around 2,300 tonnes), results in significant water volumes within the lake where concentrations exceed the 2,940 ug/L CCME guideline. These volumes are delineated by the yellow, orange and red colors in the Figure Series 5.1N. The red color is equal to or greater than 2 times the guideline. Essentially, this occurs from March 19 through the end of the simulated event on April 6. On both of these dates, the guideline is exceeded within a strip of approximately 500 m width from shore, extending beyond 4 km to the south of the Maitland River mouth. In between these dates, the exceedence occurs within extended and variable zones to the North, South and offshore from the river mouth, depending upon wind conditions (as discussed previously). It peaks in the March 23 to 25 time period with concentrations typically 50 to over 100 % greater than the guideline in a wide strip from shore of about 1 to 1.5 km, extending more than 4 km to the North of the mouth of the river.

Conductivity while showing generally similar plume patterns as NO_2+NO_3, have peak levels relatively smaller, ranging only up to approximately 2 times the lake background value.

E. coli:

As discussed previously, E. coli could only be simulated during the spring event when a total of 6 samples within the Maitland River were measured, with a peak value of 240 CFU/100ml obtained on March 18 just after the start of the runoff event, and a much smaller level of around 60 CFU/100ml on March 24 near the end of the peak portion of the runoff event. This large drop-off is unique to E. coli when compared with conductivity and NO_2+NO_3.

Two cases were considered for E. coli. The first assumed no deactivation of the E. coli at any time after it entered the lake, (i.e. “conservative” behaviour). The second case assumes an equivalent first-order deactivation rate of 1/day. This value should be considered as very approximate, and is derived from a range found applicable via the modeling of E. coli within southern Lake Michigan, as obtained from Liu, et al., (2006). This value results in an equivalent half-life of around 17 hours.

The series of results for E. coli under the no deactivation (i.e. “conservative”) assumption are provided in Figures 5.1E0(a) through 5.1E0(k). To a certain extent, the general plume pattern for E. coli is similar to that of conductivity and NO_2+NO_3. However, owing to the E. coli loading function described above, there tends to be a greater impact earlier on within the event, and lesser later on. This becomes noticeable on and after March 29 when only low levels of active E. coli are simulated. On April 4 and 6, low level remnants of the earlier portion of the E. coli plume which had moved North of the figure area, re-enters the area owing to Southerly alongshore currents, (see Figures 5.1E0(j) and 5.1E0(k)). This is similar to the pattern for conductivity and NO_2+NO_3 discussed earlier. Interestingly, the very low levels of E. coli entering the lake from the Maitland River on these dates actually creates a 'clean water plume' along the shore to the South of the river mouth, as shown in the two figures.

Locations where the 100 CFU/100mL criterion are exceeded, are indicated with the four colors of: bright lime-green, yellow, orange and red. Again, owing to the shift in E. coli 'loading' (i.e. entering earlier on within the overall runoff time period), there are only 2 figures which reveal exceedences of the criterion. These occur on March 19 and 21, as shown in Figures 5.1E0(b) and 5.1E0(c), respectively. On March 19, the exceedence area exceeds beyond 4 km to the South, within approximately 500 m of shore. On March 21, owing to offshore winds and currents, the exceedence area is pushed offshore, and is approximately 500 m to 1 km wide. It extends to a maximum of about 2 km from the river mouth.

The results for Case 2, which assumes a deactivation rate of 1/day (or an equivalent half-life of about 17 hours), are shown in Figures 5.1E1(a) through 5.1E1(k). By comparing the two cases, it becomes apparent that E. coli levels are significantly reduced when deactivation is considered. The zone where the criterion are exceeded on March 19 and 21 becomes much shorter and narrower when deactivation is included, (compare Figures 5.1E1(b) and 5.1E1(c) with Figures 5.1E0(b) and 5.1E0(c), respectively).

5.1.2 Upwelling event in July

As shown in Table 5.1 and discussed in detail previously in this chapter, the July event essentially represents the opposite extreme from the spring runoff case, in two principle ways: first, the Maitland River runoff was extremely low, (averaging only 8 m^3/s, which is about 20 times lower than for the spring event, and which likely represents only the summer-time base flow condition in 2003); and secondly, the lake's water column was stratified.

A total of 11 "snap-shots" of spatial results were produced for each of the water parameters at 1 day intervals starting at 00:00 hours on July 20, running to 00:00 hrs on July 30. The main reason that these dates were selected is that a significant upwelling event, (one of two for the summer of 2003), occurs within this time period. Specifically, within this time frame, the nearshore of the lake along the Goderich shoreline experienced a significant downwelling, followed by a significant upwelling, followed by at least a partial recovery to ‘normal’ stratified water column conditions. Further as it turns out, the model did an excellent job in simulating the current and temperature regime during this overall event, (see Figure (series) 4.5 and 4.7, respectively).

Water velocities and temperatures:

The downwelling/upwelling cycle is best demonstrated by evaluating the velocity and temperature figure series together.

Downwelling: During the initial 2 days of the event coverage, (on July 20 and 21), a South to Southwest wind generates general North to North-Northeast moving surface currents within the study area. When currents move in this direction, a downwelling event can occur, and indeed does on July 20 and 21. This downwelling, is described in more detail as follows: owing to general Coriolis (earth-rotation) effects, the surface currents moving in the Northerly direction tend to curve Eastward. This in turn, increases water surface elevation in this nearshore area which creates a vertical, downward movement of water, particularly within a couple of kilometers of shore. As the water moves downwards, it starts to move with a slight Westward trajectory, (although still possessing a strong Northerly component owing to the Northward moving alongshore current). If looking at a cross-section of the water-column facing Northward, a slight clockwise “spiral” would be observed. This is shown in part by comparing the surface and near bottom currents in Figures 5.2U(a) and 5.2U(b).

Before the downwelling event began, the water column of the lake possessed a classical temperature stratified structure. In this case, with temperatures in the upper portion and lower portion of the water column being around 21 and 15 degrees, respectively, about 2 kilometres offshore. The downwelling, as described above, draws the warmer surface water near the shore down into the deeper portion of the water column, then pushes it offshore, (as it follows the “spiral” pattern described above. As the warmer water near the bottom pushes further offshore, it will tend to generate vertical mixing particularly when colder waters higher in the water column are encountered, (owing to non-stable, buoyancy induced conditions). As such, the water column will tend to become well mixed vertically within the nearshore area. The effect of this downwelling is clearly seen by comparing Figures 5.2T(a) and 5.2T(b).

Upwelling: On July 22 through 24, strong North-Northeast to North-Northwest winds, generate relatively strong alongshore currents towards the South. In a manner essentially opposite to downwelling described above, during upwelling: the surface currents moving Southward tend to curve Westward, owing to the Coriolis effect. A higher water elevation further offshore then tends to push deeper waters towards shore. Thus, although all currents are moving Southward, those near the surface tend to have a Westerly component with those near the bottom tending to have an Easterly component. In a similar, but opposite manner to downwelling, during upwelling this current structure sets up a vertical “spiral” effect within the nearshore, this time drawing up deeper water from the bottom within a couple of kilometers of shore. (This time, a cross-section of the water column near shore looking Northward, would reveal a counter-clockwise “spiral” rotation. Portions of this “spiral” effect are shown in Figures 5.2U(c), (d) and (e).

The effects of this upwelling episode are more dramatically observed in the temperature figures. Figures 5.2T(c), (d) and (e) clearly show colder water drawn shoreward near the bottom of the water column, warmer water near the surface moved offshore, and a general significant increase in vertical mixing owing again to non-stable buoyancy effects, as inversions of colder/warmer waters occur during the overall process, particularly in the nearshore regions.

Downwelling: As shown in Figures 5.2U(g) and (h), and Figures 5.2T(g) and (h), a second downwelling event during July 26 and 27, appears to draw warmer surface water from further offshore within the lake, into the study area and move it downwards into the water column near the shore.

Recovery: During the last couple days of the event period, (July 29 and 30), it appears that larger lake basin-wide factors appear to create a partial ‘recovery’ of normalized water column temperature structures. However, it is clear that the overall effects of the downwelling and upwelling have left the nearshore area of the lake with a much weaker stratified water-column, as indicated by a greater reduced temperature differential from top to bottom, (compare Figures 5.2T(k) with 5.2T(a)).

Conductivity and NO_2+NO_3*:*

The loading of conductivity and NO2+NO3 during this time period are relatively small, since no storm induced runoff event occurs. This is reflected particularly for conductivity, (as shown in Figure series 5.2C), where on most days, its value within the Maitland River plume is less than 20 % greater than the lake background value within about 1 km of the river mouth.

NO2+NO3 within the nearshore is more discernable than conductivity, (as relatively speaking, its concentration within the discharged river water is larger with respect to its lake background value). As such, the levels of NO2+NO3, as shown in Figure series 5.2N, tends to reveal the effects of the downwelling / upwelling cycle discussed in detail above, particularly further away from the Maitland River mouth. For example, on July 21 (see Figure 5.2N(b)), the plume is clearly well-mixed vertically. However, in the portion of the plume closest to the river mouth, the effects of the presumed warmer river water, in generating a buoyant plume can be observed. For example, looking at Figures 5.2N(f), (j) and (k), (on July 25, 29 and 30), the cross-sections nearest the river mouth show the plume lying in the upper portion of the water column.

5.1.3 Upwelling & runoff event in August

The second major upwelling event during the summer of 2003 occurred during the August 2 through 15 time period. As well, summer storms generated elevated runoff from the Maitland River after August 2, through the end of the event time period. However, the bulk of the runoff occurred during the August 5 to 9 time period, (with a secondary peak occurring around August 14 and 15). The average runoff during this August 2 through 15 time period, (as provided in Table 5.1), was about 25 m3/s, which although 3 times larger than the likely base flow during the July event, still only represents around 15% of the average spring runoff discharge. The loading of conductivity and NO2+NO3 from the Maitland River during this event was estimated to be about: 5 and 10 times larger, respectively, than that which would be expected under base flow conditions existing during the July 20 to 30 time period. (These loadings are however, still approximately an order of magnitude lower than those occurring during the spring runoff event).

A total of 15 “snap-shots” of spatial results were produced for each of the water parameters at 1 day intervals starting at 00:00 hours on August 2 and running to 00:00 hrs on August 15.

Water currents and temperature:

The start of this event period on August 2, essentially represents the final day of the “recovery” period, which began around July 29, (as discussed in Section 5.1.2). Although not shown in figures, based on the wind records there was likely a downwelling effect which occurred on July 31 and August 1, (i.e. the 2 days between the two simulated events of July and August), owing to strong South-East and South winds. This is reflected in the simulated temperatures of August 2, as shown in Figure 5.3T(a), where vertically well-mixed warm water appears prevalent throughout the nearshore area.

During the time period of August 3 through 13, the winds shift to become more from the East, Northeast and North, (see Figures 5.3U(b) through 5.3U(l)). As a result, owing to direct pushing of surface water offshore (under more Easterly winds), and

Coriolis-effects (under the more Northerly winds), a large upwelling event occurs during this time frame. (It should be noted that on August 7 and 11, winds are from the West or Northwest, however they are relatively too weak and too short to cause a reversal of the overall upwelling event between August 3 and 13).

The effect of this relatively lengthy upwelling event is clearly detailed within the temperature results for this event, as shown in Figure series 5.3T. Colder water in the lower portion of the water column is drawn in towards shore, then, particularly within 1 or 2 kilometres of shore, it is drawn to the surface and then begins to move offshore. This upwelling of colder water is particularly evident during August 8 through 11, (see Figures 5.3T(g) through 5.3T(j)). By August 13, the colder bottom water has been fully drawn up, and the water column well mixed vertically, (as expected during an upwelling process as discussed in Section 5.1.2). On August 14 and 15, a larger lake basin-scale 'recovery' towards weak stratified conditions appears to begin, (i.e. by the introduction of warmer surface water from the interior portion of the lake). This is evidenced by observing the sequence of Figures 5.3T(l) through (n).

Conductivity and NO_2+NO_3 :

The Maitland River plume as delineated by both conductivity and NO2+NO3, (in Figure series 5.3C and 5.3N, respectively), is strongly buoyant throughout much of this upwelling event. The reason for this is that the Maitland River water temperature is estimated to be 27 oC throughout the event, which exceeds the surface water temperature of the lake even before the upwelling event begins, (i.e. when the surface water temperature is at its event maximum). For example, the approximate surface water temperature on August 2 and 15 is: 22 and 16 oC, respectively. This creates strongly buoyant river plume conditions, (since the river water being significantly warmer is less dense than even the surface lake water). The longer that the plume remains within the lake, and the further into the upwelling cycle, the lesser the degree of buoyancy that the plume retains. This for example can be seen on August 12, (see Figure 5.3N(k)), where a relatively well diluted plume also shows a significant vertical depth with respect to the plume 2 days "younger" on August 10 as shown in Figure 5.3N(i). The reason for this is that the longer the plume remains in the lake during the upwelling cycle, the greater the vertical disruption that it experiences owing to general vertical instability within the water column of the lake which the upwelling process generates.

It should also be noted that even under relatively strong buoyant conditions, that the plume tends to become vertically well mixed if it travels along the shallower immediate near shore, (say within 200 to 500 metres from shore, depending on the water depth). For example, the Northward, shore bound plume on August 2 and 3 shows this tendency, (see Transects "cd" and "ab", in Figures 5.3N(a) and (b)). This is likely a function of the increased wave-induced turbulence in the shallow nearshore zone.

5.1.4 November runoff event

In general terms the November runoff event was much larger than the August runoff event in terms of water runoff volume and parameter loading, (approximately by 4 to 8 times). However, it was still only around 40 to 50% of the size of the spring runoff event. Similar to the spring runoff event, the lake's water column was vertically well-mixed in November.

A total of 11 "snap-shots" of spatial results were produced for each of the water parameters at 2 day intervals starting at 00:00 hours on November 12 and running to 00:00 hrs on November 28.

Water velocities:

As the case for the spring runoff, the water velocities simulated during the November runoff case tended to be more uniform with depth. This is obviously due to the fact that no thermocline exists during the spring and fall to impede the transfer of momentum from the surface to bottom of the water column. One extreme wind event is seen on November 14, when very strong Northwesterly winds generate surface and near bottom alongshore current speeds from approximately over 0.4 m/s near the water surface to 0.25 m/s near the bottom, at distances of greater than 1 km from shore.

Water temperatures:

Figures 5.4T(a) through (i) provide the water temperatures simulated during the November runoff event. Interestingly, based on the presumed Maitland River water temperature for this time of year, (of 6^{o}C), a couple of phenomena are observed:

i) During the early portion of the period, from November 12 to 18, the water entering the lake is actually colder than the lake water, (by about 1 or 2^{o}C). This actually creates a negatively buoyant river plume, which would tend to sink to the bottom portion of the water column and spread out at that depth. As it turns out, the difference is not large enough for this phenomenon to be observed to a large extent, as initial dilution and ambient turbulence in the lake tends to minimize bottom intrusions. However, owing to the relative large mass of river water discharged during the November runoff event and its colder temperature, a significant portion of the mixed river water tends to remain along the shoreline of the lake, revealing itself as a 'cold water plume' which hugs the shore;

ii) During the remainder of this event's time interval, (i.e. November 20 to 28), the effects of seasonal cooling upon the immediate nearshore zone of the lake, particularly within 1 to 2 km of shore, becomes evident, (owing to larger scale net heat loss from the lake to the atmosphere, as simulated within the energy portion of the models). This affects the shallower, closer to shore areas first, since there is less water mass here and thus less total heat-energy to be dissipated. By the end of the interval, the nearshore water temperatures have dropped by approximately 3 to 4 ^{o}C with respect to the deeper portion of the lake 3 to 4 kilometres offshore.

According to event's Δ temperature calculation as shown in Table 5.1, less than 1^{o}C of this could be attributed to the effects of mixing of the colder Maitland River waters. As such, as shown in Figures 5.4T(g) through (i) for the November 24 to 28 time period, the effect of atmospheric cooling makes the nearshore lake waters colder than the presumed Maitland River water temperature, (by 1 or 2 ^{o}C).

Conductivity and NO_2+NO_3:

The delineation of the Maitland River plume as revealed by levels of conductivity and NO2+NO3, are provided in Figure series 5.4C and 5.4N, respectively. The figures tend to reflect the water current and temperature phenomena already noted above. The results for November 18 reveal the effects of negative buoyant river plume mixing within the lake further offshore, (see Figures 5.4C(d) and 5.4N(d)). By specifically looking at Transect "ef" (1.2 km offshore from the Maitland River mouth) and Transect "ij" (2 km South of the Maitland River mouth), it can be seen that the plume tends to be wider at the bottom of the water column than at the surface. Note that this effect is masked to a large extent owing to the large vertical exaggeration used in the cross-section plots. As these locations, the plumes are in the order of 50 to 150 m wider at the lake bottom than at the lake surface. Since the lake depth at these locations is in the order of 10 metres, it means that the actual slope of the plume's vertical profile is not straight up and down, but rather is at a ratio of about 3 to 7 horizontal meters per vertical meter. This is representative of ambient mixing of a negatively buoyant plume.

Conversely, the creation of a somewhat buoyant river plume situation by the end of the event period on November 28 can be seen at Transect “ef” (see Figures 5.4C(i) and 5.4N(i)), where the plume largely lies in the upper half of the water column.

The relative loading and impact of the Maitland River with respect to general lake background conditions are clearly much larger for NO2+NO3 than for conductivity. For example, by looking at the November 12 results, (i.e. Figures 5.4C(a) and 5.4N(a)), it is clear that a significant nearshore background level (i.e. from ongoing previous discharges) has been generated for NO2+NO3, but does not exist for conductivity. Levels for NO2+NO3 are in the order of double the general lake value, (to around 500 ug/L), at a distance of about 2 km from shore, even before the large November runoff event has begun. During the runoff event itself, there are large areas where lake water exceeds the CCME Guideline value of 2,940 ug/L as N. This occurs throughout the entire event, peaking between November 20 and 24 as shown in Figures 5.4N(e) through (g). On these dates, levels of double or more of the CCME Guideline would have been expected virtually along the entire 8 km nearshore length, with widths generally in the 500 m to 1.5 km range.

The impact of NO2+NO3 during the November runoff event when compared with that of the spring runoff event, is significantly larger, (in terms of areas / durations where / when the CCME Guideline would have been exceeded). This observation is seen despite the fact that the November runoff loading total was slightly less than half of that of the spring runoff event. The reason again was likely, as discussed above, that a significant nearshore background level of NO2+NO3 built up throughout the fall season, from earlier discharge events from both the Maitland and other nearby watershed tributaries, (the impacts of which were accounted for by the long-term whole-lake model simulation).

In a contrary fashion, the impacts of conductivity within the Maitland River plume never exceed around 3 times the general lake background value (or about 675 umho/cm2) at any time during the runoff event.

5.2 Temporal-based impact analyses

Before proceeding with temporal-based analyses, it is necessary to first define the statistical parameters that will be used to assess impacts at the selected points of interest. These parameters provide the means for comparison of simulated concentrations with selected water quality ‘yardsticks’.

Eventually as a follow-up step of this general model support work for the GLMNA program, the “water quality module” of the Delft3d modeling package will be used to examine potential secondary fate / effects of some of the water quality parameters upon aquatic biota or other water usages. At the present time, only the ‘hydrodynamic / dispersion mode’ results as derived during this modeling study can be used. However, there is much information that can be obtained by examining the time series of water quality parameter concentrations that were generated by this work. Primarily, this involves use of derived basic statistical parameters that can be used to compare the simulated results with an appropriate water quality objective or ‘yardstick’. This process is carried-out at selected points of interest within the study area.

In specific terms for demonstration purposes, the significance of conductivity, NO2+NO3 and E. coli levels at selected locations along the beach strips and further offshore, will be estimated, via use of derived simple statistical parameters. At this point in time, these impacts will be limited to single parameters (i.e. not the combined effects or implications of 2 or more water quality parameter impacts). Further, as discussed above, no secondary impacts upon aquatic biota are considered at this time.

5.2.1 Derivation of generic statistical parameters

The water quality parameter concentrations can be compared with concentrations of interest using a simple ratio format. These concentration ratios can be defined and analyzed for the entire time period over which impact integration information is sought. These ratio time-series can then be compared geographically within the study area in order to estimate how relative source impacts vary.

Some of the ratios that may be useful are defined in the remainder of this report section.

Average concentration ratio for time period:

This represents a simple comparison ratio of a given parameter’s concentration with a concentration of interest, which is averaged for the total time period. The ratio is defined as follows:

$$C_R = \sum_{i=1}^{N_p} \left(\frac{C_p}{C_{int}}\right)_i \Big/ N_p \qquad \ldots 5.1$$

where:

C_R = long-term, average concentration ratio for the time period, at a given point,

N_p = the number of sequential, equal, time-integration intervals, "$\mathbf{t_i}$", (within the total time period),

C_p = simulated concentration, averaged for the time-integration interval, and

C_{int} = concentration of interest, averaged for the time-integration interval. *(Although placed inside of the summation bracket, it would likely be a constant value for the entire time period).*

The type of concentration ratio obtained is determined by the nature of the "concentration of interest", ("$\mathbf{C_{int}}$"), used. For example, a more "generic-impact" concentration ratio for the water body (i.e. lake) could be obtained by using a multiple of the general lake background concentration, ("$\mathbf{C_{GBgd}}$"), as the concentration of interest, (i.e. $\mathbf{C_{int} = multiple^* C_{GBgd}}$).

Likewise, a more "regulatory" concentration ratio is obtained by using a given regulatory criterion for the parameter, ("$\mathbf{C_{criterion}}$"), as the concentration of interest, (i.e. $\mathbf{C_{int}} = \mathbf{C_{criterion}}$).

The length of the time-integration interval, ("$\mathbf{N_p}$"), selected would likely range in value between 1 hour and 1 day. The total time period, "$\mathbf{t_{TOTAL}}$", which is the product of "$\mathbf{N_p}$ and "$\mathbf{t_i}$", would likely be the length of a: day, week, month, season or year; depending on the nature of variability of the parameter being considered and type of statistic desired.

Impact episodes:

If there are identifiable concentration ratios of <u>concern</u>, (i.e. as determined by the "$\mathbf{C_{int}}$" value or a multiple thereof), then periods when the relative concentration exceed the concentration ratio of concern can be calculated. Some of the associated parameters might include:

(i) Ratio of exceedence time to total time, within the time period, "$\mathbf{R_{ETP}}$":

$$R_{ETP} = \sum_{i=1}^{N_{Ex}} \left(t_{Ex}\right)_i \Big/ t_{TOTAL} \qquad \ldots 5.2$$

where:

N_{Ex} = Number of exceedence episodes within the total time period,

t_{Ex} = Length of time of a given exceedence episode, "i", and

t_{TOTAL} = the total time period.

An “exceedence episode”, by this simple definition occurs when:

$(\frac{C_P}{\alpha \cdot C_{\text{int}}}) > 1$; where: **$\alpha = C_{exceedence} / C_{int}$**

(i.e., “**α**” is a simple multiple that the concentration of interest is multiplied by to produce the exceedence concentration, “**$C_{exceedence}$**”). For example, if the level of concern was double the general lake background concentration, then**:** **$\alpha \cdot Cint = 2 \cdot C_{GBgd}$**

*(ii) Average concentration ratio during exceedences within the total time period, “**C_{REx}**”:*

This is a measure of the magnitude of the exceedence, only during the exceedence intervals, (i.e. on average, how “severely” is the criterion violated when exceeded).

$$C_{REx} = \sum_{i=1}^{N_{Ex}} \left(\frac{C_P}{\alpha \cdot C_{\text{int}}}\right)_i \Big/ N_{Ex} \qquad \ldots 5.3$$

Relative source concentration at receptor point for time period:

Another perhaps more generic, but potentially useful parameter is the relative concentration of a single (or multiple) source(s) at a receptor point, “**C_{RSo}**”. Essentially, this parameter represents the fraction of source water mass to total water mass at a receptor point. The inverse of this parameter therefore represents the relative dilution of the source(s) at the receptor point.

Relative concentration is calculated using the following equation:

$$C_{RSo} = \sum_{i=1}^{N_p} \left(\frac{C_p - C_{GBdg}}{C_{Source} - C_{GBdg}}\right)_i \Big/ N_p \qquad \ldots 5.4$$

where:

C_{Source} = concentration of parameter in the source effluent.

In terms of calculating water mass itself, variances in water density due to temperature-induced changes are not significant for typical ambient river-lake temperature ranges. As such, the mass of the discharged river water is essentially proportional to its discharged volume. For this reason, for calculating the relative source concentration, the source concentration itself, "$\mathbf{C_{Source}}$", only serves as a surrogate for the discharged water mass (as proportional to volume) of the source, (i.e. it must be set such that each concentration unit represents a given constant discharge mass (and therefore volume) of water from the source). As such, "$\mathbf{C_{Source} * Q_{Source}}$" must be proportional to the discharge flow-rate, ("Q_{Source}"). Further, for multiple source analysis, this concentration proportionality must be the same for all sources. These conditions essentially mean that the concentration of the parameter within all sources must be set to the same value, and remain constant over the entire time period of the simulation. Also, it is necessary to assume conservative behaviour for the surrogate chemical in this analysis, (since the water mass-volume behaves conservatively). This implies that for the relative source concentration to be calculated, a special simulation is necessary in which the effluent concentrations of all sources are arbitrarily set to the given, constant concentration, and under the condition that no losses from the water-column occur. (This procedure can potentially be carried-out separately for each source of interest, as well as for any combination of sources).

5.2.2 Selection of specific statistical parameter values

There are some limitations on the selection of statistical parameter values based on the nature of general loading and simulation characteristics. Although the model simulation time-step size was only 1 minute for the nested model runs, instantaneous, (i.e. not averaged), simulated parameter time-series results were saved only once every hour. Part of the reason for this is logistical, in that excessive storage would be required to save output every minute for the year-long simulations. Secondly, and perhaps more significantly, the Maitland River discharge / parameter loading frequency was hourly or half-hourly. This plus the fact that the runoff events had peak segments that were usually several hours to days in length, means that even if instantaneous results were available on minute intervals, their statistical characteristics would not differ significantly from the instantaneous results collected once every hour.

While year long simulations were made for conductivity and NO2+NO3, E. coli could only be simulated during the spring runoff event. As such, temporal results for E. coli are only presented for the spring runoff event.

The selected "concentration of interest", ("C_{int}"), as directly used in Equations 5.1 and 5.3 and indirectly used in Eq. 5.2, is:

(i) 400 umho/cm2 for conductivity. This represents approximately 2 times the general lake background value;

(ii) 2,940. ug/L as N for NO2+NO3. This is the CCME Guideline value; and
(iii) 100 CFU/100mL for E. coli. This is the MOE swimming criterion.

A total of 3 “time-integration intervals”, (“t_i”), as used in all 3 equations previously outlined, are considered, namely:

(i) 1-hour, which essentially represents NO time integration, since the minimum time interval recorded was 1-hour. As discussed above, this case can also be thought of as the “instantaneous concentration” case, (or worse case);
(ii) 6-hours, which represents the averaging of instantaneous values over 6-hour sequential time-steps; and
(iii) 24-hours, (i.e. daily-average), which represents the averaging of instantaneous values within each sequential day.

The “total time period”, (“t_{TOTAL}”), values represent the total length of time considered for the statistical analysis, (as required for all 3 equations). The values considered are:

(i) the four event periods, (for each of the four events considered in 2003, as previously defined in Section 5.1);
(ii) three seasons, where the seasons are defined based on review of measured water-column stratifications at the Maitland offshore ADCP site, as follows:
    a) March 16 to May 16: spring runoff and pre-summer stratification season,
    b) May 16 to September 16: summer stratification season, and
    c) September 16 to December 1: autumn storm season; and
(iii) the year, (i.e. all three seasons combined, thus running from March 16 to November 30, 2003). (Note: Dates before March 16 and after December 1 were simulated, however, the measured parameter levels used in deriving loading functions for the Maitland River did not cover these time periods, and as such, the water quality results are not used).

5.2.3 Selection of locations within the study area

The temporal analyses described in Section 5.2.1 could be applied at multiple depths (i.e. up to 10 based on the number of model layers) at each of the 4,599 nested model grid locations. However, this is neither feasible nor necessary. Instead, selected monitoring stations within the nested model grid were selected to represent the range of locations, in terms of distances from the Maitland River and shore. Specifically, selected SWMS and other lake monitoring stations were grouped into a total of 8 transects. The stations themselves were previously defined as part of the monitoring program itself and are not located along precise East-West transect lines perpendicular to shore. As such, the 8 grouped transects only approximate an East-

West orientation direction (i.e. perpendicular to shore), and are located at approximate North-South distances from the Maitland River mouth, (i.e. there is some variability within each transect). Table 5.4 provides a summary of the stations used to represent each transect.

At each station location, results at both the surface and near-bottom depths, (as defined using model Layers 1 and 8 respectively), were assessed. This permits the potential temporal effects of stratification within the lake to be determined.

5.2.4 Results from the temporal statistical analyses for water quality parameters

The time-series data were processed for the 8 time-periods selected, using the 3 data time-integration intervals, resulting in a 24 sets of results for conductivity and NO2+NO3. As discussed previously, E. coli could only be processed during one time-period, (i.e. "Event 1"), and therefore 3 sets of results were produced. Owing to the large number of tables produced, they have all been placed within Appendix II for easier reference. The nomenclature used is provided on the appendix cover sheet.

Table 5.4 Locations of stations where temporal analyses were performed.

Transect *(Approximate N-S distance from the Maitland River mouth)*	**Station name** *(distance from shore in kilometres)*			
1 *(6.0 km North)*	Stn. 528 *(4.9)*	Stn. 529 *(2.0)*	Wright Point *(0.0)*	
2 *(3.0 km North)*	Offshore ADCP *(6.7)*	Stn. 532 *(2.2)*	Sunset Beach *(0.0)*	
3 *(0.9 km North)*	Stn. 535 (0.9)	Stn. 538 (0.2)		200 m North of River mouth[2] *(0.0)*
4 *(0.1 km North)*	Nearshore ADCP *(1.2)*	Stn. 539 *(0.3)*	Maitland River mouth[1] *(0.0)*	
5 *(0.8 km South)*	Stn. 537 *(2.9)*	Stn. 541 *(1.3)*	Stn. 543 *(0.4)*	St. Christopher Beach *(0.0)*
6 *(2.1 km South)*	Stn. 540 *(5.2)*	Stn. 544 *(0.5)*	The Cove Beach *(0.0)*	
7 *(3.8 km South)*	Stn. 545 *(2.1)*	Stn. 546 *(0.3)*		Stn. 542[3] *(within the inner harbour)*
8 *(6.0 km South)*	Stn. 550 *(5.3)*	Stn. 549 *(2.5)*	Black's Point Beach *(0.0)*	

Notes:

(1) This location is within the Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river discharge and can be used for comparison with the other (non-river) stations.

(2) This station actual lies between Transects 3 and 4, (at the shore, 200 m North of the river mouth). It can be compared with Stn. 539 (which is about 300 m directly offshore of the river mouth) in order to evaluate the significance of the initial momentum of the river flow into the lake.

(3) This station is not within the lake itself, but at the approximate centre of the inner harbour.

A total of 6 statistics are calculated at the surface and bottom of each station, based on those derived in Section 5.2.1. They include:

(i) the average concentration ratio, C_R, using Equation 5.1,
(ii) percentage of the total time-period when $C_R > 1$, (i.e. when exceedences of the selected criterion occur), using Equation 5.2 converting “R_{ETP}” to a percentage),
(iii) the total number of exceedence “episodes” during the time-period. (An “episode” is the elapsed time associated with a single-event when the concentration rises above the criterion to when it falls below the criterion),
(iv) the longest exceedence “episode” during the time-period,
(v) the average concentration ratio (“C_{REx}”) which occurs only during the exceedence episodes, (i.e. using Equation 5.3), and
(vi) the maximum concentration ratio during the entire time-period.

Conductivity:

The temporal analysis results for conductivity are summarized within 24 tables, namely Tables 5.21C(a) through 5.28C(c) as provided in Appendix II. To assist with interpretation of these results, any statistic that indicates “exceedence” of the 400 umho/cm^2 criterion is highlighted with a tan-coloured background. (As stated previously, 400 umho/cm^2 is <u>not</u> a regulatory criterion but simply represents an approximate doubling of the general lake background value. As such, it does at least qualitatively represent a significantly large impact from the Maitland River, i.e. in order to create a doubling of lake’s conductivity background value).

First of all, it is worth noting that for all 8 time-periods considered, (i.e. the 4 events, 3 seasons, and the year), the conductivity level in the water discharged from the Maitland River to the lake always exceeds 400 umho/cm^2. As such, relative impacts within the lake during these time-periods are dictated largely by the relative volume of discharged water during the time-periods, (as provided in Table 5.1). For this reason, impacts in the lake during Events 1 and 4, (the spring runoff and autumn storm) are much larger than for Events 2 and 3 when the flow from the river was driven only by summer base-flow and a small runoff event, respectively. (This can be seen by comparing Tables 5.21C(a) and 5.24C(a) with Tables 5.22(a) and 5.23(a)).

In terms of vertical mixing within the water column at the stations, it is clear that during the spring and autumn events, (i.e. Events 1 and 4), there is virtually no difference in the impact between the surface and bottom portions of the water column, (see Tables 5.21C(a) and 5.24C(a)). It is also interesting to note that during the 2 summer events, (i.e. Events 2 and 3), and the summer season, (“Season 2”), that buoyant impacts where conductivity levels are higher at the near surface as compared with the near bottom, seem largely confined to stations within about 1.5 km from the Maitland River mouth, (see the stations of Transects 3 and 4 in Tables 5.22C(a), 5.23C(a) and 5.26C(a), respectively).

In general, the 3 seasonal time-period results (of Tables 5.25C(a), 5.26C(a) and 5.27C(a)) reveal similar exceedence patterns as those of the limited events that occur within them, although at reduced frequency and magnitude. This would be expected, since Events 1, 3 and 4 were selected specifically during Maitland River runoff events during the 3 seasons. This pattern is best seen by comparing:

(i) Table 5.21C(a) with Table 5.25C(a) for the spring season,
(ii) Table 5.23C(a) with Table 5.26C(a) for the summer season, and
(iii) Table 5.24C(a) with Table 5.27C(a) for the fall season.

By looking at the "all seasons" (i.e. "the year") results of Table 5.28(a), we can make some general statements regarding the Maitland Rivers impact upon the study area in terms of conductivity in 2003. The lake background level of conductivity was doubled (i.e. defined as an exceedence in this analysis):

(i) at least 25% of the time within about 500 m of the river mouth,
(ii) approximately 2 to 10% of the time at distances of about 1 to 3 km from the river mouth and within 500 m of shore,
(iii) around 3% of the time in the immediate nearshore zone at distances of up to 6 km from the river mouth, and
(iv) for only 0.1% of the time within the inner harbour (i.e. Station 542).

For each of the 8 time-periods considered, the effect of using averaged-data is provided, by examining the time-period's Table (a), (b) and (c). As discussed previously, these correspond to: (non-averaged) instantaneous hourly data, data averaged over 6-hour sequential periods, and data averaged daily (over 24-hour sequential periods); respectively. This essentially shows that as the averaging time increases, the extent of the exceedence decreases. This is to be expected, since in effect the "peak" impact concentrations are averaged-down. However, this effect is not as pronounced as might be expected since the Maitland River storm discharges tended to be of a larger time-scale of many hours and days.

NO2+NO3:

The temporal analysis results for NO2+NO3 are summarized within 24 tables, namely Tables 5.21N(a) through 5.28N(c) as provided in Appendix II. To assist with interpretation of these results, any statistic that indicates "exceedence" of the 2,940 ug/L (as N) CCME Guideline value is highlighted with a light green-coloured background.

The ratio of criterion value to lake background value for NO2+NO3 is much larger than that used for conductivity, (i.e. it represents a factor of about 10 for NO2+NO3 but only 2 for conductivity). As such, it would be expected that the 'exceedence impacts' for NO2+NO3 within the lake will be more variable, (as related to the wide variation in the flow-rate from the Maitland River into the lake). This pattern is confirmed by comparing the results during Events 1, 2, 3 and 4, as provided in

Tables 5.21N(a), 5.22N(a), 5.23N(a) and 5.24N(a), respectively. Clearly, the impact during the spring runoff event (i.e. Event 1 as shown in Table 5.21N(a)) is very large. Over 40% of the time, the guideline would have been exceeded within 3 km of the river mouth and within approximately 1 km of shore. Even at distances of 6 km from the river mouth and near the shore, the guideline would have been exceeded between 20 and 30 % of the time during this 20 day event, at intervals of up to 2 to 3 days at a time.

The extreme opposite picture is seen in Table 5.22N(a) during Event 2, (the upwelling event when only base flow was entering from the Maitland River). NO2+NO3 within the Maitland River remained below the guideline and as such, levels in the lake did as well.

Exceedences that occurred during the summer run-off event (Event 3 as shown in Table 5.23N(a)) were limited to within approximately 1 km of the river mouth. The effects of the buoyant river plume are easier discerned for NO2+NO3 as compared to conductivity. Again this relates to the ratio of the criterion to lake background level as discussed above.

In a similar fashion to the spring runoff event, the autumn runoff event (Event 4) created large exceedences of the guideline, (see Table 5.24N(a)). During the autumn event, the percentages of the total period when exceedences occurred were significantly smaller in the Southern portion of the study area, (i.e. compare Tables 5.24N(a) with 5.21N(a)). As well the exceedence episode lengths were much shorter. However to the North of the Maitland River, the impacts were somewhat similar in nature.

In general, as with conductivity, the 3 seasonal time-period results (of Tables 5.25N(a), 5.26N(a) and 5.27N(a)) reveal similar exceedence patterns as those of the limited events that occur within them, although at reduced frequency and magnitude. This pattern is confirmed by comparing:

(i) Table 5.21N(a) with Table 5.25N(a) for the spring season,
(ii) Table 5.23N(a) with Table 5.26N(a) for the summer season, and
(iii) Table 5.24N(a) with Table 5.27N(a) for the fall season.

The impact of NO2+NO3 discharged from the Maitland River during 2003 can be summarized by looking at Table 5.28N(a), which is for the entire March 16 to December 1 time period. The CCME guideline (of 2,940 ug/L as N) was exceeded:

(i) between 20 and 60% of the time within about 500 m of the river mouth. There were approximately 50 to 75 exceedence episodes here with maximum durations of from a week 200 m North of the river mouth to a month 300 m directly off from the river mouth,
(ii) between about 10 and 20% of the time at distances of about 1 to 3 km from the river mouth and within 500 m of shore. There were approximately between 20

and 50 exceedence episodes in this area, with maximum duration lengths in the 3 to 6 day range,
(iii) around 6% of the time at distances of about 6 km from the river mouth and near the shore. At these locations, there were about 15 to 20 exceedence episodes the largest duration of which was about 3 to 4 days, and
(iv) around 7% of the time within the inner harbour. Here, although there were few exceedence episodes (3 to 7) the maximum duration was up to 12 days in length. This tendency, (i.e. few episodes of longer duration), is indicative of a restricted exchange flow between the inner and outer harbours.

As with conductivity, the effects upon the analysis results of using averaged concentration data for NO2+NO3, can be seen by comparing Tables (a), (b) and (c), for any of the 8 analysed time-periods. Although there is some reduction in the extent of the exceedences, the reduction is again limited owing to the slower dynamic nature of the Maitland River discharge.

E. coli:

As stated previously, E. coli simulations were limited to Event 1, (i.e. the spring runoff event), as dictated by measured data availability. However, two cases were considered based upon the assumed behaviour of E. coli within the lake. The first assumes no deactiviation, (i.e. 'conservative behaviour') and the second uses a first-order deactivation rate of 1/day, (which produces a half-life of around 17 hours). The results of these two cases are summarized within Tables 5.21E0(a) to (c) and 5.21E1(a) to (c), respectively. To aid with the interpretation of these tables, any statistic that indicates "exceedence" of the 100 CFU/100mL MOE criterion, is highlighted will pale-yellow.

The nature of the Maitland River 'loading function' for E. coli during Event 1 was quite different than that of conductivity and NO2+NO3. Essentially, the levels of these latter two parameters tended to be proportional to the Maitland River flow-rate, and as such, their loadings into the lake extended well into the runoff event. E. coli on the other hand, was higher at the first couple of days of the runoff event, and tailed-off significantly as the storm event continued. As such, impacts of E. coli within the lake, even for the assumed conservative behaviour, tended to be somewhat more dynamic with shorter time-scales of impact. This resulted in:

(i) relatively speaking, less impacts further away from the Maitland River mouth as compared with impacts near the mouth for E. coli. This can be seen by comparing the general exceedence pattern of E. coli with NO2+NO3 as provided in Tables 5.21E0(a) and 5.21N(a), respectively. And,

(ii) a greater effect in reducing the extent of exceedences by averaging the E. coli data over 6 or 24 hours, as compared with either of the other two parameters. This is observed by comparing the reduction in exceedence pattern that occurs from Tables 5.21E0(a) to (b) to (c); with the reduction in exceedence pattern that occurs from Tables 5.21N(a) to (b) to (c).

As shown in Table 5.21E0(a), the only stations experiencing E. coli levels, under presumed ‘conservative behaviour’, greater than 100 CFU/100mL for over 10% of the spring runoff time-period, are those located 300 m directly offshore, and at the St. Christopher and Cove beaches. Obviously, normal swimming is not an issue at this time of the year, although some dry-suit surfing may occur.

When deactivation of E. coli is considered, (at what is likely a median summer-time rate), the exceedence impacts are greatly reduced. In this case they are limited to stations immediately offshore of the river mouth. Impact to the two beaches to the South discussed above, are both below the criterion.

5.2.6 Results from the temporal statistical analyses for Maitland River dilution

As described in the latter portion of Section 5.2.1, dilution is defined as the inverse of the relative concentration. Special simulations were carried-out to provide the relative concentration information needed to produce the time-series data for analysis. The same whole-lake and nested models and all calibrated parameters and procedures as used before were used again for this special simulation; except that: all initial lake concentrations, boundary conditions and non-Maitland River source concentrations were set to a value of 1; and the Maitland River source concentration was set to a constant 1,000.

The relative concentration results were converted to dilution results, which were then analysed for the same 8 time-periods of 2003 as used for the water quality parameters. However this time, since there are no actual dilution criteria and owing to the generic nature of this parameter, the analysis consisted of determining the maximum dilution as a function of the percentage of time during each time-period, at the surface and bottom of every station location. Specifically, the maximum dilutions associated with time-period % of: 0 (i.e. the overall minimum dilution during the time-period), 5, 25, 50, 75, 95 and 100 (i.e. the overall maximum dilution during the time-period); were calculated. An upper dilution limit of 1,000,000 was selected to represent the case when no Maitland River water was present.

It should be noted that the dilution results derived, while only considering the Maitland River do include integrated impact effects as associated with the accumulated release of Maitland River water from January 1, 2003 and onwards. This simply means that all Maitland River water discharged between January 1, 2003 and the end of the specific time-period being considered is accounted for in the impact assessment. This is possible since the whole-lake model tracks the larger scale movements of the Maitland River plume leaving and re-entering the nested modelling grid (as reflected in derived boundary conditions for the nested model).

The results of the dilution analyses are provided in Tables 5.31 through 5.38, which have been placed within Appendix III. (The nomenclature used is provided on the appendix cover sheet). These results are for the same 8 time-periods as used previously. Again for each time-period, 3 sets of results are derived depending upon the data integration time period, (i.e. (a) is for the 1-hour instantaneous dilution data, and (b) and (c) is for analysis of the 6-hour and 24-hour averaged, sequential dilution data, respectively).

To assist with interpretation of these dilution results, 3 quantitative dilution ranges have been somewhat arbitrarily defined to represent qualitative impact classes, as follows:

(i) Dilution range of 1.0 to 2.0, as highlighted with a dark orange colour, represents the "dominant" presence of river water;
(ii) Dilution range of 2.1 to 10.0, as highlighted with a golden orange colour, represents a "very high" presence of river water; and
(iii) Dilution range of 10.1 to 100, as highlighted with a tan colour, represents a "significant" presence of river water.

As would be expected, the dilution results for Events 1, 2, 3 and 4, as shown in Tables 5.31(a), 5.32(a), 5.33(a) and 5.34(a), respectively, inversely reflect the effects from the combined amount of river water discharged, (as indicated in Table 5.1), and the duration of each of the four events. The amount of water discharged from the Maitland River, as an equivalent percentage of the nearshore lake volume (within 4 km of the Maitland River mouth), per day, was about: 5.0, 0.25, 0.77 and 2.4 %; for Event 1, 2, 3 and 4, respectively. As such, the dilutions associated with Events 1 and 4 are much smaller than those associated with Events 2 and 3.

Based on the qualitative dilution class range discussed above, "significant" amounts of Maitland River water would have existed from between 50 to 100% of the entire Event 1 time period at all stations, (see Table 5.31(a)). "Dominant" or "very high" proportions of river water would have existed over 50% of the time at locations along the shoreline within about 2 km to the South and 6 km to the North of the river mouth.

Generally speaking, the dilution results are quite similar for the two summer events, Events 2 and 3, (see Tables 5.32(a) and 5.33(a)). All dilution class zones are much smaller in size when compared with Event 1. In fact "dominant" or "very high" amounts of river water only exist greater than 50% of the time at stations within about 500 m of the river mouth, during Events 2 and 3.

The dilution results associated with the autumn runoff event, Event 4, are similar in pattern to those of the spring runoff event, (Event 1), although the dilution values themselves tend to be somewhat higher during Event 4, as would be expected (i.e. since the rate of river discharge during Event 4 was only about half of that of Event 1).

The dilution patterns during the spring and autumn seasons, (Season 1 and 3 as shown in Tables 5.35(a) and 5.37(a), respectively), are generally similar. However, there appears to be a slight shift of the Maitland River water towards the North portion of the study area during the fall season based on comparison of dilution values themselves.

Generally speaking, the Maitland River water dilutions occurring during the summer season, (Season 2 as shown in Table 5.36(a)), are in the order of 2 to 5 times larger than those during the spring and autumn seasons. The effects of the buoyant Maitland River plume and stratified lake conditions, (resulting in much higher concentrations and therefore much lower dilutions near the surface as compared with near the bottom), are very evident within about 2 km of the river mouth. Here the ratio of: bottom dilution to surface dilution; are in the order of 2 or larger to 1.

The results for all (three) seasons, (from March 16 to December 1), as expected show the greatest range in dilutions overall, at any given station, as seen in Table 5.38(a). “Dominant” or “very high” amounts of Maitland River water occur greater than 50% of the time only at the two stations within 500 m of the river mouth. “Significant” levels, (where dilutions are between 10 and 100), occur at least 50% of the time at all lake stations within about 1 km of the entire 13 km length of the study area shoreline, as well as within the inner harbour. The summer season effects of lower surface dilutions (owing to buoyant river plume and lake stratification) is still seen at virtually all stations, even when combined with the spring and fall seasons. The ratio of near bottom to near surface dilutions is greatly reduced, however, to around 1.5 or less, and is more pronounced at stations within a kilometre of the river mouth, or to those stations that are both further offshore and at larger distances from the river mouth. Presumably, this reflects to some degree the effects of greater vertical mixing within the shallower stations along the shoreline which tends to create well-mixed vertical concentration gradients. This effect can be easily observed by examining the stations along any of the transects in Table 5.38(a), from left to right, (i.e. progressively moving further offshore).

The effects of data averaging are best seen by comparing the daily-average (i.e. 24-hour data-averaging length) results with those derived directly from the 1-hour (instantaneous) data, (i.e. for any given time-period, compare figure (c) with figure (a)). Some of the observations that may be made include:

(i) The range of dilutions using the daily average data decreases, as the lower probability range dilutions increase and the higher probability range dilutions decrease. This is of course expected, since averaging reduces the severity of both the high and low dilution ‘spikes’;

(ii) For all 4 event and 3 seasonal time-periods examined, there are some periods of time, based on the hourly instantaneous results, when no Maitland River water is found, (as implied when the probabilistic dilutions are greater than 1,000,000). This usually only occurs at a very few stations which tend to be located at the greatest distances offshore and/or alongshore from the Maitland River mouth. However in all cases when daily-average data is used, (except for the autumn storm runoff event), some impact of Maitland River water, albeit sometimes at very low levels (i.e. high dilution values), are observed at all stations. Stated another way, there is some exposure to Maitland River water at all stations, during at least a portion of virtually every day.

As has been shown earlier in this report, during many days steady wind conditions create alongshore currents that move the Maitland River plume in only one alongshore direction. This would imply therefore in order for some Maitland River water to be found at all stations during portions of every day (except in the autumn), (including those in the opposite direction or further offshore from where the plume is located), that previously discharged river water must be the cause. As such the dilution results help to confirm the fact that there is extensive spreading of the Maitland River plume along both shoreline directions, over days and weeks, owing to the highly frequent alongshore current reversals, (i.e. a ‘sloshing back-and-forth’ phenomenon within the nearshore of the study area). In fact there were approximately 130 alongshore current reversals that were measured between May 16 and November 27 in 2003, (Nettleton, 2005 and 2006), which is an average of between 4 and 5 per week. While this is likely intuitive, it verifies the conclusion that it would be reasonable to expect that on any given day when field monitoring is conducted within the nearshore in the vicinity of the Maitland River, that there could be great difficulty in directly correlating the measured results to discharges from the Maitland River on the same day.

6. Conclusions and Recommendations

This study has accomplished its main goal of setting-up and successfully applying the state-of-the-art “Delft3d” hydrodynamic – dispersion model to delineate the impact of the Maitland River’s discharge upon the nearshore area of Lake Huron in the vicinity of Goderich. This modeling project involved a great deal of work to specifically address the major aspects of the application including the development of:

- whole-lake and nested modeling grids and interactions,
- meteorological and hydrologic data base for Lake Huron,
- procedures for model testing, sensitivity analysis and calibration,
- post-processing software, to permit more efficient interpretation of various types of “Delft3d” model results, and
- spatial and temporal delineation of the Maitland River plume impact within the nearshore vicinity, under various lake seasonal and meteorological conditions.

A 2-dimensional applications of the models, (where conditions over the entire water-column are assumed to be vertically well-mixed at any given location), were successfully made based upon good correlation and fourier norm analyses results. The 2d model also provided reasonable simulation results for conductivity and NO2+NO3 levels within the 4 nearshore zones in the study area, as compared with those measured by the EMRB-GLMNA program on 4 dates in 2003, namely: May 27, July 8 and 31 and November 23.

Most of the work in this study involved the more complex application of the fully 3-dimensional "Delft3d" model. This required the development and successful application of a "heat-flux" model for Lake Huron in 2003. This permitted an accurate description of the development of temperature-density structures throughout the lake's water column during the entire year of 2003. This modeling component, along with additional input-data that needed to be developed for the 3-d applications were used to provide a modeling system capable of examining the fully 3-dimensional impacts from the Maitland River plume within the lake. The 3-d modeling applications were deemed to work well, based on good correlation and fourier-norm analyses results for temperatures and velocities at the two main ADCP measurement locations used in the study area in 2003.

The 3-d models were used to provide detailed spatial and temporal impact results, for the Maitland River plume under a range of seasonal and meteorological conditions, including:

- the major spring runoff event,
- the effects of lake downwelling / upwelling with and without summer runoff event,
- autumn storm runoff event

The magnitude and extent of the effects of meteorological and lake conditions during these events upon the impact of water quality and dilution of the Maitland River plume, were statistically described in detail, at a range of stations throughout the study area. This was accomplished for all events as well as during the entire spring, summer and autumn seasons.

It is reasonable to conclude, based upon this study as a whole, that the modeling approach described in this report can be utilized to successfully serve as an interpolation / extrapolation tool, to extend the knowledge already gained through field work conducted through the EMRB-GLMNA program.

There are however, areas where some improvement would be beneficial for future applications. These would help to improve the quality of the model applications so as to better meet the modeling related goals of the GLMNA program. The improvements include:

- better description of all loadings of parameters associated with the main sources in a study area.
- wind measurements within the local study area and use of the baroclinic assumption for wind and atmospheric pressure, when possible,
- the development of more comprehensive quantitative criteria that can be used to assist with answering questions involving the nature of water

quality within a nearshore study area, (i.e. to provide a better defined ‘end-point’ for model applications).

In terms of resource requirements, it can be concluded that to carry-out a new modeling study like this one requires a significant amount of time. It is estimated that a total of around 315 equivalent (full) days of time were required to develop, apply and report upon, all aspects of the modeling as described in this report. A very approximate break-down of this total time is as follows: 25% went into the development and testing of the actual modeling grids, 25% went into the development of post-processing software (for the Delft3d model) and the remaining 50% went into actual model application, input data development, model result processing and report writing. As such, for future reference purposes, it is estimated that: approximately 75% of the total project time, (or say 240 equivalent (full) days), would be required to make an initial similar application of the Delft3d model at GLMNA sites located within the other Great Lakes; and that around 50% of the total project time, (or say 160 equivalent (full) days), would be required to make a similar repeat application at the same Lake Huron GLMNA site for a different field-data year.

It is highly recommended that EMRB obtain the latest version of the Delft3d model (or an equivalent state-of-the-art model). There are new features that would have reduced the required times above to some degree, as well as improve the capabilities and quality of the model applications. Having the latest version of appropriate state-of-the-art water modeling tools is essential to assist EMRB in helping to meet Ontario’s Great Lakes monitoring responsibilities, which are both extensive and unique.

References

Beletsky, D., D.J. Schwab, P. J. Roebber, M.J. McCormick, G. S. Miller, and J. H. Saylor. Modeling wind-driven circulation during the March 1998 sediment resuspension event in Lake Michigan. Journal of Geophysical Research, 108(C2), 3038, 2003.

Environment Canada, 1985. Water Quality of the Lake Huron-Georgian Bay System. Scientific Series No. 143. Inland Waters Directorate, Ontario Region, Water Quality Branch, Burlington, Ontario. 43 p.

Gill, A. E., 1982. Atmosphere – Ocean dynamics, *International Geophysics Series*, Volume 30, Academic Press.

Howell, T. (Committee Chair). 2005. Sources and Mechanisms of Delivery of E. coli (bacteria) Pollution to the Lake Huron Shoreline of Huron County – Interim Report (April 8, 2005). *Science Committee to Investigate Sources of Bacterial Pollution of the Lake Huron shoreline of Huron County*. 270 p.

Howell, T. and P. Weidman. September, 2004. Nearshore water quality of southeastern Lake Huron near the Saugeen, Maitland, and Bayfield Rivers, 2003: Elevated levels of nitrates and bacteria (*Escherichia coli*). Ontario Ministry of the Environment, *DRAFT REPORT*.

Liu, L., M.S. Phanikumar, S.L. Molloy, R.L. Whitman, D.A. Shively, M.B. Nevers, D.J. Schwab, and J.B. Rose, August 15, 2006. Modeling the transport and inactivation of E. coli and enterococci in the near-shore region of Lake Michigan. *Environmental Science & Technology*, Volume 40, Issue 16, pp. 5022-5028.

Nettleton, P. October 18, 2005. Progress Note 1: Delft3d modeling of the Maitland River section of Lake Huron. Draft modeling report, Ontario Ministry of the Environment.

Nettleton, P. February 13, 2006. Progress Note 2: Delft3d modeling of the Maitland River section of Lake Huron. Draft modeling report, Ontario Ministry of the Environment.

NOAA-GLERL, 1977. Detroit and St. Clair River Transient Models. (Frank H. Quinn and John C. Hagman). NOAA Technical Memorandum ERL GLERL-14.

NOAA-GLERL, 1982. Effect of Channel Changes in the St. Clair River since 1900. (Jan A. Derecki). NOAA Technical Memorandum ERL GLERL-40.

NOAA-GLERL, 1994. Great Lakes Monthly Hydrologic Data, (T. Hunter). NOAA Technical Memorandum TM-083.

NOAA-GLERL, 2004. *(Lake Huron data downloaded from GLERL's website: http://www.glerl.noaa.gov/wr/ahps/curfcst/)*.

NOAA, 2004. *(Water level data downloaded from the Tides and Currents data-base website: http://tidesandcurrents.noaa.gov/).*

RD Instruments, January, 1989. Acoustic Doppler Current Profilers – Principles of Operation: A Practical Primer. RD Instruments, San Diego, California.

Saylor, James H. and Peter W. Sloss, March, 1976. Water Volume Transport and Oscillatory Current Flow through the Straits of Mackinac. *Journal of Physical Oceanography* 6(2):229-237.

Schwab, D. J., 1983. Numerical Simulation of Low-Frequency Current Fluctuations in Lake Michigan. *Journal of Physical Oceanography*, Volume 13, pp. 2213 – 2224.

U.S. EPA, June, 1985. Rates, Constants, and Kinetics Forumlations in Surface Water Quality Quality Modeling (Second Edition). Environmental Research Laboratory, EPA/600/3-85/040.

WL-Delft Hydraulics, August, 2001. Delft3d-Flow User Manual.

FIGURES

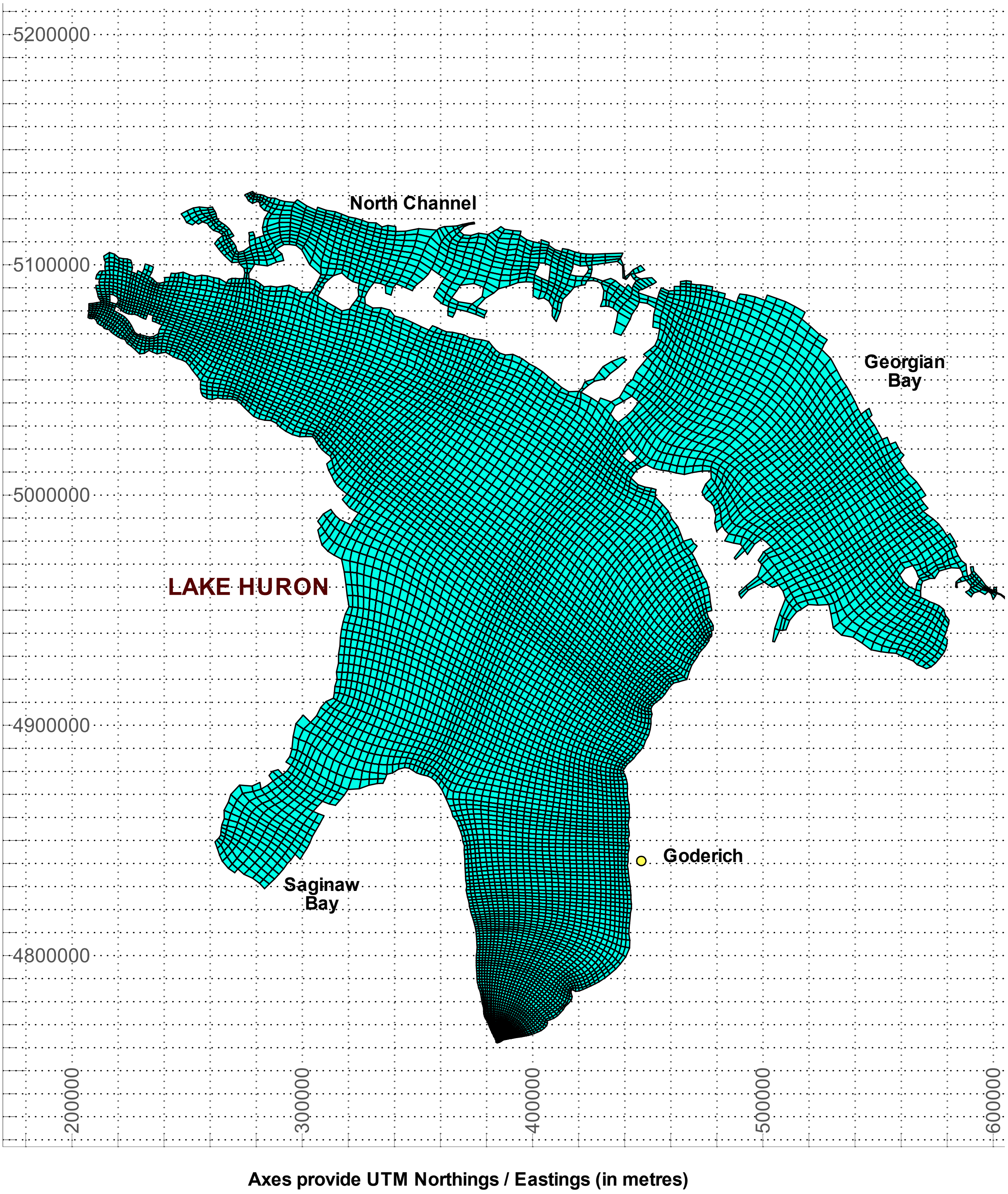


Figure 3.1 Whole-lake 2d modeling grid.

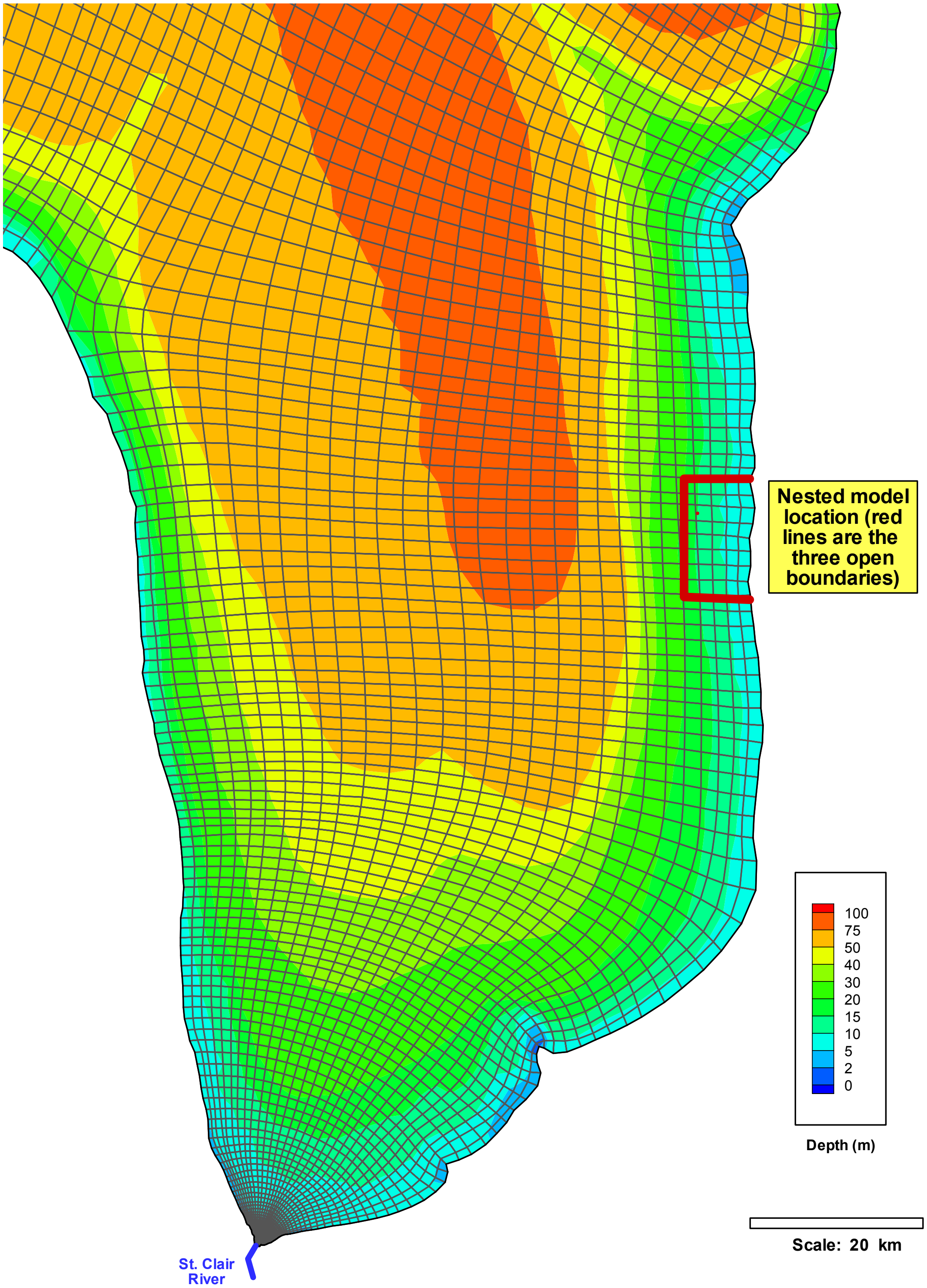


Figure 3.2 Portion of the whole-lake 2d modeling grid in southern Lake Huron showing the location of nested modeling grid.

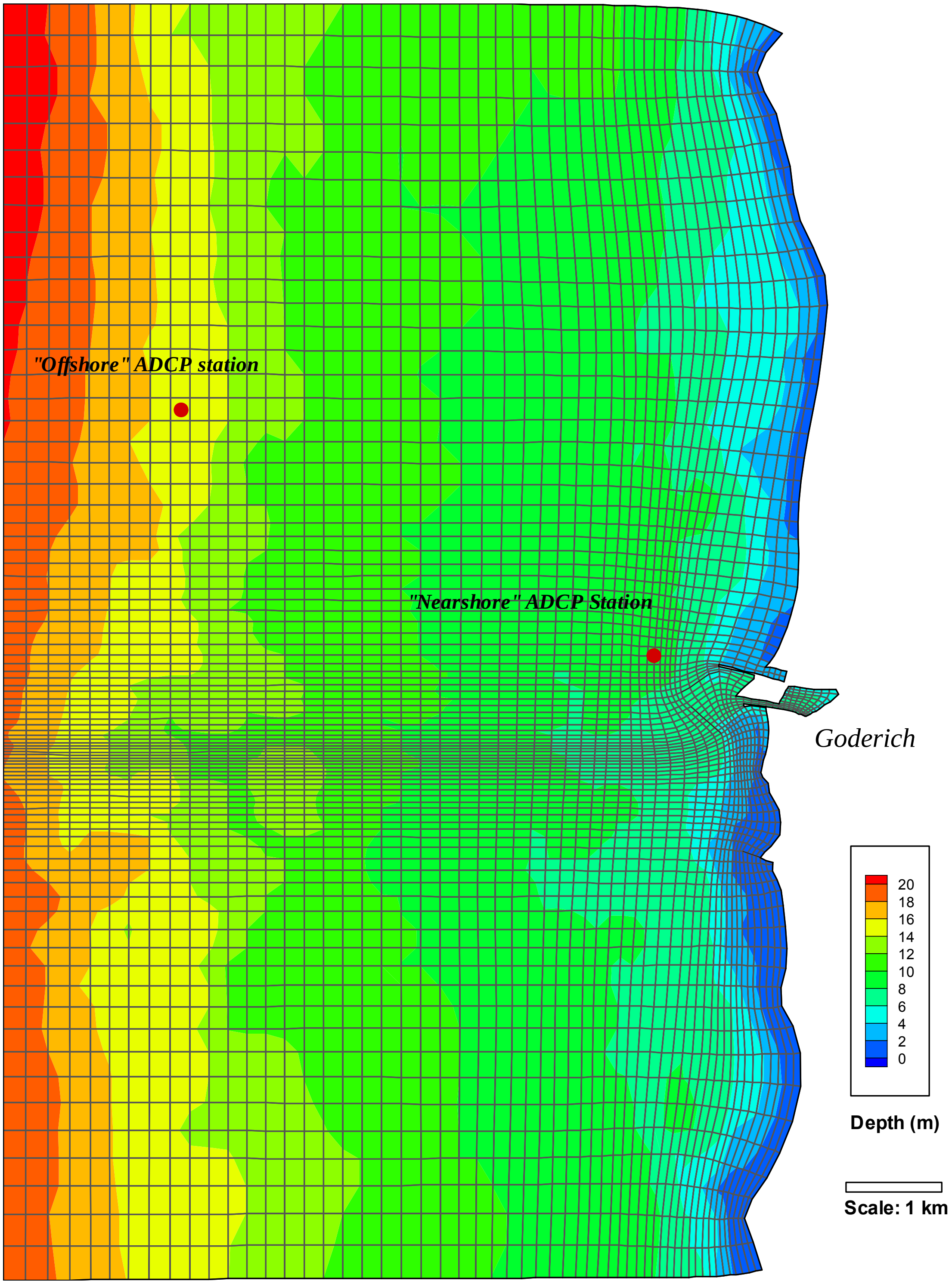


Figure 3.3 Nested modeling grid used for the Maitland River – Goderich study area.

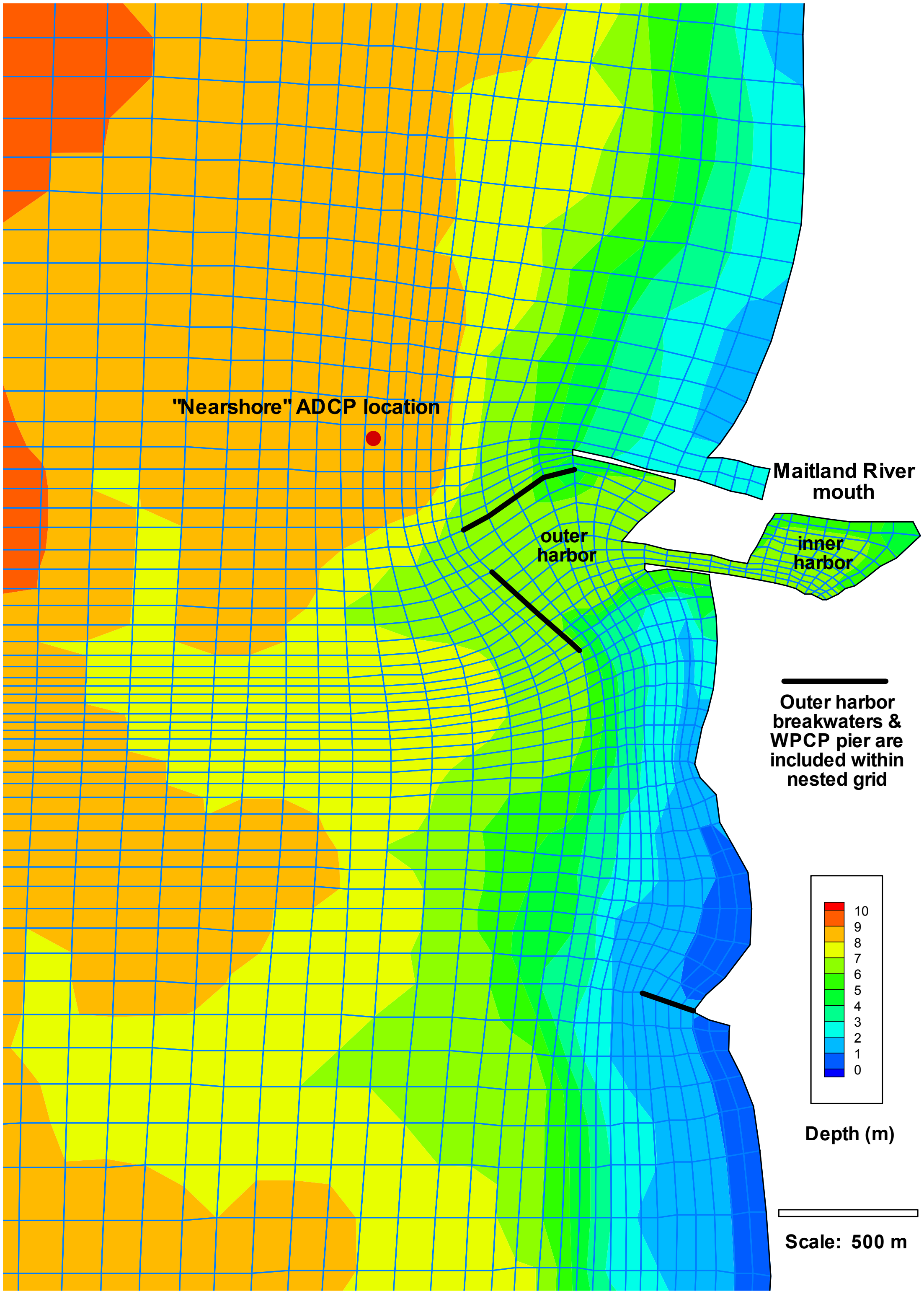


Figure 3.4 Enlargement of the nested modeling grid in the vicinity of the Maitland River mouth and Goderich Harbour.

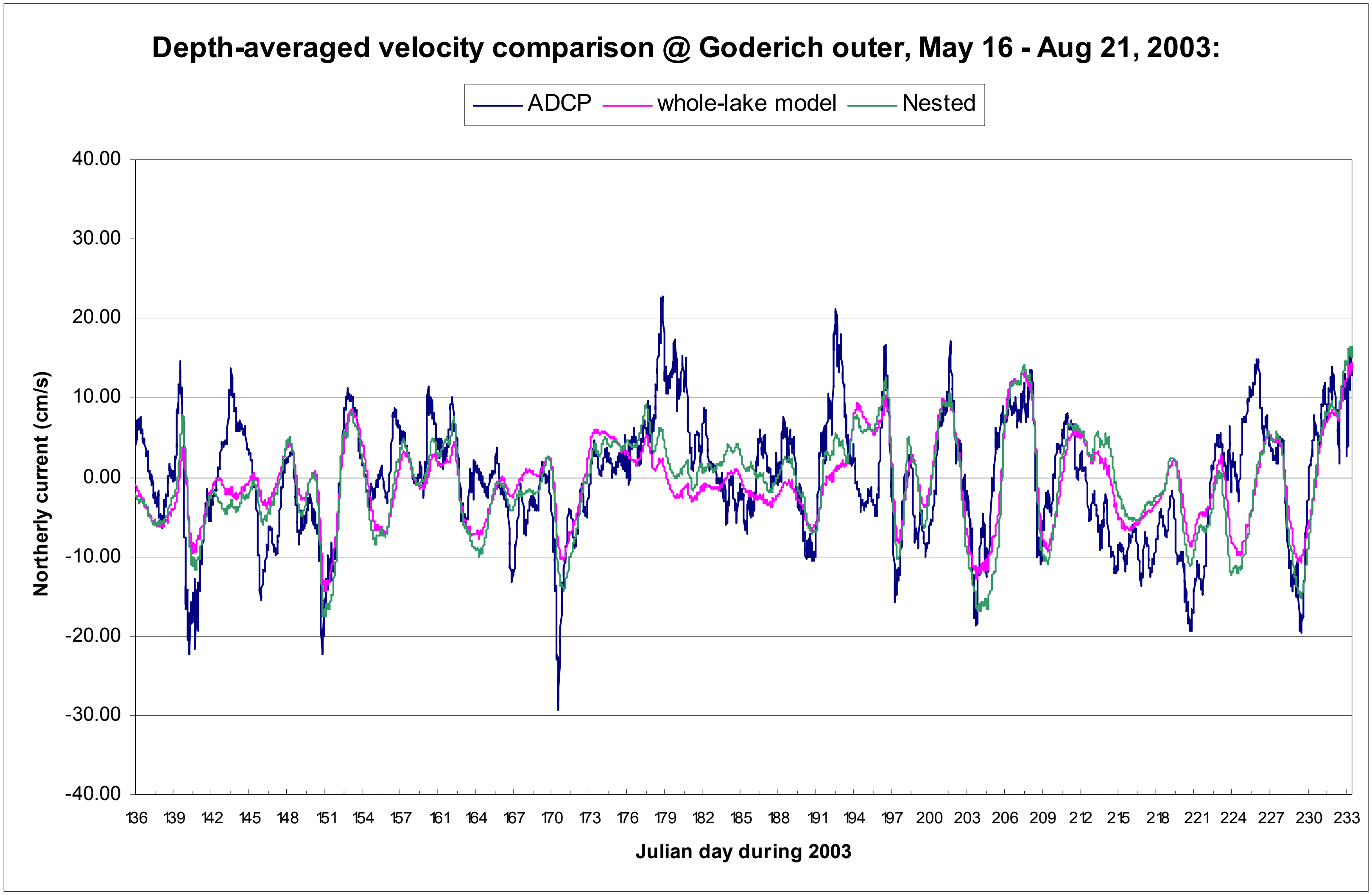


Figure 3.6(a) Comparison of velocities of the 2d whole-lake and nested models with those measured at the Offshore ADCP location, on May 16 to August 21, 2003.

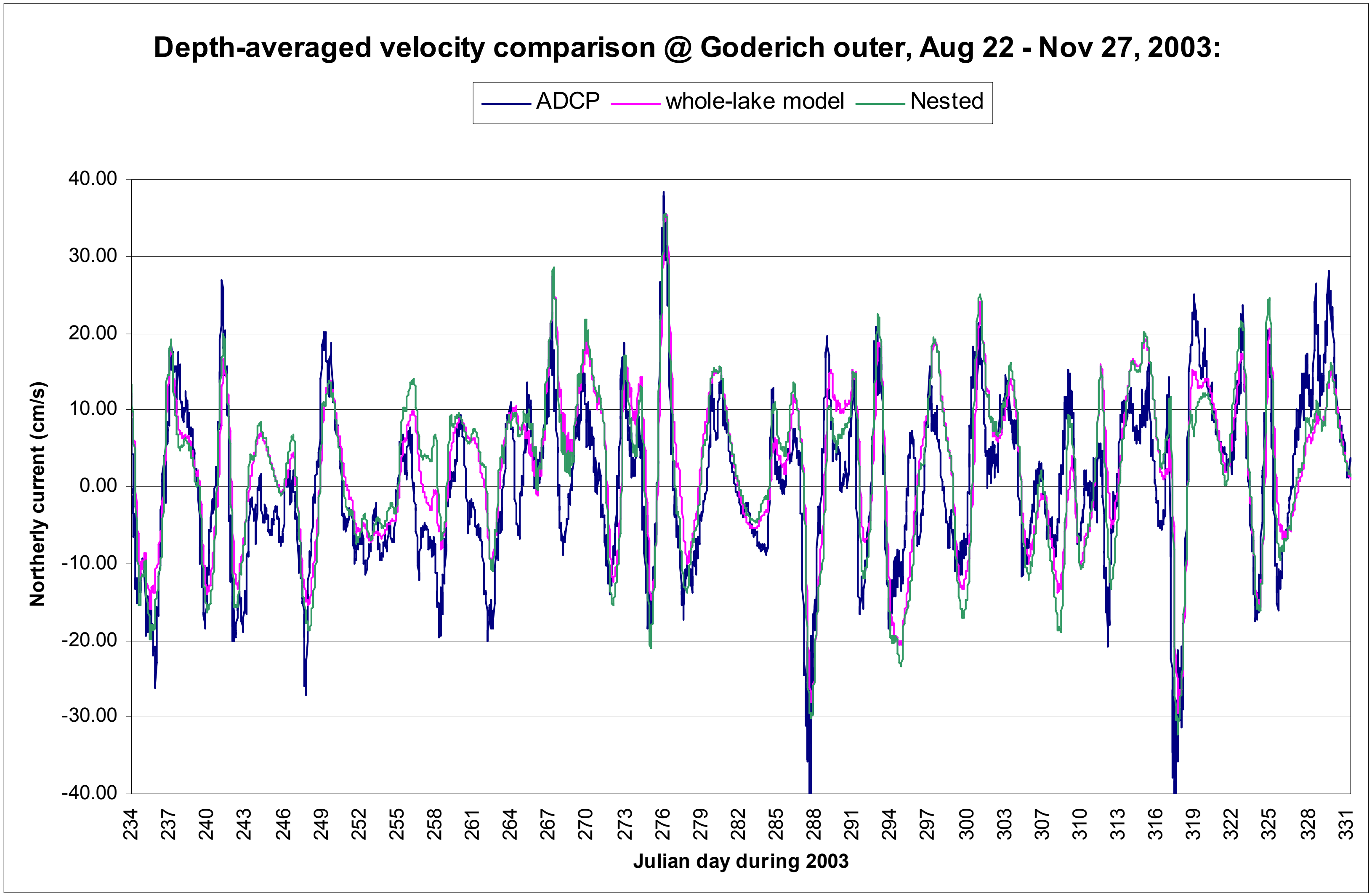


Figure 3.6(b) Comparison of velocities of the 2d whole-lake and nested models with those measured at the Offshore ADCP location, on August 22 to November 27, 2003.

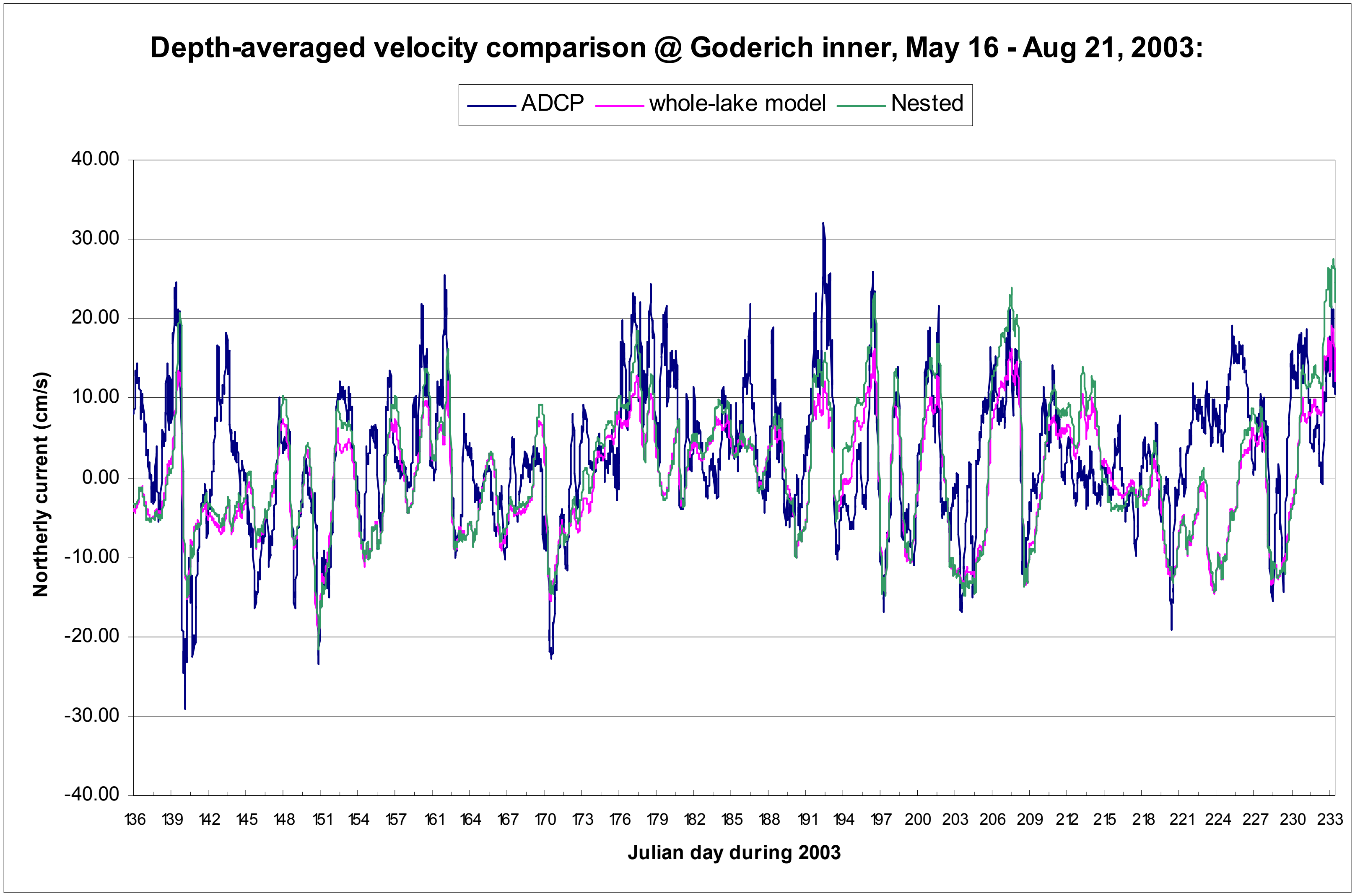


Figure 3.7(a) Comparison of velocities of the 2d whole-lake and nested models with those measured at the Nearshore ADCP location, on May 16 to August 21, 2003.

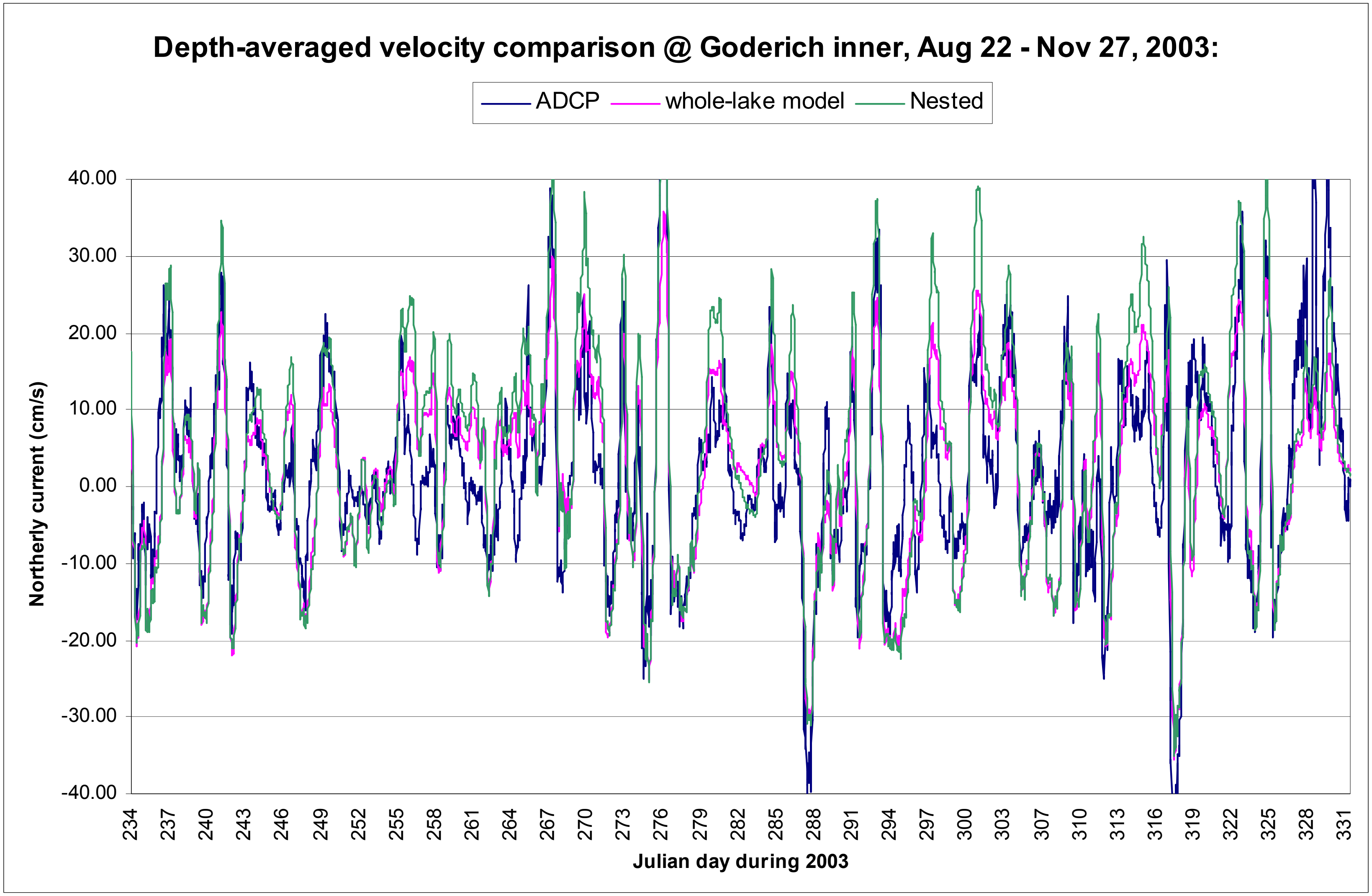


Figure 3.7(b) Comparison of velocities of the 2d whole-lake and nested models with those measured at the Nearshore ADCP location, on August 22 to November 27, 2003.

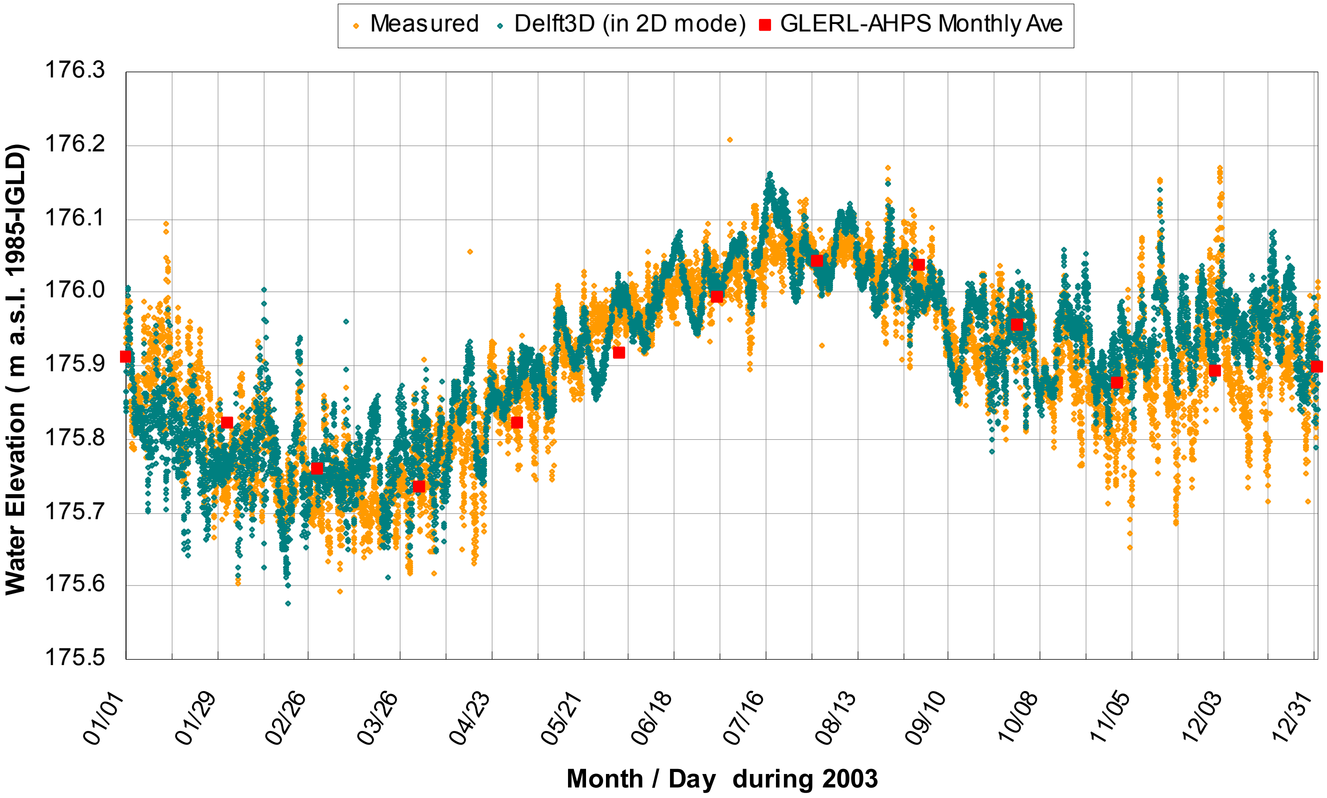


Figure 3.8(a) : Comparison of water levels simulated by the 2d model with those measured at Harbor Beach, Michigan, in 2003.

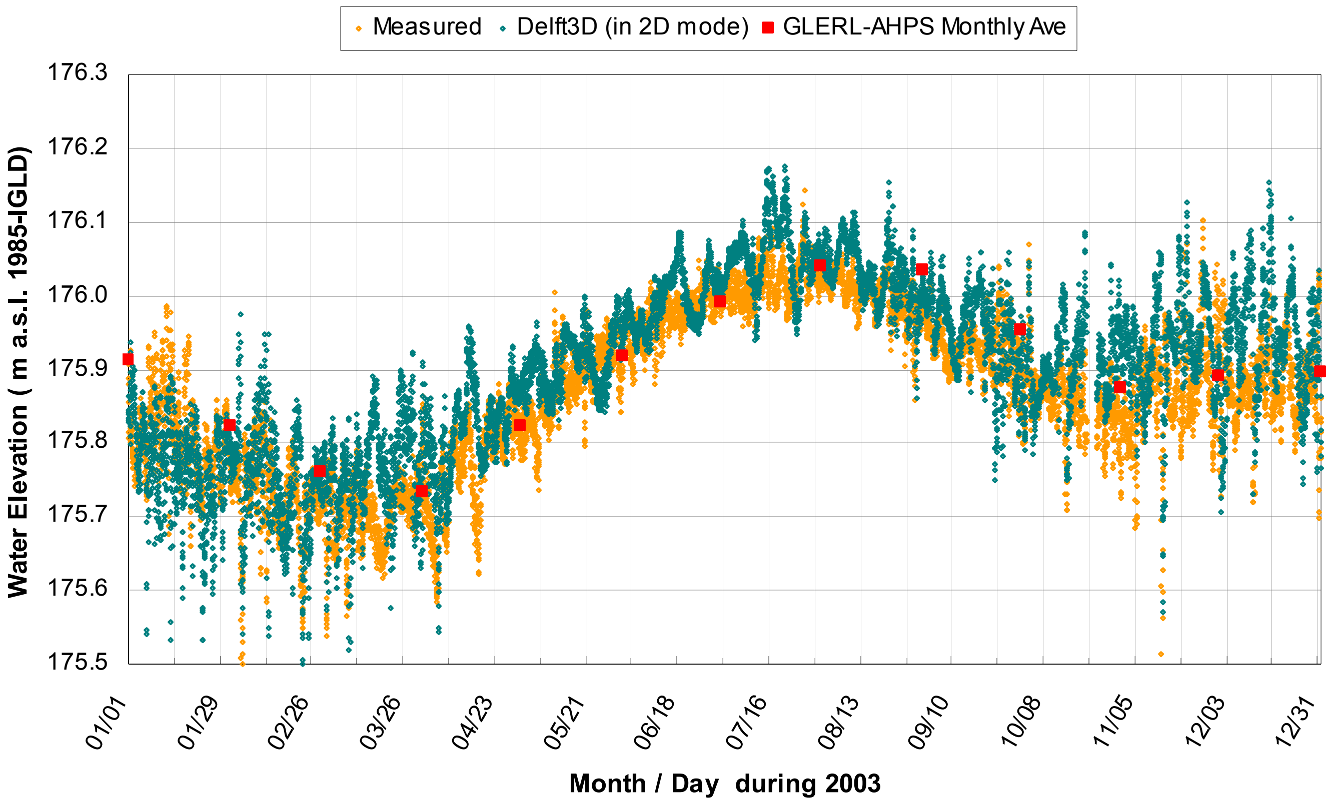


Figure 3.8(b) : Comparison of water levels simulated by the 2d model with those measured at De Tour Village, Michigan, in 2003.

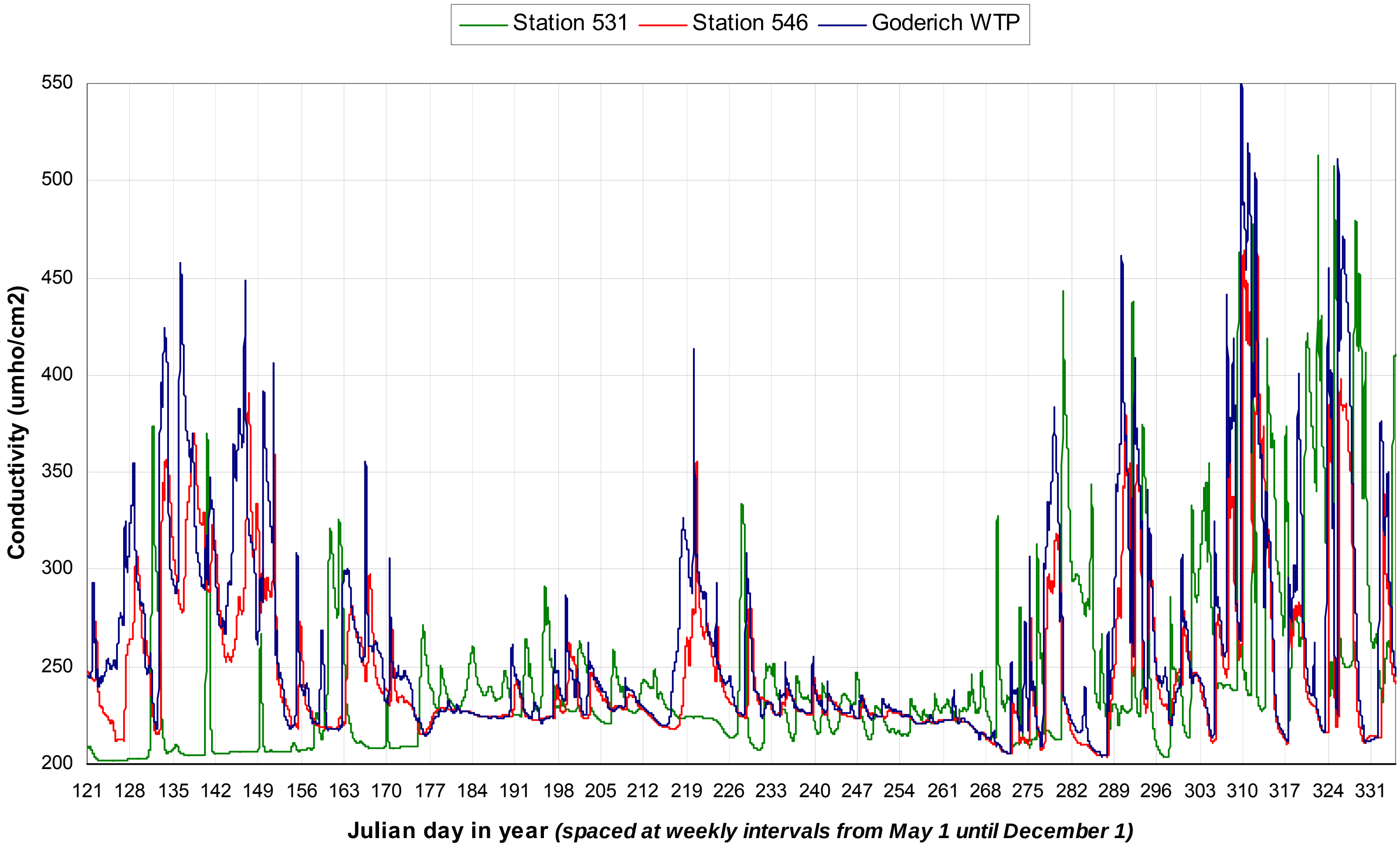


Figure 3.9 Conductivity time-series (from the nested 2d model) at selected points in 2003.

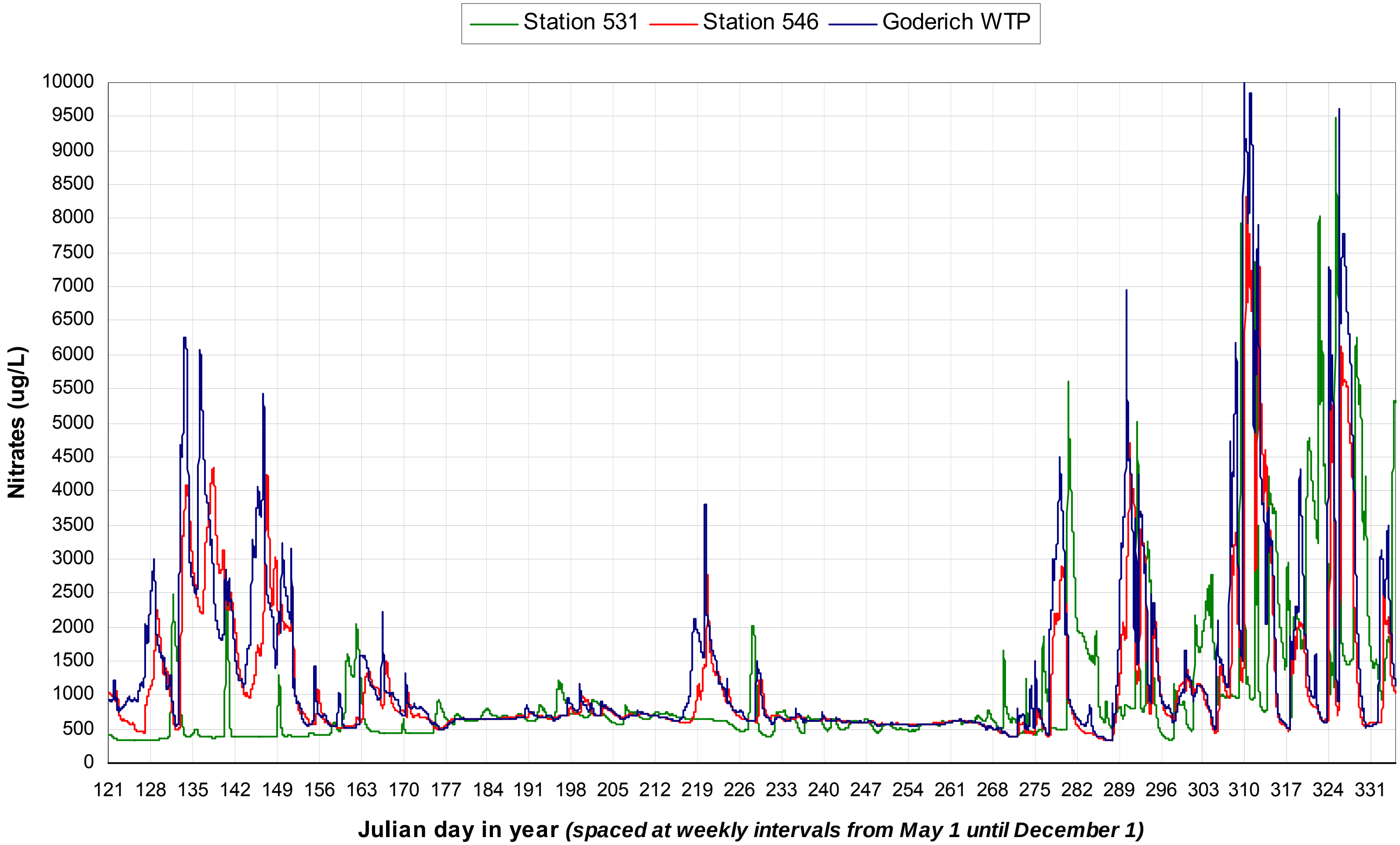


Figure 3.10 NO_2+NO_3 time-series (from the nested 2d model) at selected points in 2003.

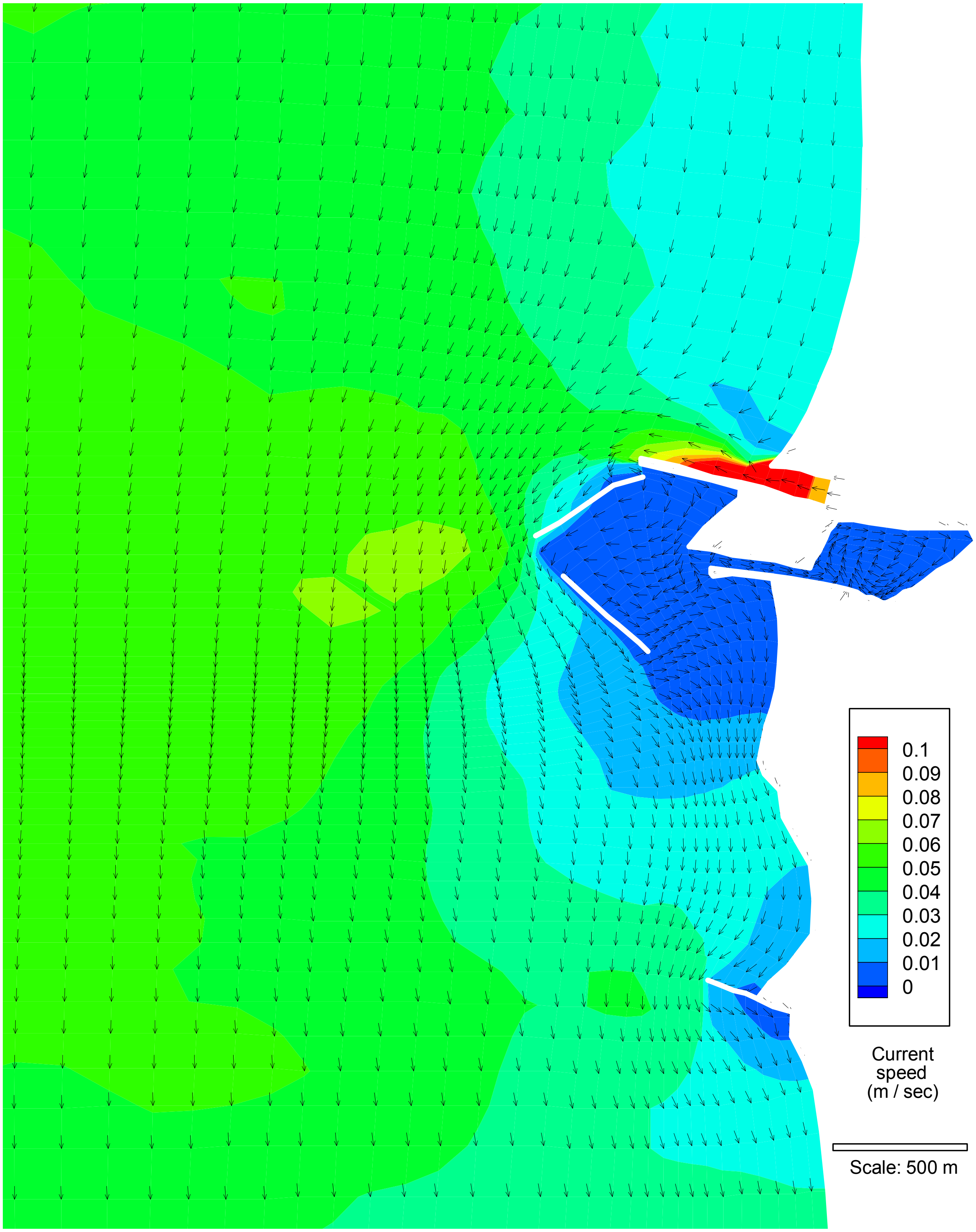


Figure 3.11(a) Depth-average current velocity, in the vicinity of Goderich Harbour, (at 12:00 hrs), on May 27, 2003, simulated by the 2d nested model.

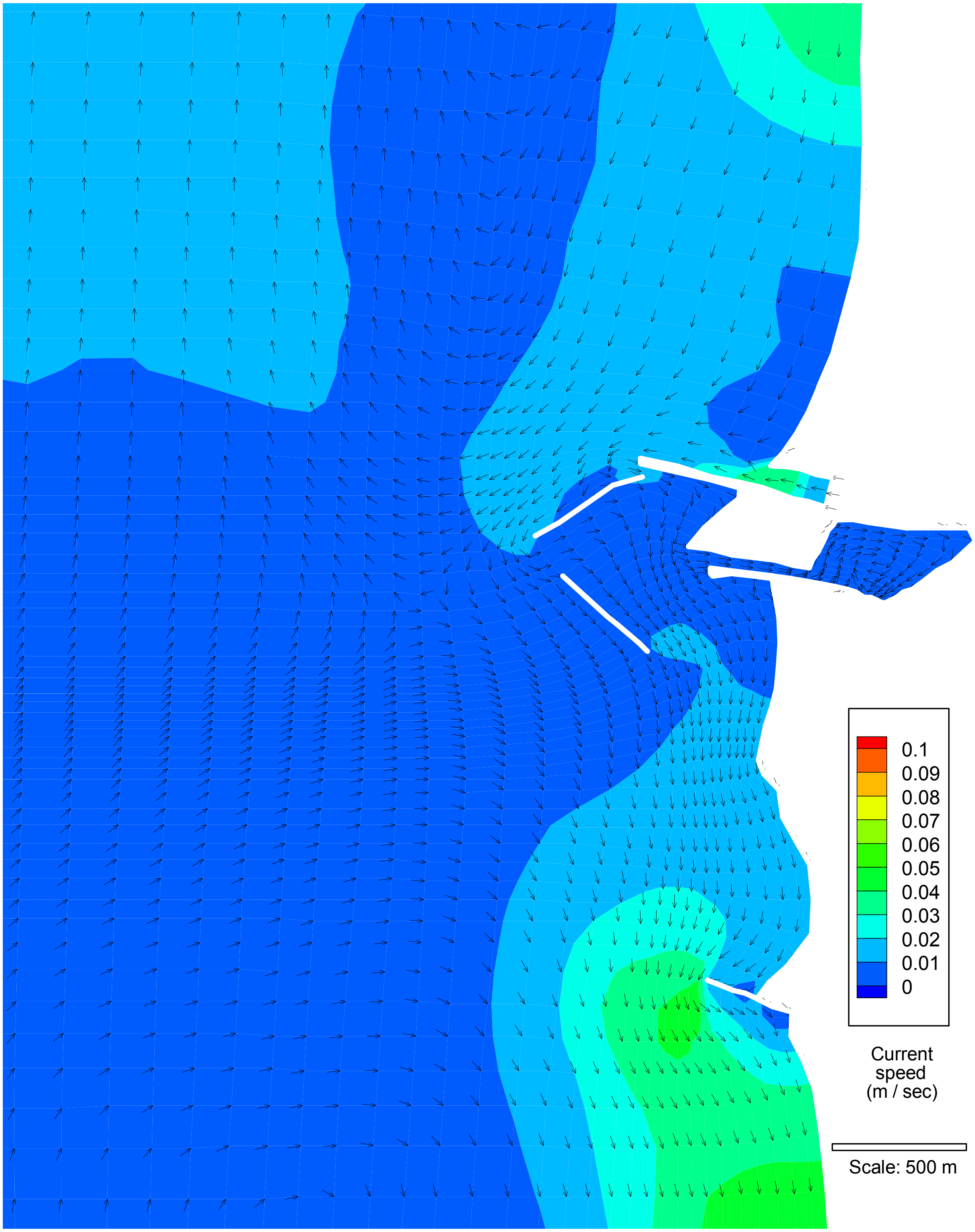


Figure 3.11(b) Depth-average current velocity, in the vicinity of Goderich Harbour, (at 12:00 hrs), on July 8, 2003, simulated by the 2d nested model.

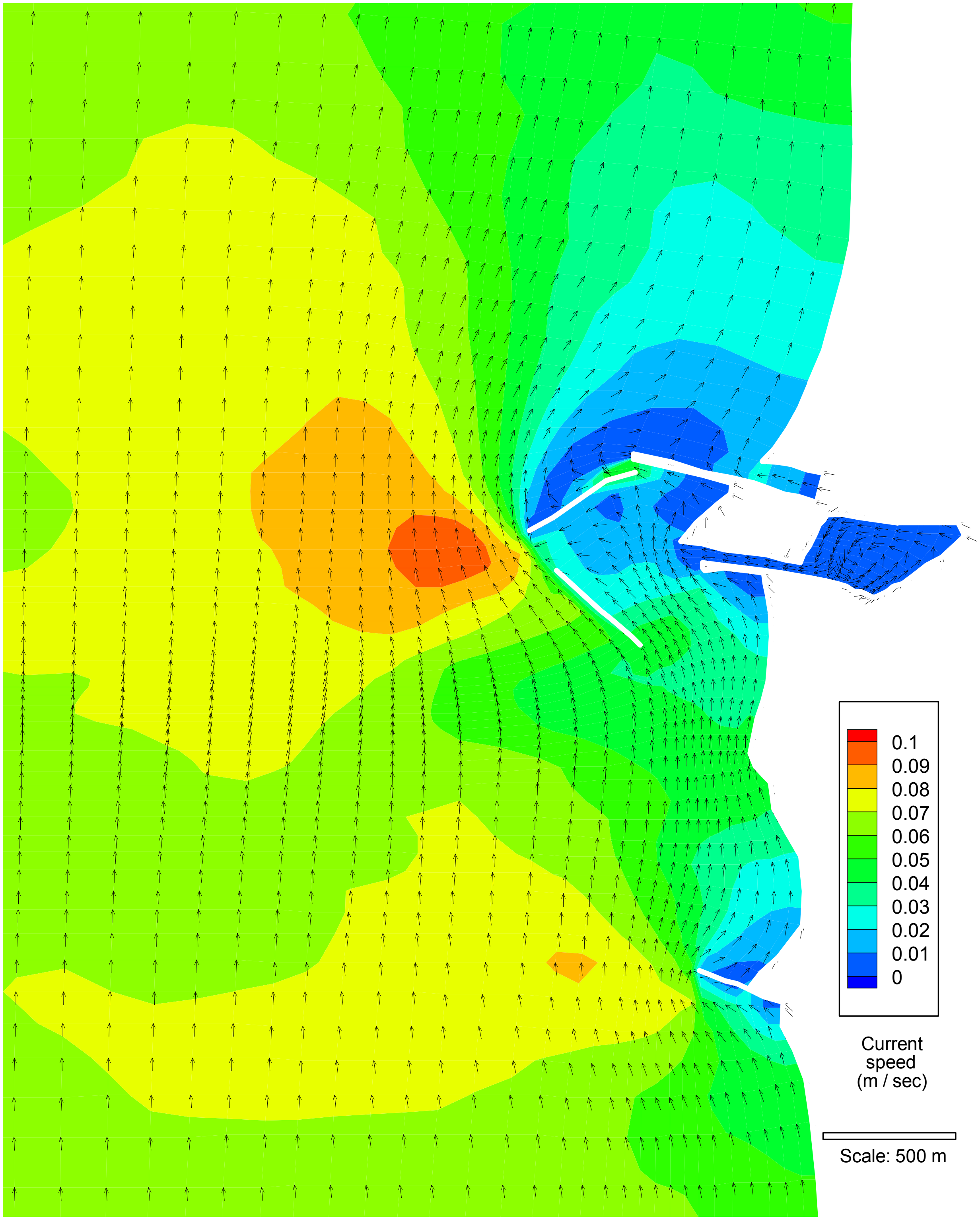


Figure 3.11(c) Depth-average current velocity, in the vicinity of Goderich Harbour, (at 12:00 hrs), on July 31, 2003, simulated by the 2d nested model.

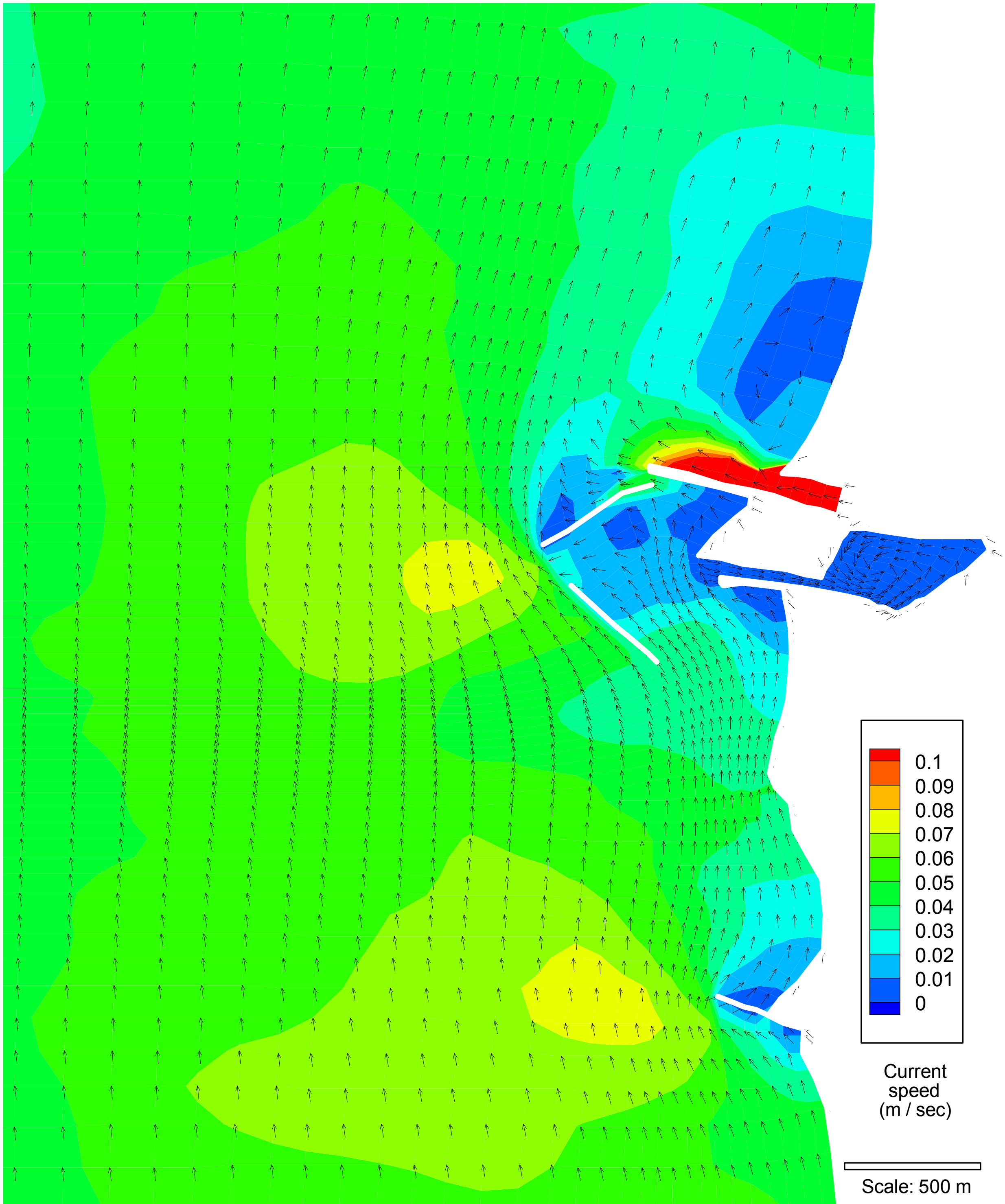


Figure 3.11(d) Depth-average current velocity, in the vicinity of Goderich Harbour, (at 12:00 hrs), on November 23, 2003, simulated by the 2d nested model.

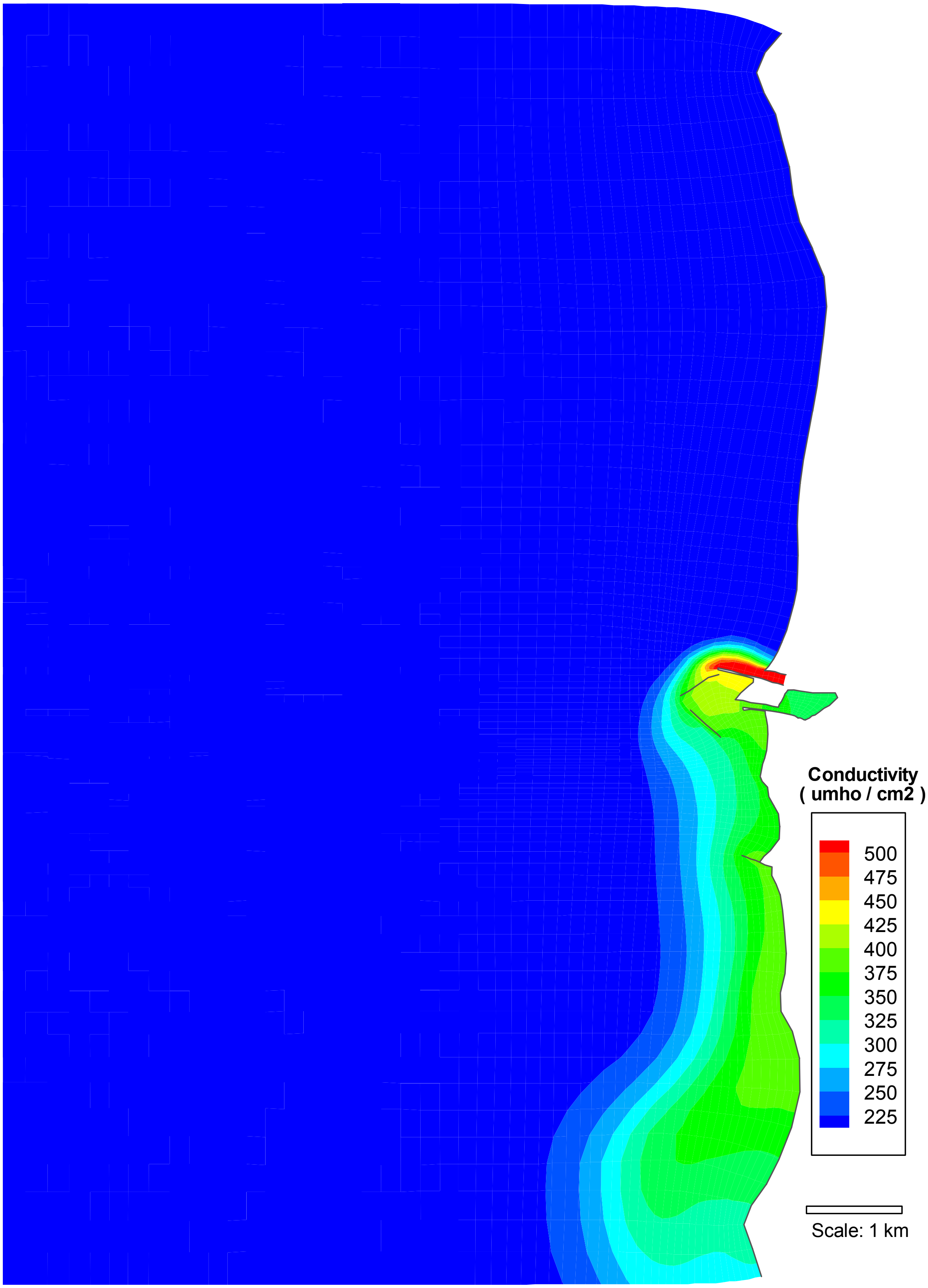


Figure 3.12(a) Conductivity plume, simulated by the 2d neted model within the Maitland River – Goderich study area, (at 12:00 hrs), on May 27, 2003.

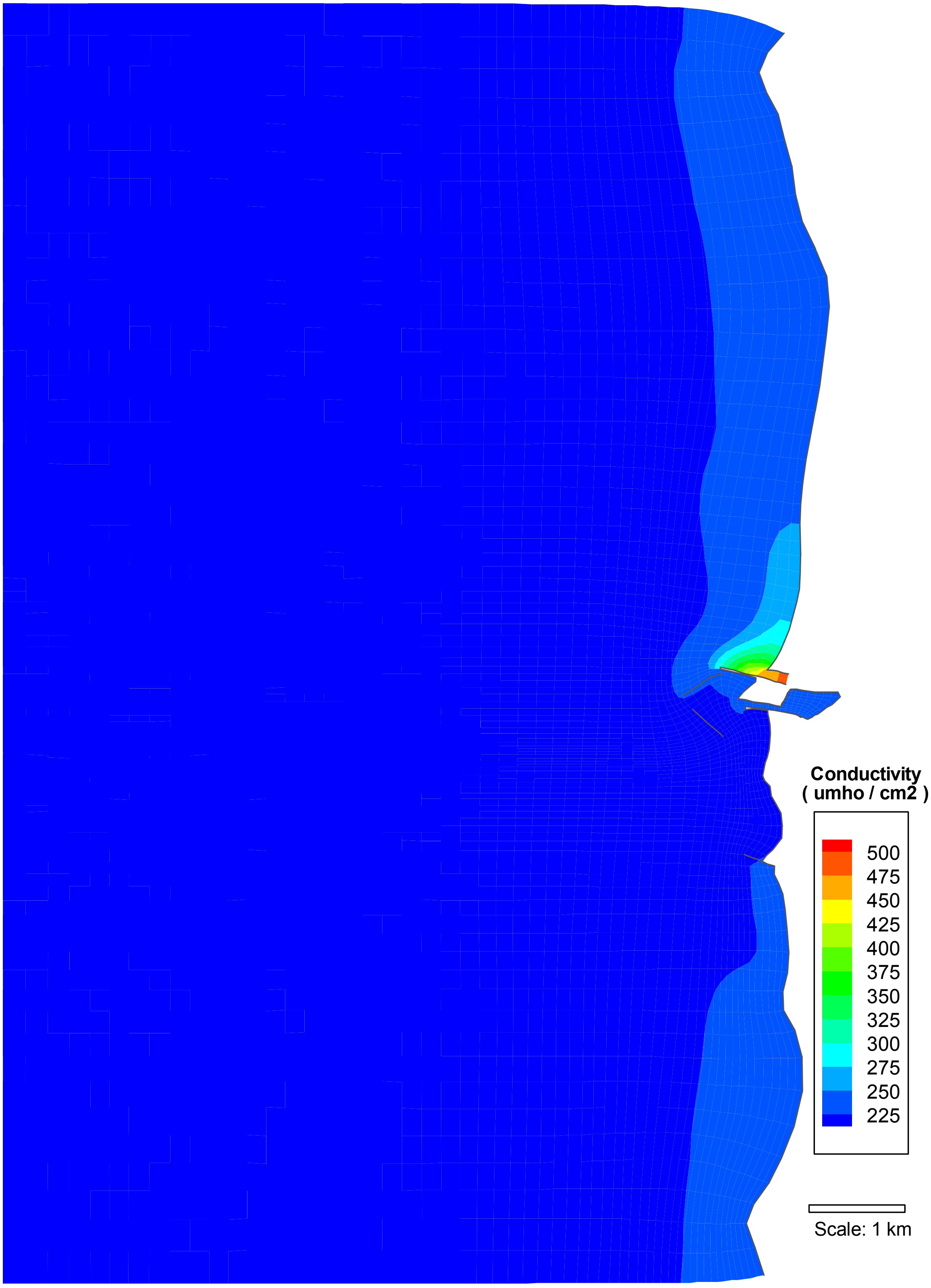


Figure 3.12(b) Conductivity plume, simulated by the 2d neted model within the Maitland River – Goderich study area, (at 12:00 hrs), on July 8, 2003.

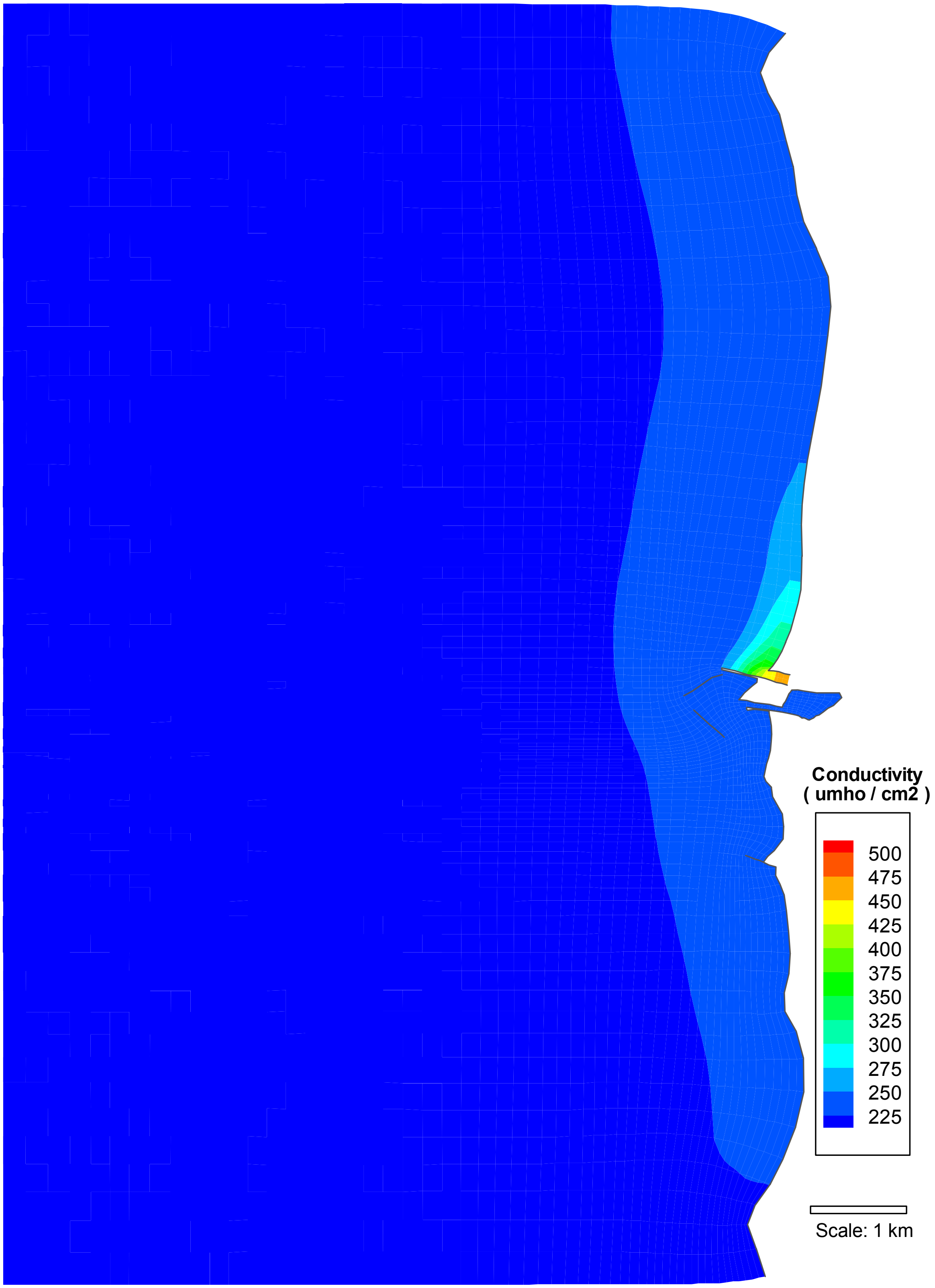


Figure 3.12(c) Conductivity plume, simulated by the 2d neted model within the Maitland River – Goderich study area, (at 12:00 hrs), on July 31, 2003.

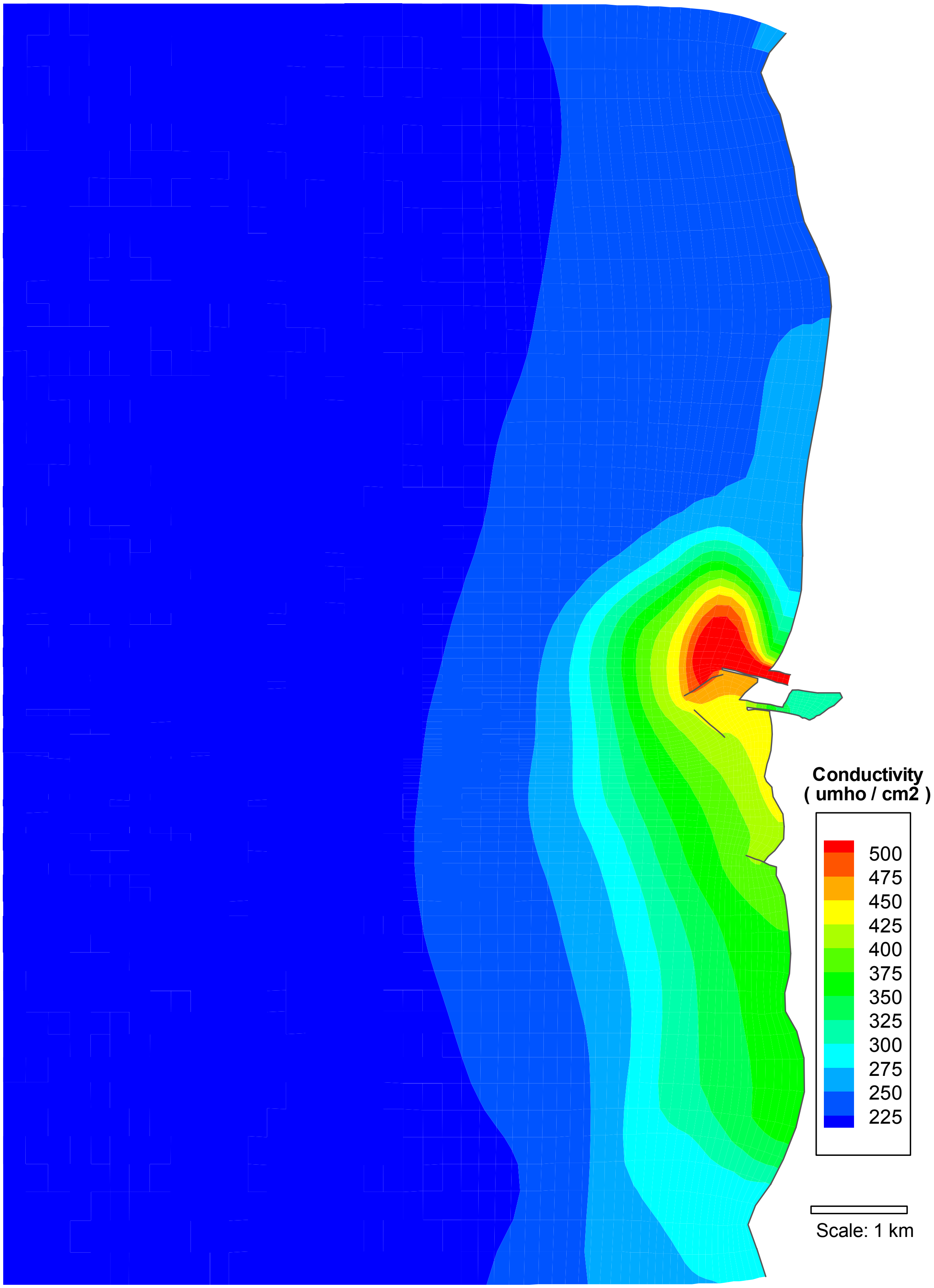


Figure 3.12(d) Conductivity plume, simulated by the 2d neted model within the Maitland River – Goderich study area, (at 12:00 hrs), on November 23, 2003.

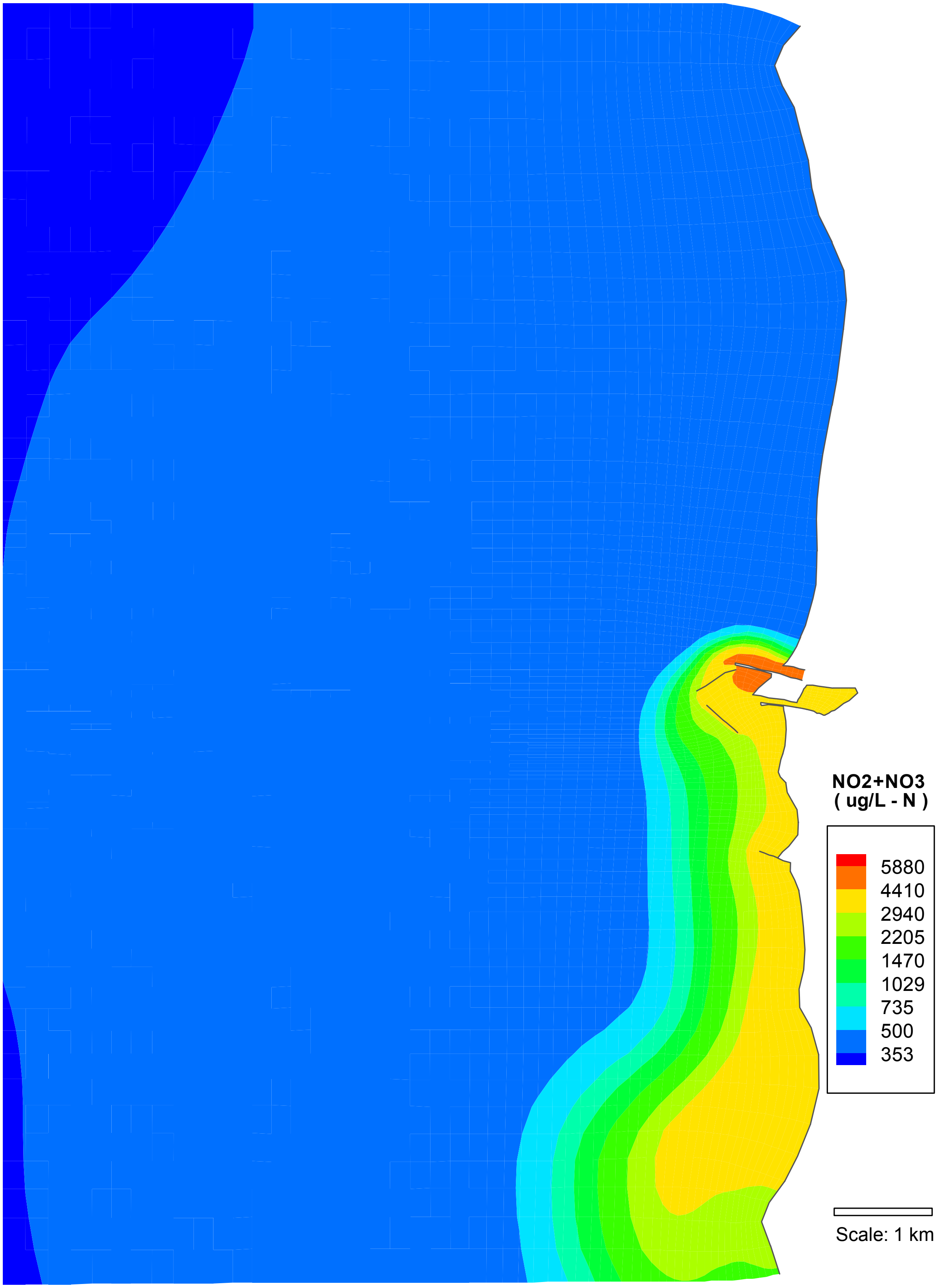


Figure 3.13(a) NO_2+NO_3 plume, simulated by the 2d neted model within the Maitland River – Goderich study area, (at 12:00 hrs), on May 27, 2003.

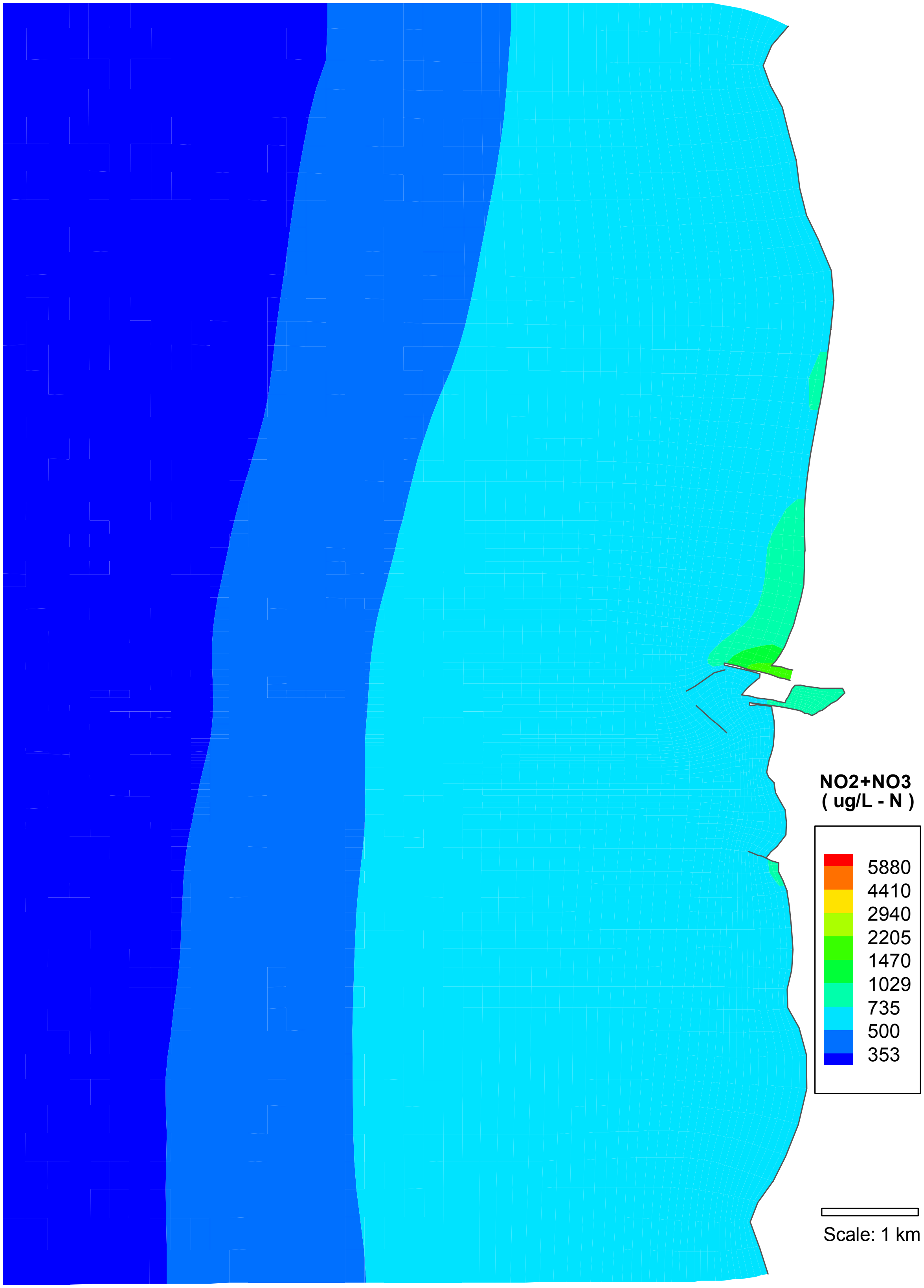


Figure 3.13(b) NO_2+NO_3 plume, simulated by the 2d neted model within the Maitland River – Goderich study area, (at 12:00 hrs), on July 8, 2003.

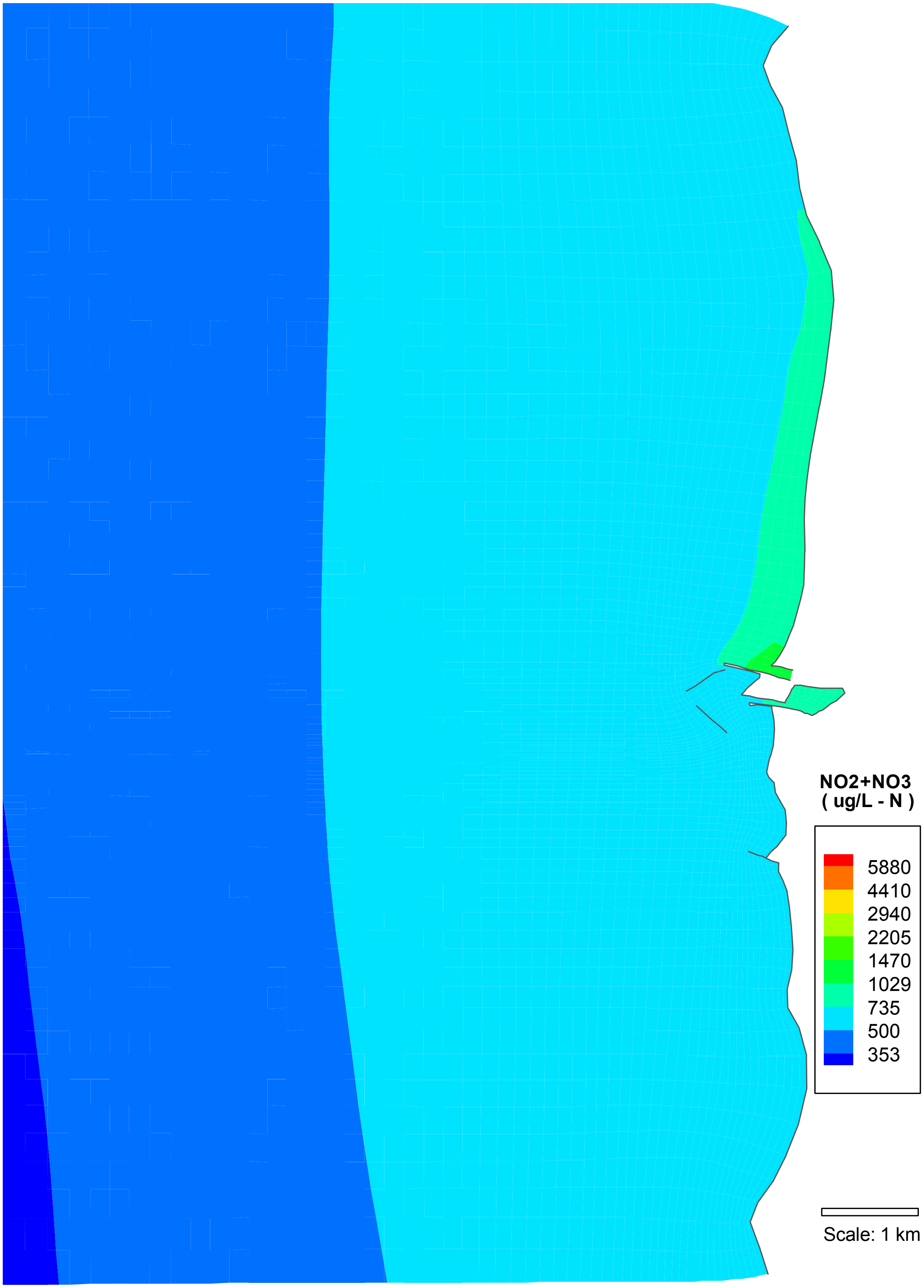


Figure 3.13(c) NO$_2$+NO$_3$ plume, simulated by the 2d neted model within the Maitland River – Goderich study area, (at 12:00 hrs), on July 31, 2003.

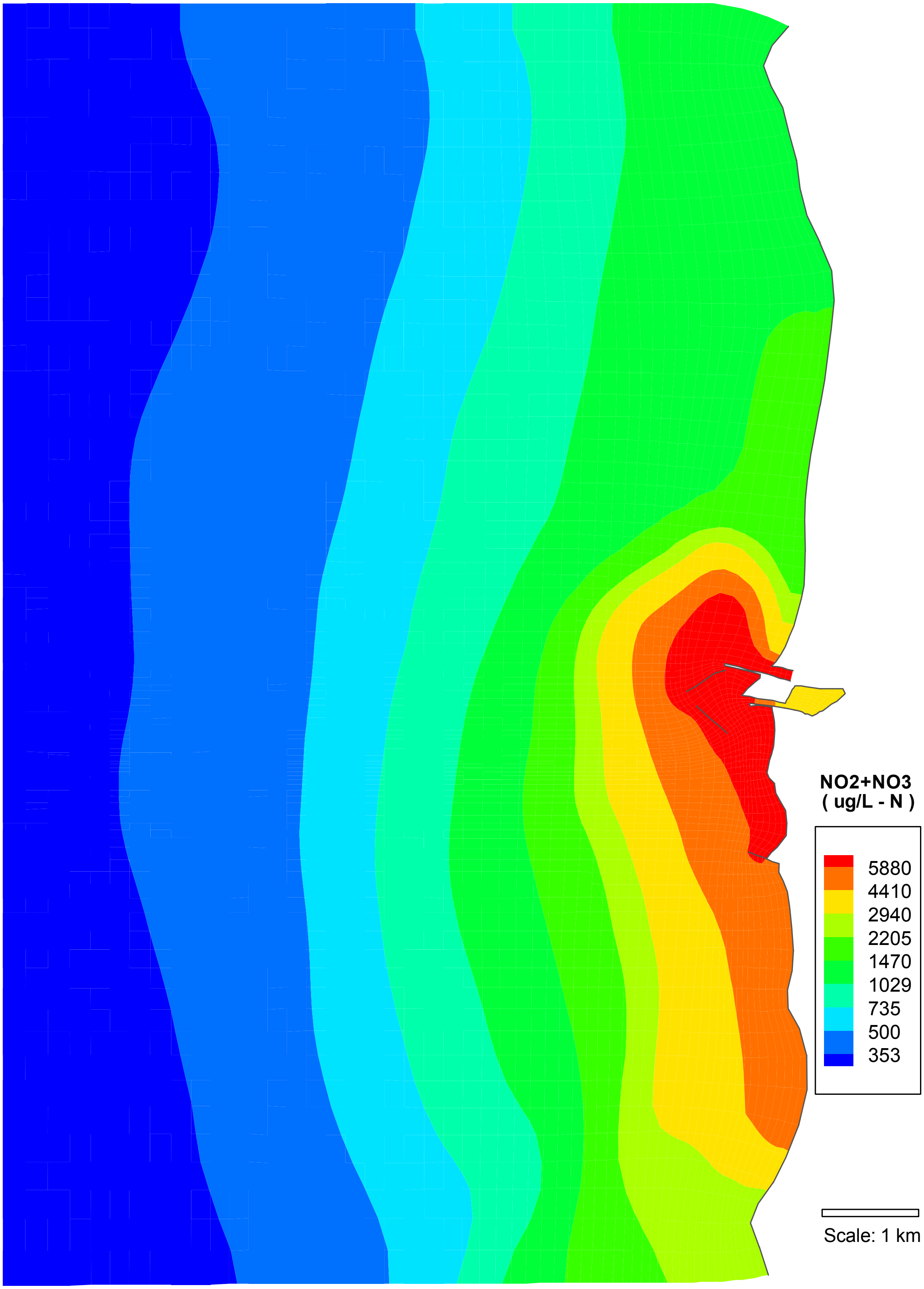


Figure 3.13(d) NO_2+NO_3 plume, simulated by the 2d neted model within the Maitland River – Goderich study area, (at 12:00 hrs), on November 23, 2003.

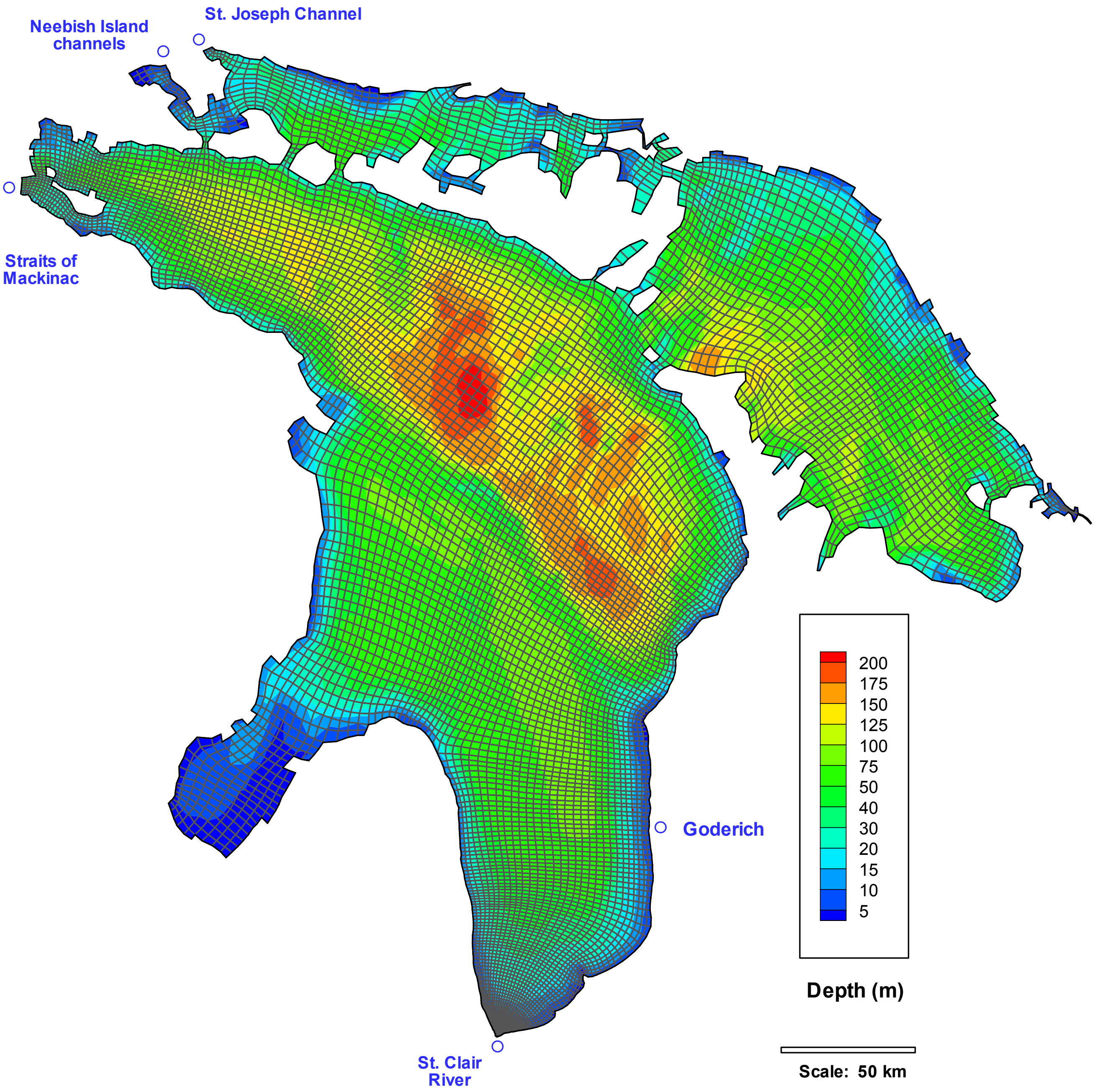


Figure 4.1 The initial grid considered, ("LHWLkPt"), for whole-lake 3d modeling.

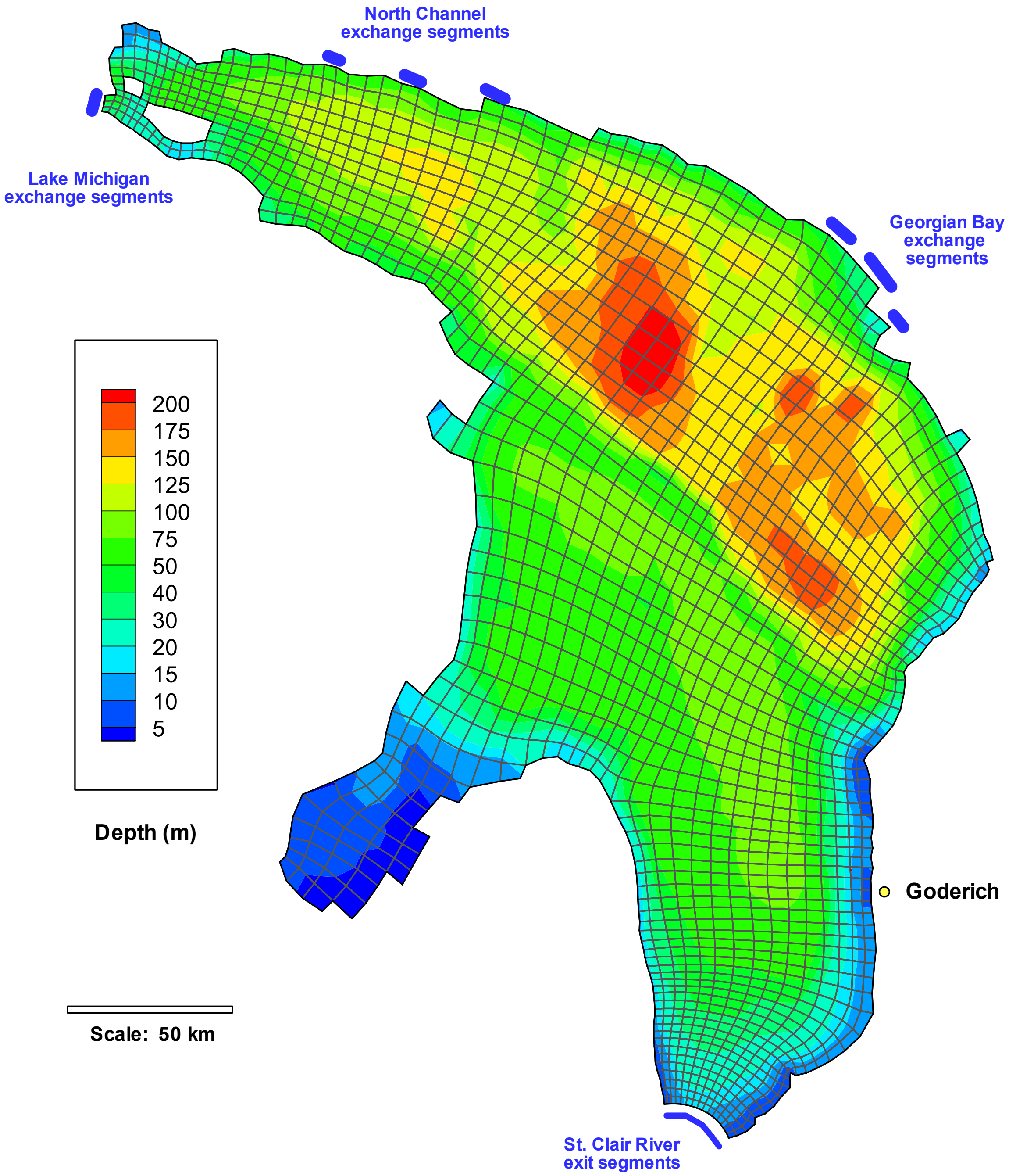


Figure 4.2 The final grid used, ("LHWLkPtD"), for whole-lake 3d modeling.

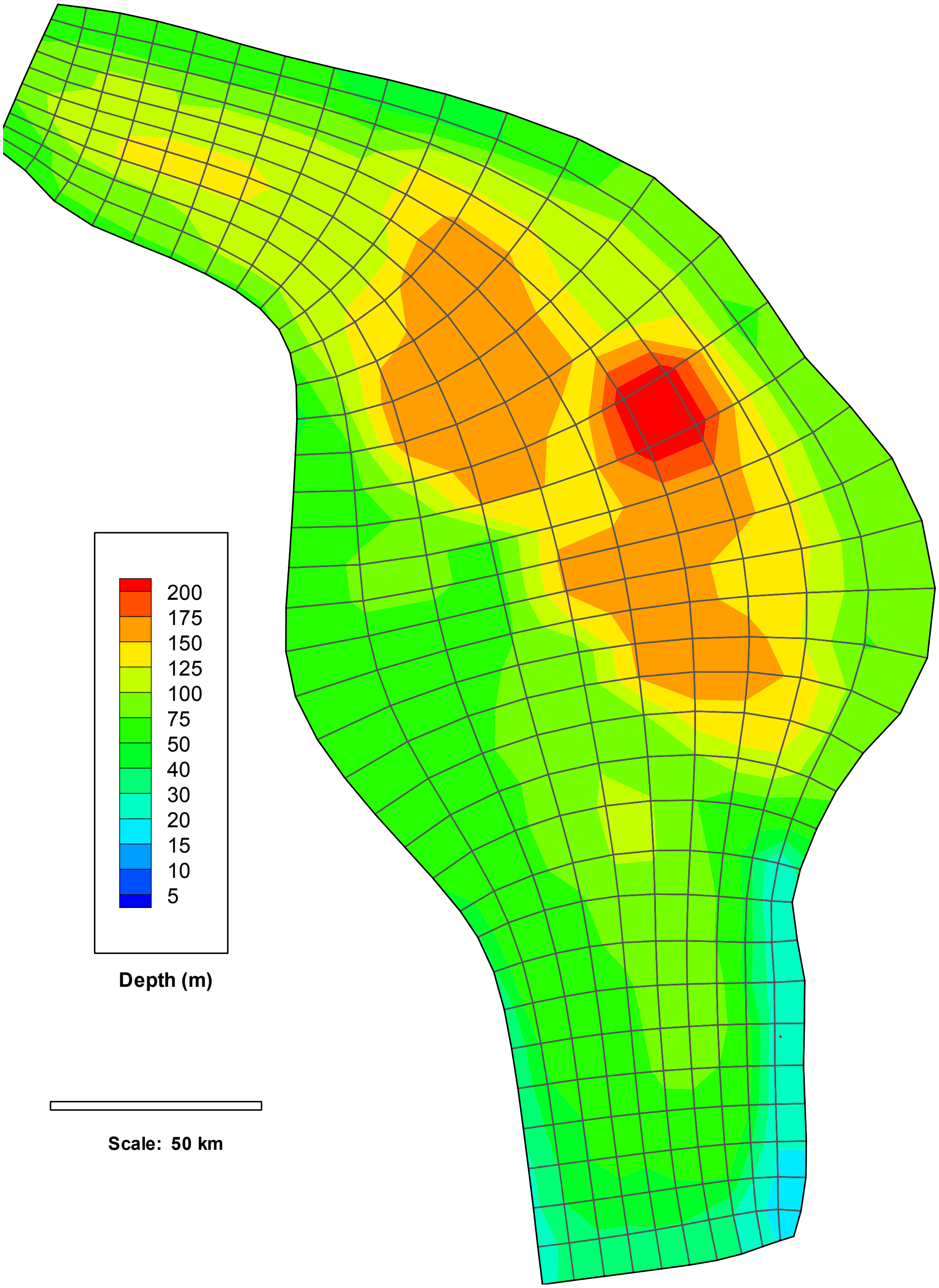


Figure 4.3 The whole-lake 3d test grid, ("vtest"), used for sensitivity analysis.

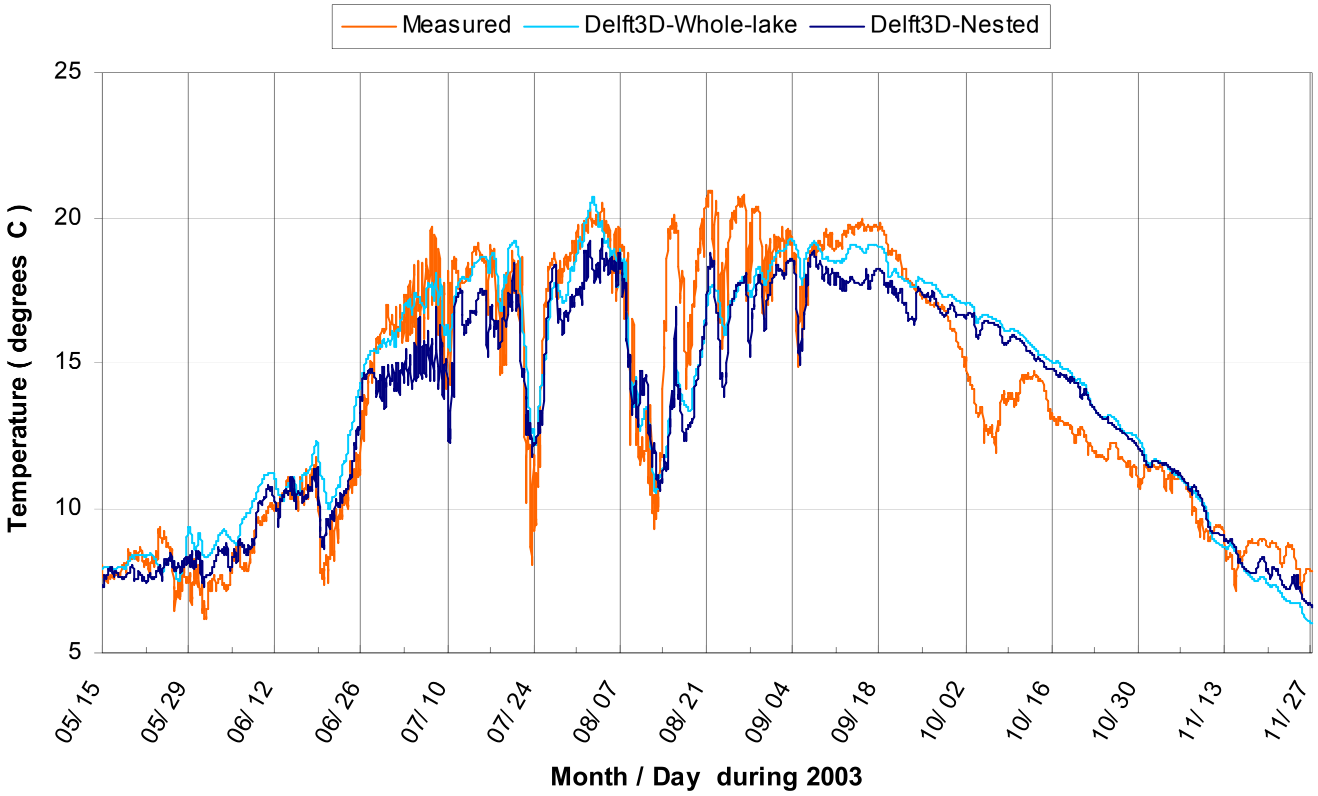


Figure 4.4(a) : Intra-thermistor depth-average water temperature, at the Maitland Offshore site.

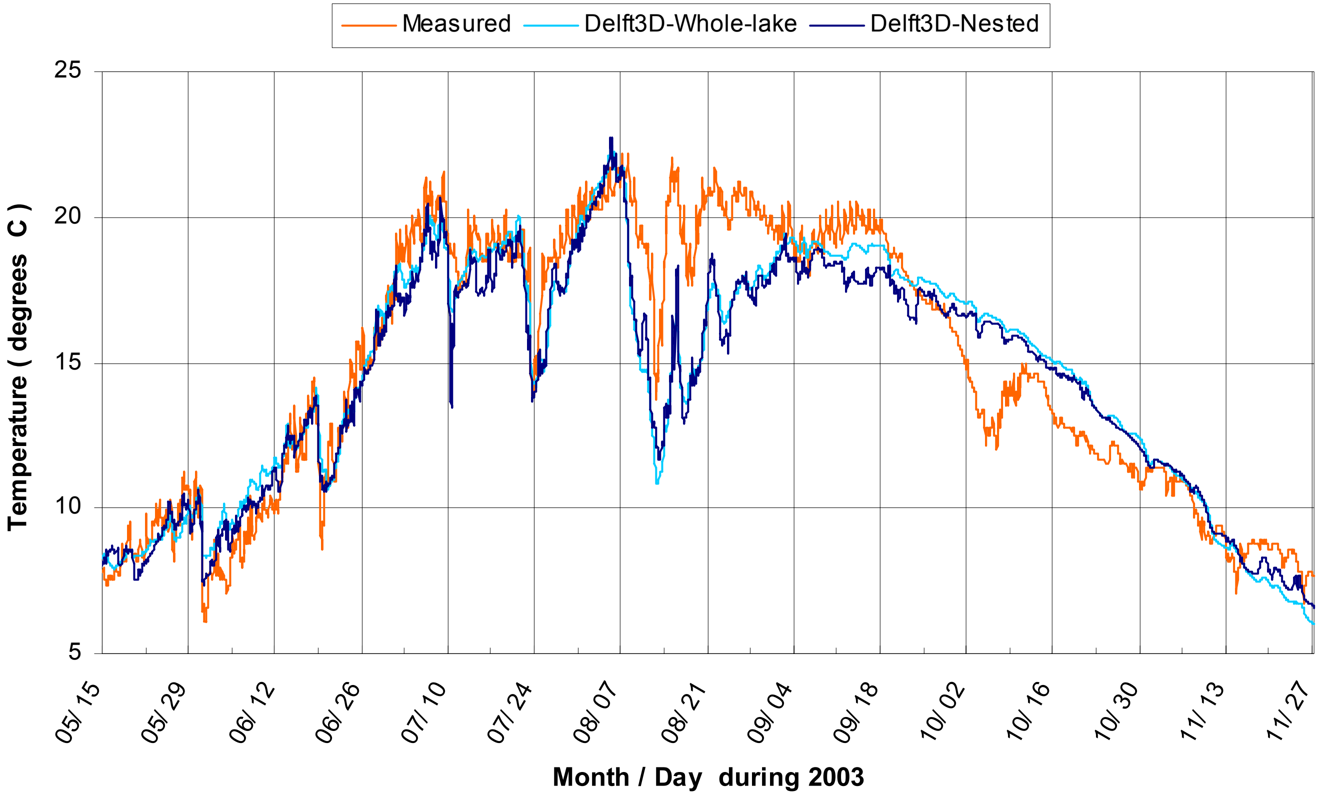


Figure 4.4(b) : Top thermistor water temperature, at the Maitland Offshore site.

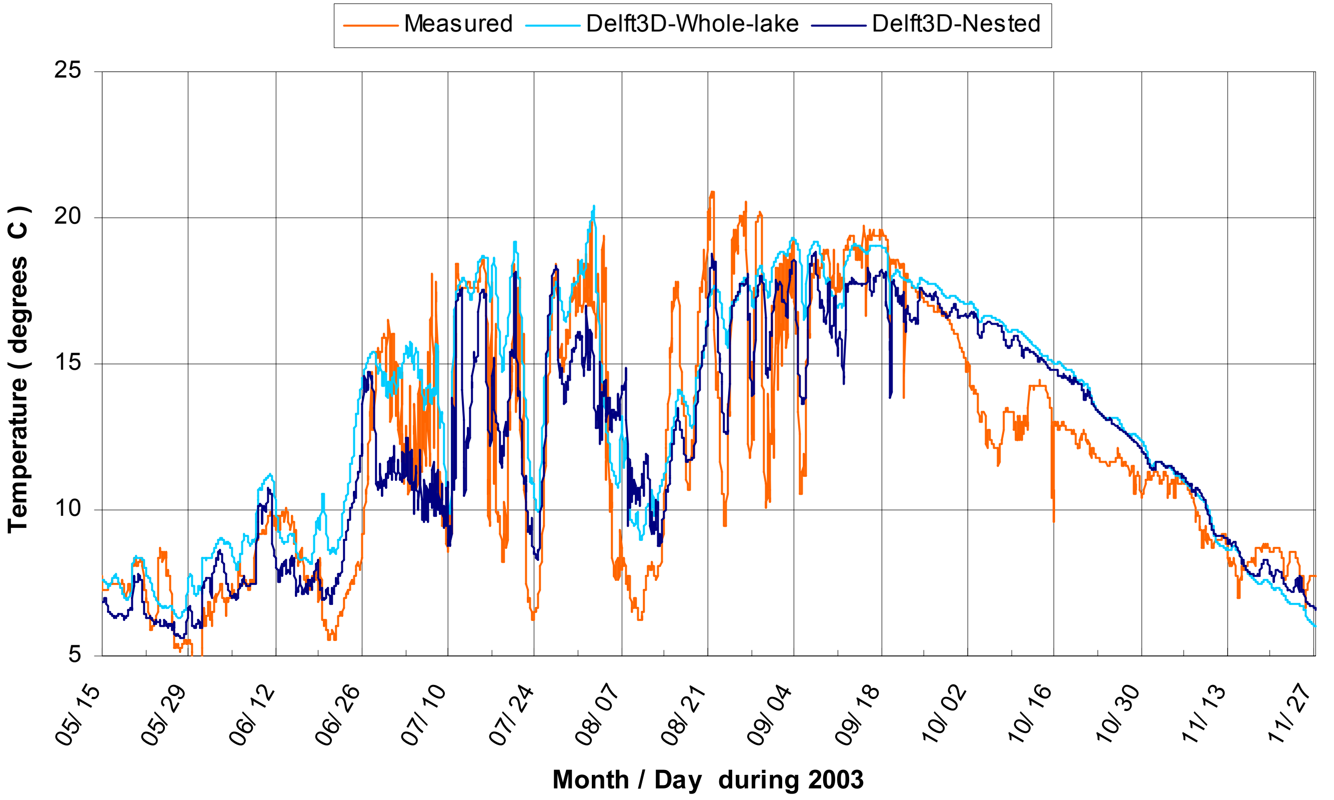


Figure 4.4(c) : Bottom thermistor water temperature, at the Maitland Offshore site.

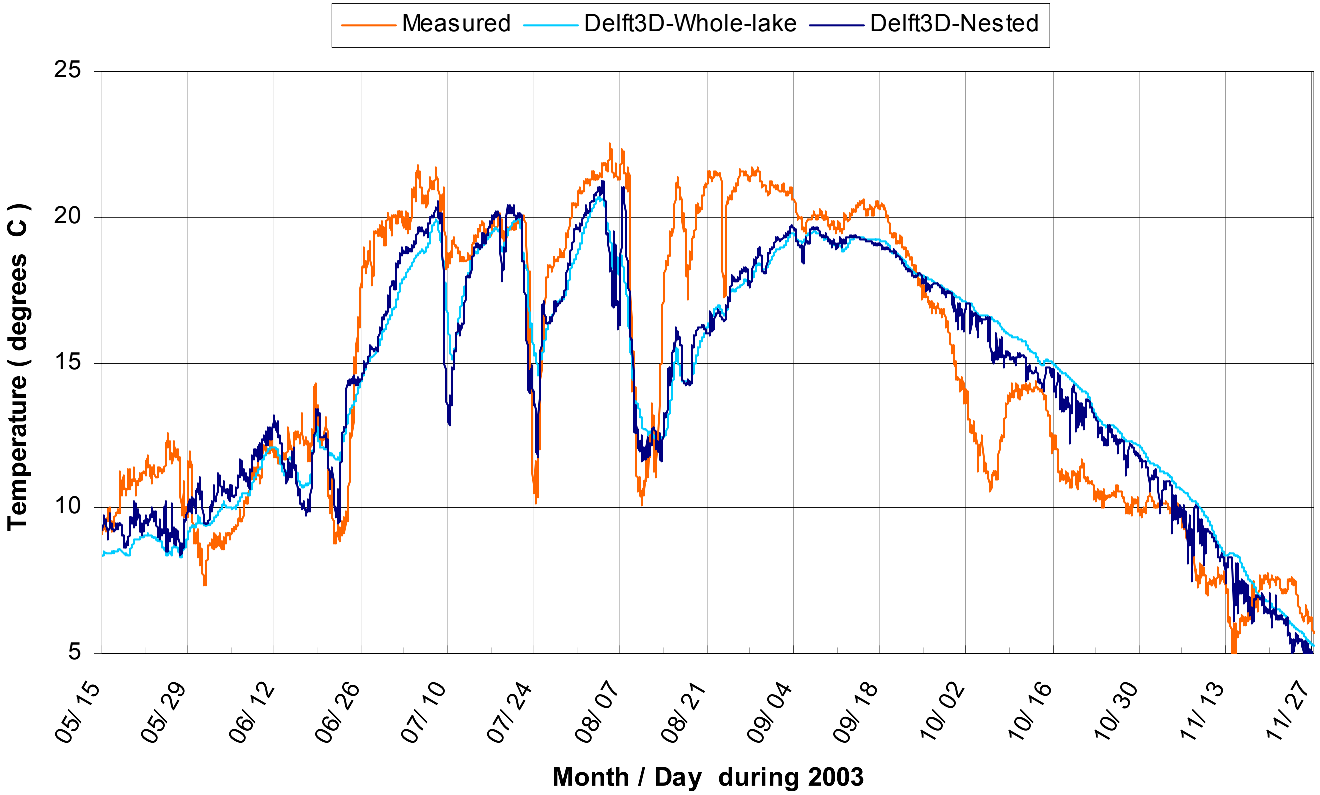


Figure 4.5(a) : Intra-thermistor depth-average water temperature, at the Maitland Nearshore site.

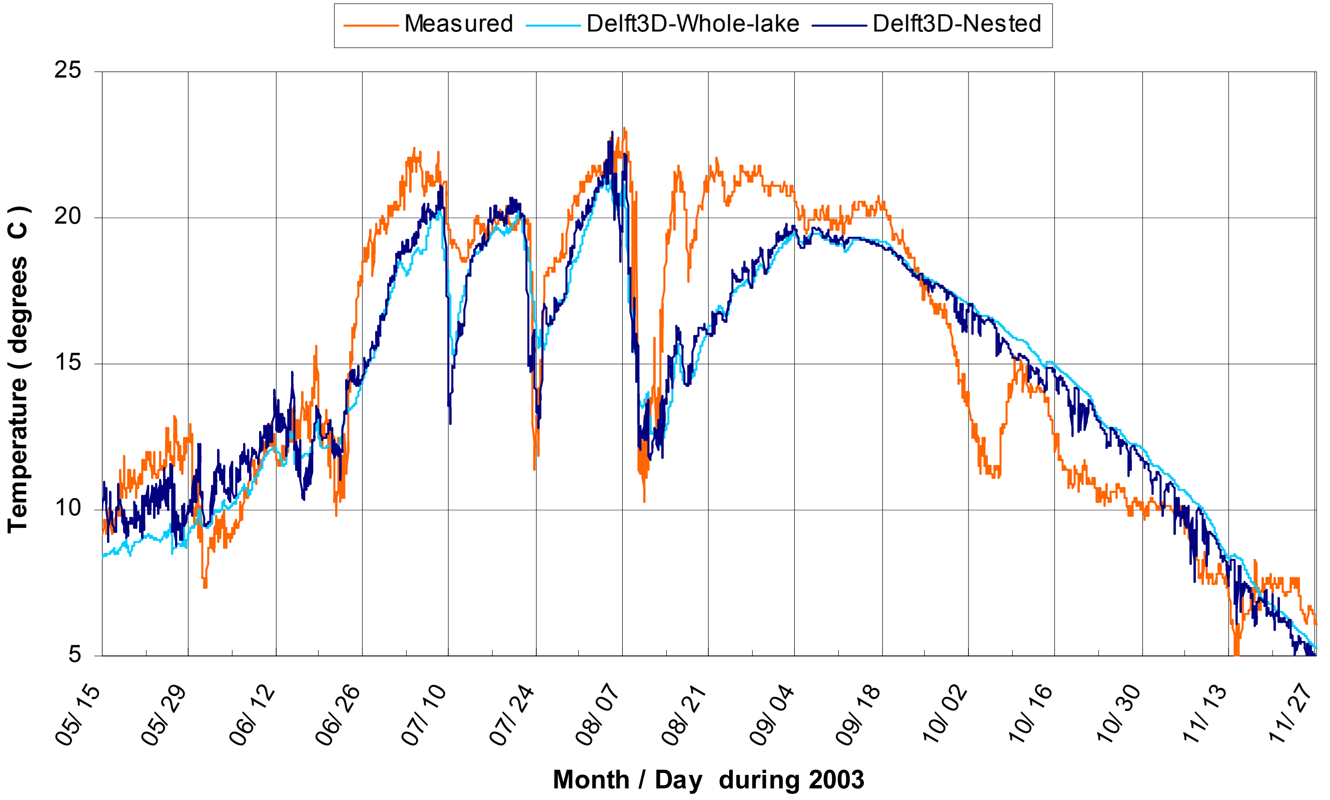


Figure 4.5(b) : Top thermistor water temperature, at the Maitland Nearshore site.

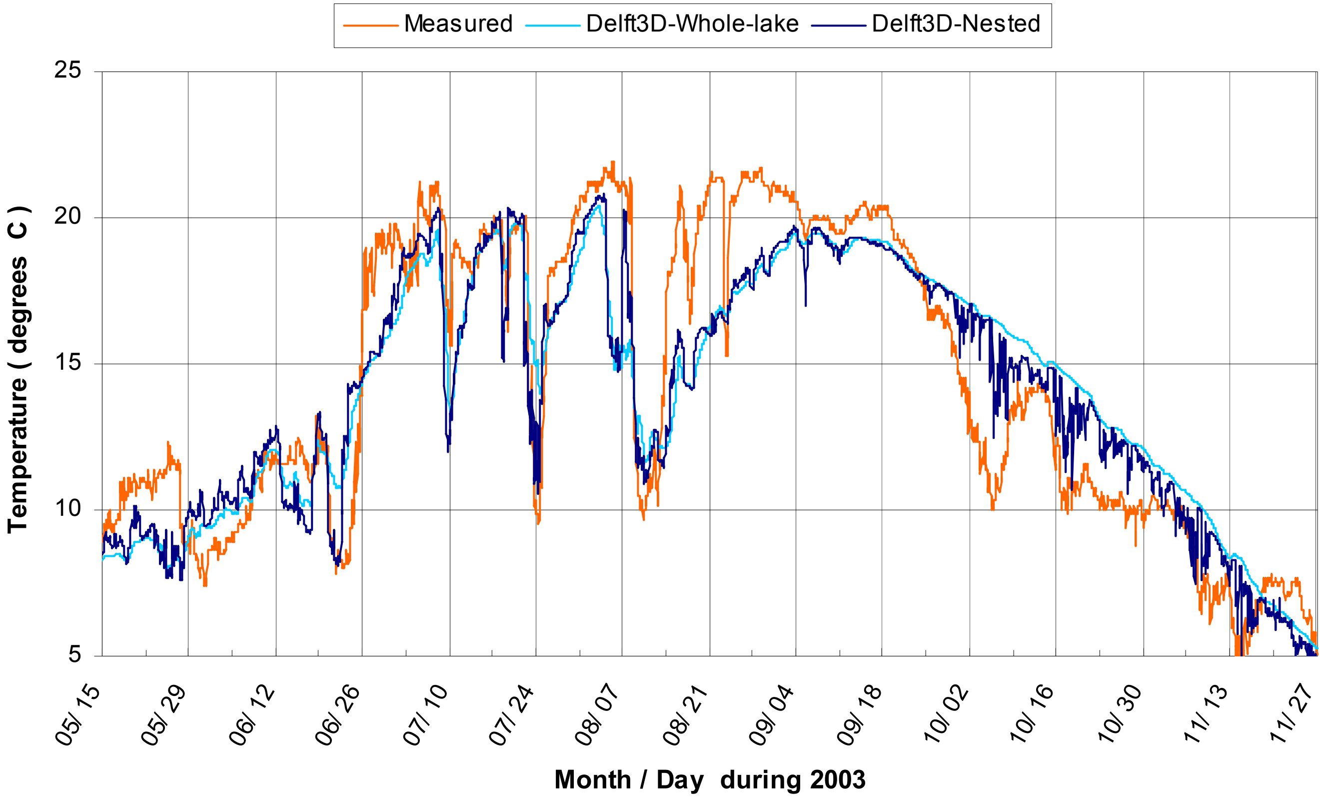


Figure 4.5(c) : Bottom thermistor water temperature, at the Maitland Nearshore site.

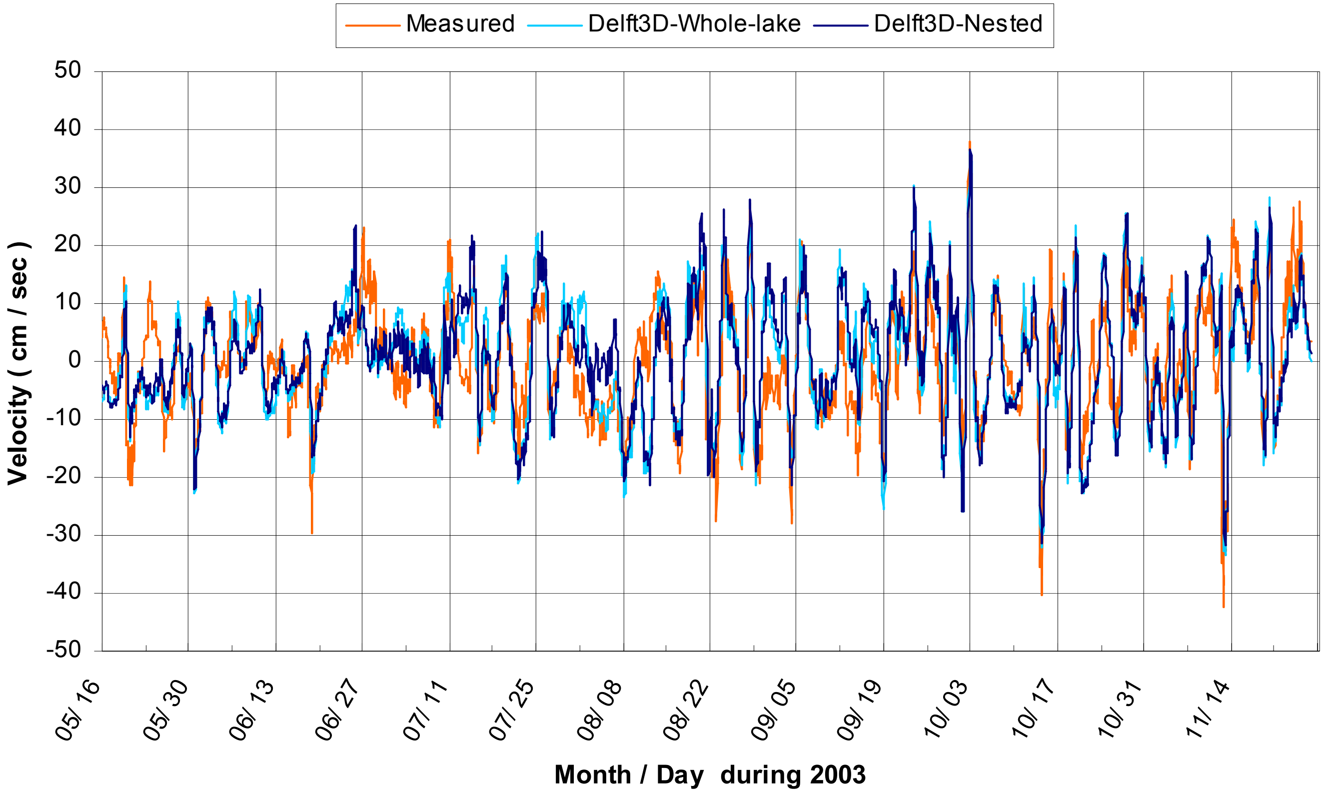


Figure 4.6(a) : Depth-average alongshore water velocity, (within the vertical ADCP intra-bin zone), at the Maitland Offshore site.

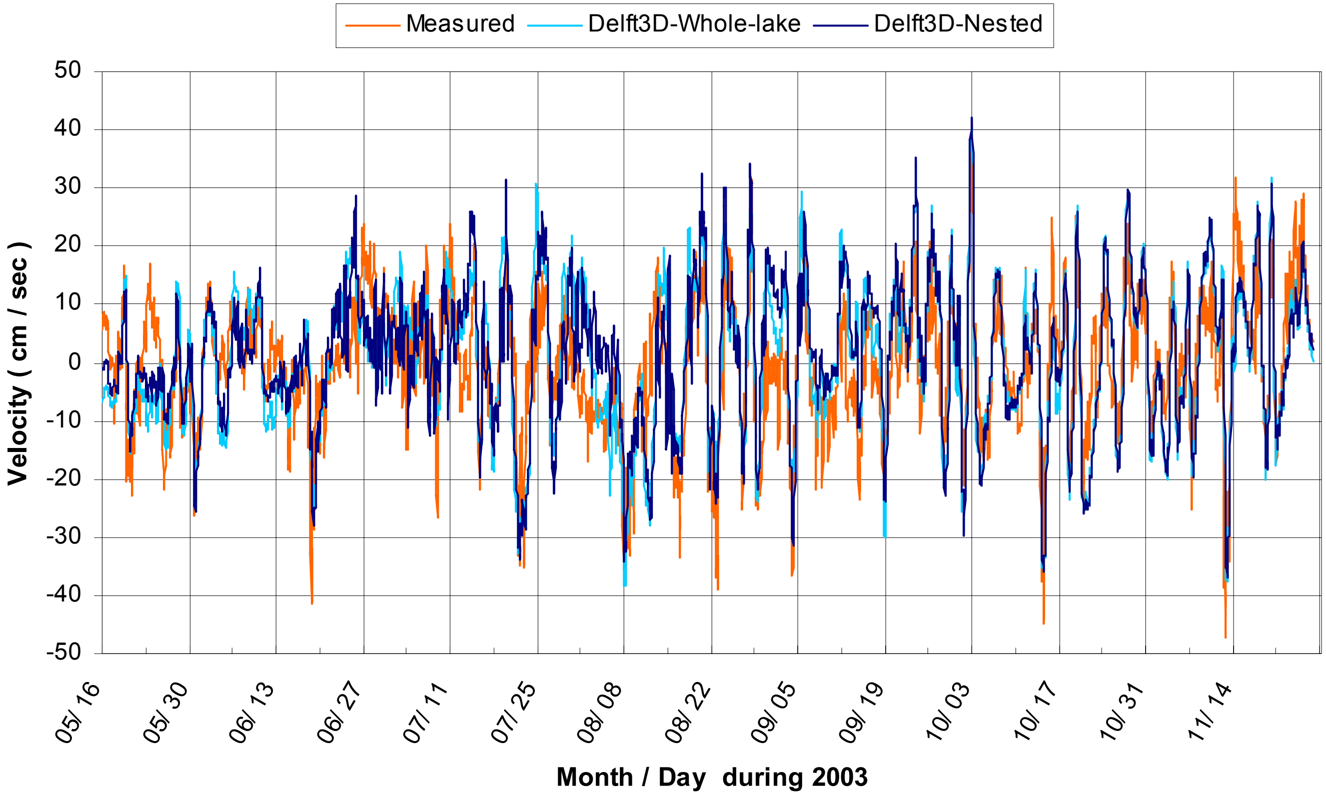


Figure 4.6(b) : Alongshore water velocity, at the top ADCP bin depth, at the Maitland Offshore site.

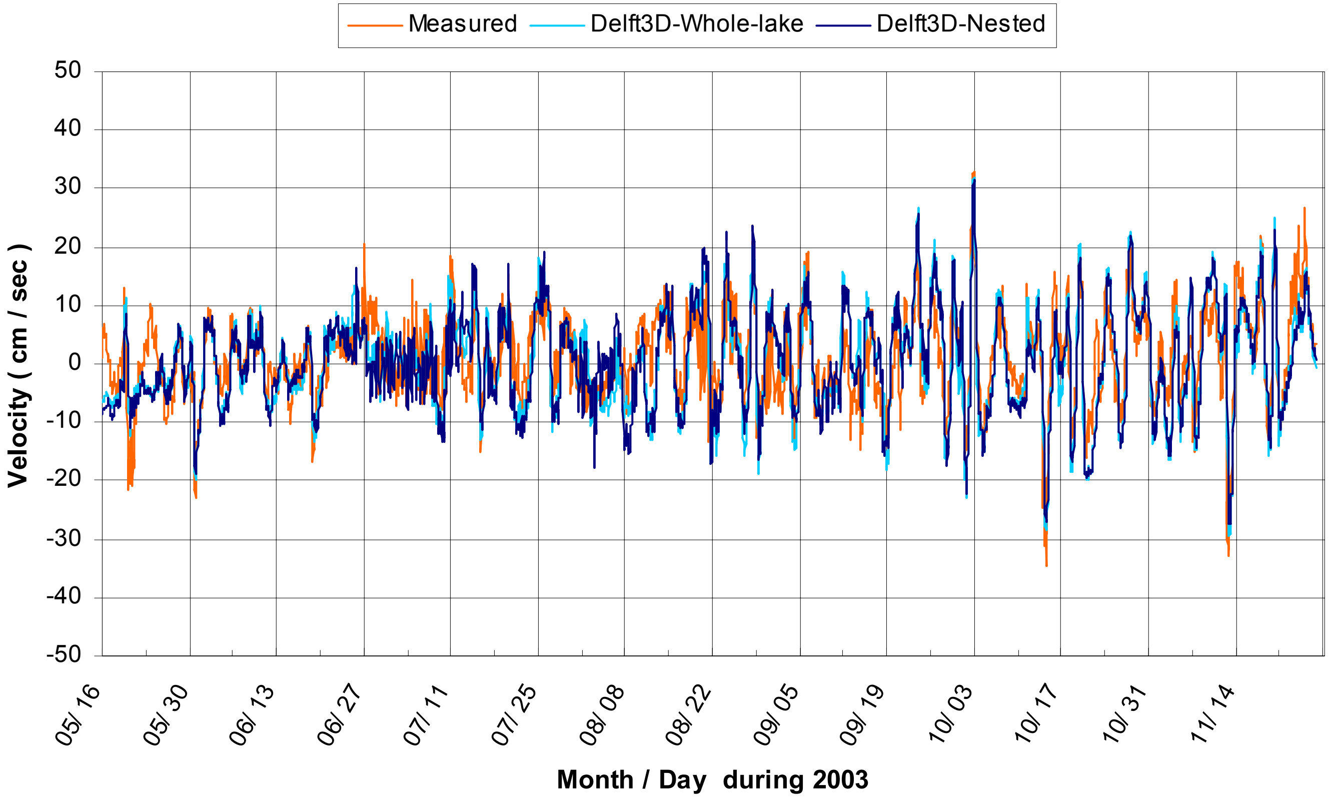


Figure 4.6(c) : Alongshore water velocity, at the bottom ADCP bin depth, at the Maitland Offshore site.

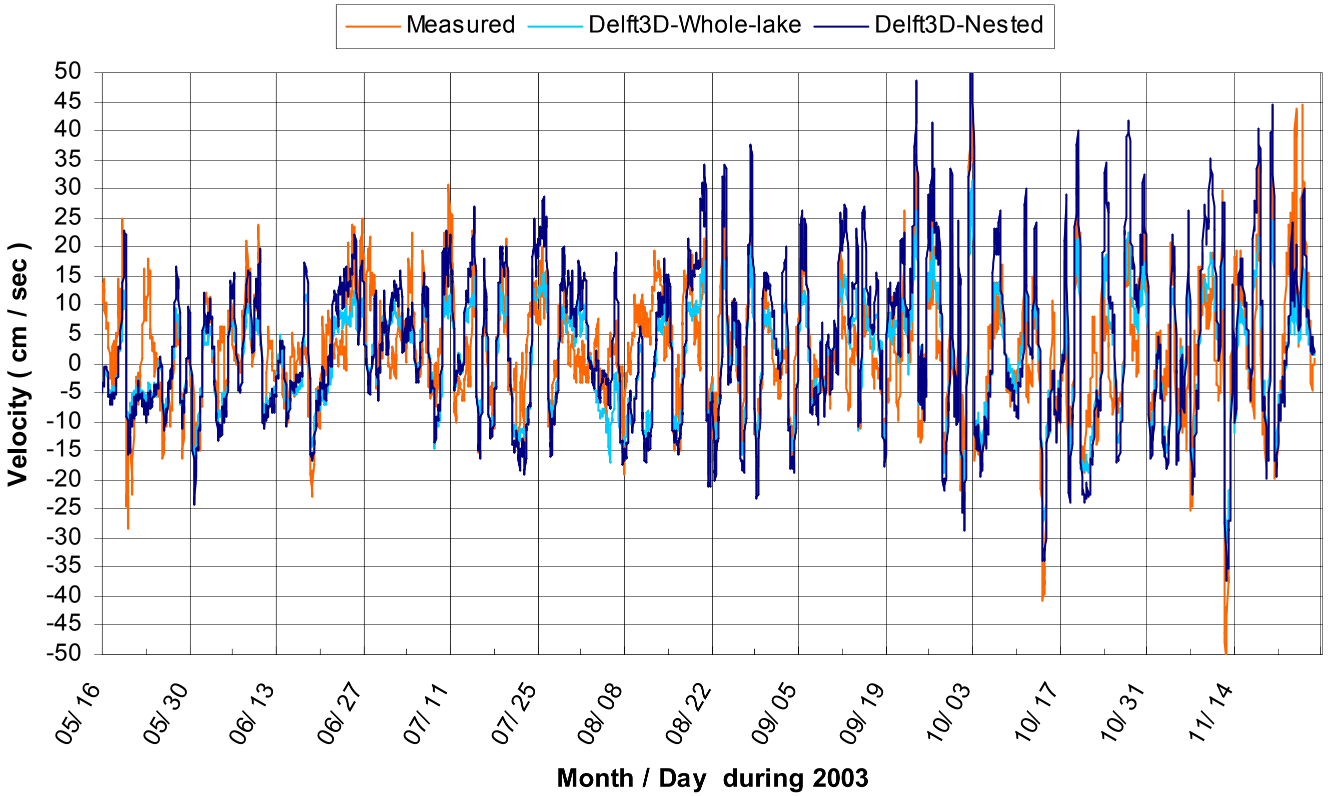


Figure 4.7(a) : Depth-average alongshore water velocity, (within the vertical ADCP intra-bin zone), at the Maitland Nearshore site.

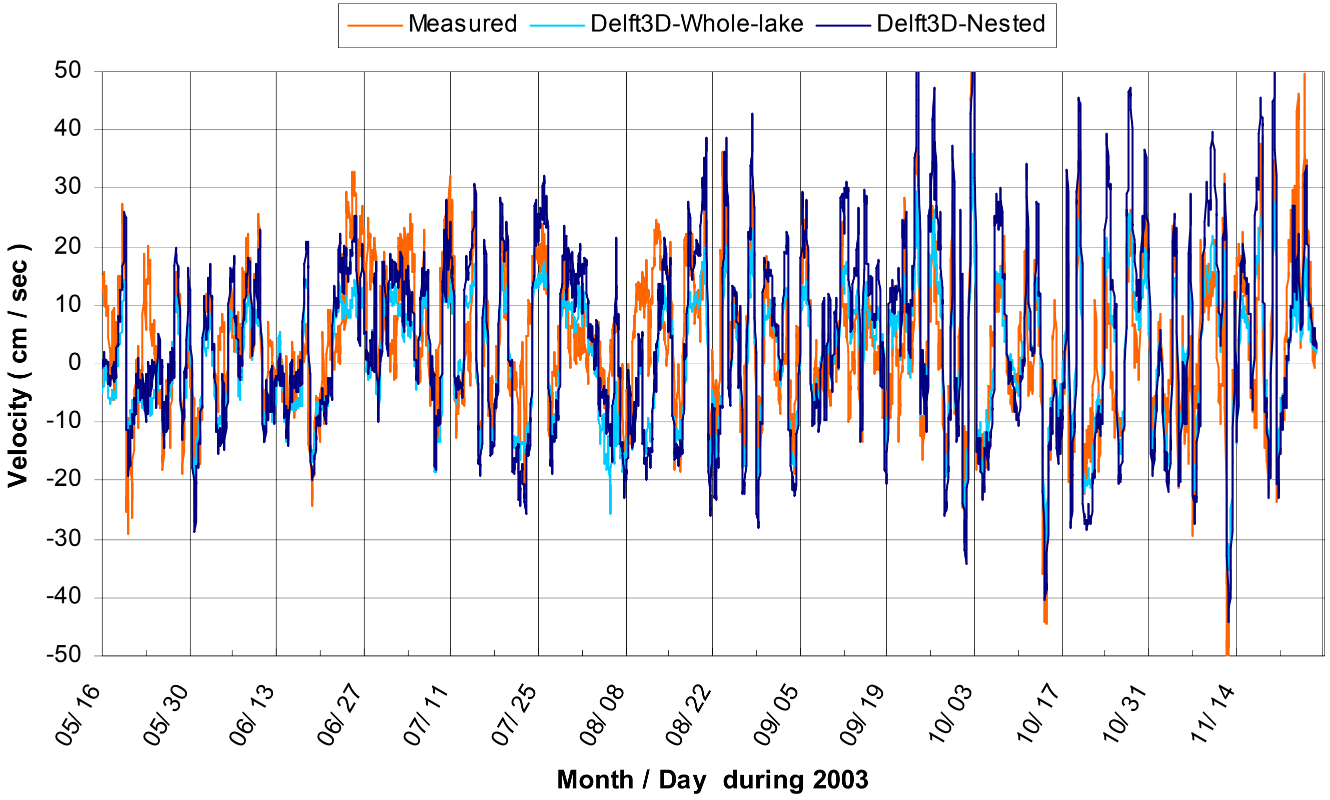


Figure 4.7(b) : Alongshore water velocity, at the top ADCP bin depth, at the Maitland Nearshore site.

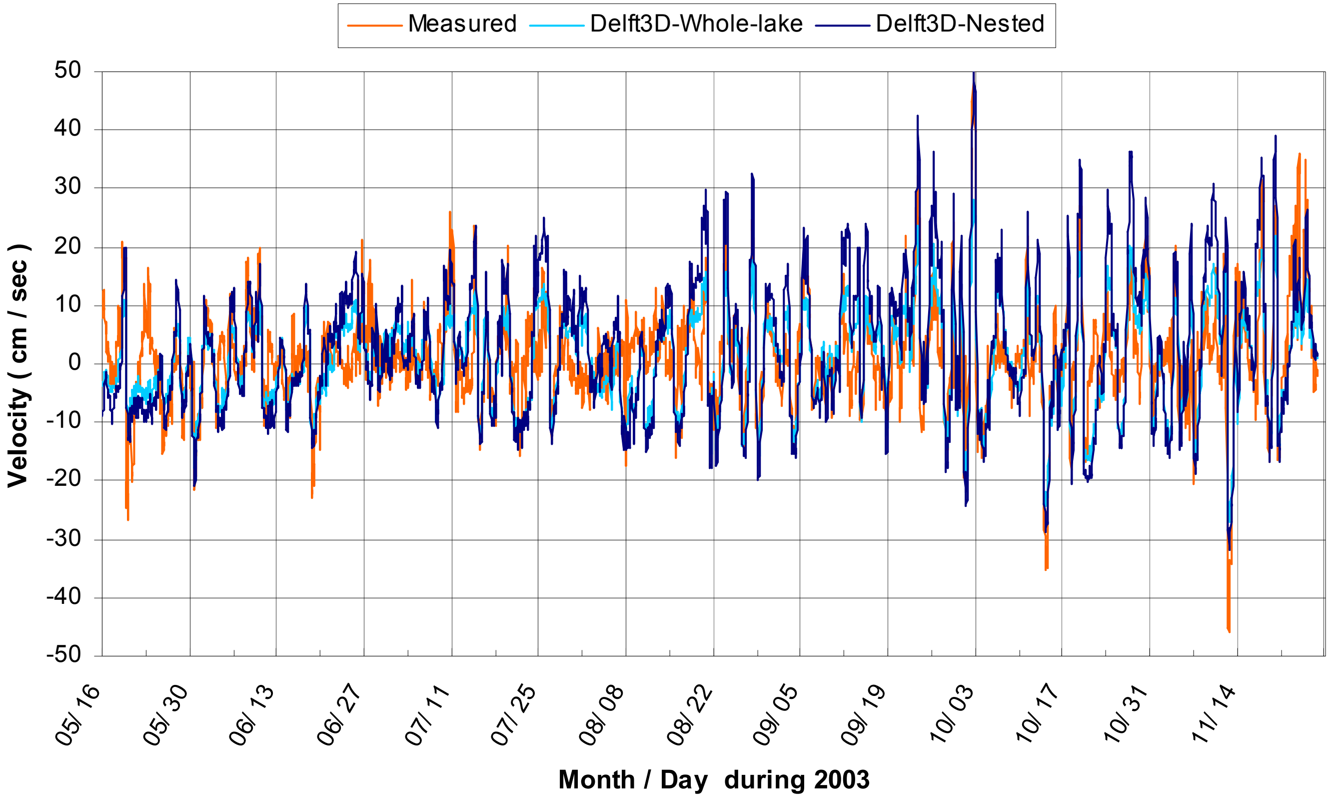


Figure 4.7(c) : Alongshore water velocity, at the bottom ADCP bin depth, at the Maitland Nearshore site.

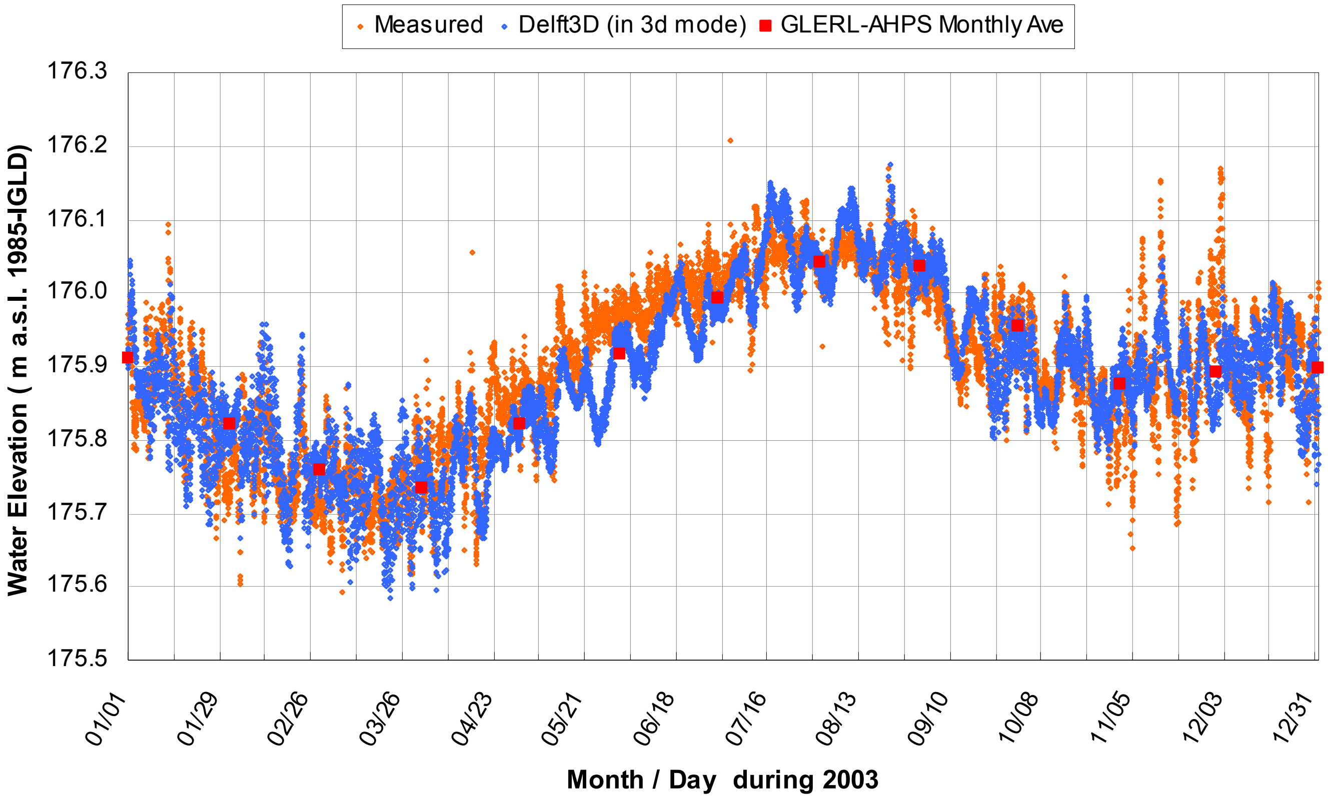


Figure 4.8(a) : Comparison of water levels simulated by the 3d model with those measured at Harbor Beach, Michigan, in 2003.

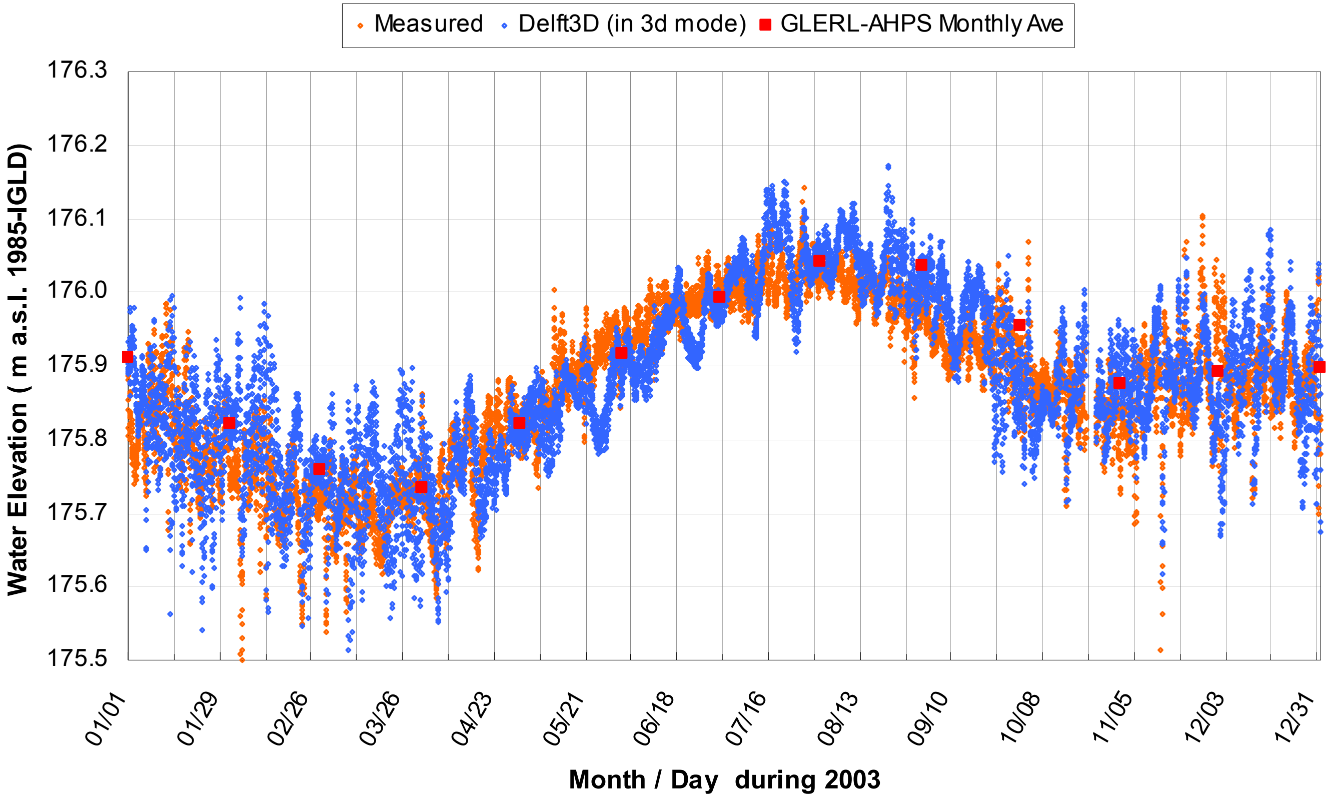


Figure 4.8(b) : Comparison of water levels simulated by the 3d model with those measured at De Tour Village, Michigan, in 2003.

APPENDIX I

3-D SPATIAL IMPACTS
OF THE
MAITLAND RIVER DISCHARGE
AND LAKE CONDITIONS
FOR SELECTED EVENTS IN 2003

IMPACT FIGURE SERIES

Event 1: Spring runoff (March 17 to April 6)

Parameters *(in presentation order)*:	**Figure series:**
Water velocities	**5.1U (a) to (k)**
Water temperatures	**5.1T (a) to (k)**
Conductivity	**5.1C (a) to (k)**
NO2+NO3	**5.1N (a) to (k)**
E. coli (conservative)	**5.1E0 (a) to (k)**
E. coli (deactivation rate of 1/day)	**5.1E1 (a) to (k)**

Where: (a) to (k) represents the following dates-times:
(a) March 17 @ 00:00 hrs
(b) March 19 @ 00:00 hrs
(c) March 21 @ 00:00 hrs
(d) March 23 @ 00:00 hrs
(e) March 25 @ 00:00 hrs
(f) March 27 @ 00:00 hrs
(g) March 29 @ 00:00 hrs
(h) March 31 @ 00:00 hrs
(i) April 2 @ 00:00 hrs
(j) April 4 @ 00:00 hrs
(k) April 6 @ 00:00 hrs

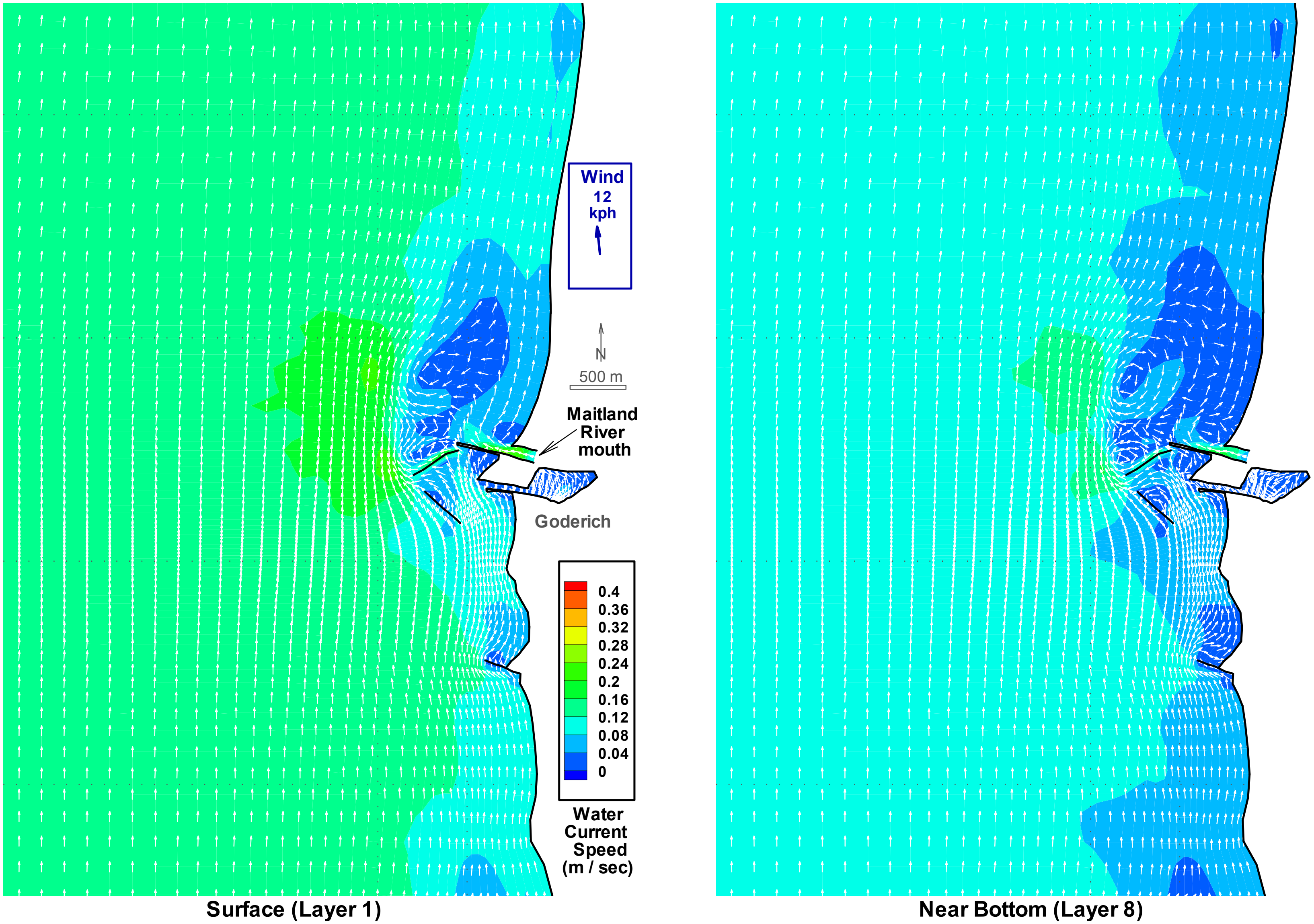
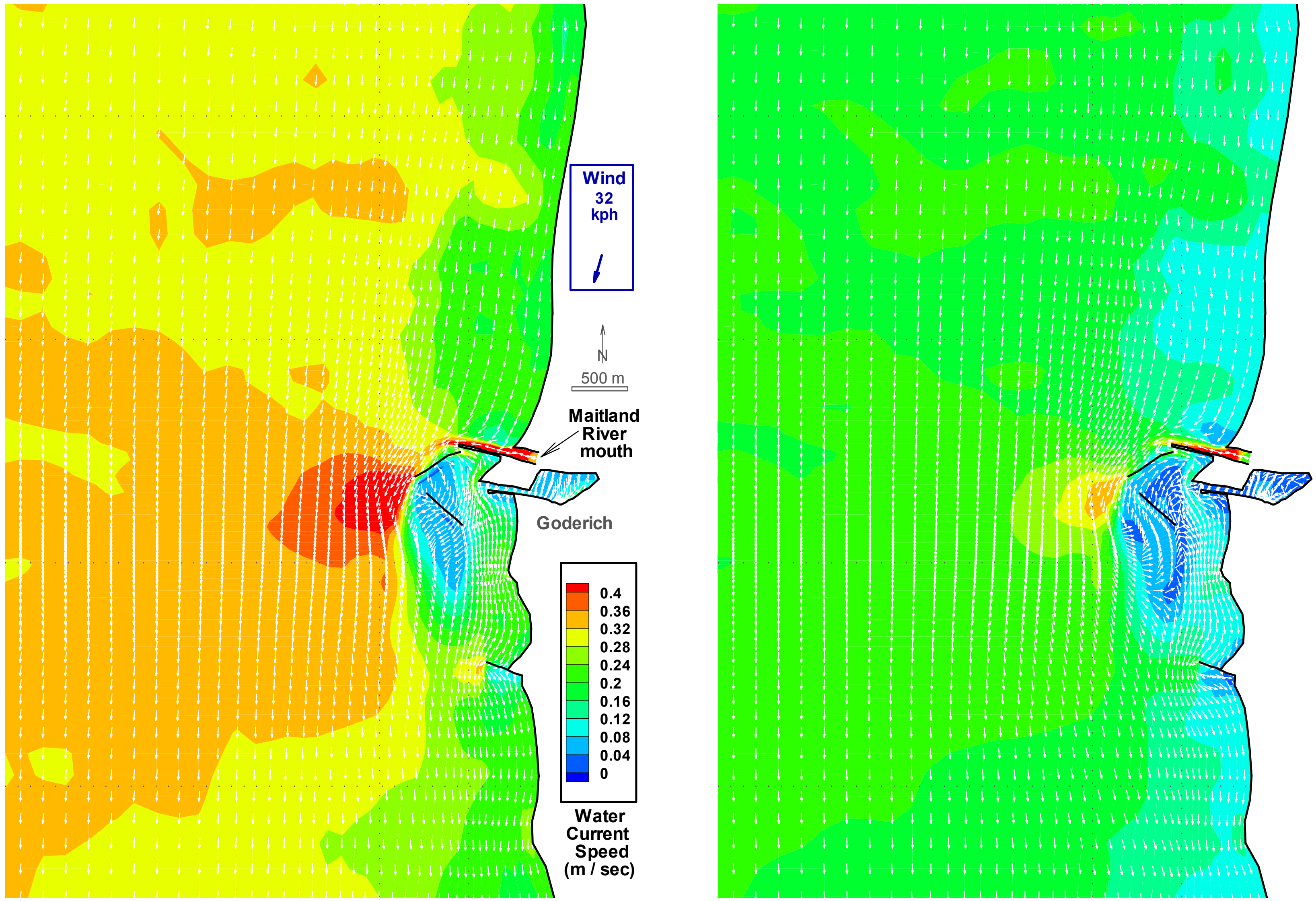


Figure 5.1U(a) Water current velocities at 00:00 hours on March 17, 2003; (directions indicated by arrows, speeds by contours).



Surface (Layer 1) **Near Bottom (Layer 8)**

Figure 5.1U(b) Water current velocities at 00:00 hours on March 19, 2003; (directions indicated by arrows, speeds by contours).

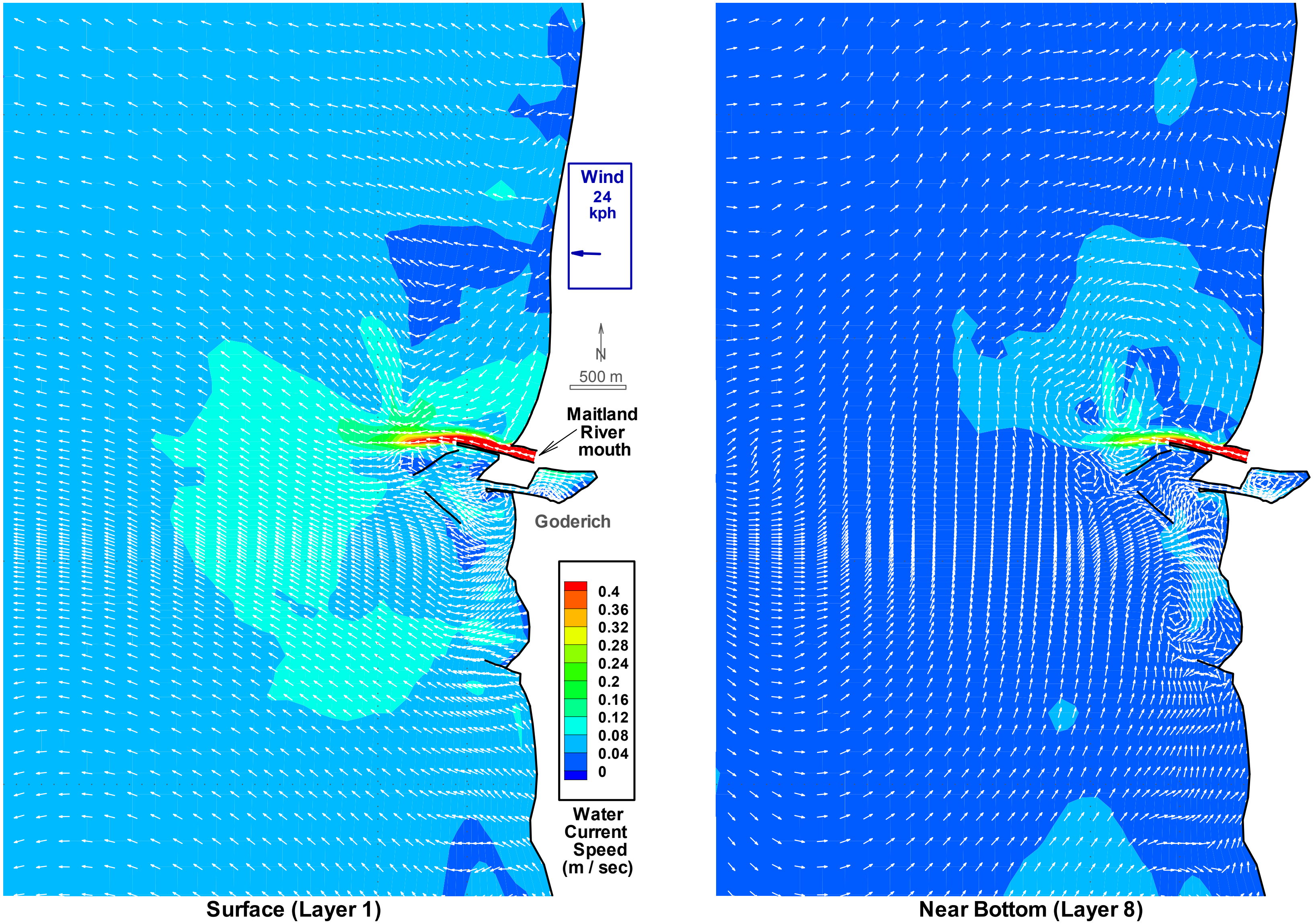


Figure 5.1U(c) Water current velocities at 00:00 hours on March 21, 2003; (directions indicated by arrows, speeds by contours).

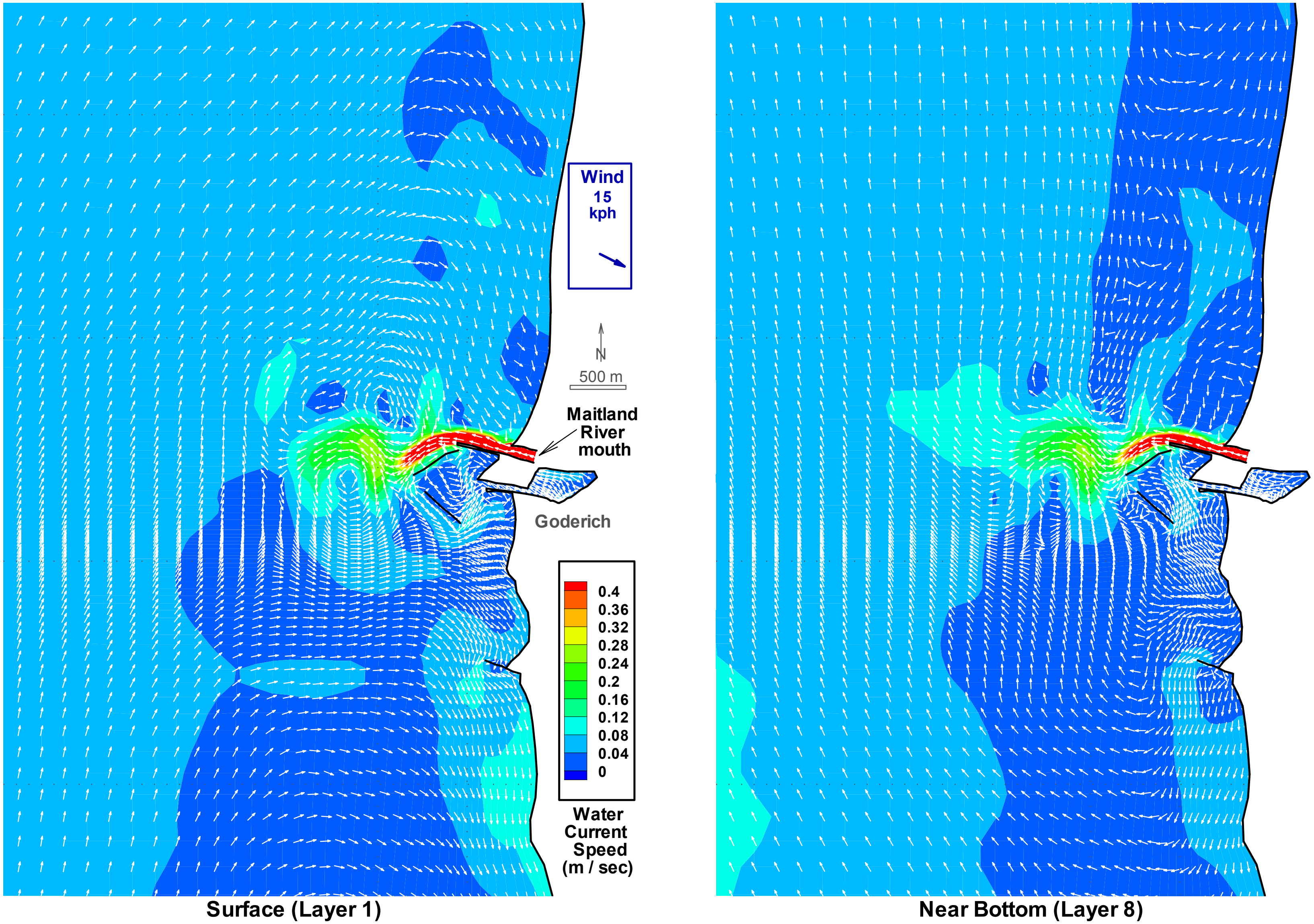


Figure 5.1U(d) Water current velocities at 00:00 hours on March 23, 2003; (directions indicated by arrows, speeds by contours).

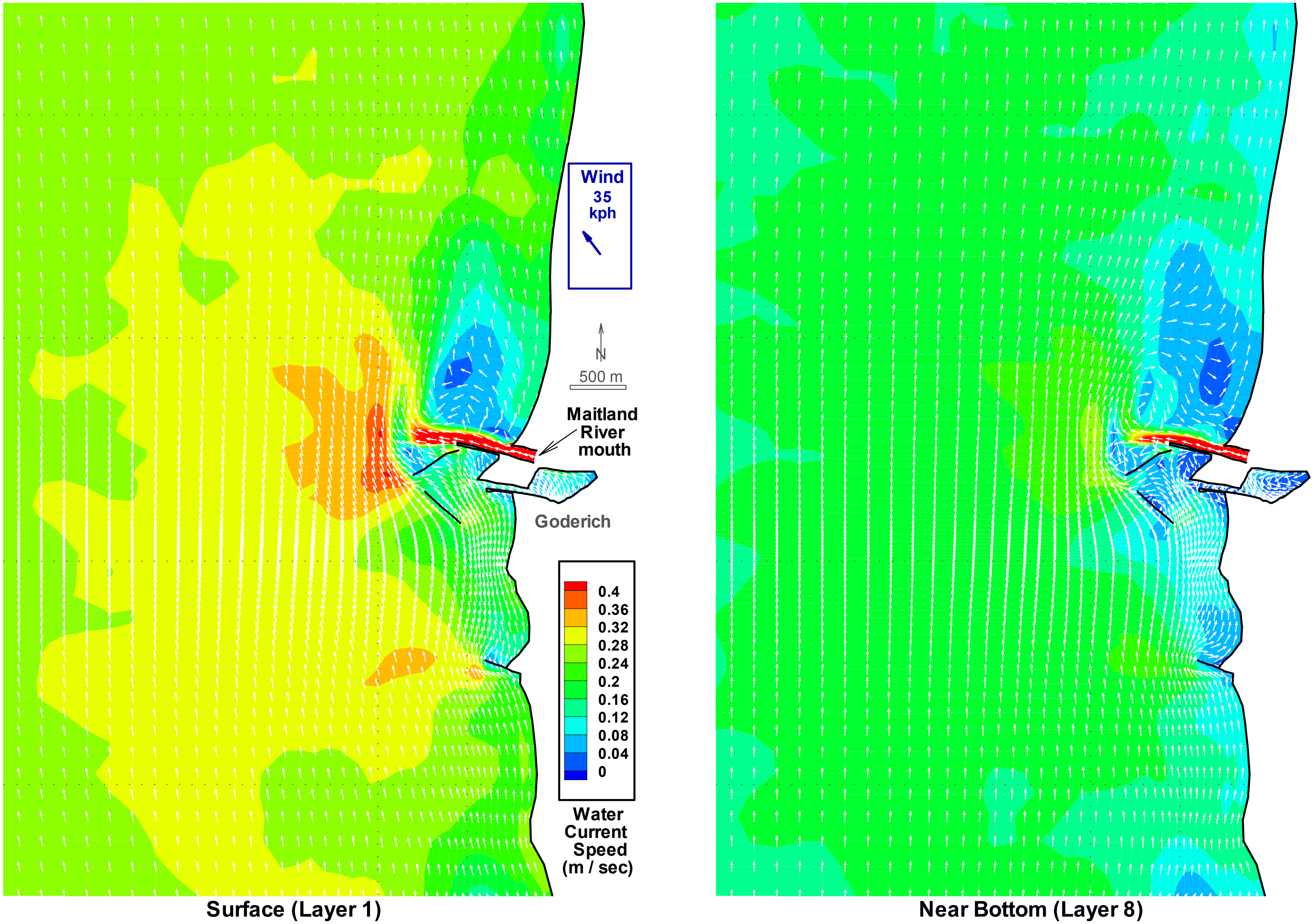


Figure 5.1U(e) Water current velocities at 00:00 hours on March 25, 2003; (directions indicated by arrows, speeds by contours).

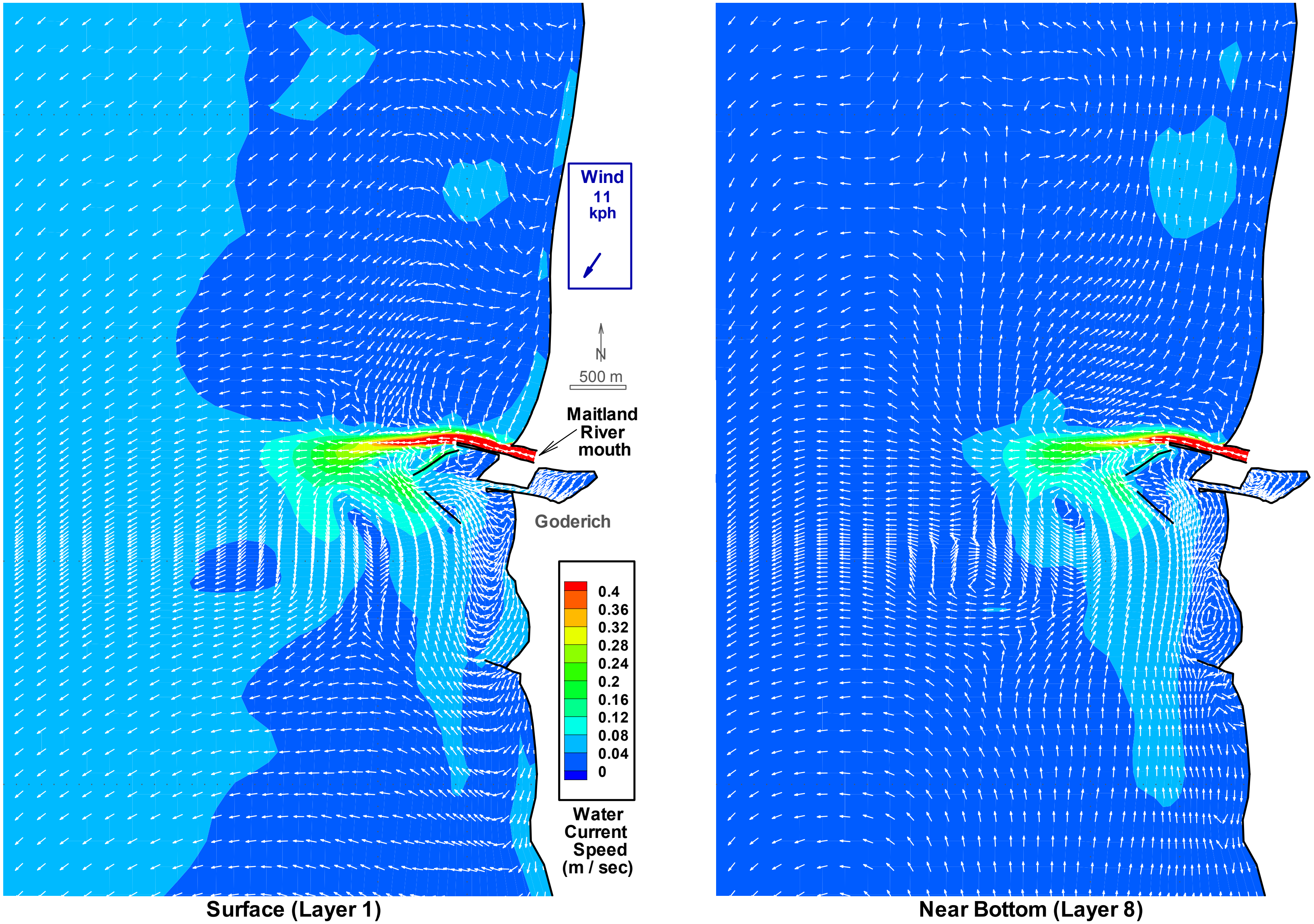


Figure 5.1U(f) Water current velocities at 00:00 hours on March 27, 2003; (directions indicated by arrows, speeds by contours).

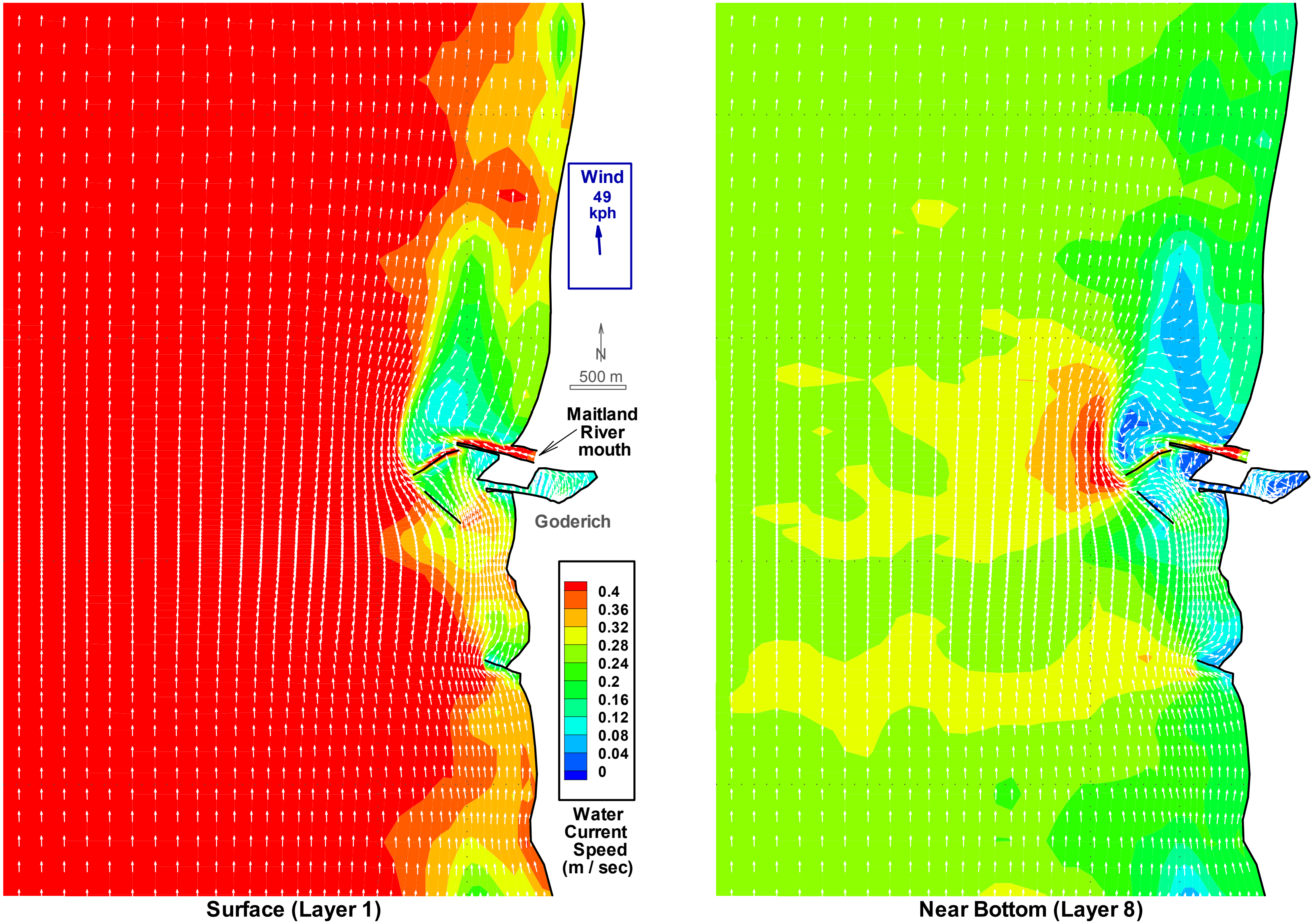


Figure 5.1U(g) Water current velocities at 00:00 hours on March 29, 2003; (directions indicated by arrows, speeds by contours).

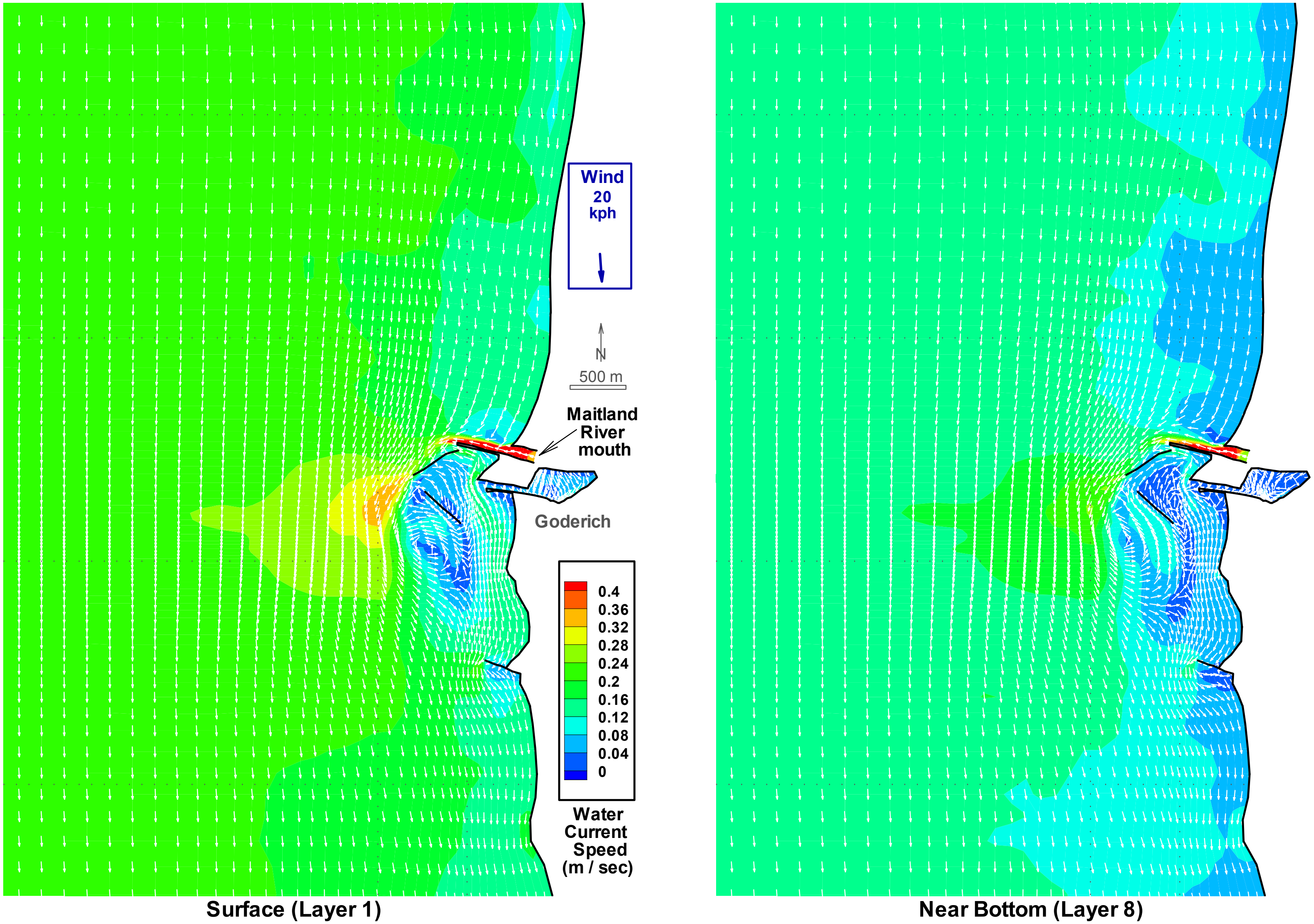


Figure 5.1U(h) Water current velocities at 00:00 hours on March 31, 2003; (directions indicated by arrows, speeds by contours).

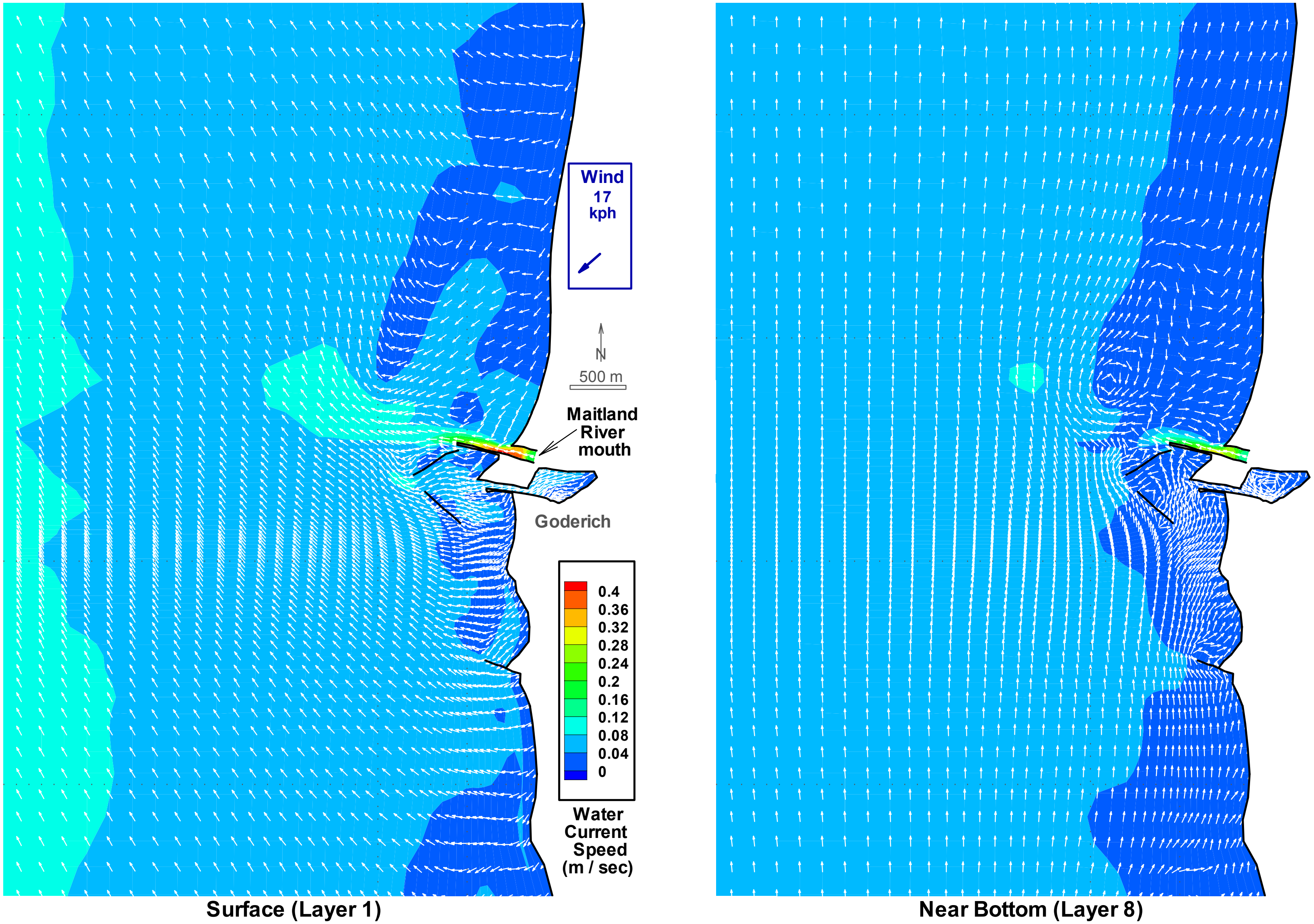


Figure 5.1U(i) Water current velocities at 00:00 hours on April 2, 2003; (directions indicated by arrows, speeds by contours).

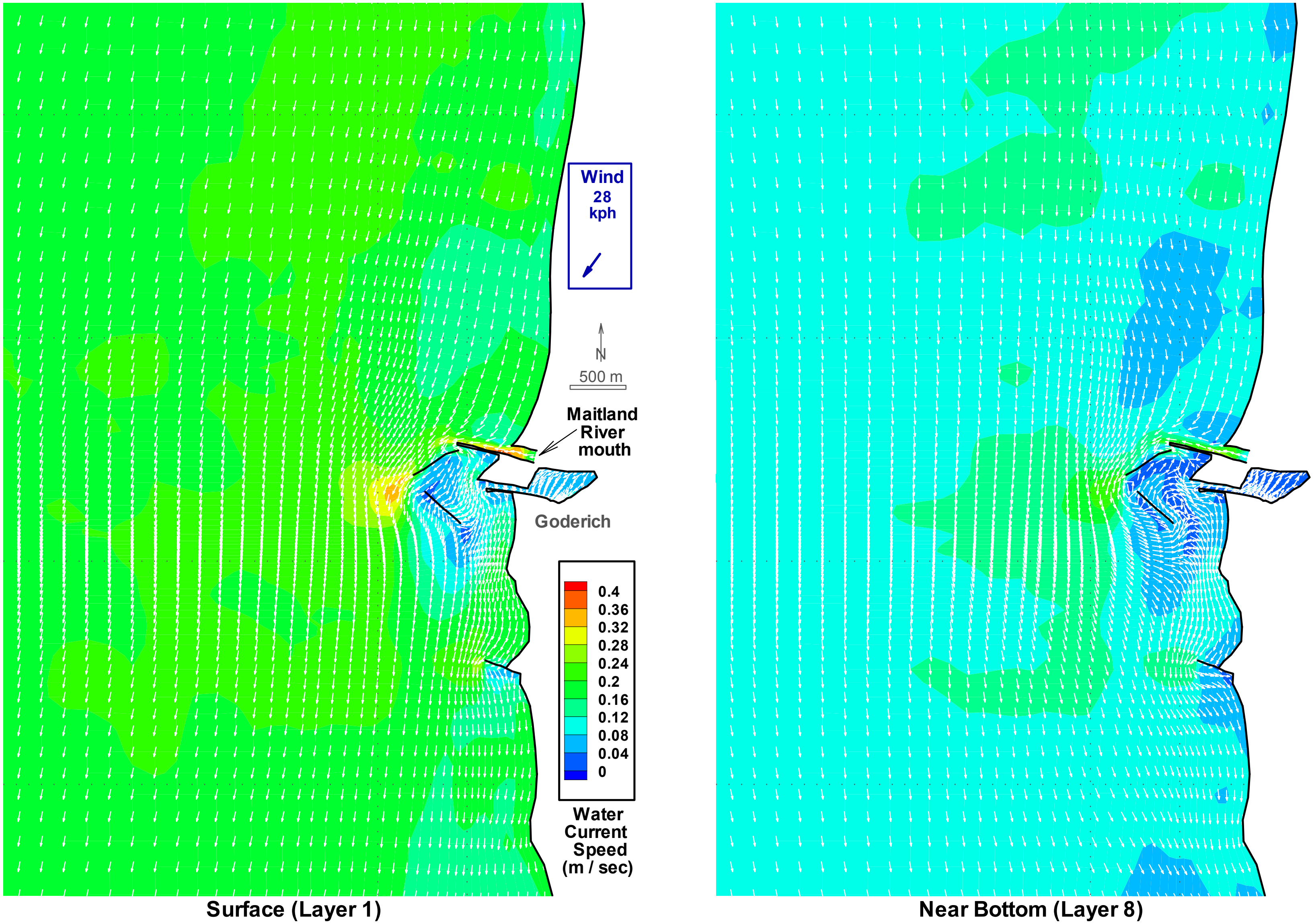


Figure 5.1U(j) Water current velocities at 00:00 hours on April 4, 2003; (directions indicated by arrows, speeds by contours).

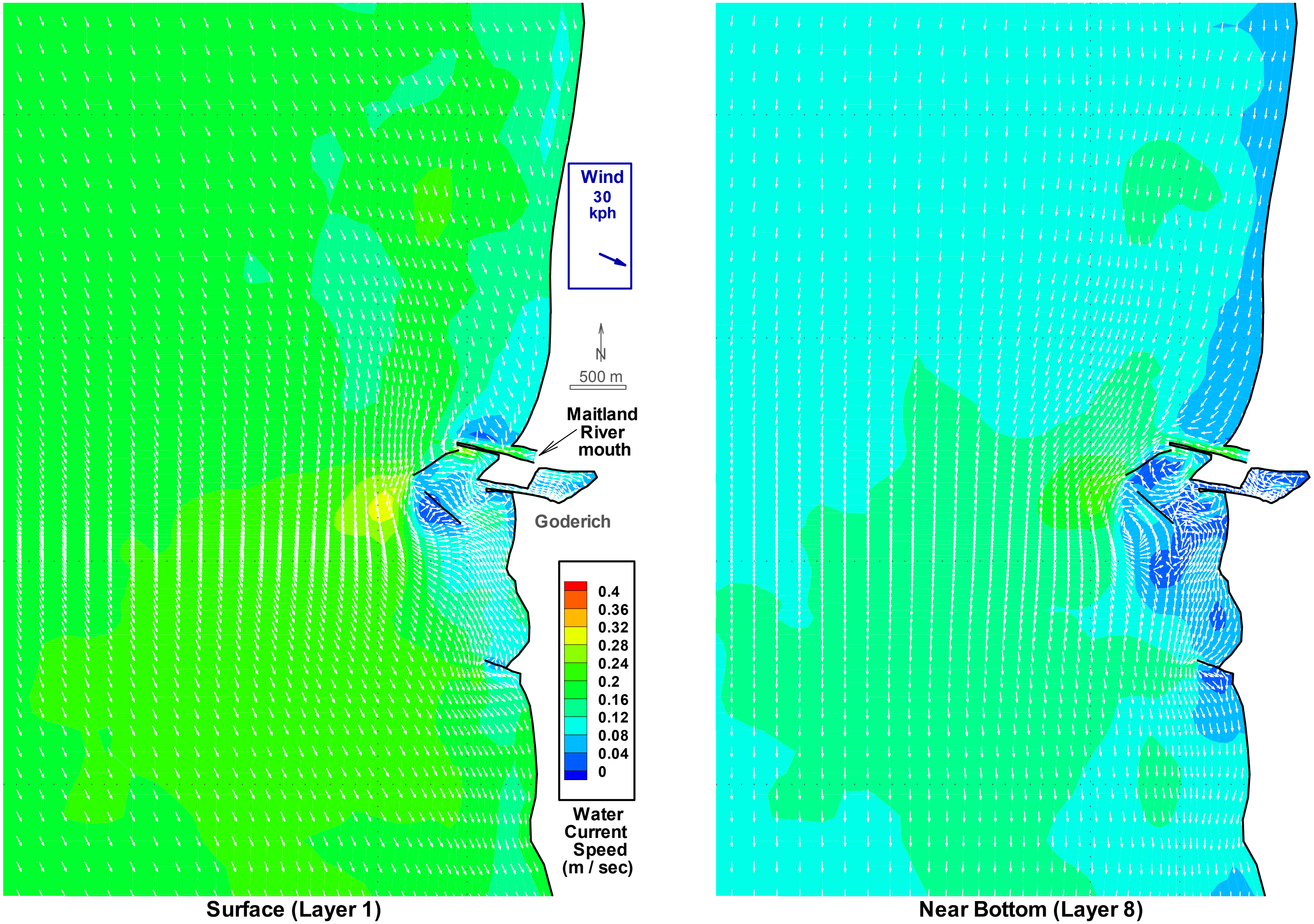
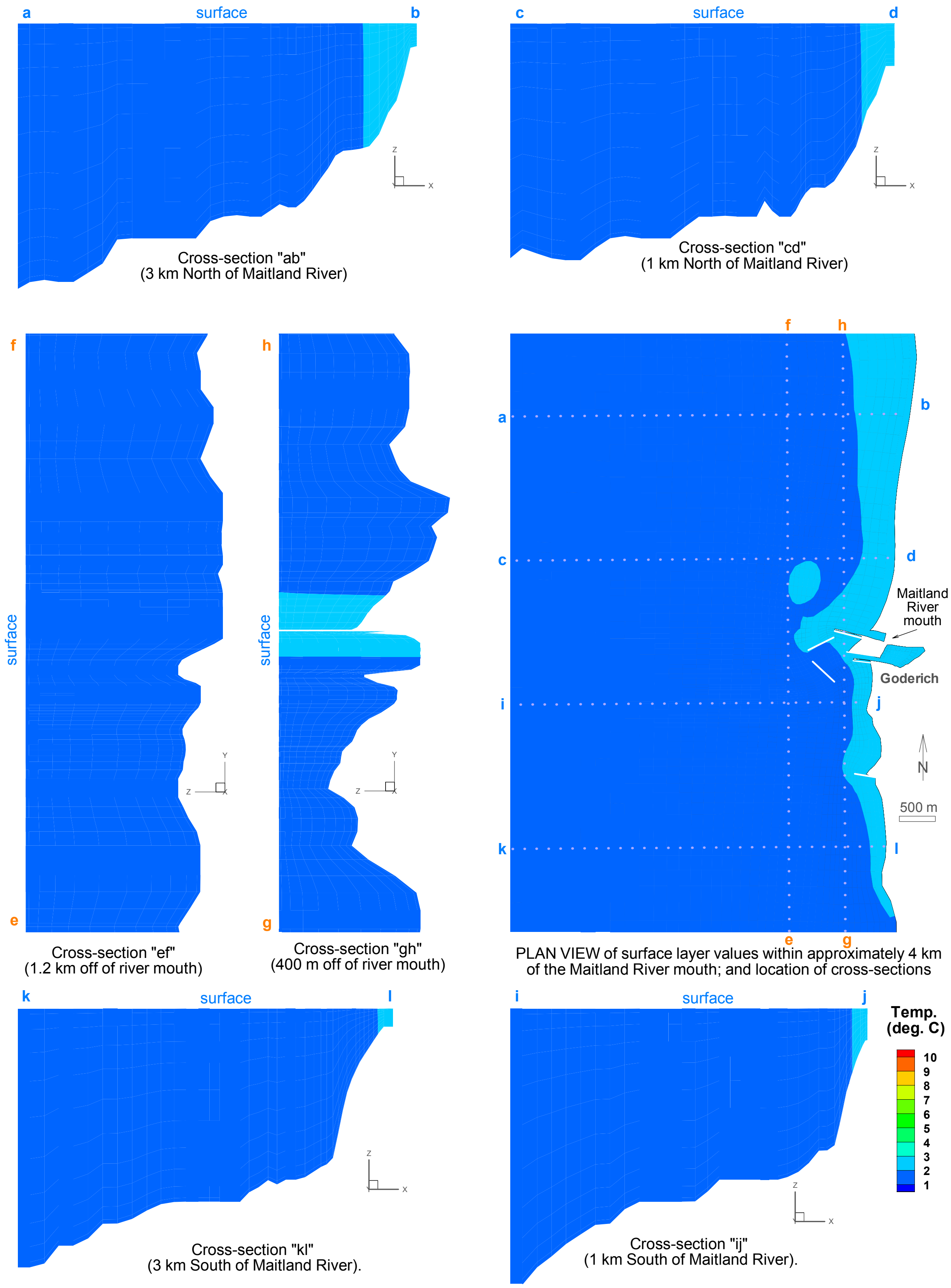


Figure 5.1U(k) Water current velocities at 00:00 hours on April 6, 2003; (directions indicated by arrows, speeds by contours).



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

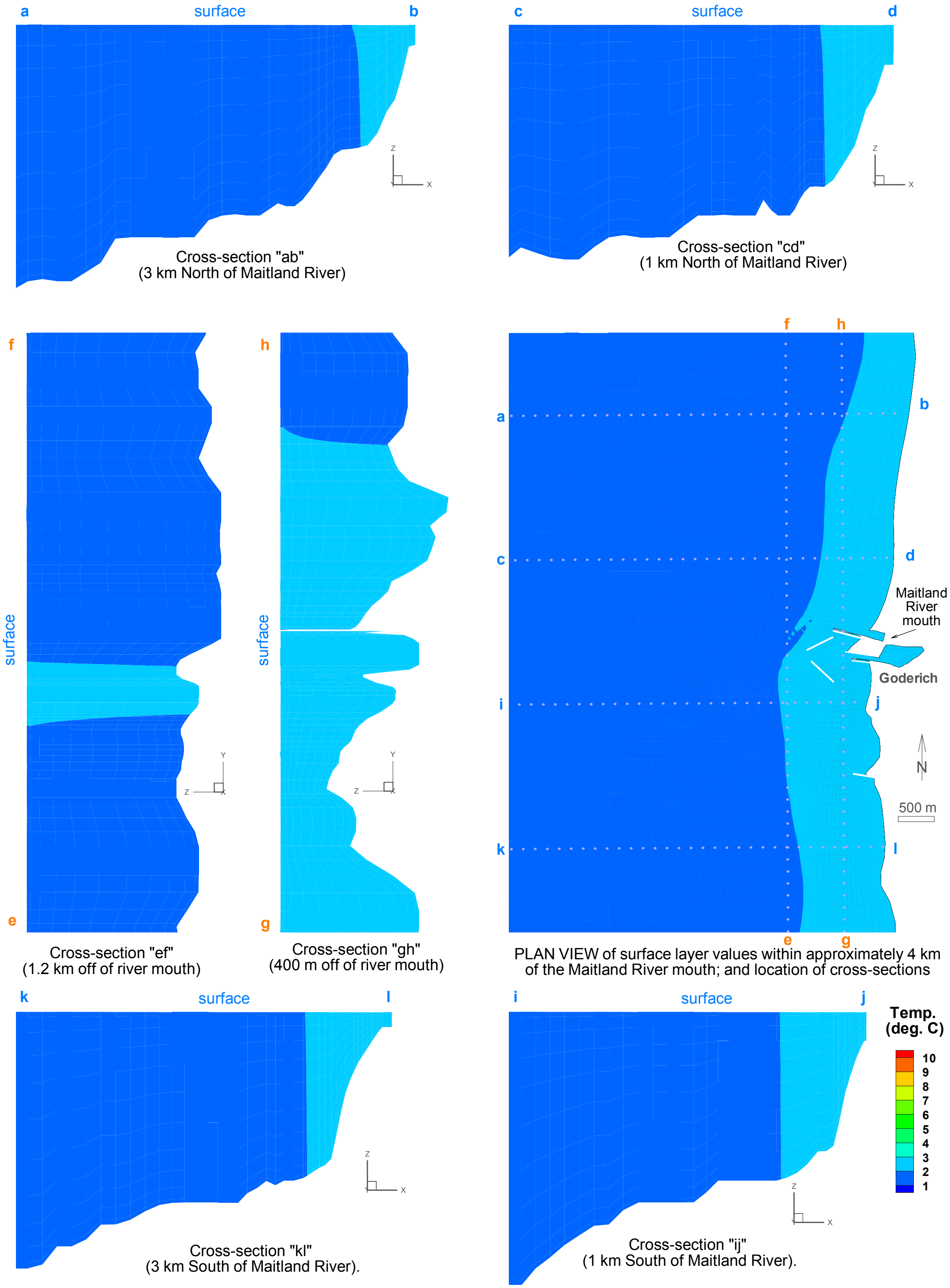
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1T(a) **Water temperature, (plan view and 6 cross-sections), at 00 hours on March 17, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**


Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1T(b) **Water temperature, (plan view and 6 cross-sections), at 00 hours on March 19, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

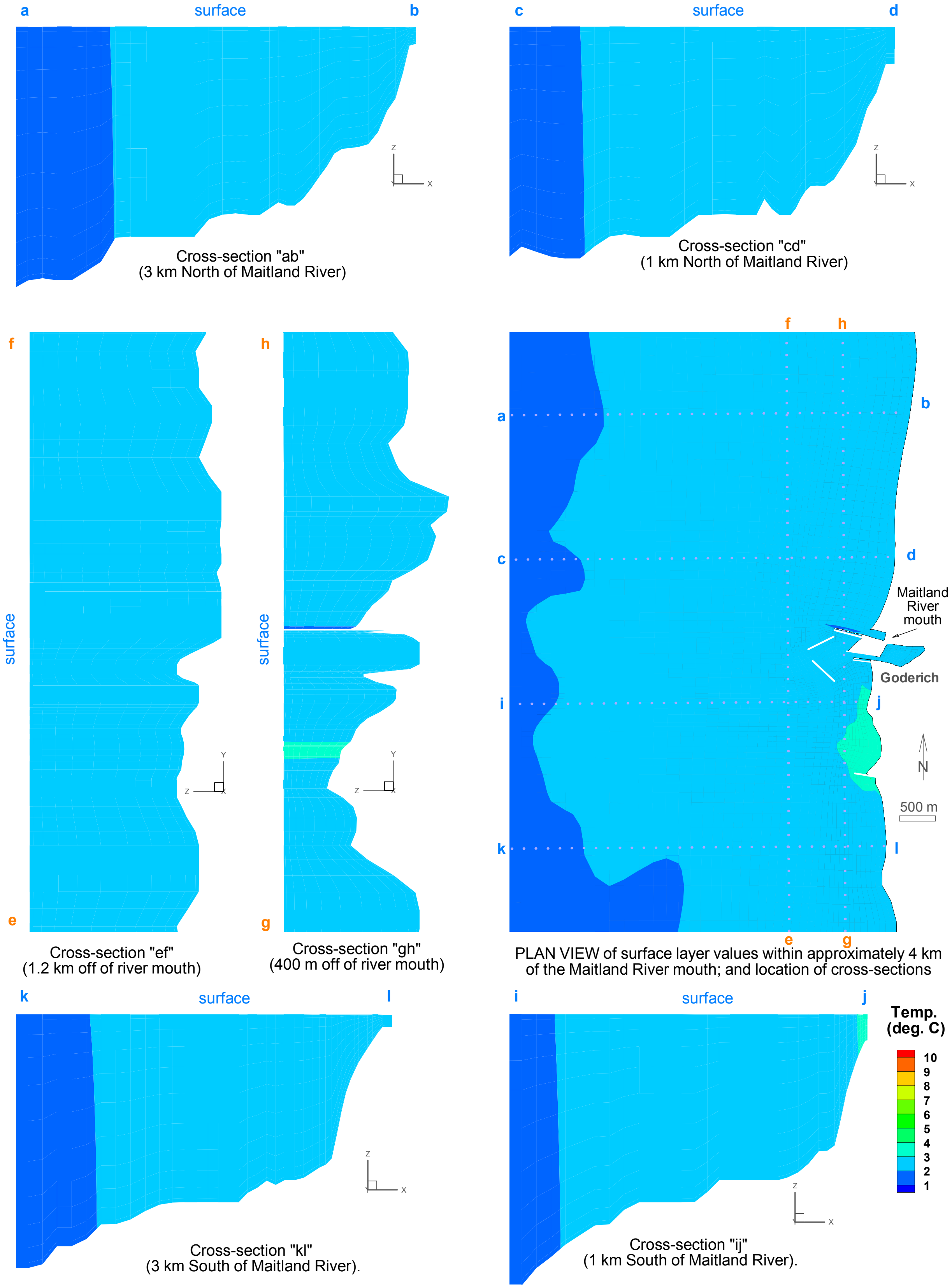
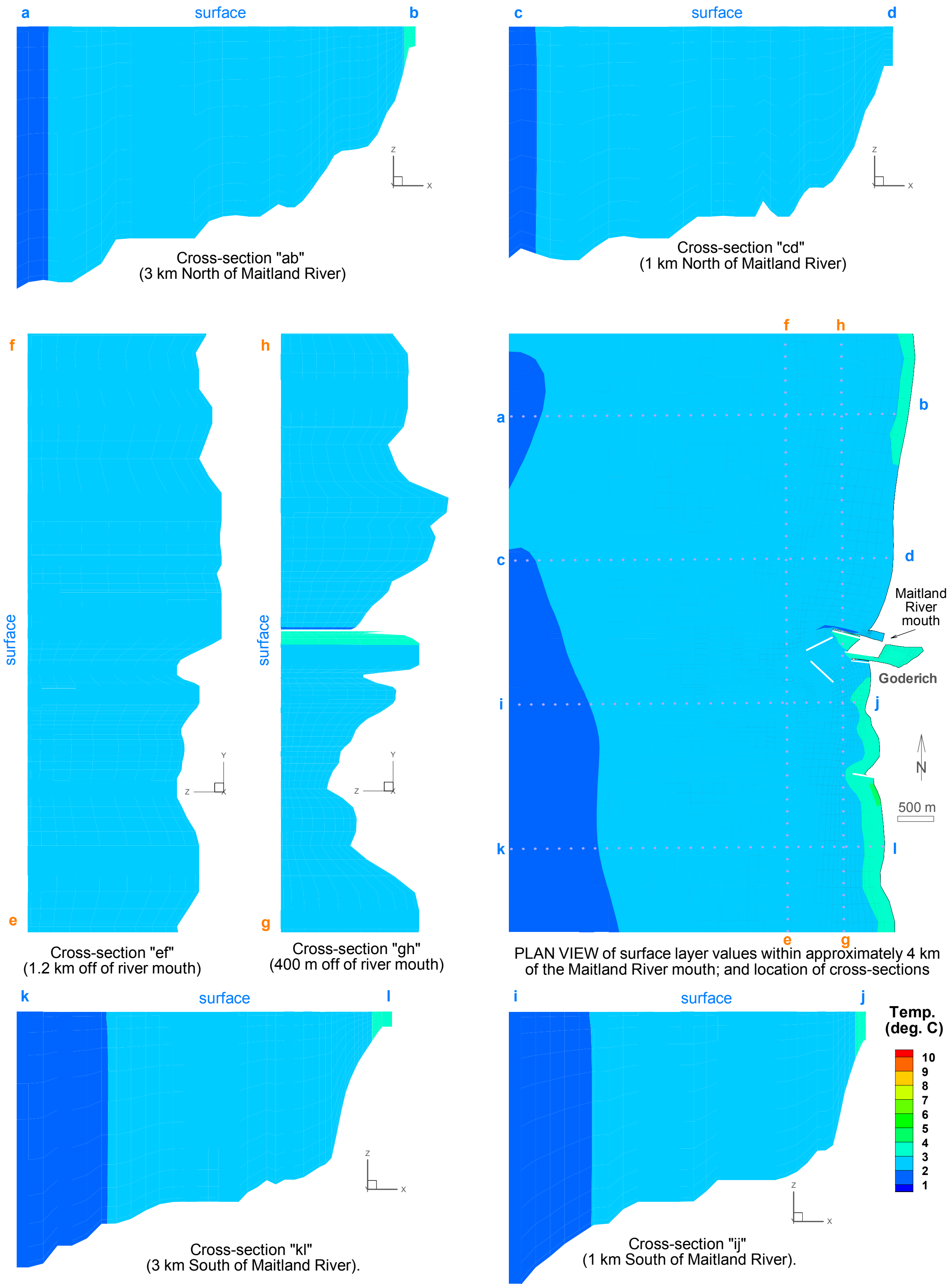


Figure 5.1T(c) **Water temperature, (plan view and 6 cross-sections), at 00 hours on March 21, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

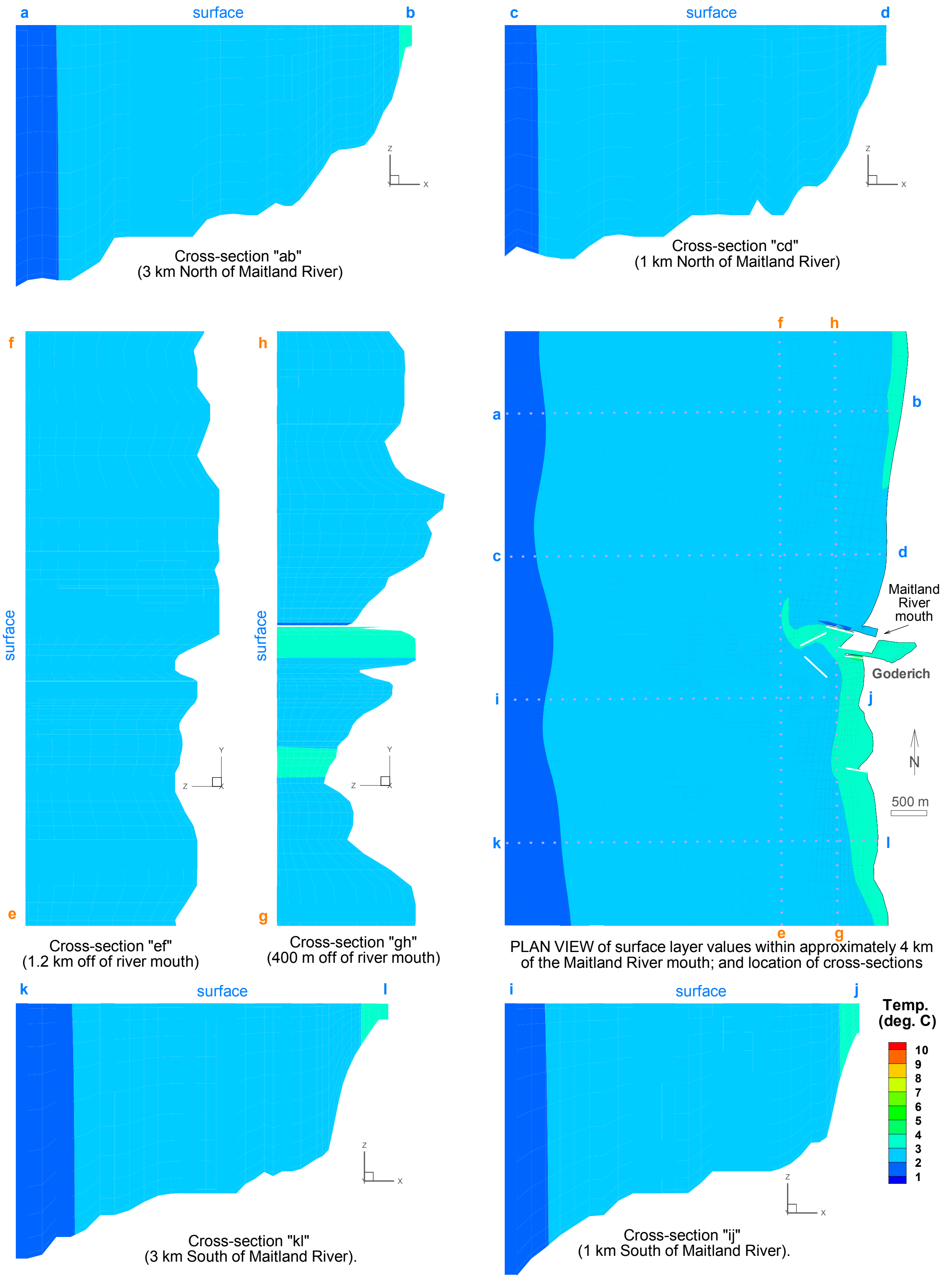
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1T(d) **Water temperature, (plan view and 6 cross-sections), at 00 hours on March 23, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1T(e) Water temperature, (plan view and 6 cross-sections), at 00 hours on March 25, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

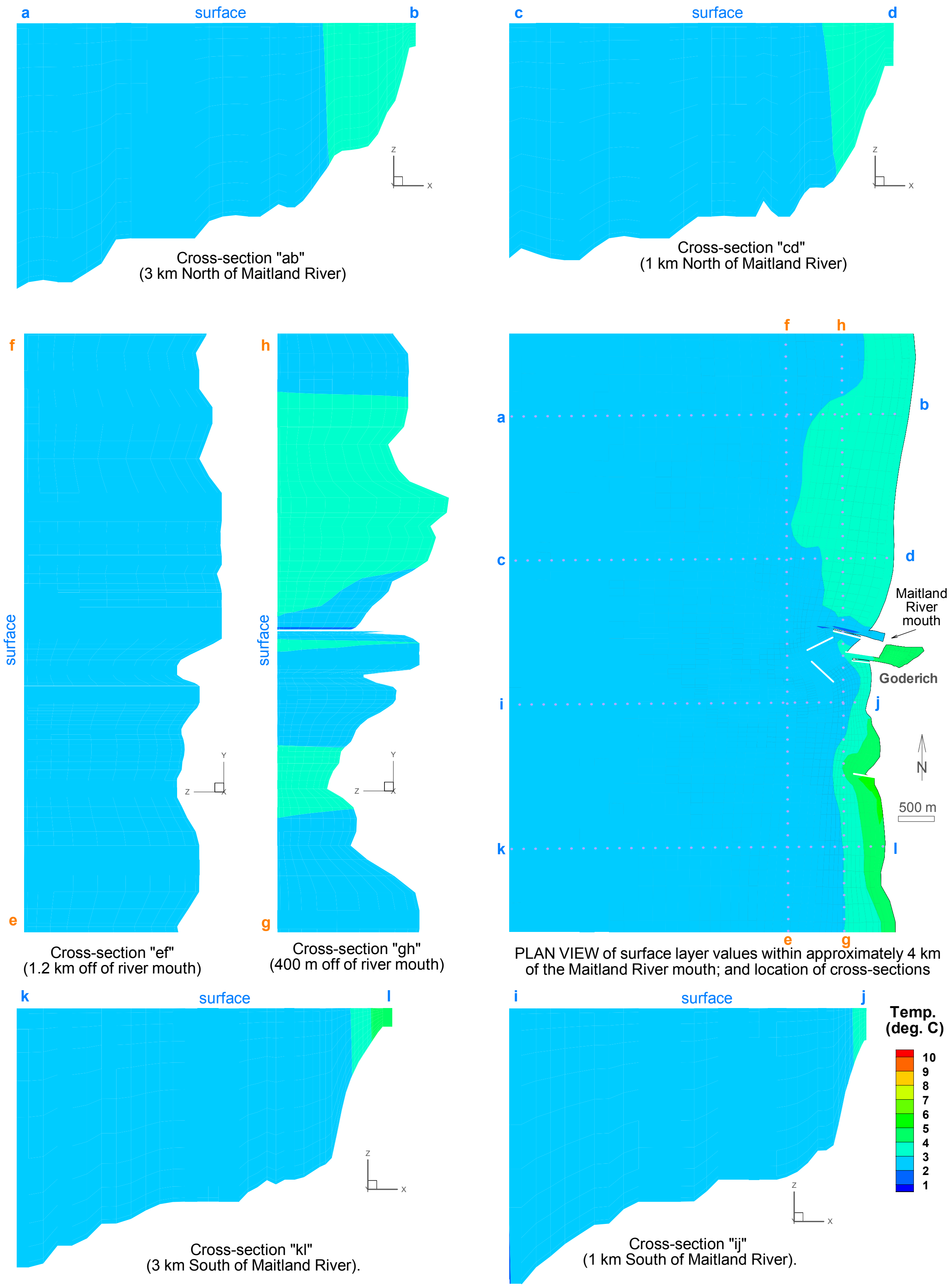


Figure 5.1T(f) Water temperature, (plan view and 6 cross-sections), at 00 hours on March 27, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

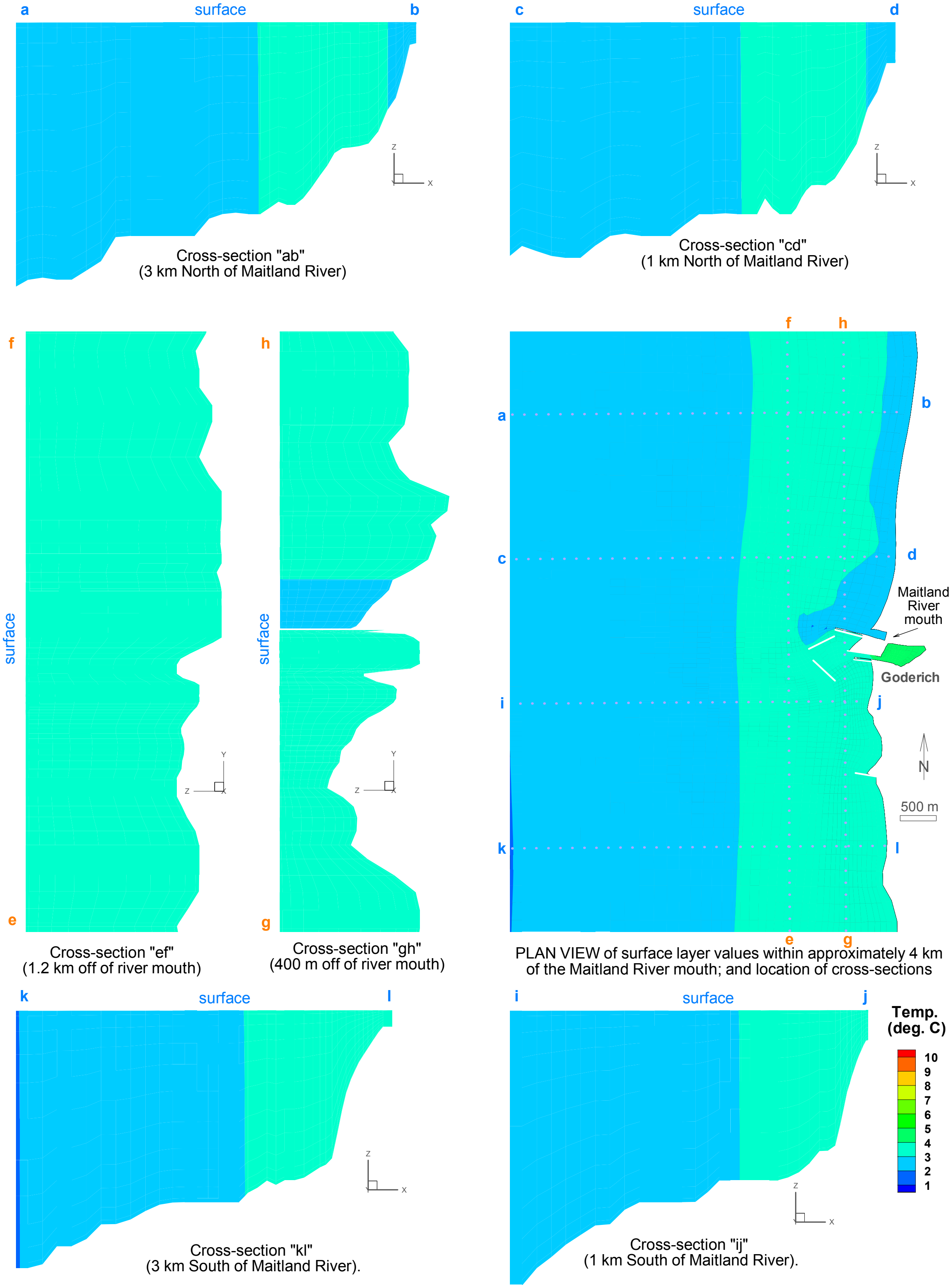


Figure 5.1T(g) **Water temperature, (plan view and 6 cross-sections), at 00 hours on March 29, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

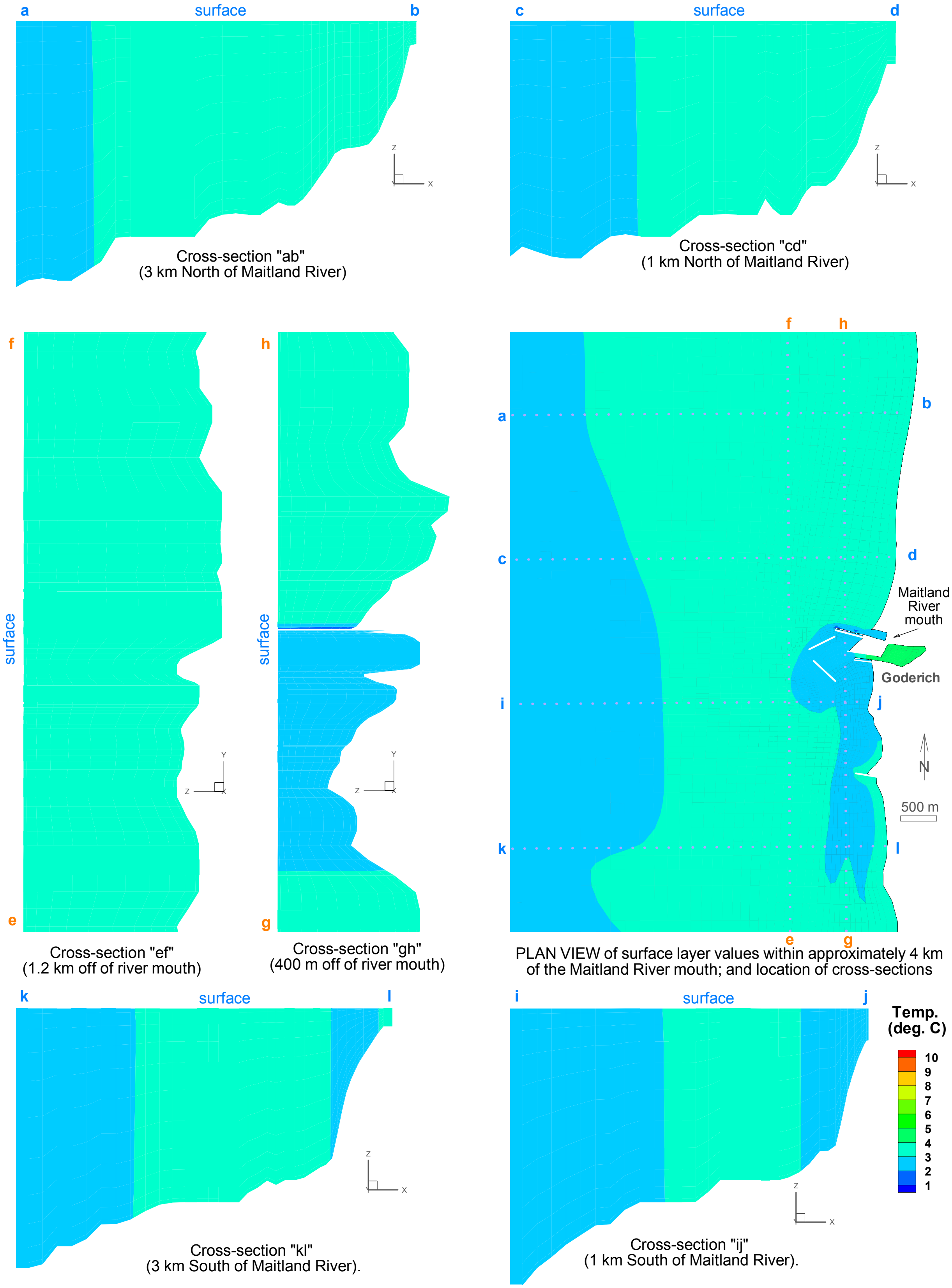


Figure 5.1T(h) **Water temperature, (plan view and 6 cross-sections), at 00 hours on March 31, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

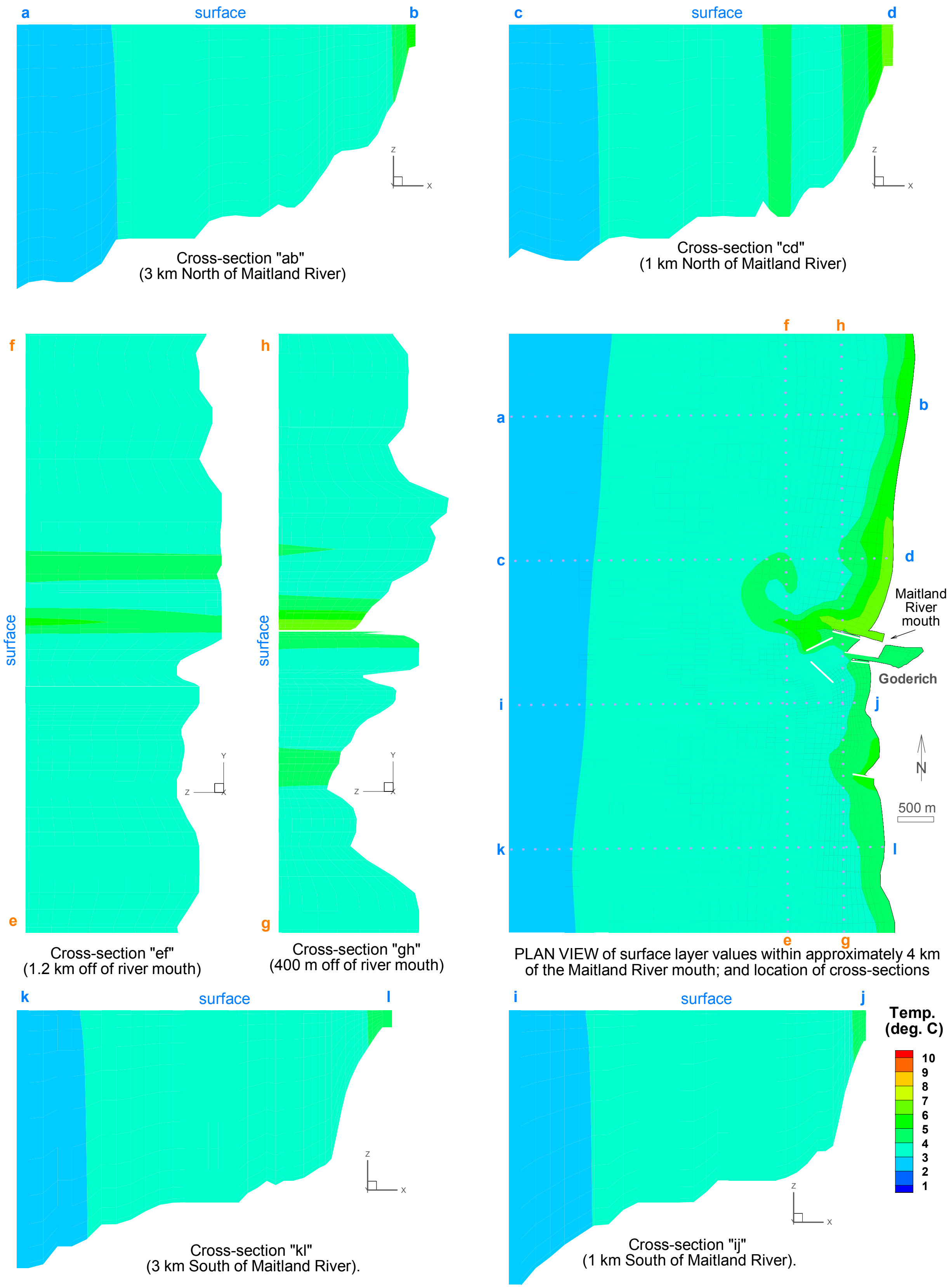
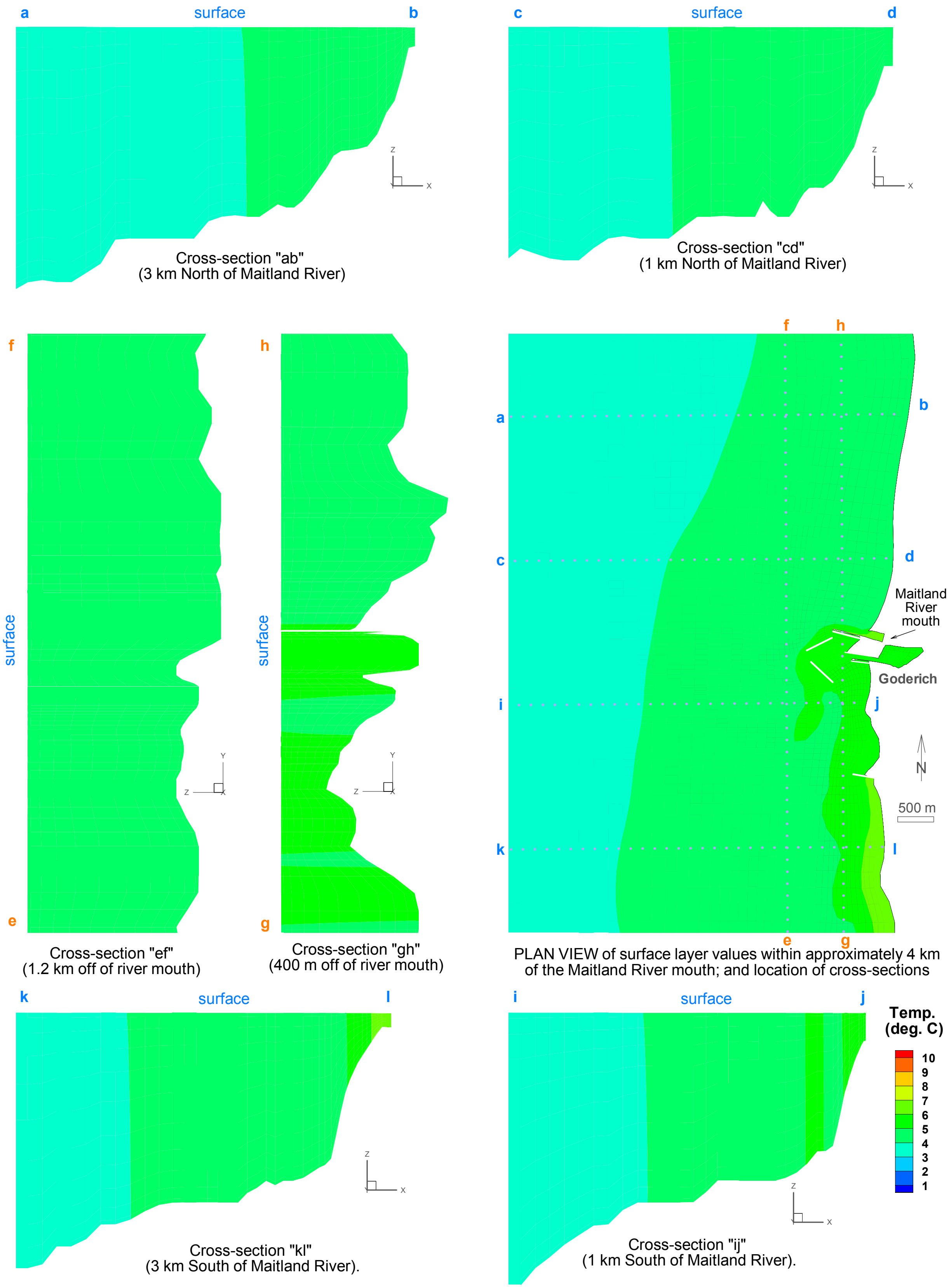


Figure 5.1T(i) Water temperature, (plan view and 6 cross-sections), at 00 hours on April 2, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1T(j) Water temperature, (plan view and 6 cross-sections), at 00 hours on April 4, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

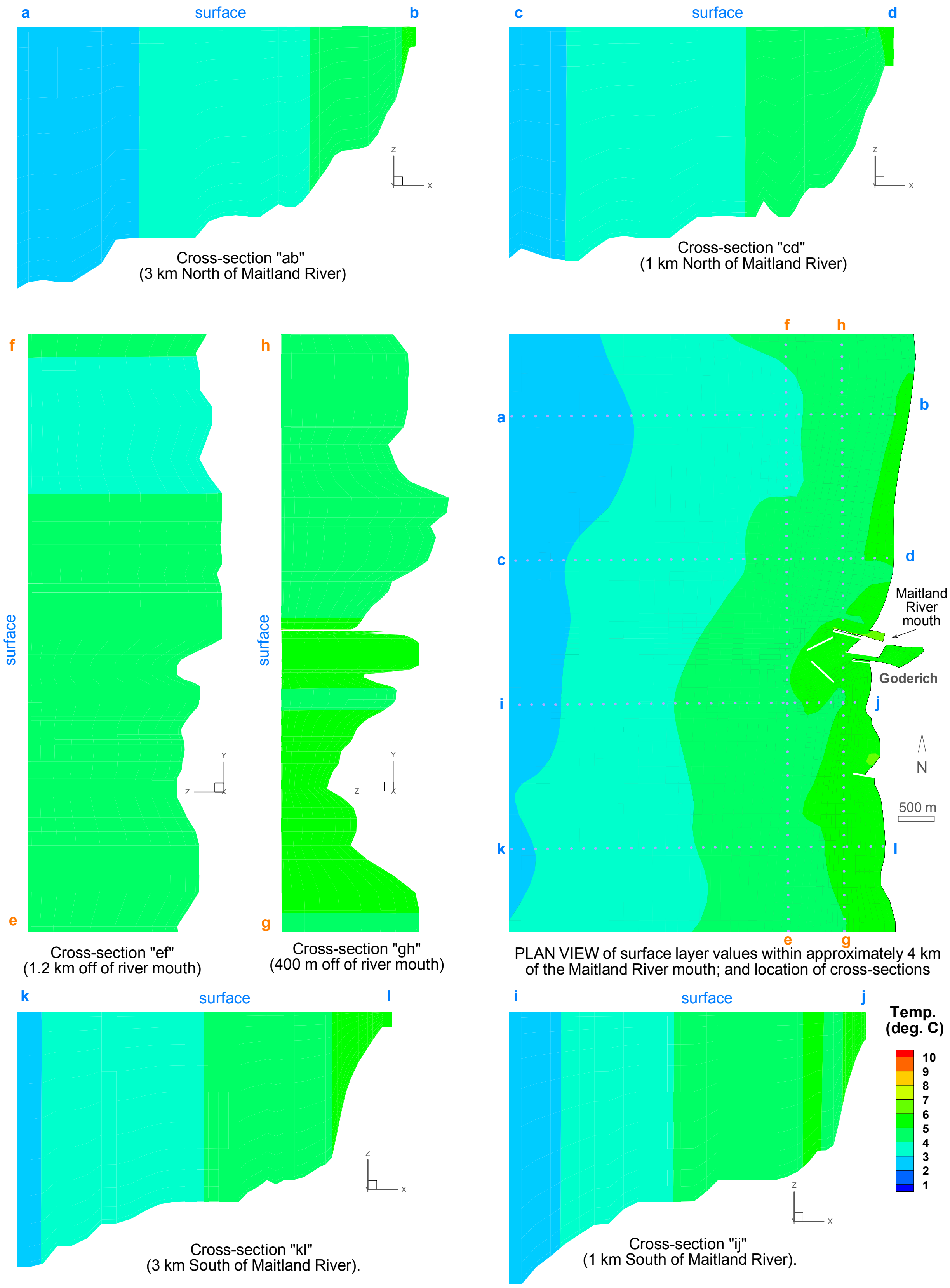


Figure 5.1T(k) **Water temperature, (plan view and 6 cross-sections), at 00 hours on April 6, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

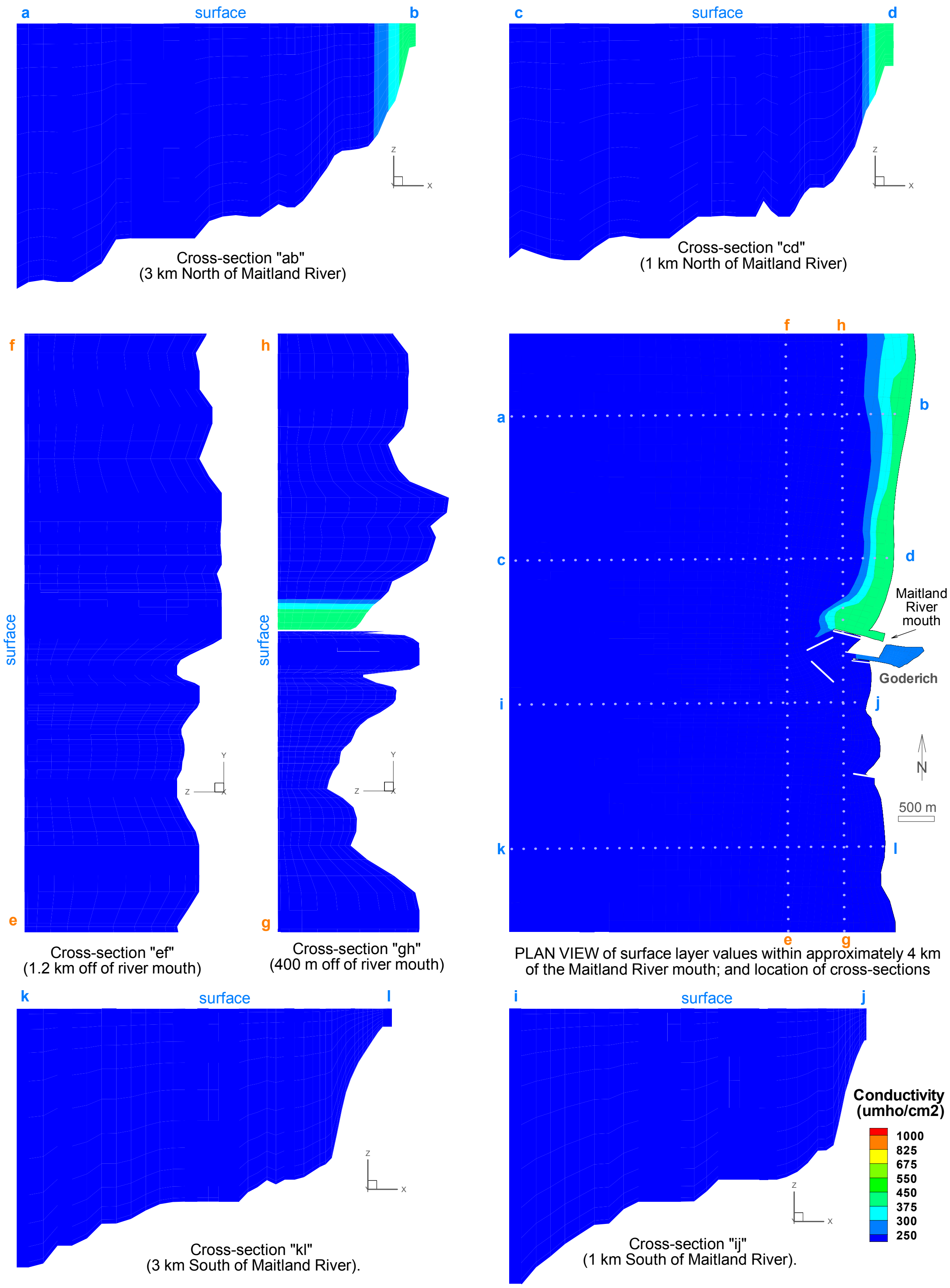
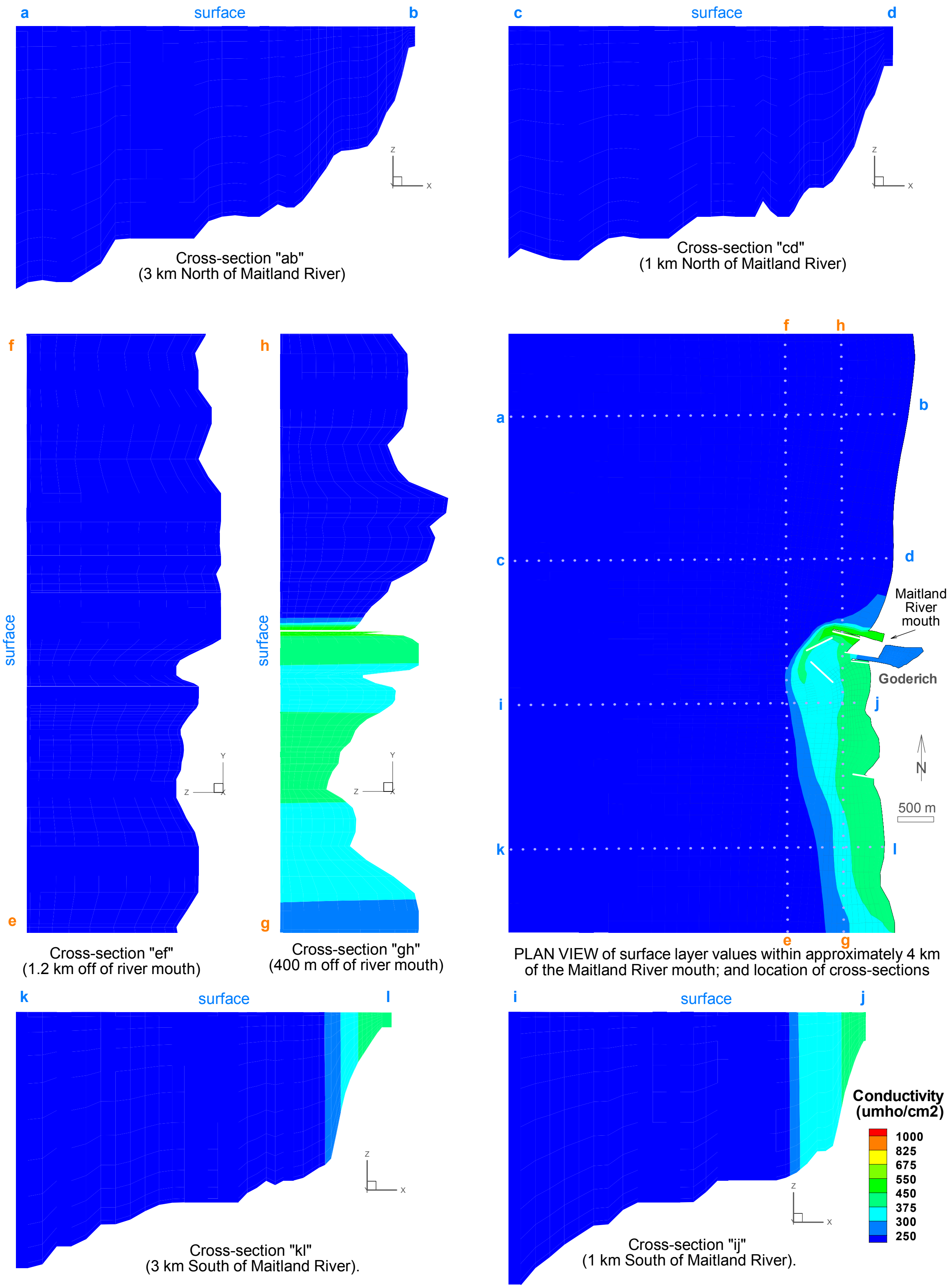


Figure 5.1C(a) **Conductivity, (plan view and 6 cross-sections), at 00 hours on March 17, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

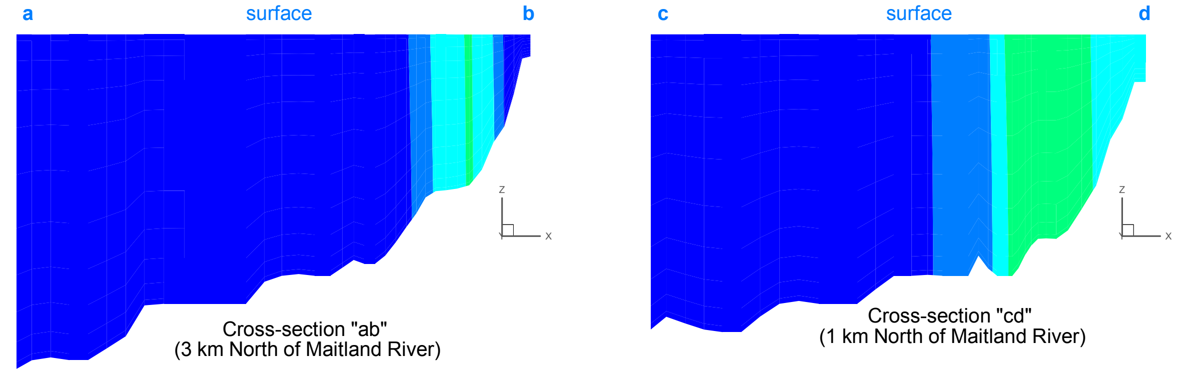
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

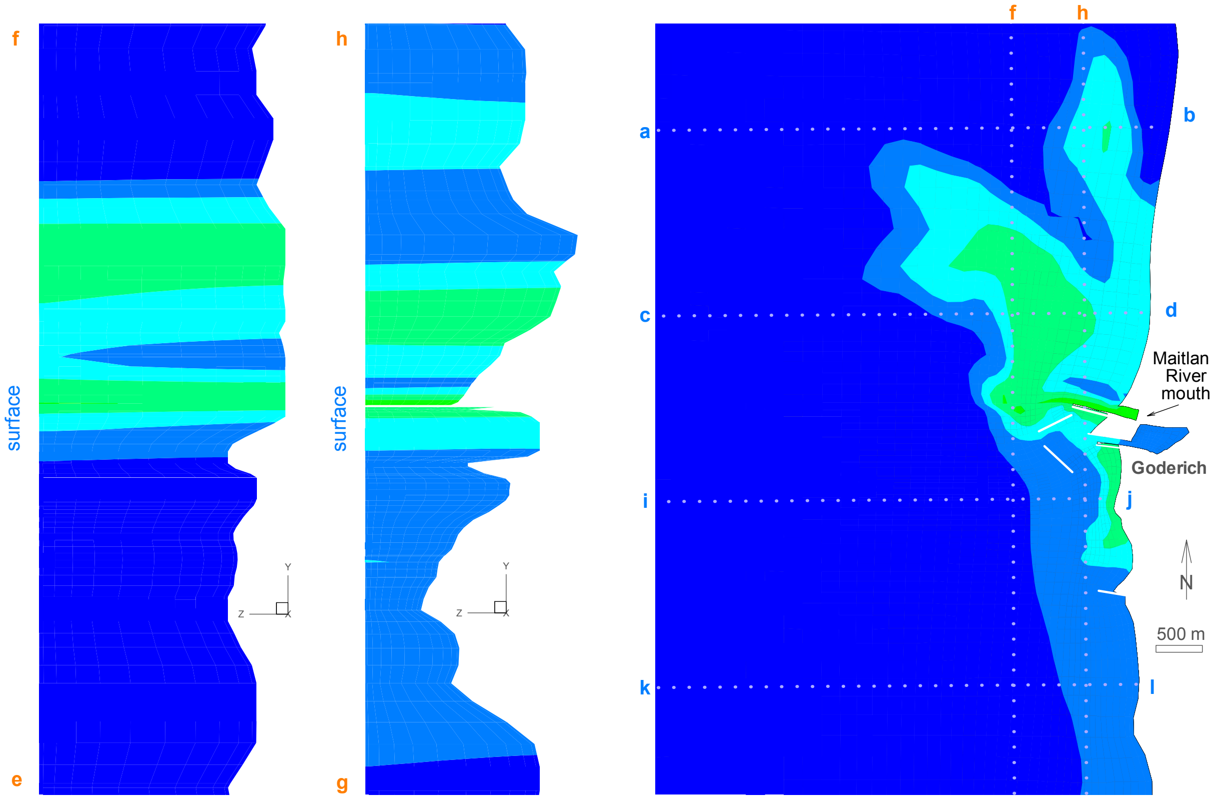
Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1C(b) Conductivity, (plan view and 6 cross-sections), at 00 hours on March 19 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

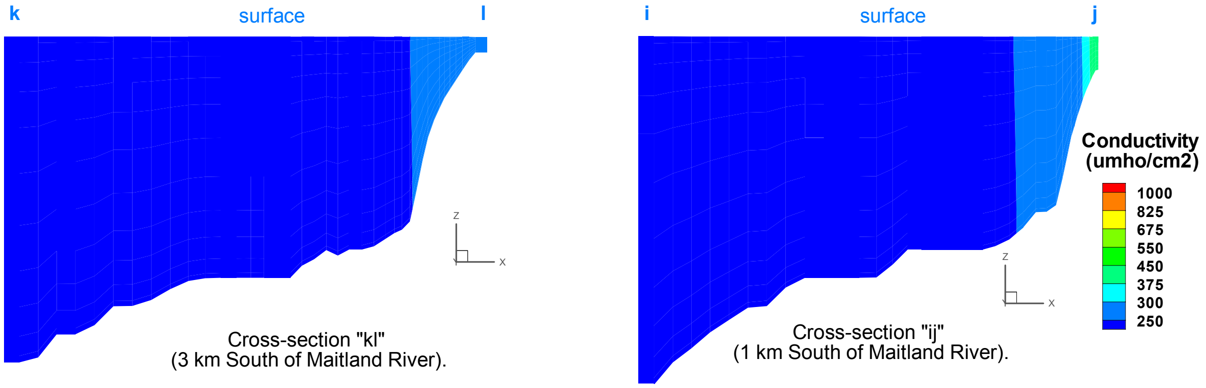
Cross-section "cd"
(1 km North of Maitland River)



Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

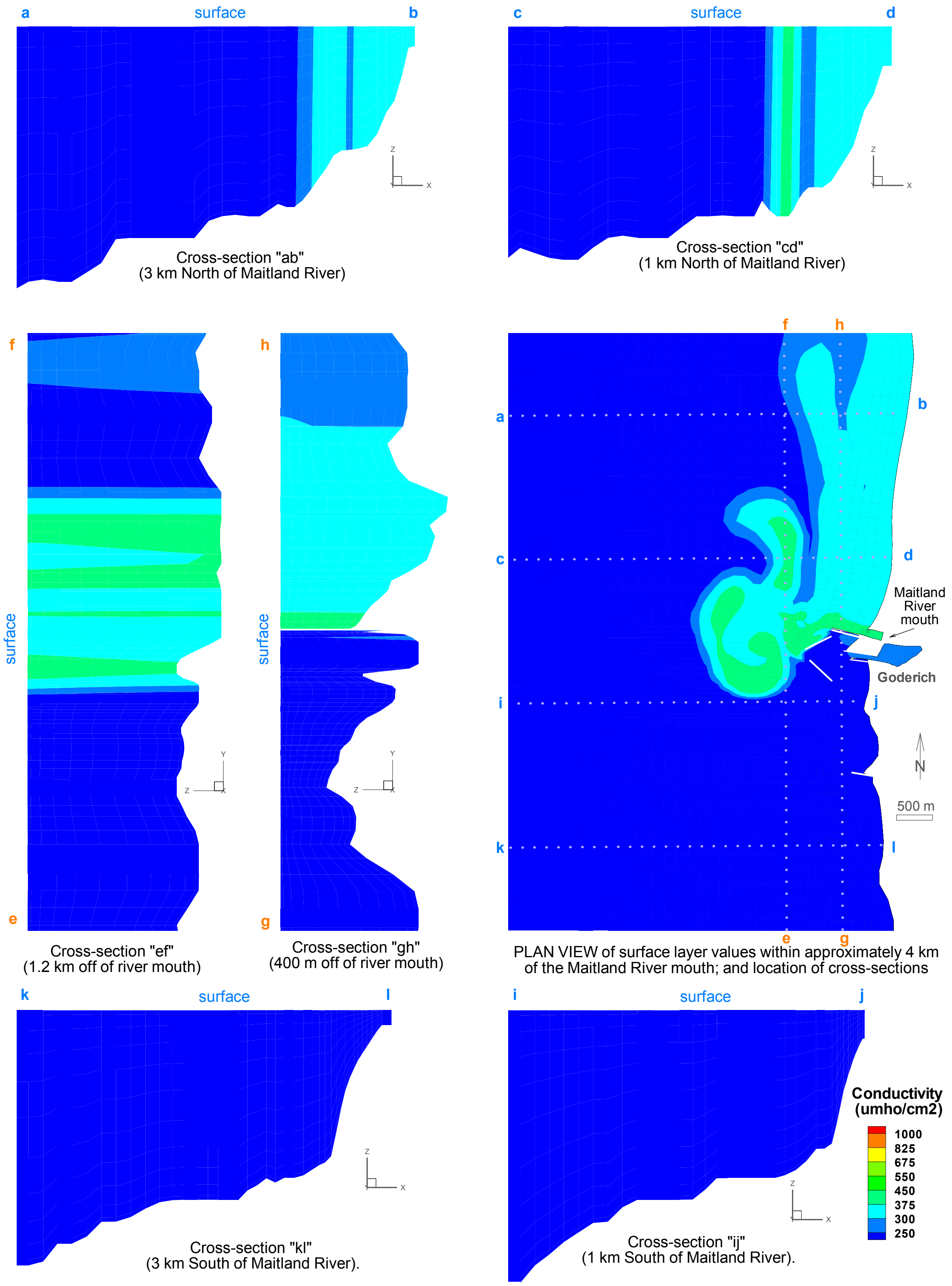
PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections



Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1C(c) Conductivity, (plan view and 6 cross-sections), at 00 hours on March 21, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

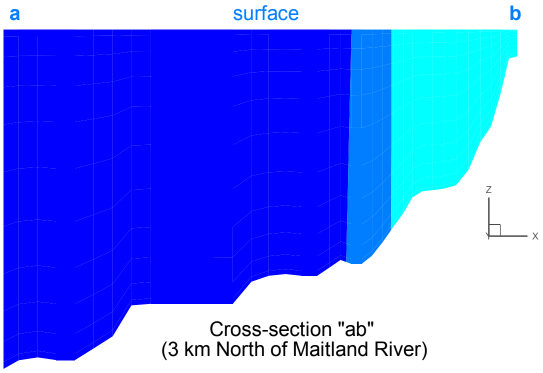
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

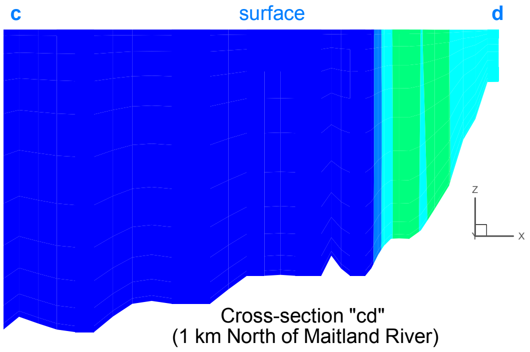
Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

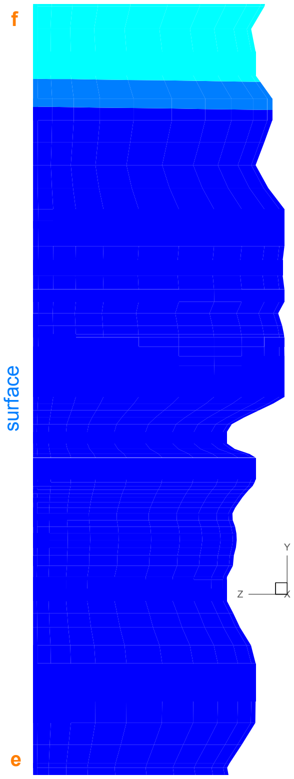
Figure 5.1C(d) Conductivity, (plan view and 6 cross-sections), at 00 hours on March 23, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



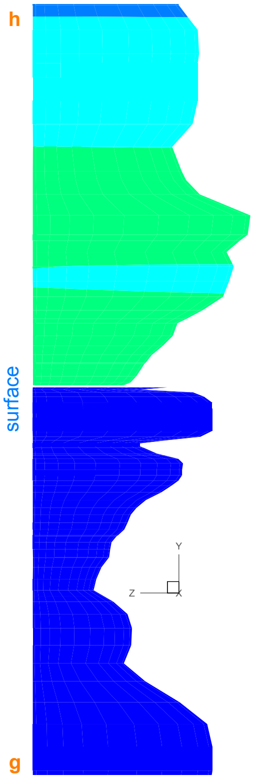
Cross-section "ab"
(3 km North of Maitland River)



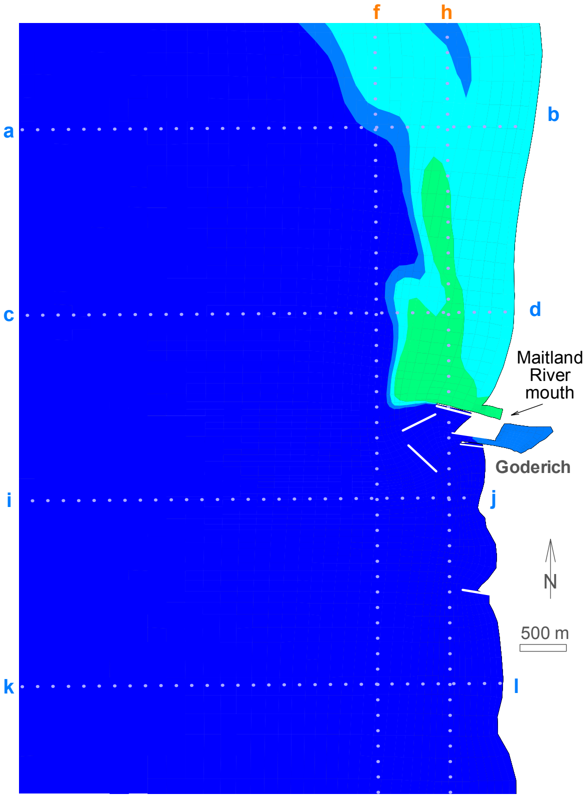
Cross-section "cd"
(1 km North of Maitland River)



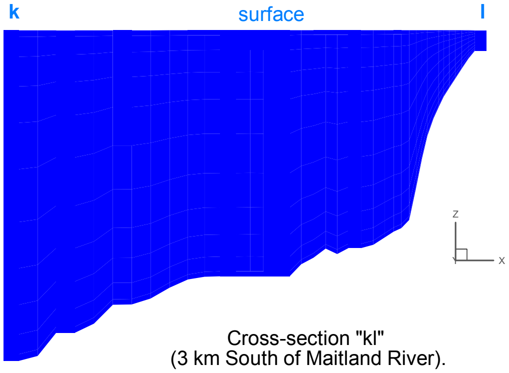
Cross-section "ef"
(1.2 km off of river mouth)



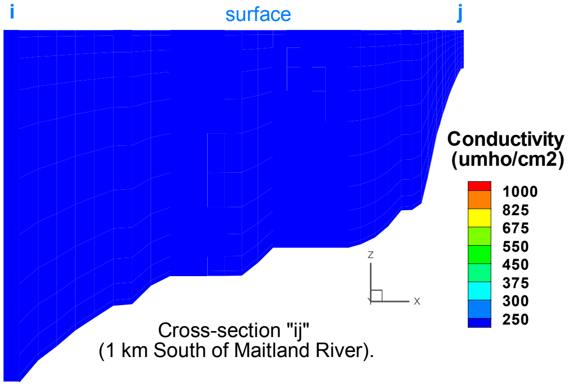
Cross-section "gh"
(400 m off of river mouth)



PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

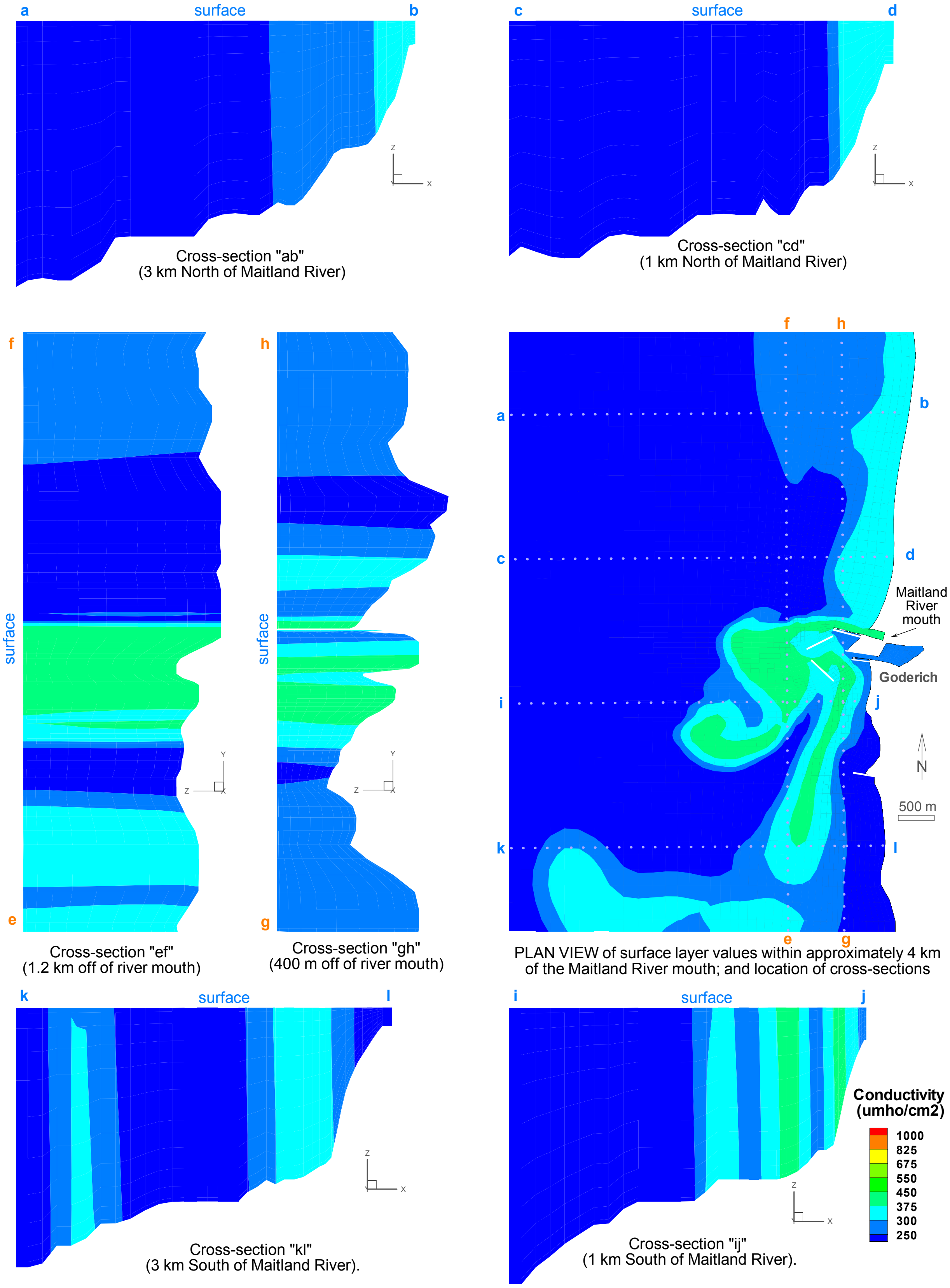


Cross-section "kl"
(3 km South of Maitland River).



Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1C(e) Conductivity, (plan view and 6 cross-sections), at 00 hours on March 25, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].


Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1C(f) Conductivity, (plan view and 6 cross-sections), at 00 hours on March 27, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

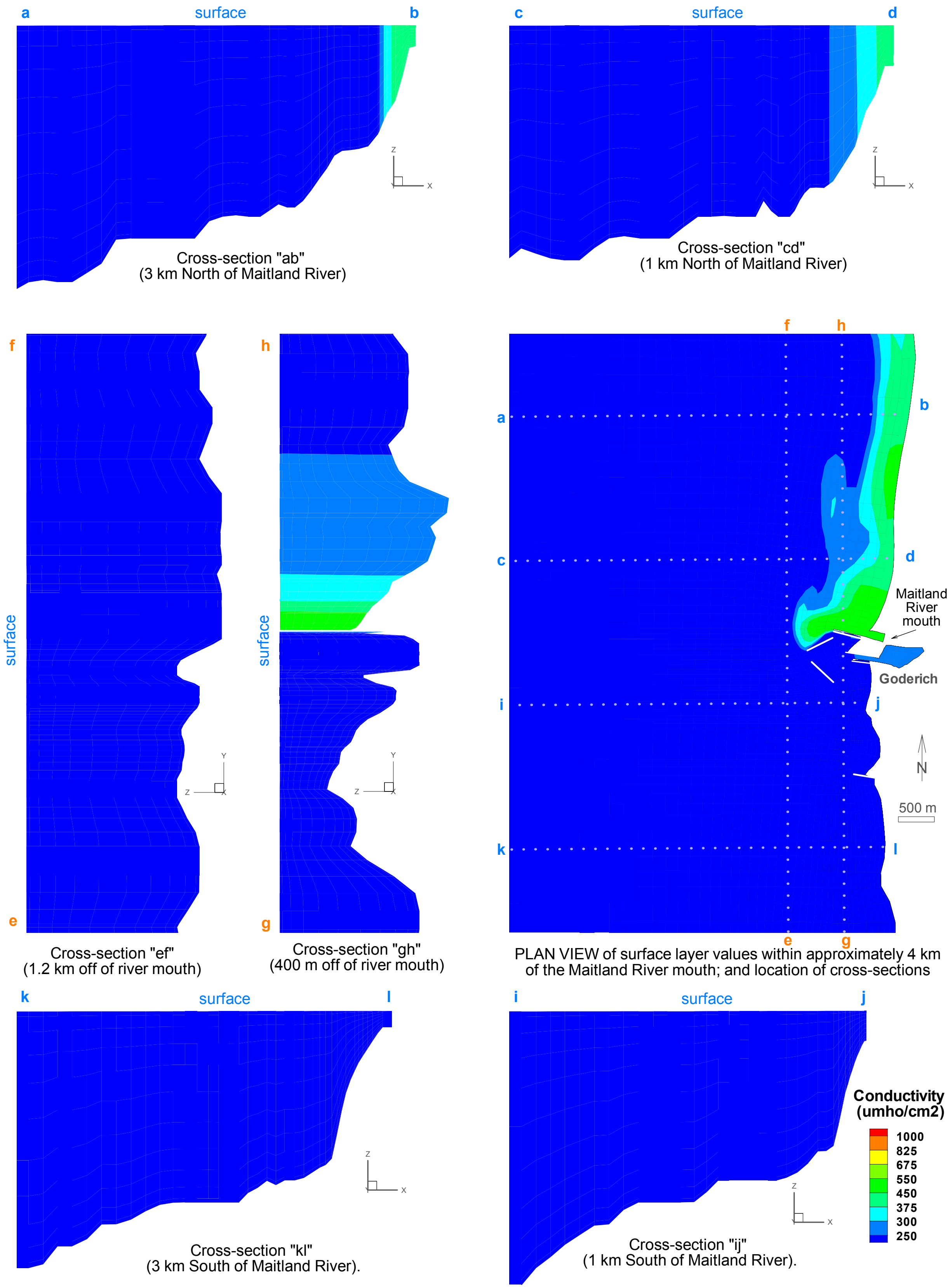
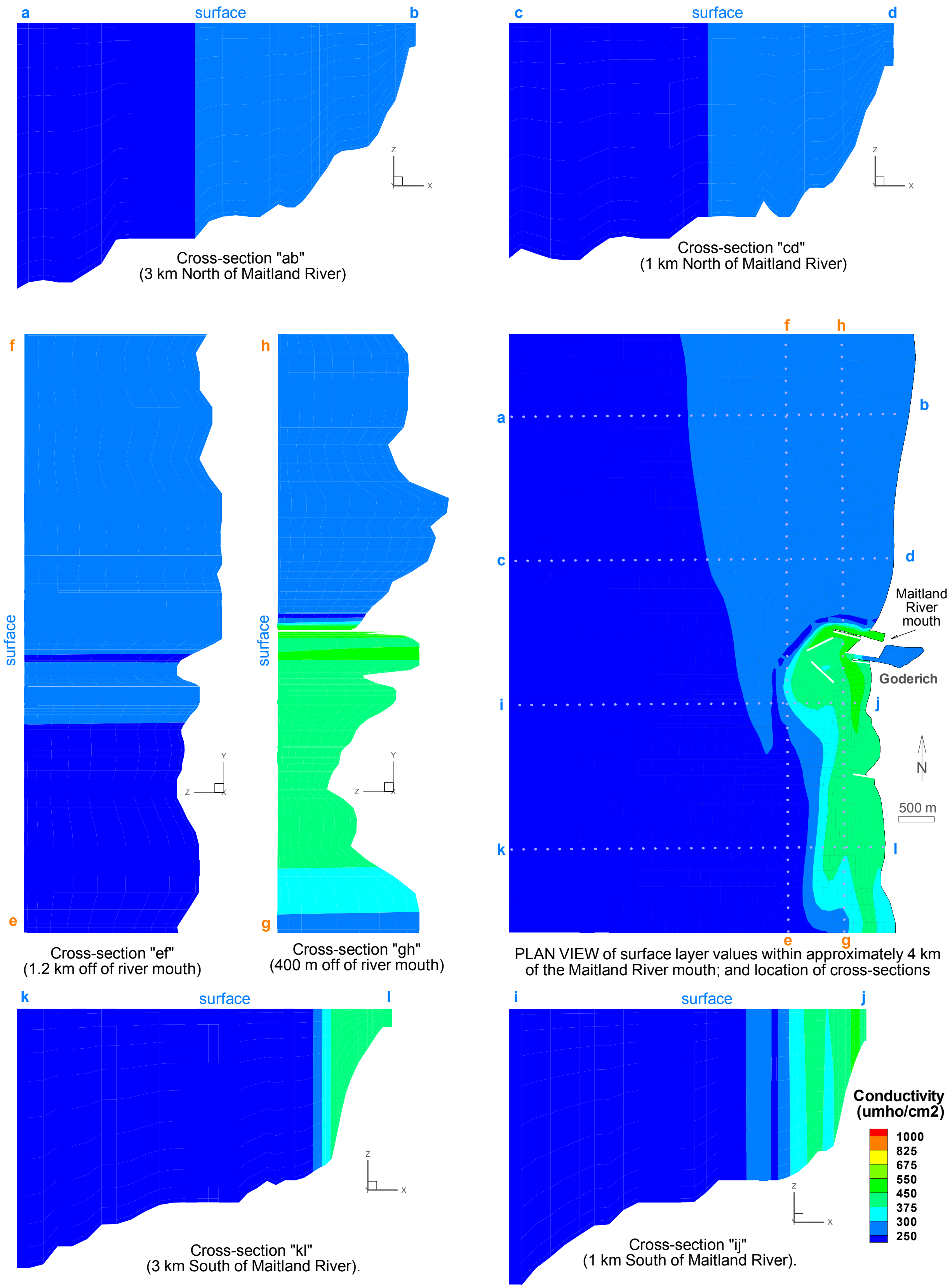


Figure 5.1C(g) Conductivity, (plan view and 6 cross-sections), at 00 hours on March 29, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

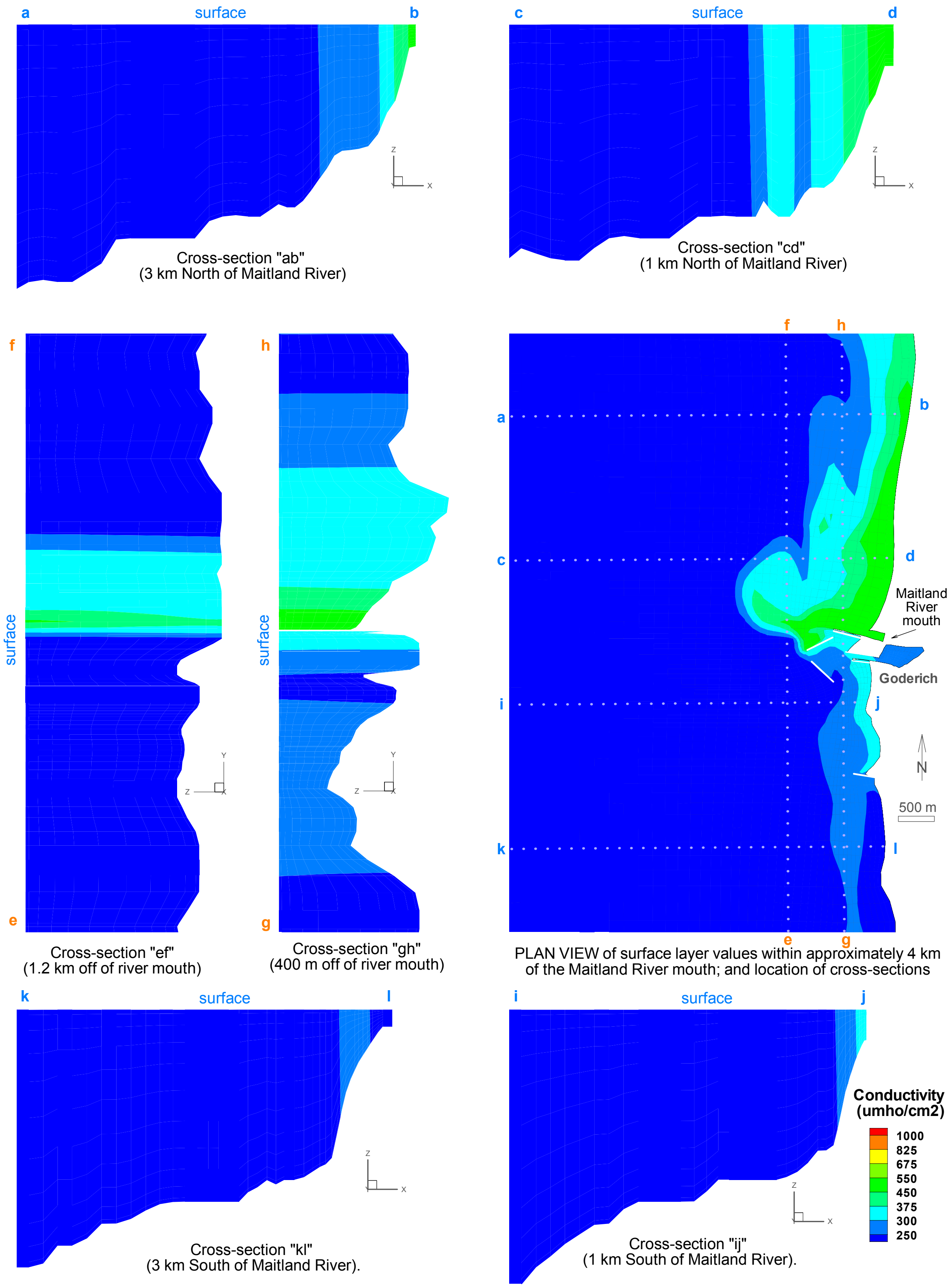
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1C(h) Conductivity, (plan view and 6 cross-sections), at 00 hours on March 31, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

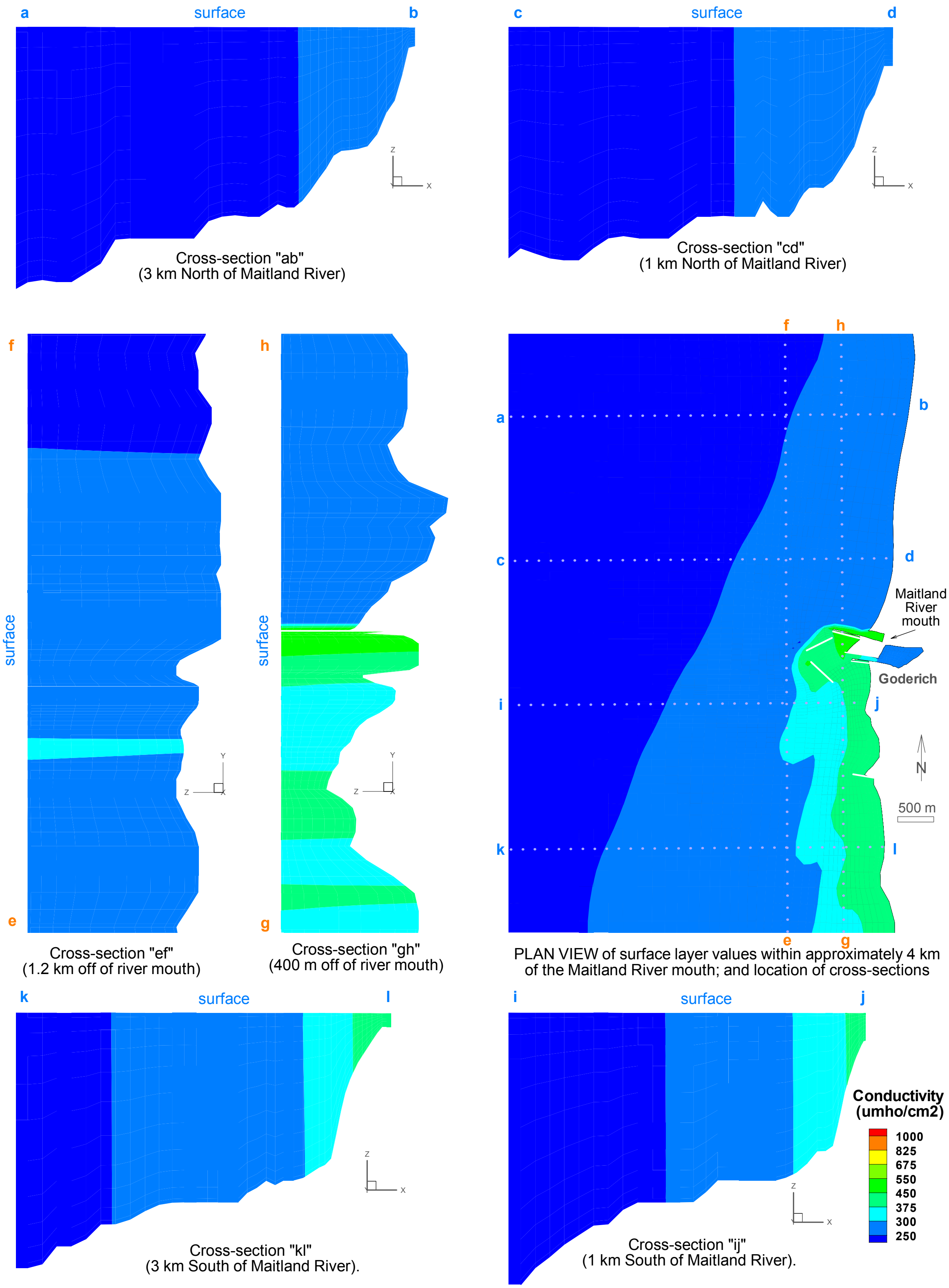
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1C(i) Conductivity, (plan view and 6 cross-sections), at 00 hours on April 2, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab" (3 km North of Maitland River)

Cross-section "cd" (1 km North of Maitland River)

Cross-section "ef" (1.2 km off of river mouth)

Cross-section "gh" (400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl" (3 km South of Maitland River).

Cross-section "ij" (1 km South of Maitland River).

Figure 5.1C(j) Conductivity, (plan view and 6 cross-sections), at 00 hours on April 4, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

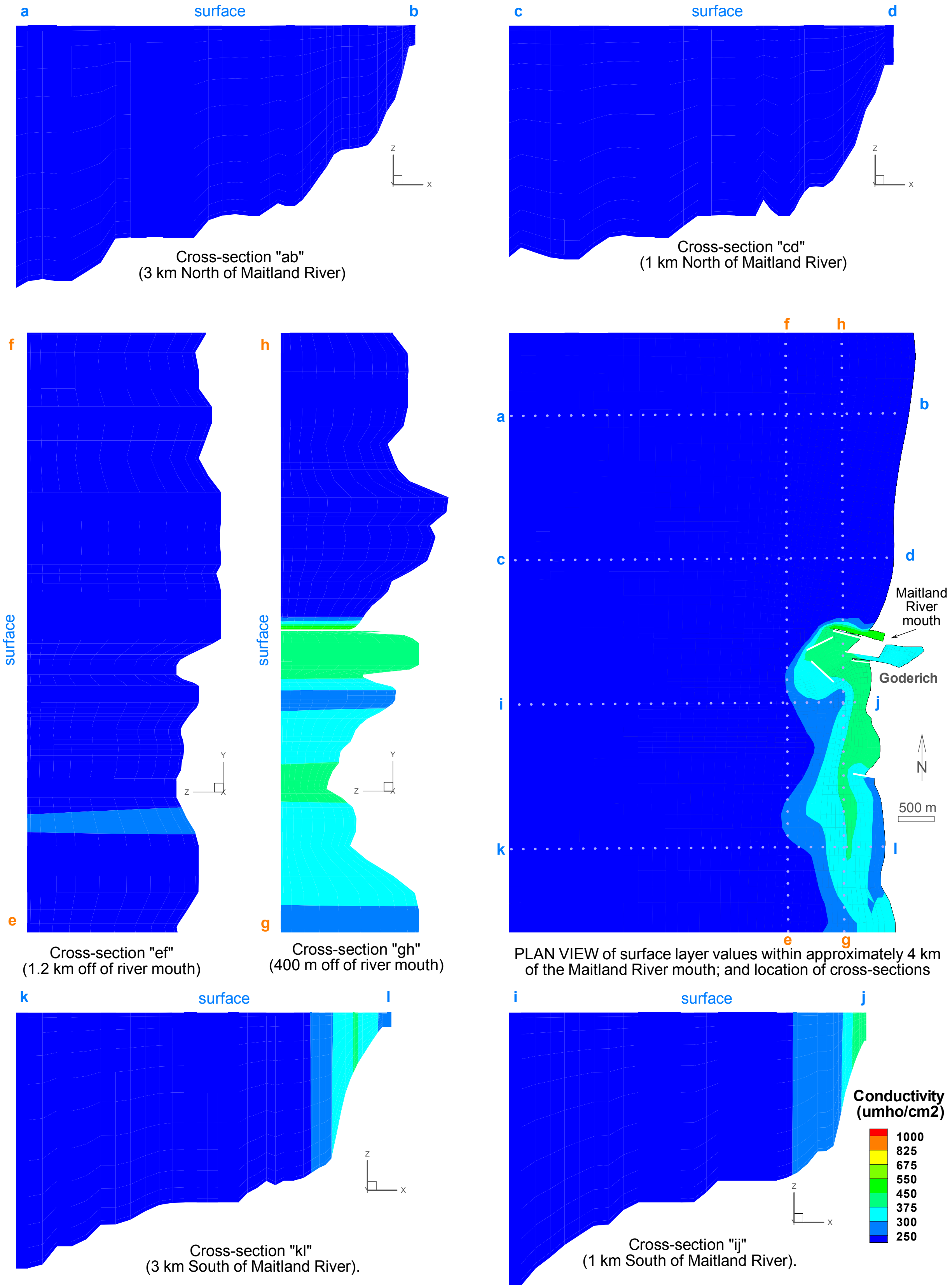
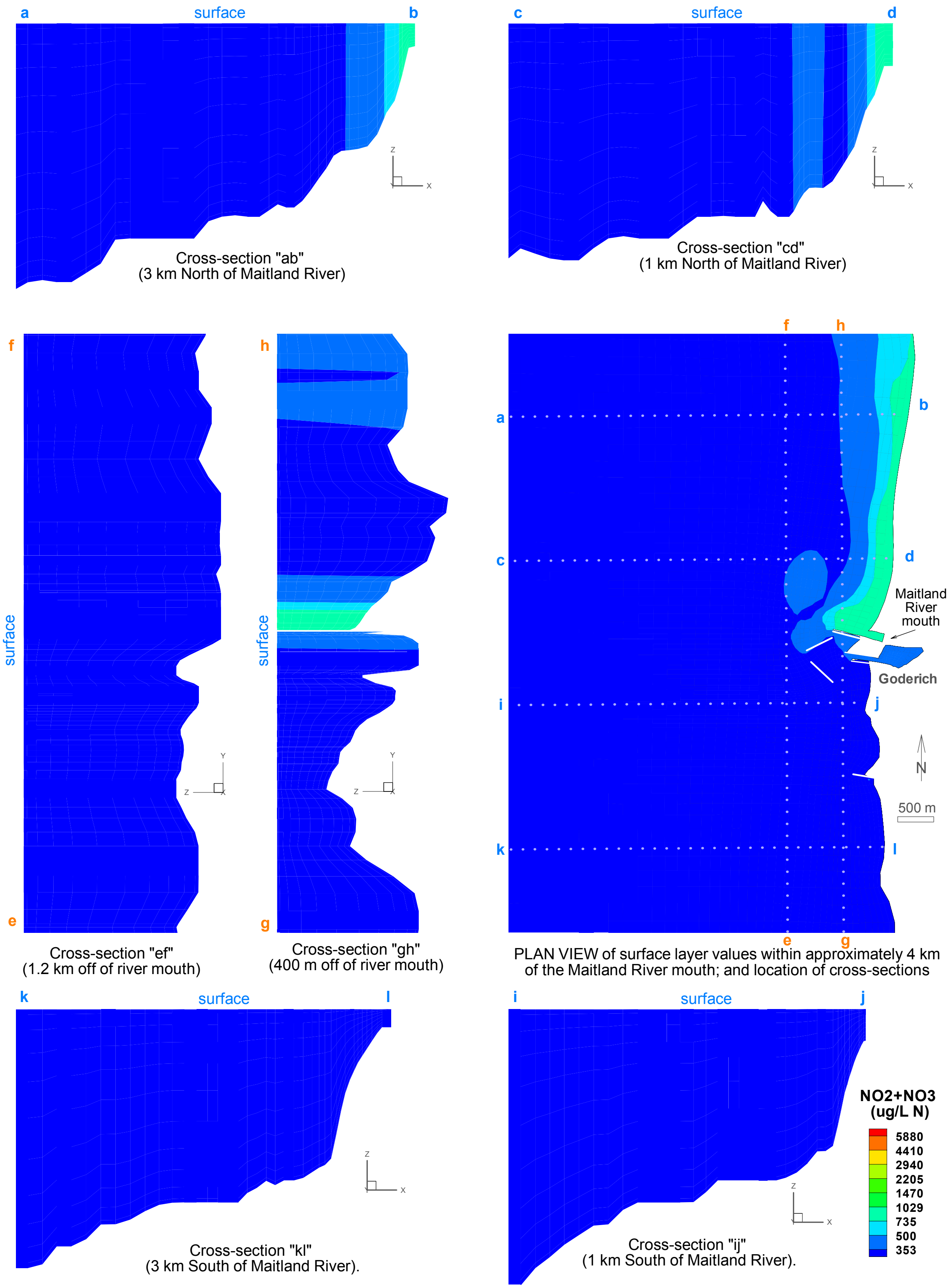


Figure 5.1C(k) **Conductivity, (plan view and 6 cross-sections), at 00 hours on April 6, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1N(a) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on March 17, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

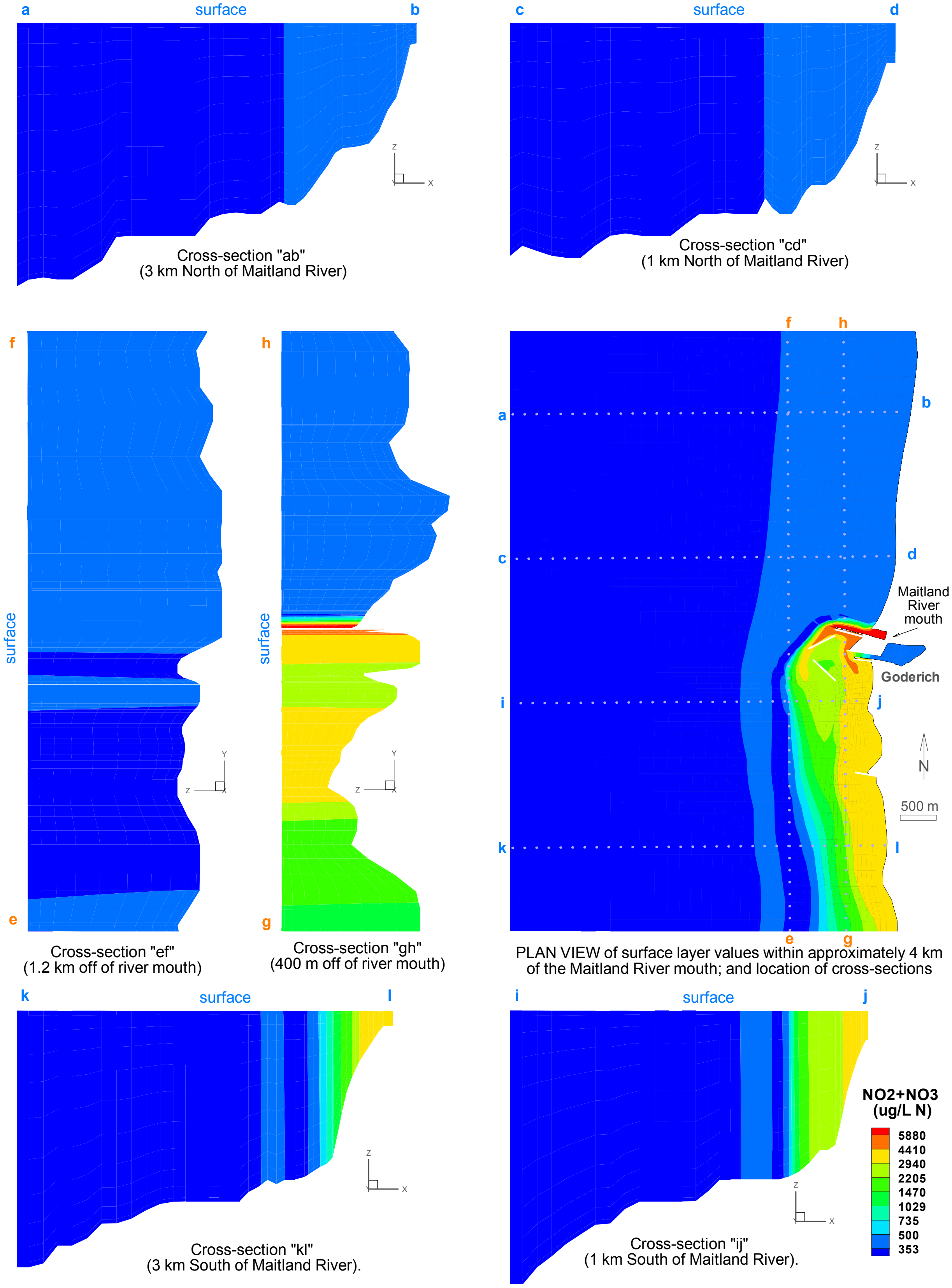
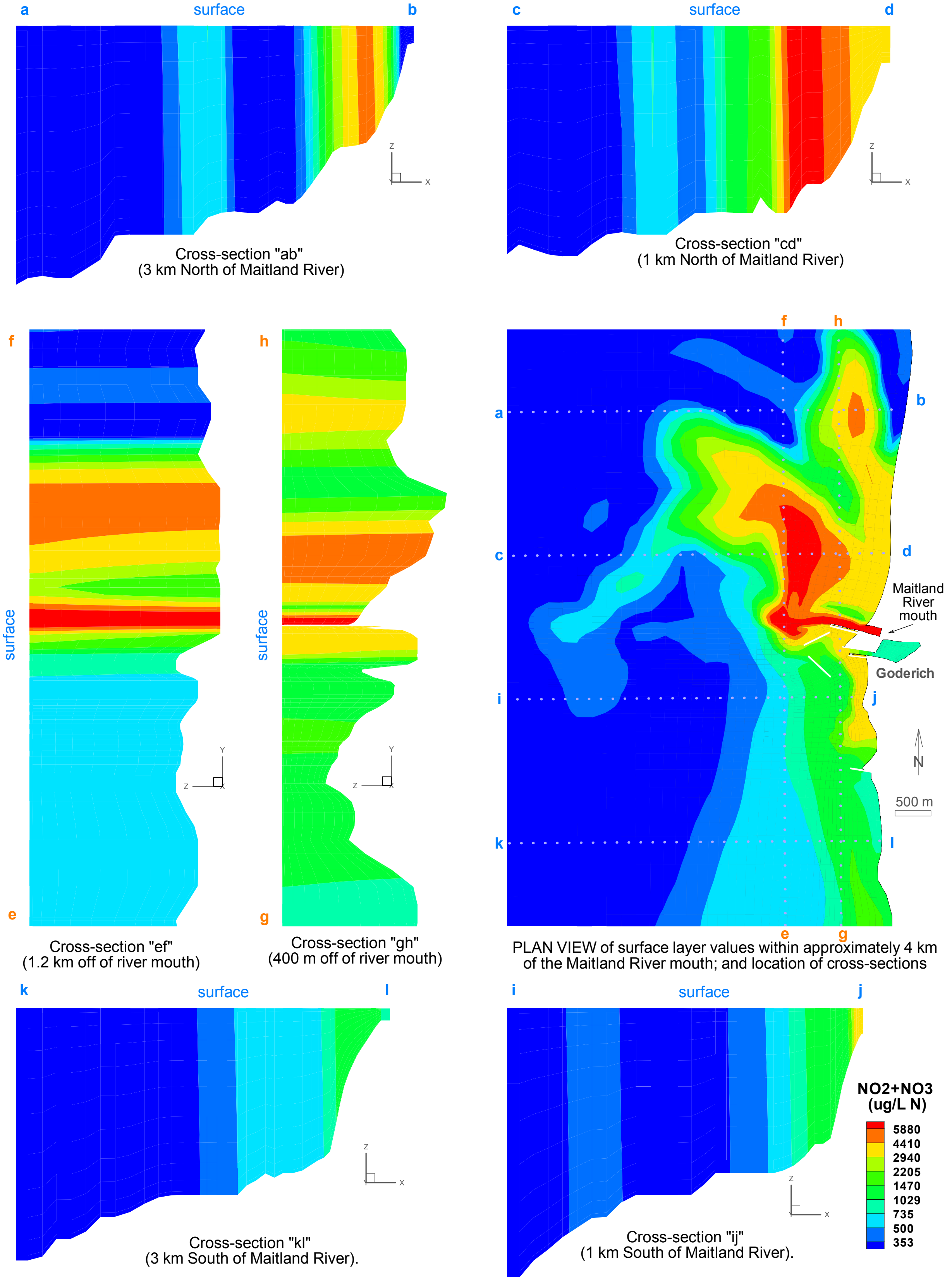


Figure 5.1N(b) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on March 19, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

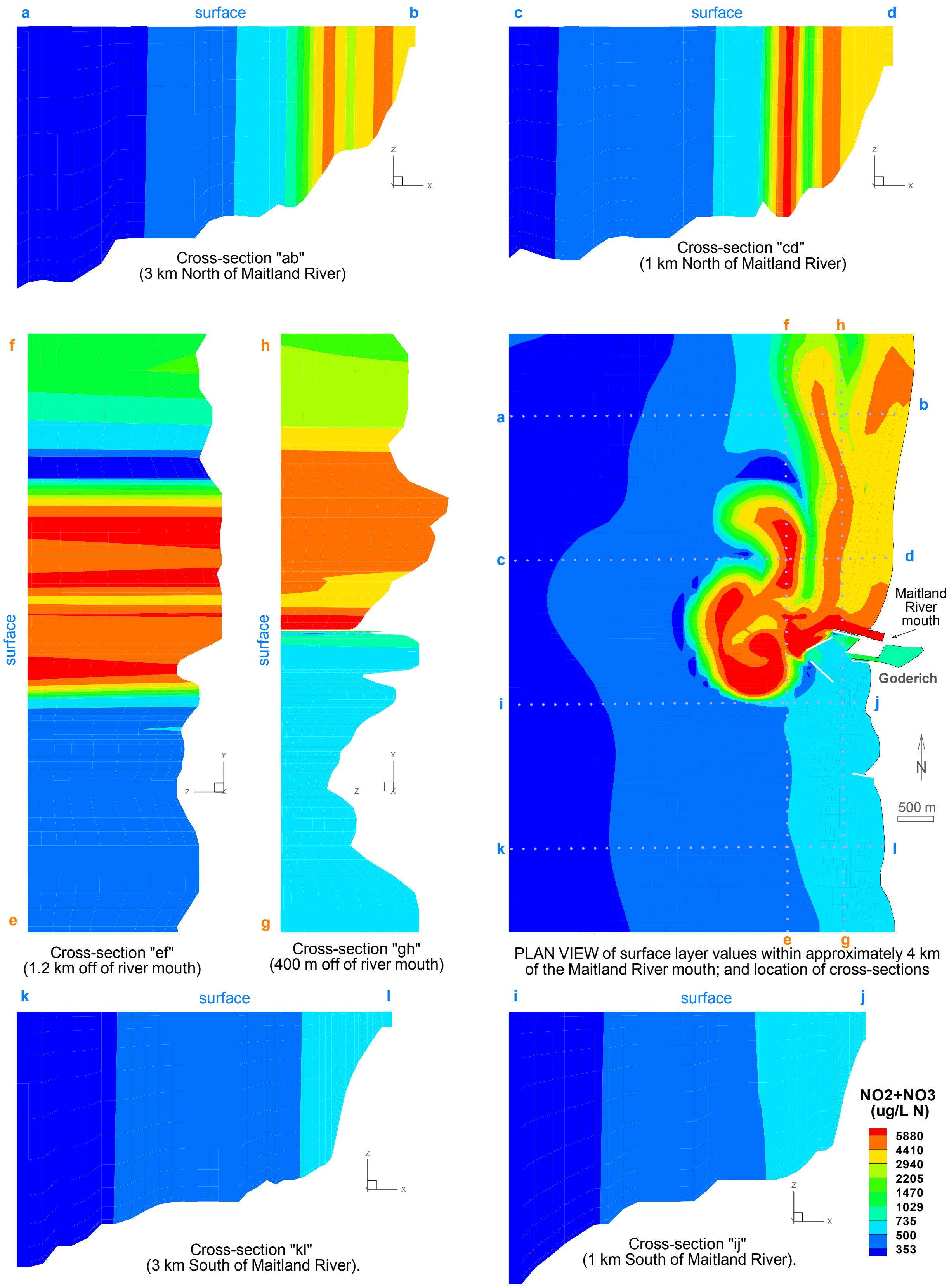
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1N(c) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on March 21, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

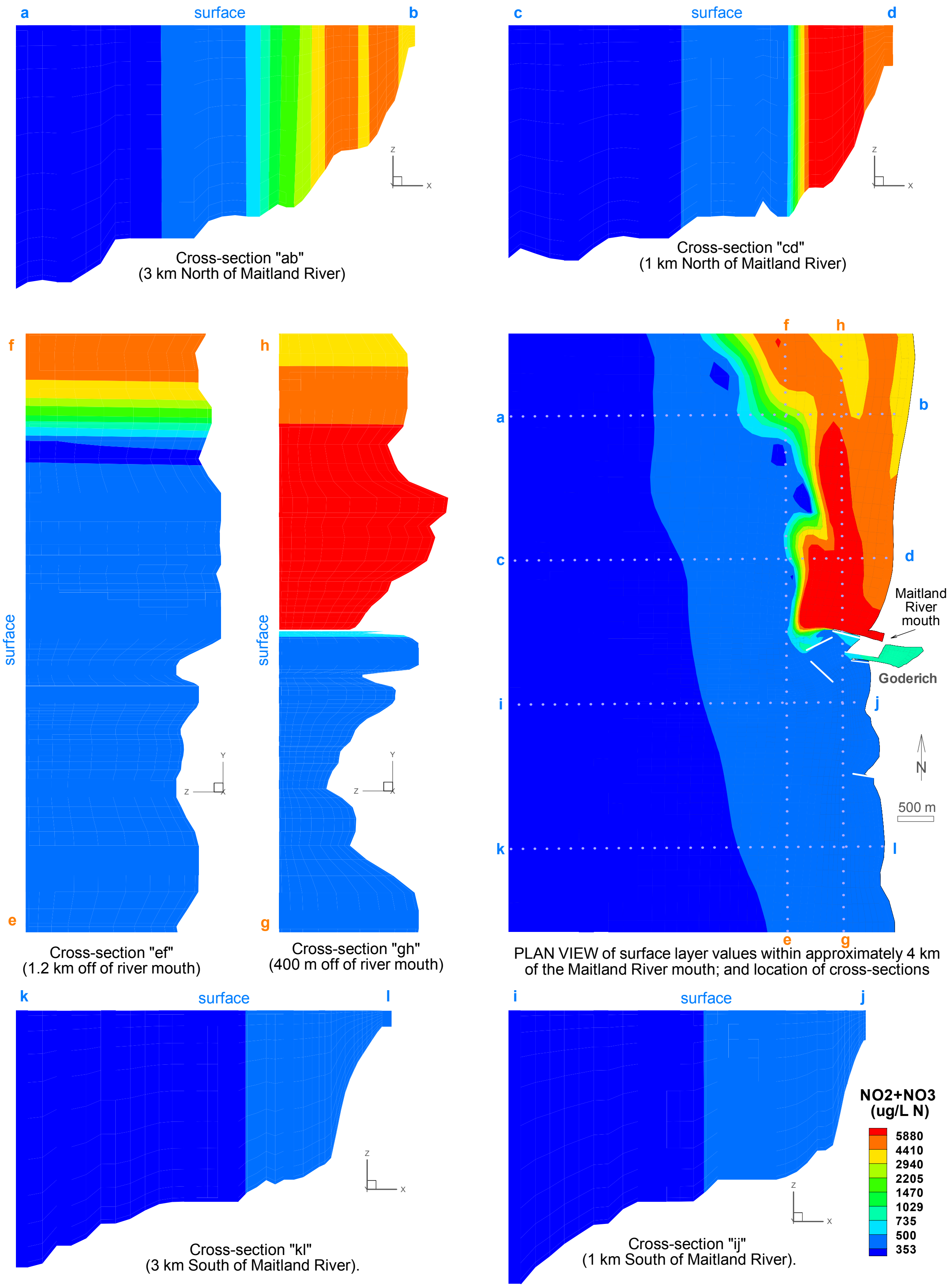
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1N(d) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on March 23, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

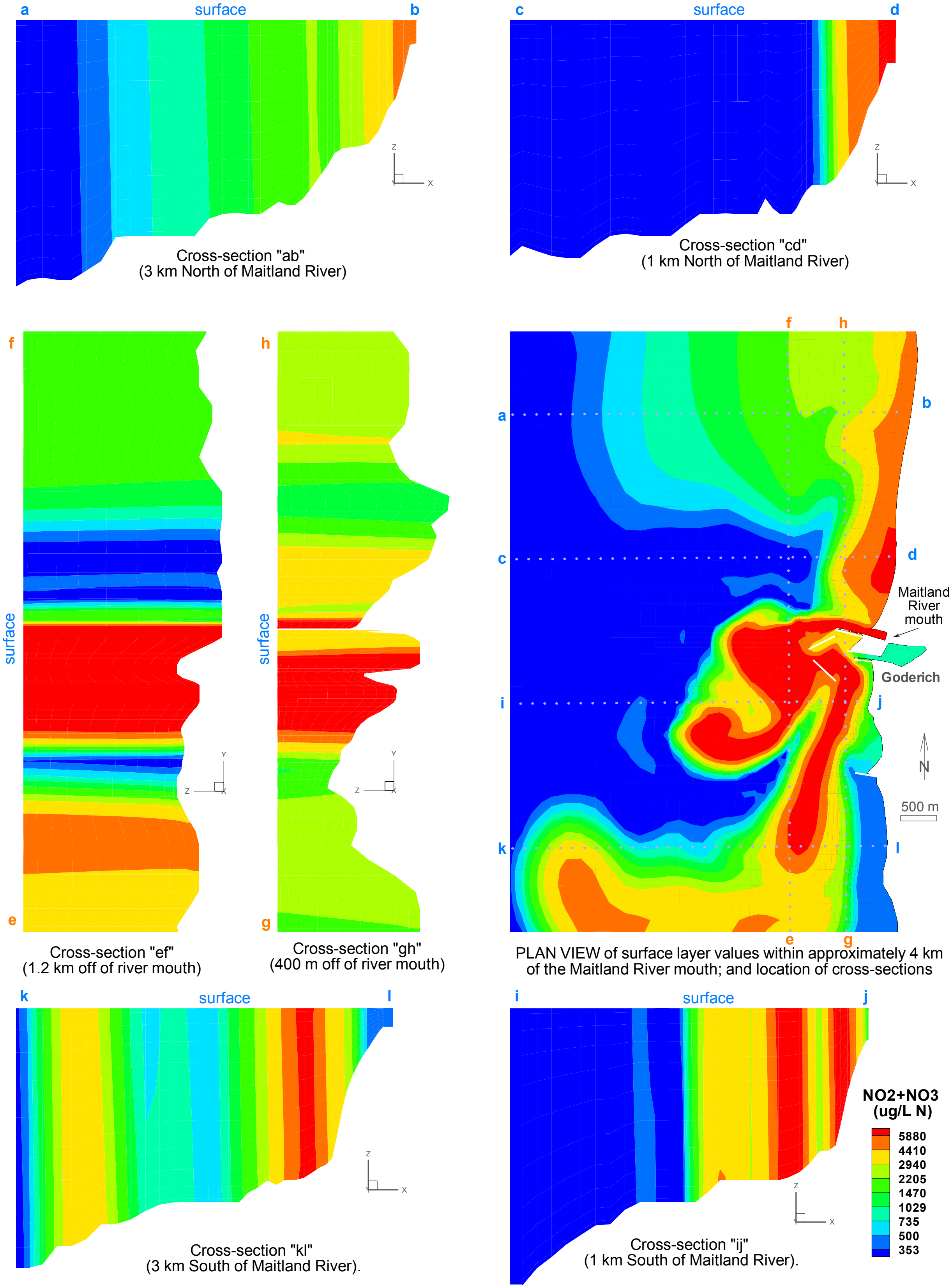
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1N(e) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on March 25, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1N(f) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on March 27, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

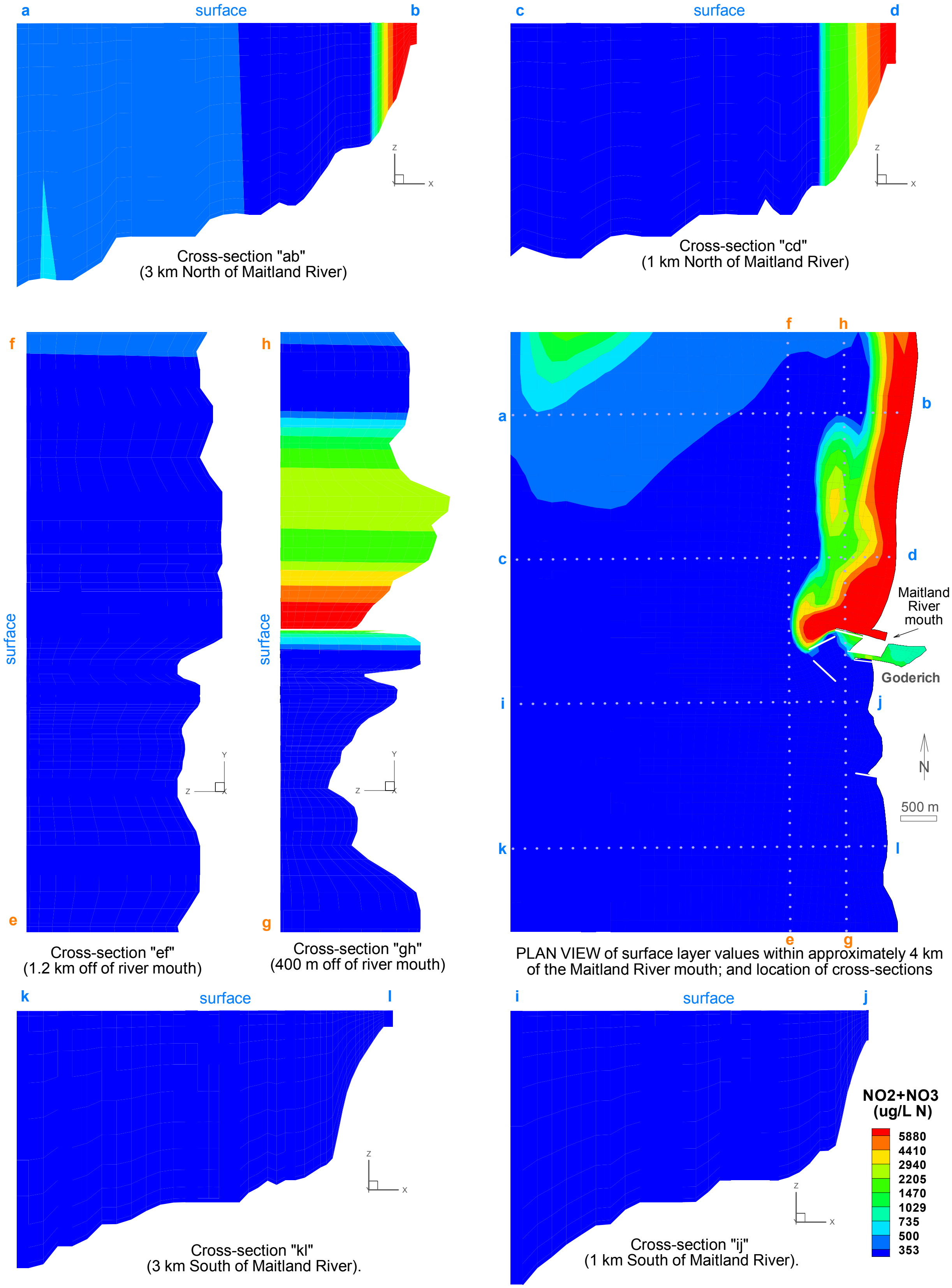
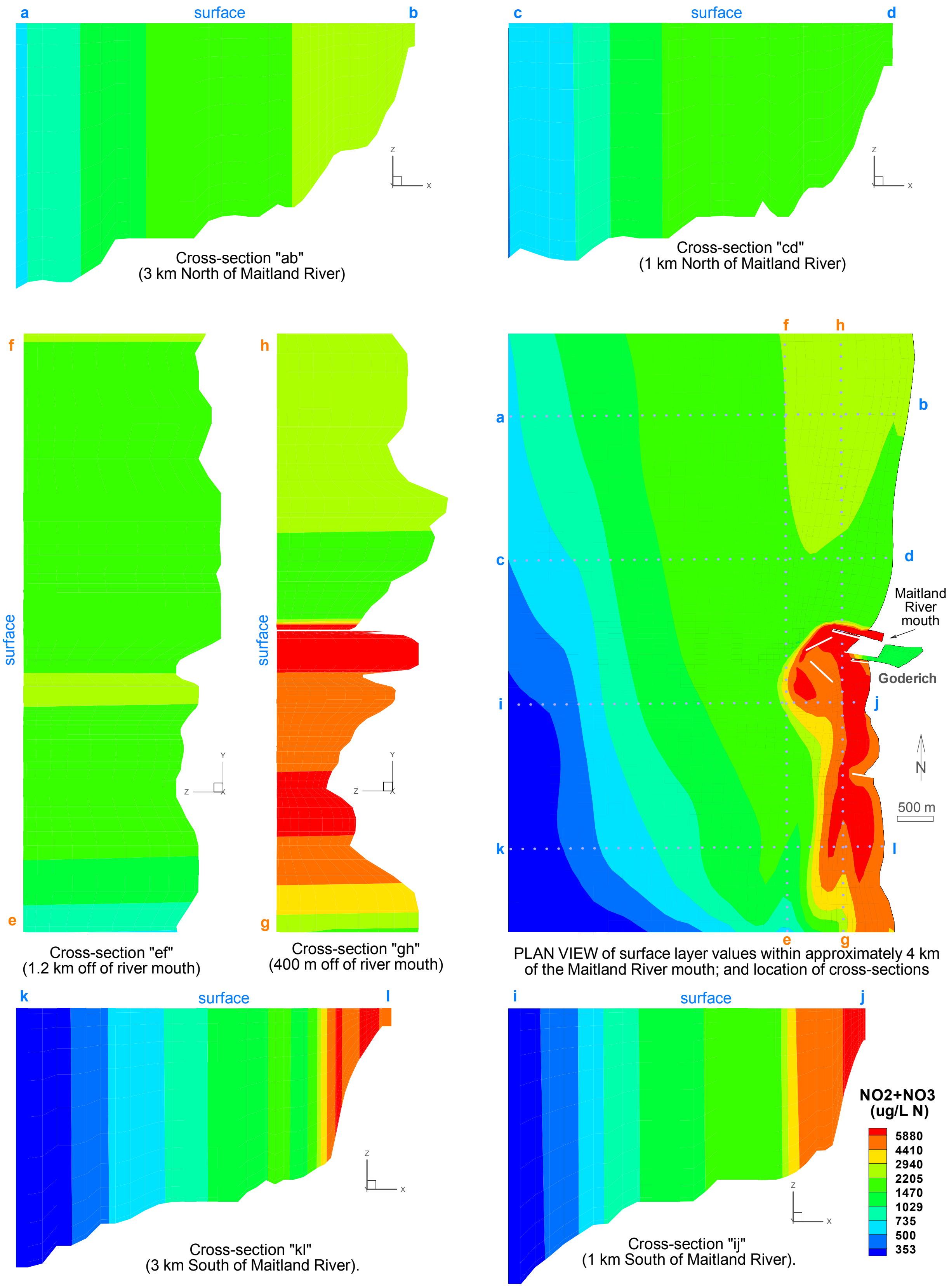


Figure 5.1N(g) **NO2+NO3, (plan view and 6 cross-sections), at 00 hours on March 29, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

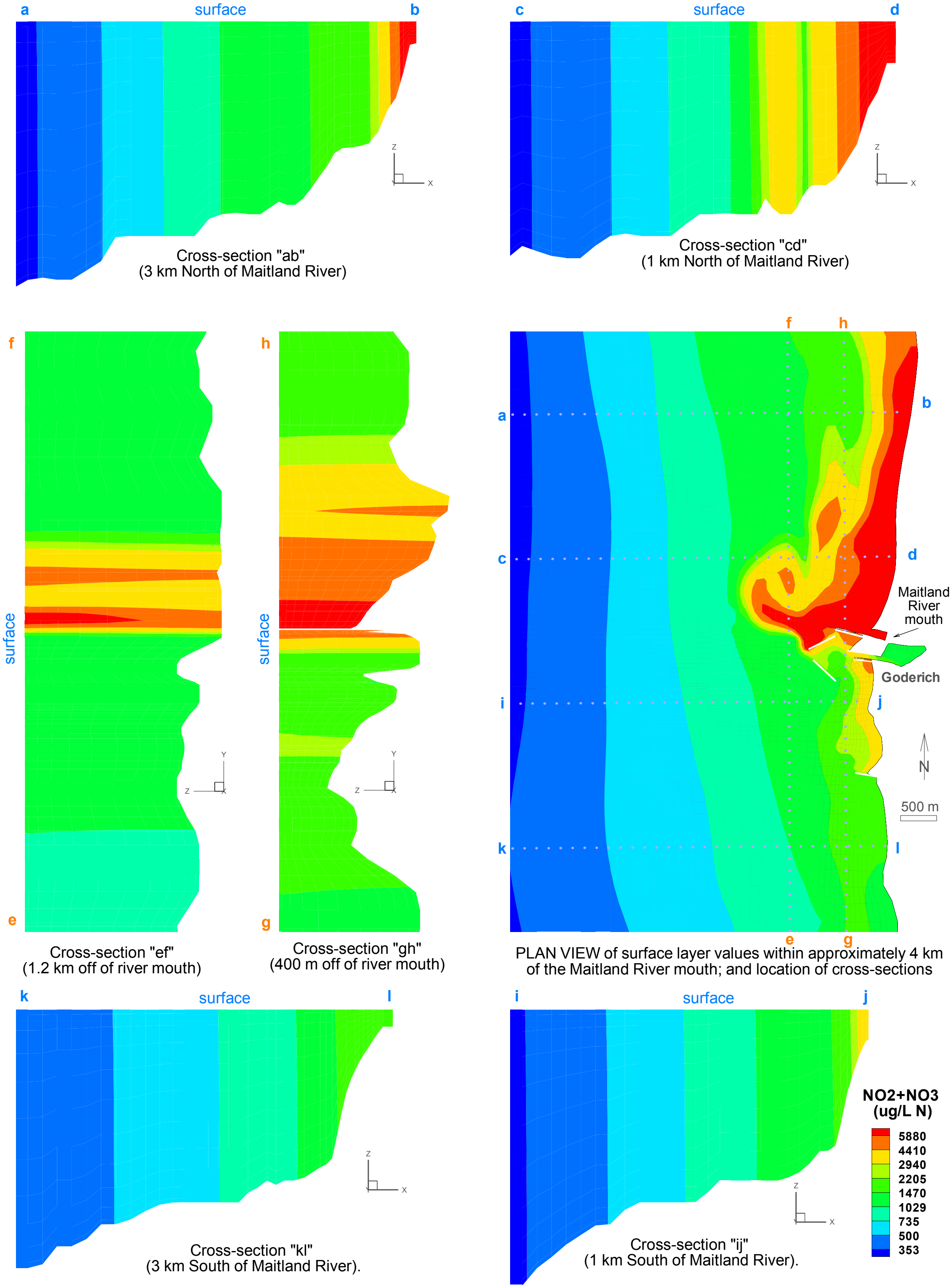
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1N(h) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on March 31, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

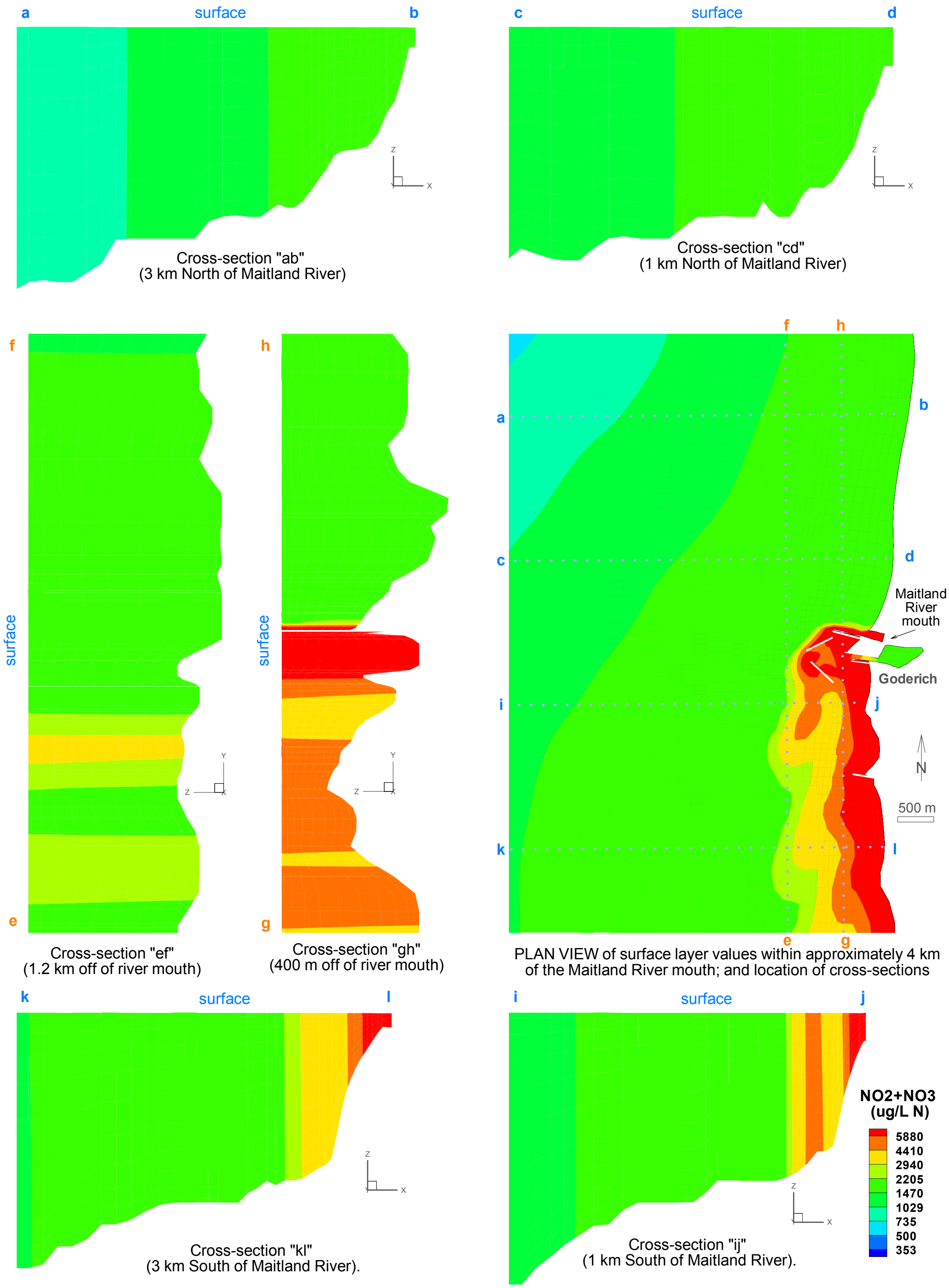
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1N(i) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on April 2, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

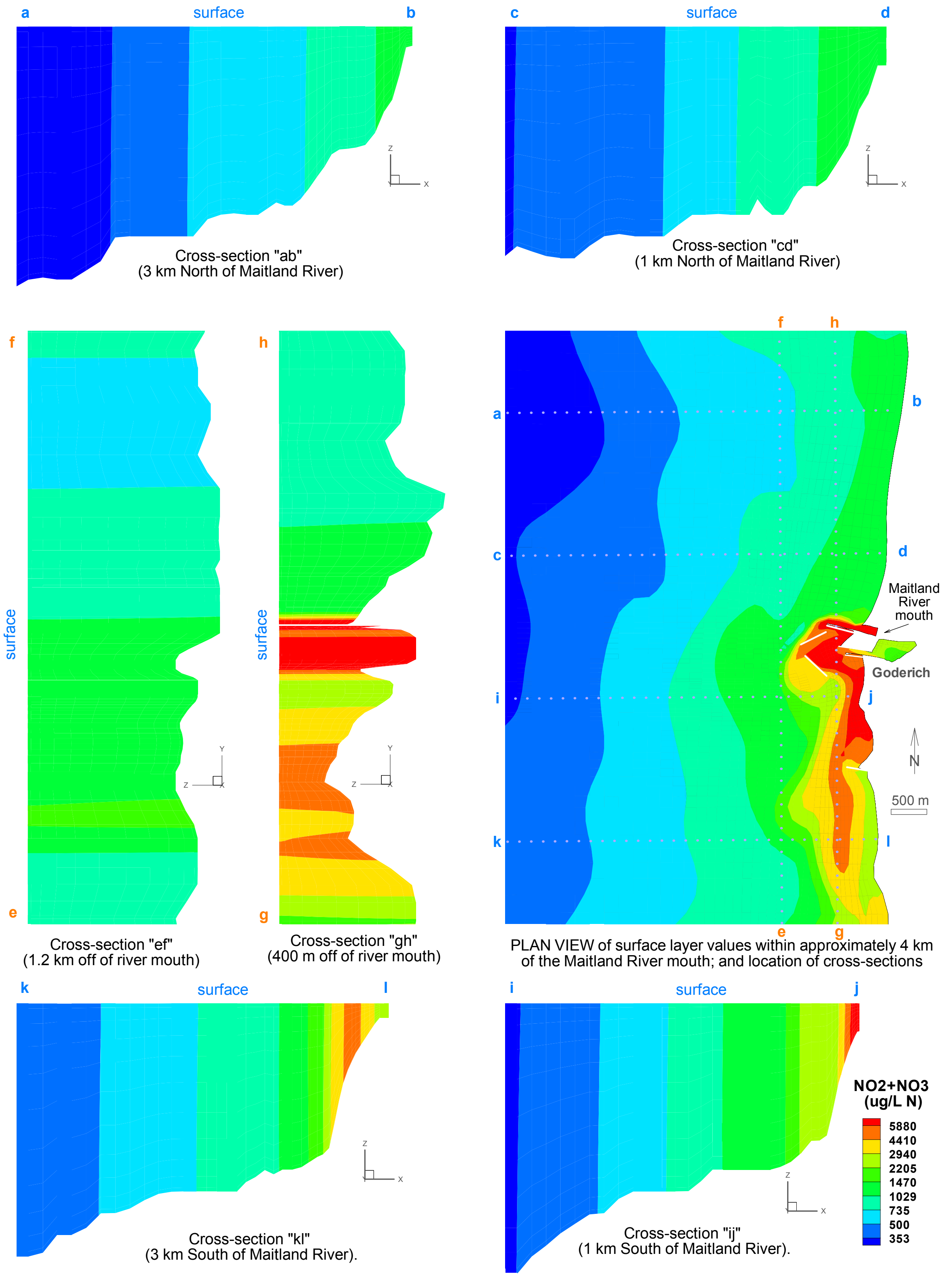
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1N(j) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on April 4, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

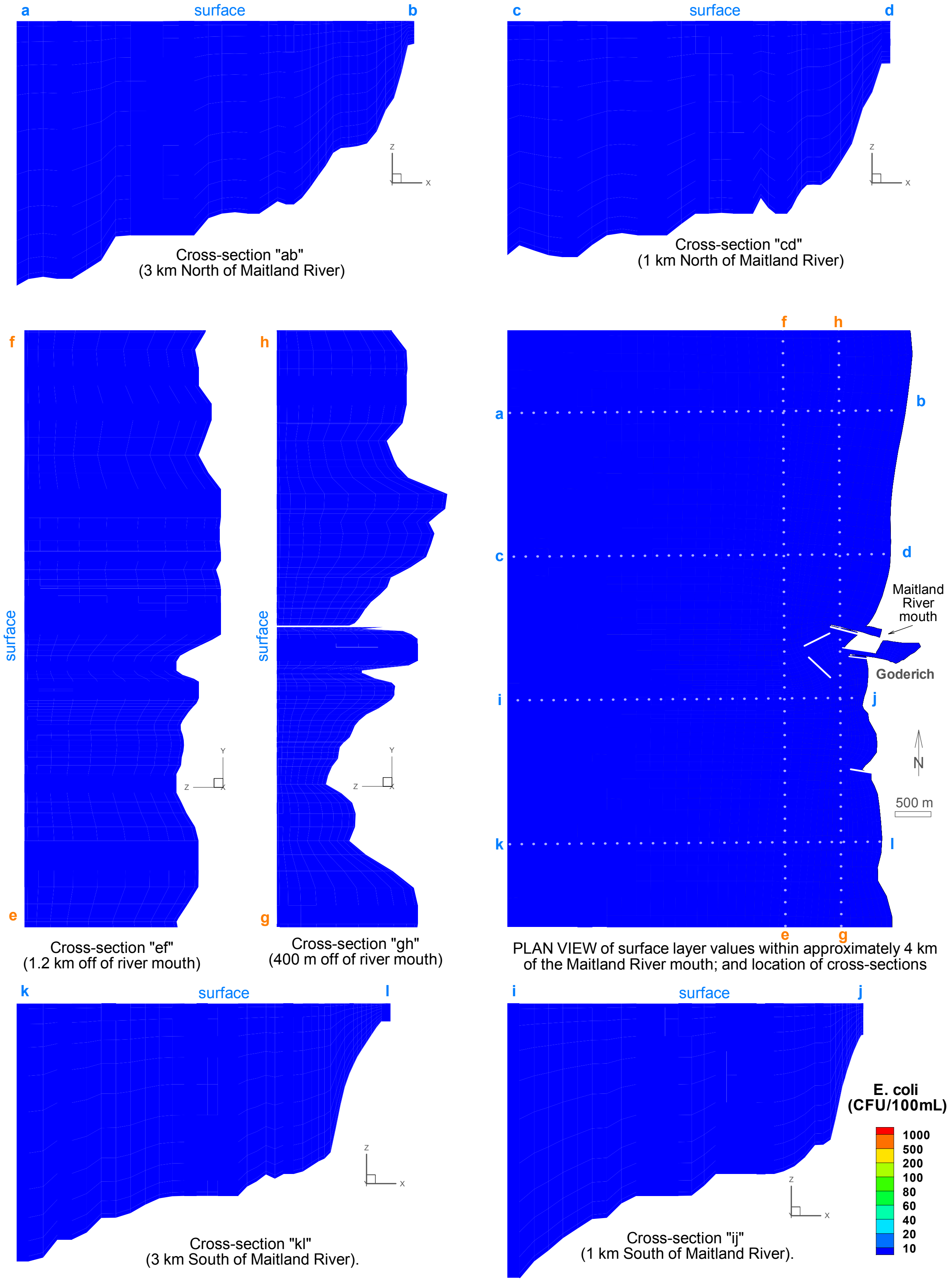
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1N(k) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on April 6, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

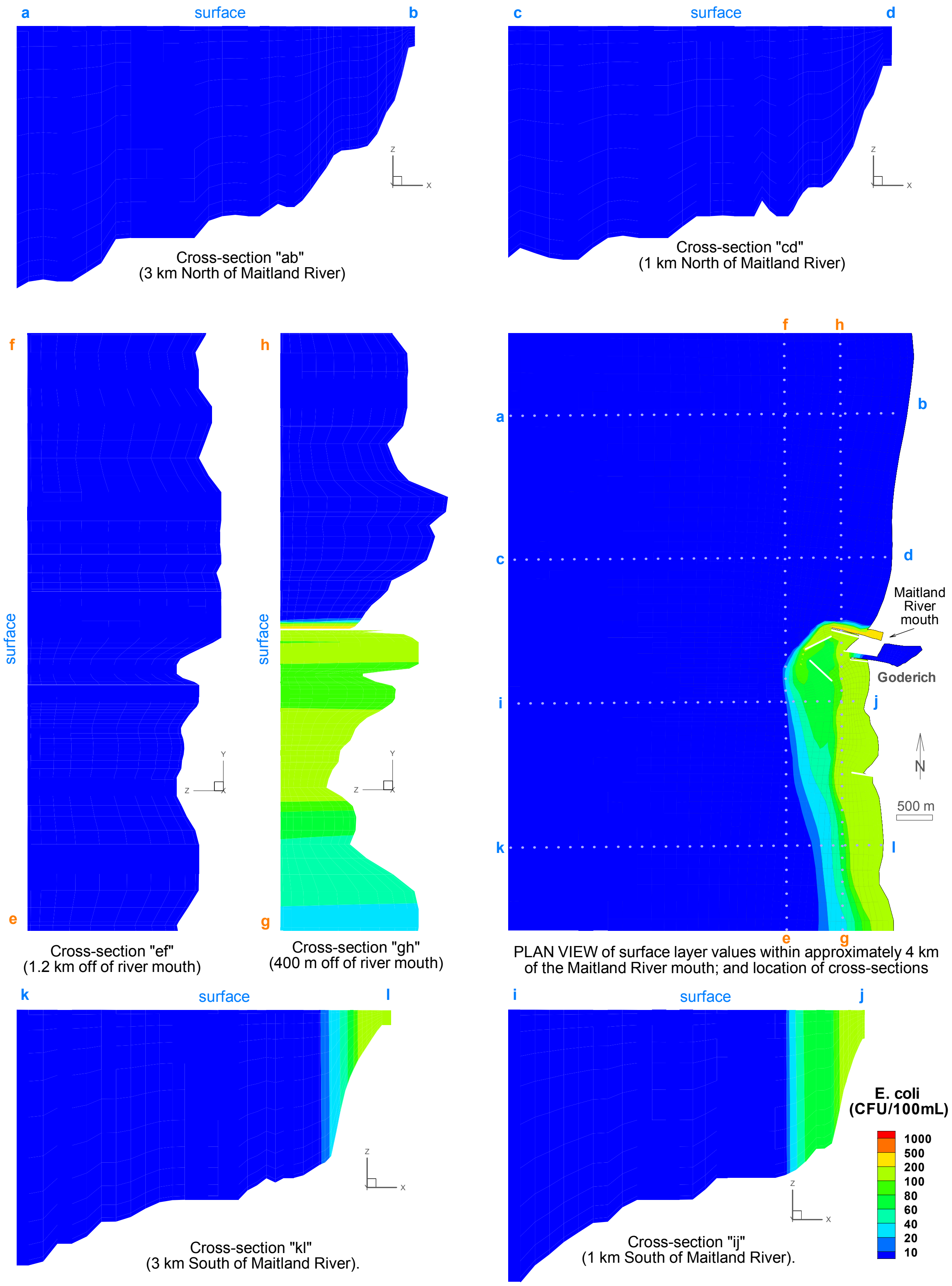
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1E0(a) E. coli - NO deactivation, (plan view and 6 cross-sections), at 00 hours on March 17, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1E0(b) E. coli - NO deactivation, (plan view and 6 cross-sections), at 00 hours on March 19, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

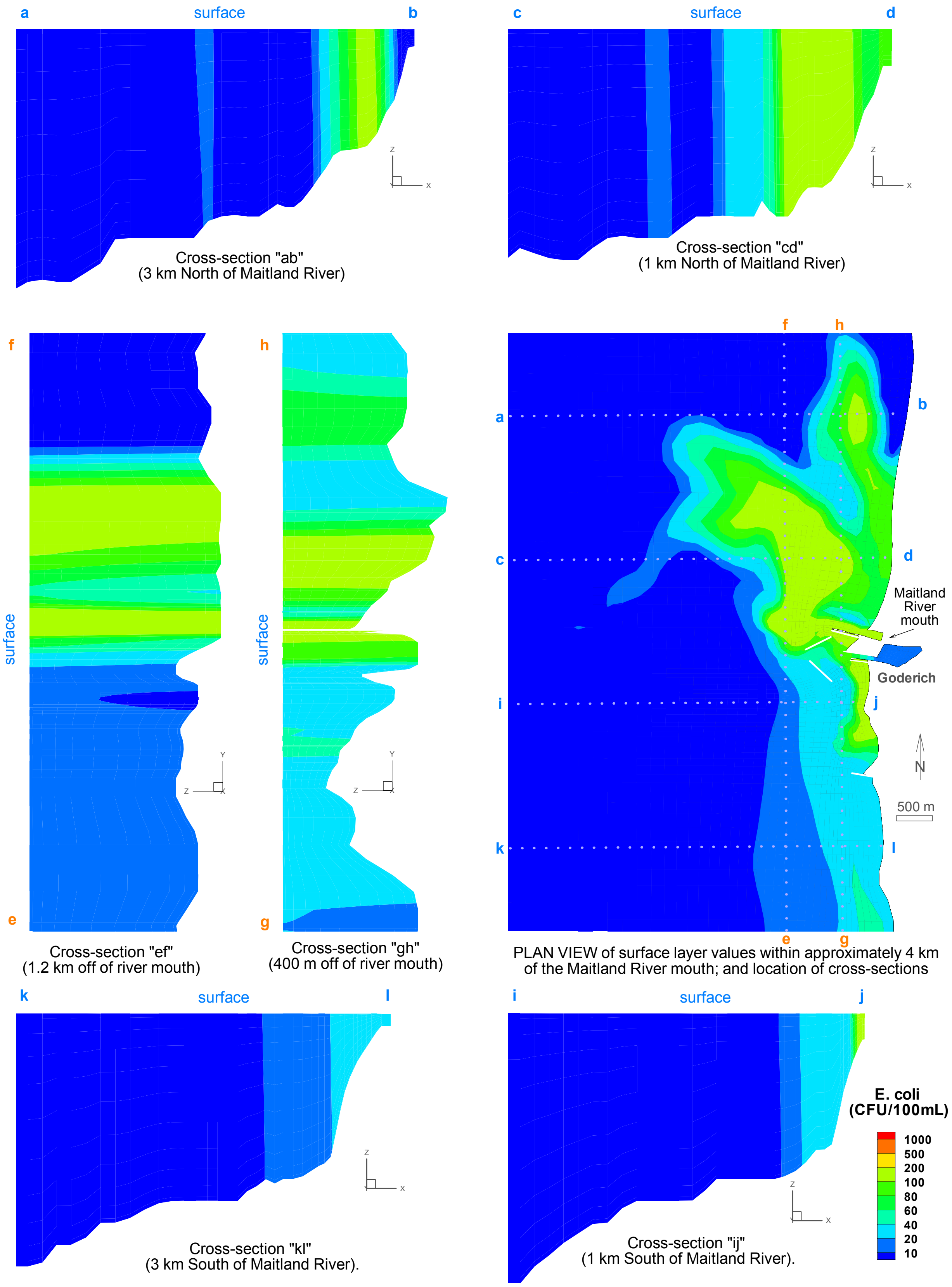


Figure 5.1E0(c) E. coli - NO deactivation, (plan view and 6 cross-sections), at 00 hours on March 21, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

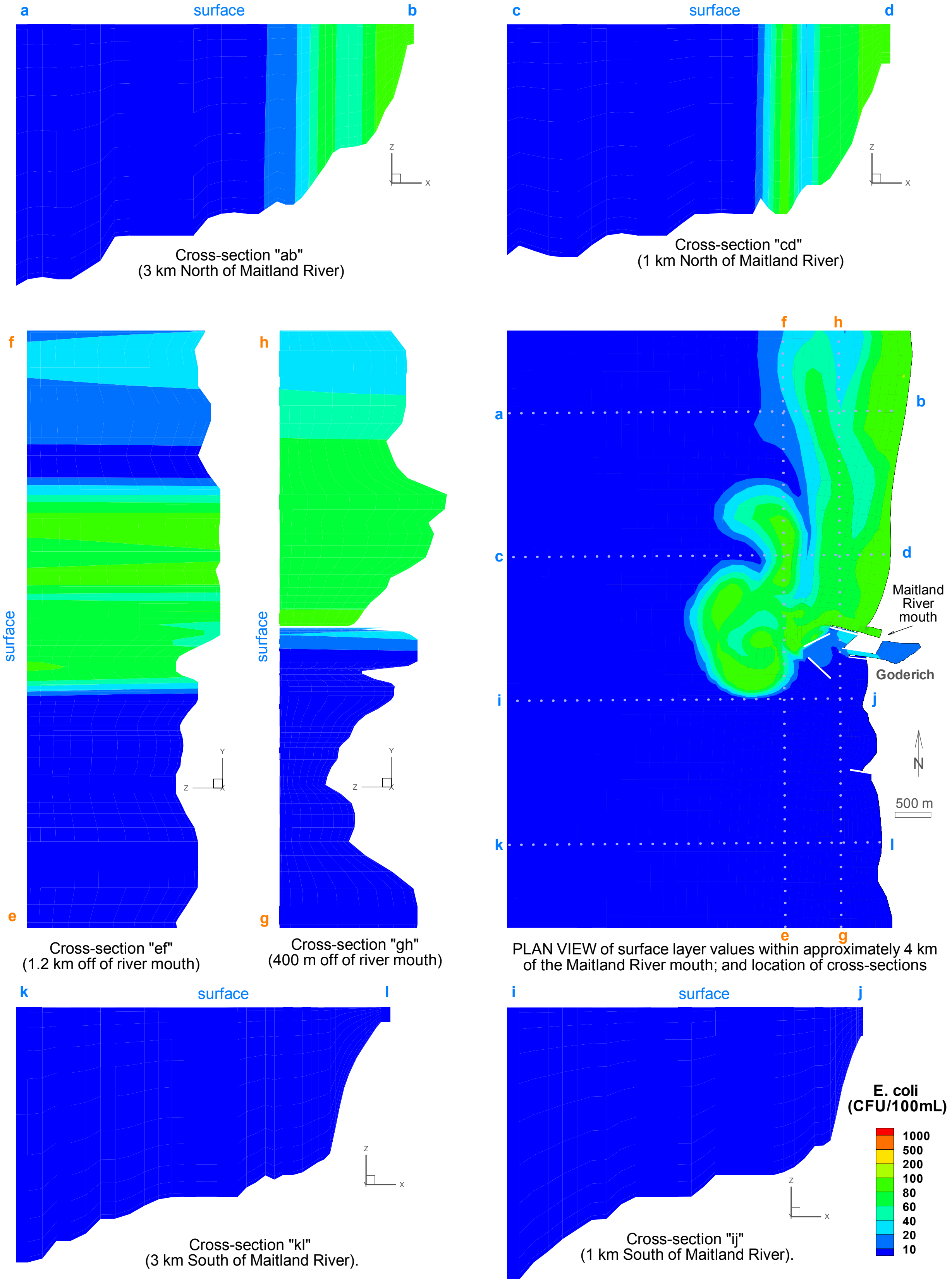


Figure 5.1E0(d) **E. coli - NO deactivation, (plan view and 6 cross-sections), at 00 hours on March 23, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

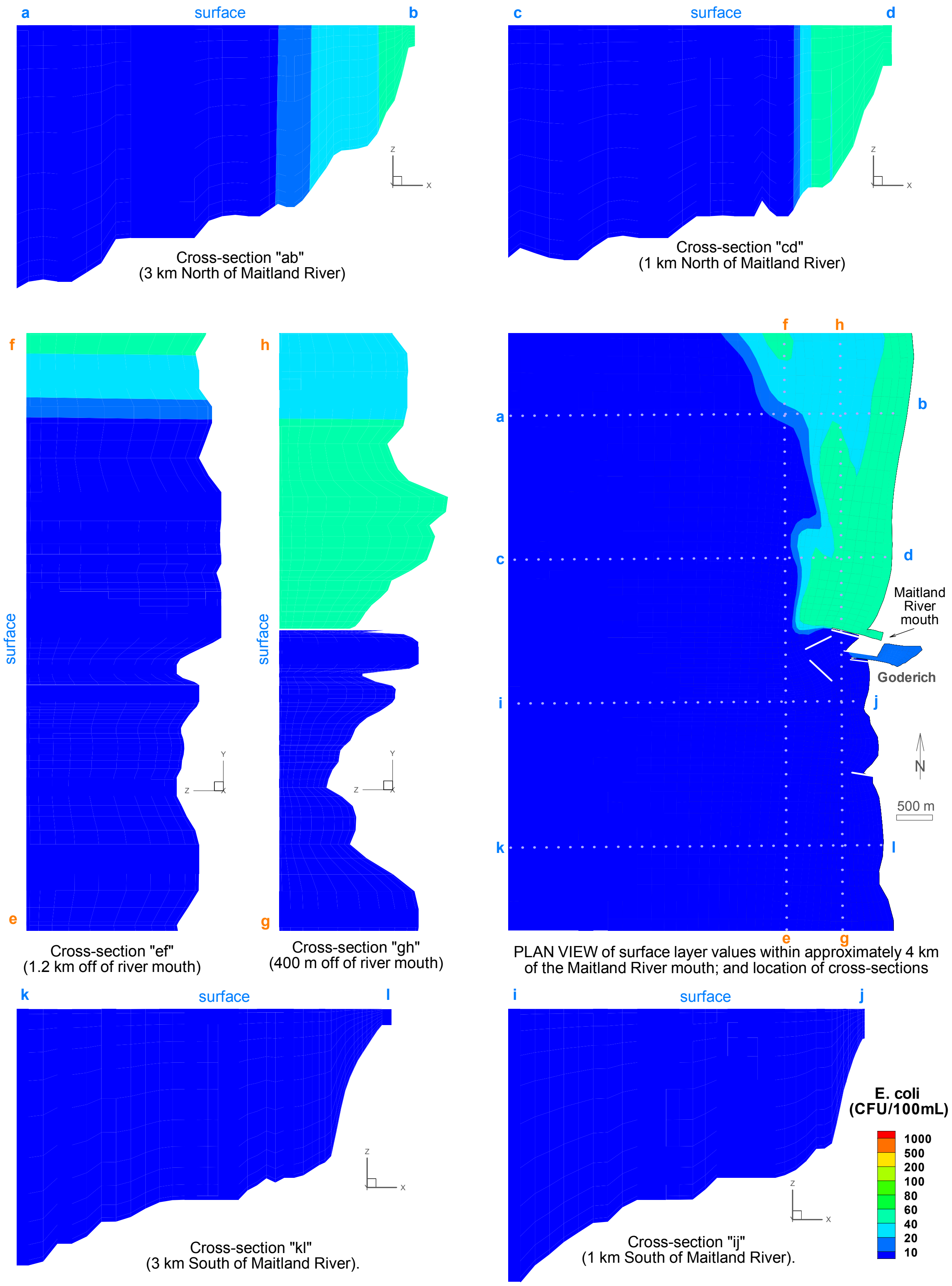


Figure 5.1E0(e) E. coli - NO deactivation, (plan view and 6 cross-sections), at 00 hours on March 25, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

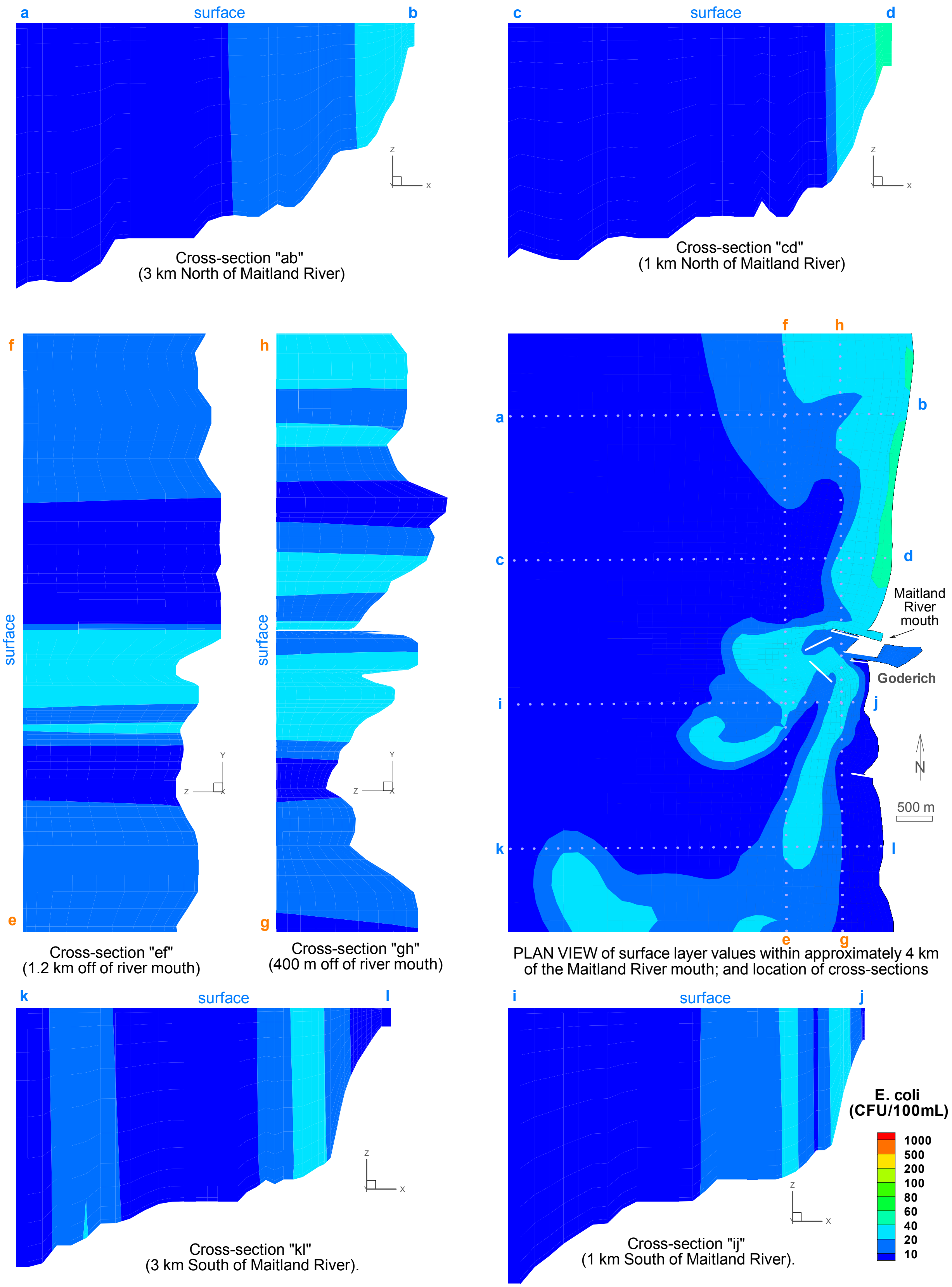
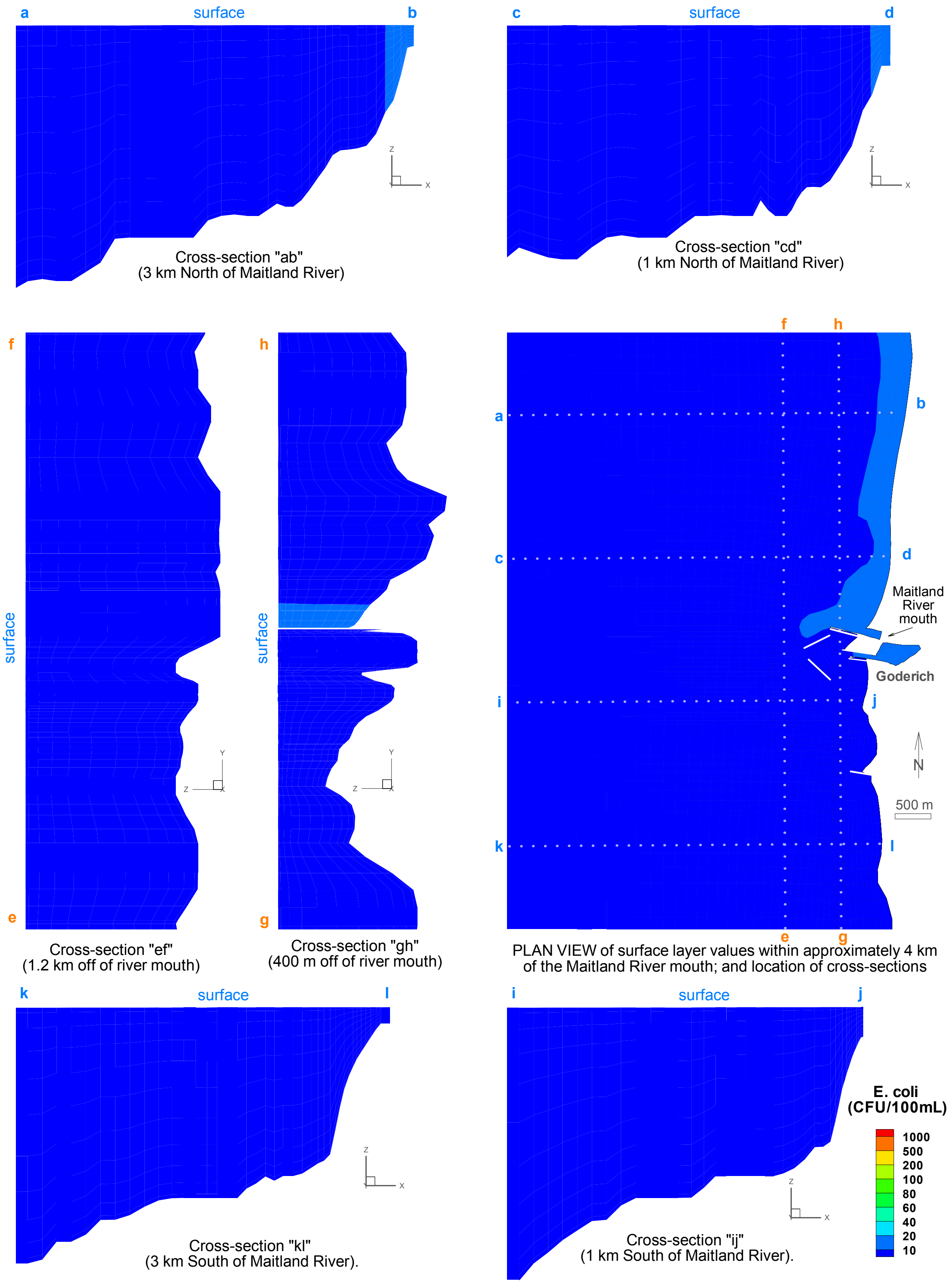


Figure 5.1E0(f) E. coli - NO deactivation, (plan view and 6 cross-sections), at 00 hours on March 27, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab" (3 km North of Maitland River)

Cross-section "cd" (1 km North of Maitland River)

Cross-section "ef" (1.2 km off of river mouth)

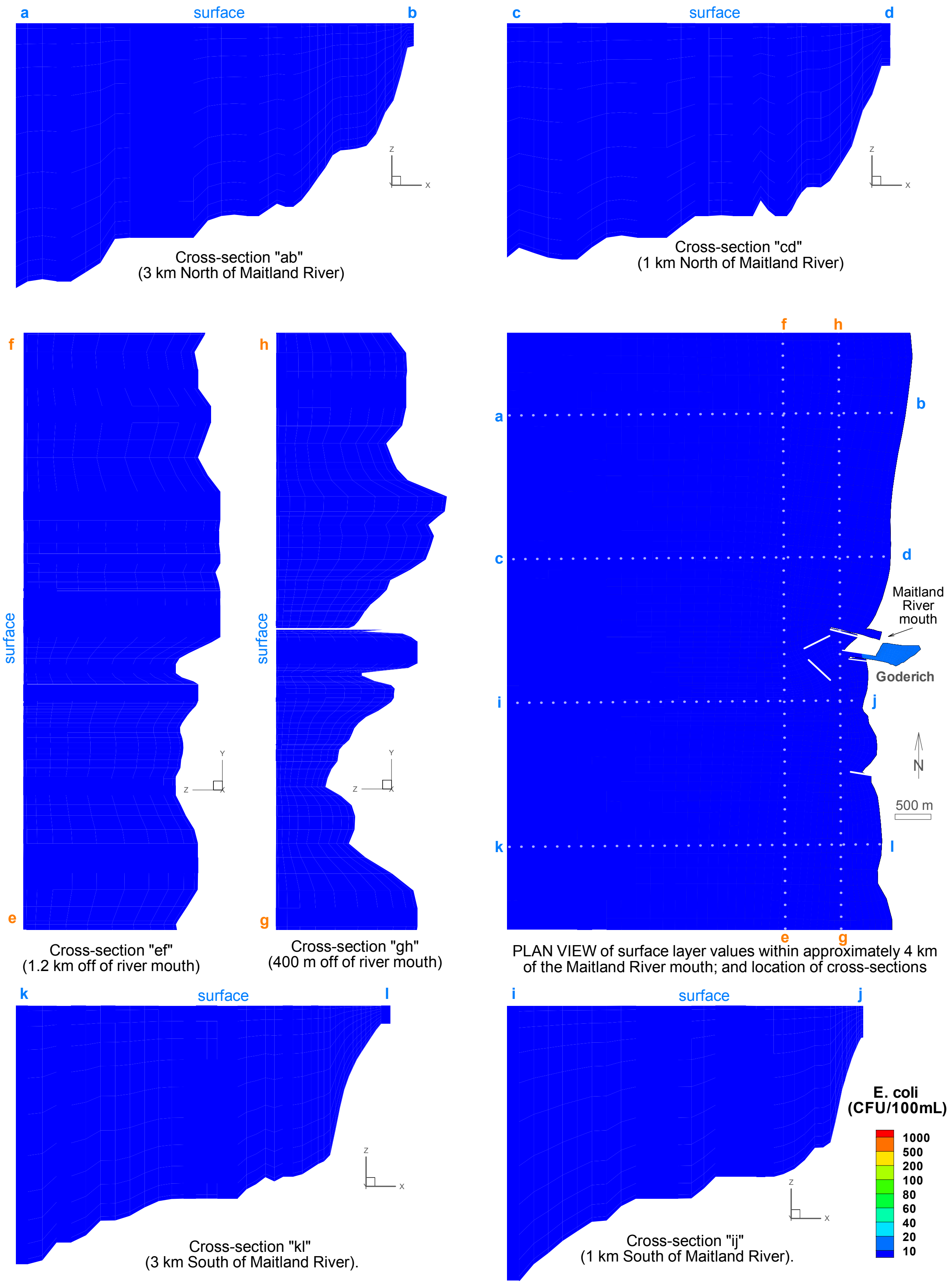
Cross-section "gh" (400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl" (3 km South of Maitland River).

Cross-section "ij" (1 km South of Maitland River).

Figure 5.1E0(g) E. coli - NO deactivation, (plan view and 6 cross-sections), at 00 hours on March 29, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab" (3 km North of Maitland River)

Cross-section "cd" (1 km North of Maitland River)

Cross-section "ef" (1.2 km off of river mouth)

Cross-section "gh" (400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl" (3 km South of Maitland River).

Cross-section "ij" (1 km South of Maitland River).

Figure 5.1E0(h) E. coli - NO deactivation, (plan view and 6 cross-sections), at 00 hours on March 31, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

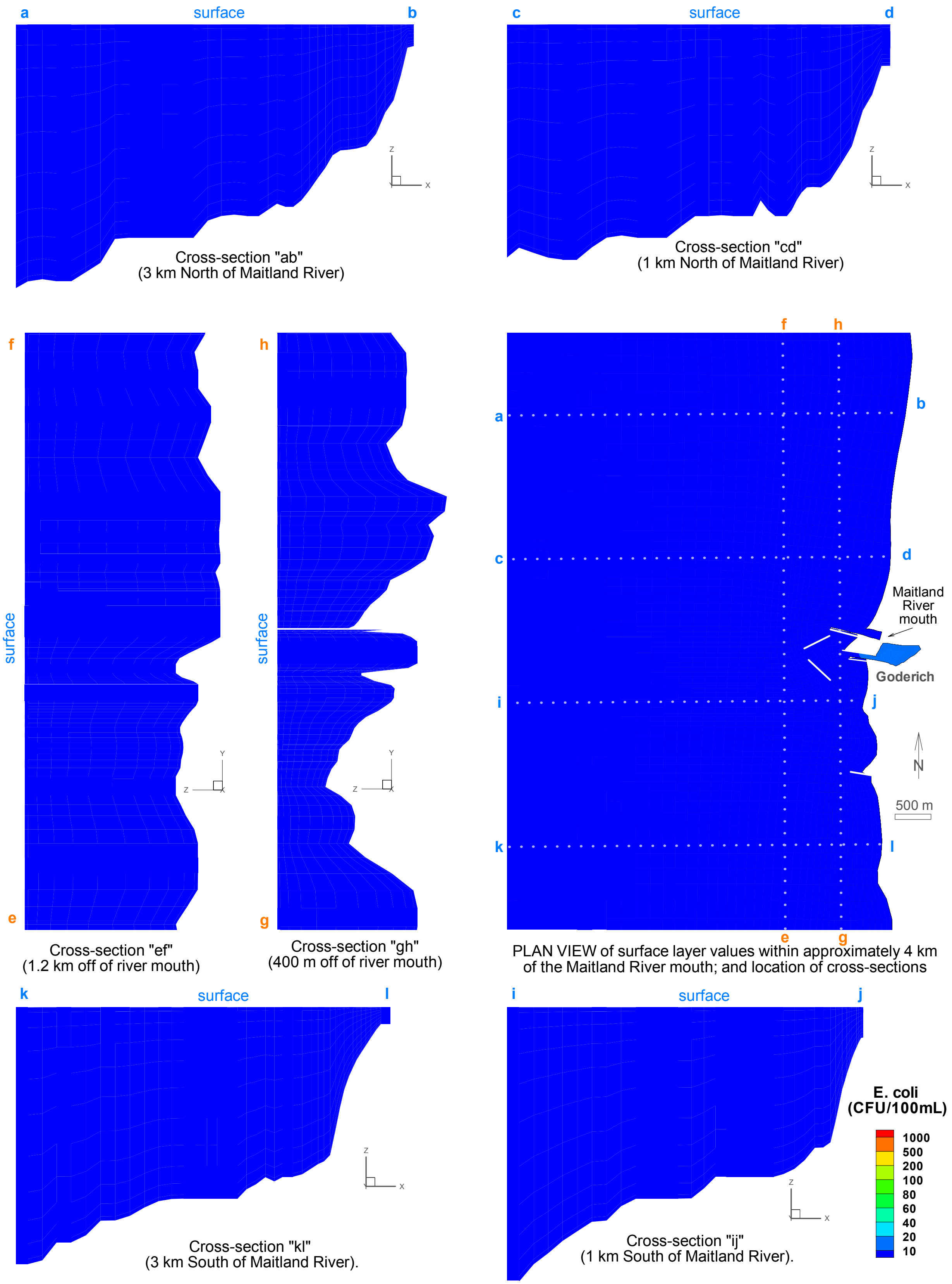
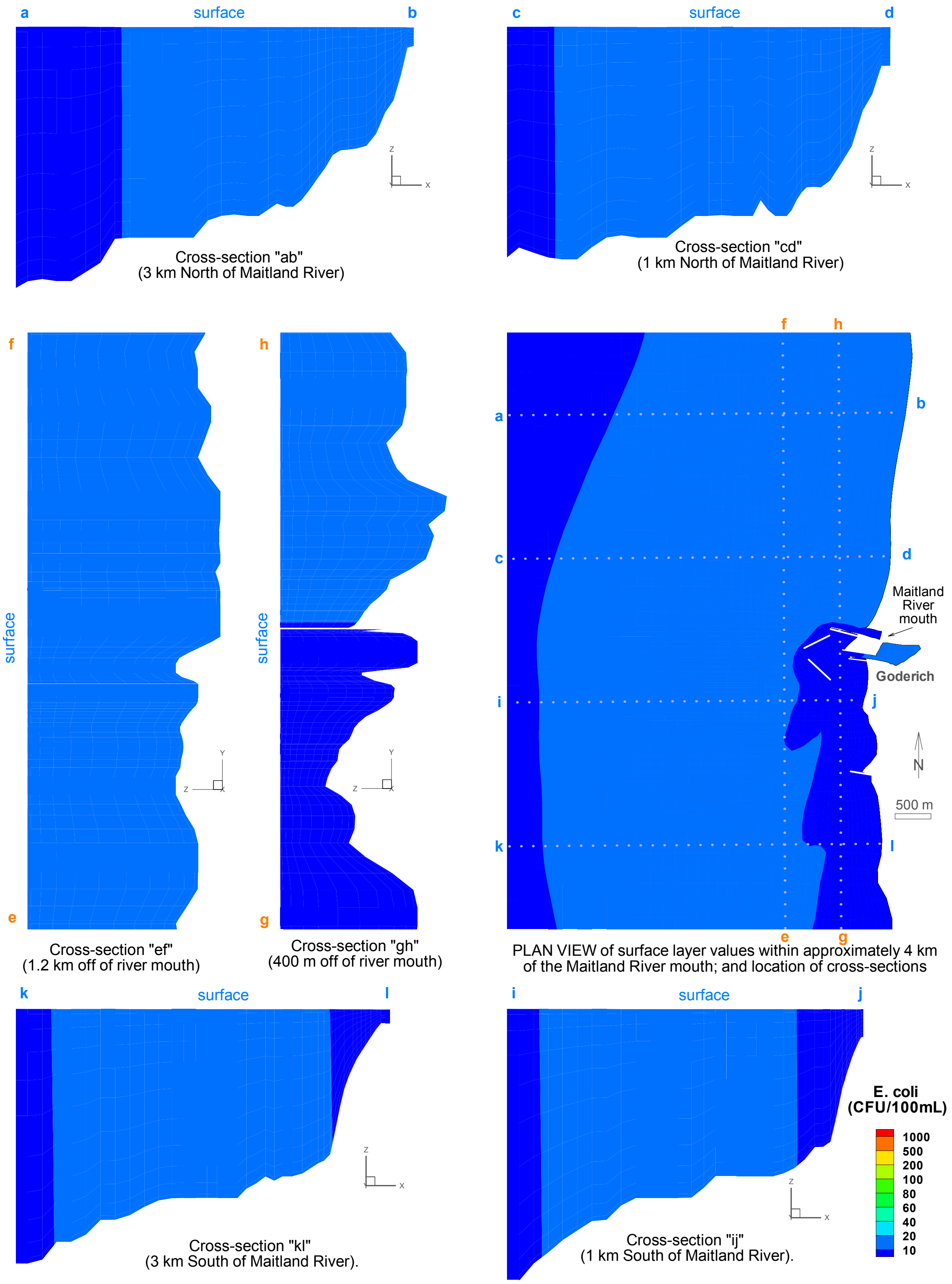


Figure 5.1E0(i) E. coli - NO deactivation, (plan view and 6 cross-sections), at 00 hours on April 2, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab" (3 km North of Maitland River)

Cross-section "cd" (1 km North of Maitland River)

Cross-section "ef" (1.2 km off of river mouth)

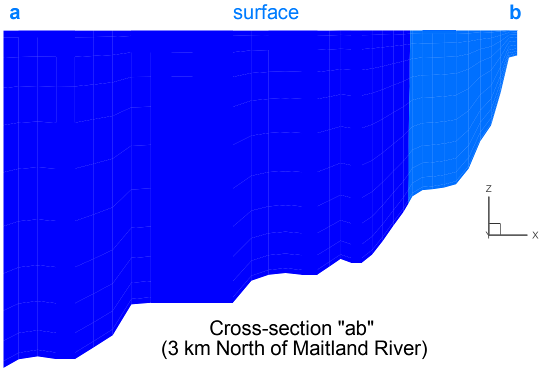
Cross-section "gh" (400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

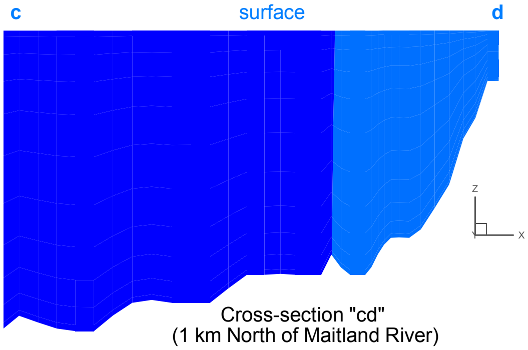
Cross-section "kl" (3 km South of Maitland River).

Cross-section "ij" (1 km South of Maitland River).

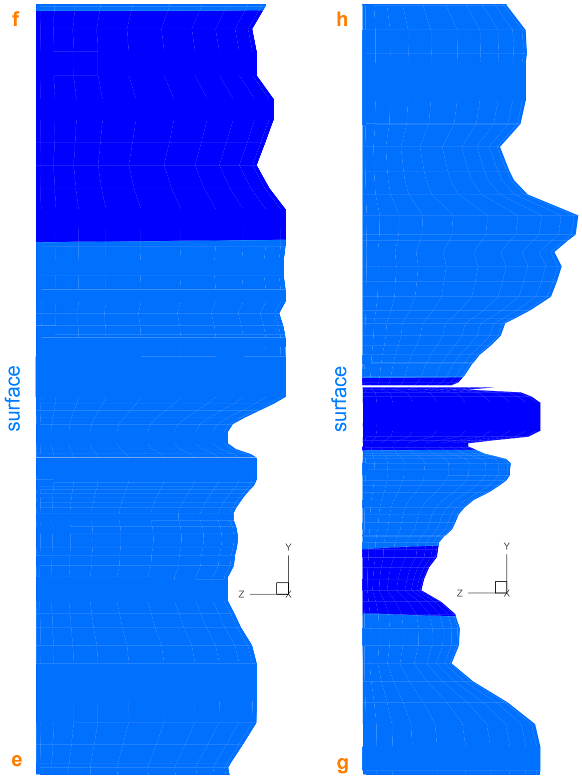
Figure 5.1E0(j) E. coli - NO deactivation, (plan view and 6 cross-sections), at 00 hours on April 4, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

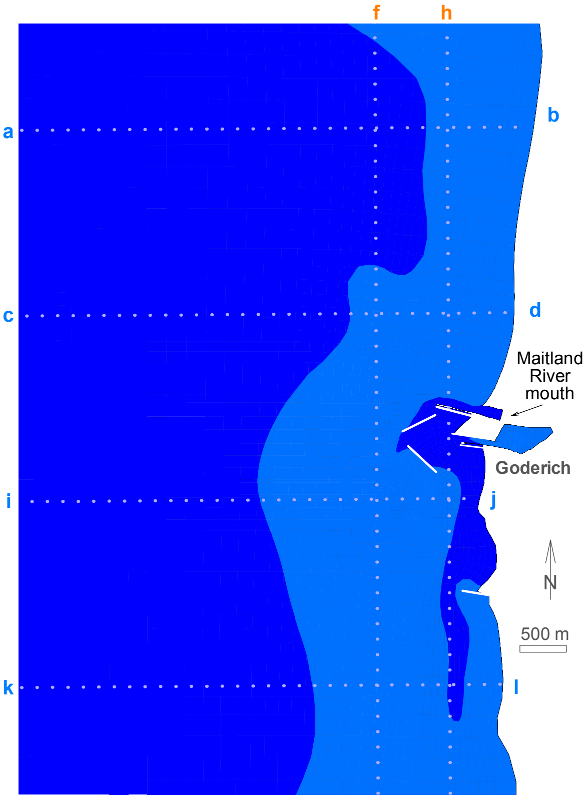


Cross-section "cd"
(1 km North of Maitland River)

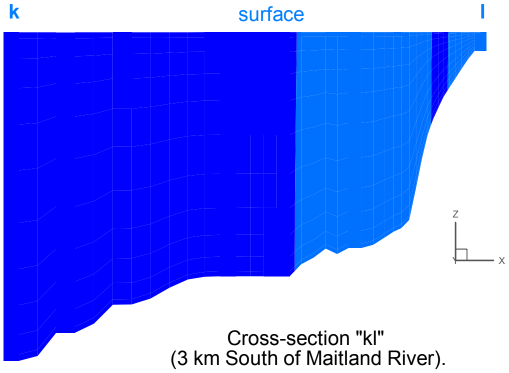


Cross-section "ef"
(1.2 km off of river mouth)

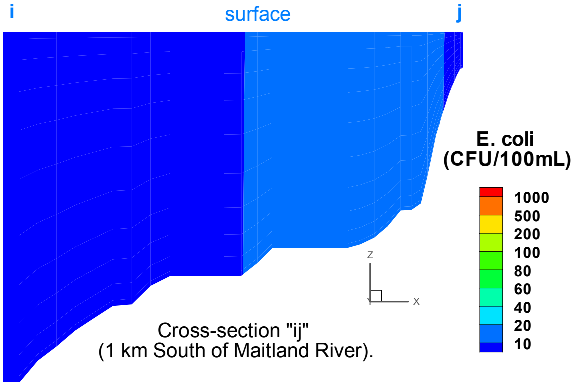
Cross-section "gh"
(400 m off of river mouth)



PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections



Cross-section "kl"
(3 km South of Maitland River).



Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1E0(k) E. coli - NO deactivation, (plan view and 6 cross-sections), at 00 hours on April 6, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

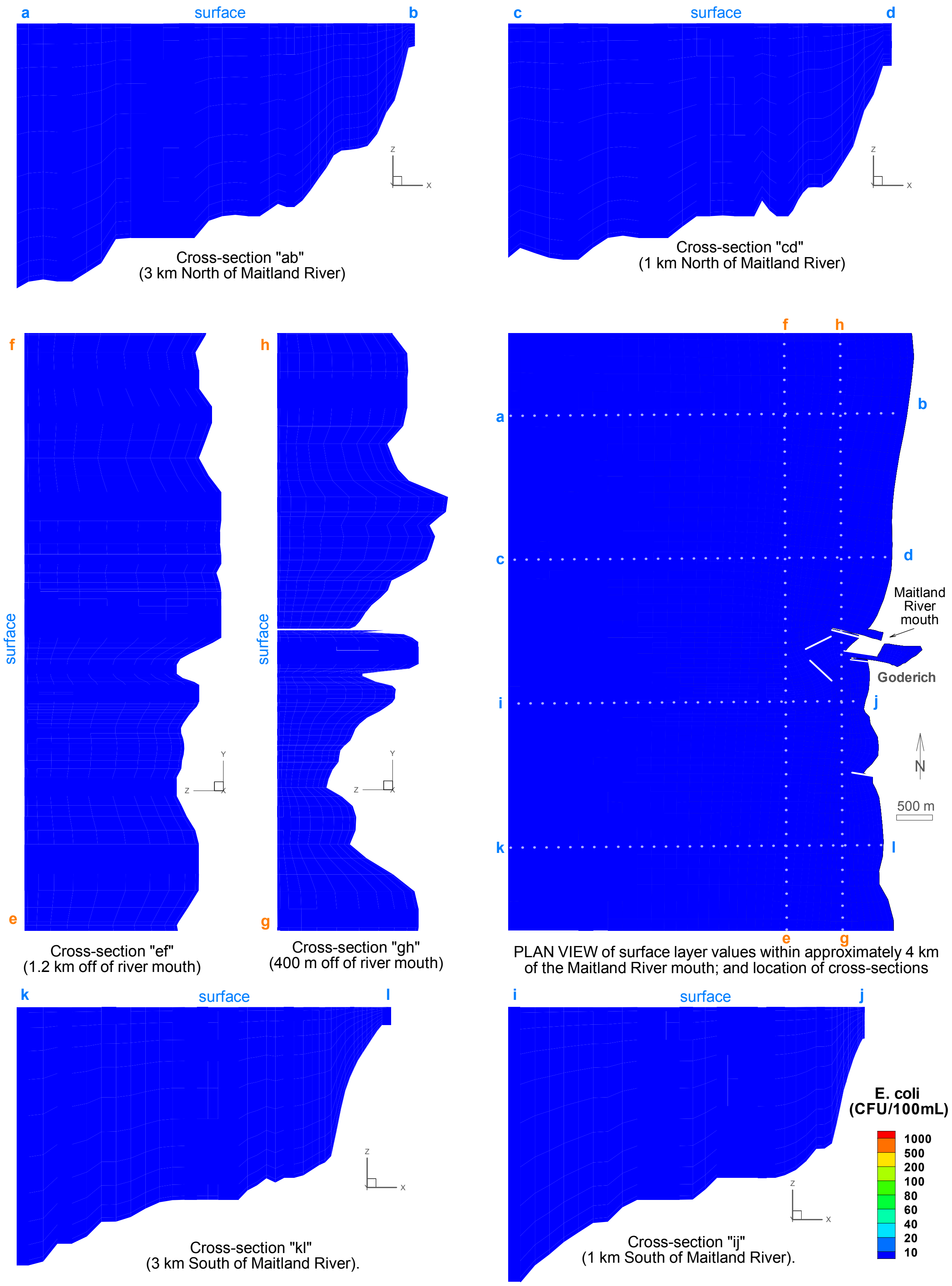


Figure 5.1E1(a) E. coli - Deactivation rate of 1/day (plan view and 6 cross-sections), at 00 hrs on March 17, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

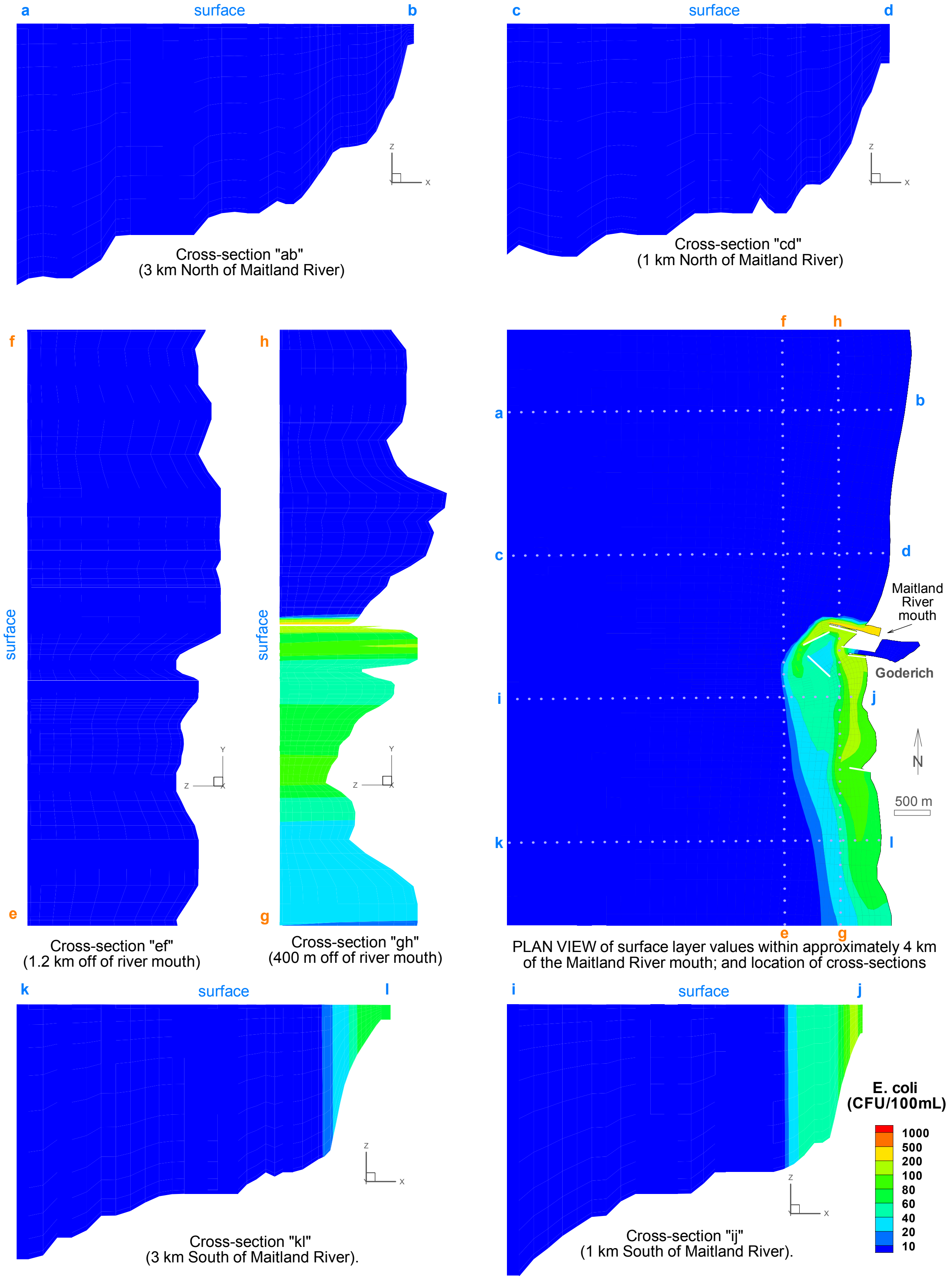


Figure 5.1E1(b) E. coli - Deactivation rate of 1/day (plan view and 6 cross-sections), at 00 hrs on March 19, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

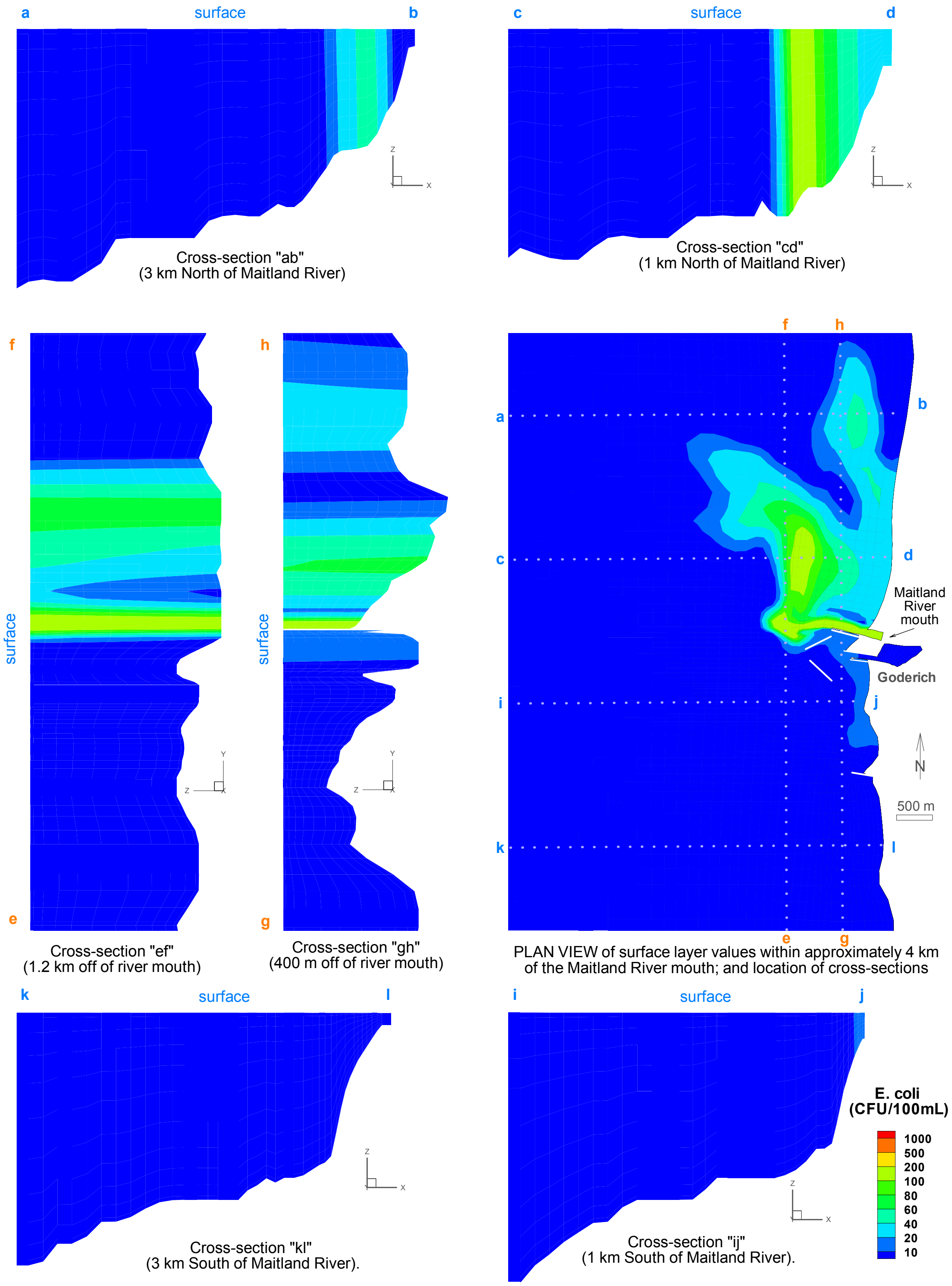
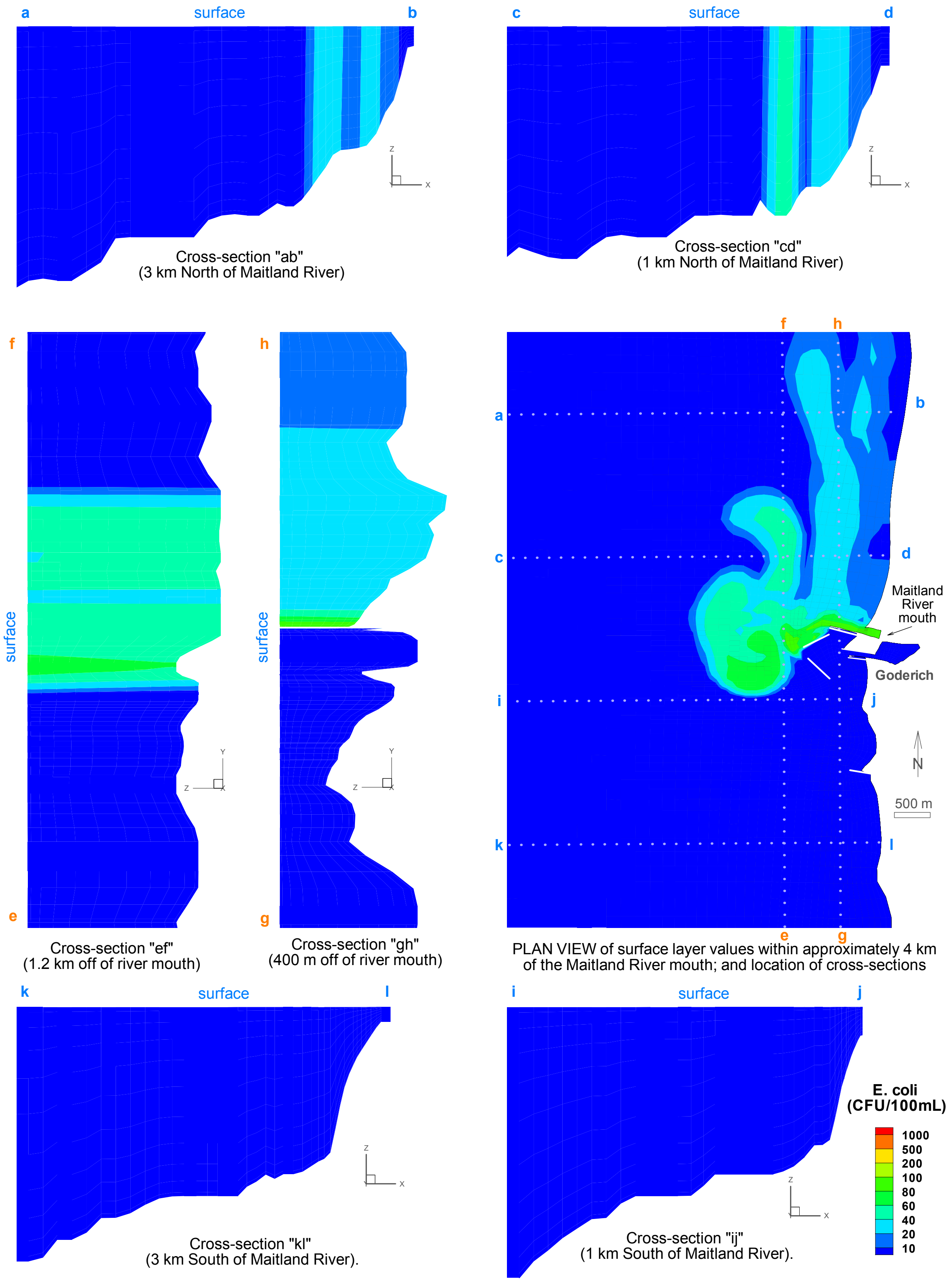


Figure 5.1E1(c) E. coli - Deactivation rate of 1/day (plan view and 6 cross-sections), at 00 hrs on March 21, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1E1(d) E. coli - Deactivation rate of 1/day (plan view and 6 cross-sections), at 00 hrs on March 23, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

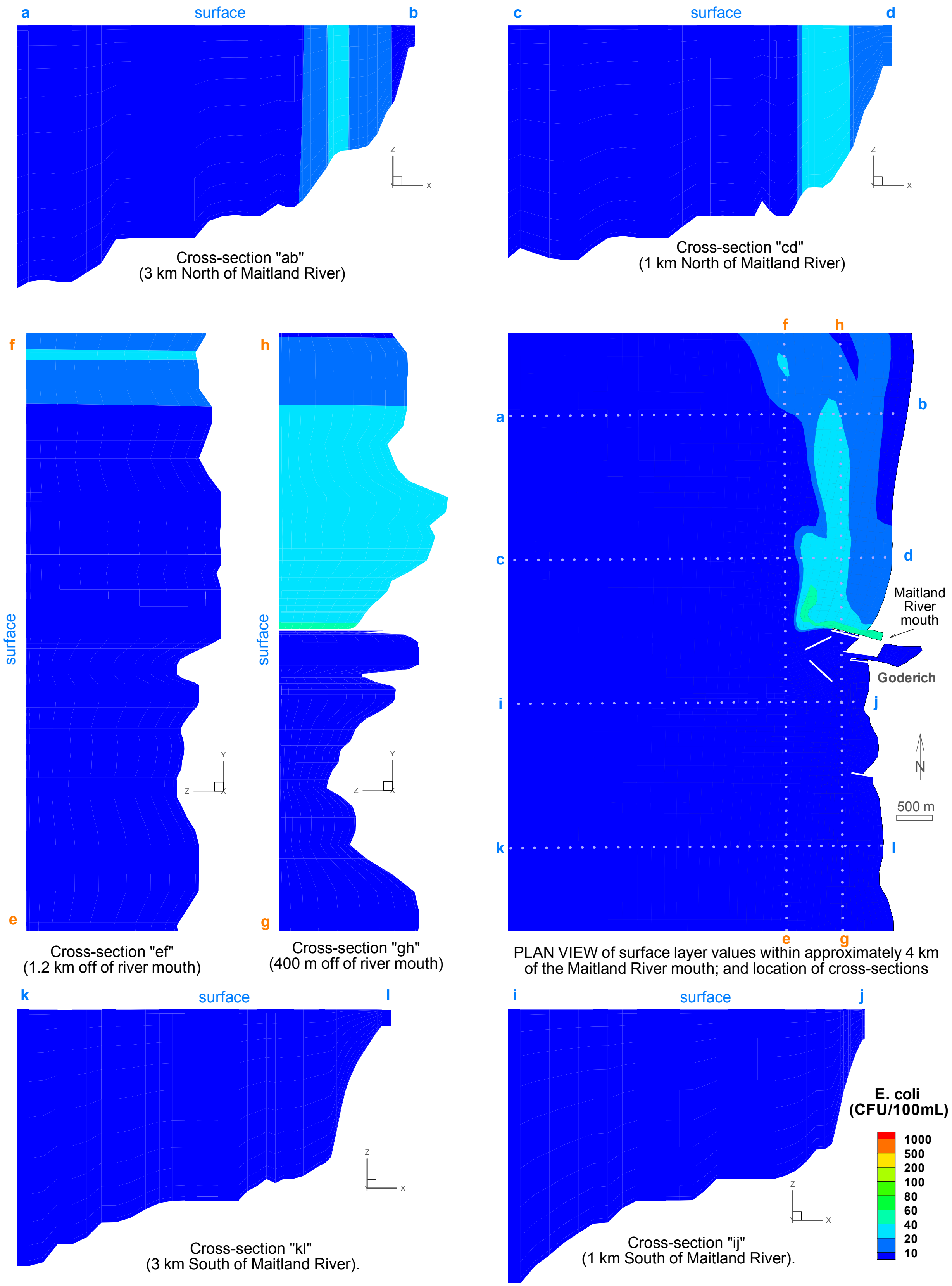
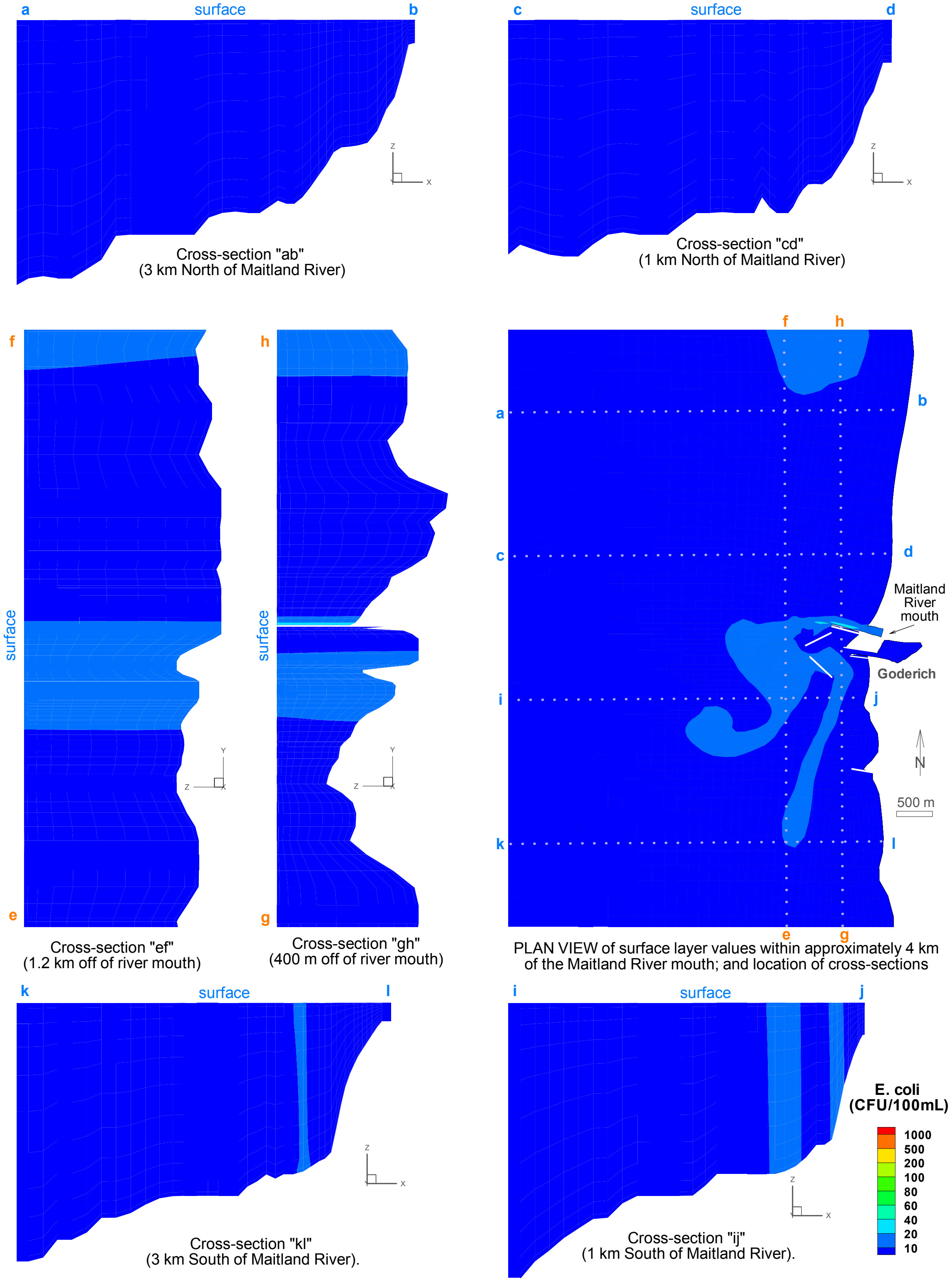


Figure 5.1E1(e) E. coli - Deactivation rate of 1/day (plan view and 6 cross-sections), at 00 hrs on March 25, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.1E1(f) E. coli - Deactivation rate of 1/day (plan view and 6 cross-sections), at 00 hrs on March 27, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

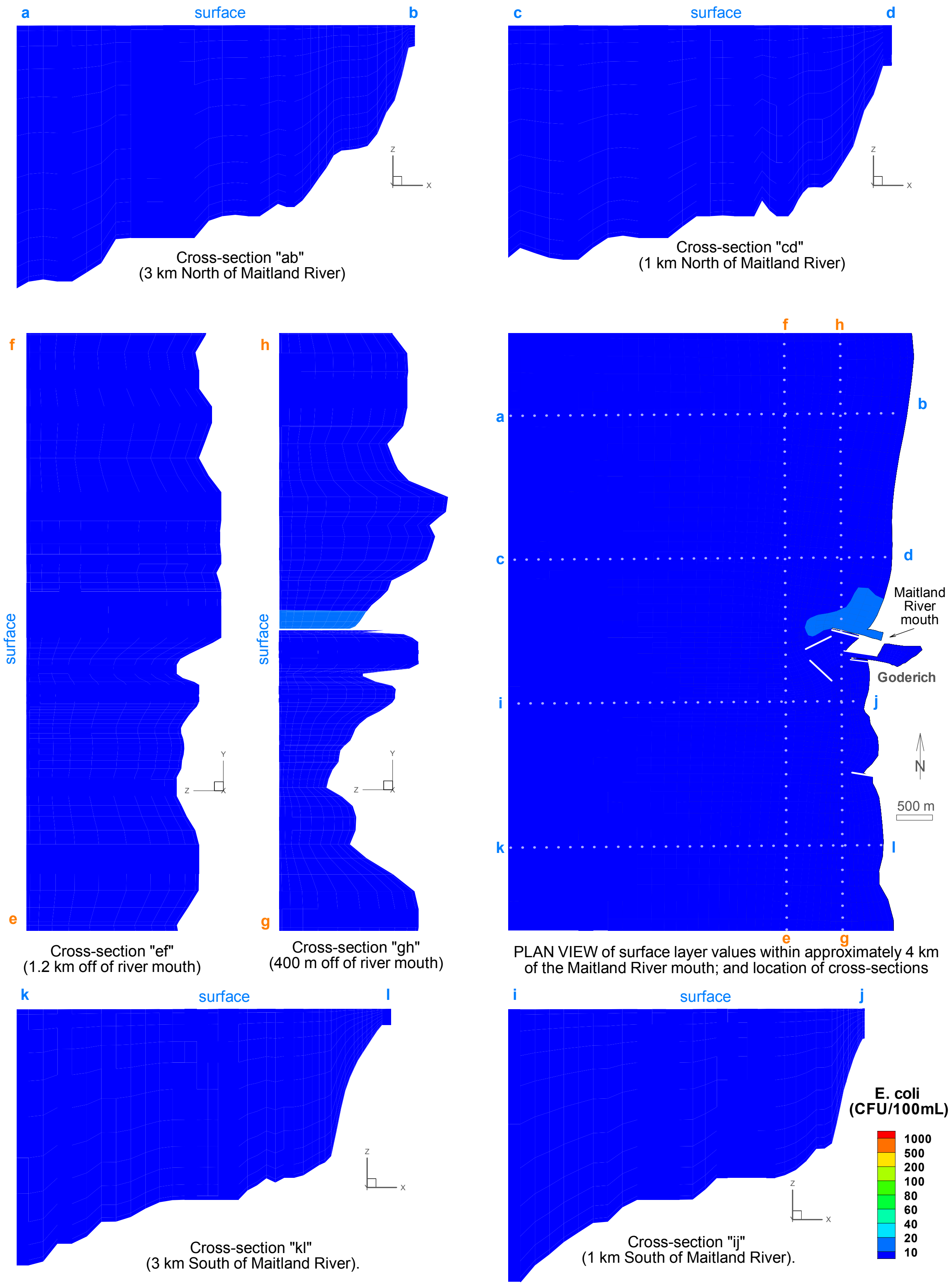


Figure 5.1E1(g) E. coli - Deactivation rate of 1/day (plan view and 6 cross-sections), at 00 hrs on March 29, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

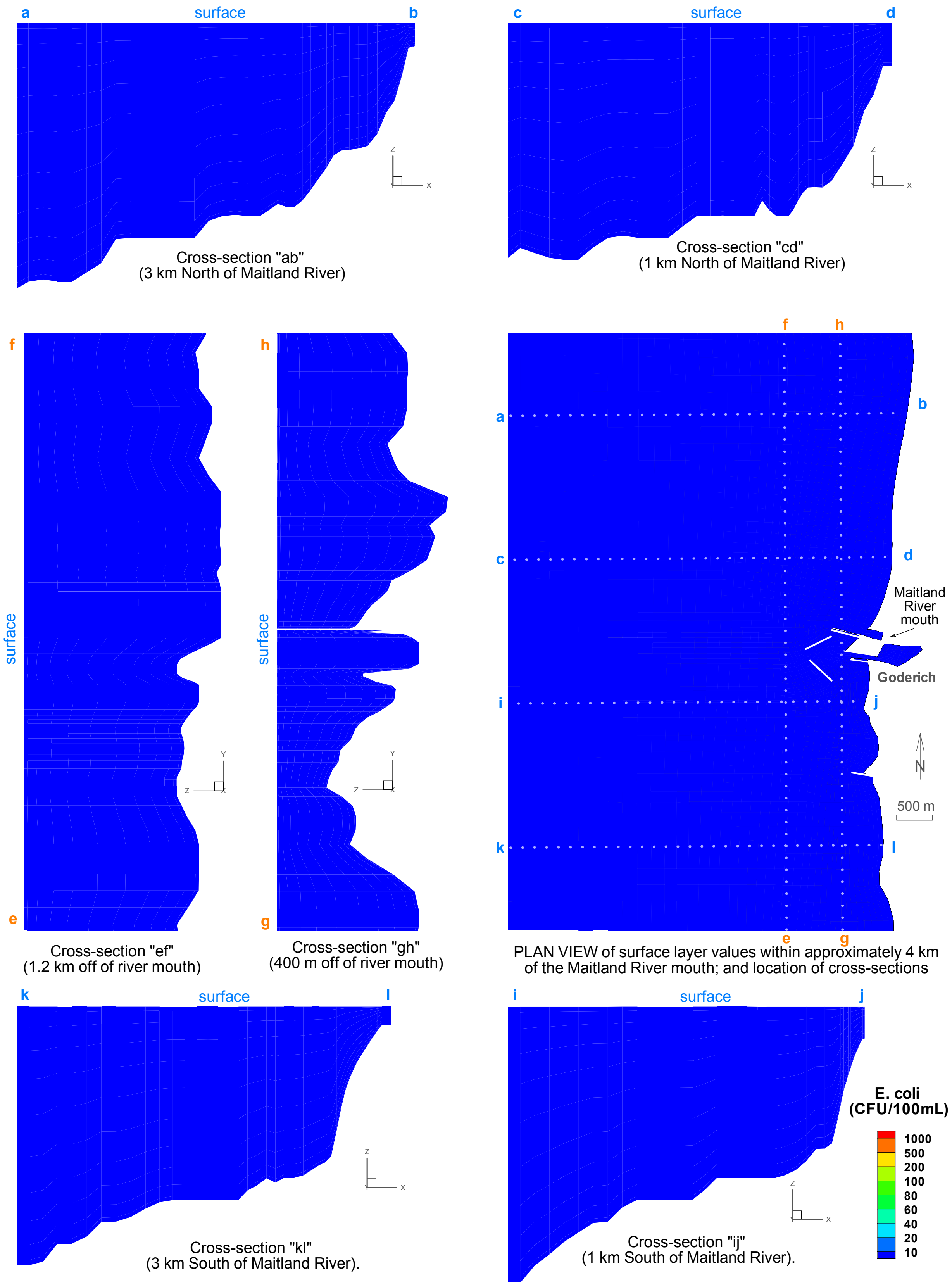


Figure 5.1E1(h) E. coli - Deactivation rate of 1/day (plan view and 6 cross-sections), at 00 hrs on March 31, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

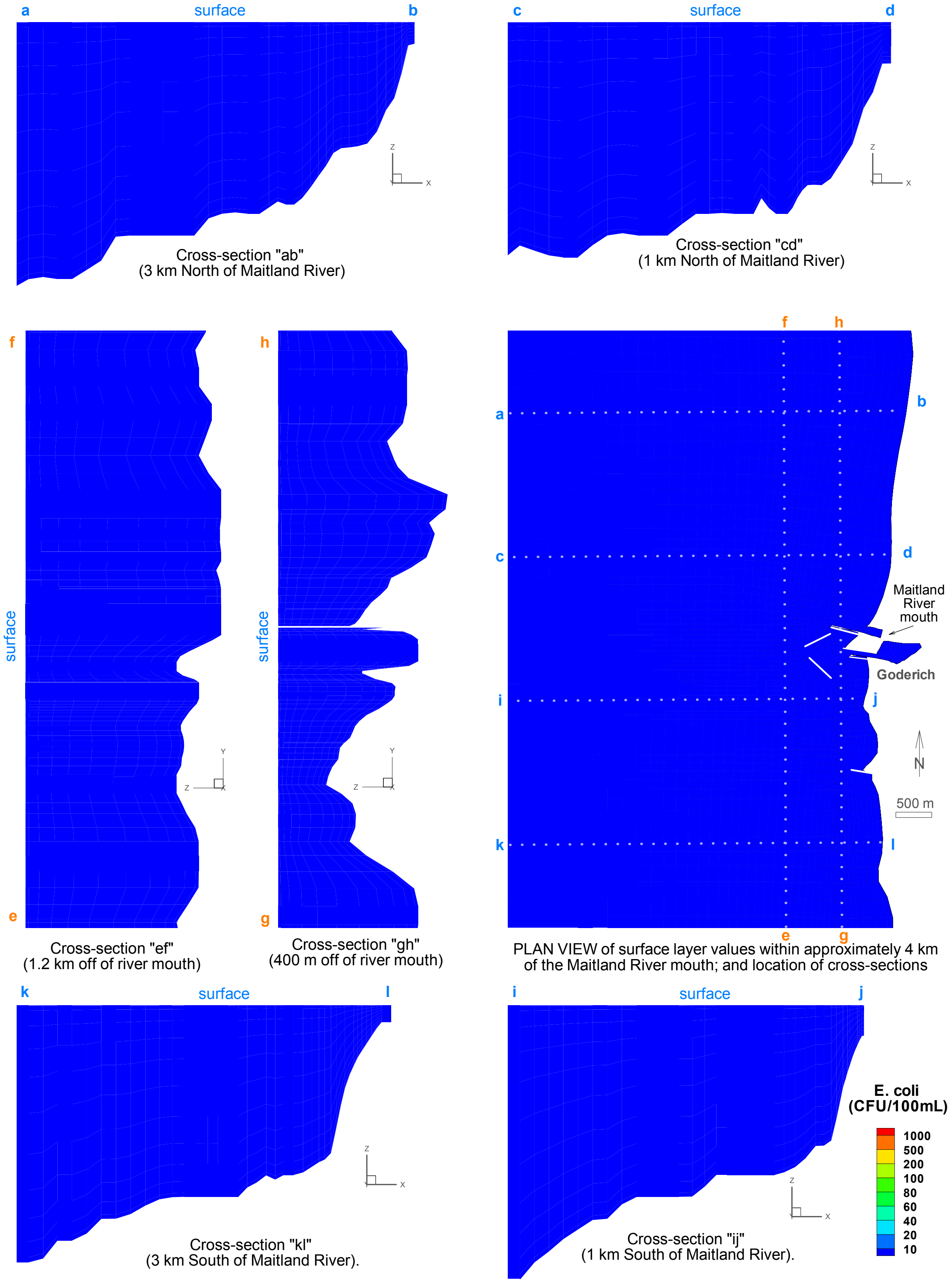
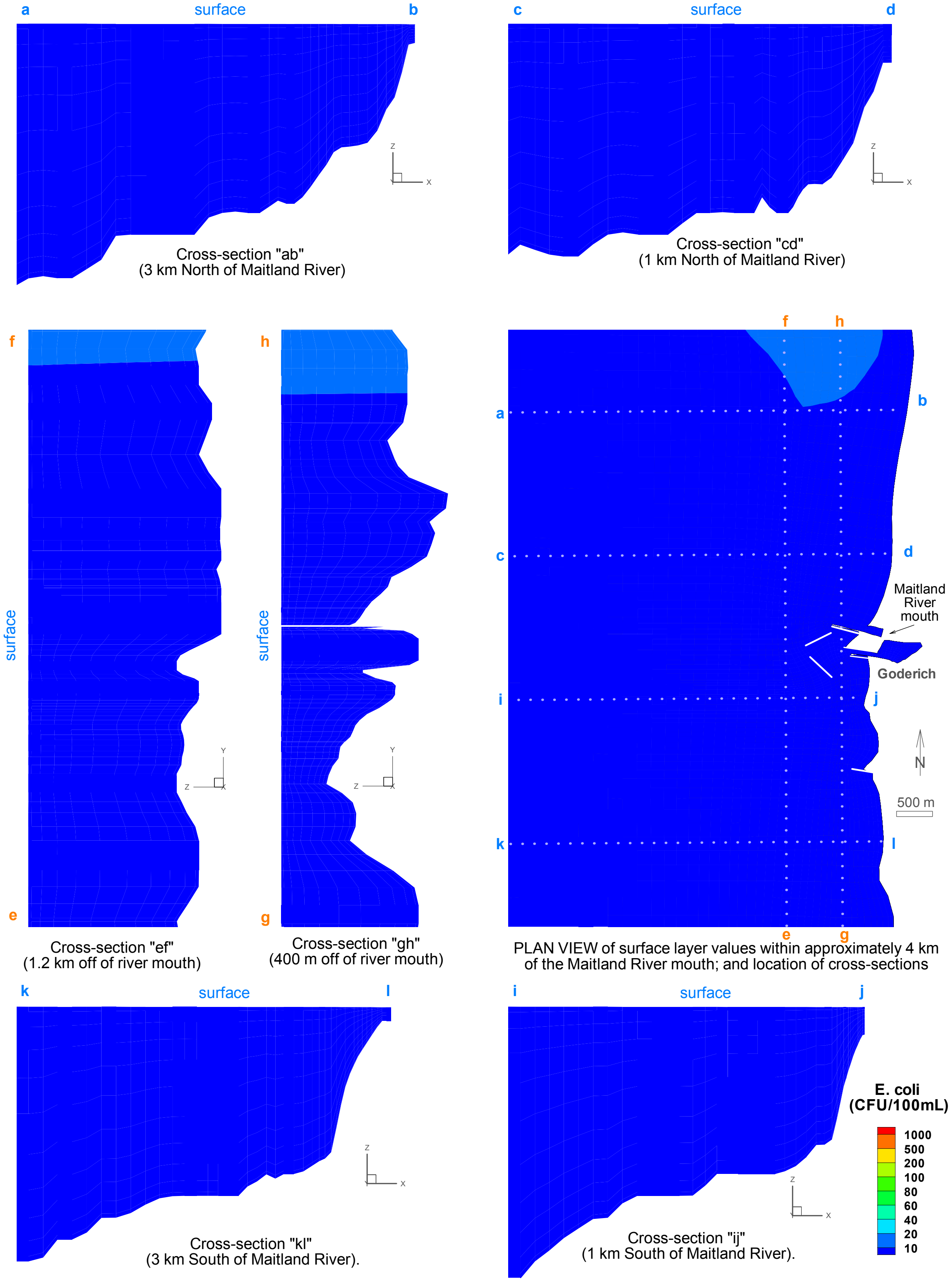


Figure 5.1E1(i) E. coli - Deactivation rate of 1/day (plan view and 6 cross-sections), at 00 hrs on April 2, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab" (3 km North of Maitland River)

Cross-section "cd" (1 km North of Maitland River)

Cross-section "ef" (1.2 km off of river mouth)

Cross-section "gh" (400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl" (3 km South of Maitland River).

Cross-section "ij" (1 km South of Maitland River).

Figure 5.1E1(j) E. coli - Deactivation rate of 1/day (plan view and 6 cross-sections), at 00 hrs on April 4, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

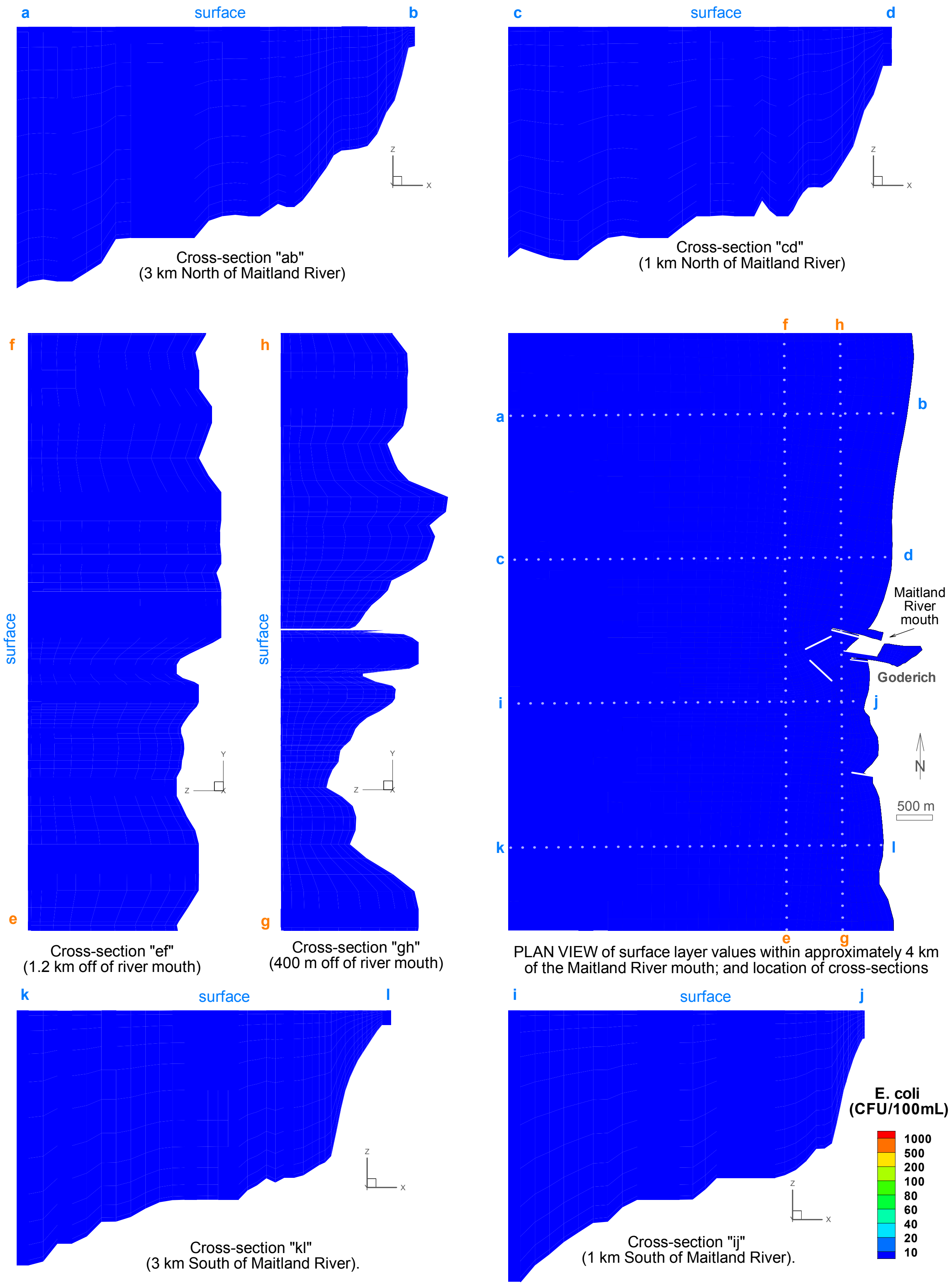


Figure 5.1E1(k) E. coli - Deactivation rate of 1/day (plan view and 6 cross-sections), at 00 hrs on April 6, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

Event 2: Downwelling / Upwelling event – with only Maitland River base flow (July 20 to 30)

Parameters *(in presentation order)*:	**Figure series:**
Water velocities	**5.2U (a) to (k)**
Water temperatures	**5.2T (a) to (k)**
Conductivity	**5.2C (a) to (k)**
NO2+NO3	**5.2N (a) to (k)**

Where: (a) to (k) represents the following dates-times:
(a) July 20 @ 00:00 hrs
(b) July 21 @ 00:00 hrs
(c) July 22 @ 00:00 hrs
(d) July 23 @ 00:00 hrs
(e) July 24 @ 00:00 hrs
(f) July 25 @ 00:00 hrs
(g) July 26 @ 00:00 hrs
(h) July 27 @ 00:00 hrs
(i) July 28 @ 00:00 hrs
(j) July 29 @ 00:00 hrs
(k) July 30 @ 00:00 hrs

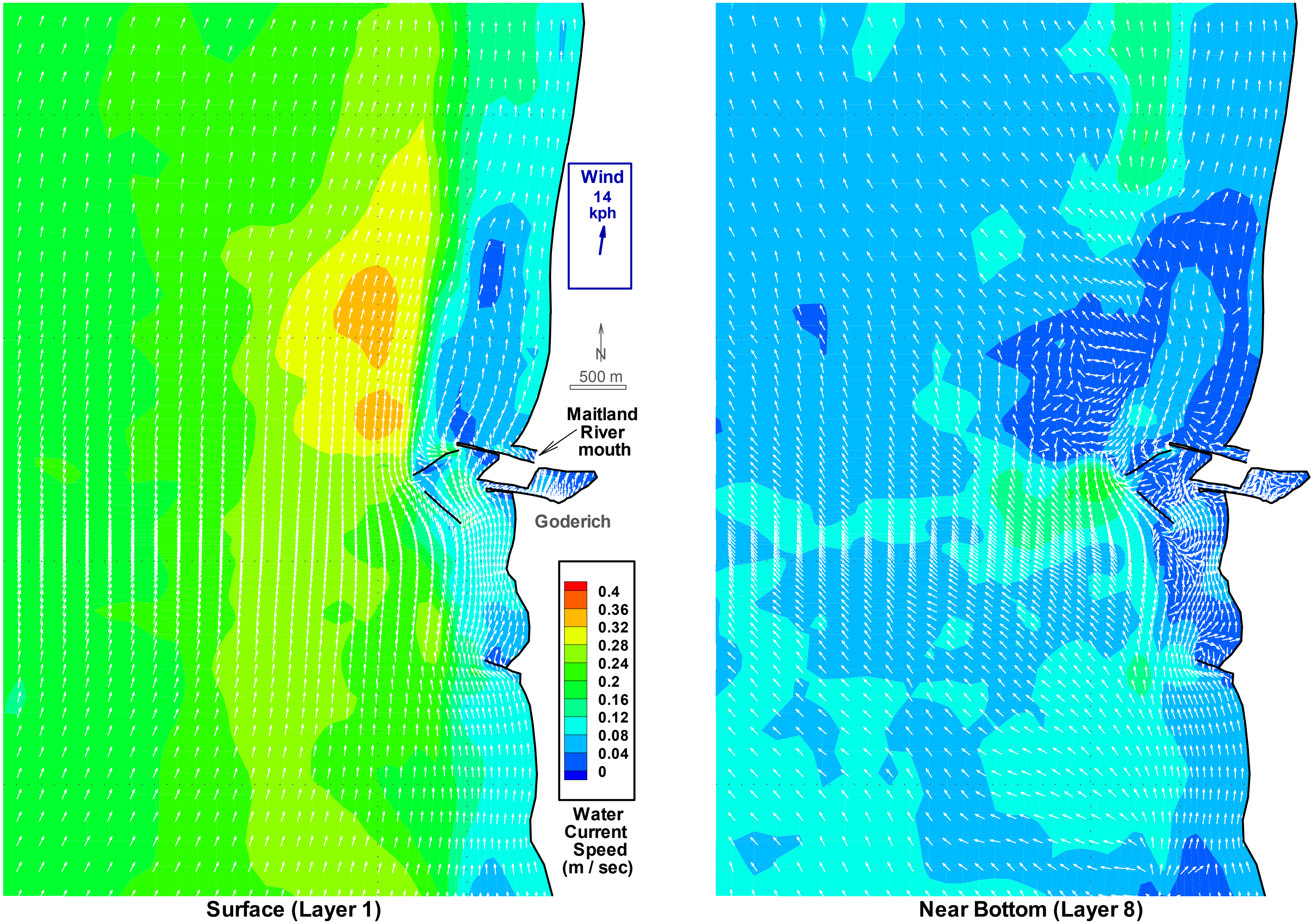


Figure 5.2U(a) Water current velocities at 00:00 hours on July 20, 2003; (directions indicated by arrows, speeds by contours).

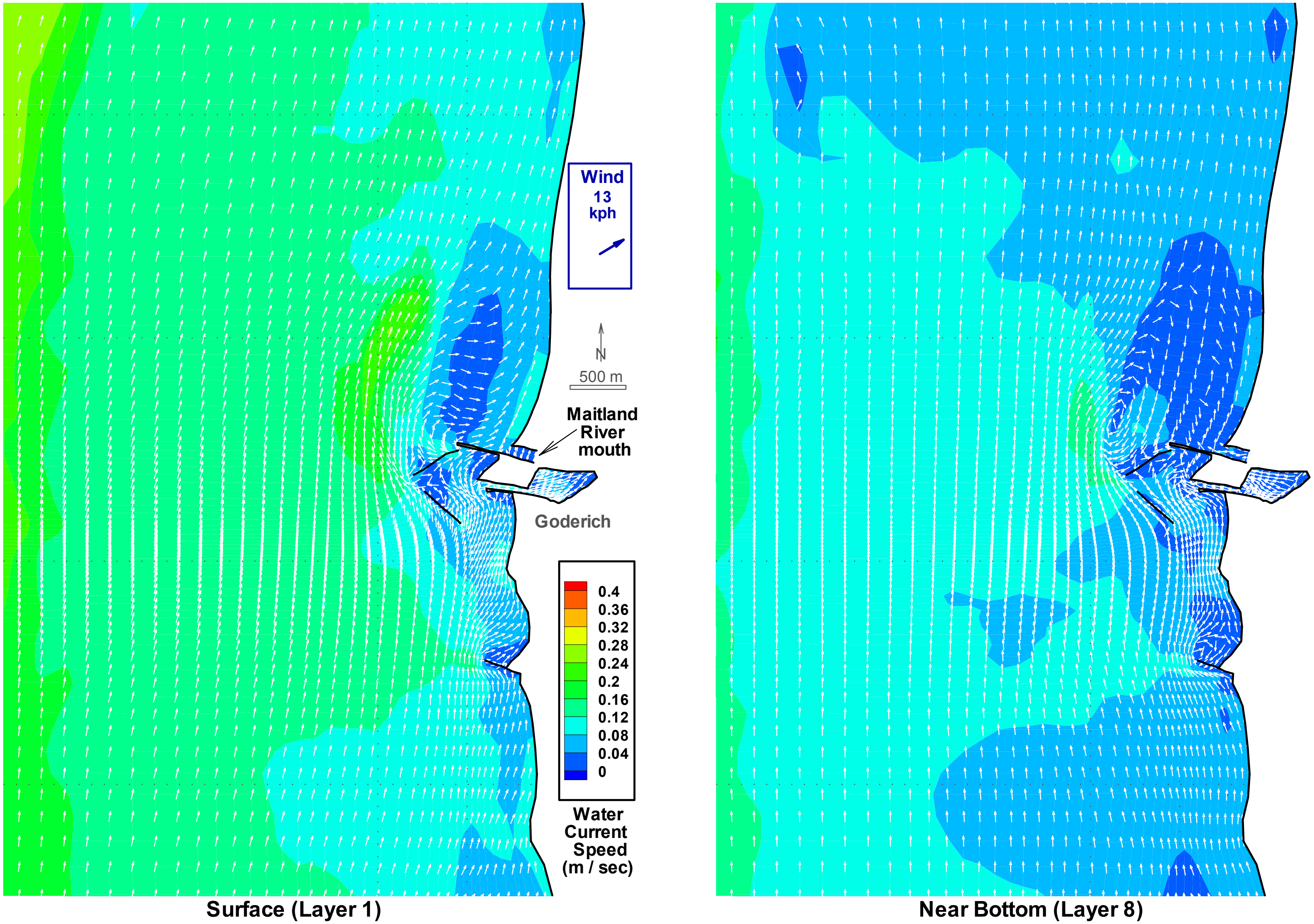
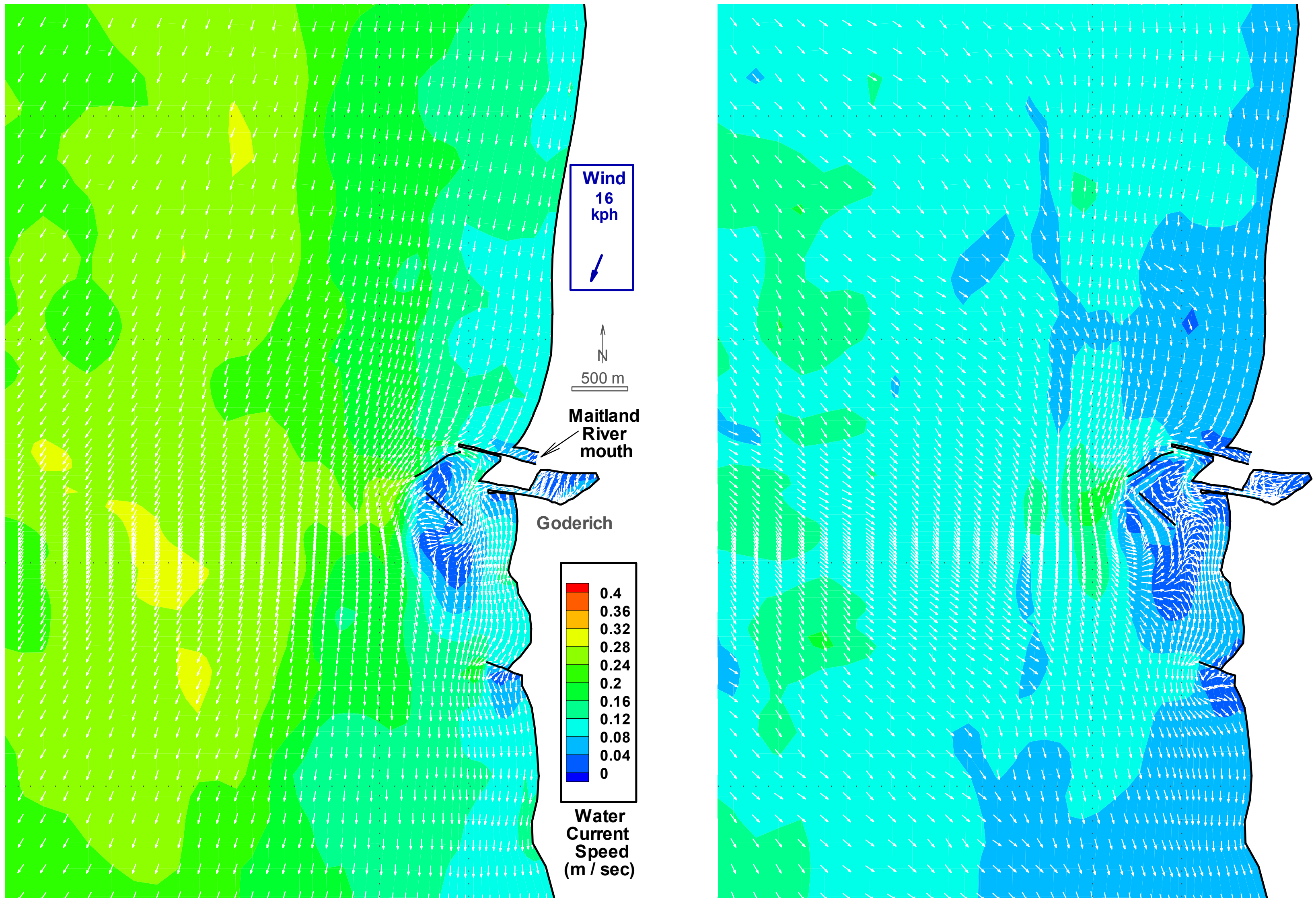


Figure 5.2U(b) Water current velocities at 00:00 hours on July 21, 2003; (directions indicated by arrows, speeds by contours).



Surface (Layer 1)

Near Bottom (Layer 8)

Figure 5.2U(c) Water current velocities at 00:00 hours on July 22, 2003; (directions indicated by arrows, speeds by contours).

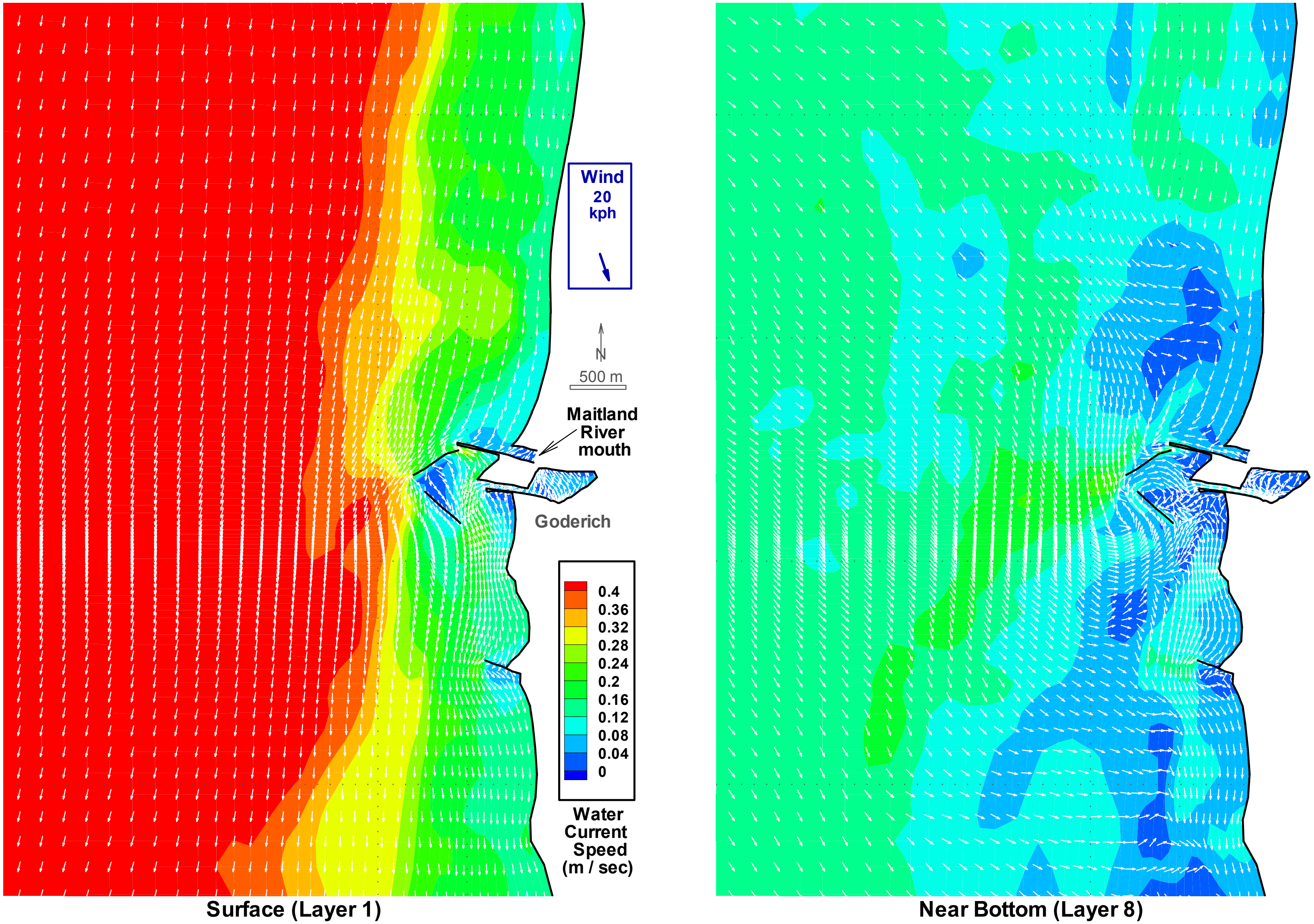


Figure 5.2U(d) Water current velocities at 00:00 hours on July 23, 2003; (directions indicated by arrows, speeds by contours).

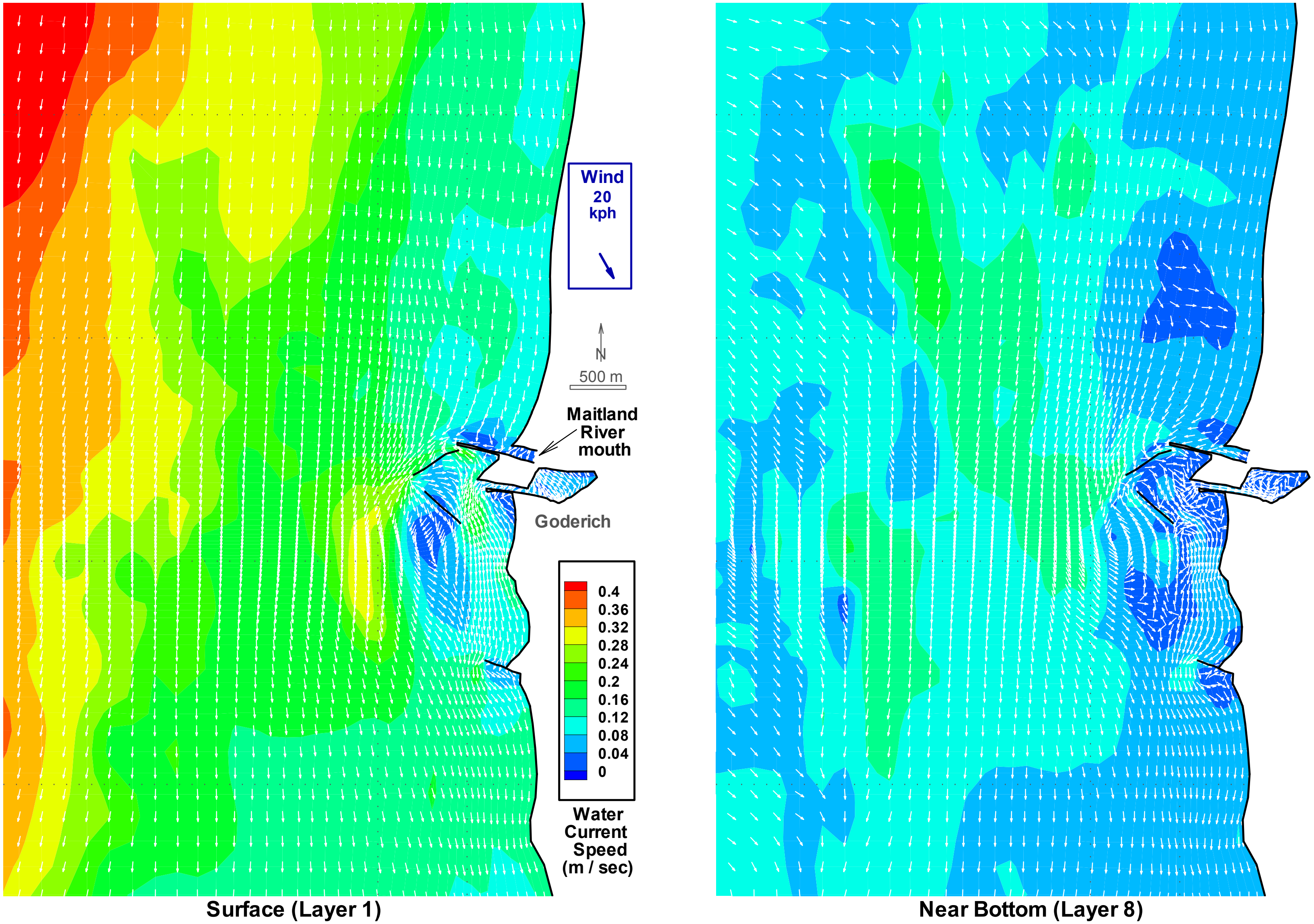


Figure 5.2U(e) Water current velocities at 00:00 hours on July 24, 2003; (directions indicated by arrows, speeds by contours).

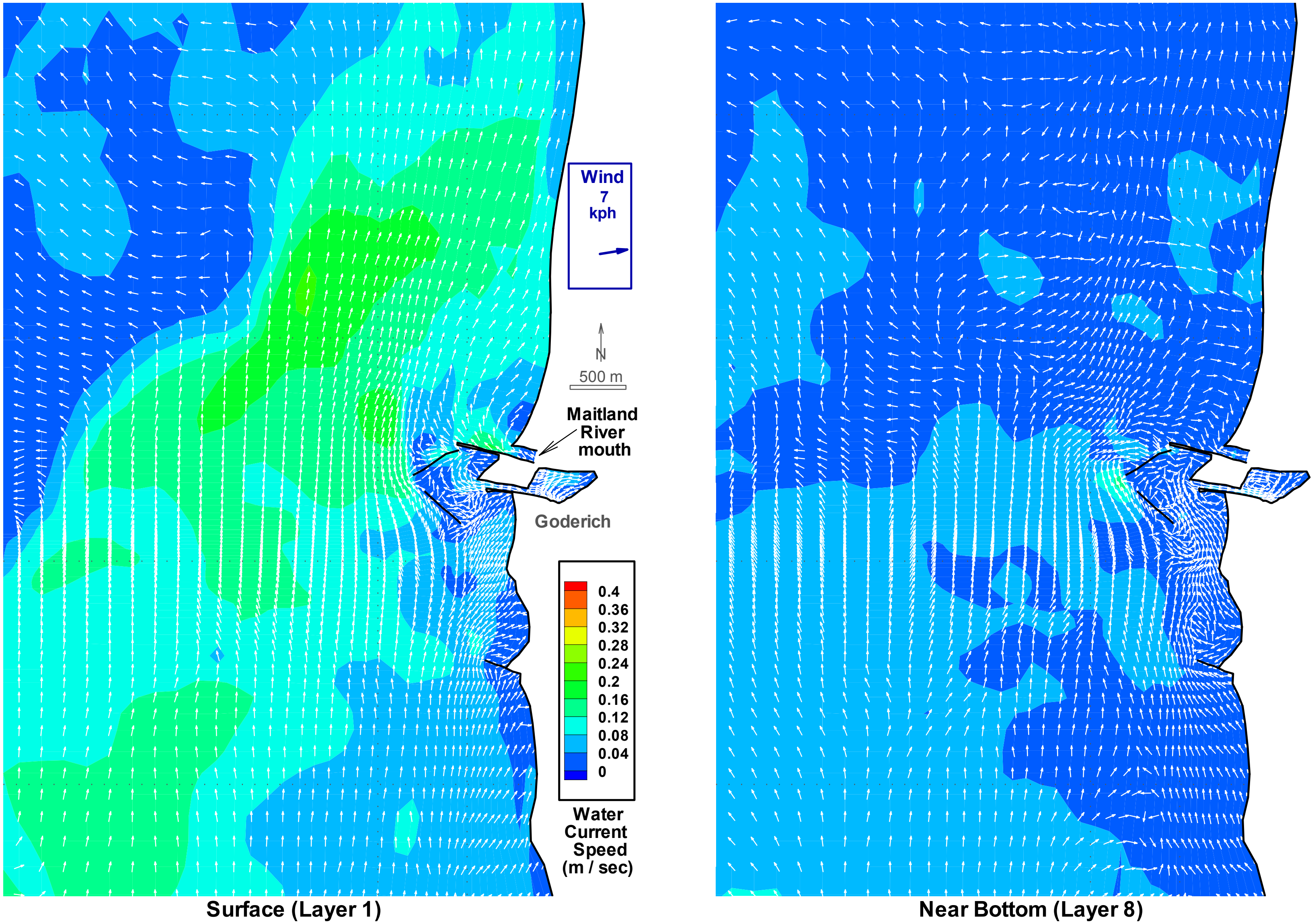


Figure 5.2U(f) Water current velocities at 00:00 hours on July 25, 2003; (directions indicated by arrows, speeds by contours).

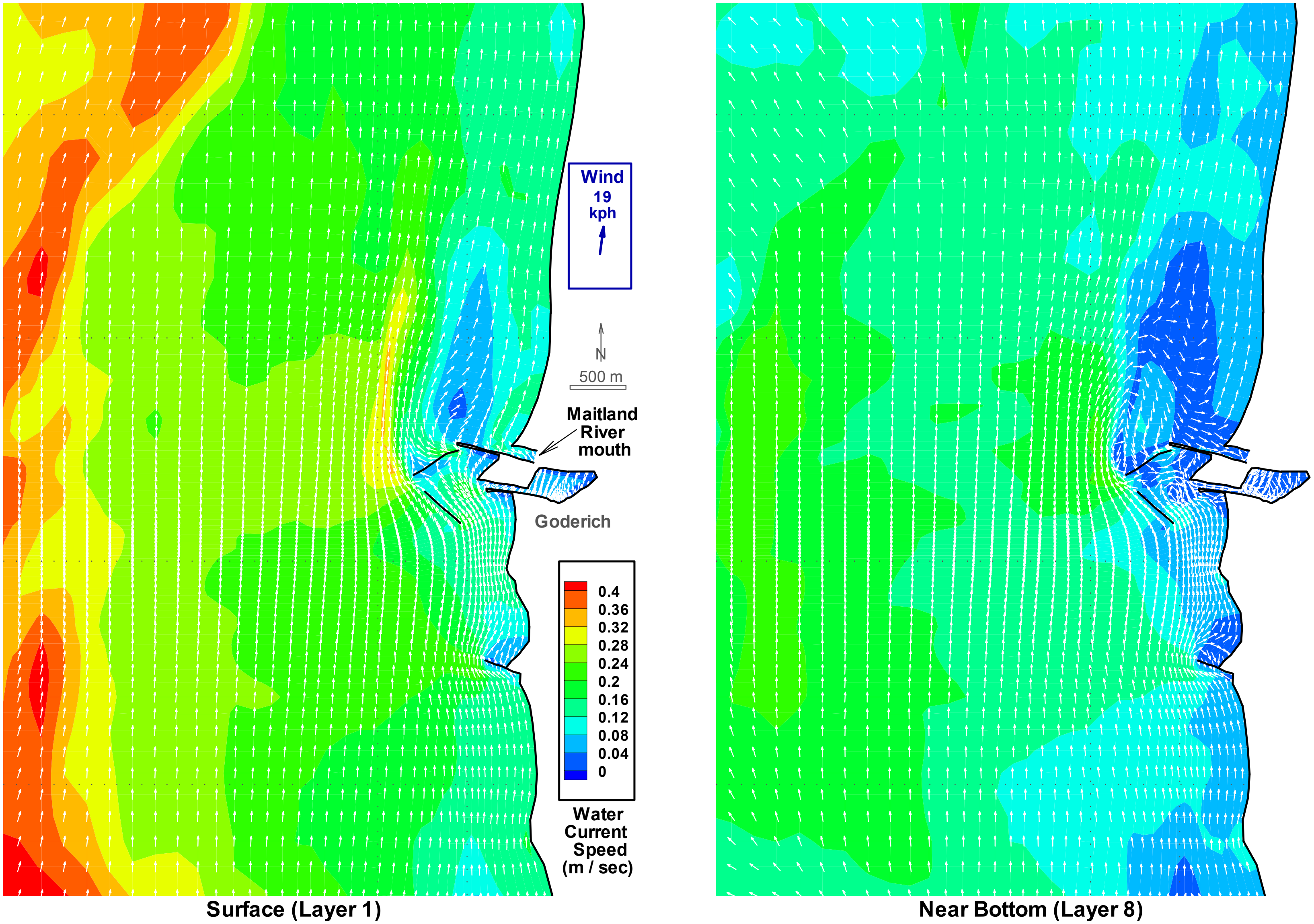


Figure 5.2U(g) Water current velocities at 00:00 hours on July 26, 2003; (directions indicated by arrows, speeds by contours).

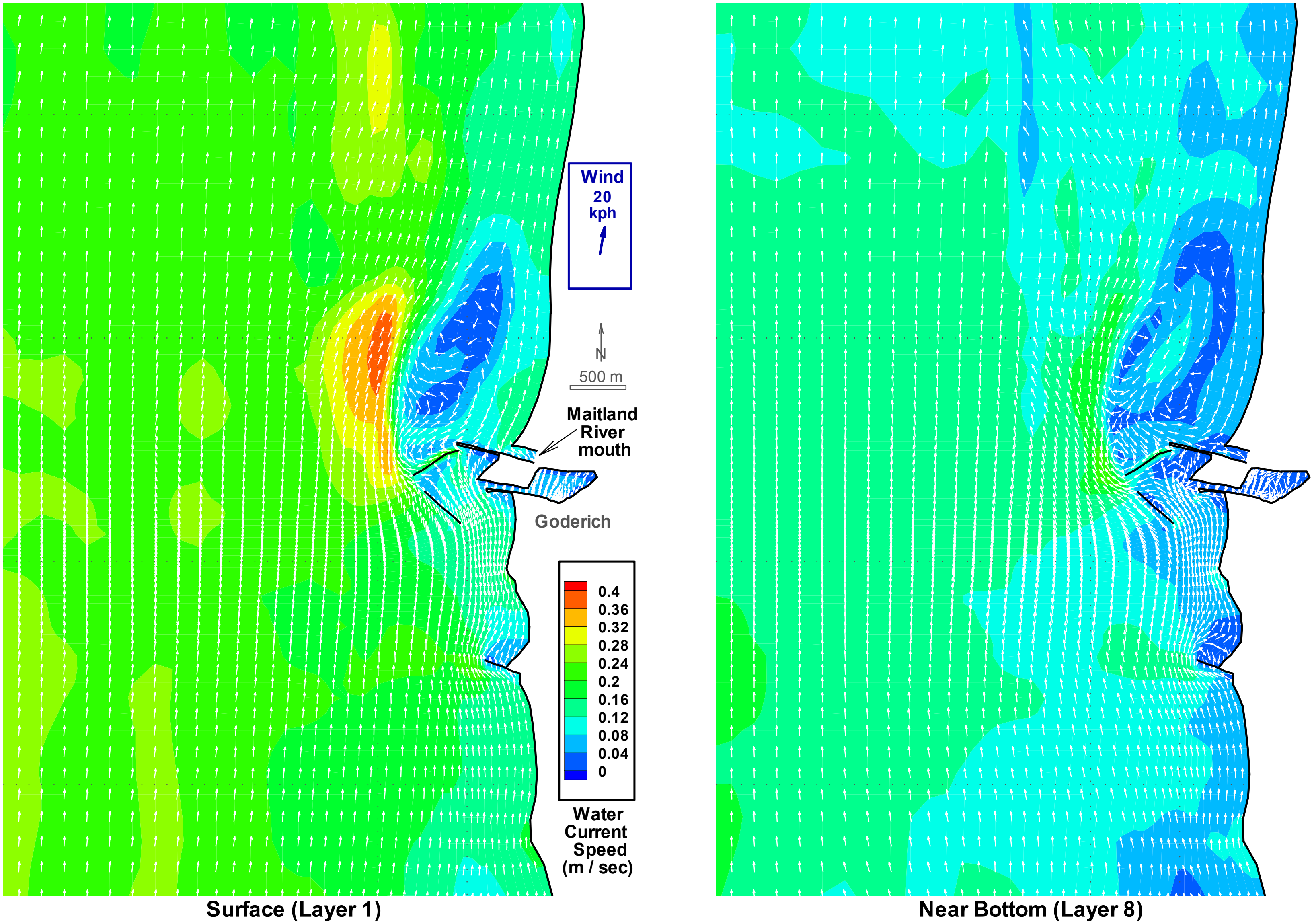


Figure 5.2U(h) Water current velocities at 00:00 hours on July 27, 2003; (directions indicated by arrows, speeds by contours).

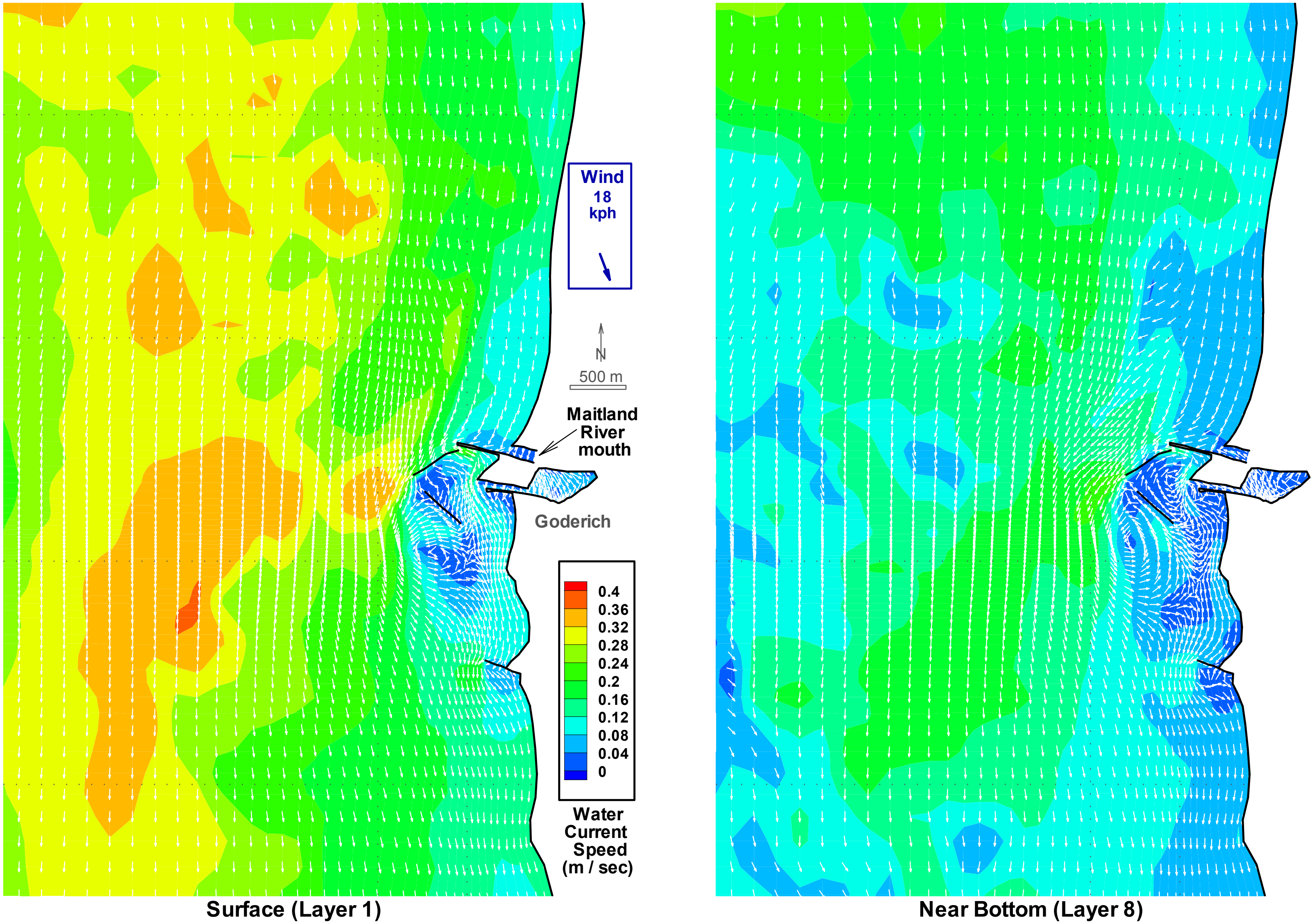


Figure 5.2U(i) Water current velocities at 00:00 hours on July 28, 2003; (directions indicated by arrows, speeds by contours).

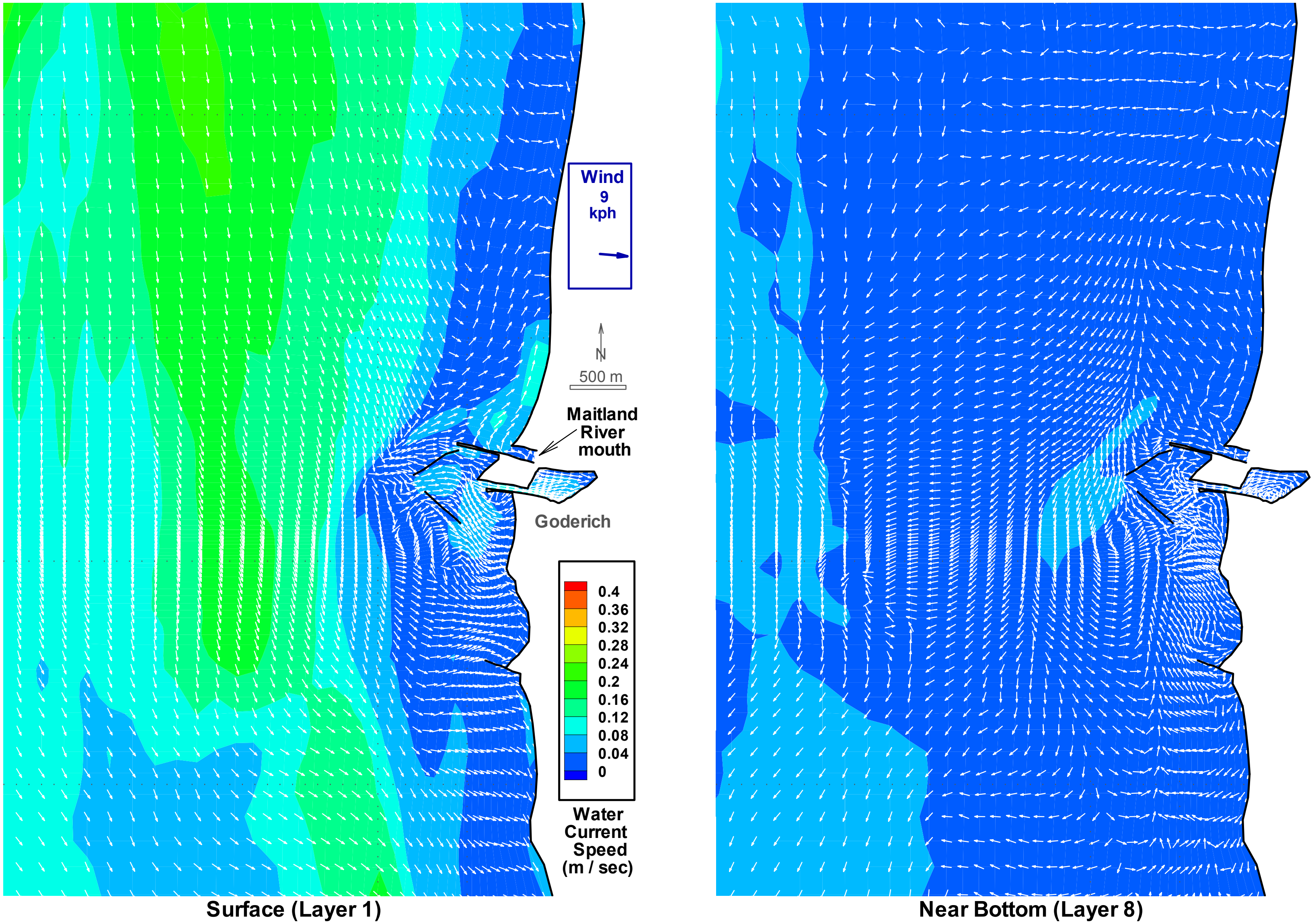


Figure 5.2U(j) Water current velocities at 00:00 hours on July 29, 2003; (directions indicated by arrows, speeds by contours).

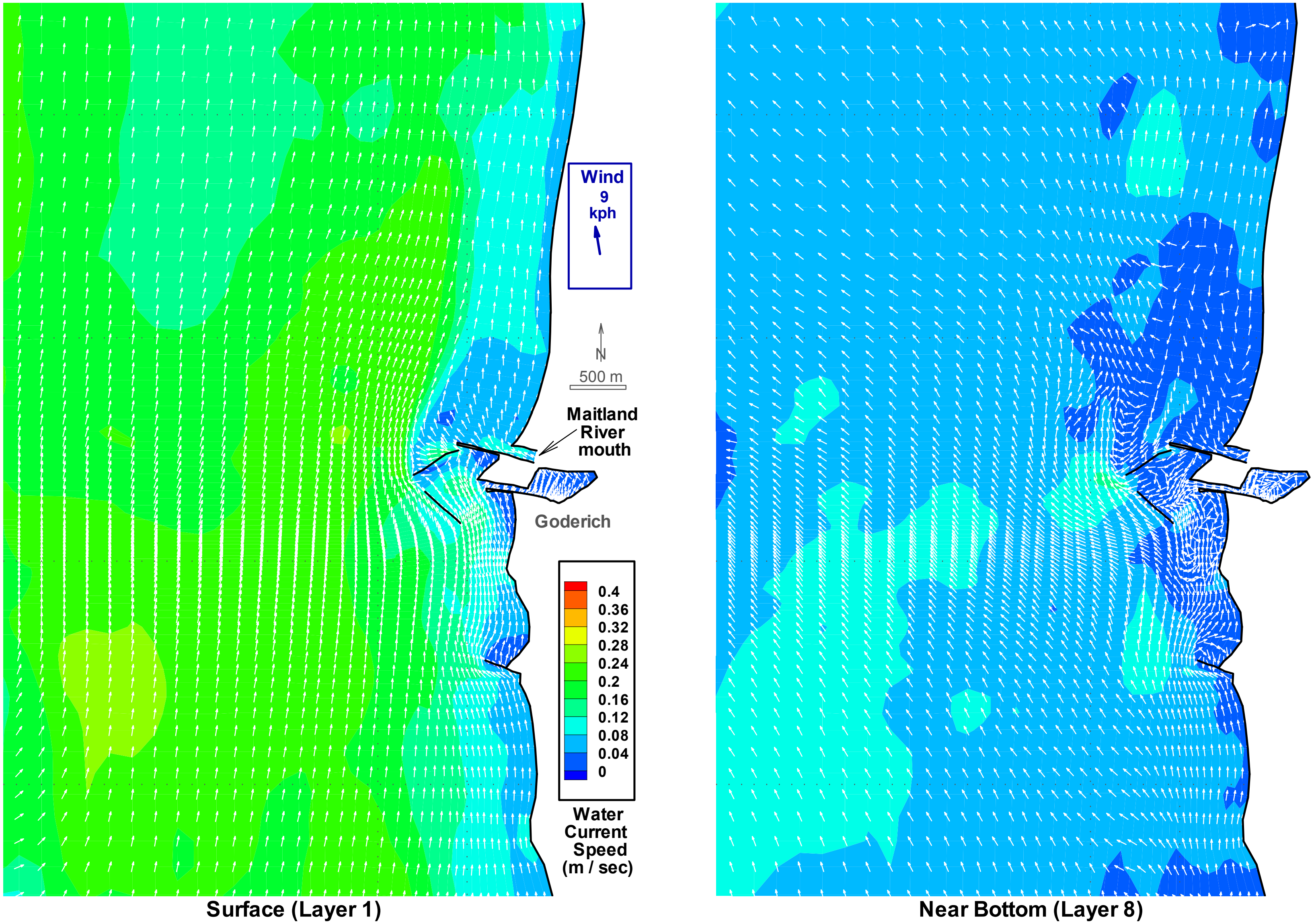


Figure 5.2U(k) Water current velocities at 00:00 hours on July 30, 2003; (directions indicated by arrows, speeds by contours).

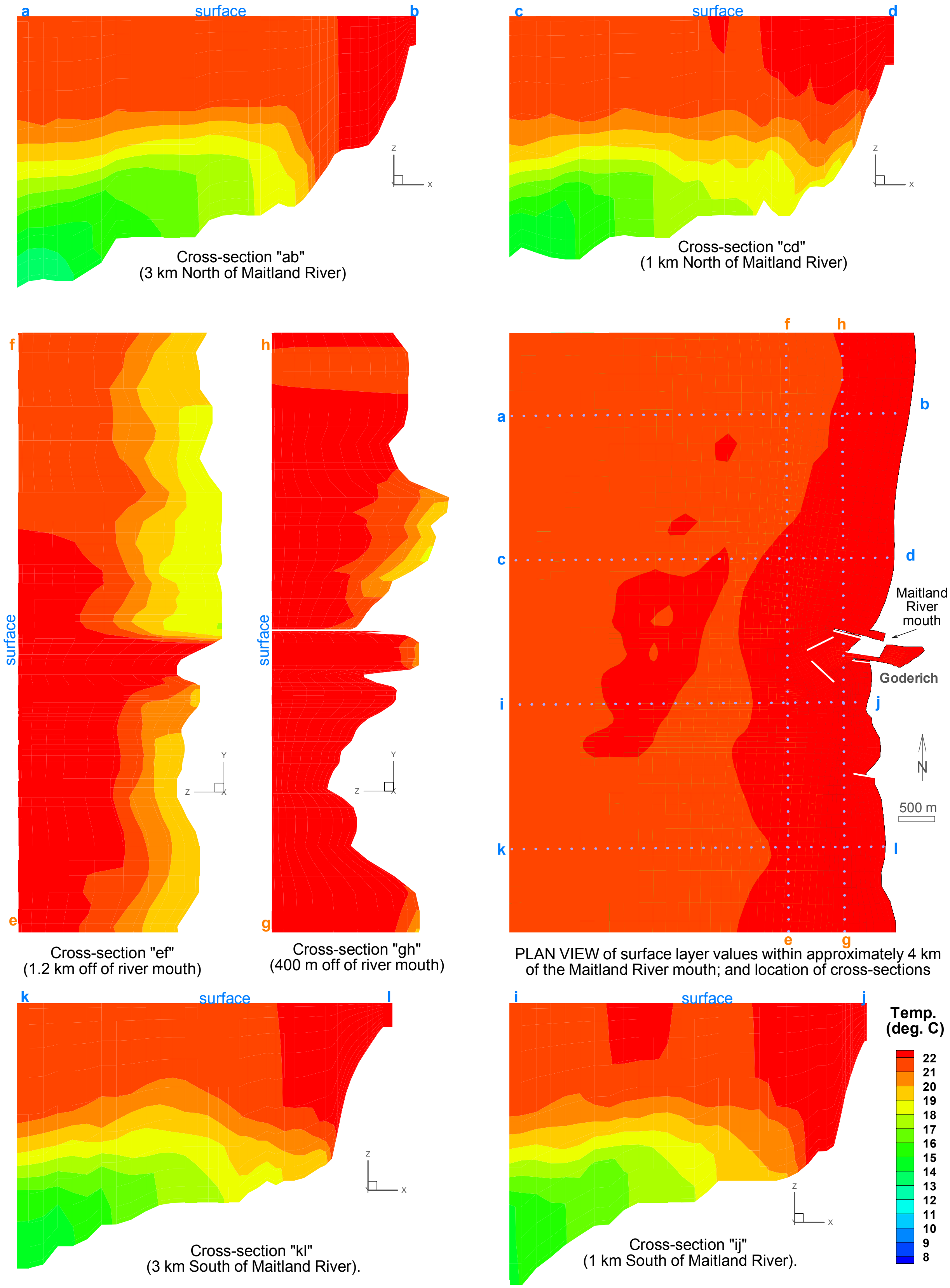
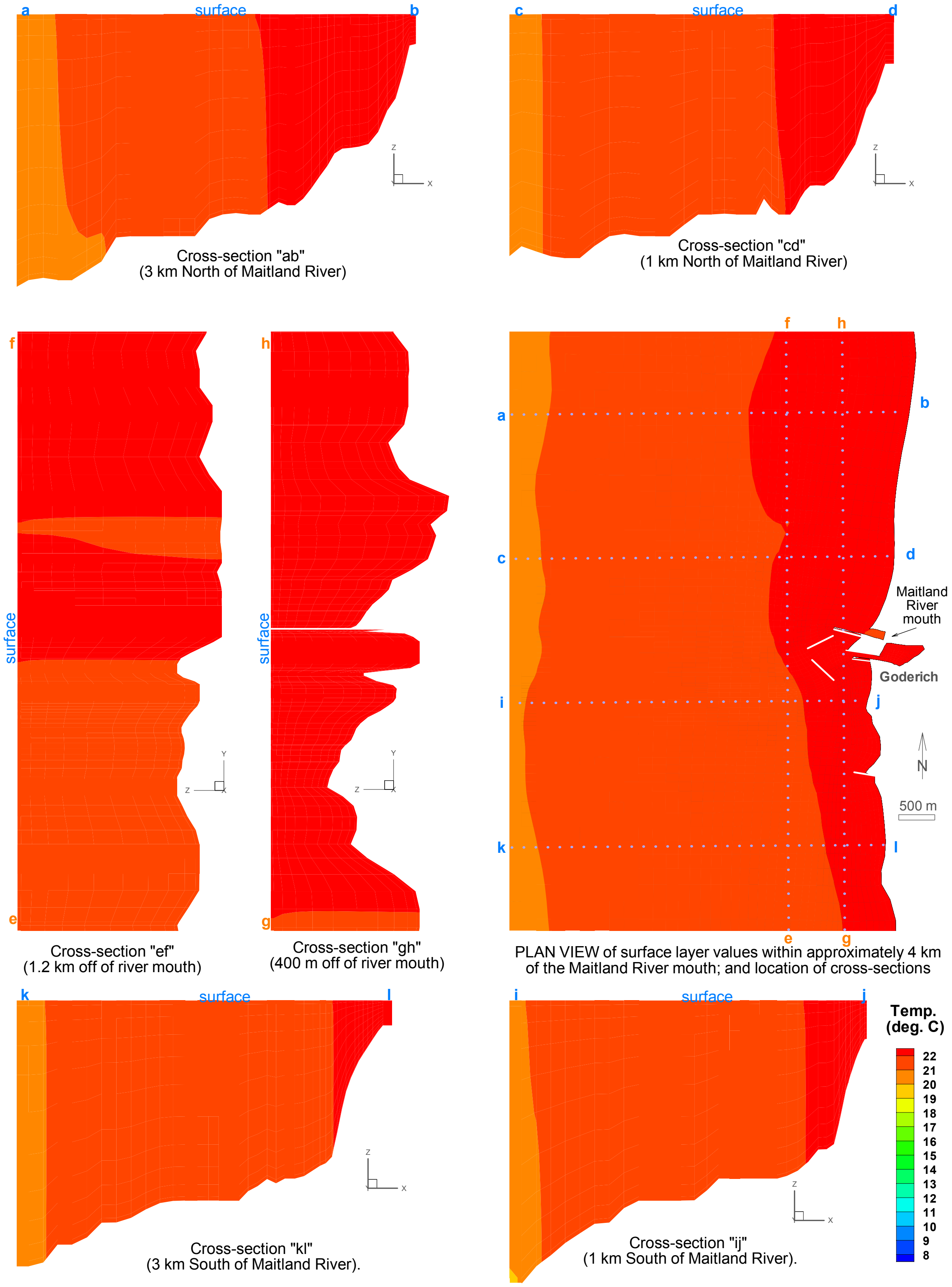


Figure 5.2T(a) **Water temperature, (plan view and 6 cross-sections), at 00 hours on July 20, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2T(b) Water temperature, (plan view and 6 cross-sections), at 00 hours on July 21, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

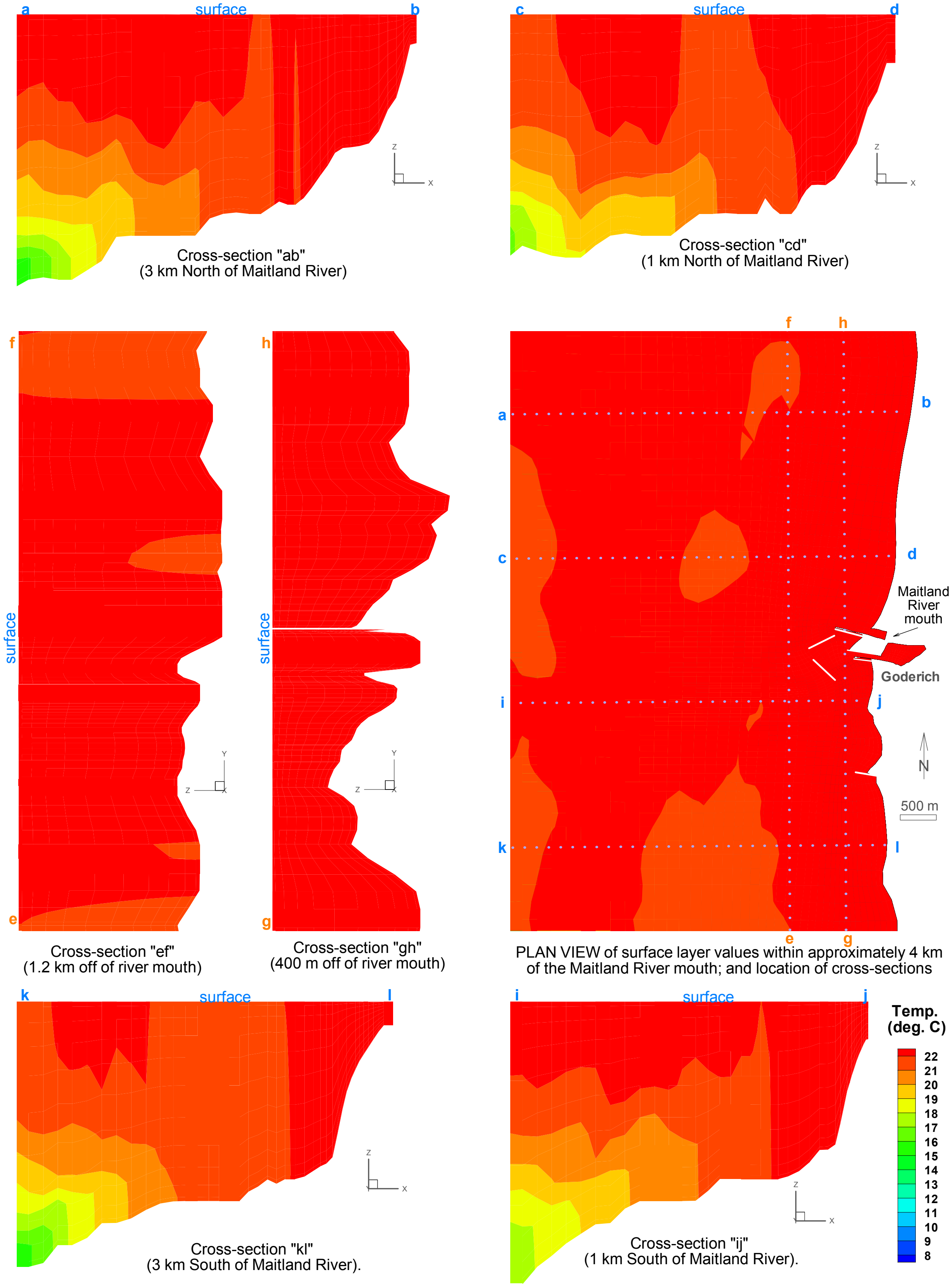


Figure 5.2T(c) **Water temperature, (plan view and 6 cross-sections), at 00 hours on July 22, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

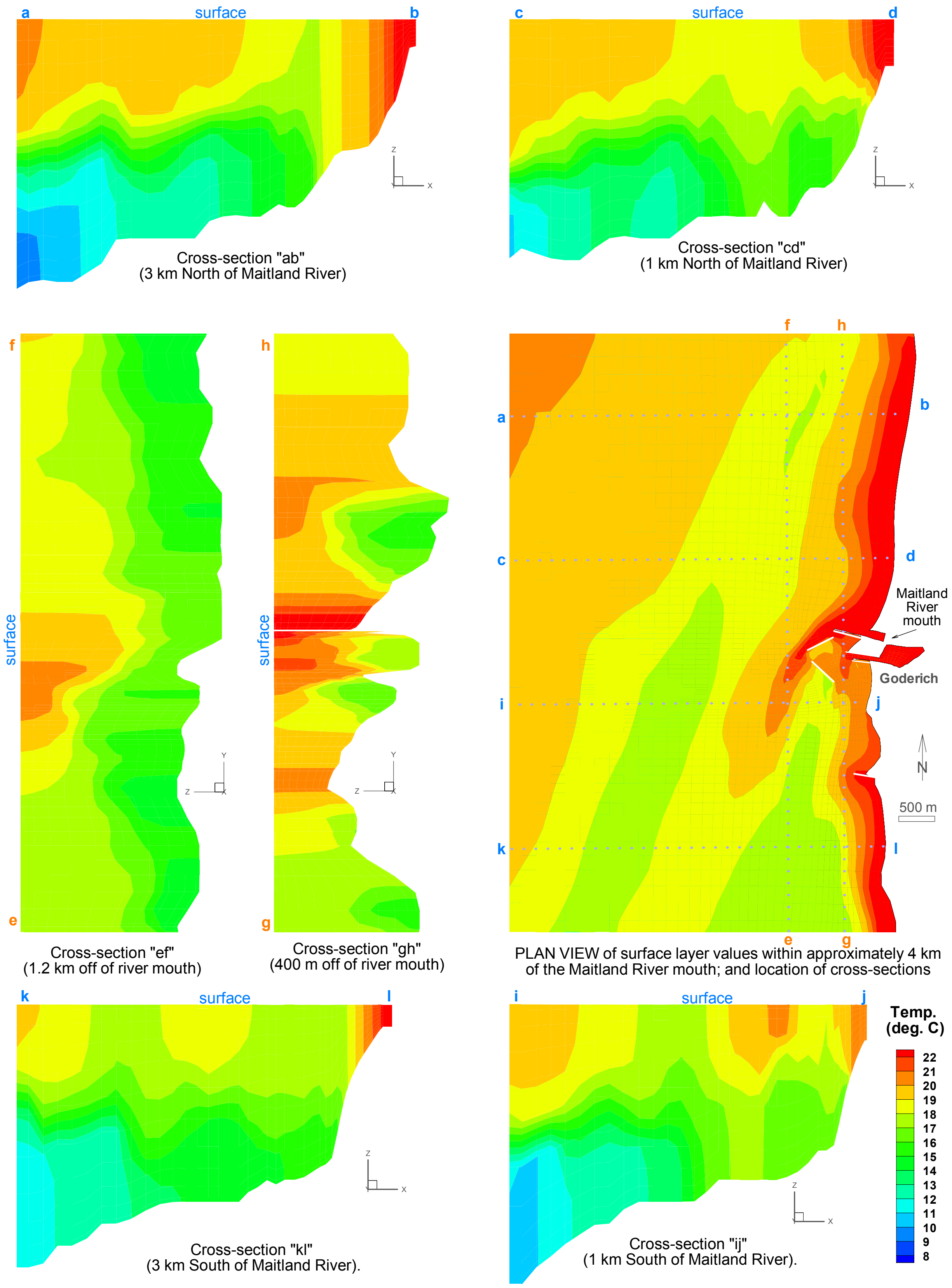


Figure 5.2T(d) **Water temperature, (plan view and 6 cross-sections), at 00 hours on July 23, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

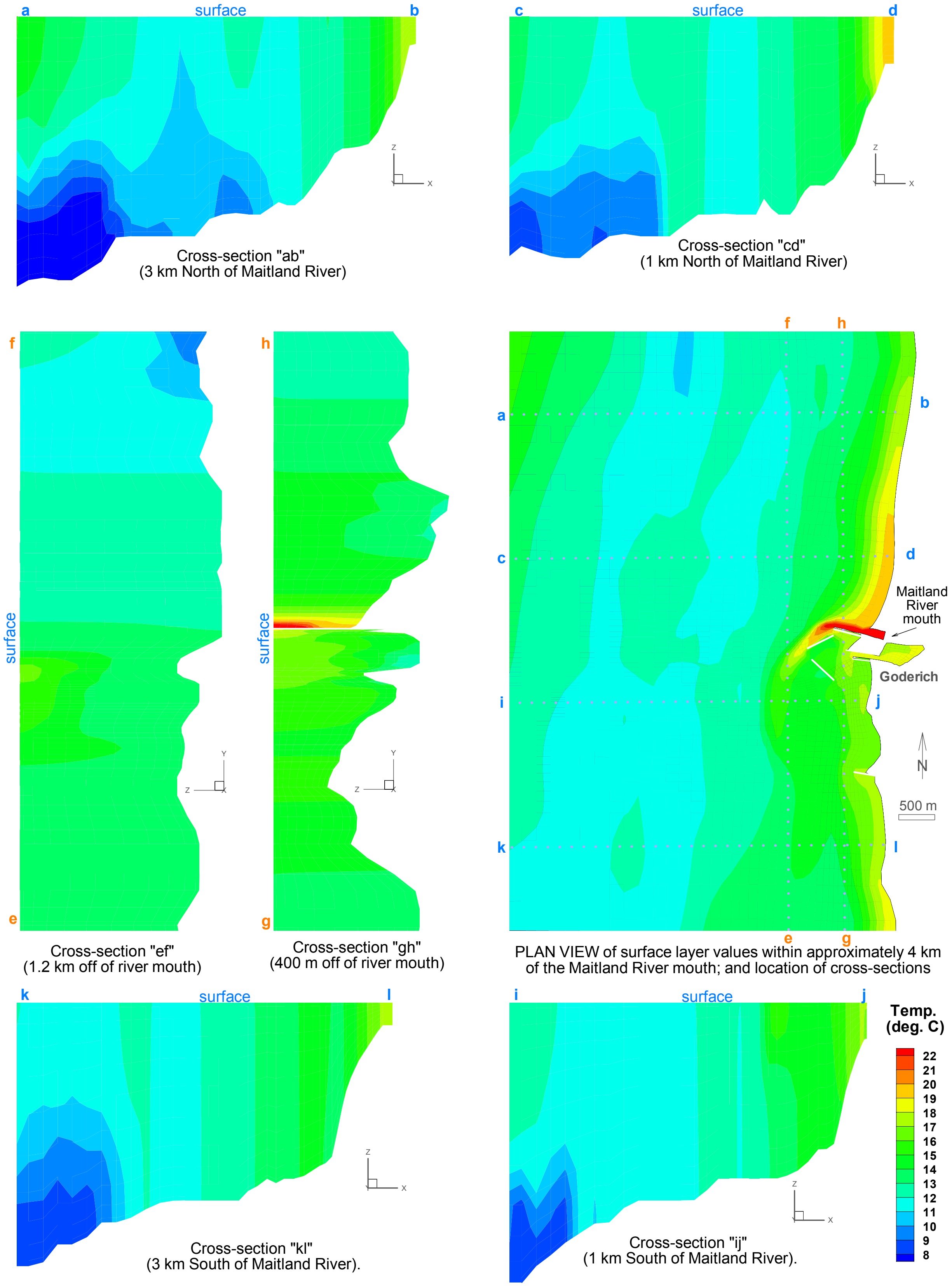
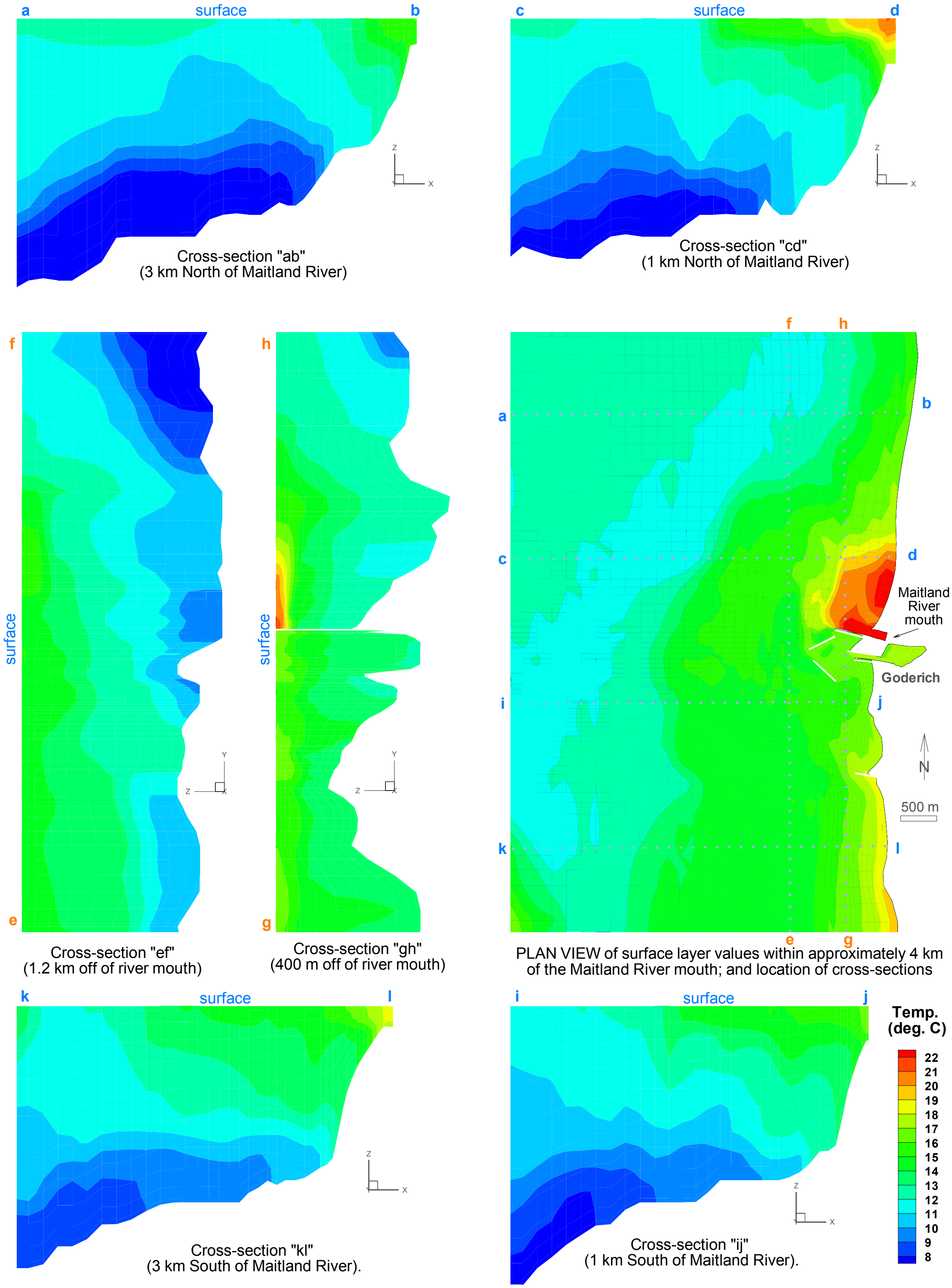


Figure 5.2T(e) **Water temperature, (plan view and 6 cross-sections), at 00 hours on July 24, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

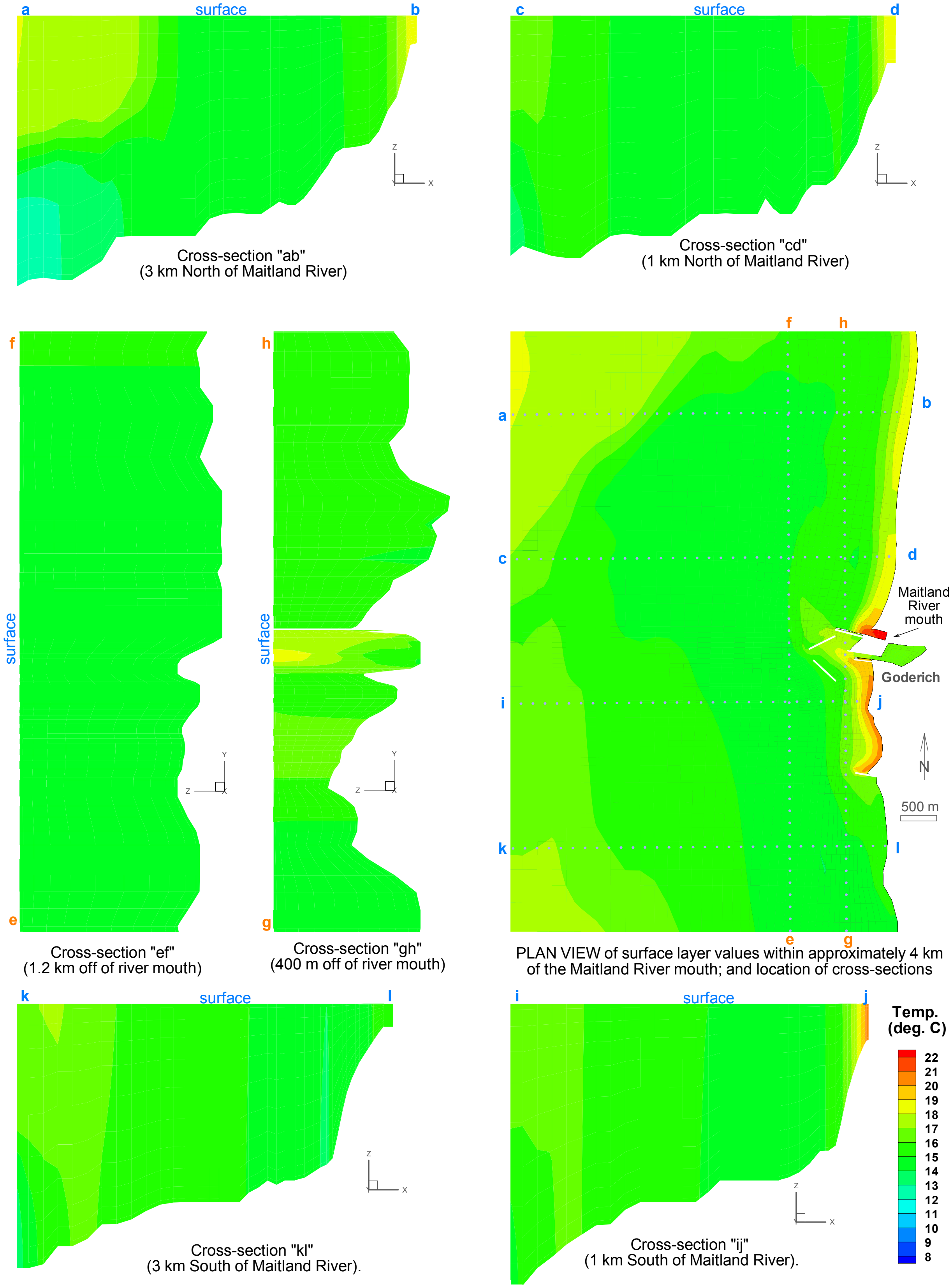
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2T(f) Water temperature, (plan view and 6 cross-sections), at 00 hours on July 25, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

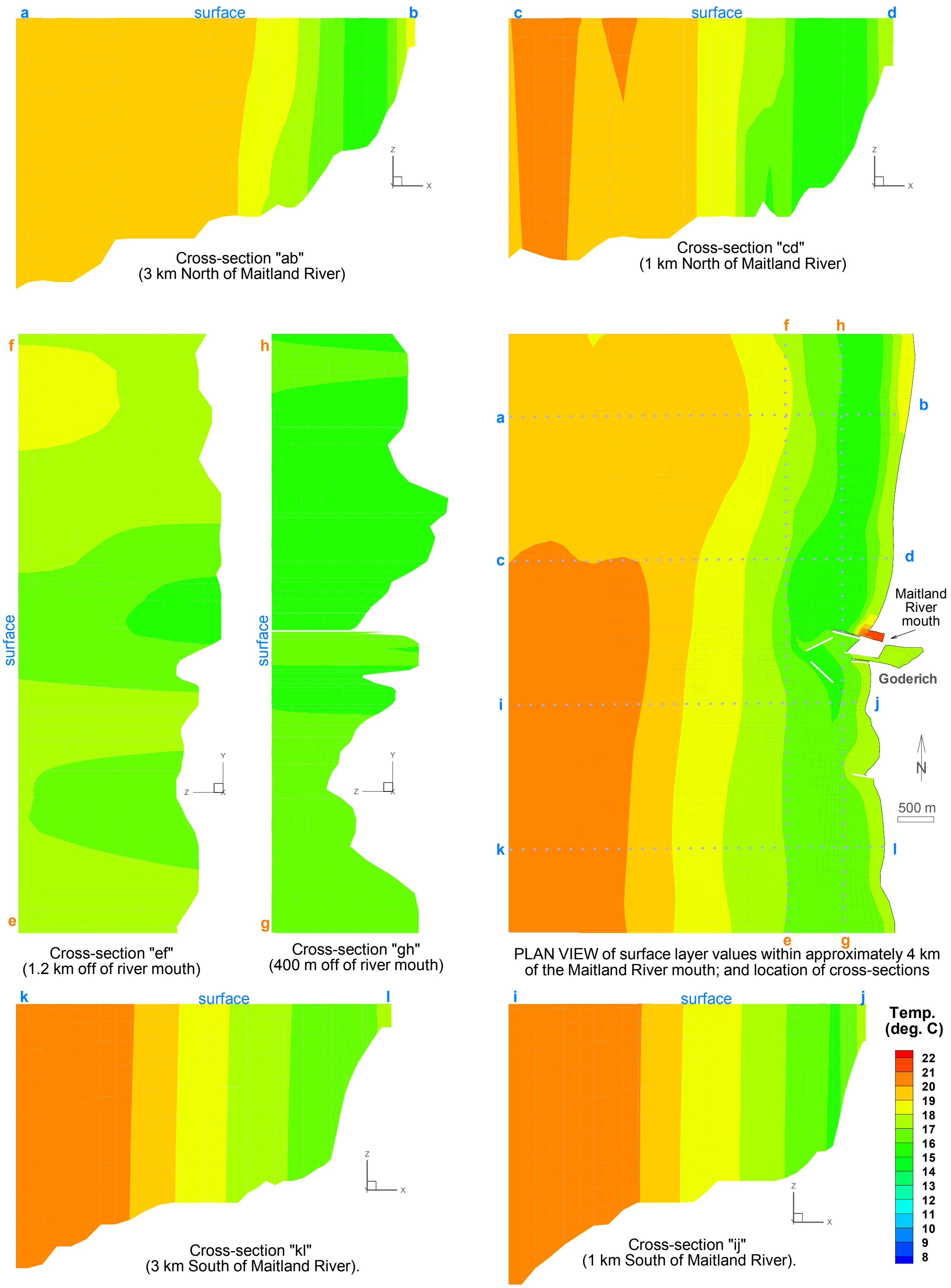
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2T(g) Water temperature, (plan view and 6 cross-sections), at 00 hours on July 26, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

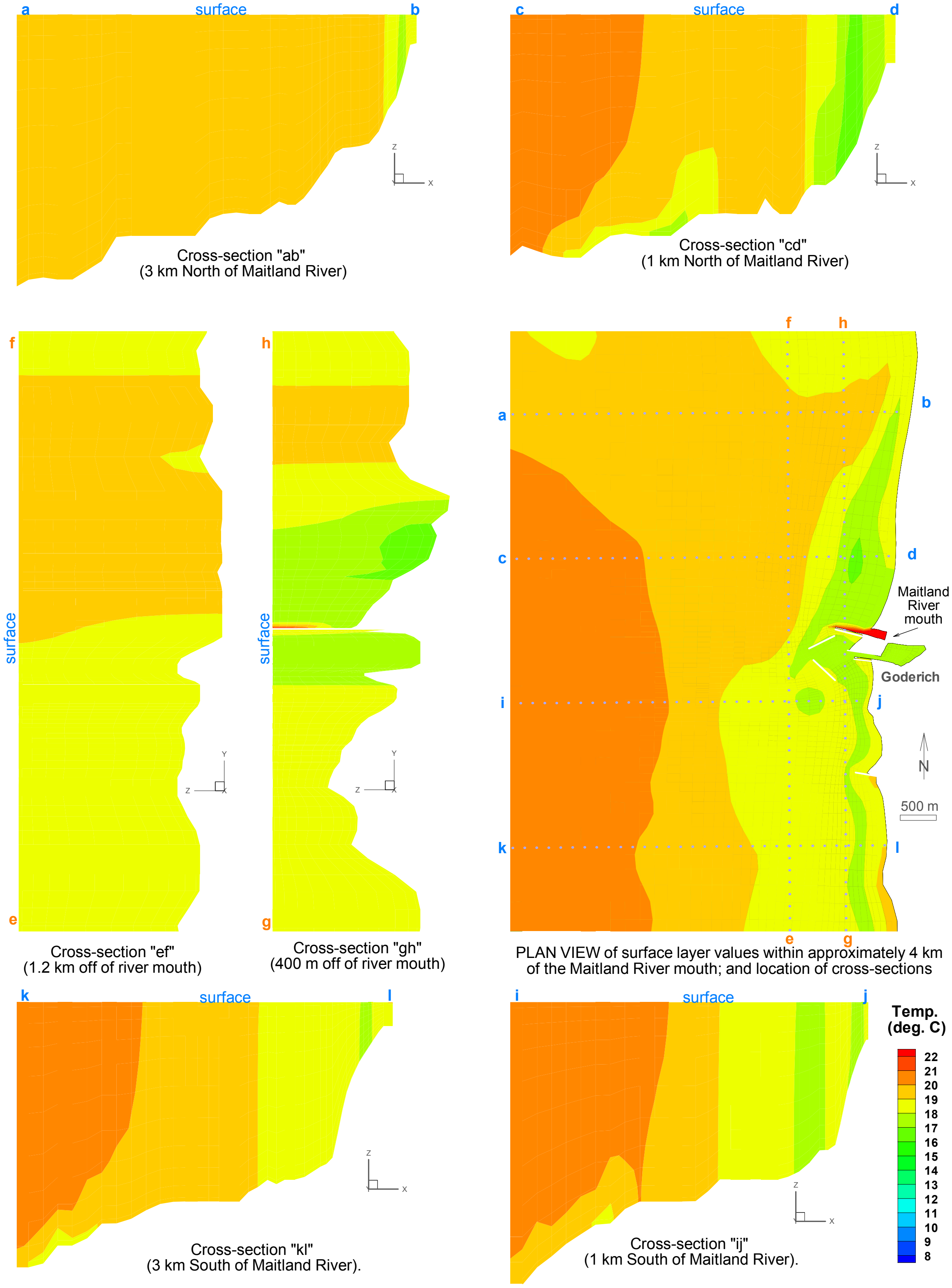
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2T(h) Water temperature, (plan view and 6 cross-sections), at 00 hours on July 27, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab" (3 km North of Maitland River)

Cross-section "cd" (1 km North of Maitland River)

Cross-section "ef" (1.2 km off of river mouth)

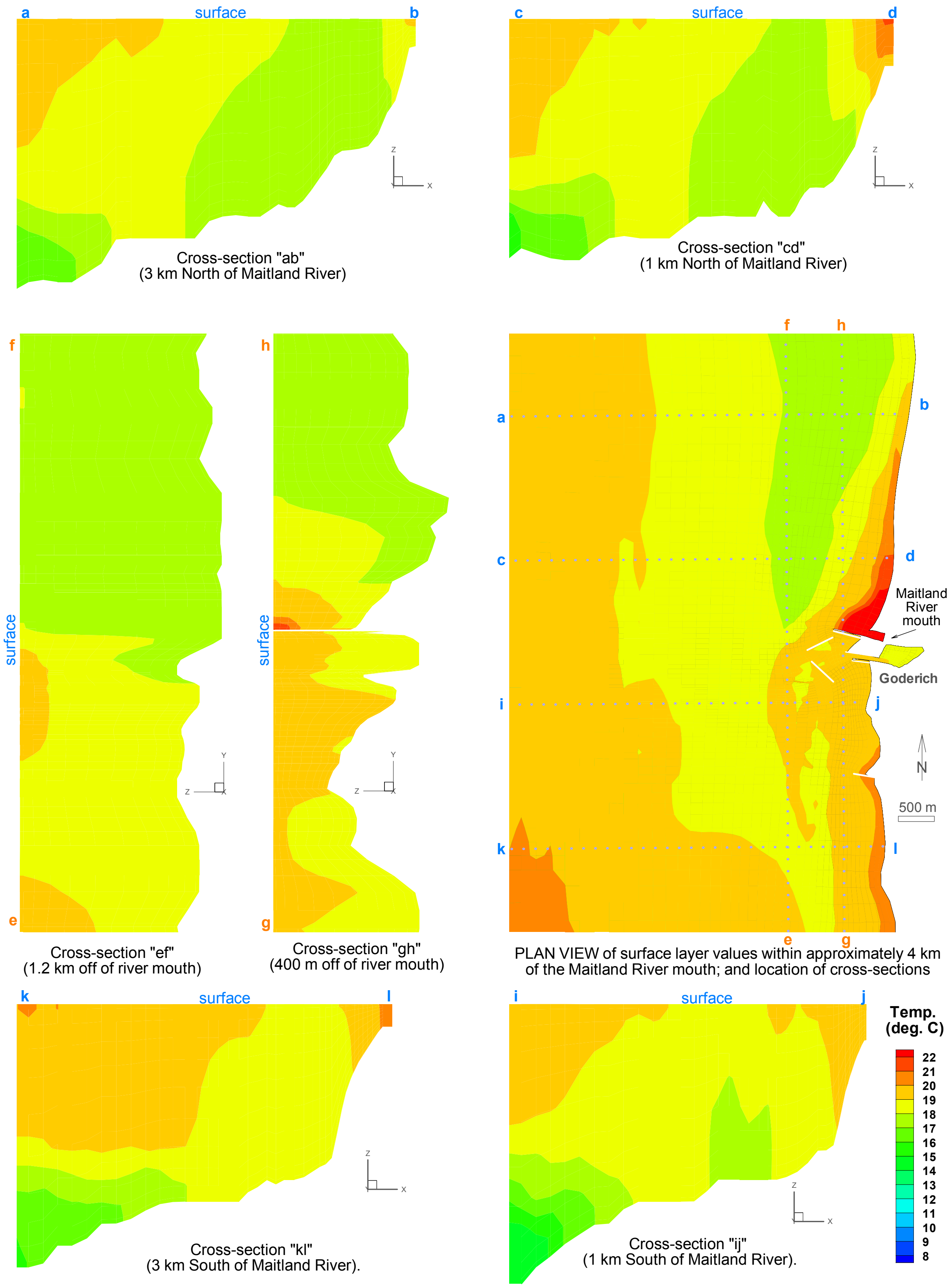
Cross-section "gh" (400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl" (3 km South of Maitland River).

Cross-section "ij" (1 km South of Maitland River).

Figure 5.2T(i) Water temperature, (plan view and 6 cross-sections), at 00 hours on July 28, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2T(j) Water temperature, (plan view and 6 cross-sections), at 00 hours on July 29, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

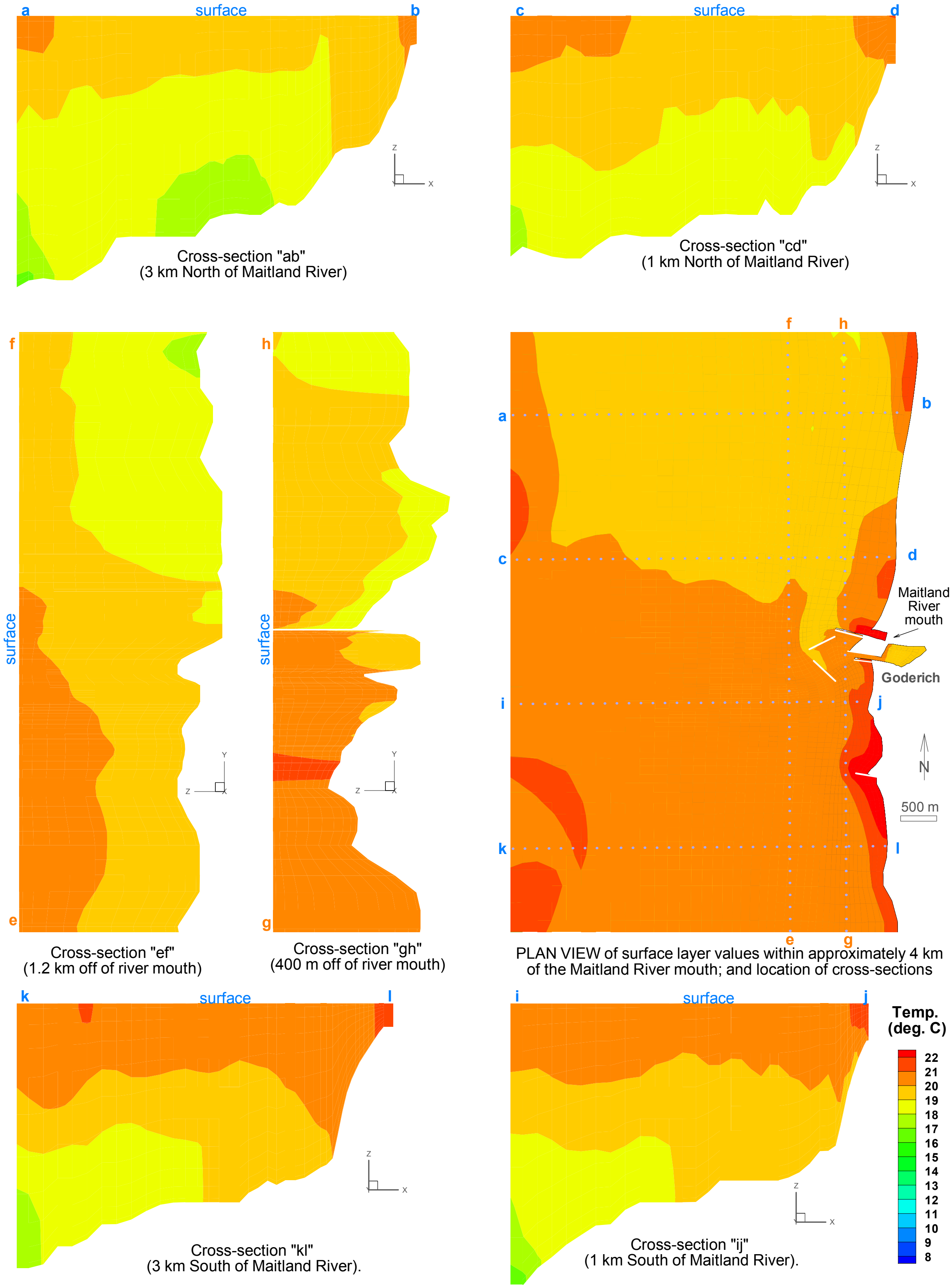


Figure 5.2T(k) **Water temperature, (plan view and 6 cross-sections), at 00 hours on July 30, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

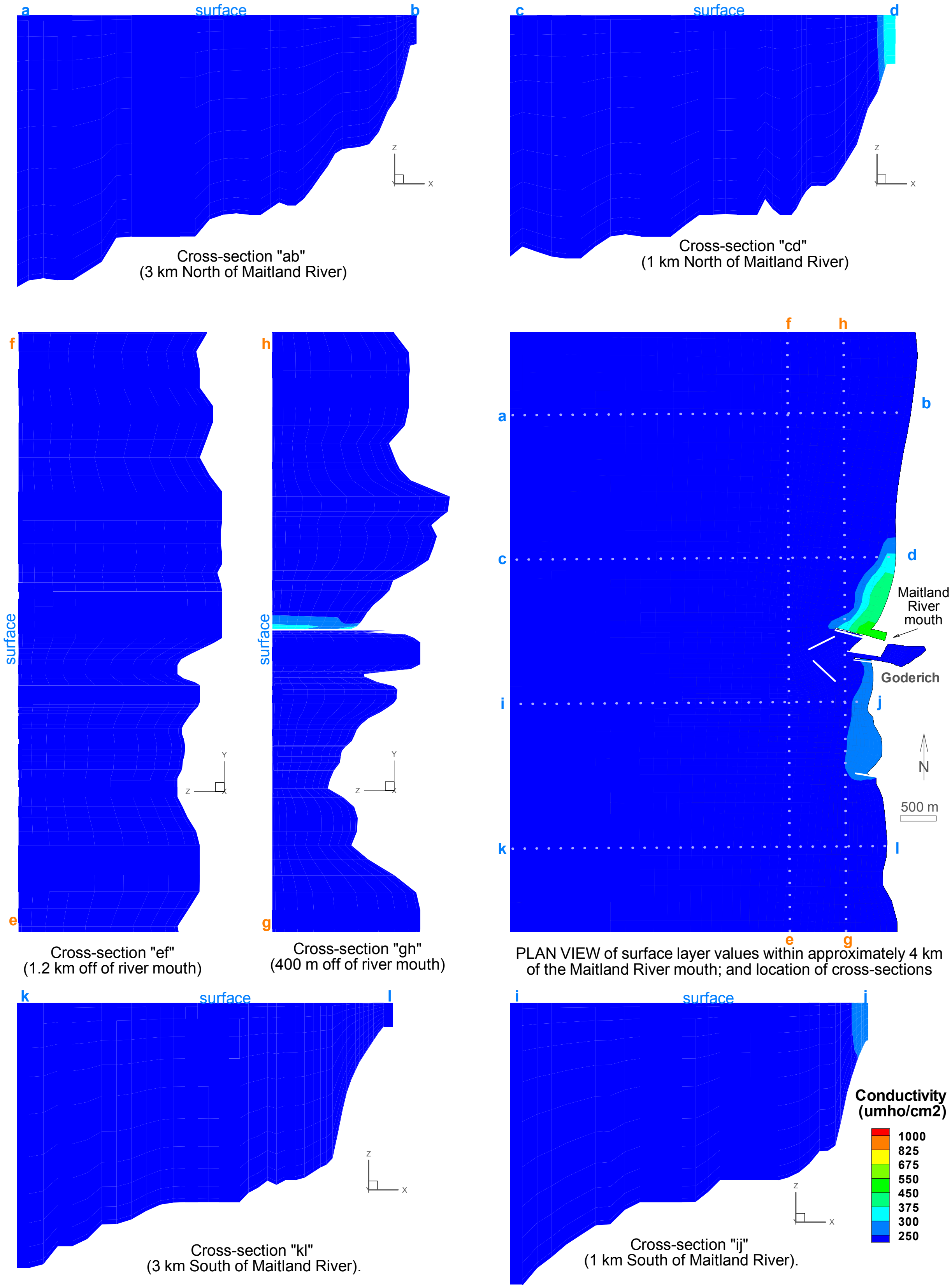
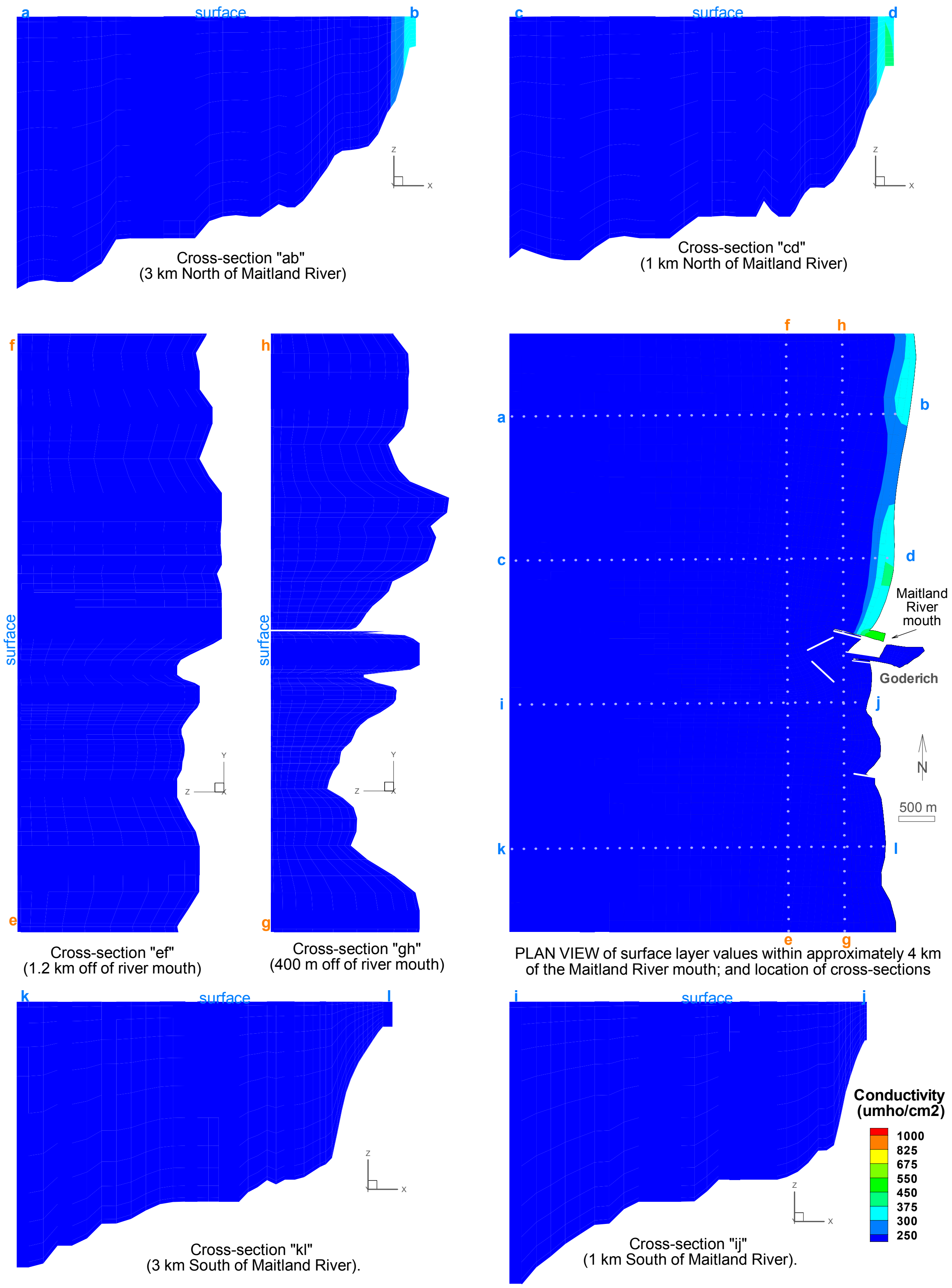


Figure 5.2C(a) **Conductivity, (plan view and 6 cross-sections), at 00 hours on July 20, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

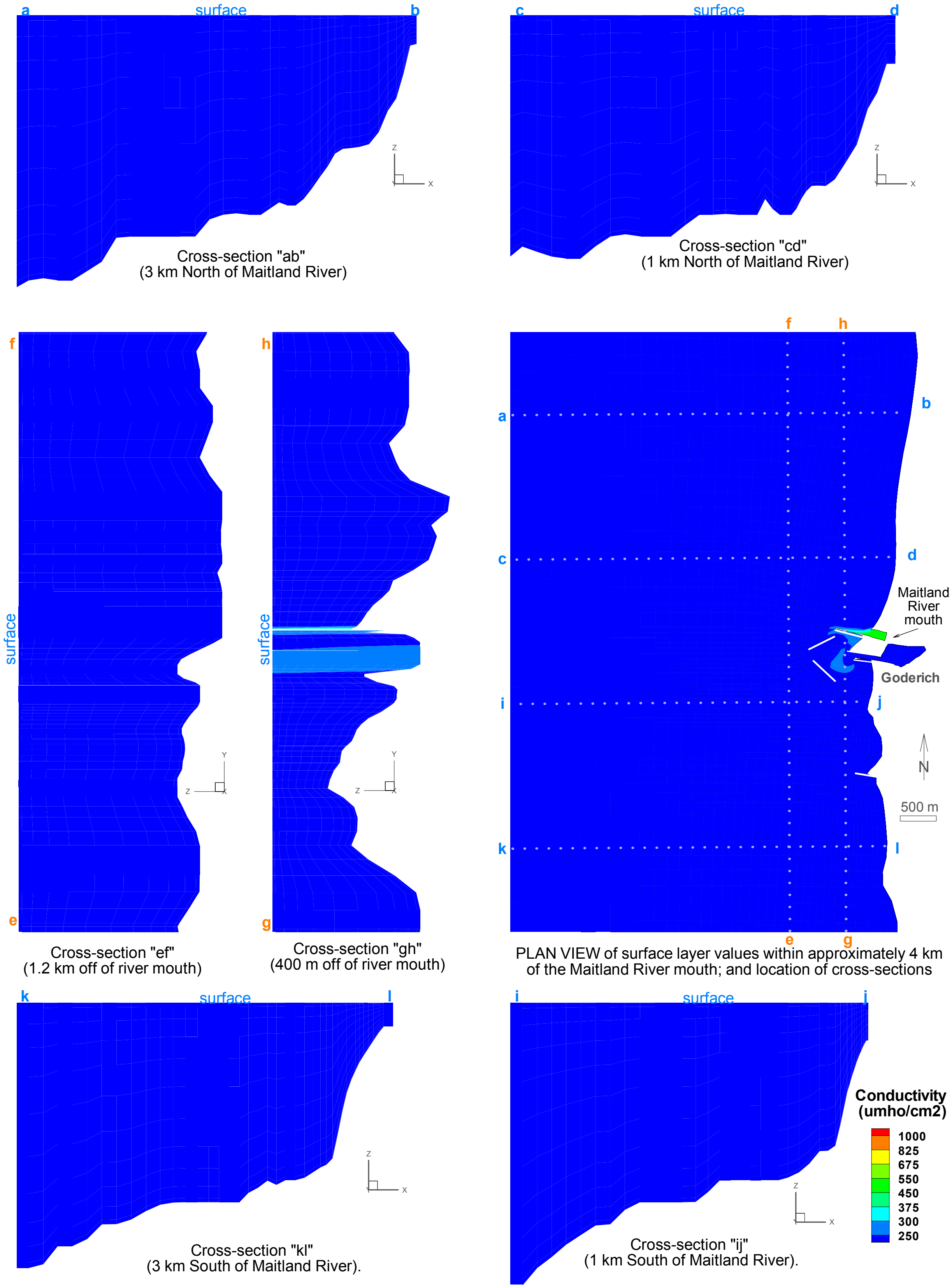
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2C(b) Conductivity, (plan view and 6 cross-sections), at 00 hours on July 21, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

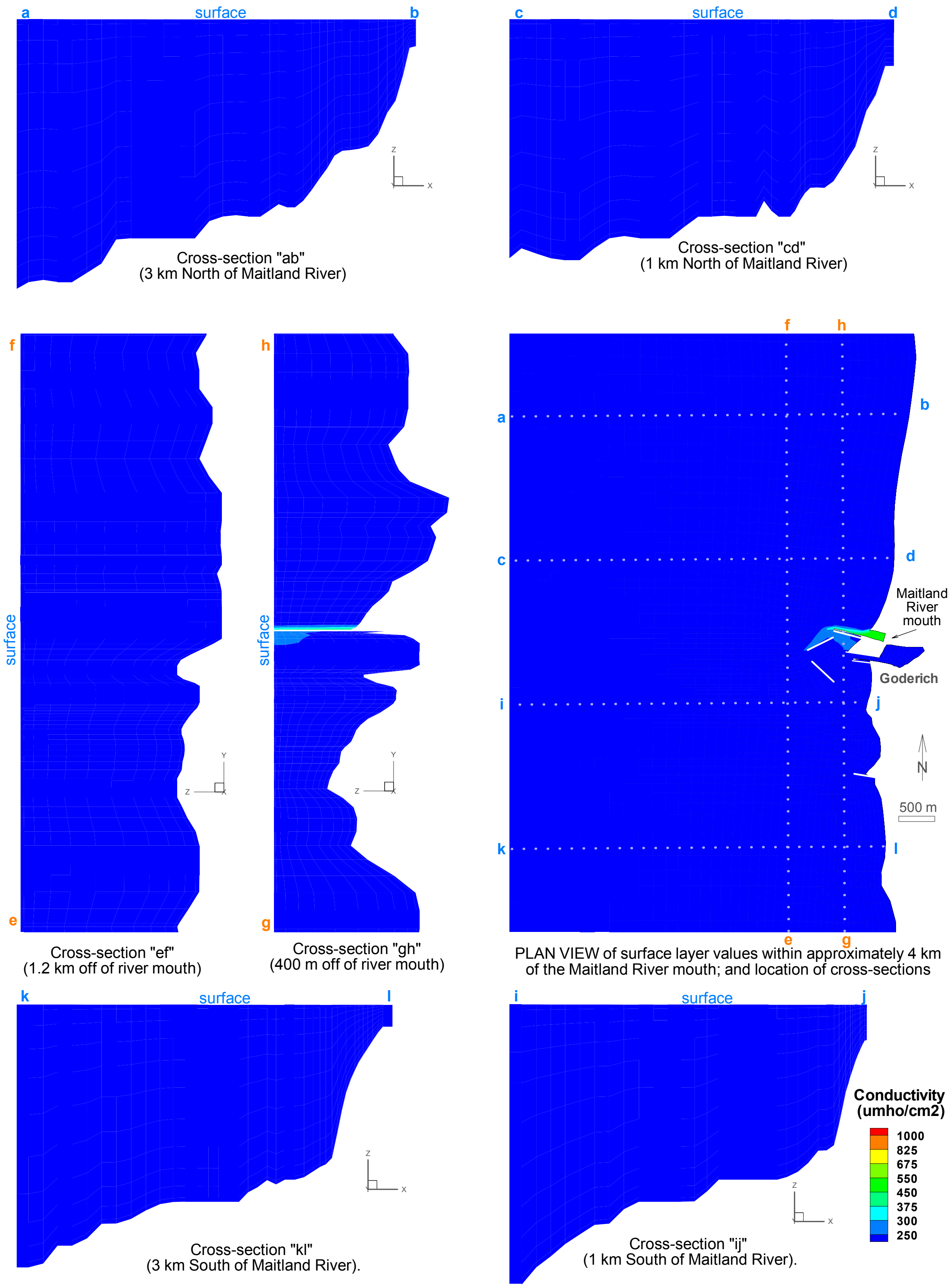
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2C(c) Conductivity, (plan view and 6 cross-sections), at 00 hours on July 22, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2C(d) Conductivity, (plan view and 6 cross-sections), at 00 hours on July 23, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

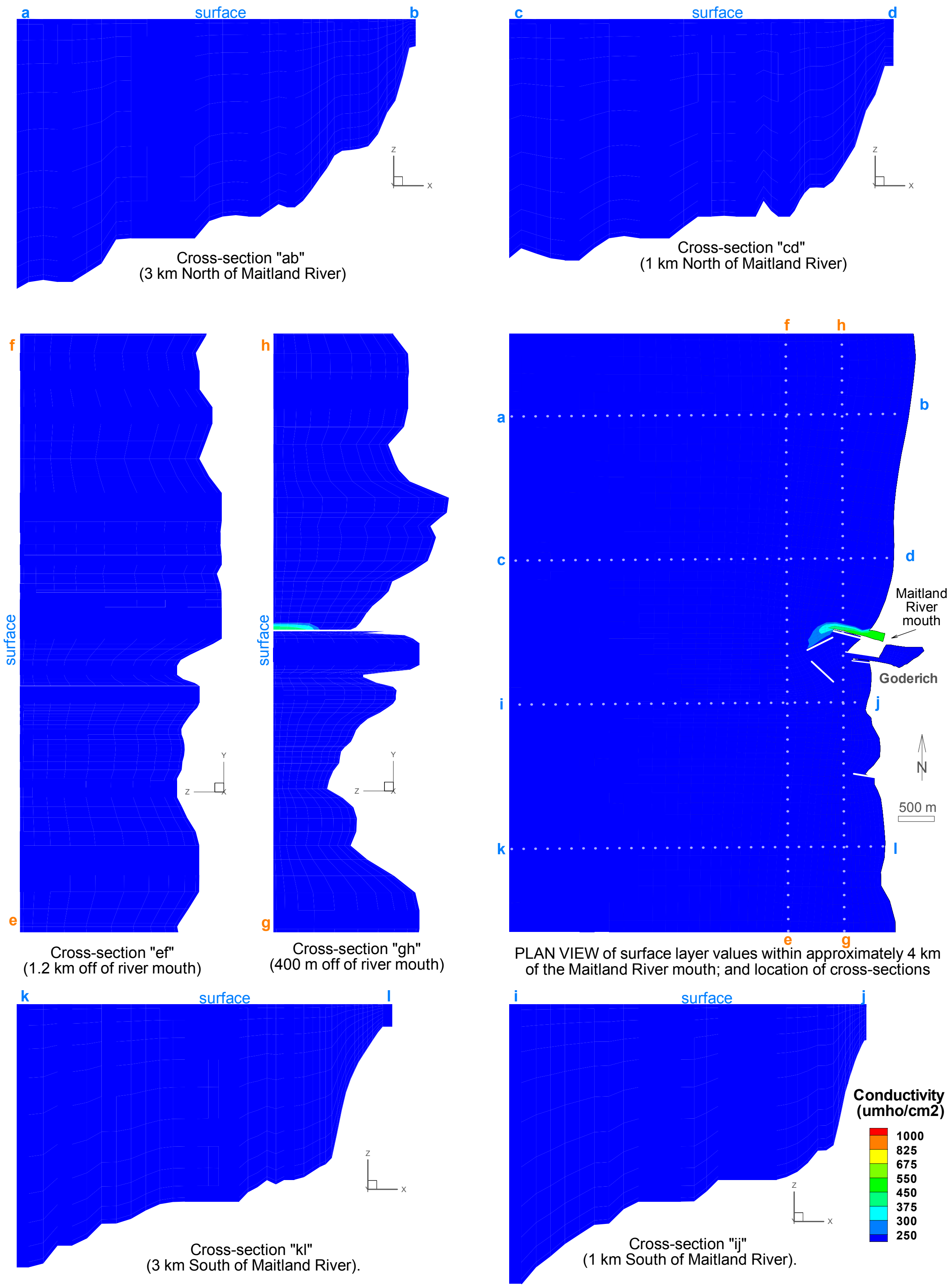


Figure 5.2C(e) Conductivity, (plan view and 6 cross-sections), at 00 hours on July 24, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

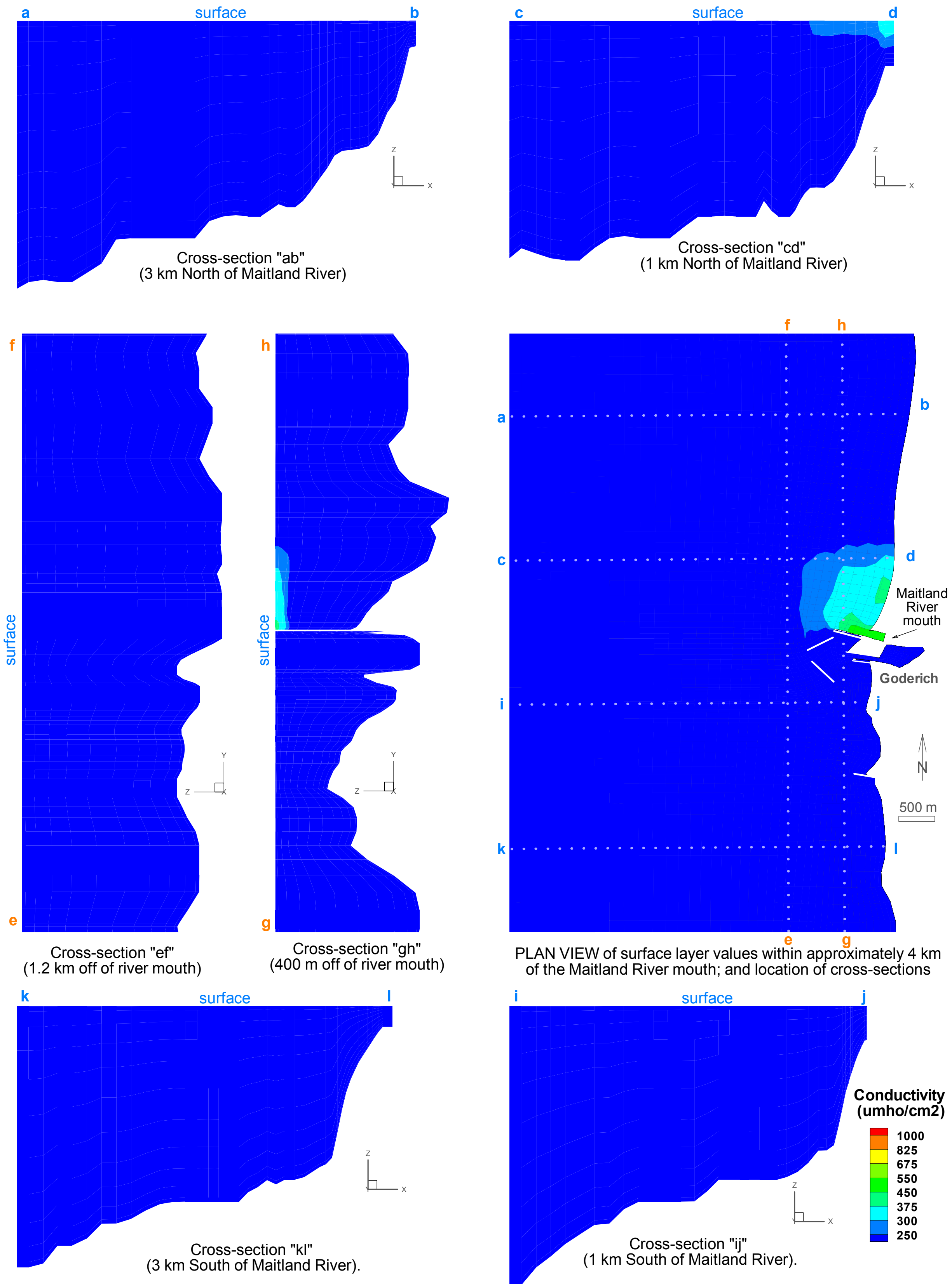


Figure 5.2C(f) **Conductivity, (plan view and 6 cross-sections), at 00 hours on July 25, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

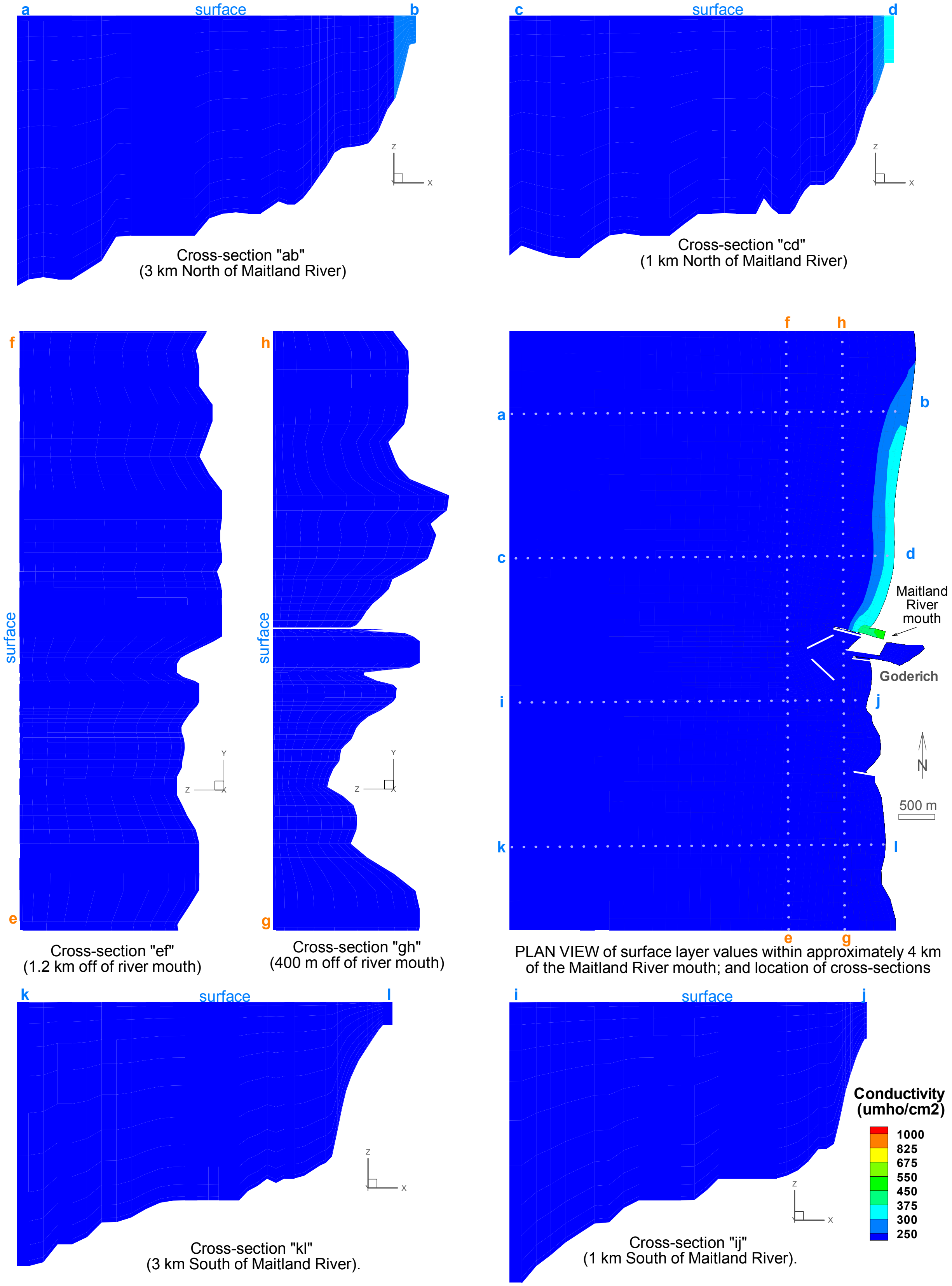


Figure 5.2C(g) Conductivity, (plan view and 6 cross-sections), at 00 hours on July 26, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

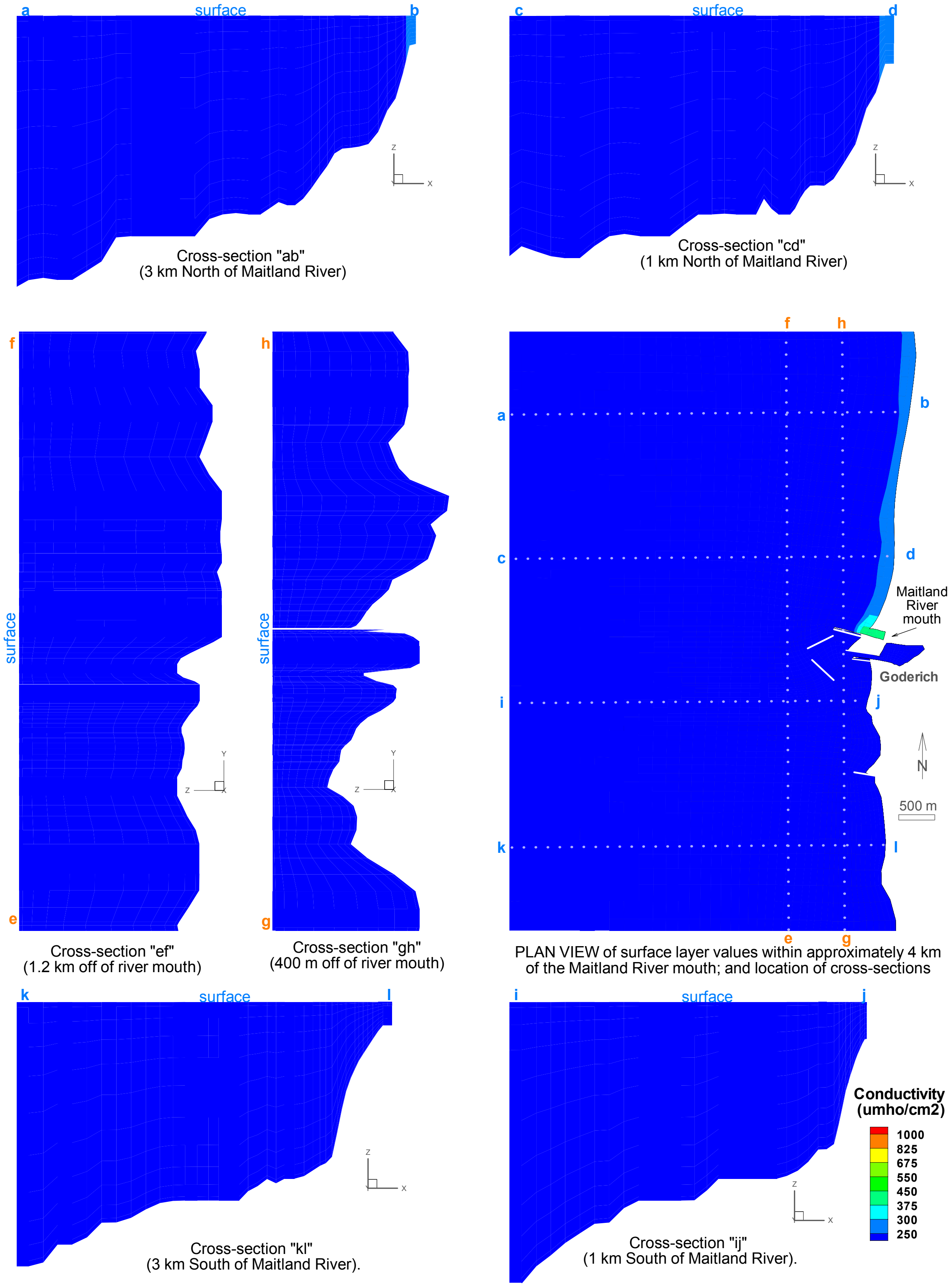


Figure 5.2C(h) Conductivity, (plan view and 6 cross-sections), at 00 hours on July 27, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

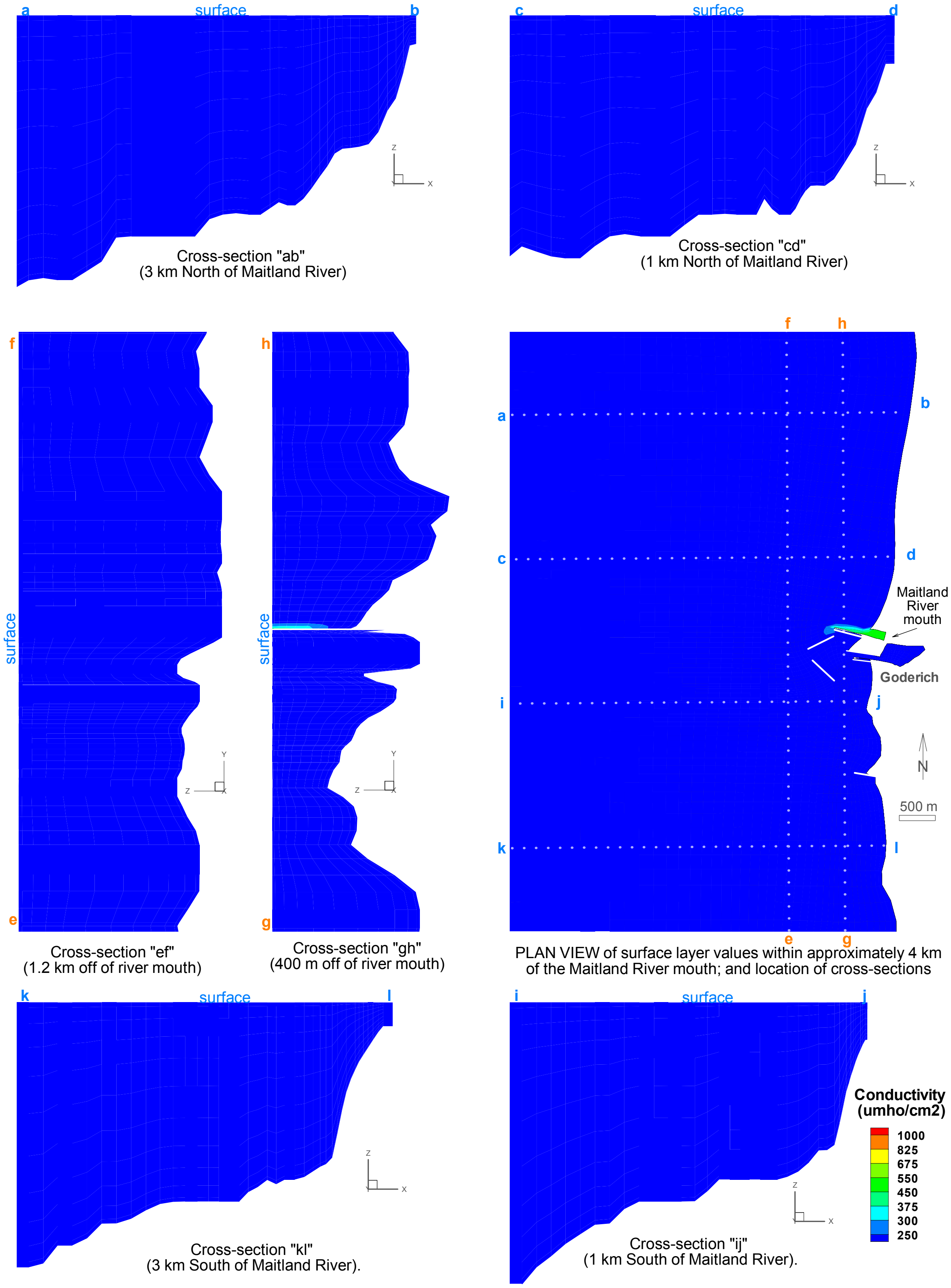
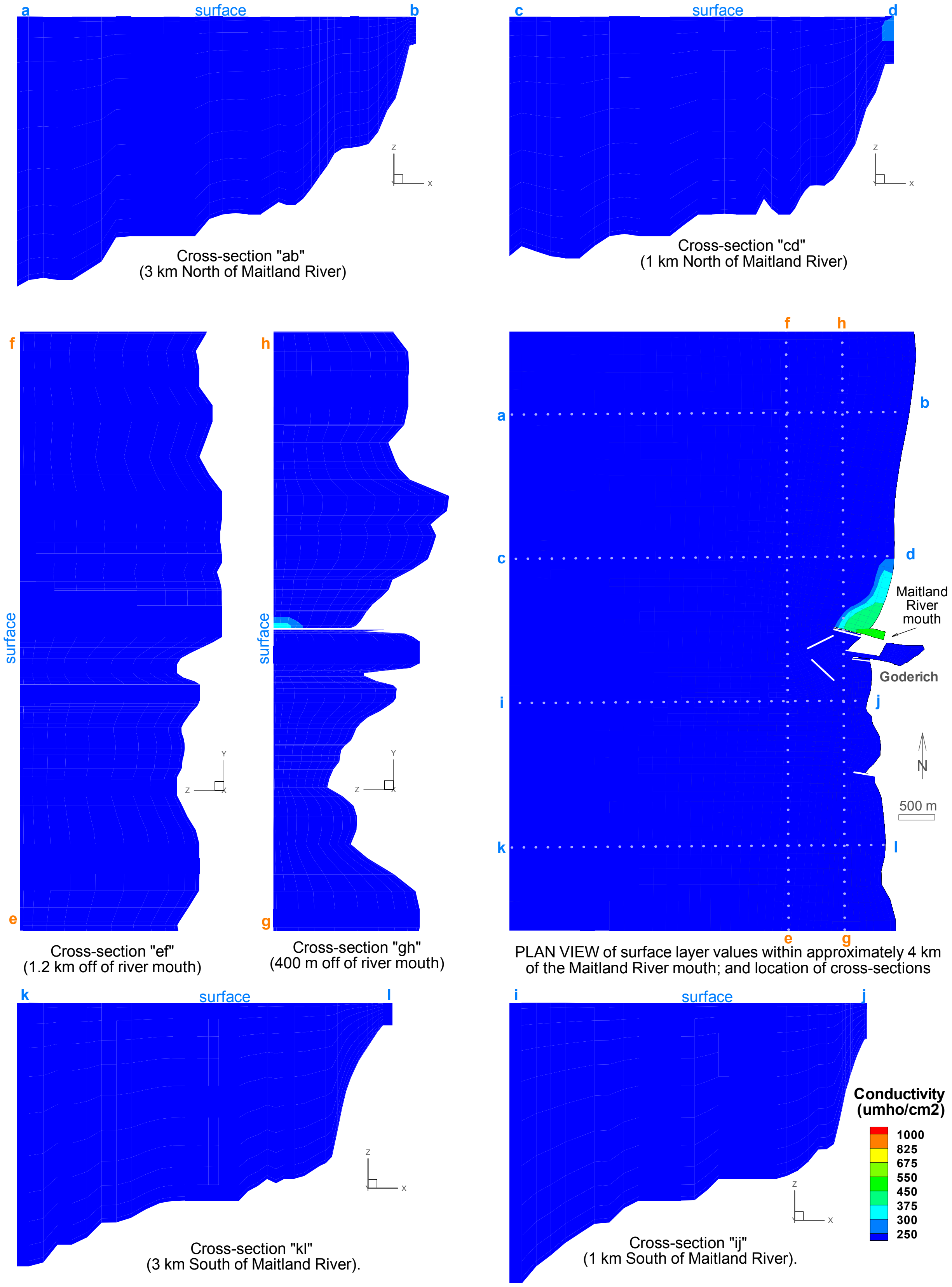


Figure 5.2C(i) Conductivity, (plan view and 6 cross-sections), at 00 hours on July 28, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab" (3 km North of Maitland River)

Cross-section "cd" (1 km North of Maitland River)

Cross-section "ef" (1.2 km off of river mouth)

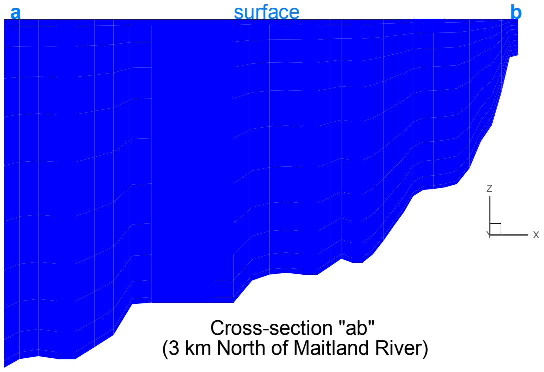
Cross-section "gh" (400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

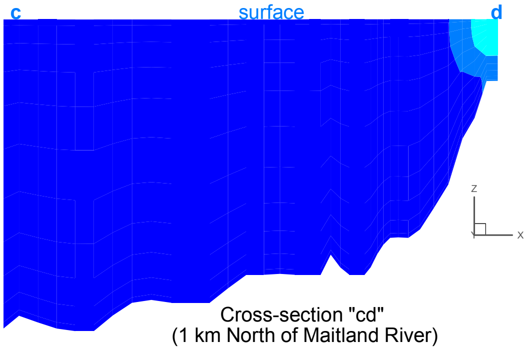
Cross-section "kl" (3 km South of Maitland River).

Cross-section "ij" (1 km South of Maitland River).

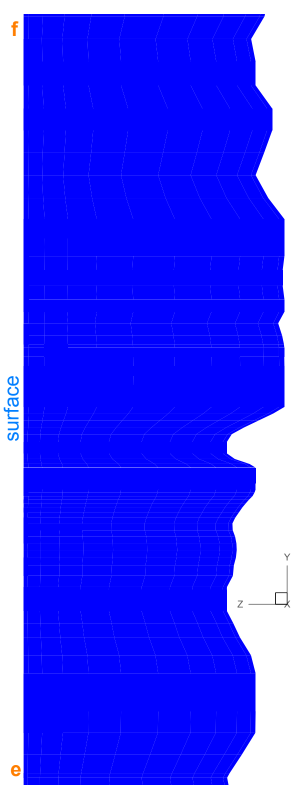
Figure 5.2C(j) Conductivity, (plan view and 6 cross-sections), at 00 hours on July 29, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



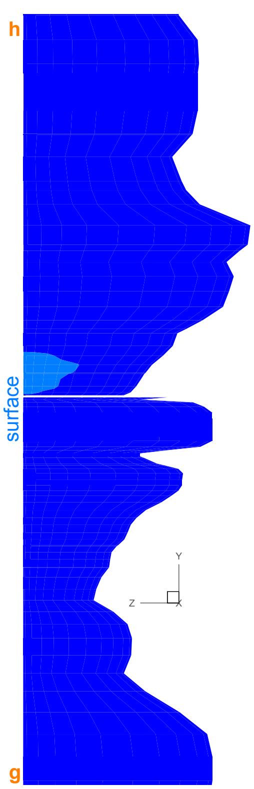
Cross-section "ab"
(3 km North of Maitland River)



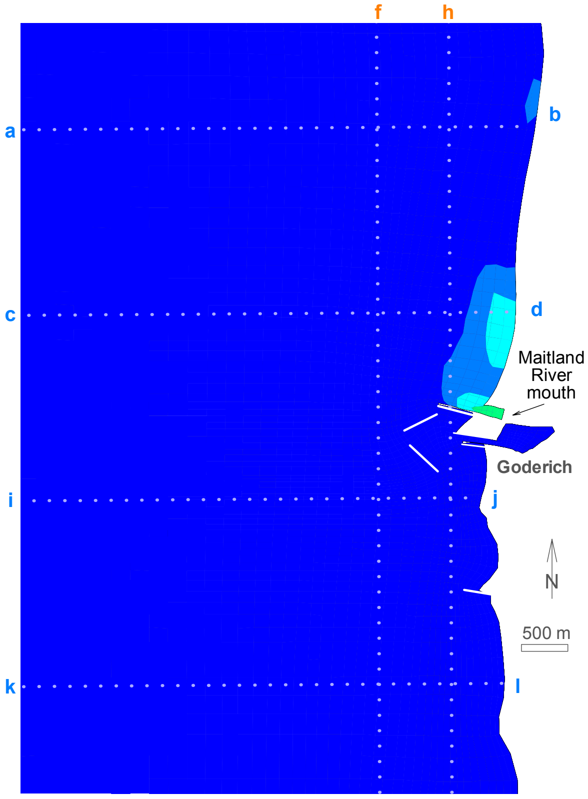
Cross-section "cd"
(1 km North of Maitland River)



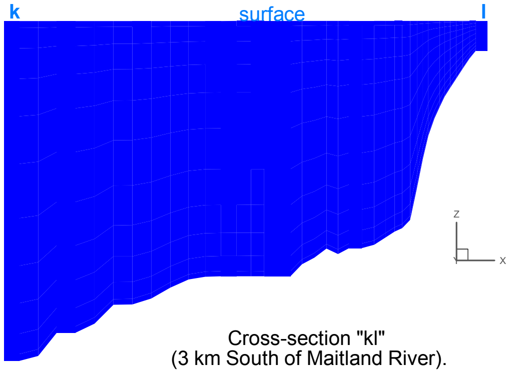
Cross-section "ef"
(1.2 km off of river mouth)



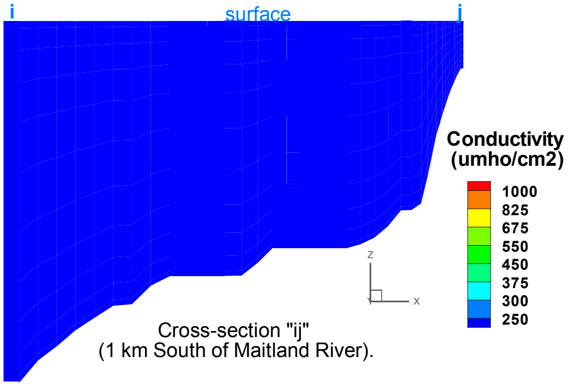
Cross-section "gh"
(400 m off of river mouth)



PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

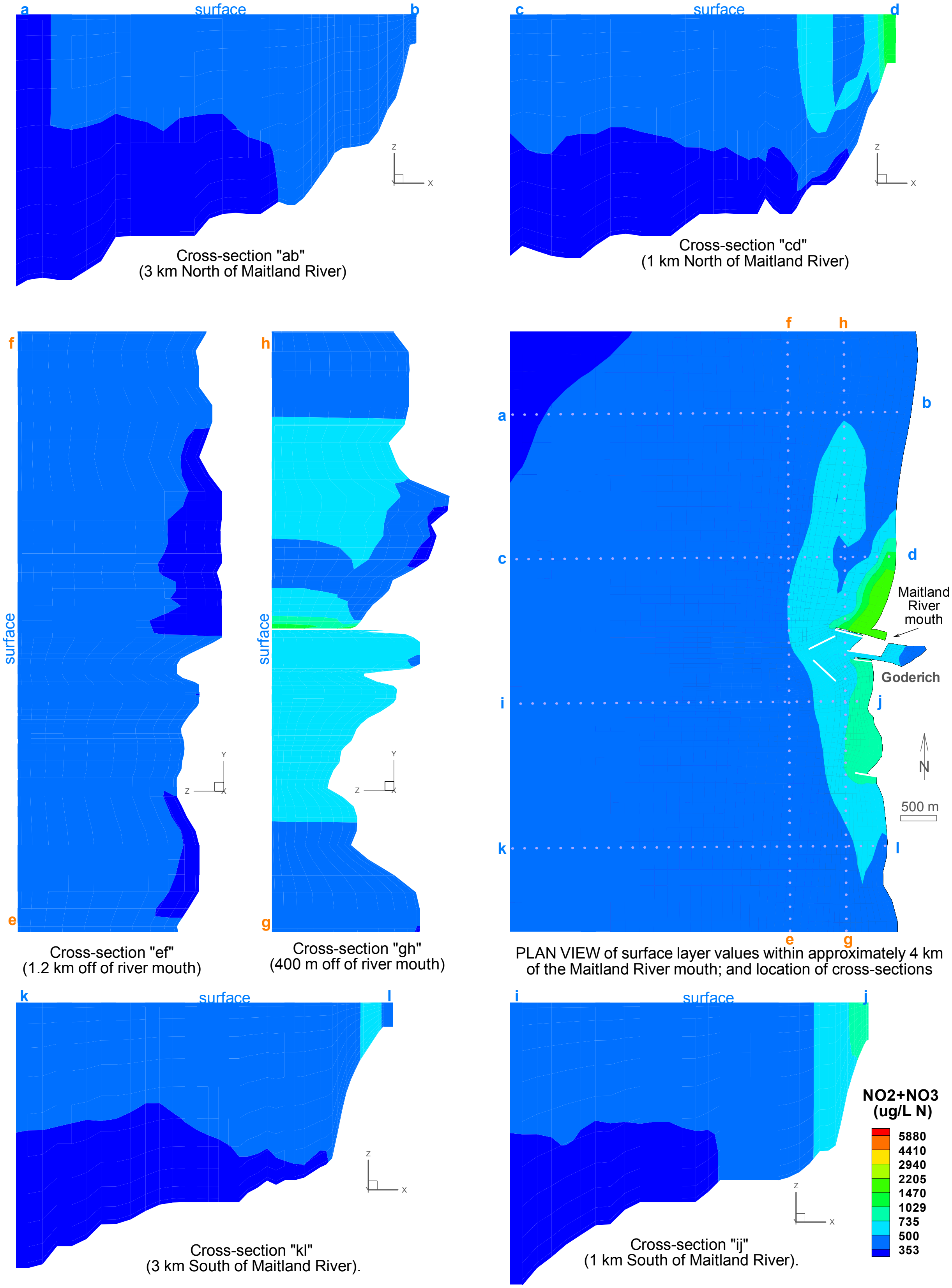


Cross-section "kl"
(3 km South of Maitland River).



Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2C(k) Conductivity, (plan view and 6 cross-sections), at 00 hours on July 30, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

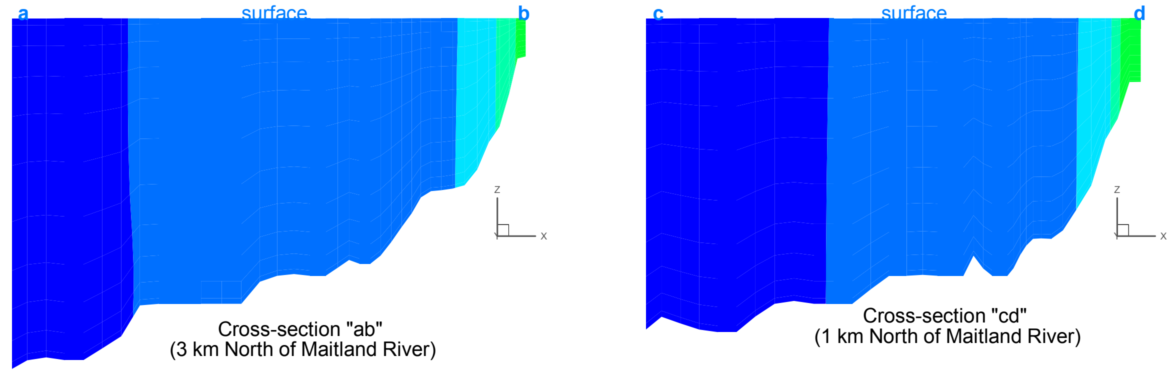
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

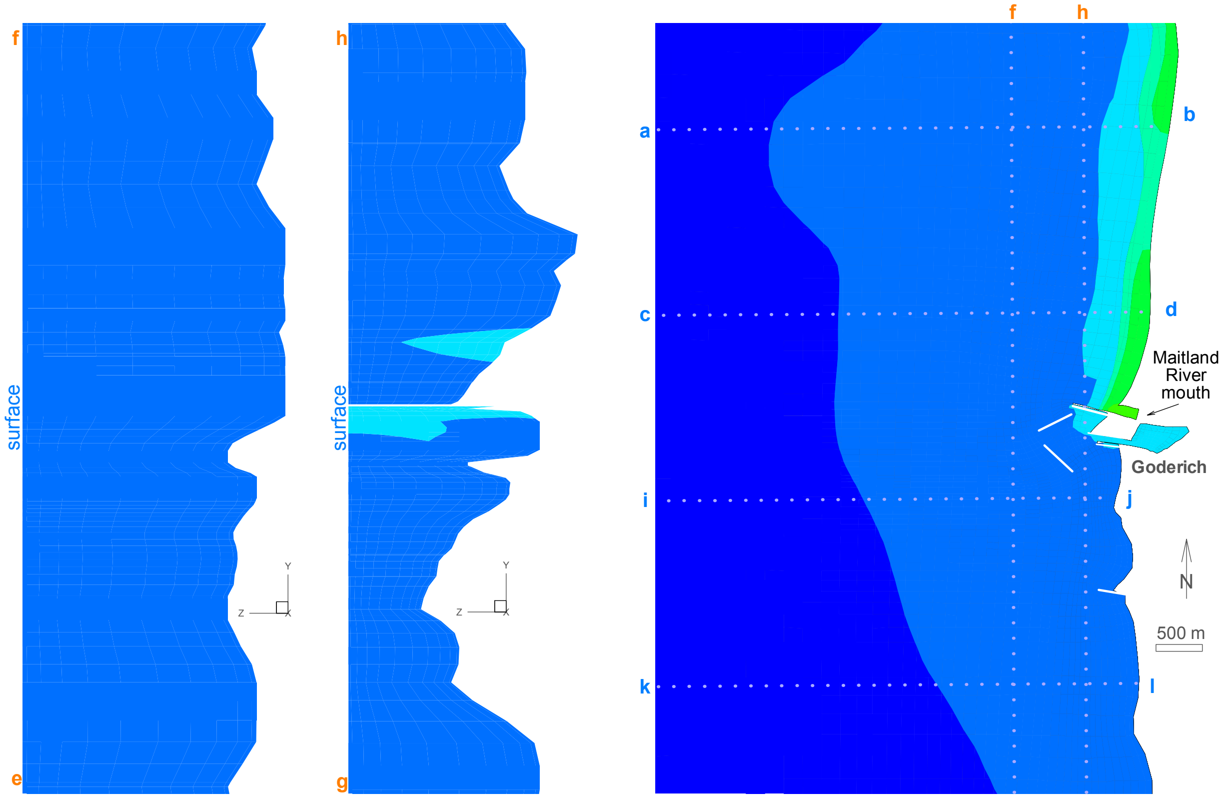
Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2N(a) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on July 20, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

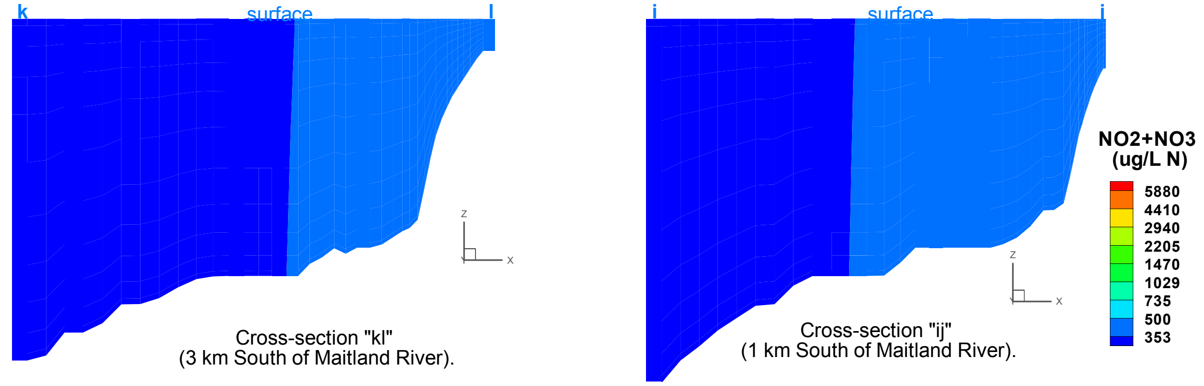
Cross-section "cd"
(1 km North of Maitland River)



Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

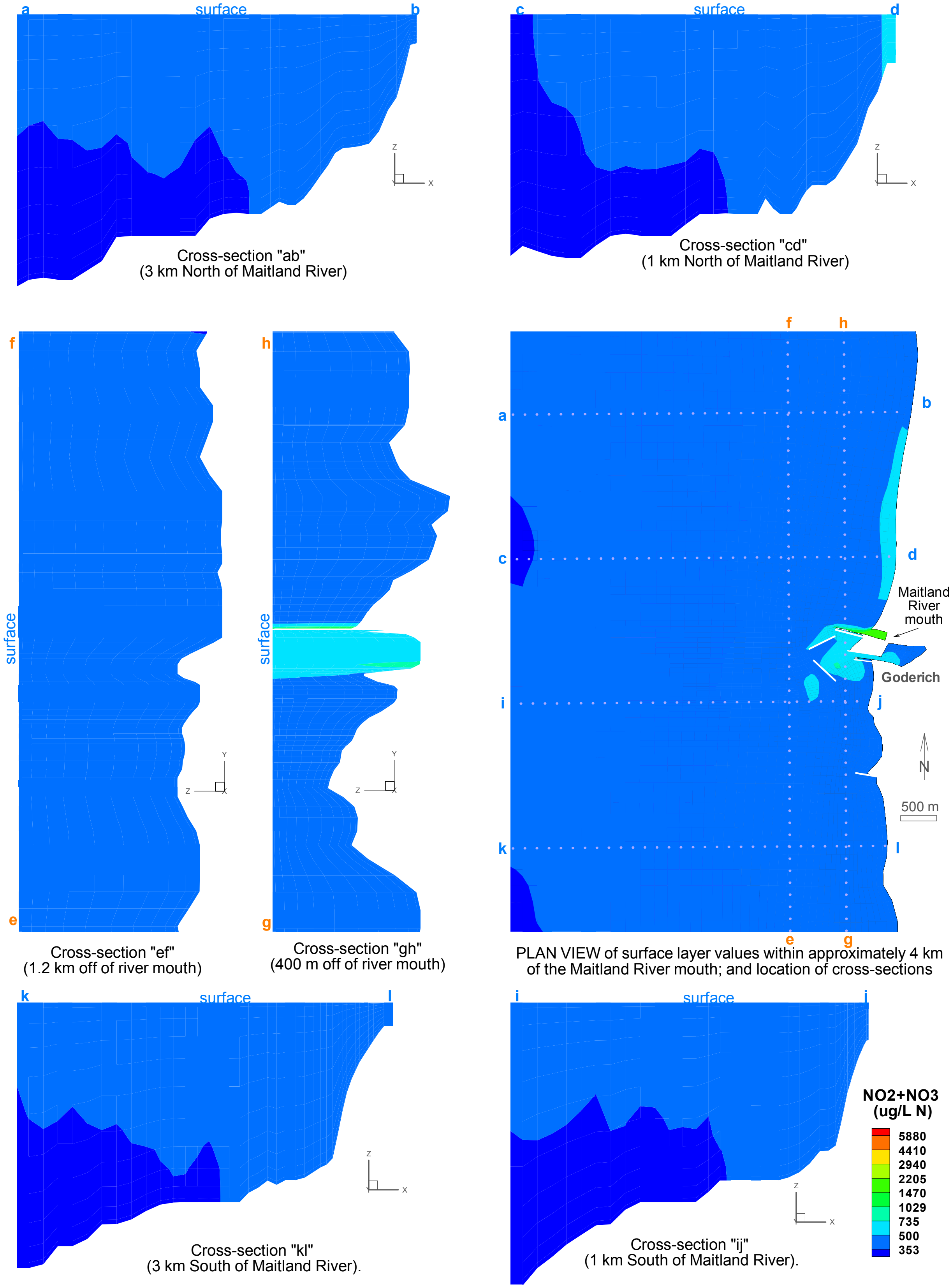
PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections



Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2N(b) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on July 21, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

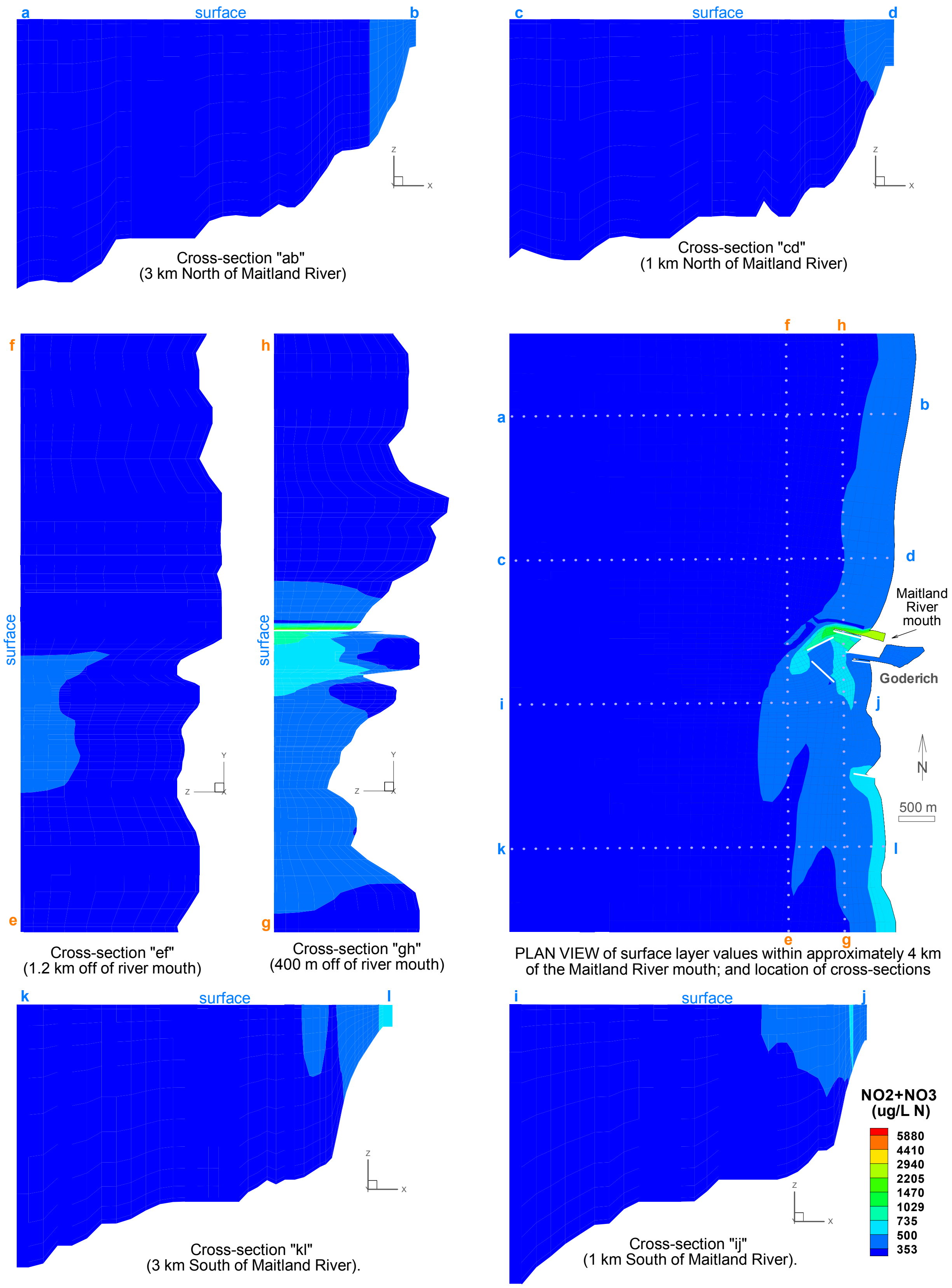
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2N(c) **NO2+NO3, (plan view and 6 cross-sections), at 00 hours on July 22, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

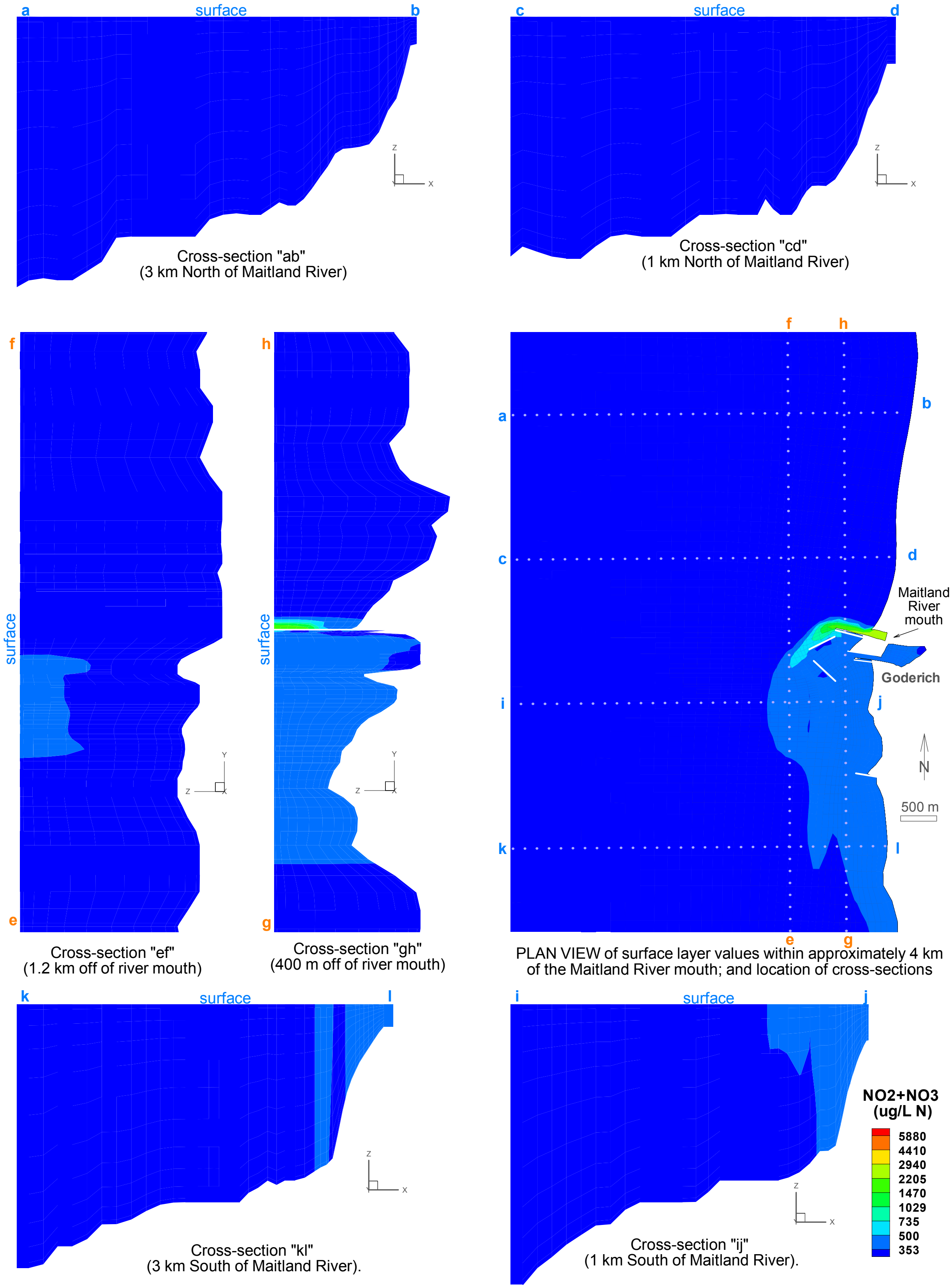
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2N(d) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on July 23, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].


Cross-section "ab" (3 km North of Maitland River)

Cross-section "cd" (1 km North of Maitland River)

Cross-section "ef" (1.2 km off of river mouth)

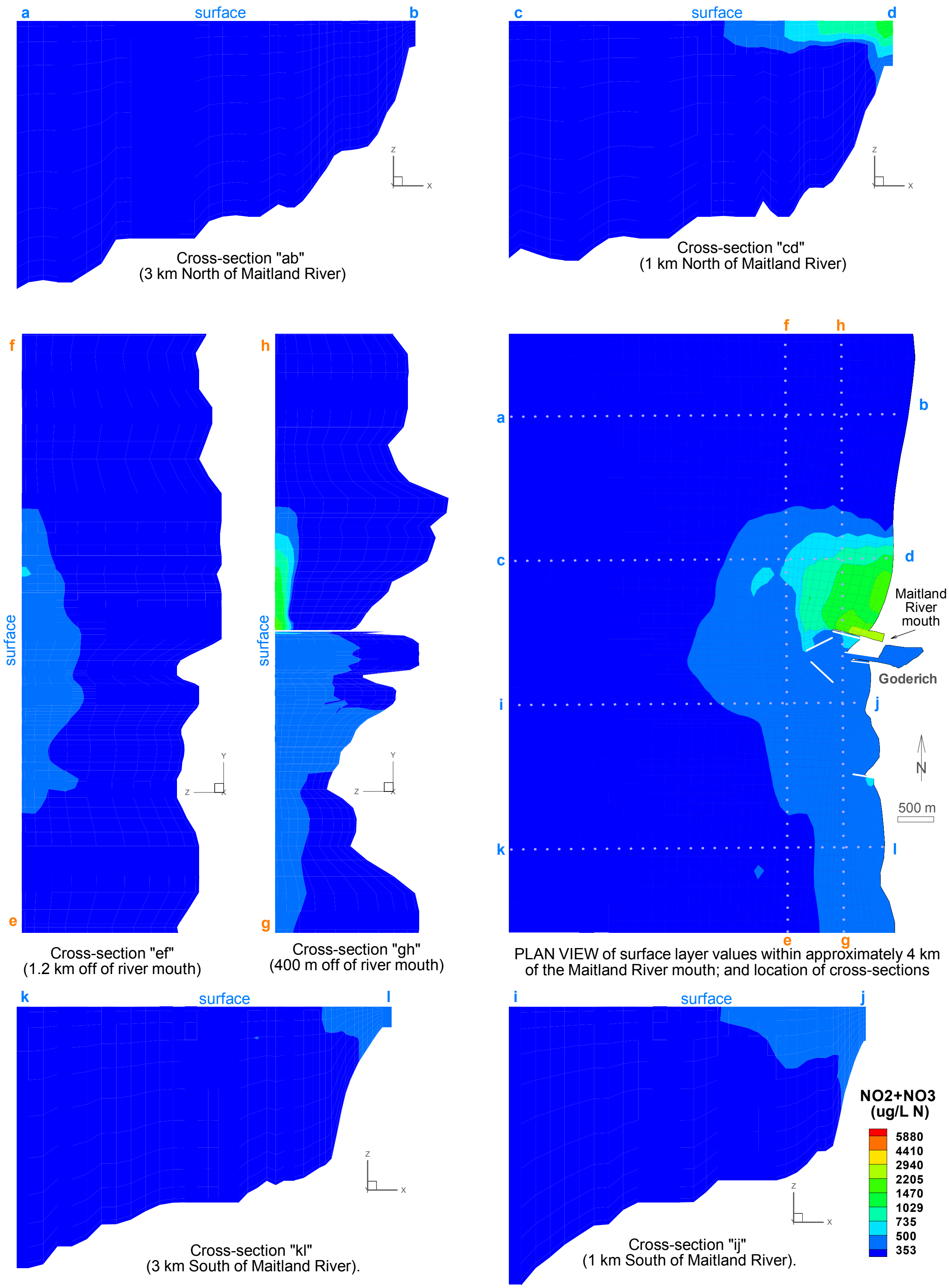
Cross-section "gh" (400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl" (3 km South of Maitland River).

Cross-section "ij" (1 km South of Maitland River).

Figure 5.2N(e) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on July 24, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

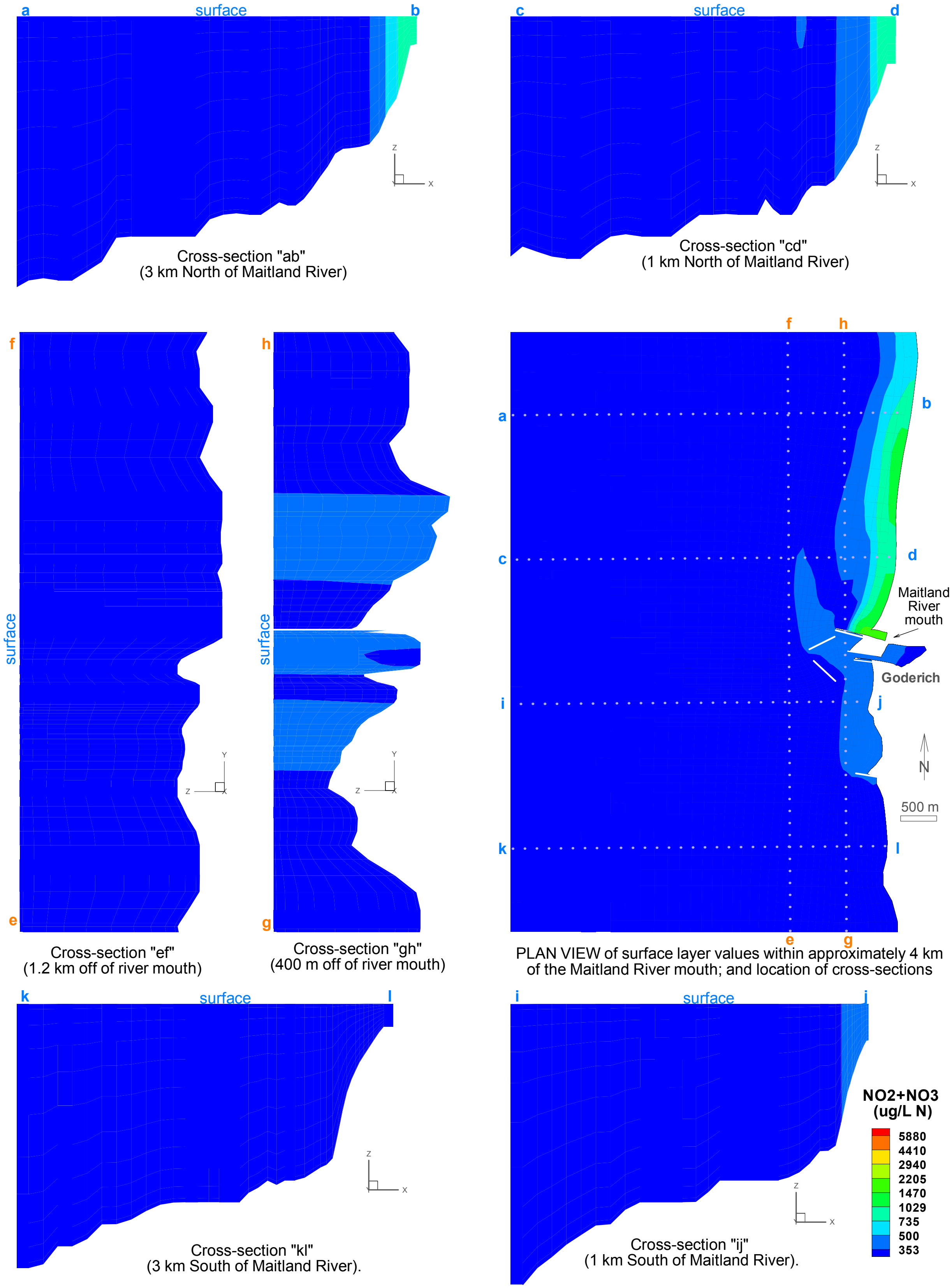
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2N(f) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on July 25, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2N(g) **NO2+NO3, (plan view and 6 cross-sections), at 00 hours on July 26, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

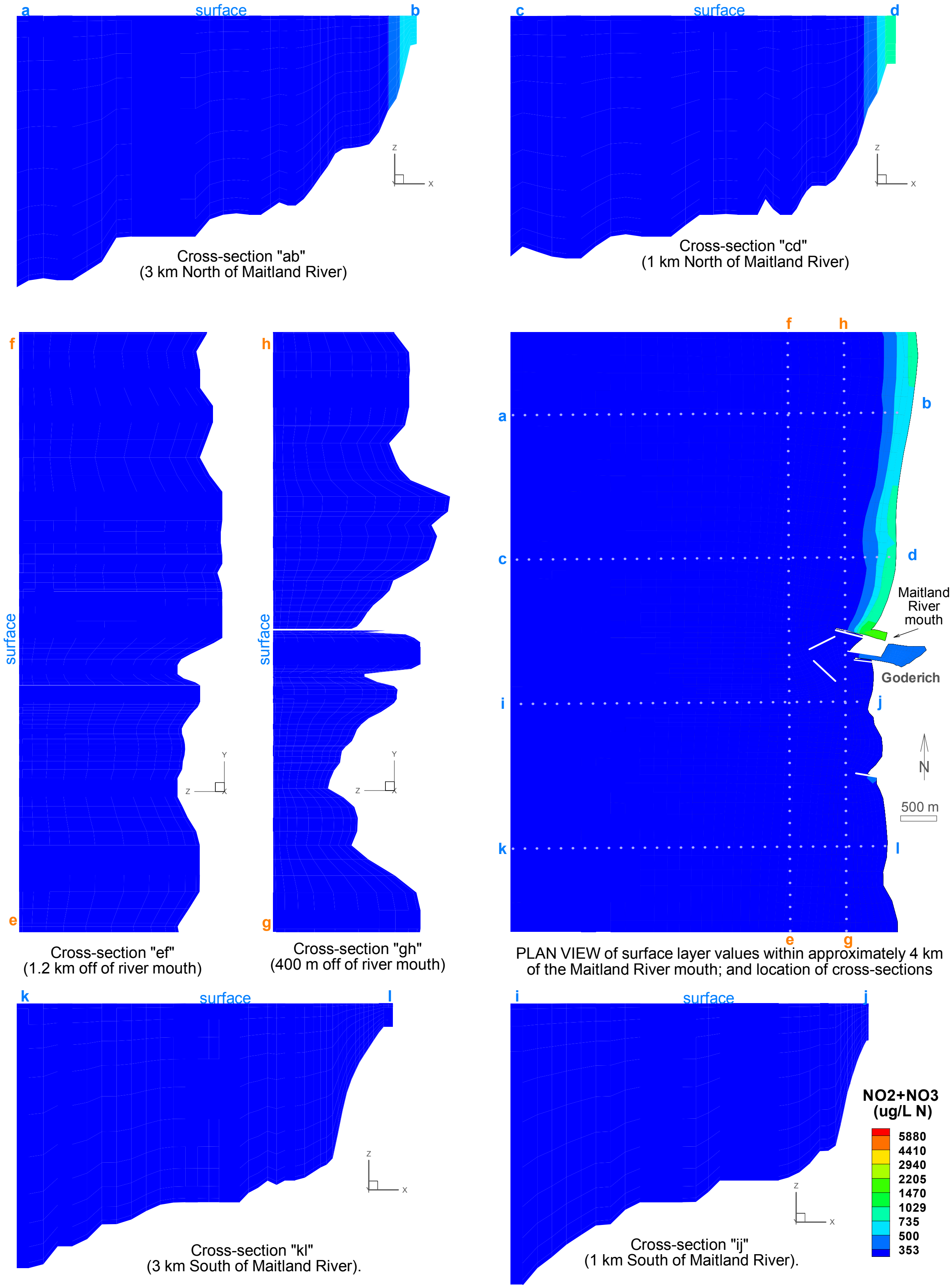
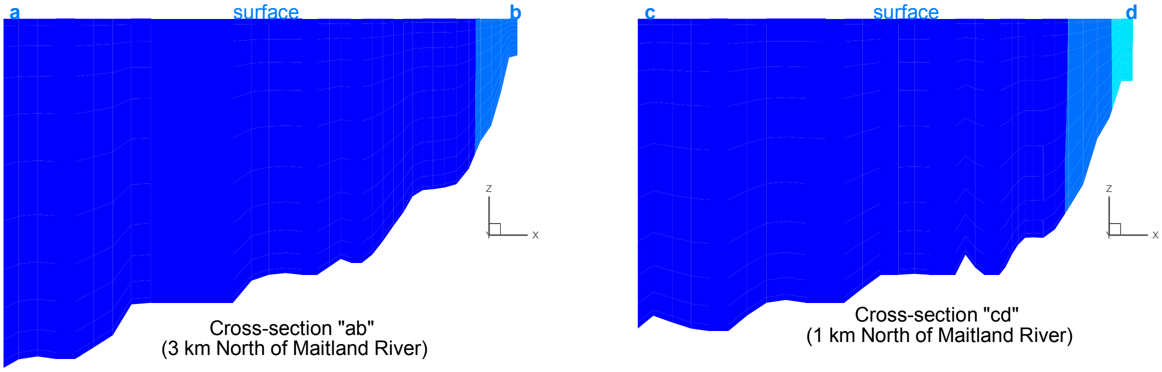
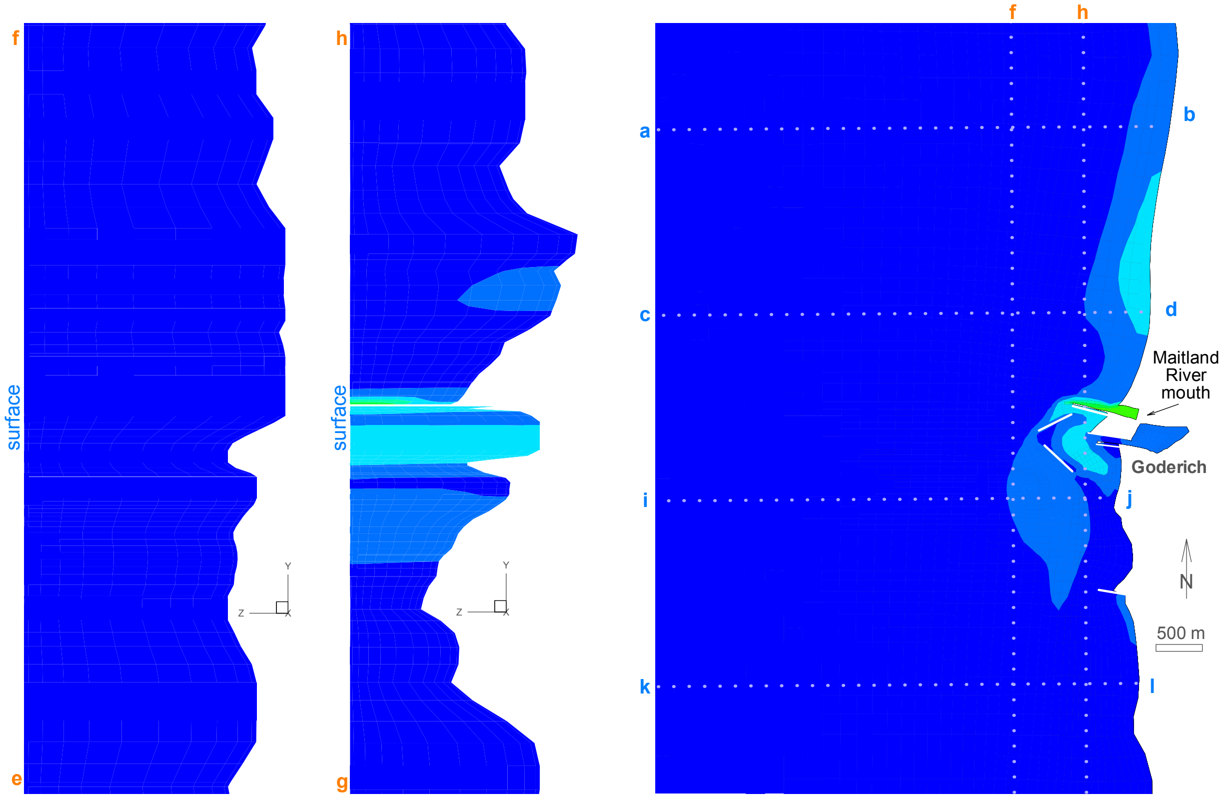


Figure 5.2N(h) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on July 27, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

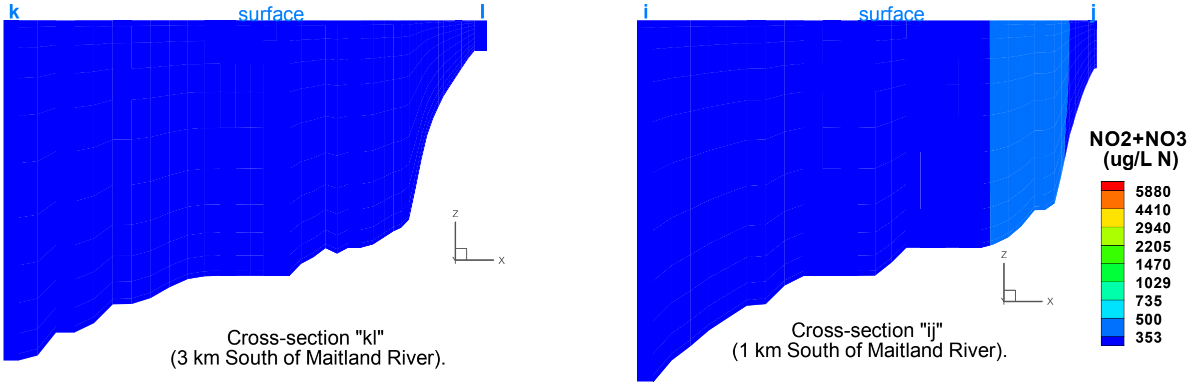
Cross-section "cd"
(1 km North of Maitland River)



Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections



Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.2N(i) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on July 28, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

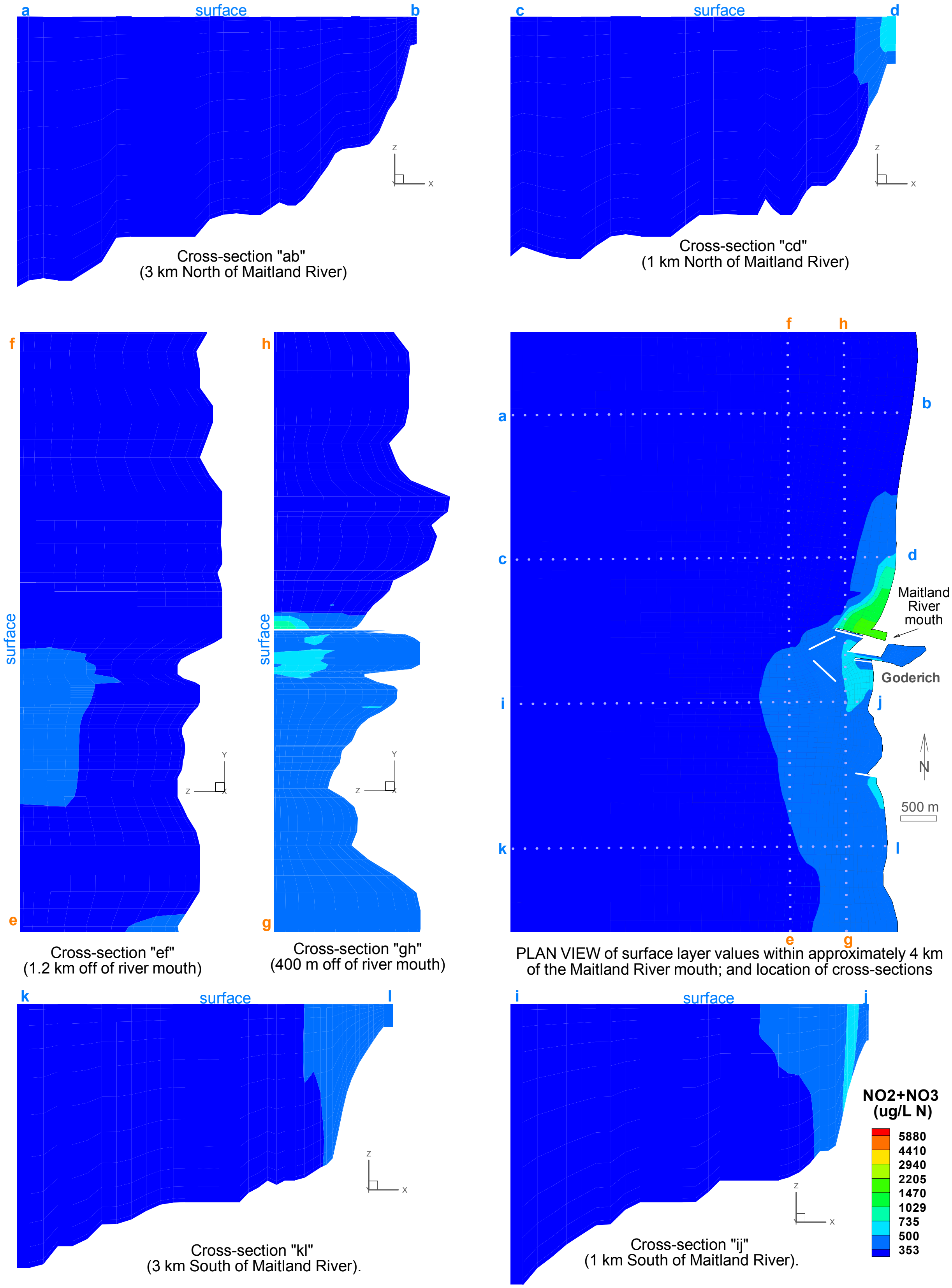


Figure 5.2N(j) **NO2+NO3, (plan view and 6 cross-sections), at 00 hours on July 29, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

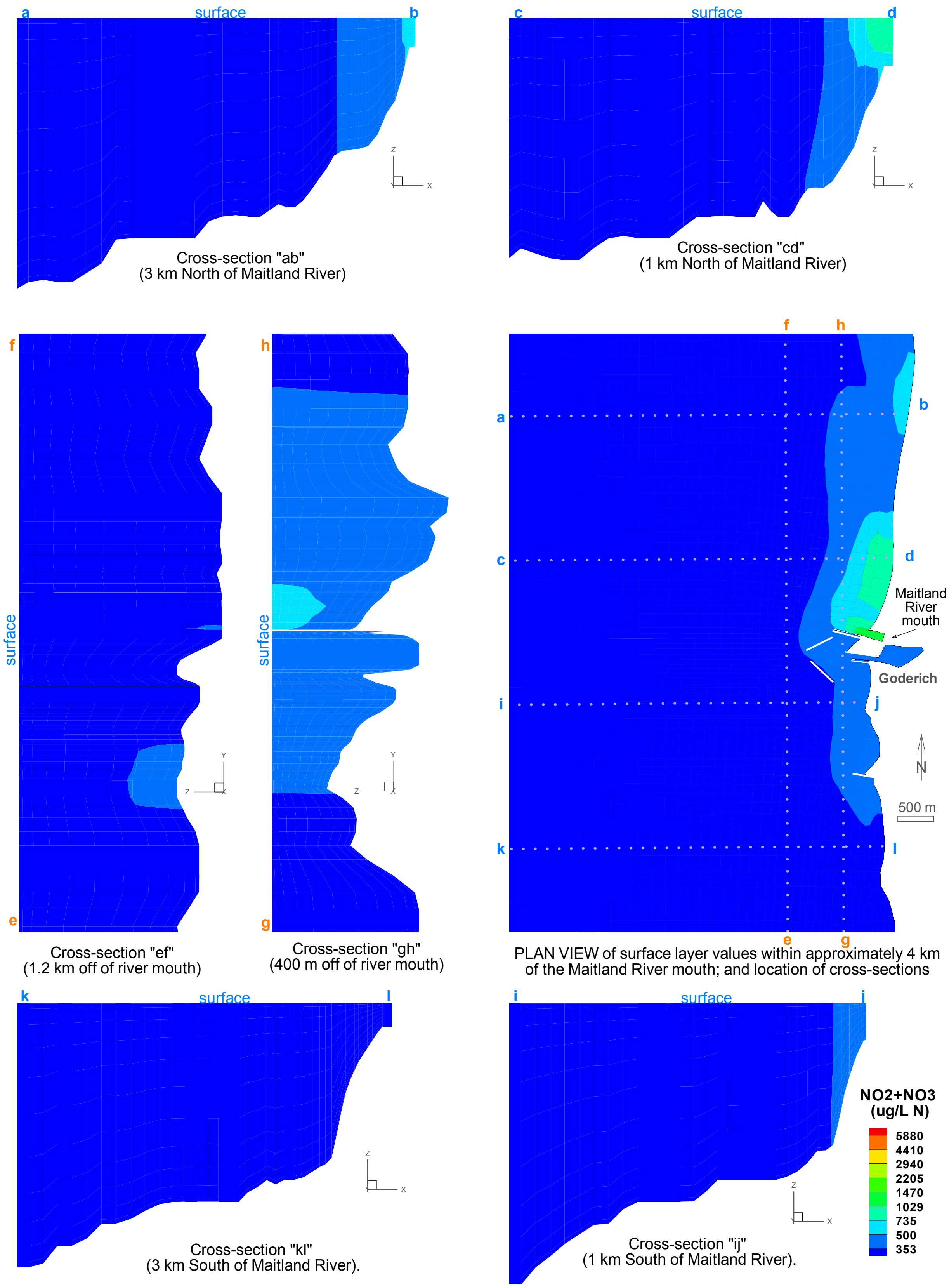


Figure 5.2N(k) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on July 30, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

Event 3 Upwelling event – with Maitland River (summer) storm runoff (August 2 to 15)

Parameters *(in presentation order)*:	Figure series:
Water velocities	**5.3U (a) to (n)**
Water temperatures	**5.3T (a) to (n)**
Conductivity	**5.3C (a) to (n)**
NO2+NO3	**5.3N (a) to (n)**

Where: (a) to (n) represents the following dates-times:
(a) August 2 @ 00:00 hrs
(b) August 3 @ 00:00 hrs
(c) August 4 @ 00:00 hrs
(d) August 5 @ 00:00 hrs
(e) August 6 @ 00:00 hrs
(f) August 7 @ 00:00 hrs
(g) August 8 @ 00:00 hrs
(h) August 9 @ 00:00 hrs
(i) August 10 @ 00:00 hrs
(j) August 11 @ 00:00 hrs
(k) August 12 @ 00:00 hrs
(l) August 13 @ 00:00 hrs
(m) August 14 @ 00:00 hrs
(n) August 15 @ 00:00 hrs

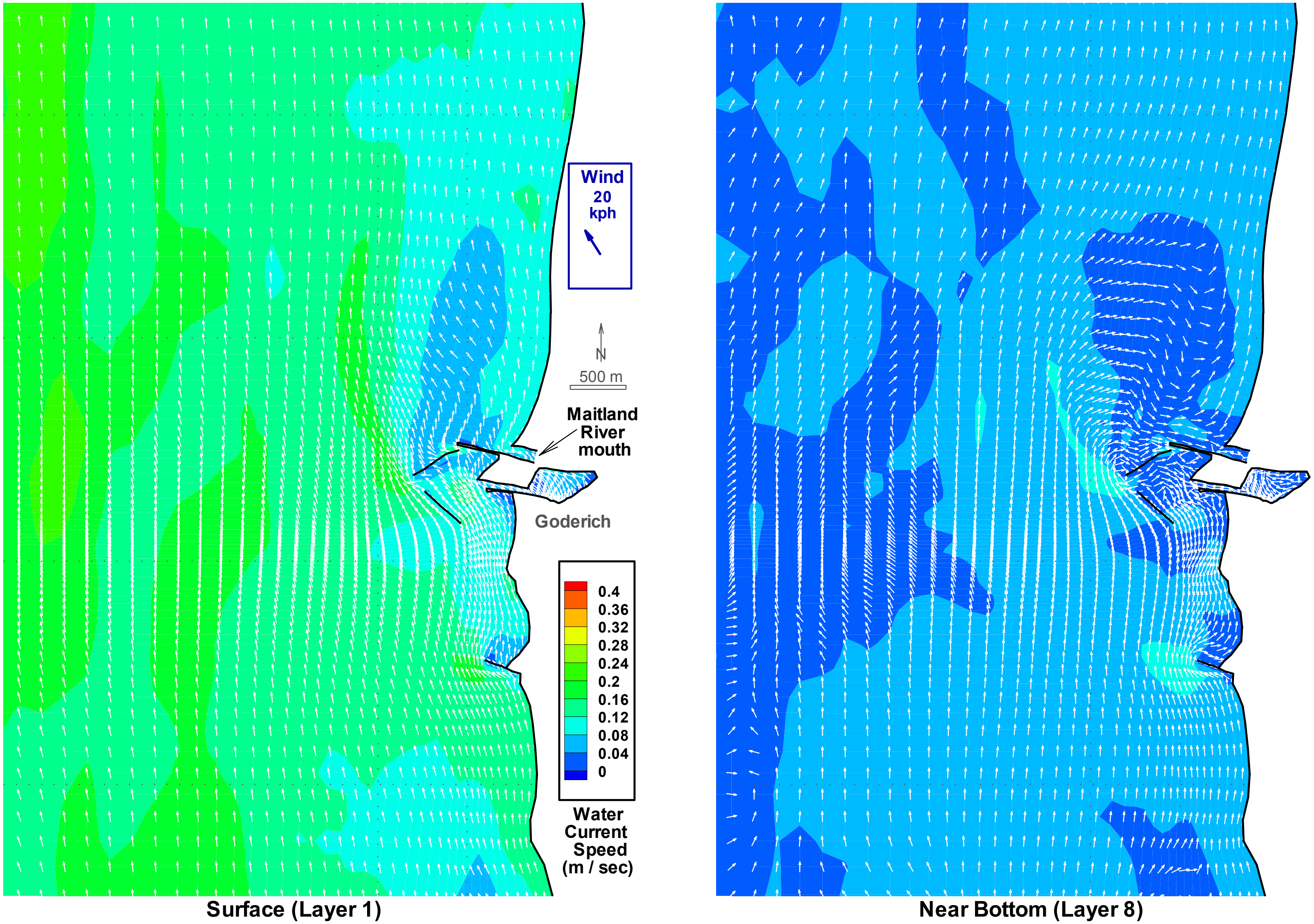


Figure 5.3U(a) Water current velocities at 00:00 hours on August 2, 2003; (directions indicated by arrows, speeds by contours).

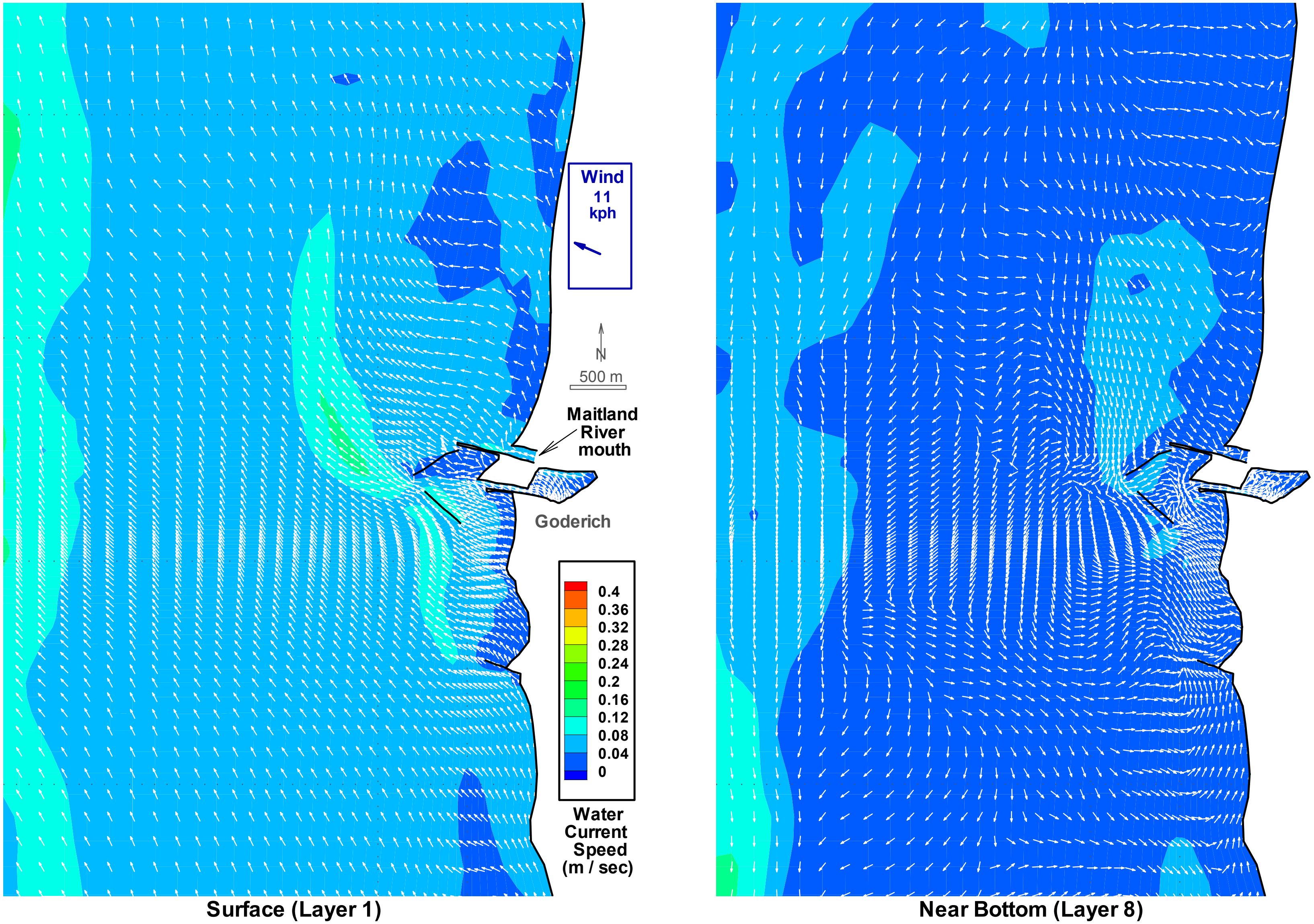


Figure 5.3U(b) Water current velocities at 00:00 hours on August 3, 2003; (directions indicated by arrows, speeds by contours).

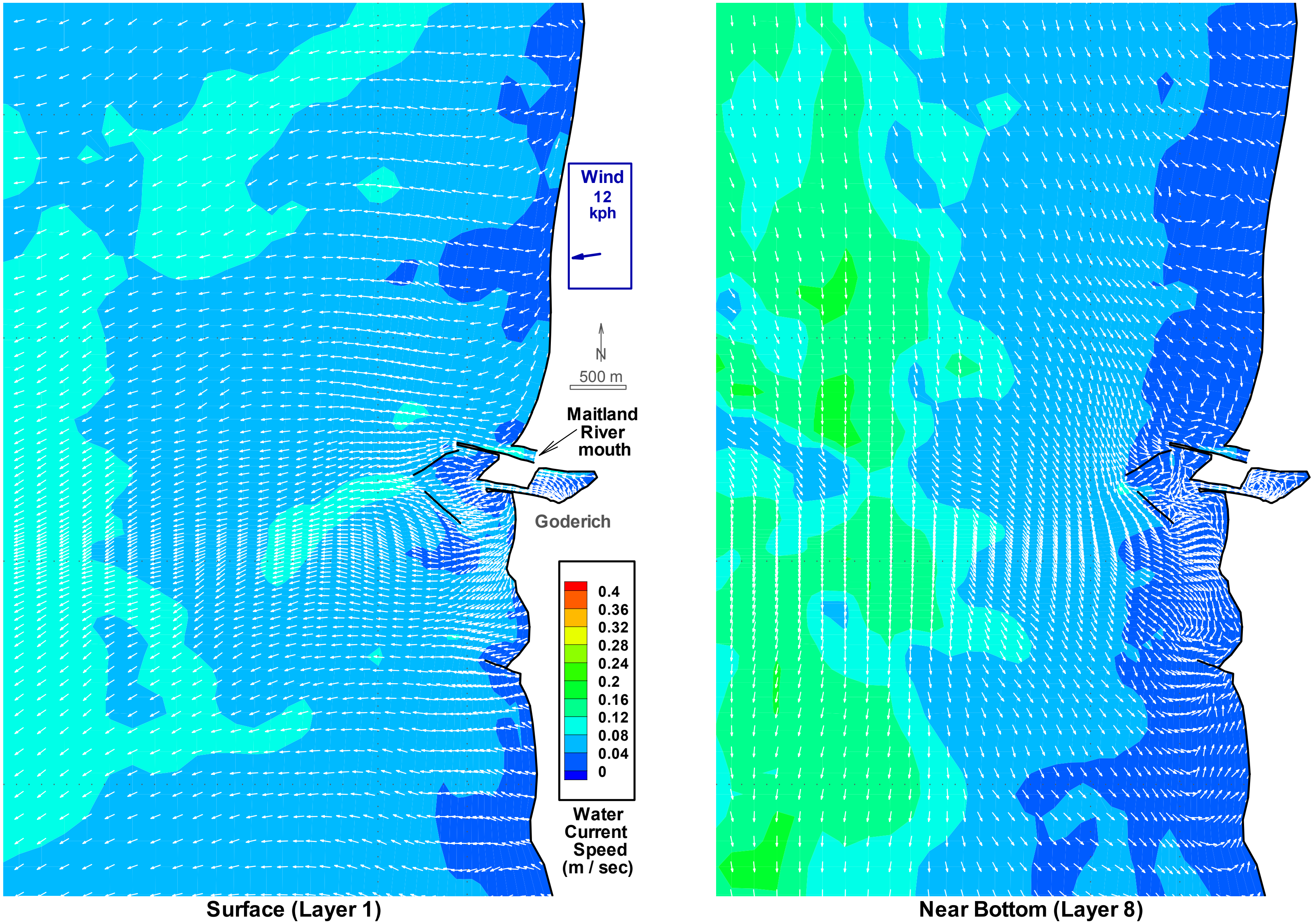


Figure 5.3U(c) Water current velocities at 00:00 hours on August 4, 2003; (directions indicated by arrows, speeds by contours).

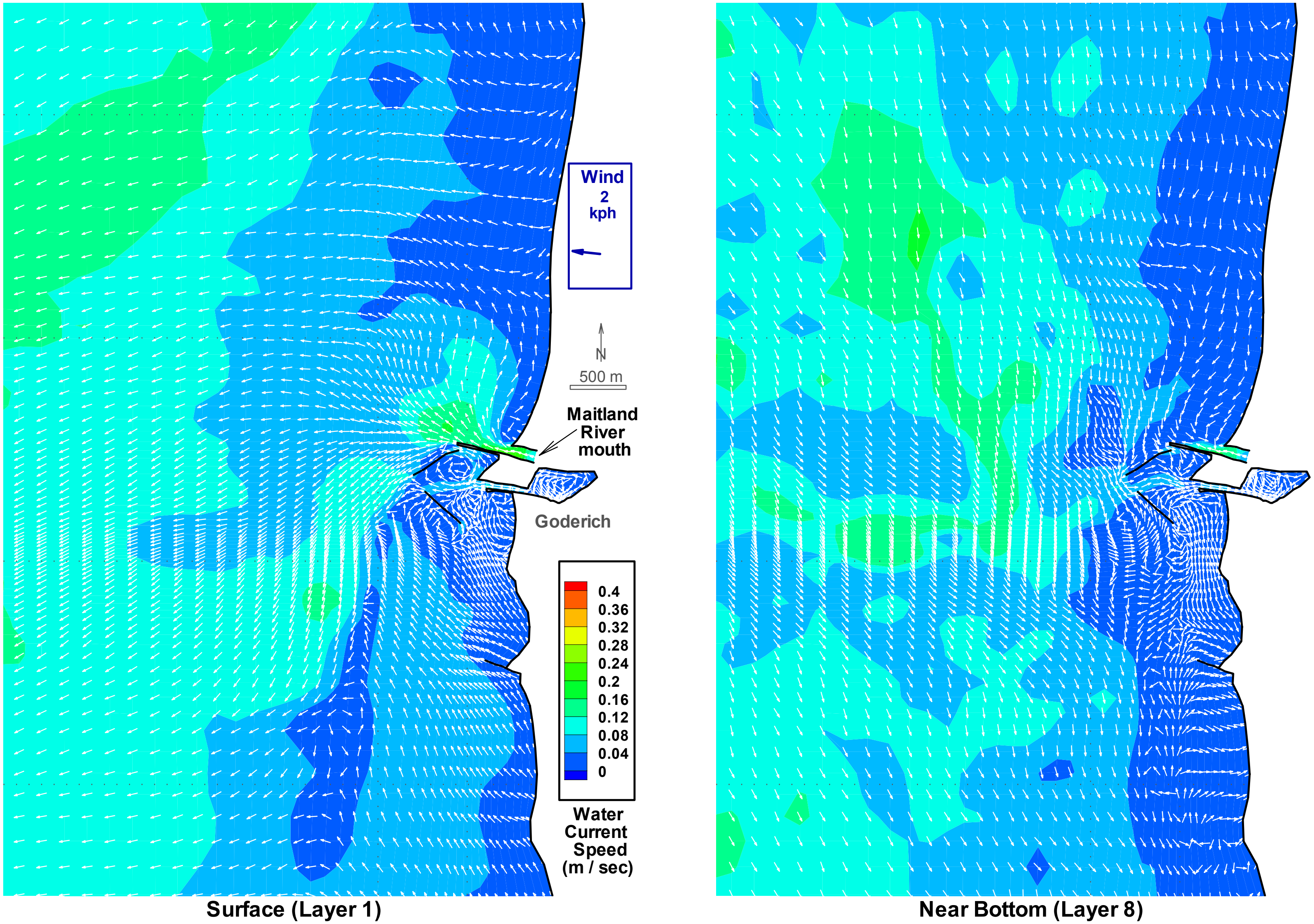


Figure 5.3U(d) Water current velocities at 00:00 hours on August 5, 2003; (directions indicated by arrows, speeds by contours).

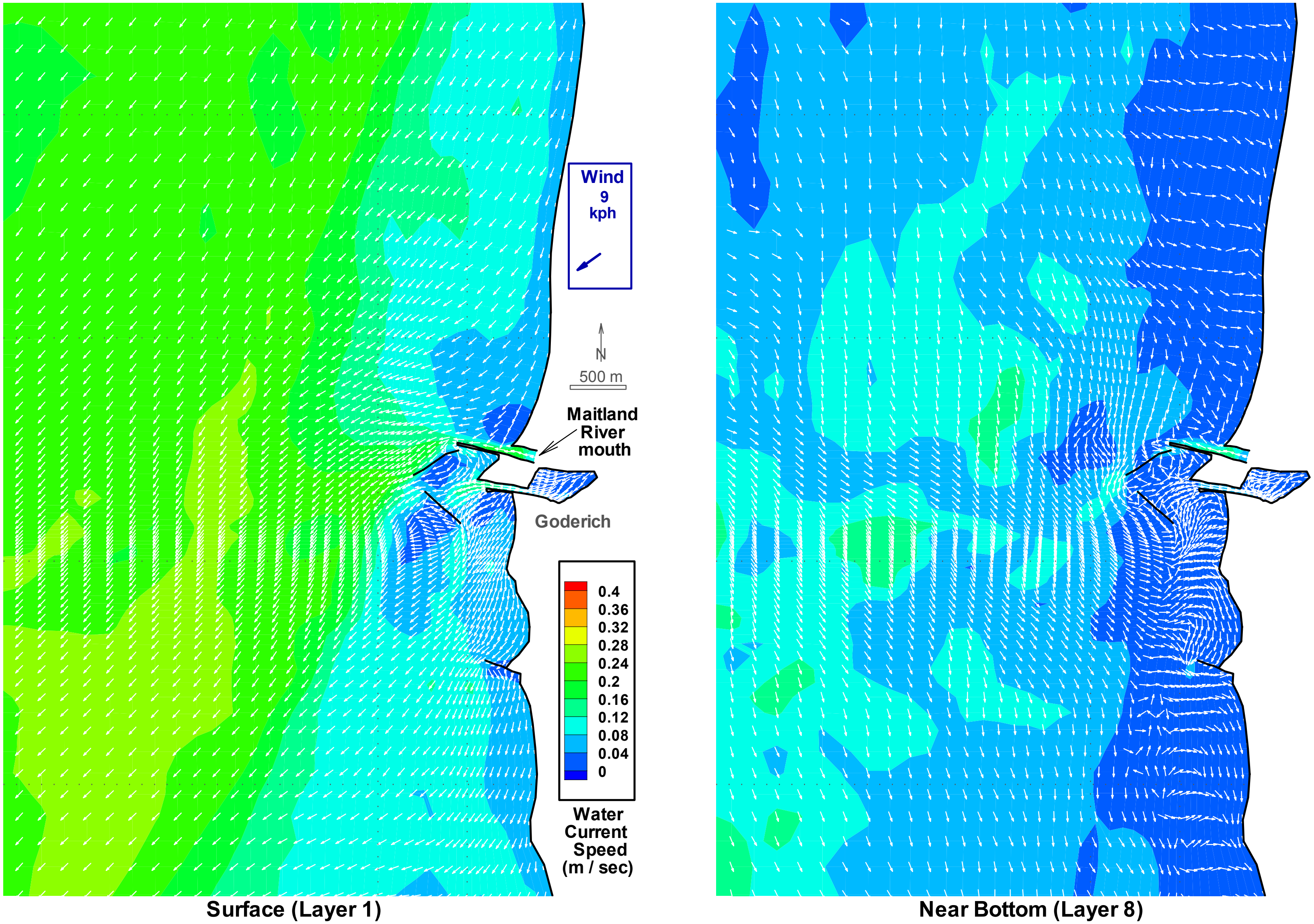


Figure 5.3U(e) Water current velocities at 00:00 hours on August 6, 2003; (directions indicated by arrows, speeds by contours).

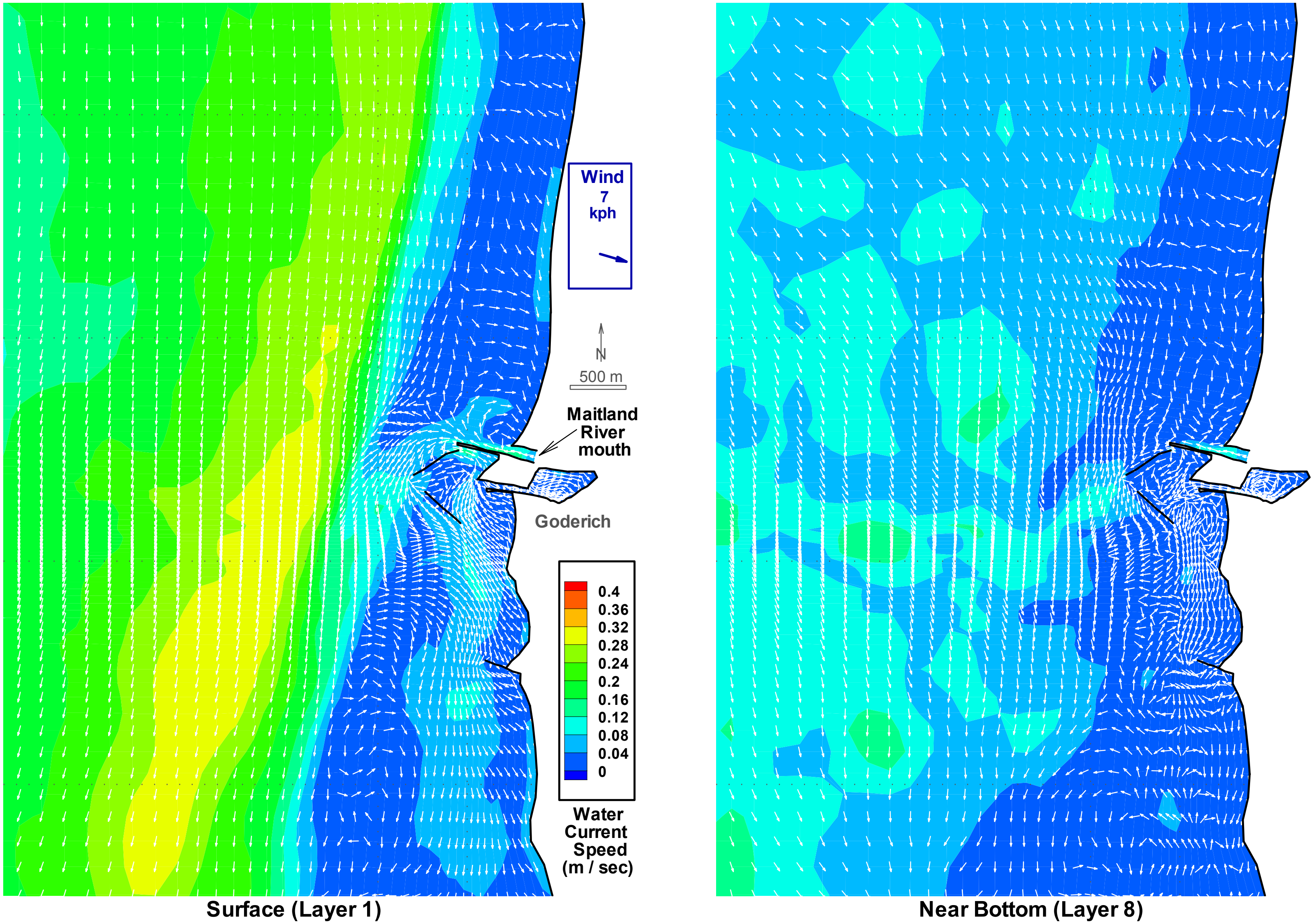


Figure 5.3U(f) Water current velocities at 00:00 hours on August 7, 2003; (directions indicated by arrows, speeds by contours).

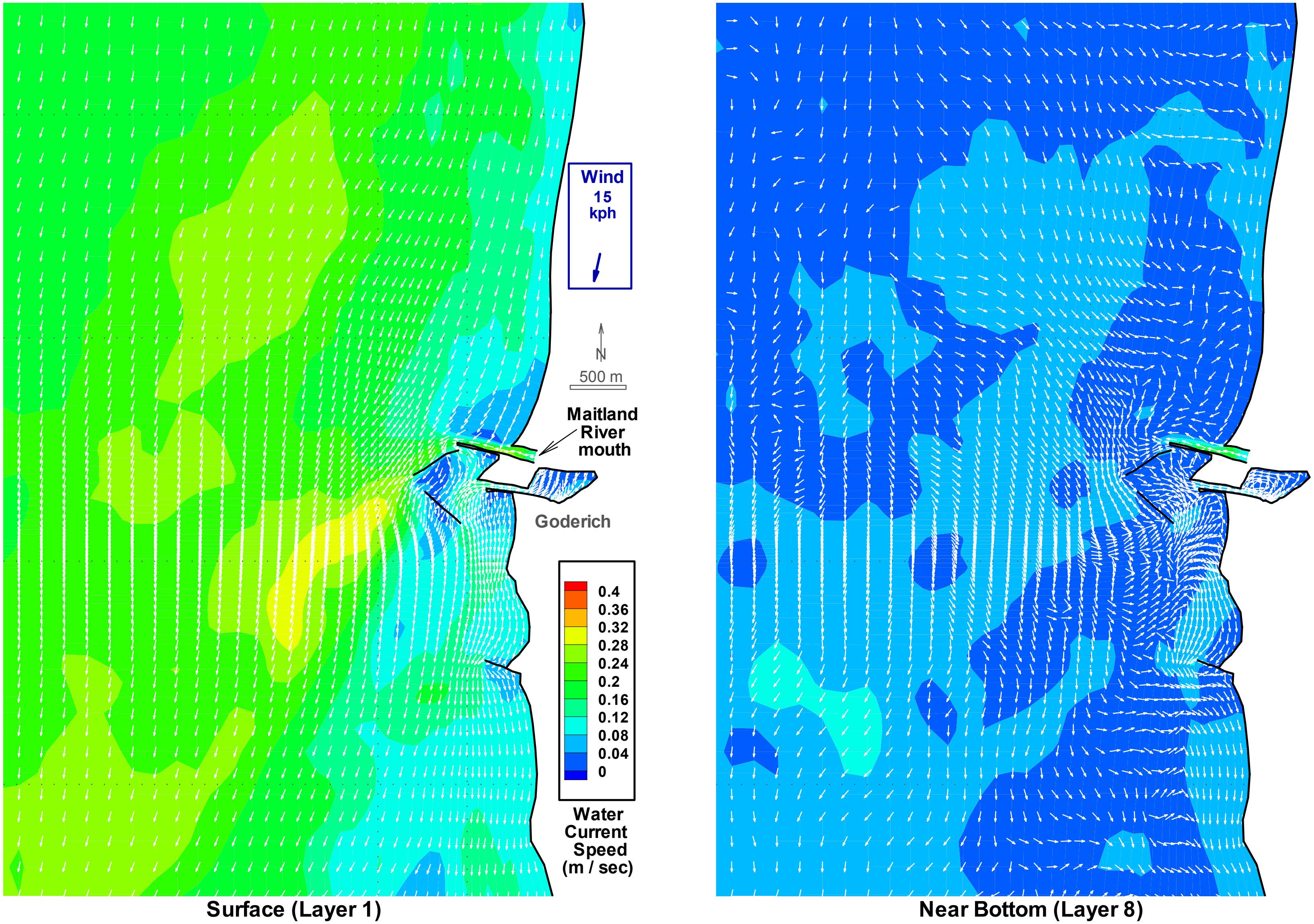


Figure 5.3U(g) Water current velocities at 00:00 hours on August 8, 2003; (directions indicated by arrows, speeds by contours).

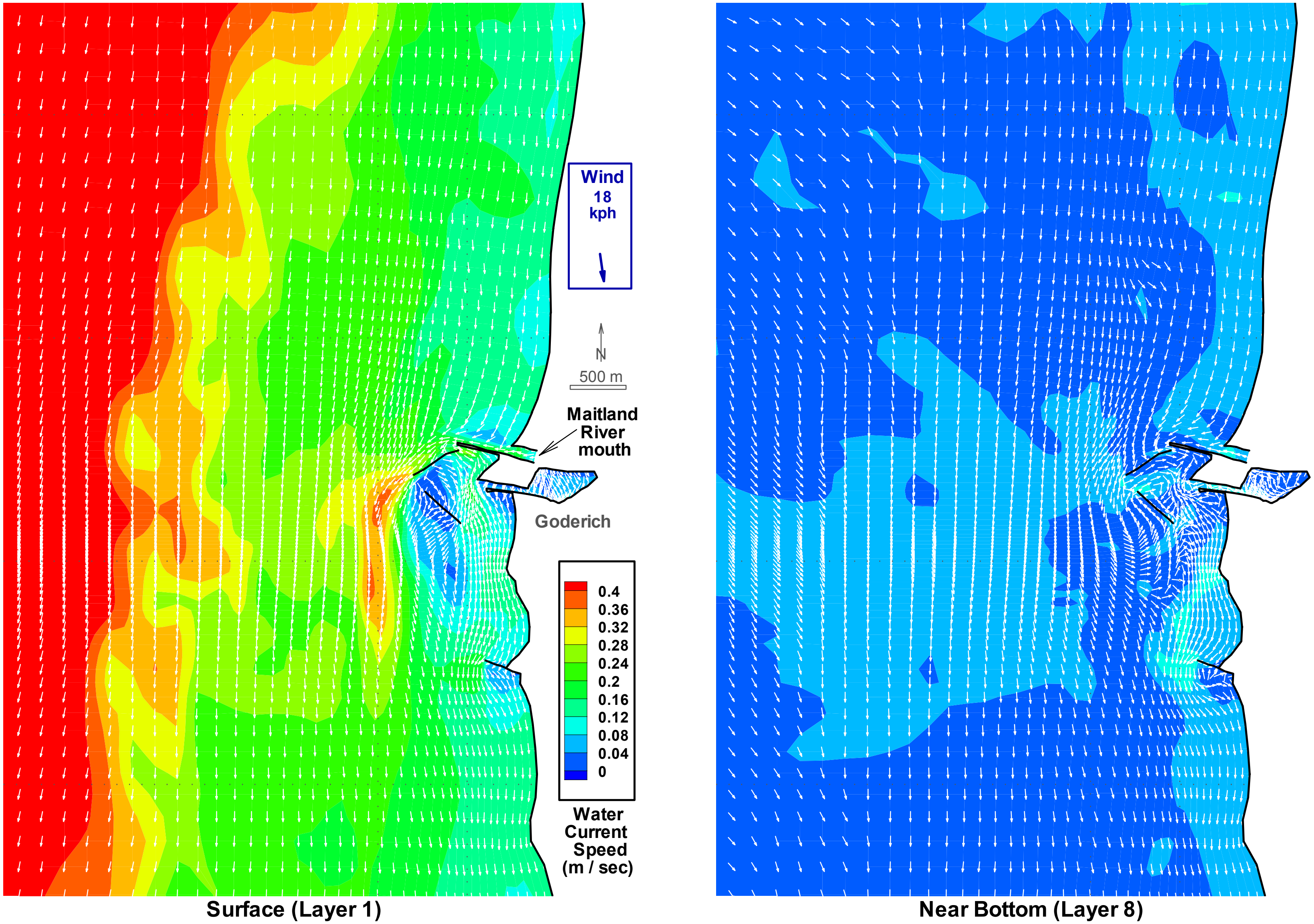


Figure 5.3U(h) Water current velocities at 00:00 hours on August 9, 2003; (directions indicated by arrows, speeds by contours).

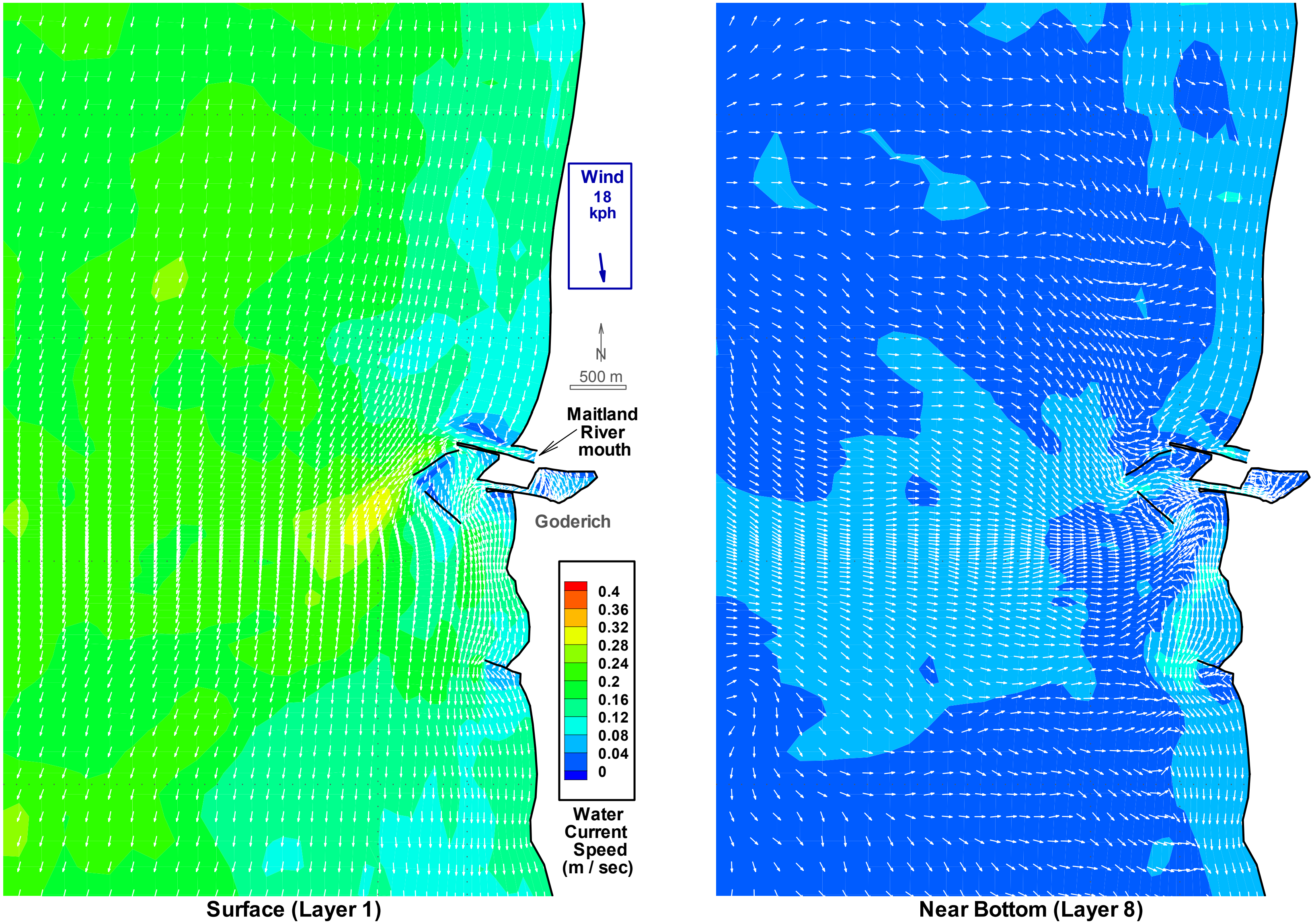


Figure 5.3U(i) **Water current velocities at 00:00 hours on August 10, 2003; (directions indicated by arrows, speeds by contours).**

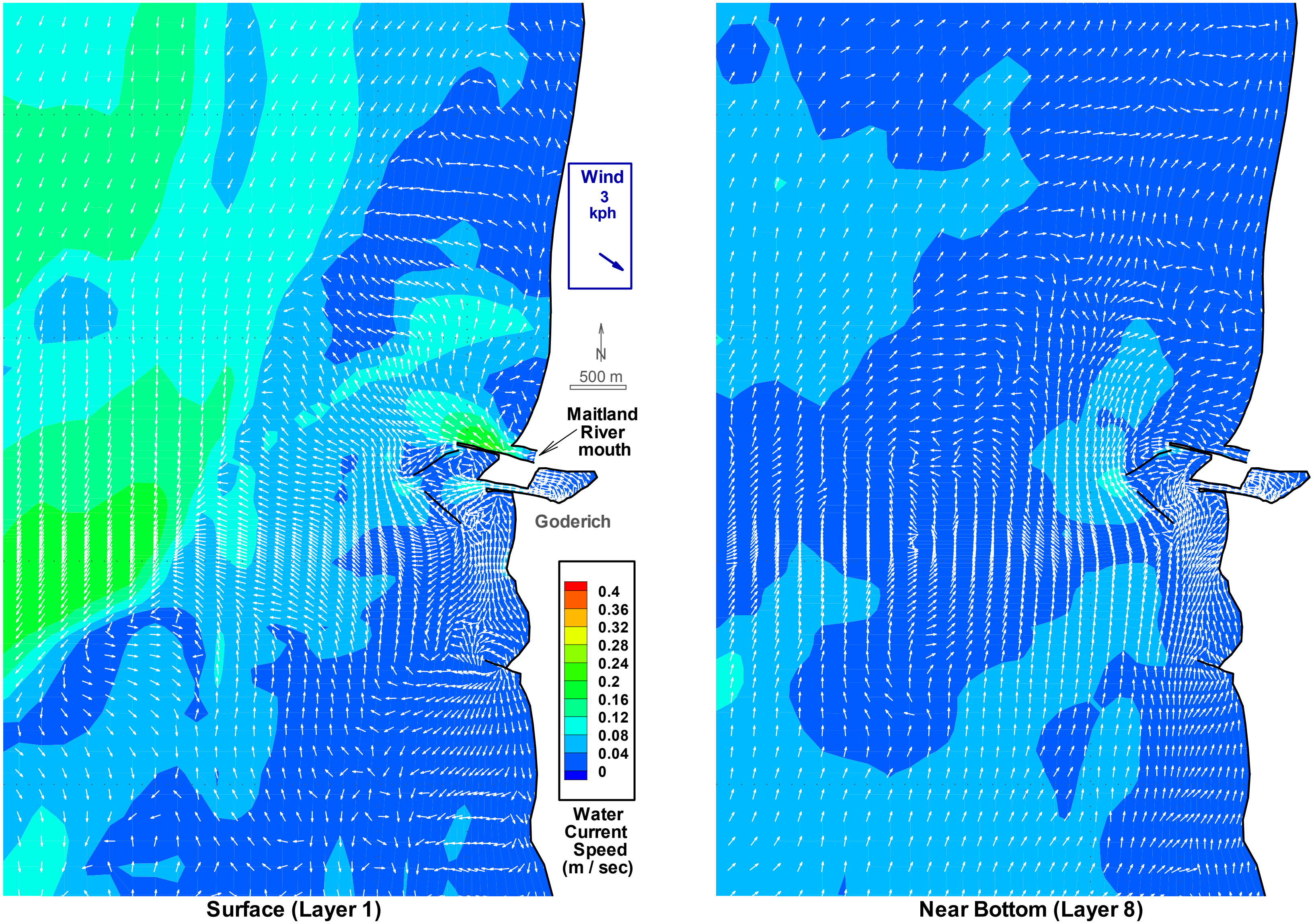


Figure 5.3U(j) Water current velocities at 00:00 hours on August 11, 2003; (directions indicated by arrows, speeds by contours).

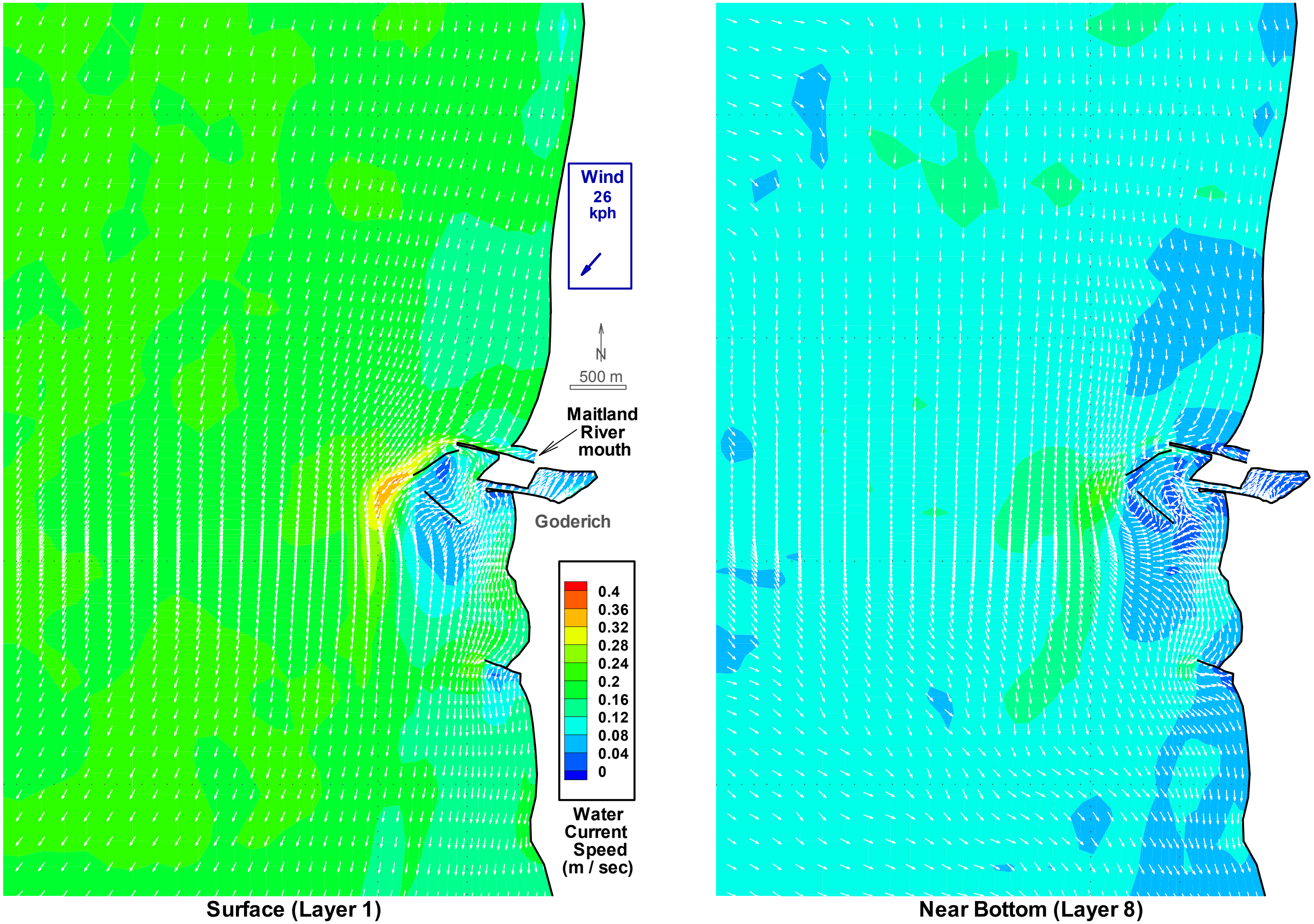


Figure 5.3U(k) Water current velocities at 00:00 hours on August 12, 2003; (directions indicated by arrows, speeds by contours).

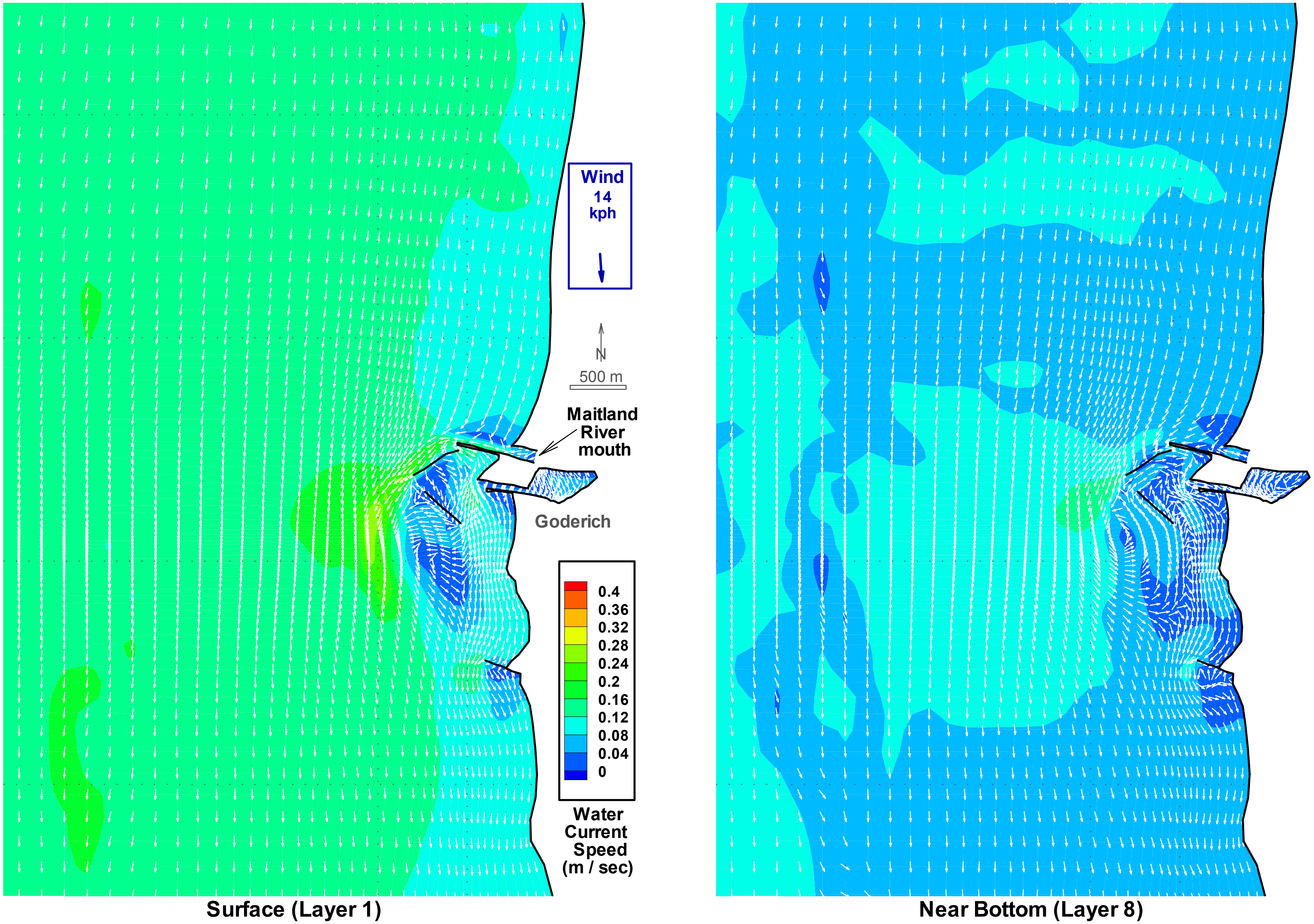


Figure 5.3U(l) Water current velocities at 00:00 hours on August 13, 2003; (directions indicated by arrows, speeds by contours).

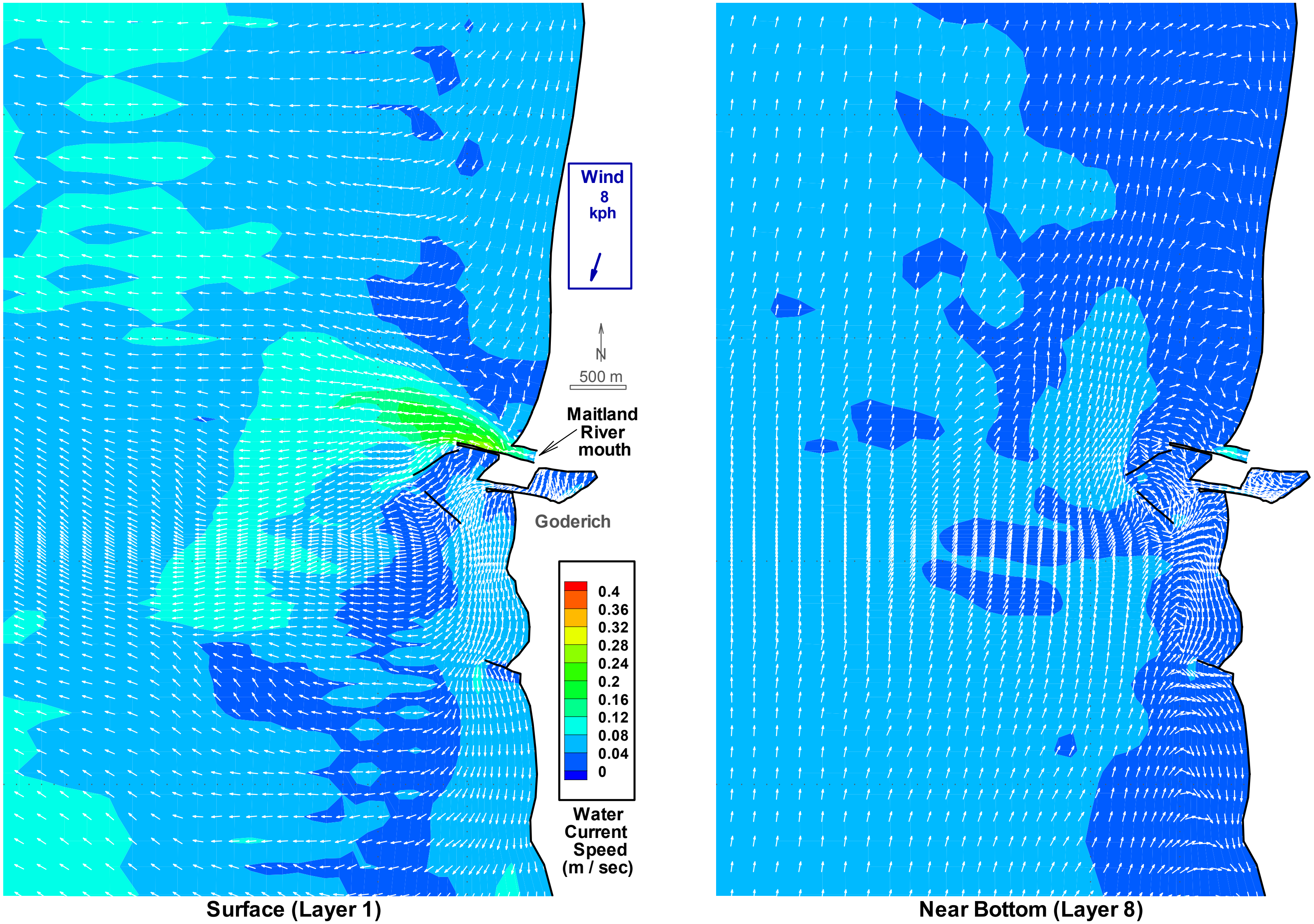


Figure 5.3U(m) Water current velocities at 00:00 hours on August 14, 2003; (directions indicated by arrows, speeds by contours).

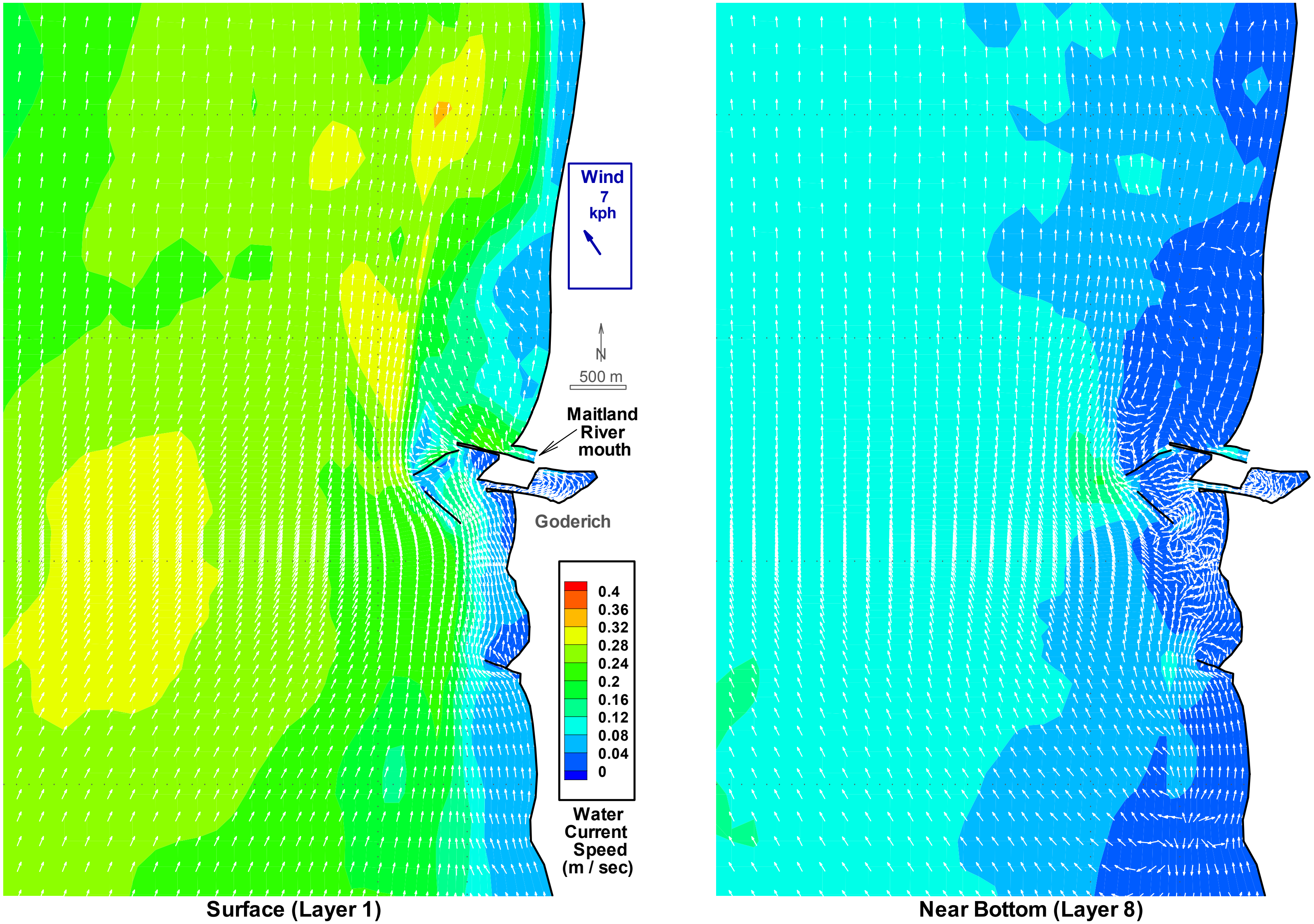
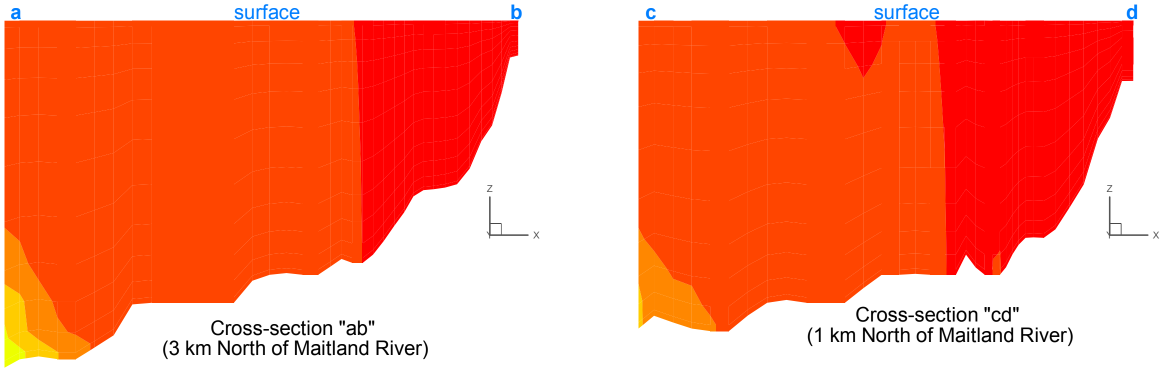
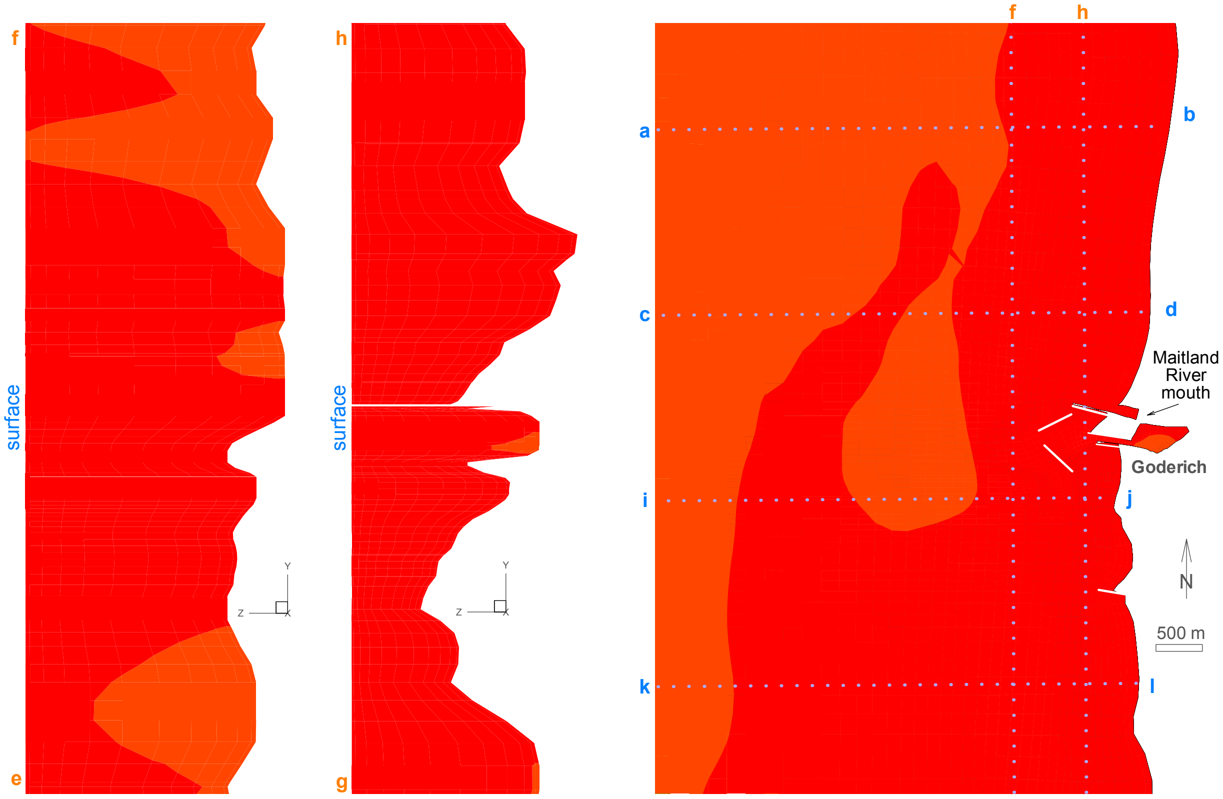


Figure 5.3U(n) Water current velocities at 00:00 hours on August 15, 2003; (directions indicated by arrows, speeds by contours).



Cross-section "ab"
(3 km North of Maitland River)

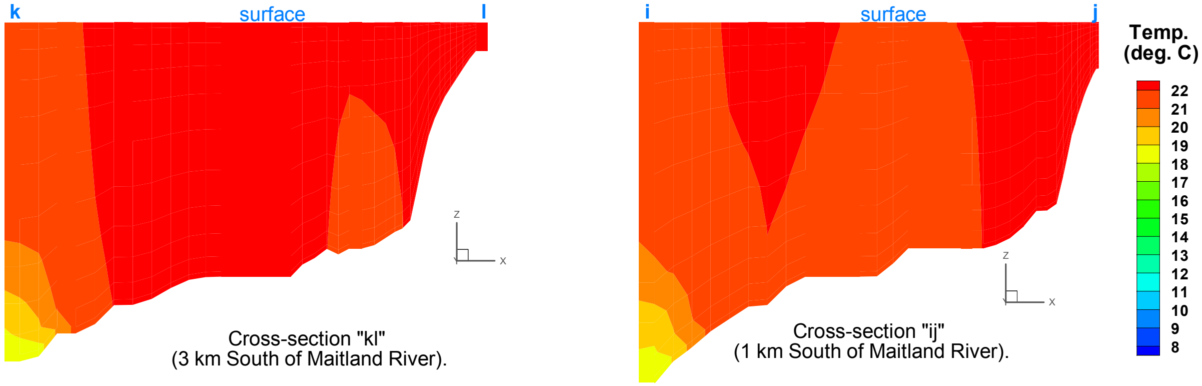
Cross-section "cd"
(1 km North of Maitland River)



Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

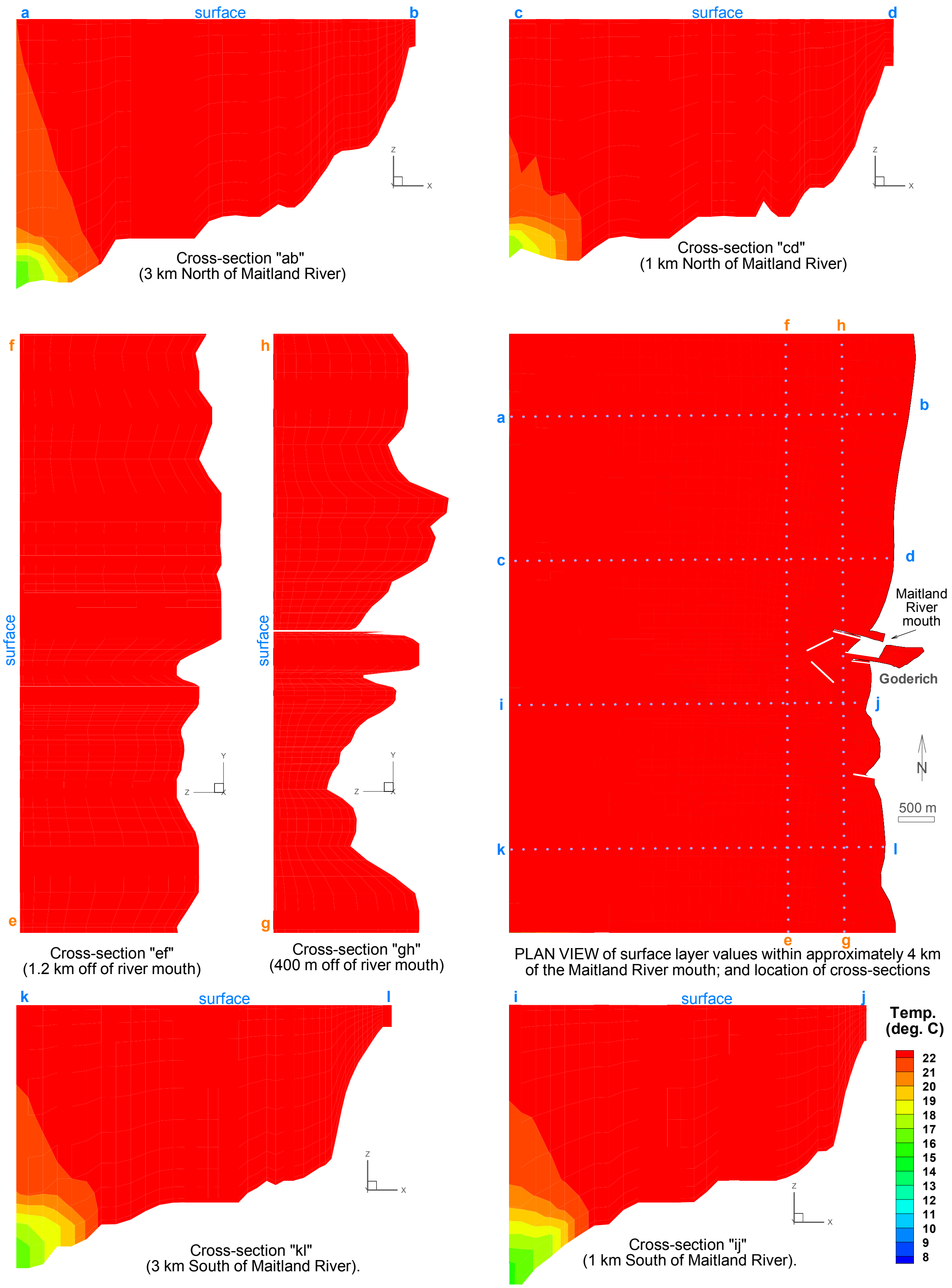
PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections



Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3T(a) Water temperature, (plan view and 6 cross-sections), at 00 hours on August 2, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

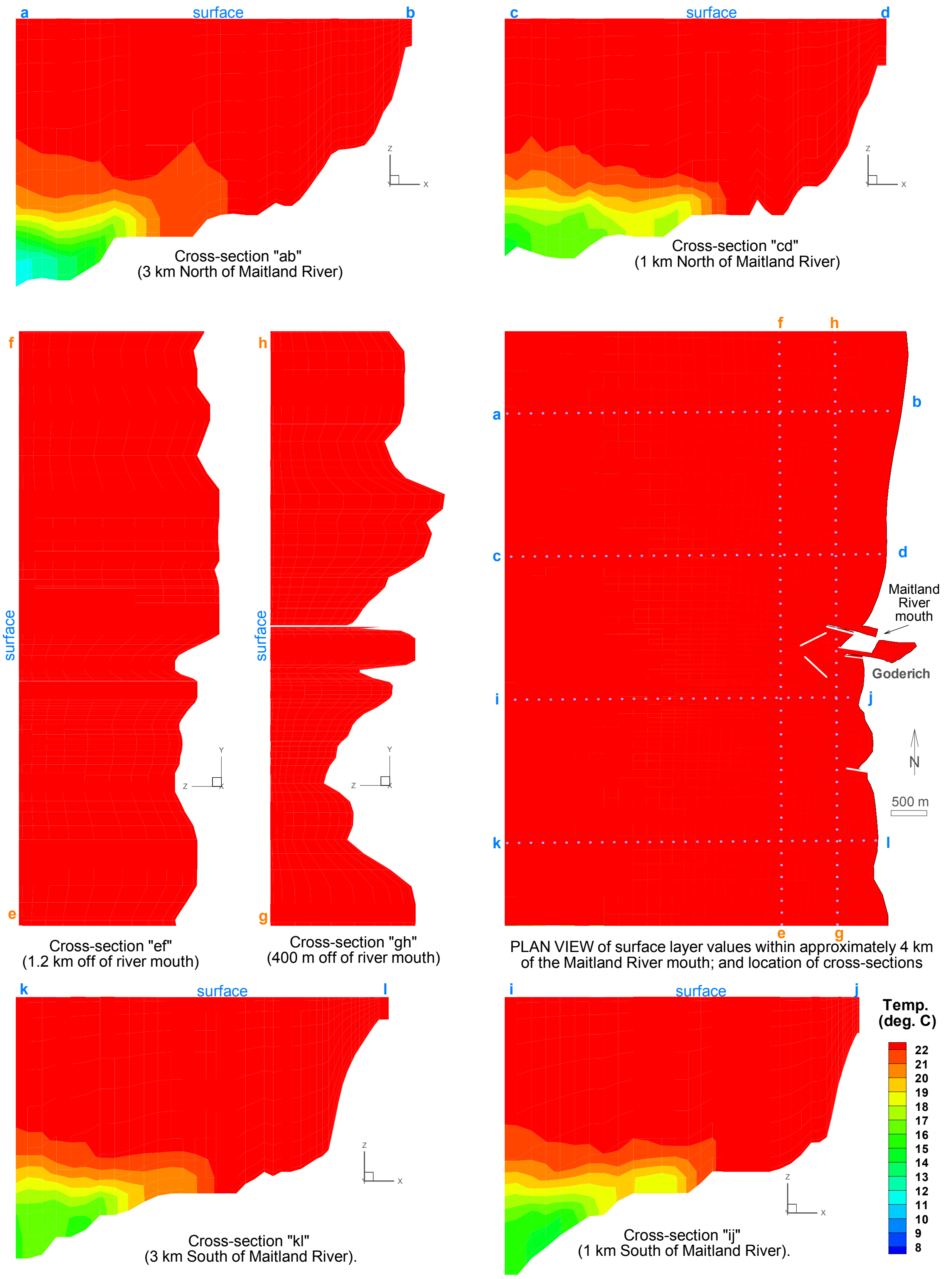
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3T(b) Water temperature, (plan view and 6 cross-sections), at 00 hours on August 3, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3T(c) Water temperature, (plan view and 6 cross-sections), at 00 hours on August 4, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

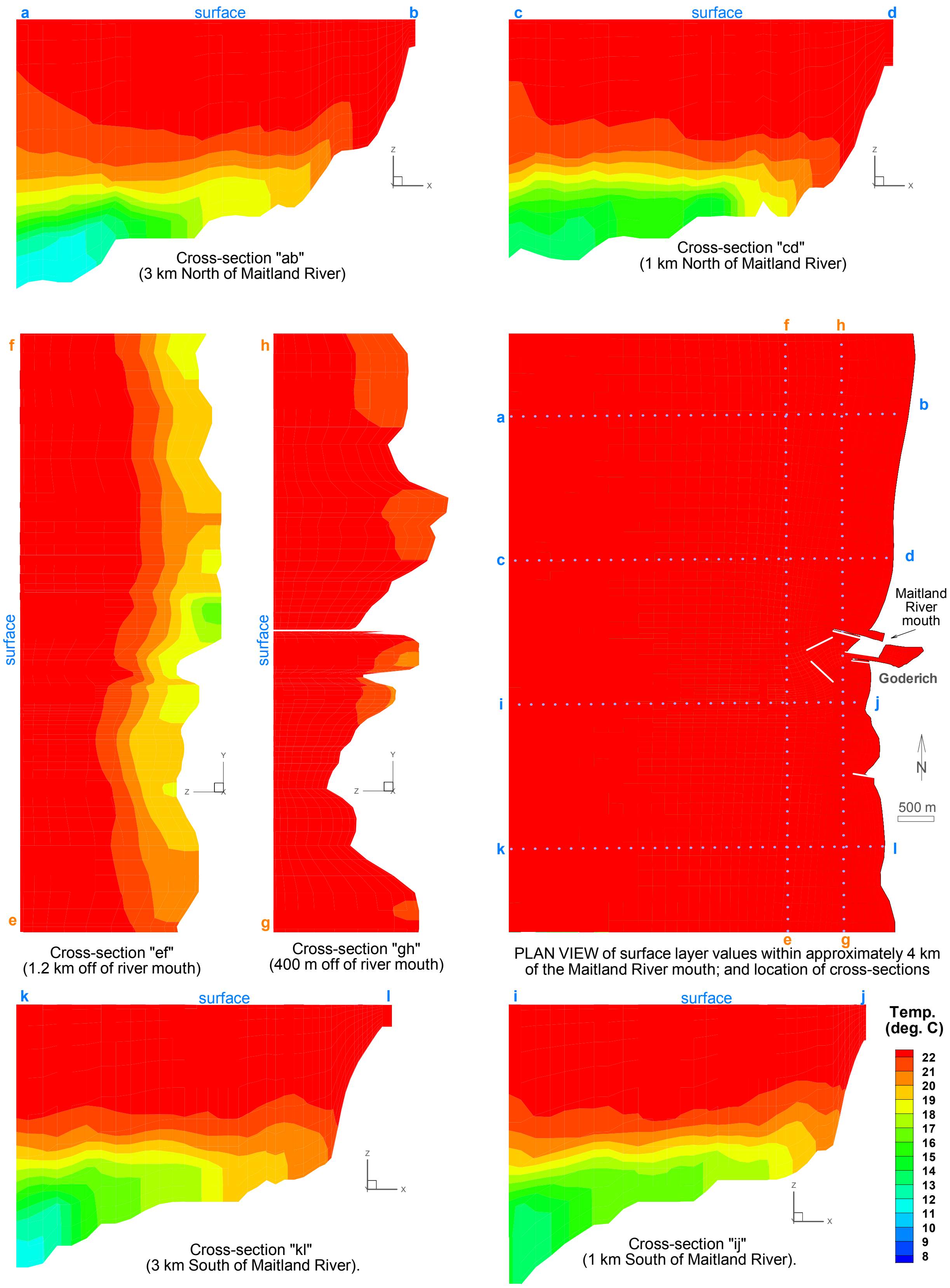
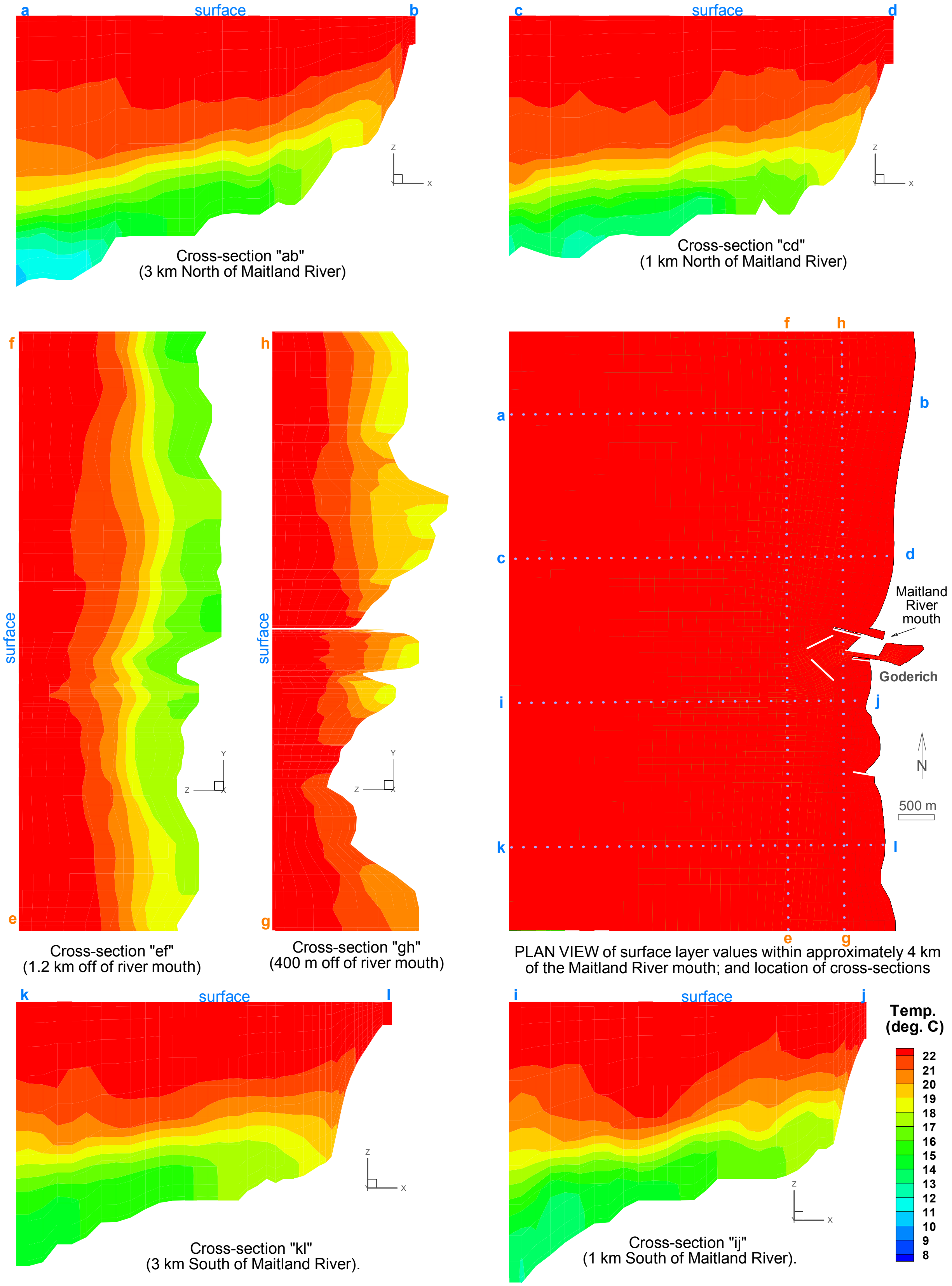


Figure 5.3T(d) Water temperature, (plan view and 6 cross-sections), at 00 hours on August 5, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

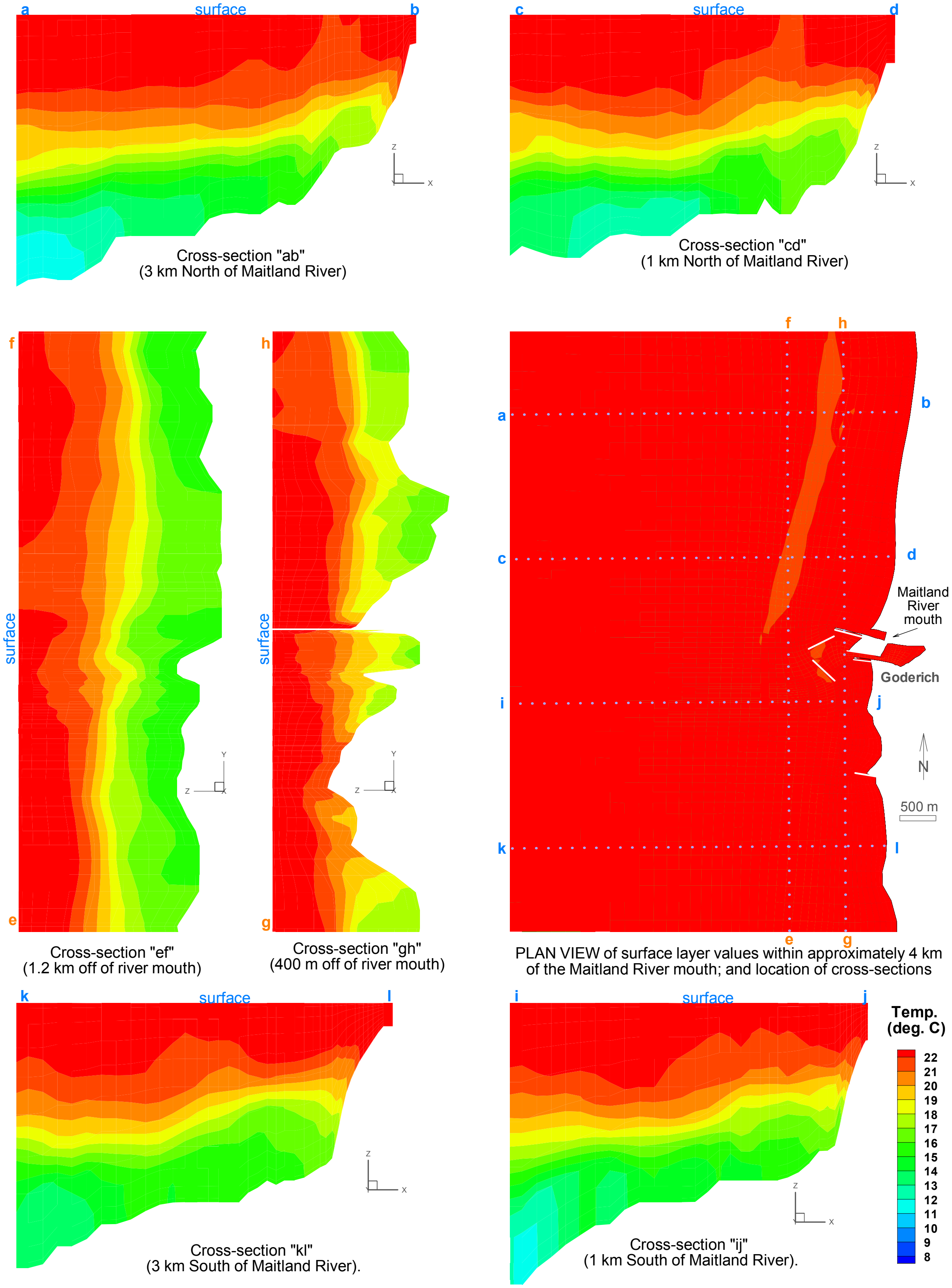
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3T(e) Water temperature, (plan view and 6 cross-sections), at 00 hours on August 6, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

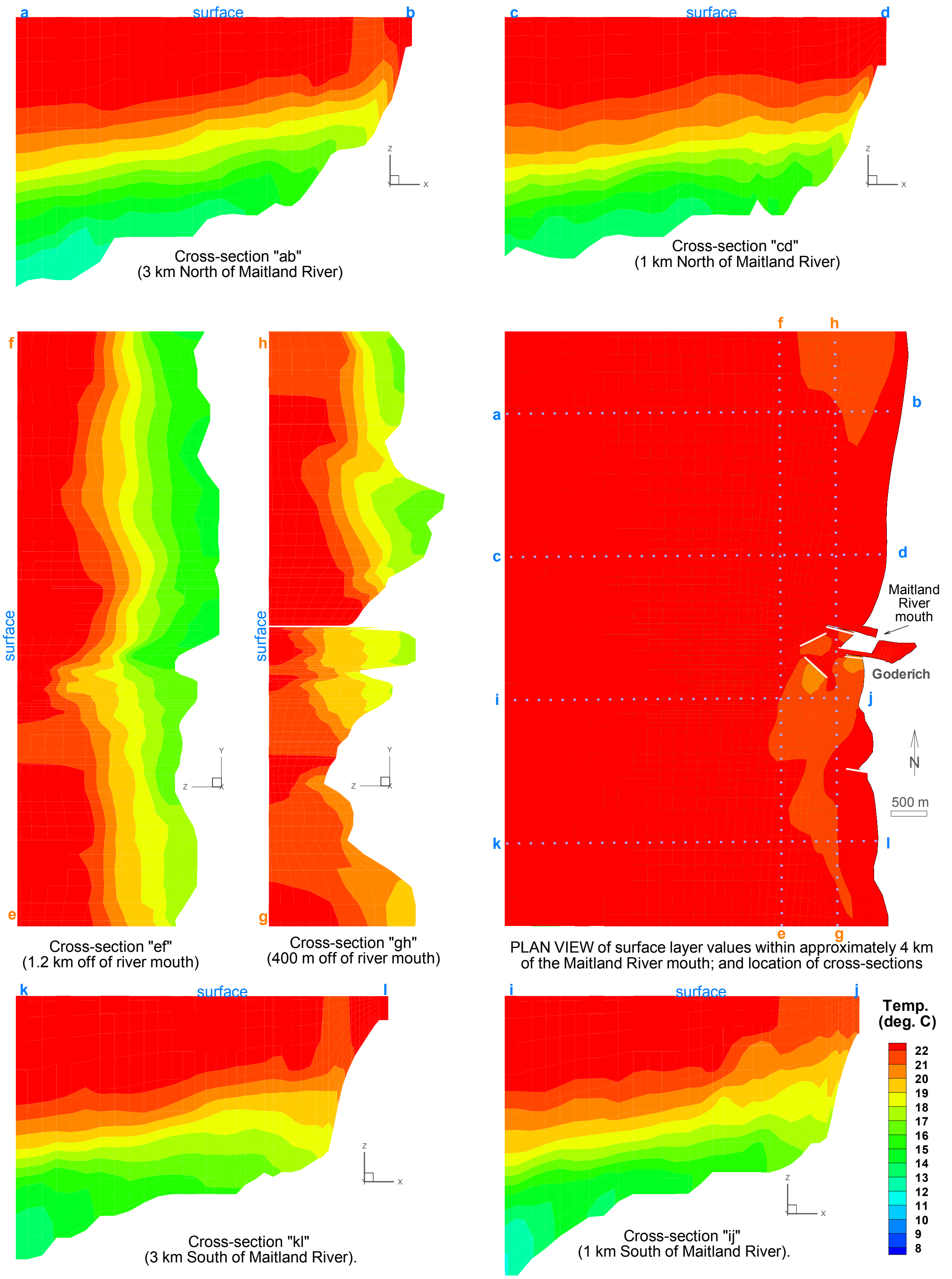
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3T(f) Water temperature, (plan view and 6 cross-sections), at 00 hours on August 7, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3T(g) Water temperature, (plan view and 6 cross-sections), at 00 hours on August 8, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

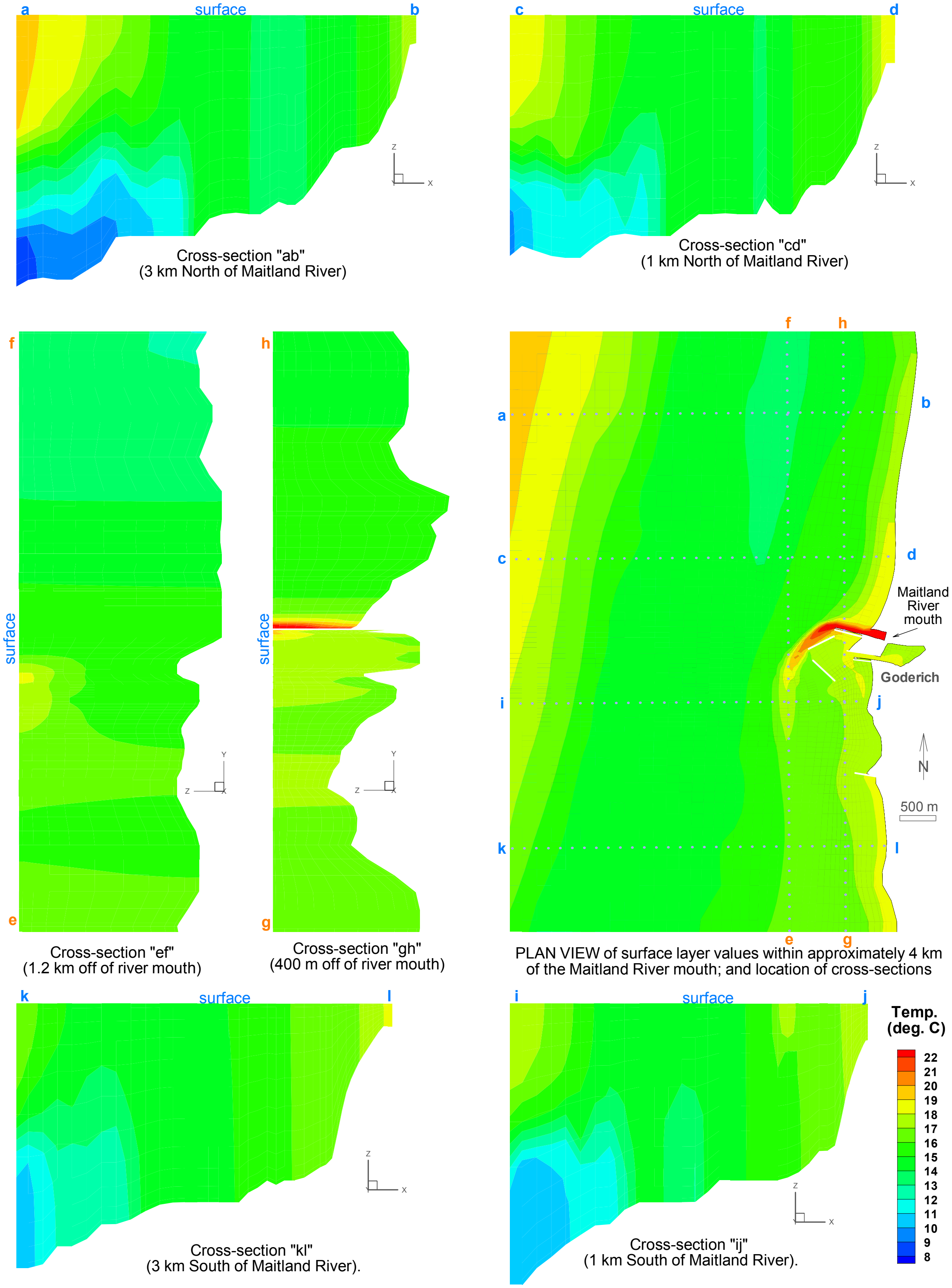


Figure 5.3T(h) **Water temperature, (plan view and 6 cross-sections), at 00 hours on August 9, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

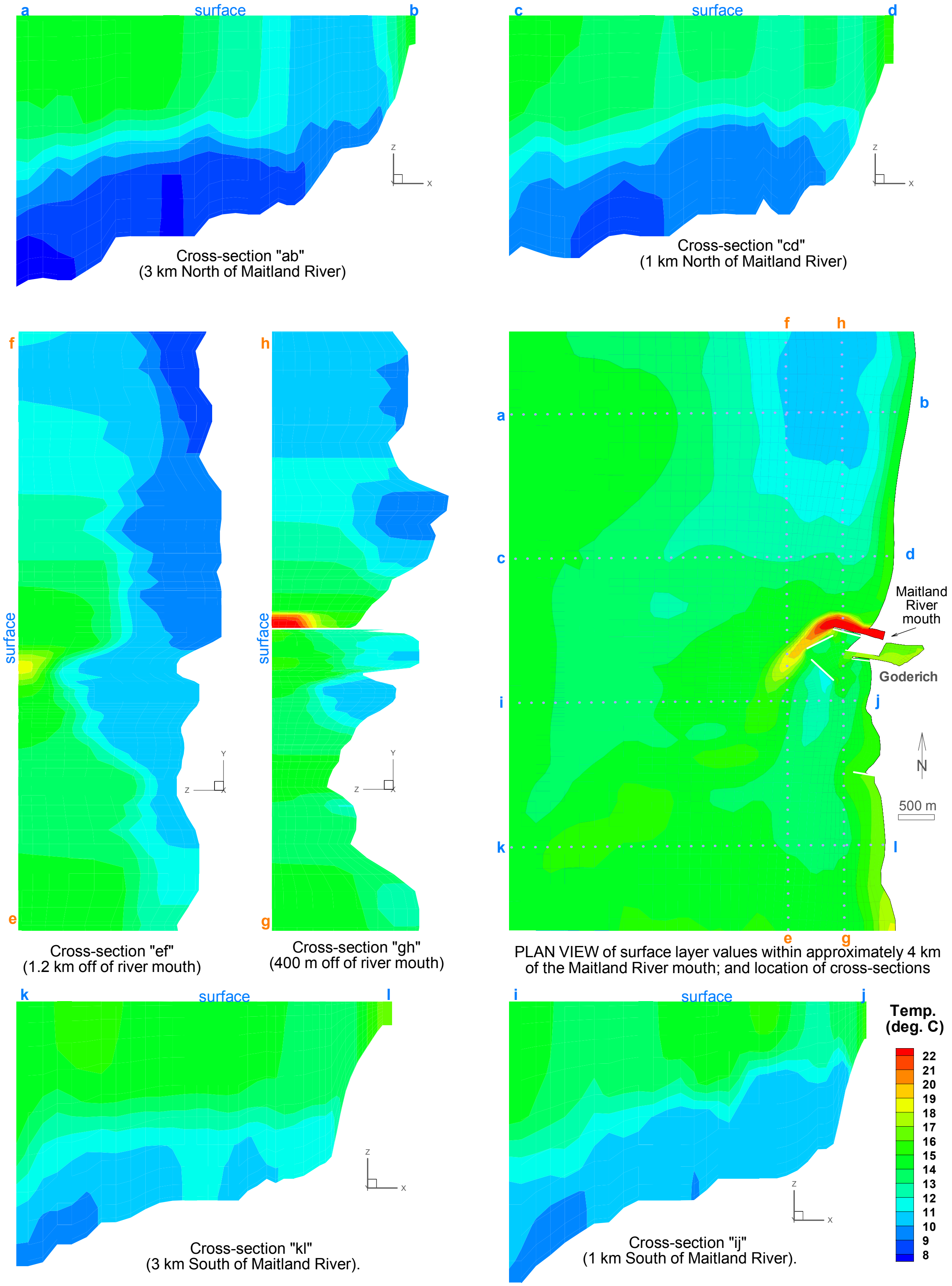


Figure 5.3T(i) Water temperature, (plan view and 6 cross-sections), at 00 hours on August 10, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

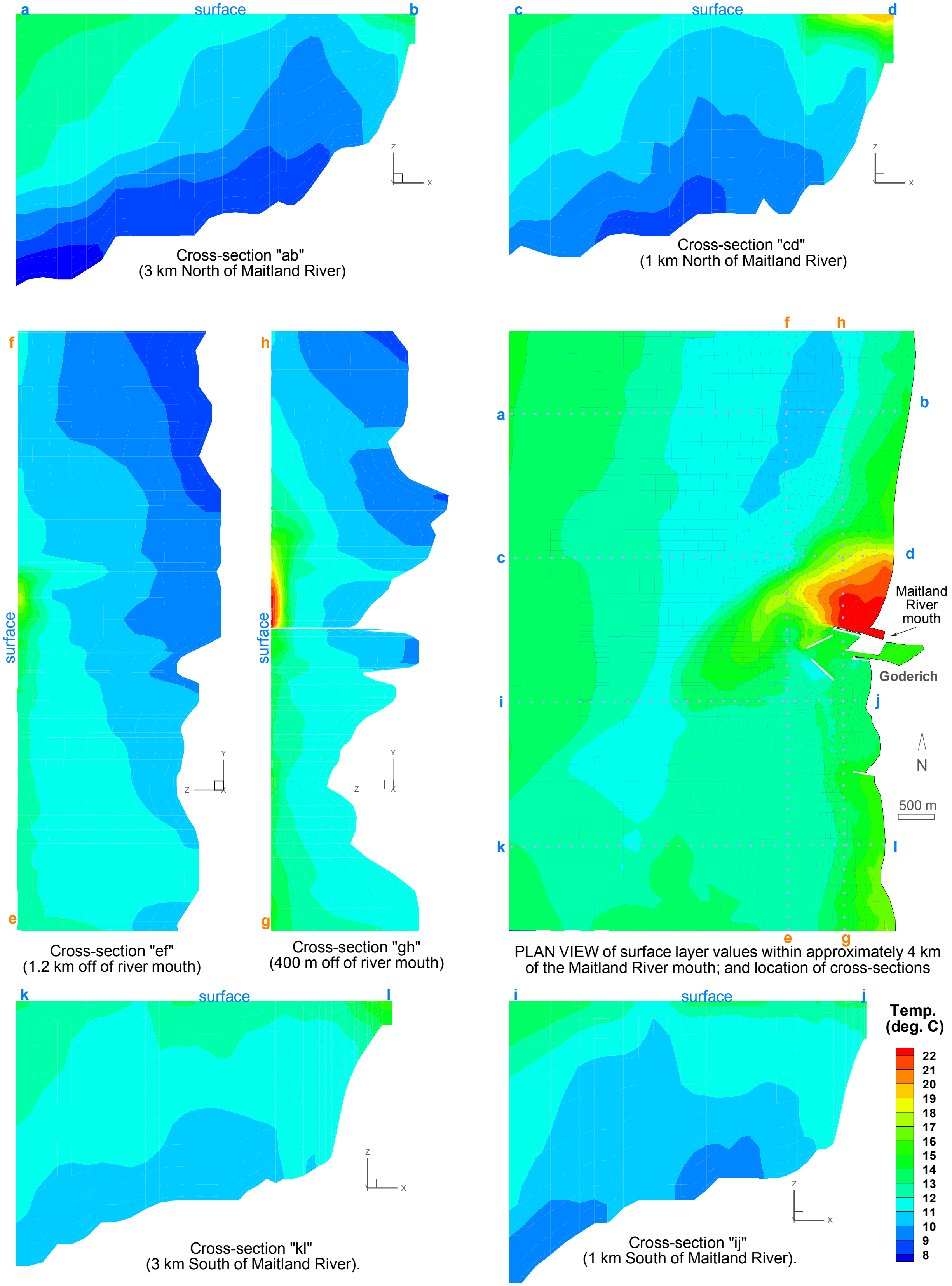


Figure 5.3T(j) Water temperature, (plan view and 6 cross-sections), at 00 hours on August 11, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

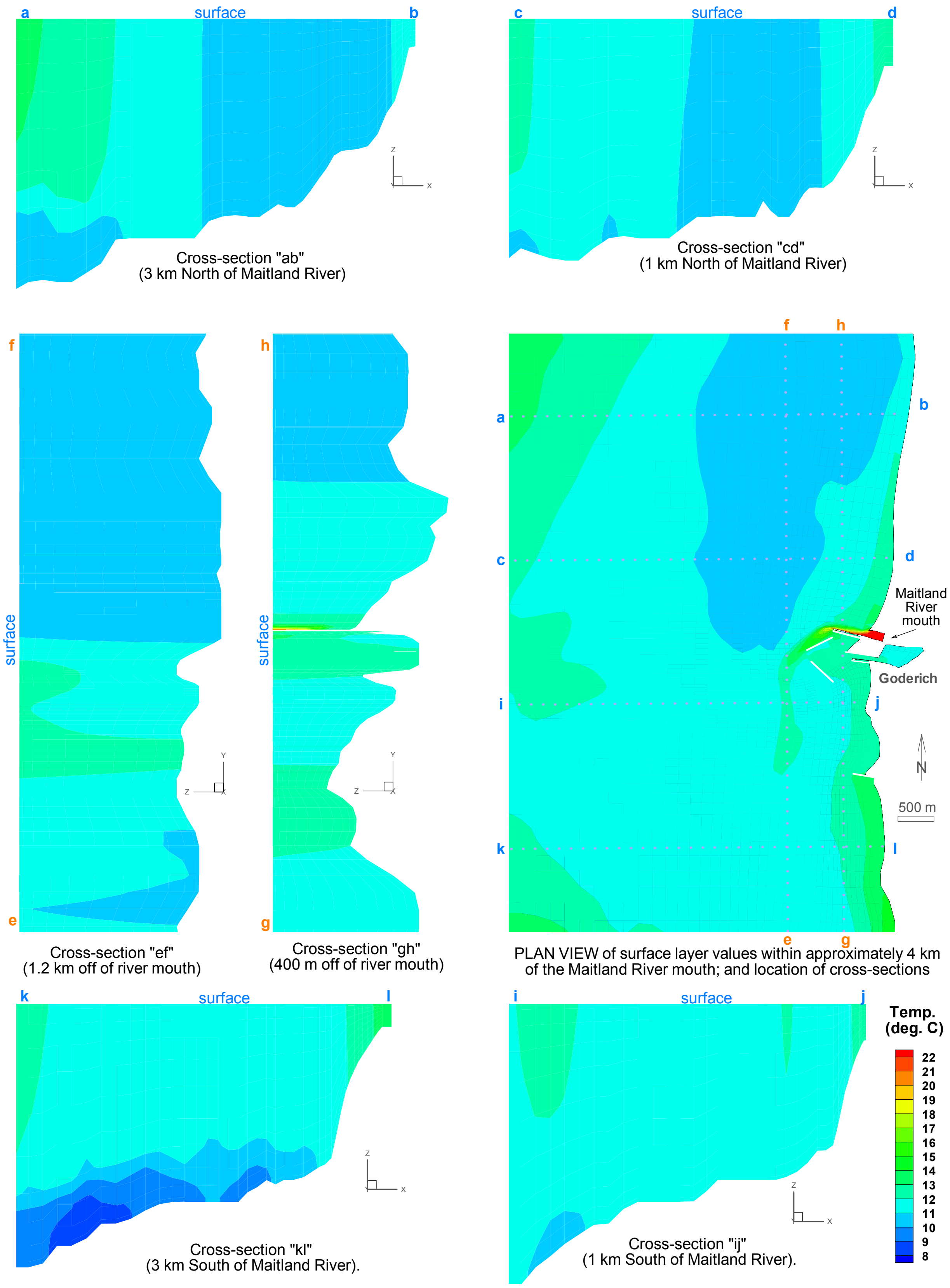
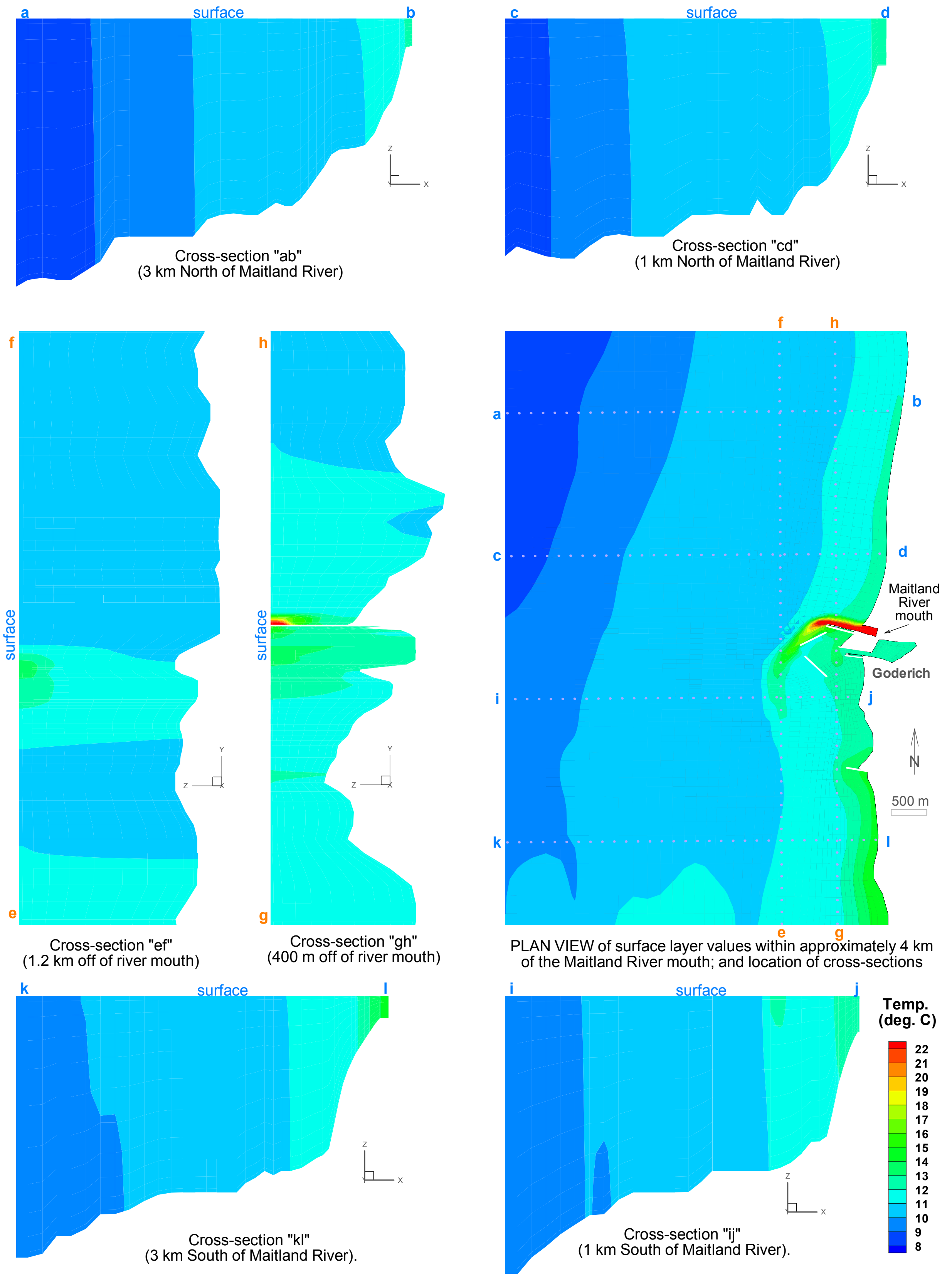


Figure 5.3T(k) **Water temperature, (plan view and 6 cross-sections), at 00 hours on August 12, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

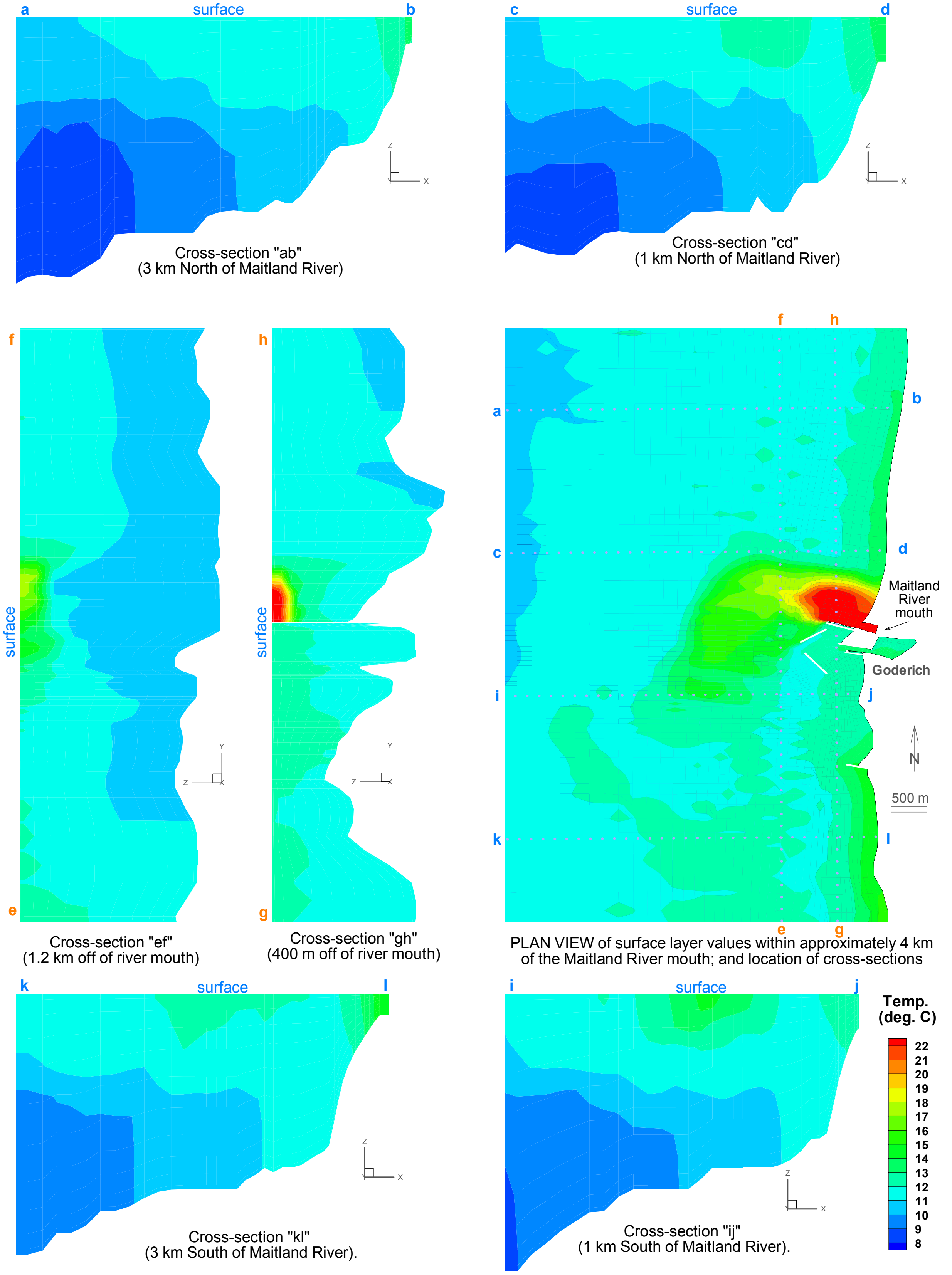
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3T(l) Water temperature, (plan view and 6 cross-sections), at 00 hours on August 13, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

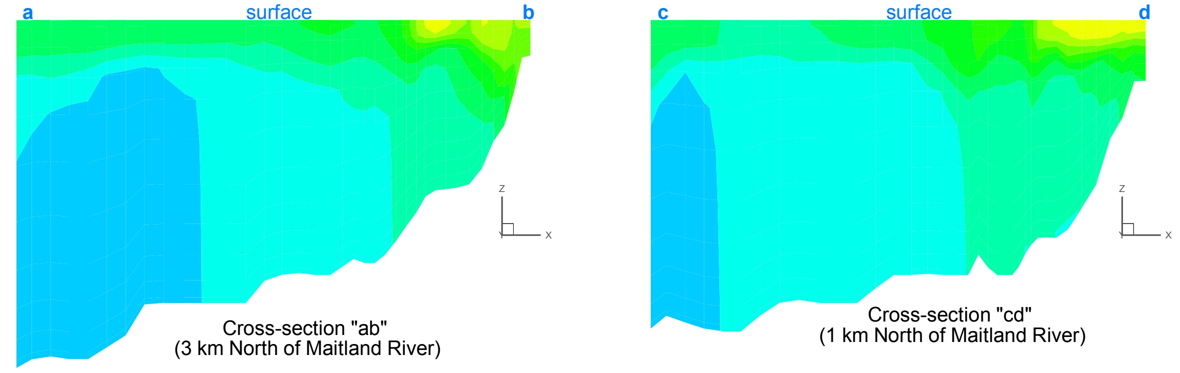
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

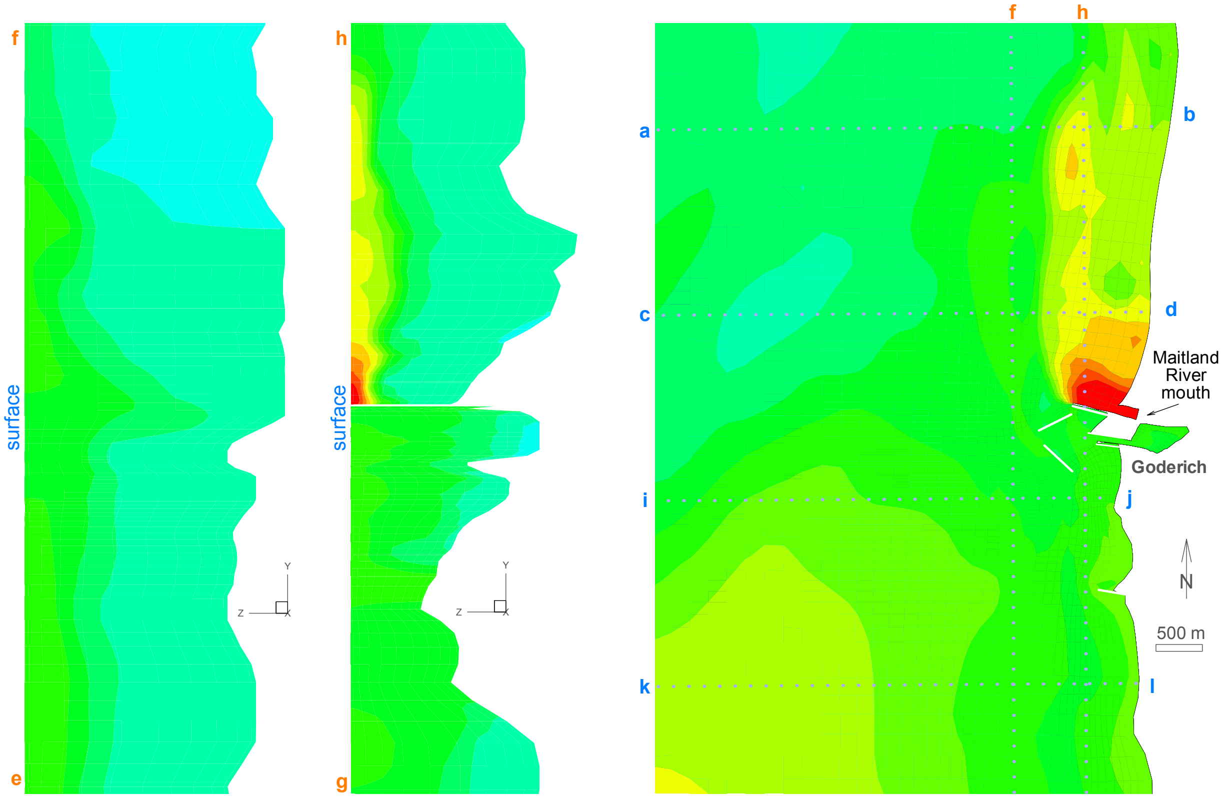
Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3T(m) Water temperature, (plan view and 6 cross-sections), at 00 hours on August 14, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

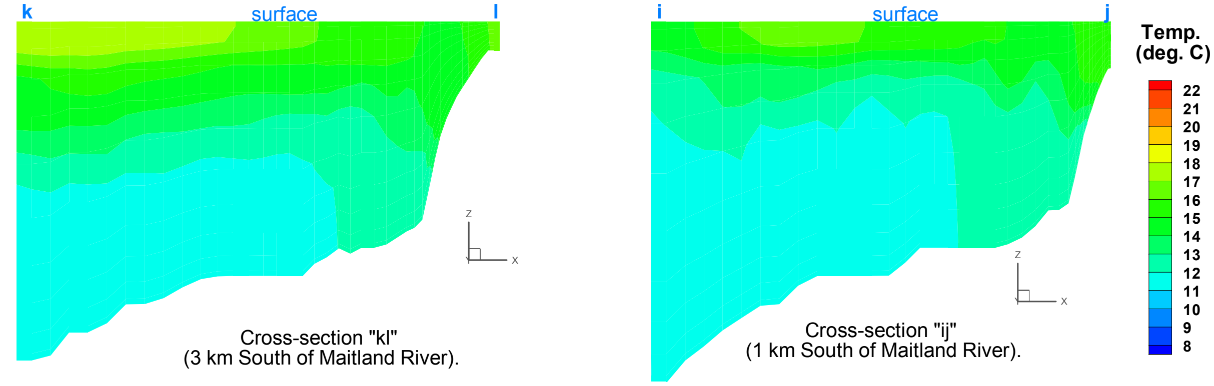
Cross-section "cd"
(1 km North of Maitland River)



Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

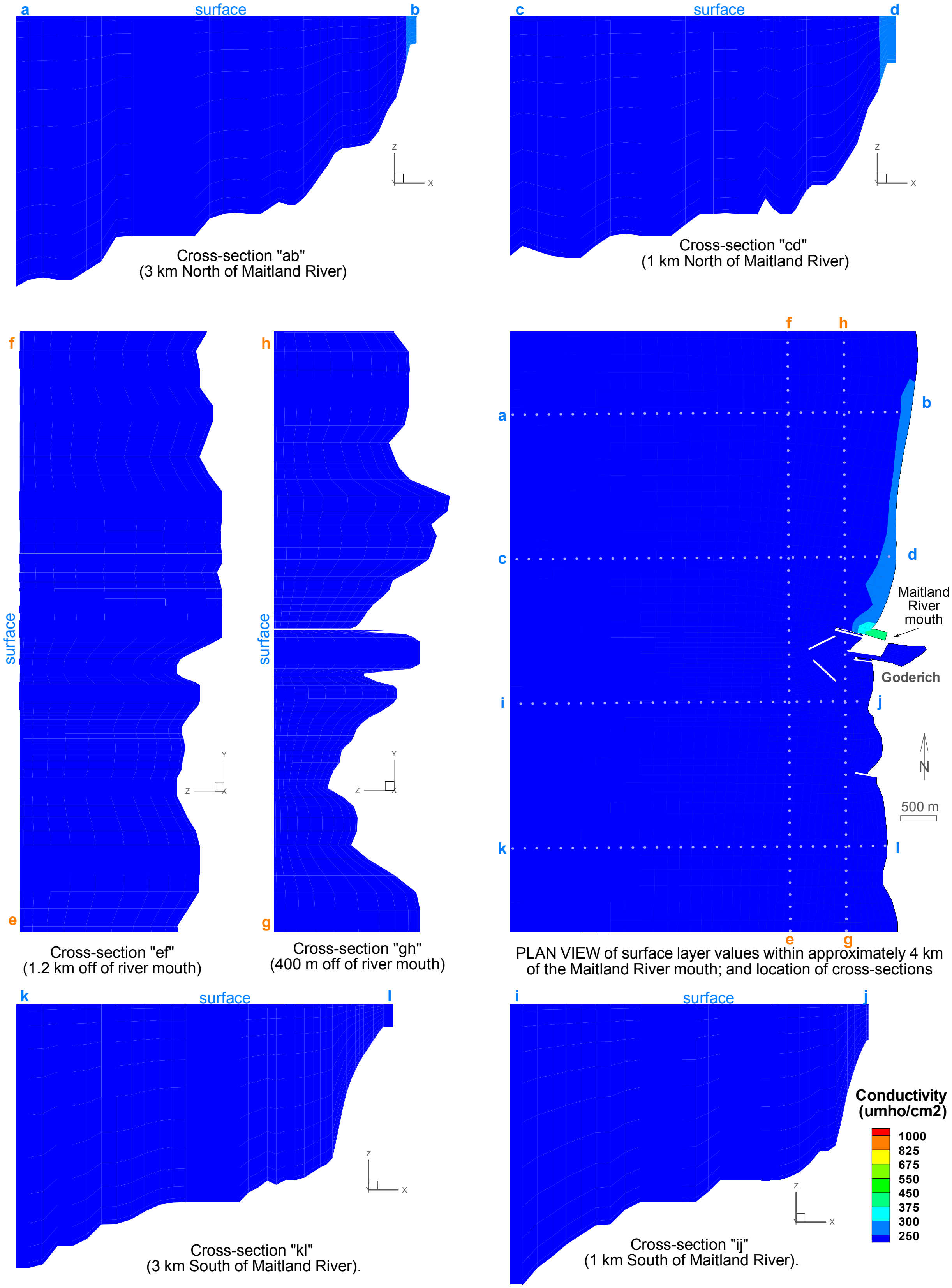
PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections



Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3T(n) **Water temperature, (plan view and 6 cross-sections), at 00 hours on August 15, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3C(a) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 2, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

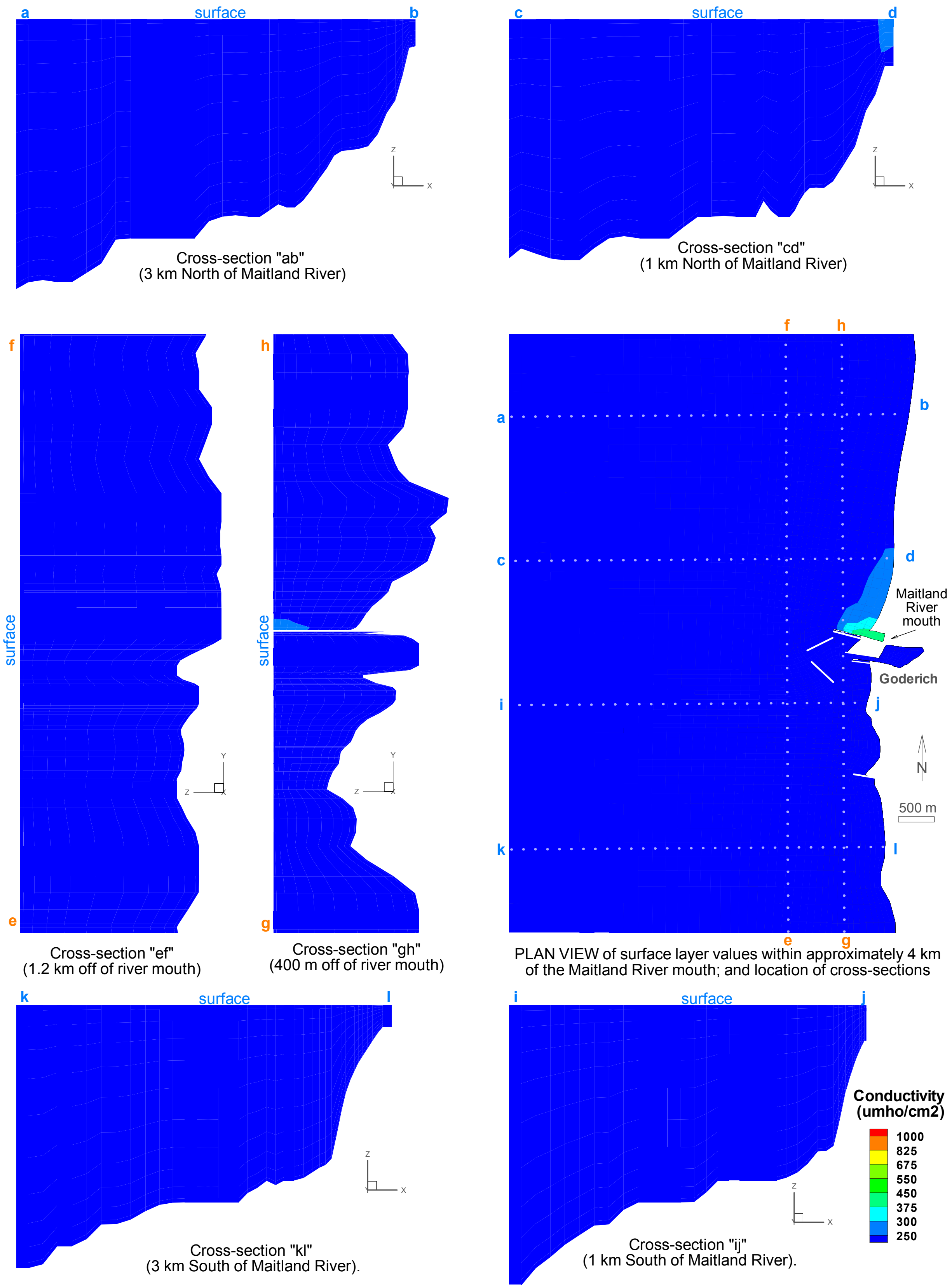
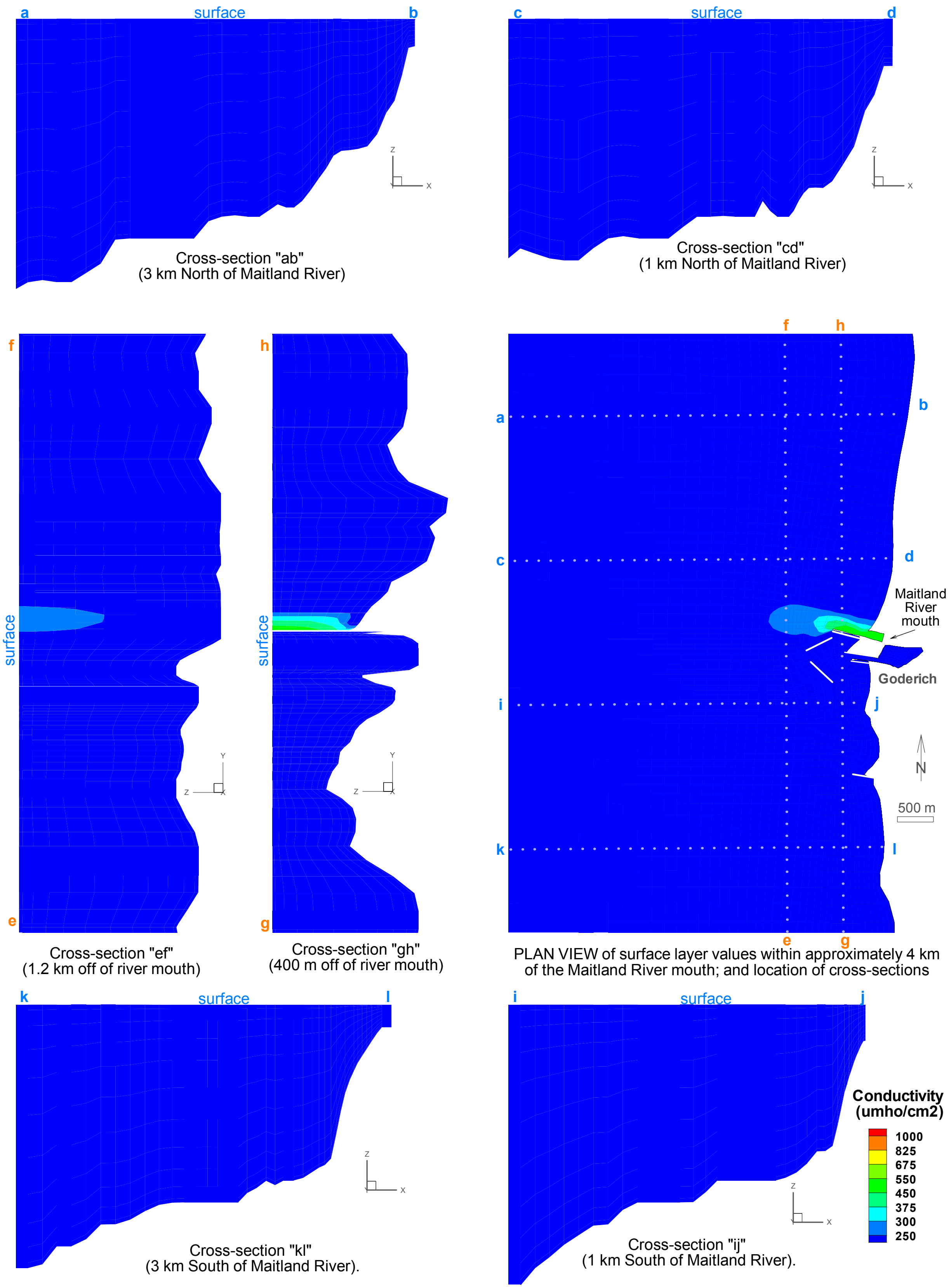


Figure 5.3C(b) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 3, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

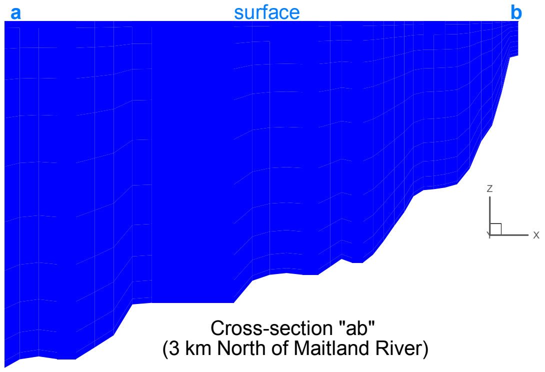
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

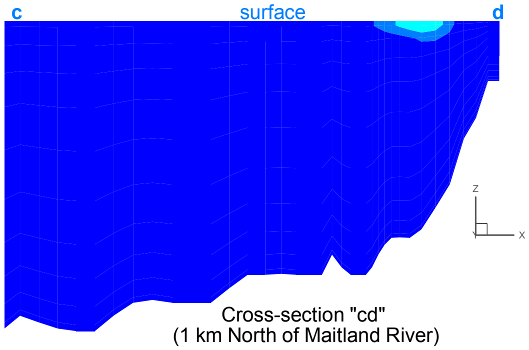
Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

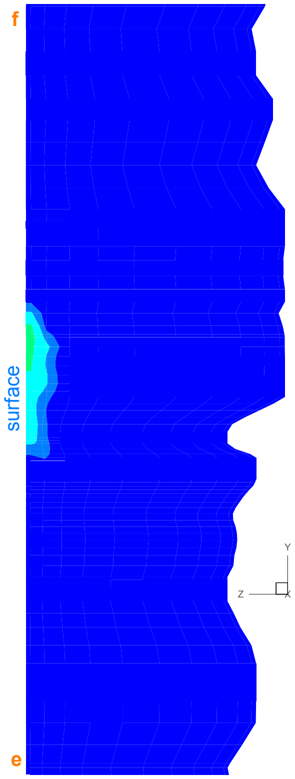
Figure 5.3C(c) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 4, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



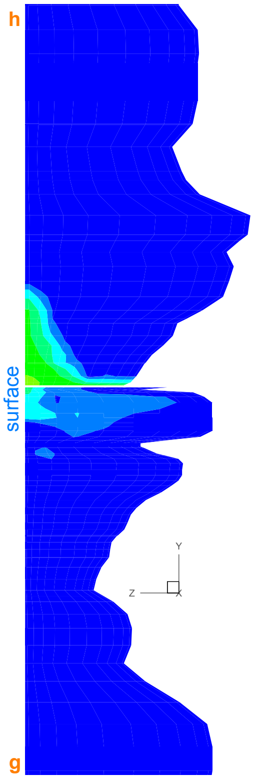
Cross-section "ab"
(3 km North of Maitland River)



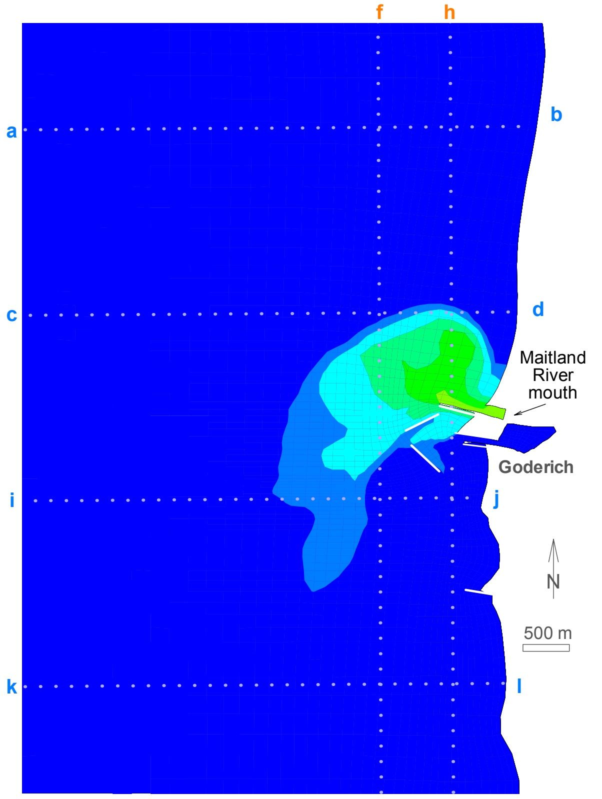
Cross-section "cd"
(1 km North of Maitland River)



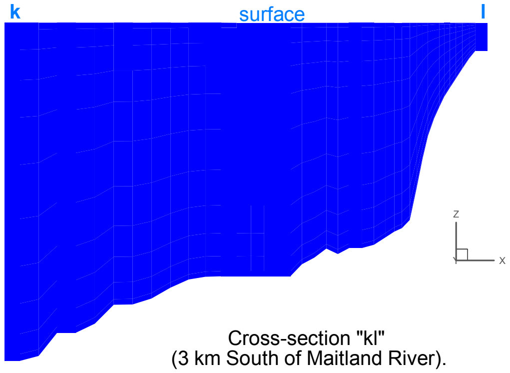
Cross-section "ef"
(1.2 km off of river mouth)



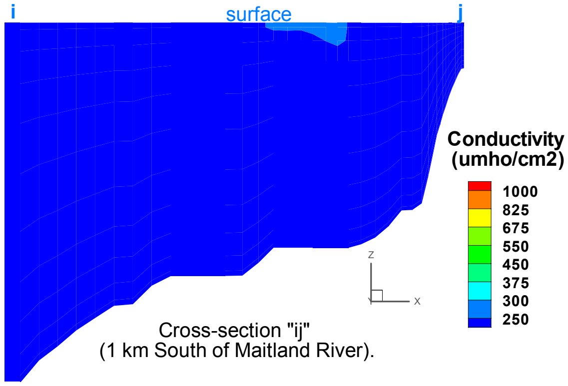
Cross-section "gh"
(400 m off of river mouth)



PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections



Cross-section "kl"
(3 km South of Maitland River).



Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3C(d) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 5, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

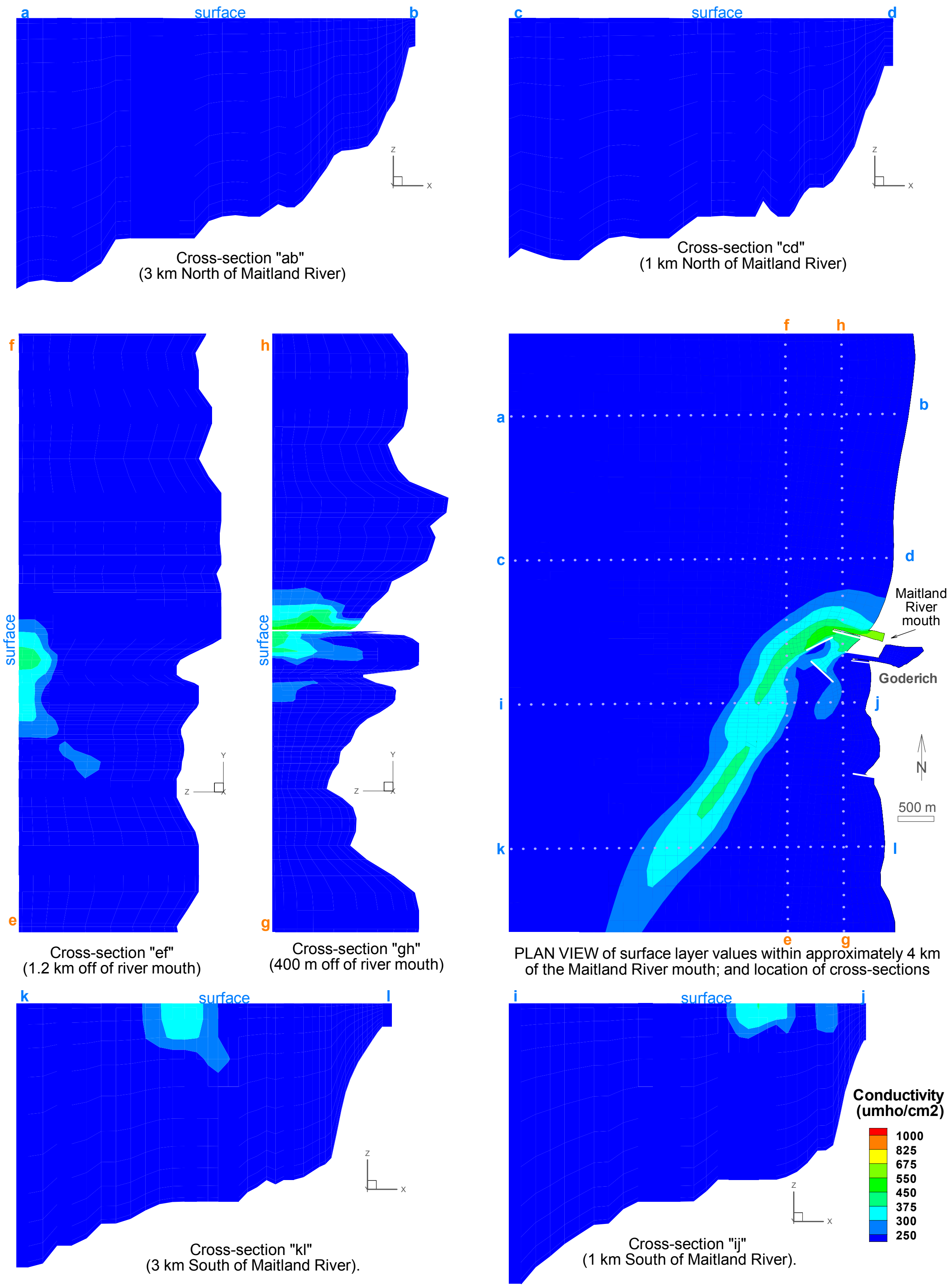


Figure 5.3C(e) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 6, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

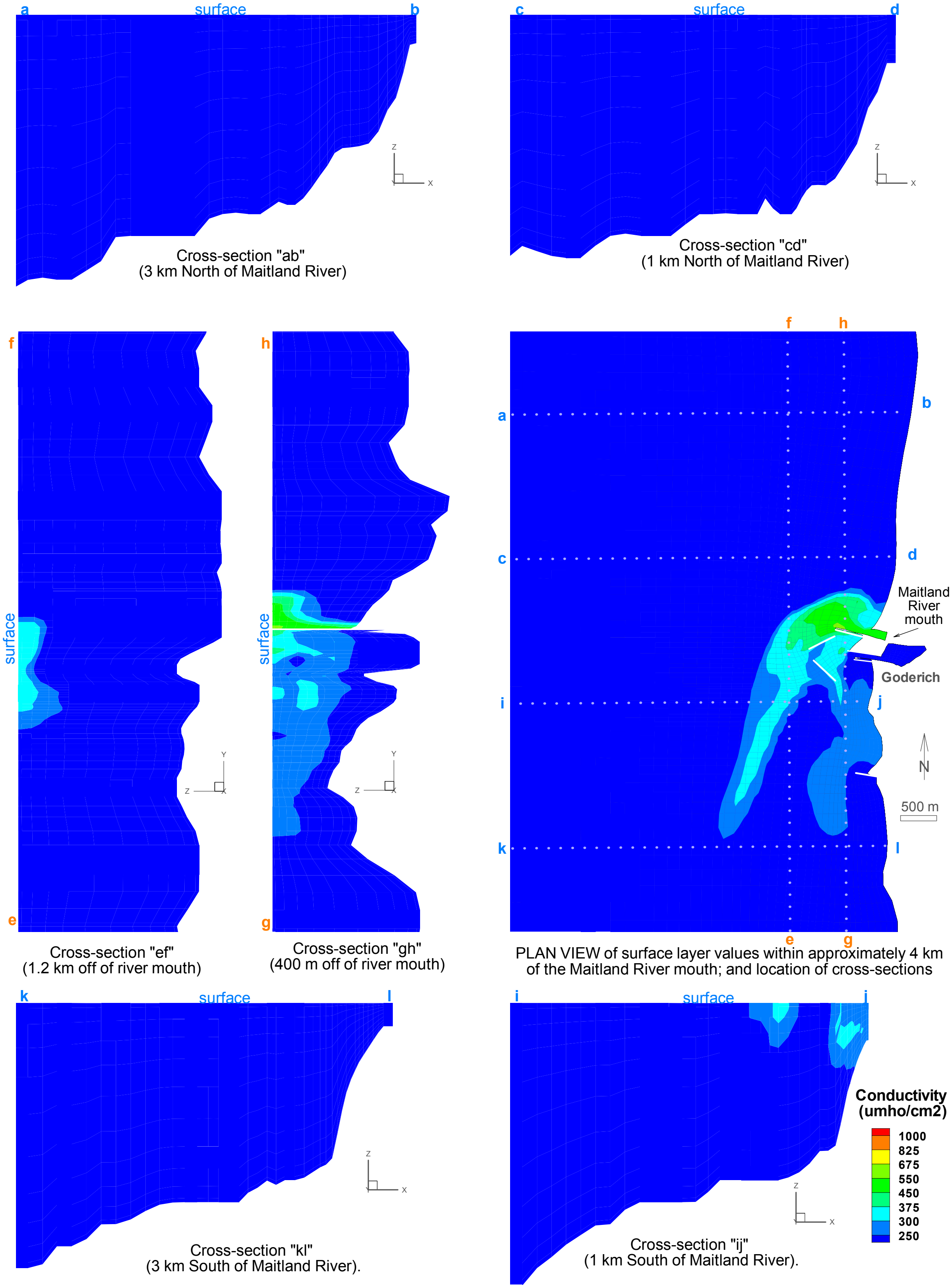


Figure 5.3C(f) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 7, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

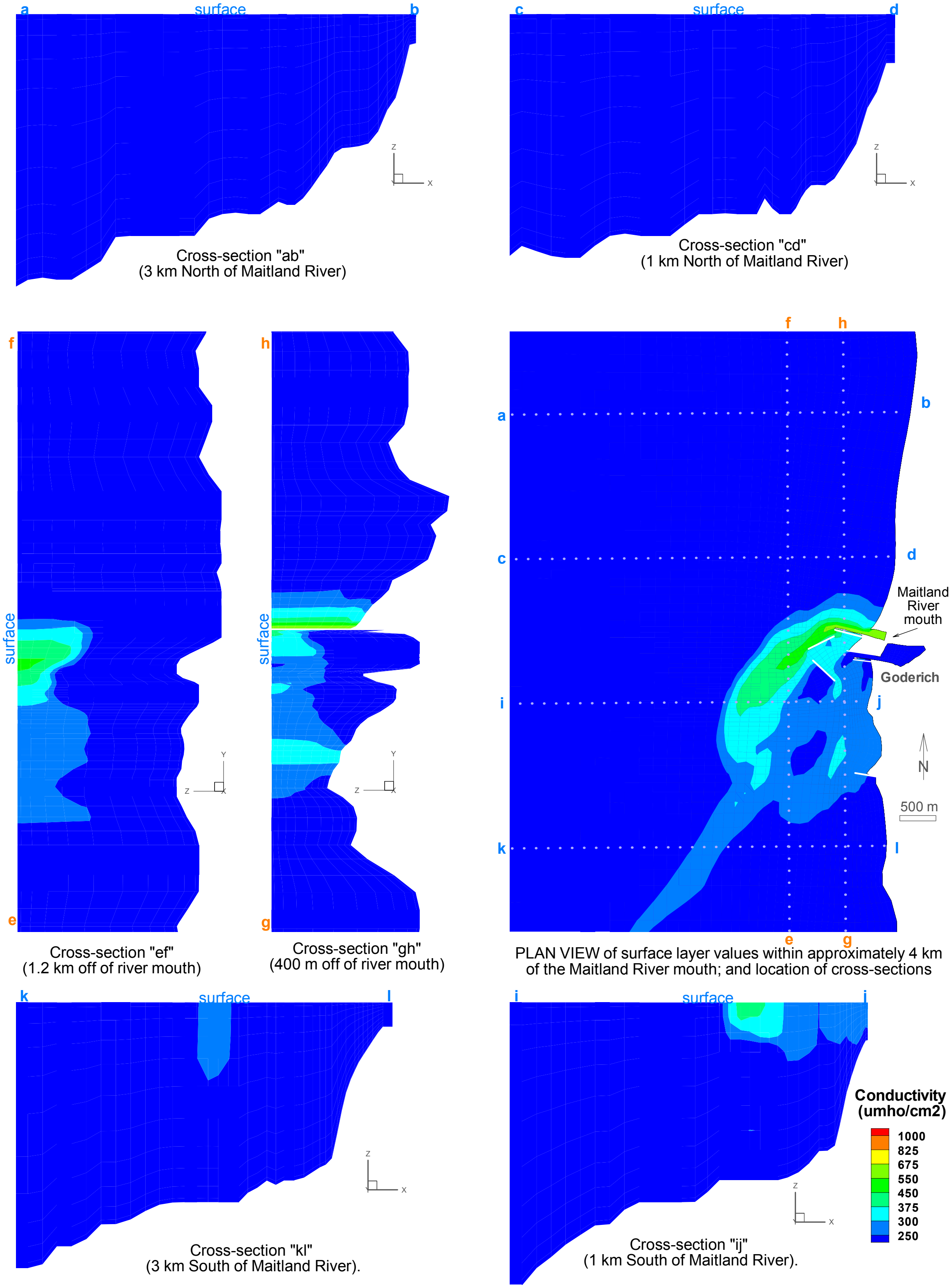


Figure 5.3C(g) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 8, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

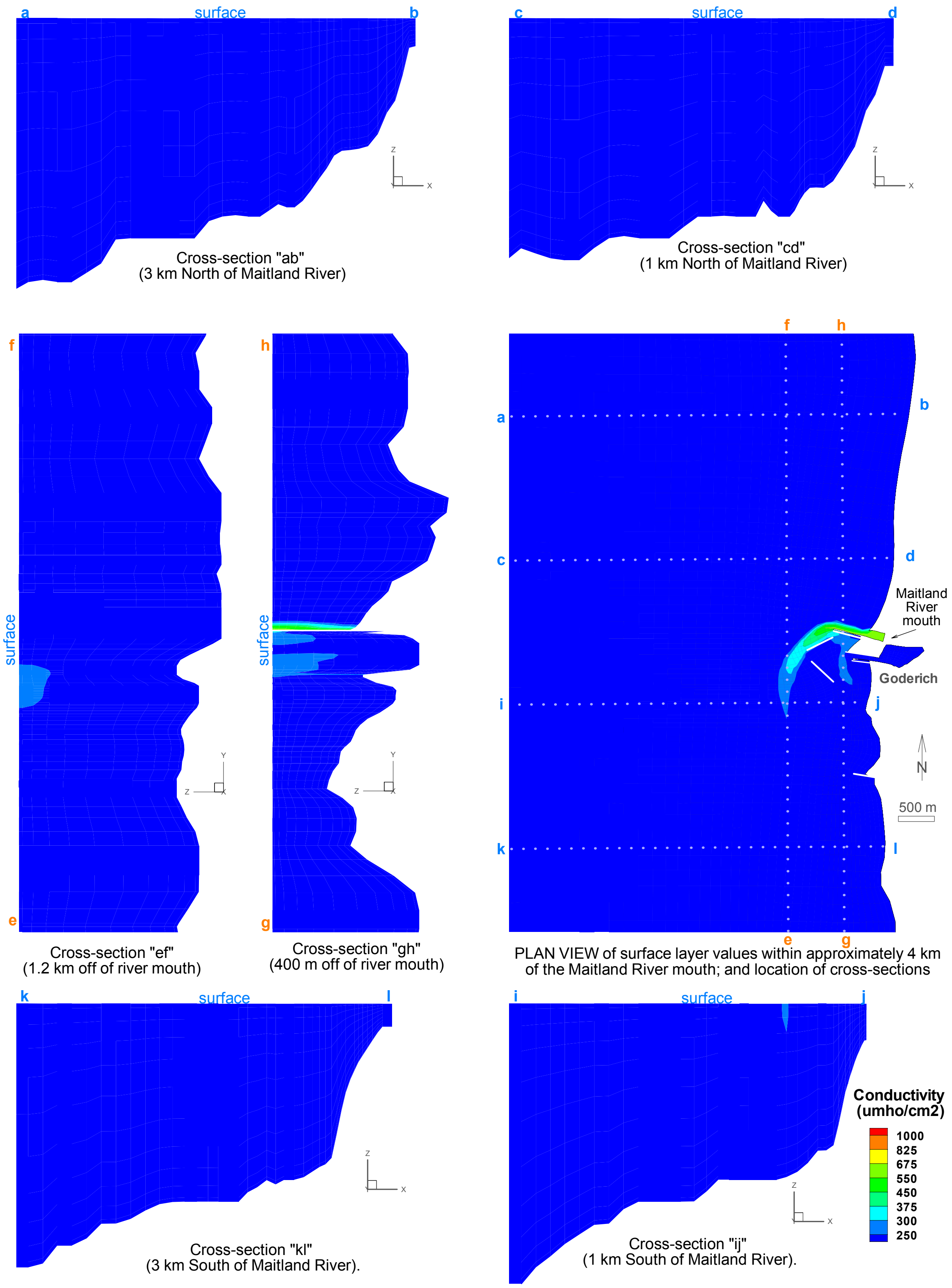


Figure 5.3C(h) **Conductivity, (plan view and 6 cross-sections), at 00 hours on August 9, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

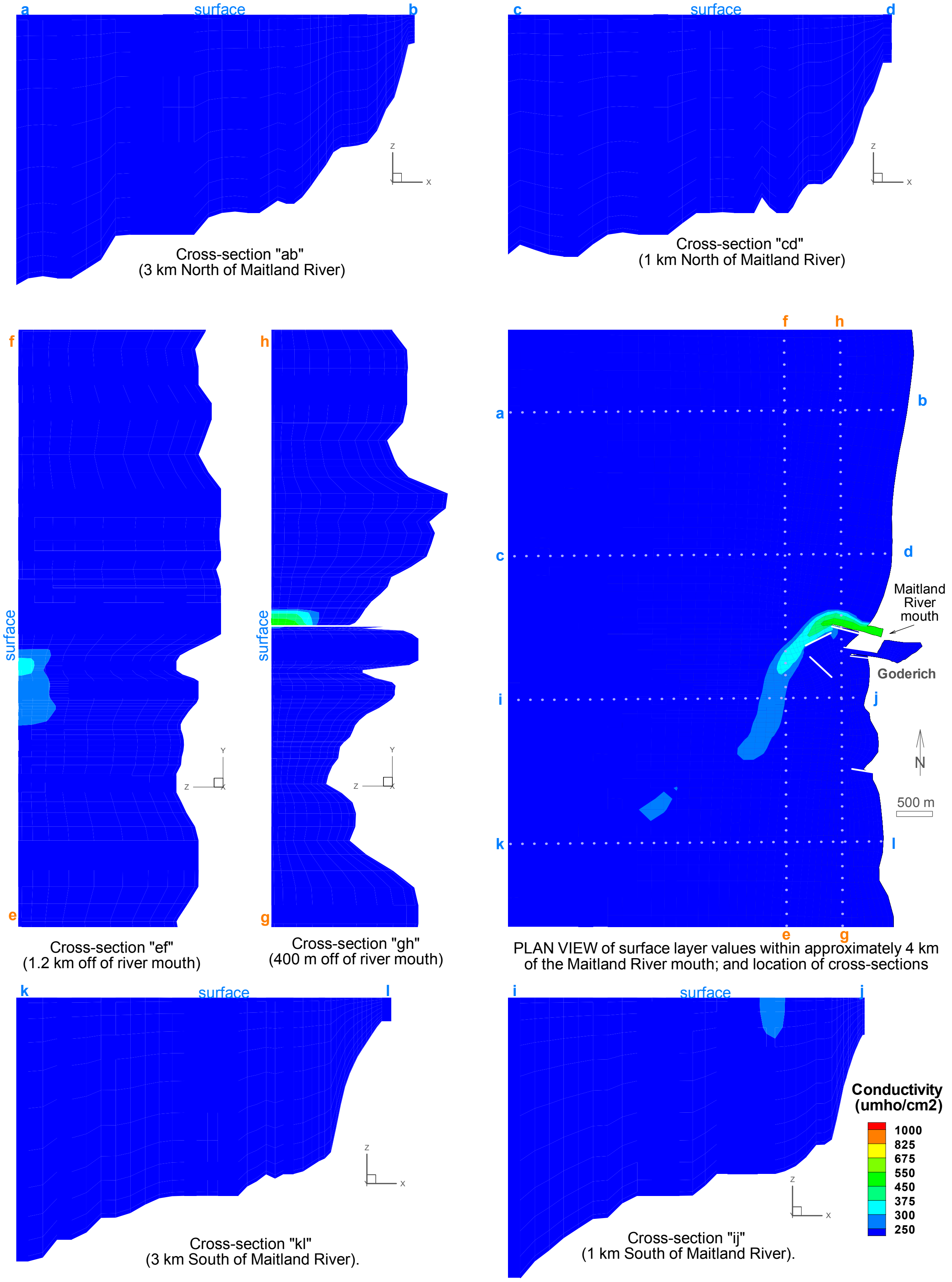
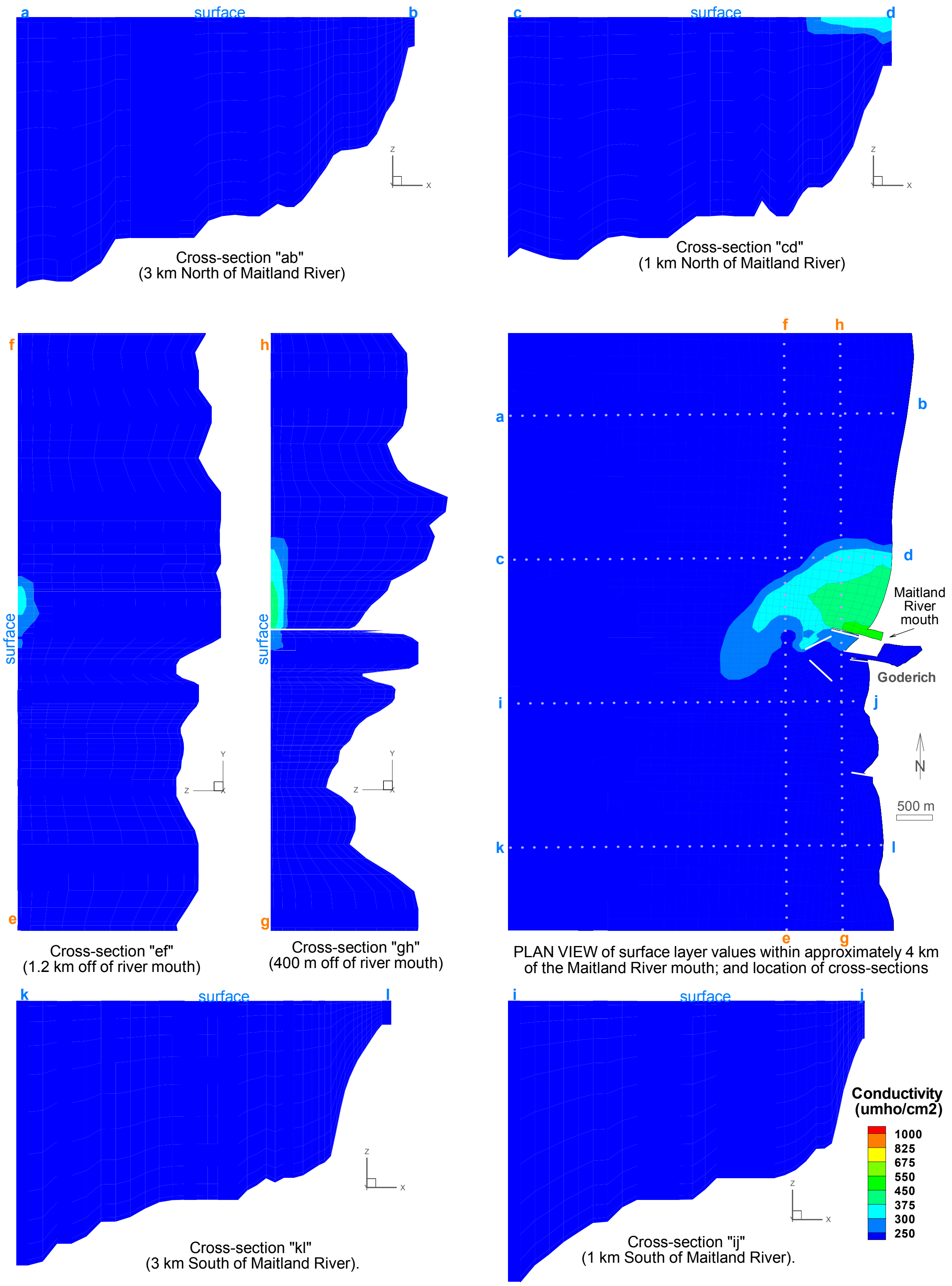


Figure 5.3C(i) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 10, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab" (3 km North of Maitland River)

Cross-section "cd" (1 km North of Maitland River)

Cross-section "ef" (1.2 km off of river mouth)

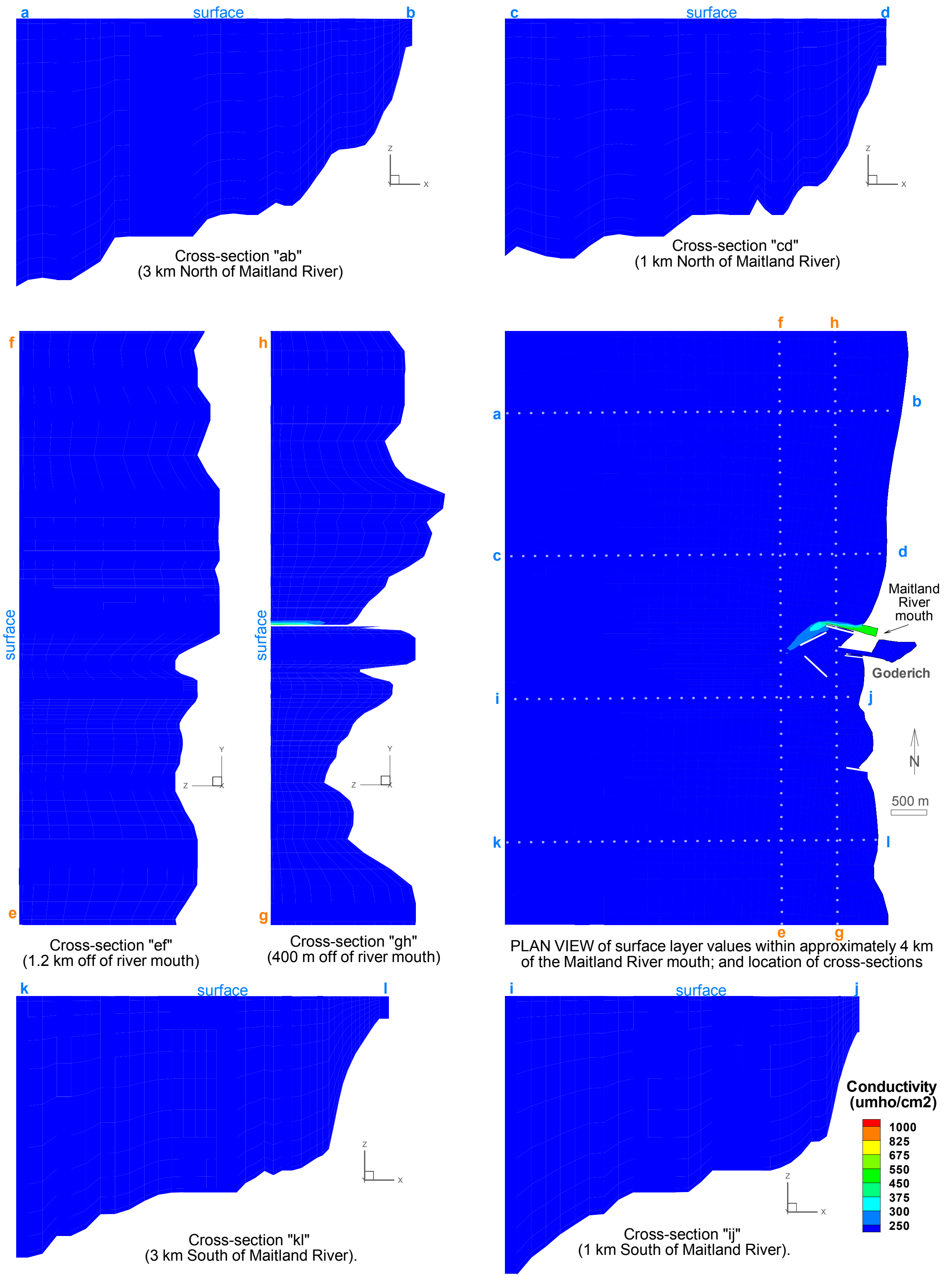
Cross-section "gh" (400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl" (3 km South of Maitland River).

Cross-section "ij" (1 km South of Maitland River).

Figure 5.3C(j) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 11, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

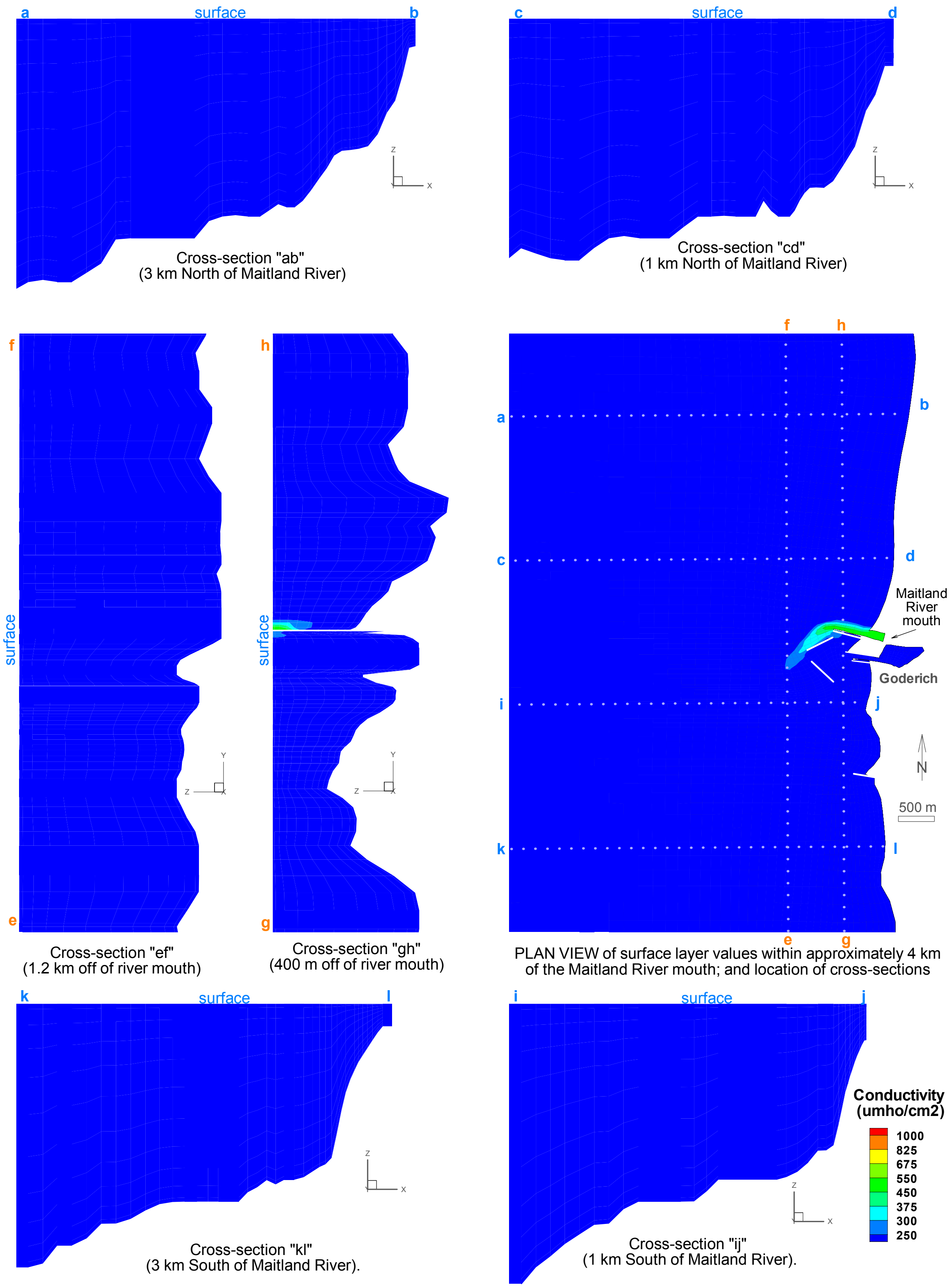
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3C(k) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 12, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3C(I) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 13, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

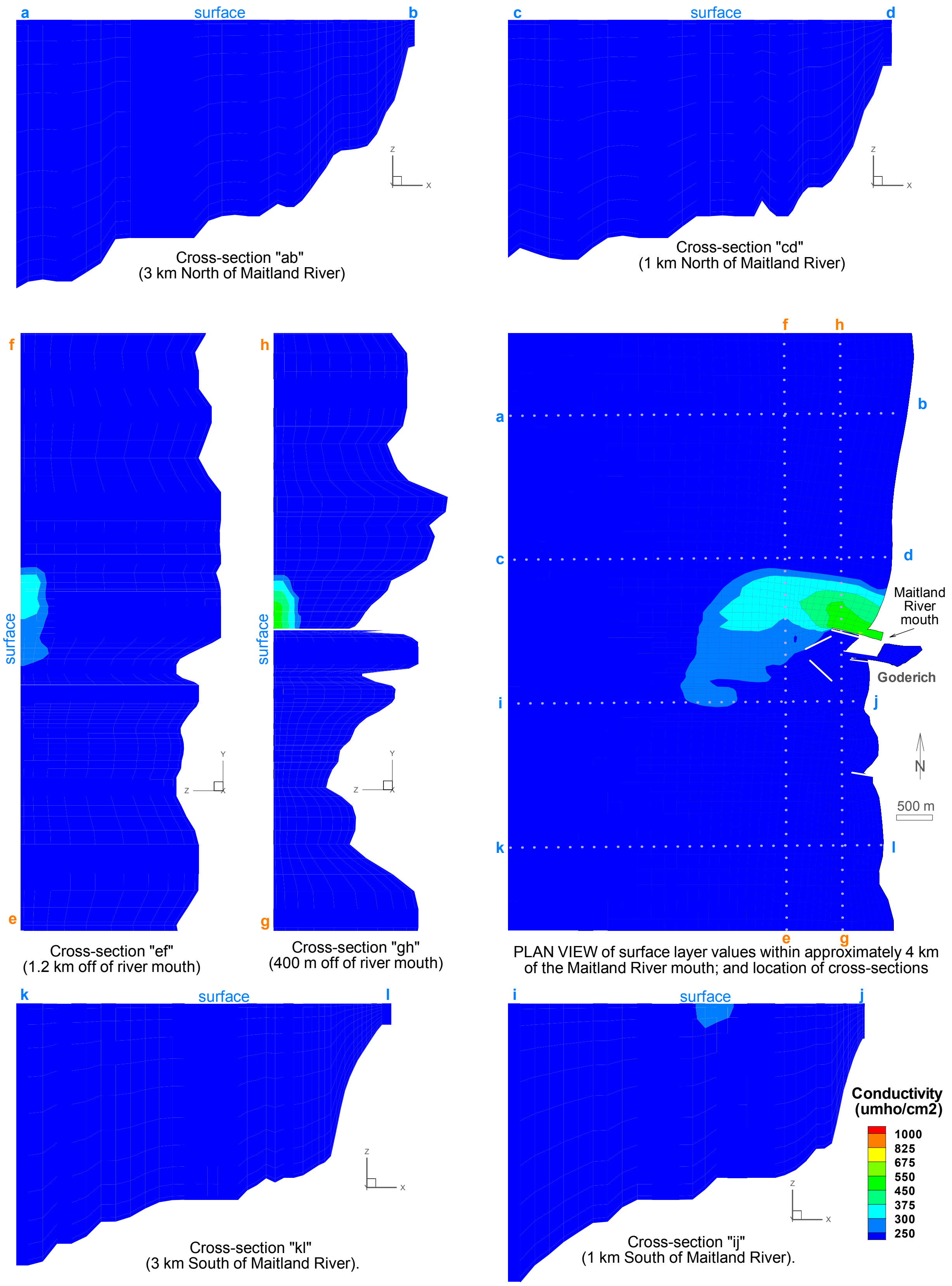
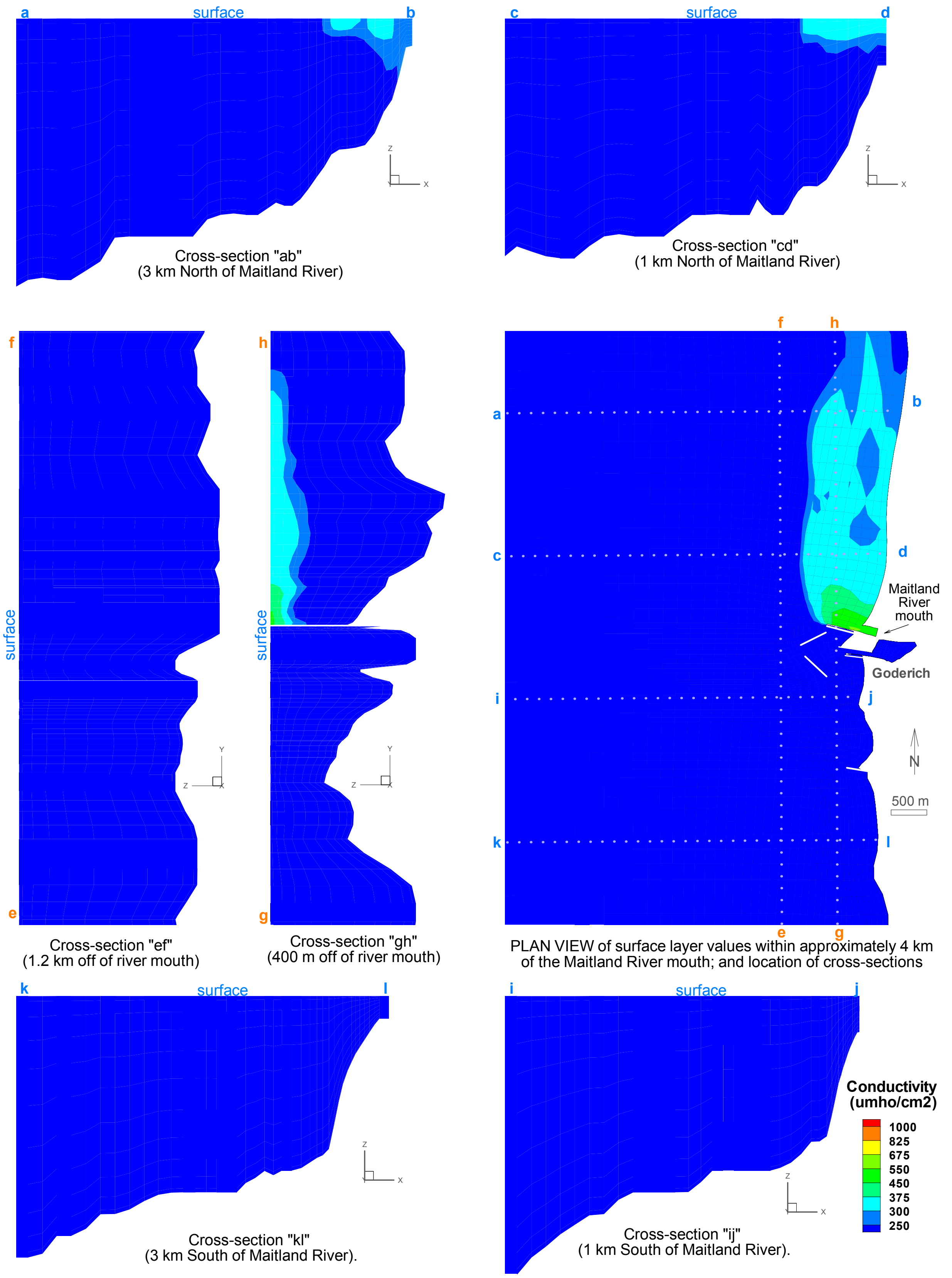


Figure 5.3C(m) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 14, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

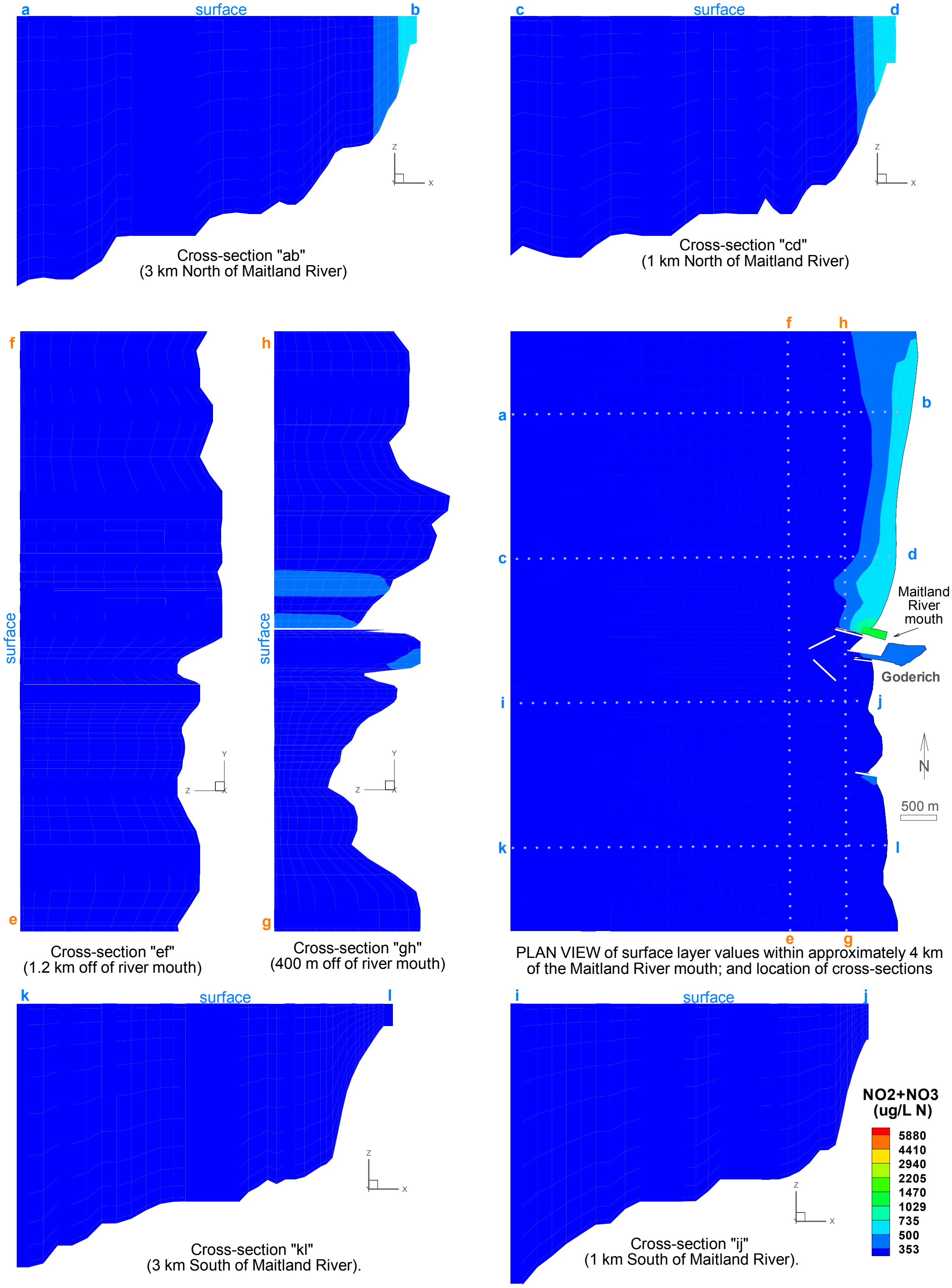
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3C(n) Conductivity, (plan view and 6 cross-sections), at 00 hours on August 15, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

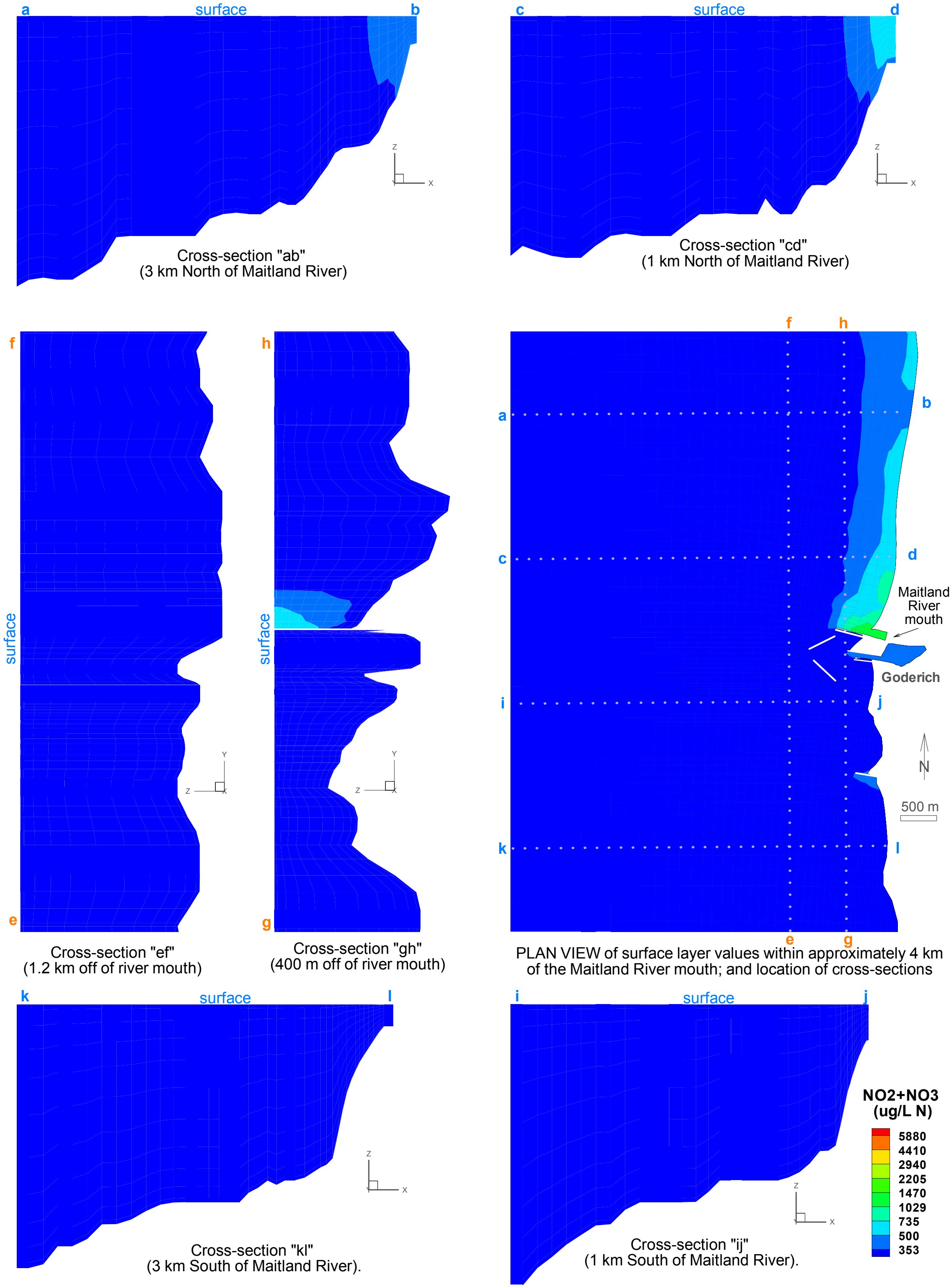
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3N(a) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 2, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3N(b) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 3, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

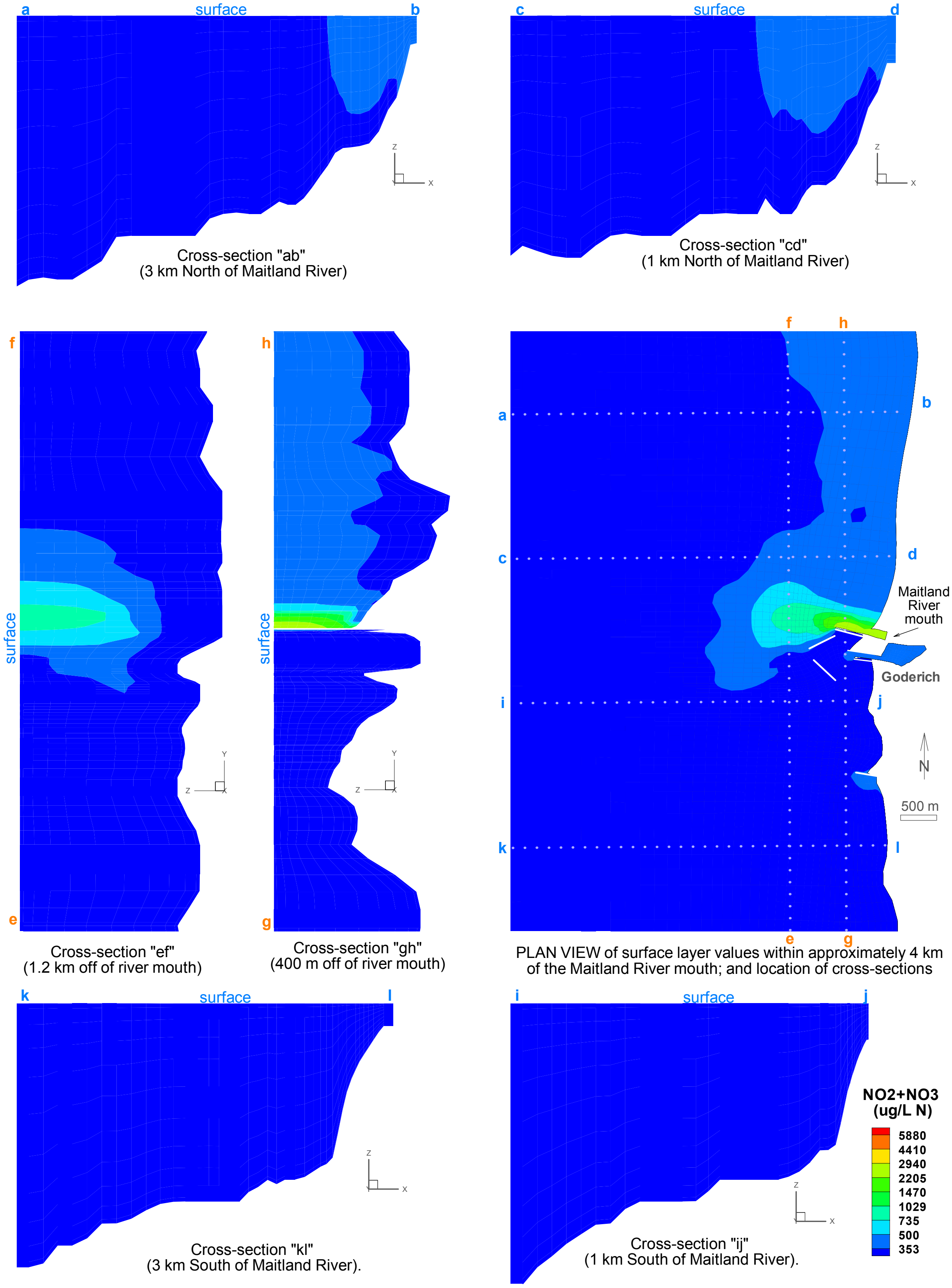
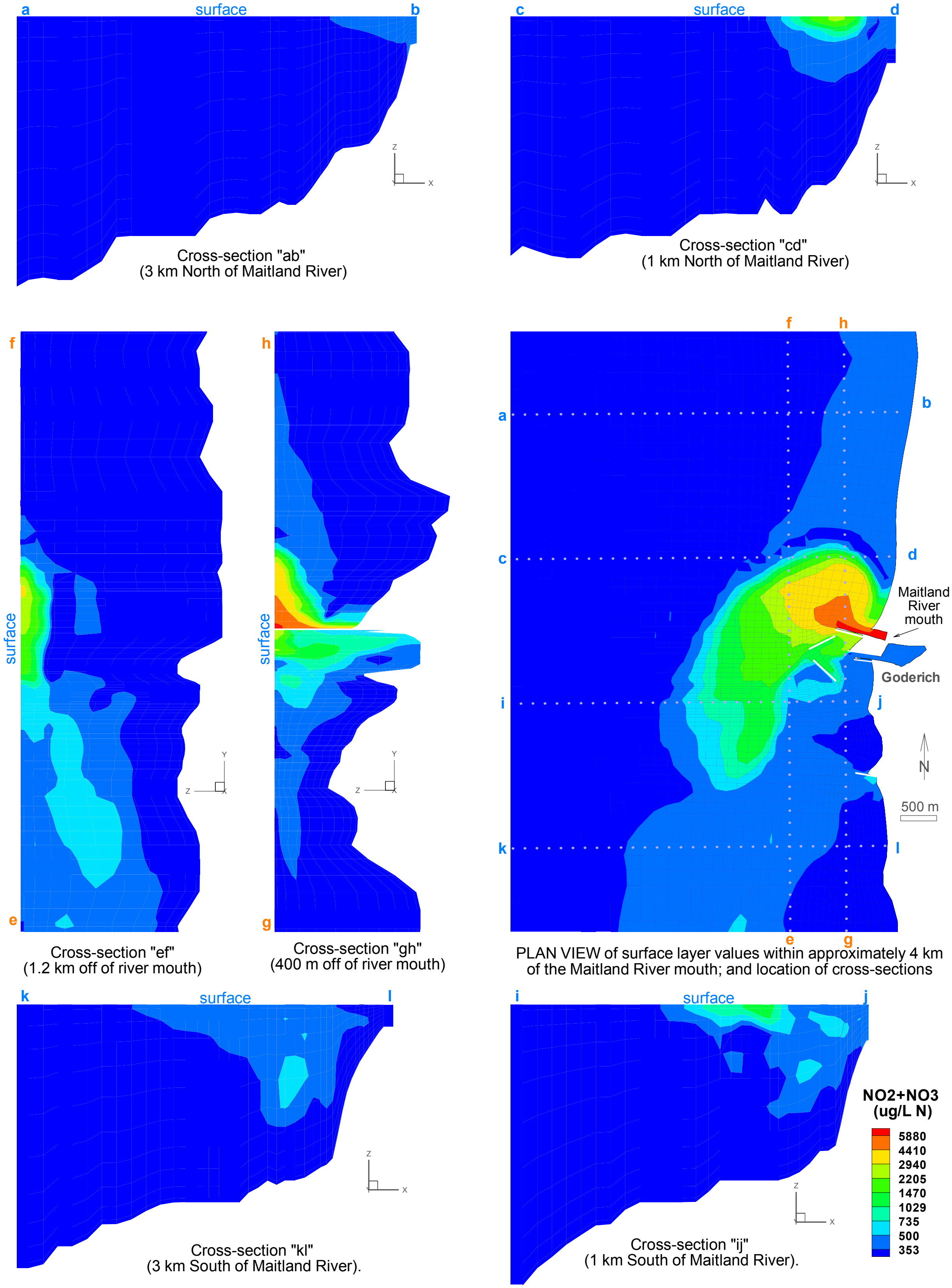


Figure 5.3N(c) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 4, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3N(d) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 5, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

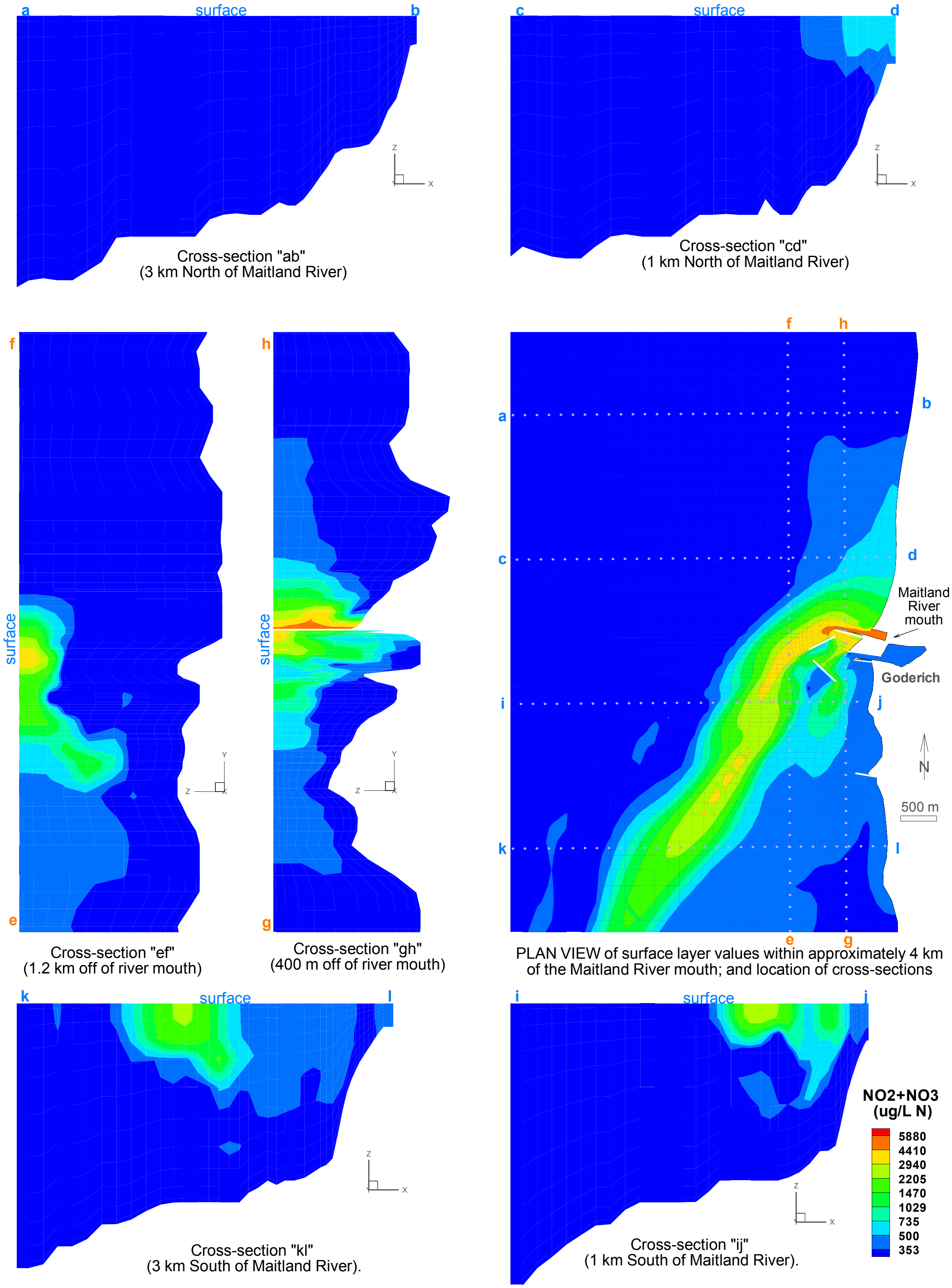
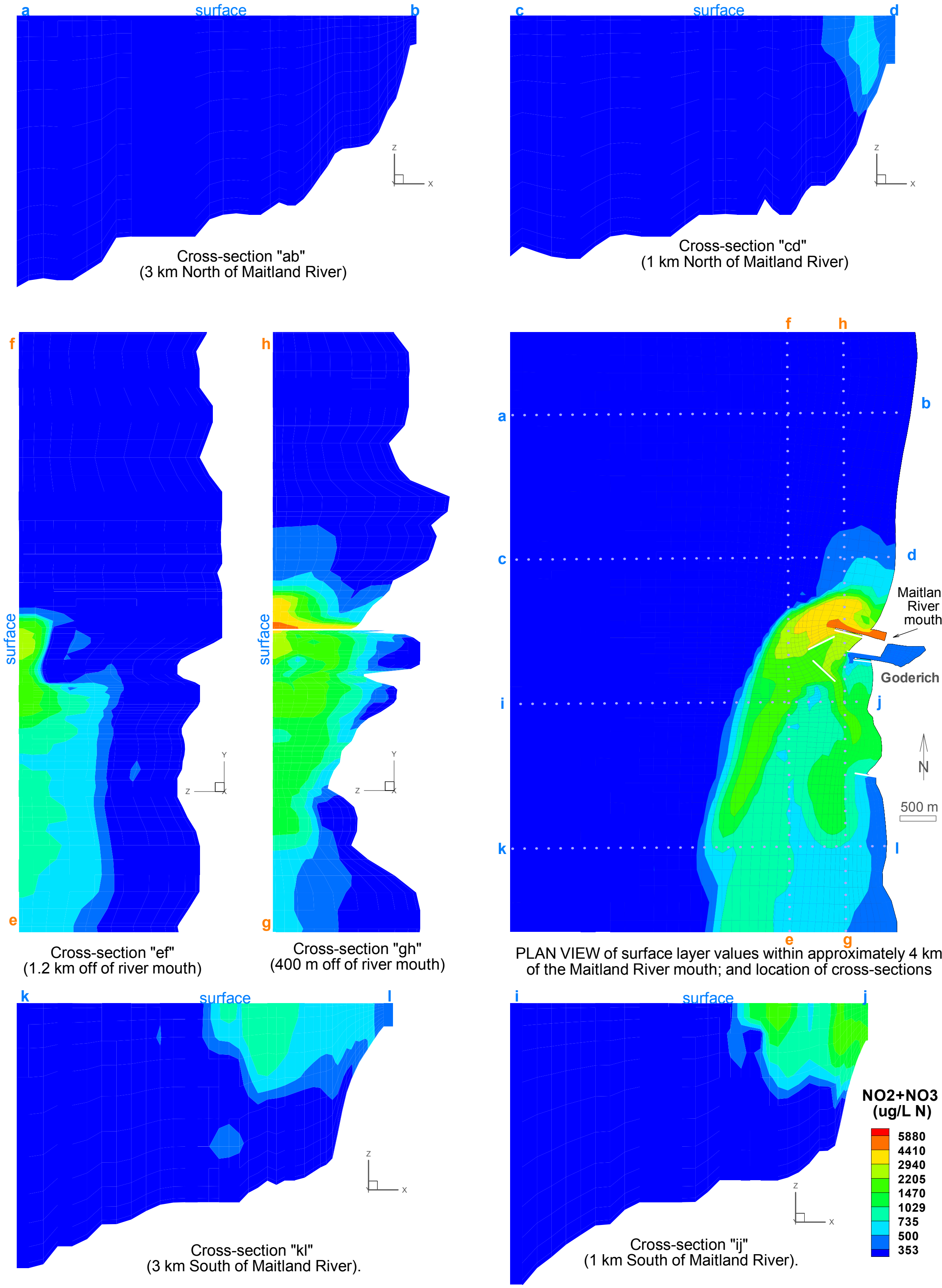


Figure 5.3N(e) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 6, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab" (3 km North of Maitland River)

Cross-section "cd" (1 km North of Maitland River)

Cross-section "ef" (1.2 km off of river mouth)

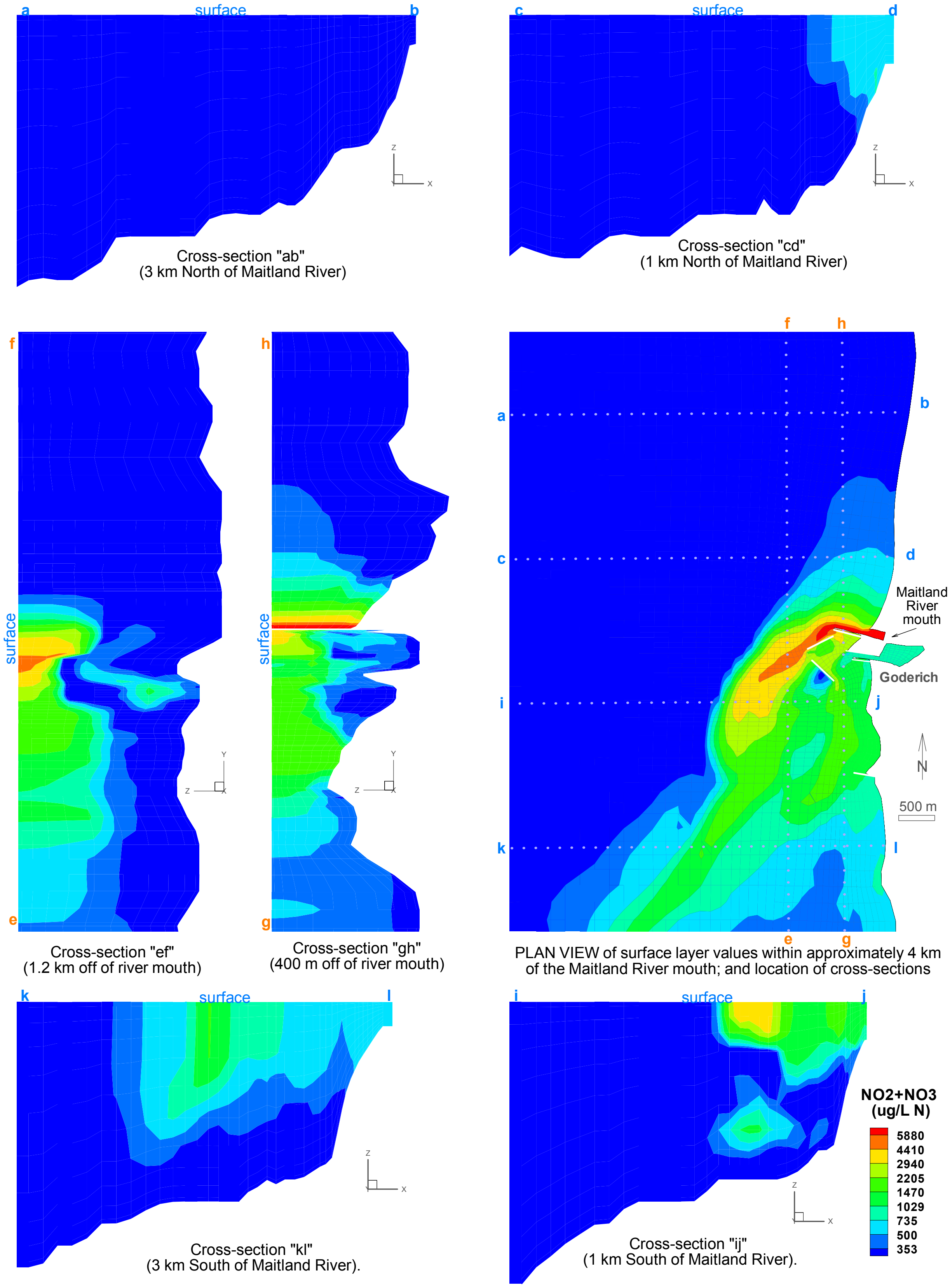
Cross-section "gh" (400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl" (3 km South of Maitland River).

Cross-section "ij" (1 km South of Maitland River).

Figure 5.3N(f) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 7, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

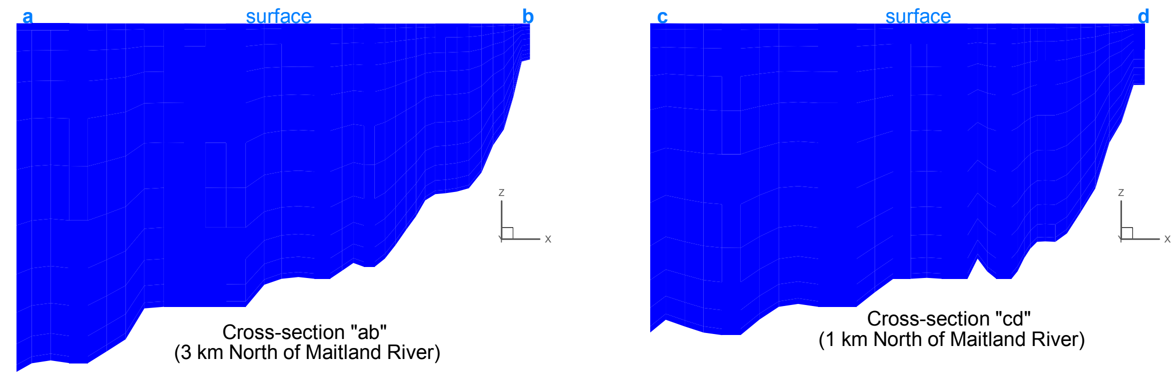
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

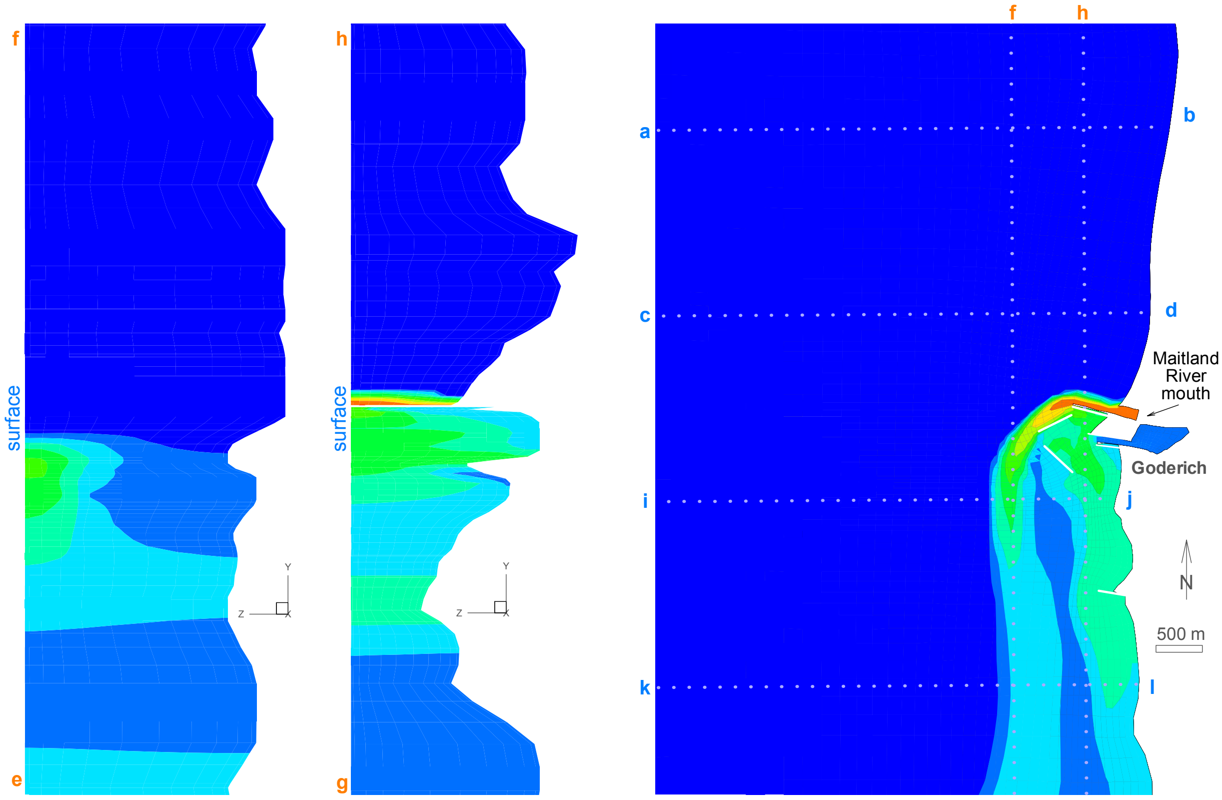
Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3N(g) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 8, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

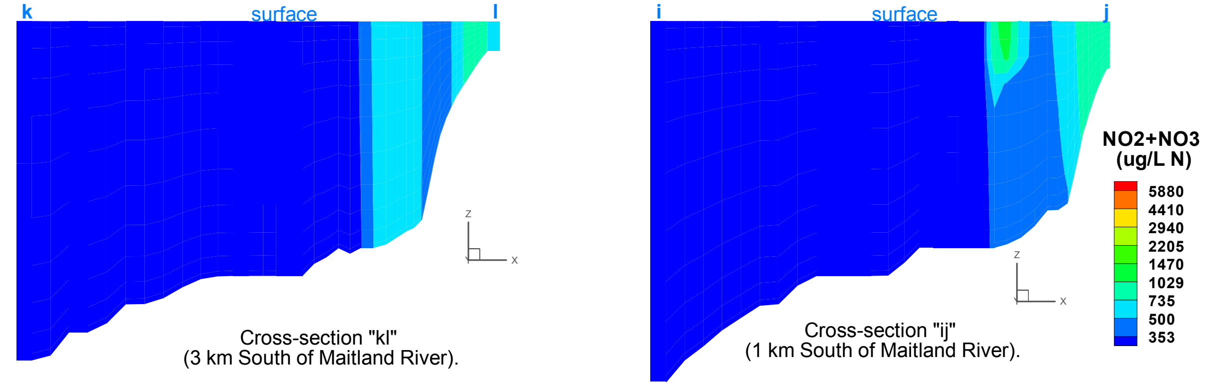
Cross-section "cd"
(1 km North of Maitland River)



Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

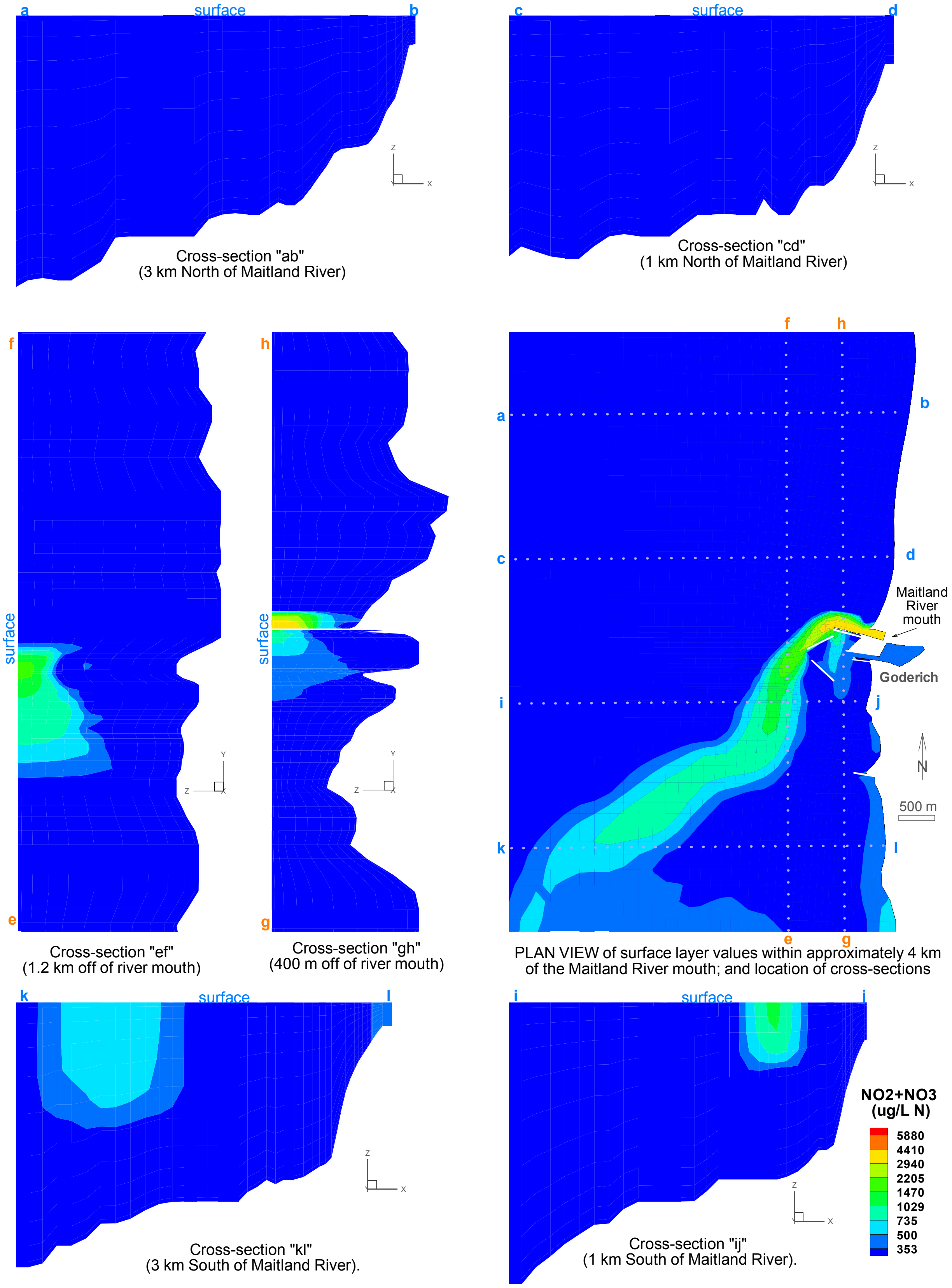
PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections



Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3N(h) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 9, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].


Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

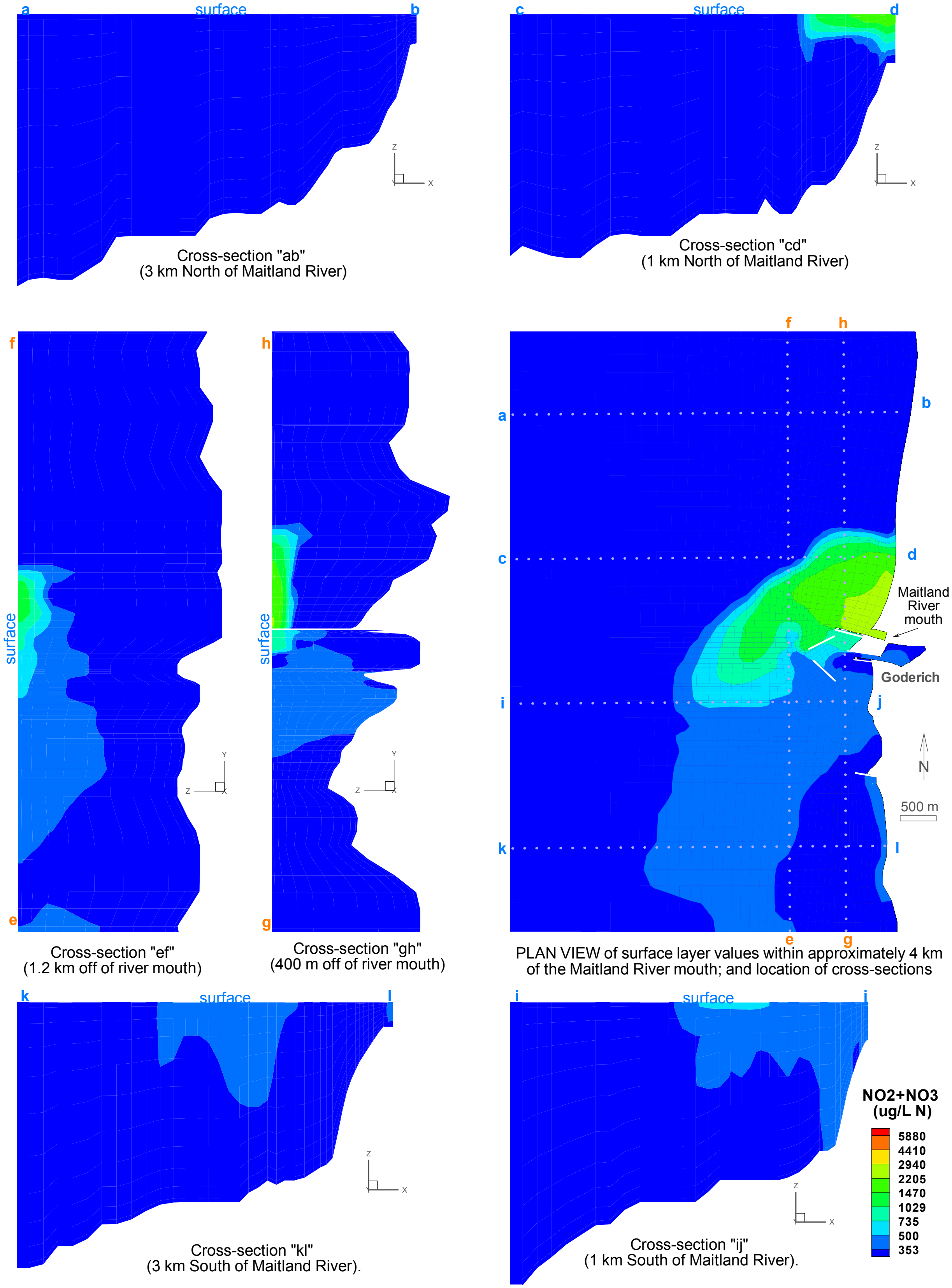
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3N(i) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 10, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

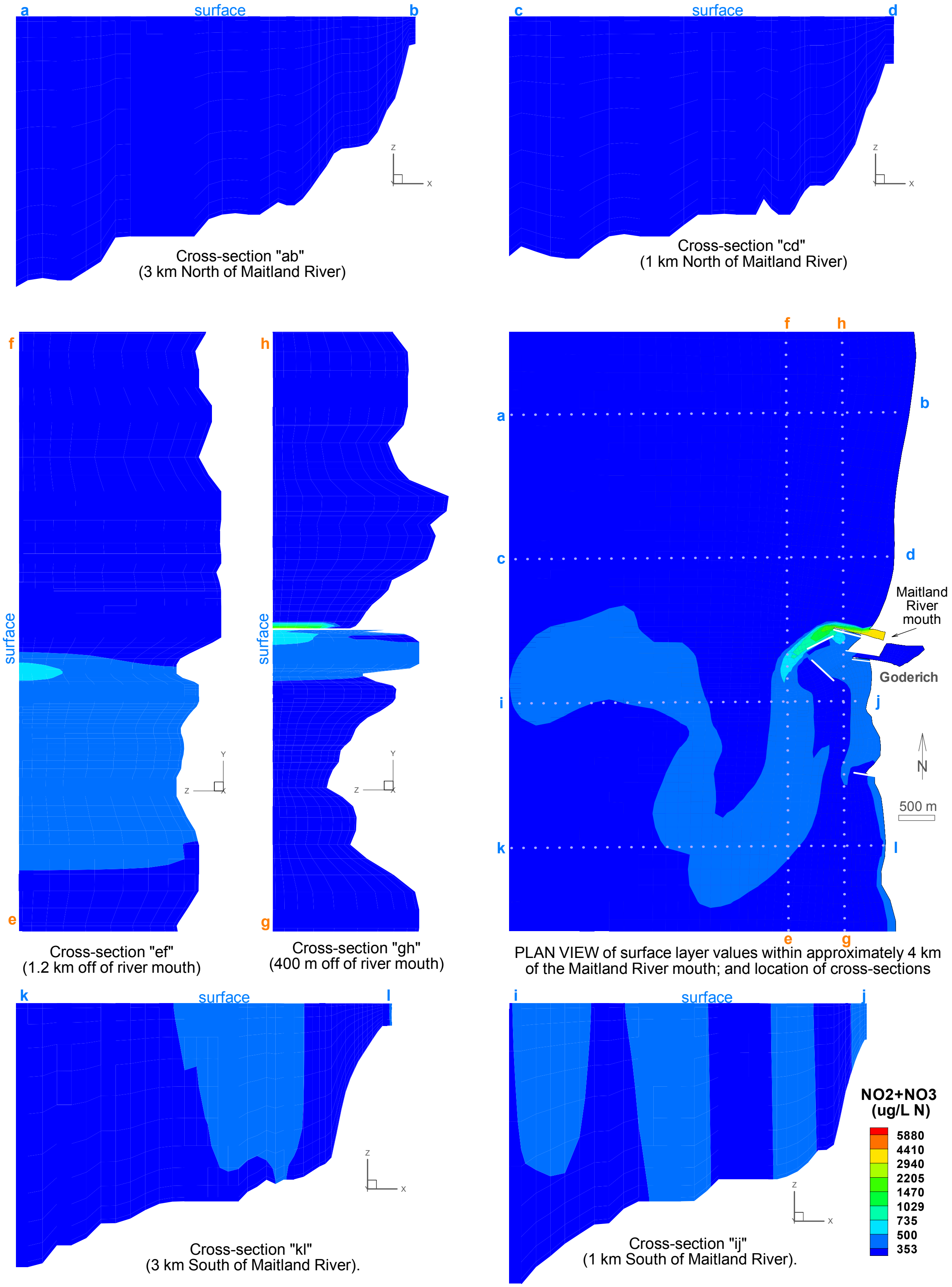
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3N(j) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 11, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

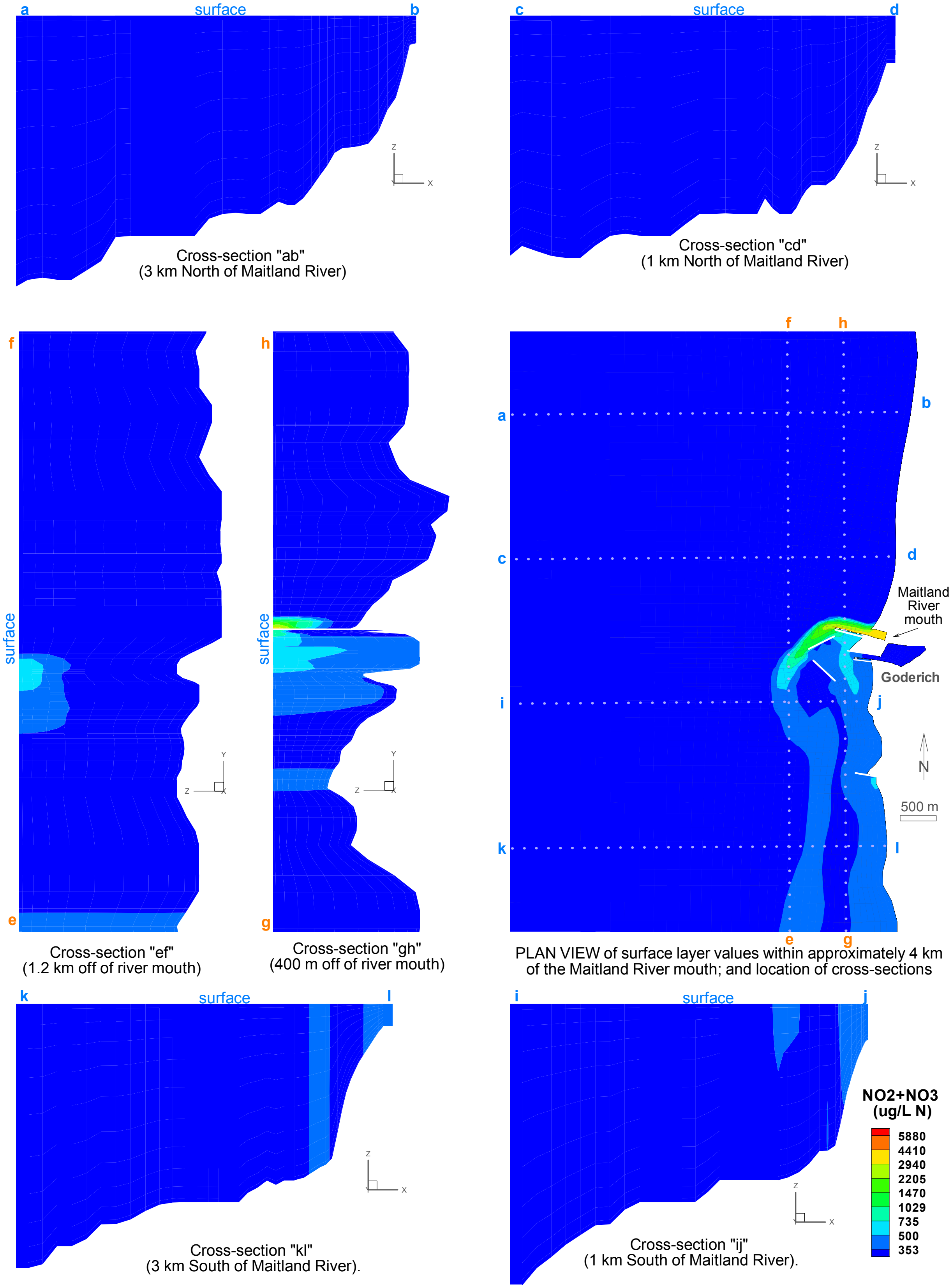
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3N(k) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 12, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

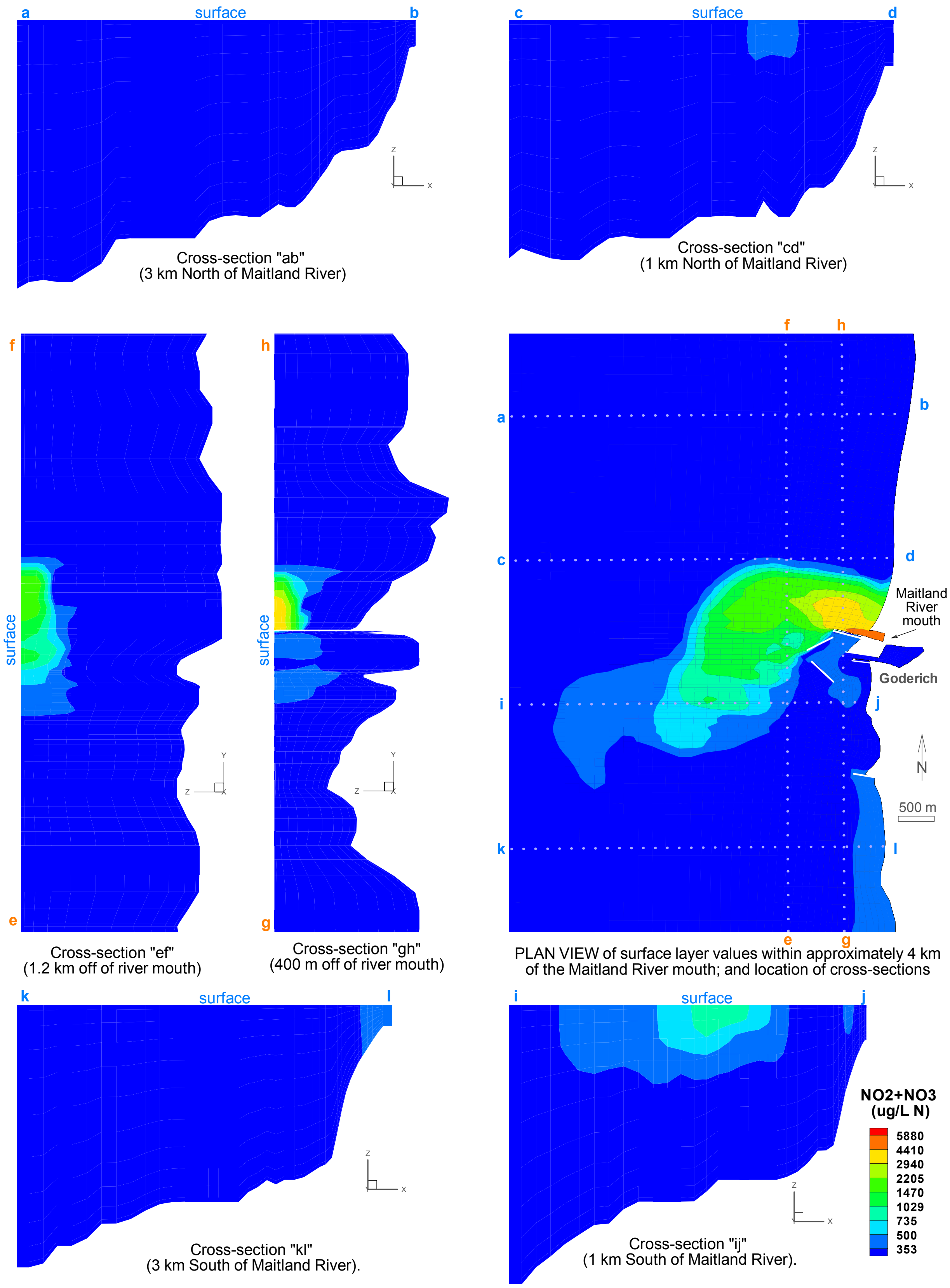
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3N(l) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 13, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.3N(m) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 14, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

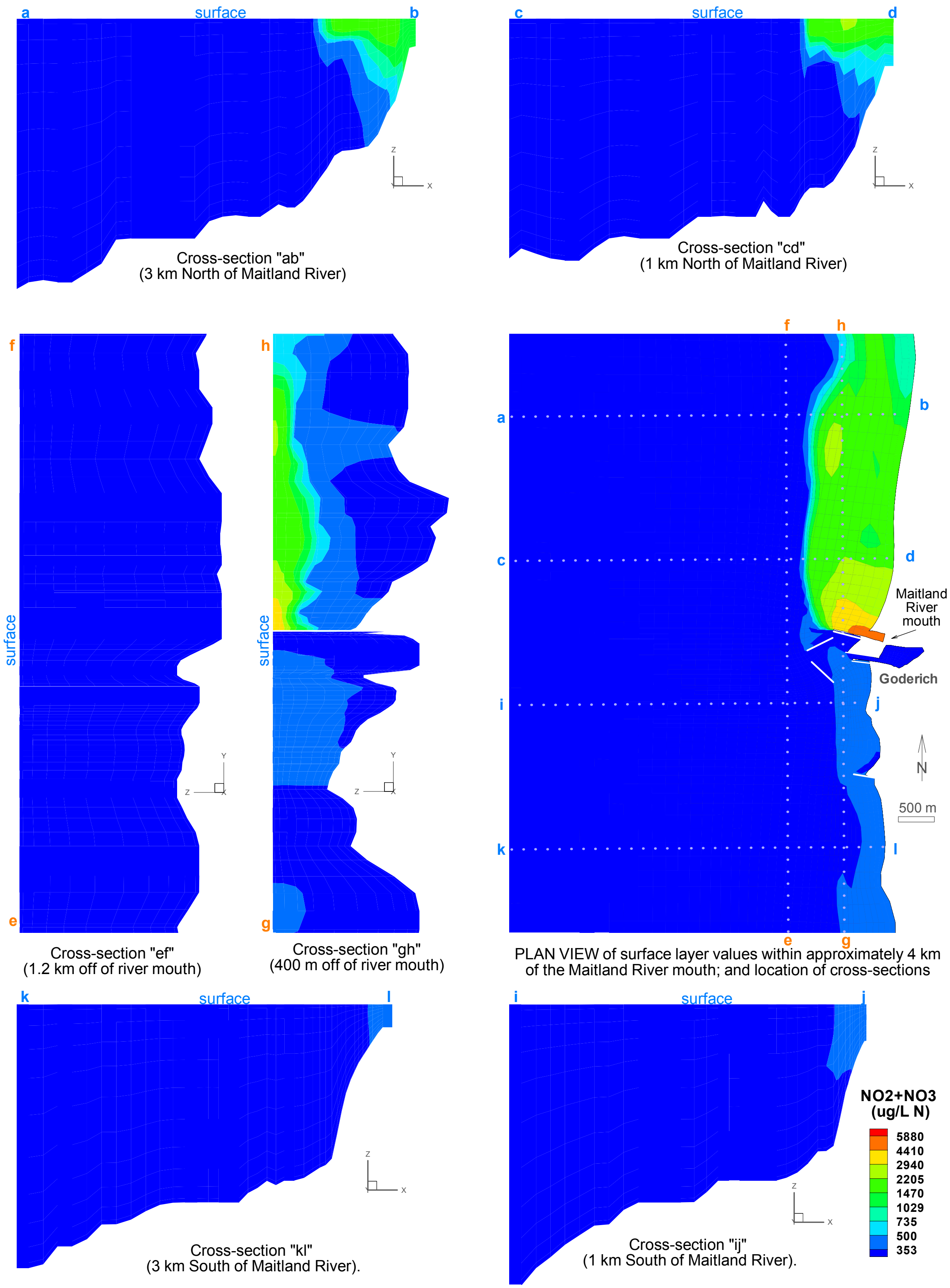


Figure 5.3N(n) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on August 15, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

Event 4 Maitland River (autumn) storm runoff (November 12 to 28)

Parameters ***(in presentation order)*****:**	**Figure series:**
Water velocities	**5.4U (a) to (i)**
Water temperatures	**5.4T (a) to (i)**
Conductivity	**5.4C (a) to (i)**
NO2+NO3	**5.4N (a) to (i)**

Where: (a) to (i) represents the following dates-times:
(a) November 12 @ 00:00 hrs
(b) November 14 @ 00:00 hrs
(c) November 16 @ 00:00 hrs
(d) November 18 @ 00:00 hrs
(e) November 20 @ 00:00 hrs
(f) November 22 @ 00:00 hrs
(g) November 24 @ 00:00 hrs
(h) November 26 @ 00:00 hrs
(i) November 28 @ 00:00 hrs

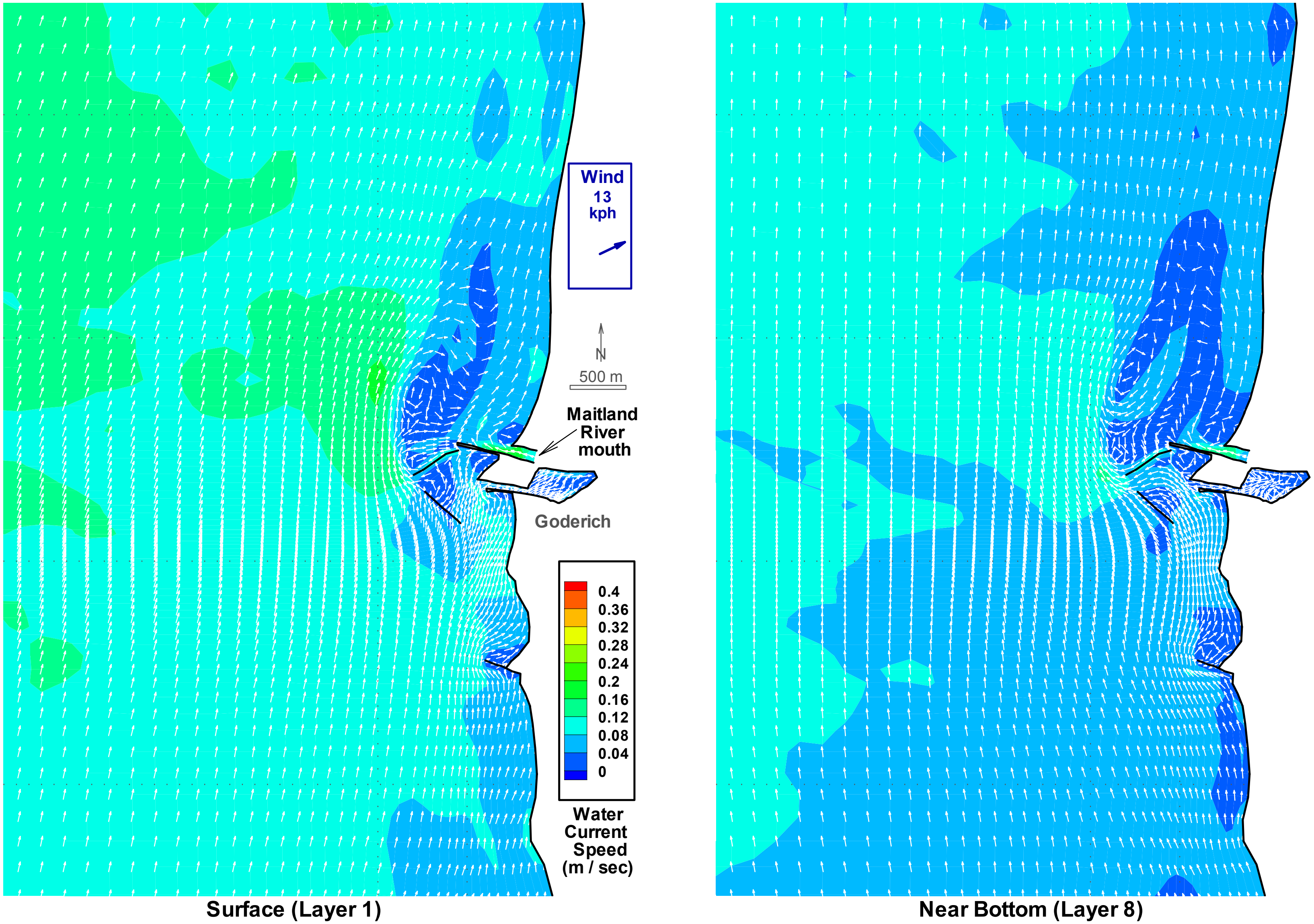


Figure 5.4U(a) Water current velocities at 00:00 hours on November 12, 2003; (directions indicated by arrows, speeds by contours).

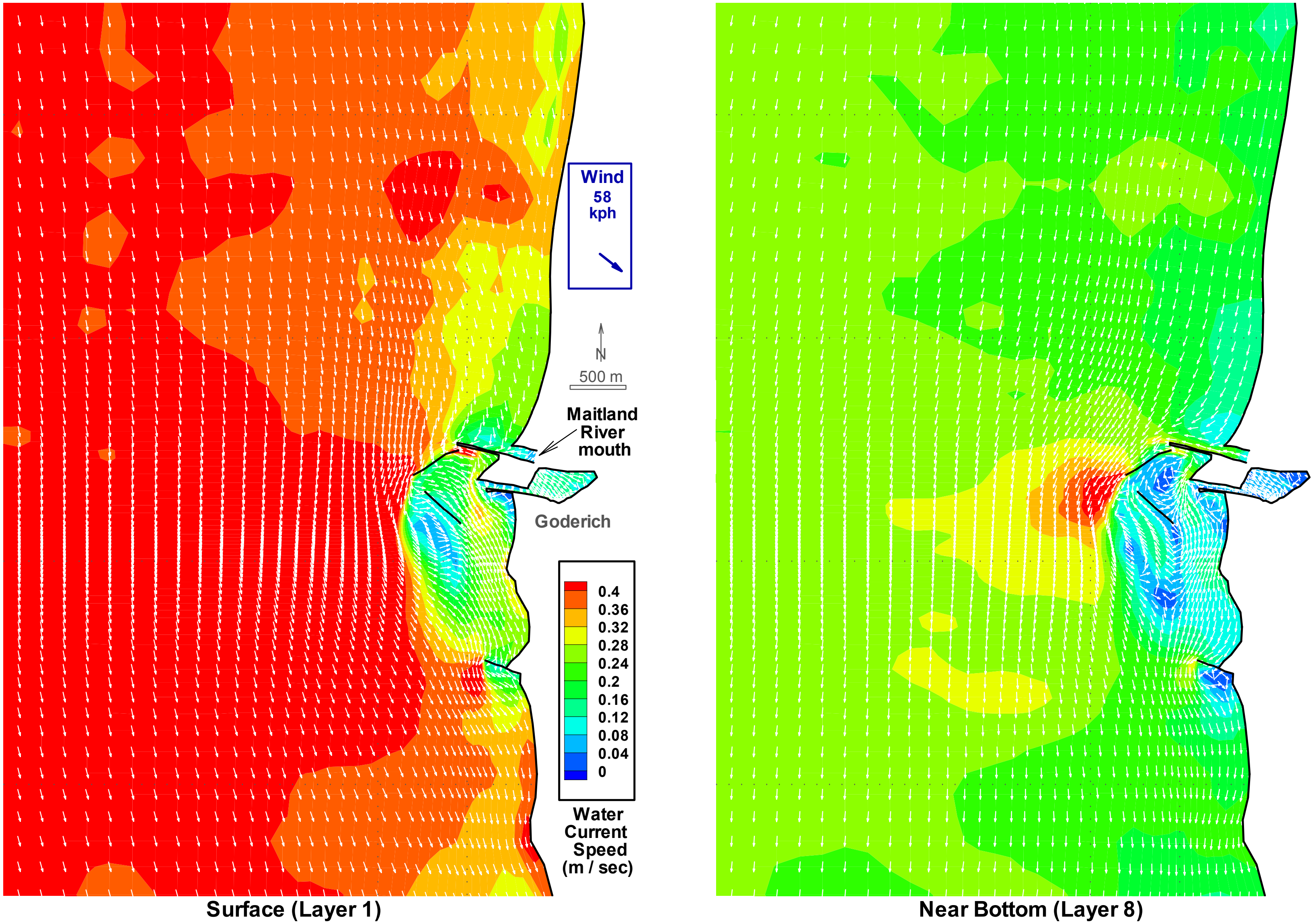


Figure 5.4U(b) Water current velocities at 00:00 hours on November 14, 2003; (directions indicated by arrows, speeds by contours).

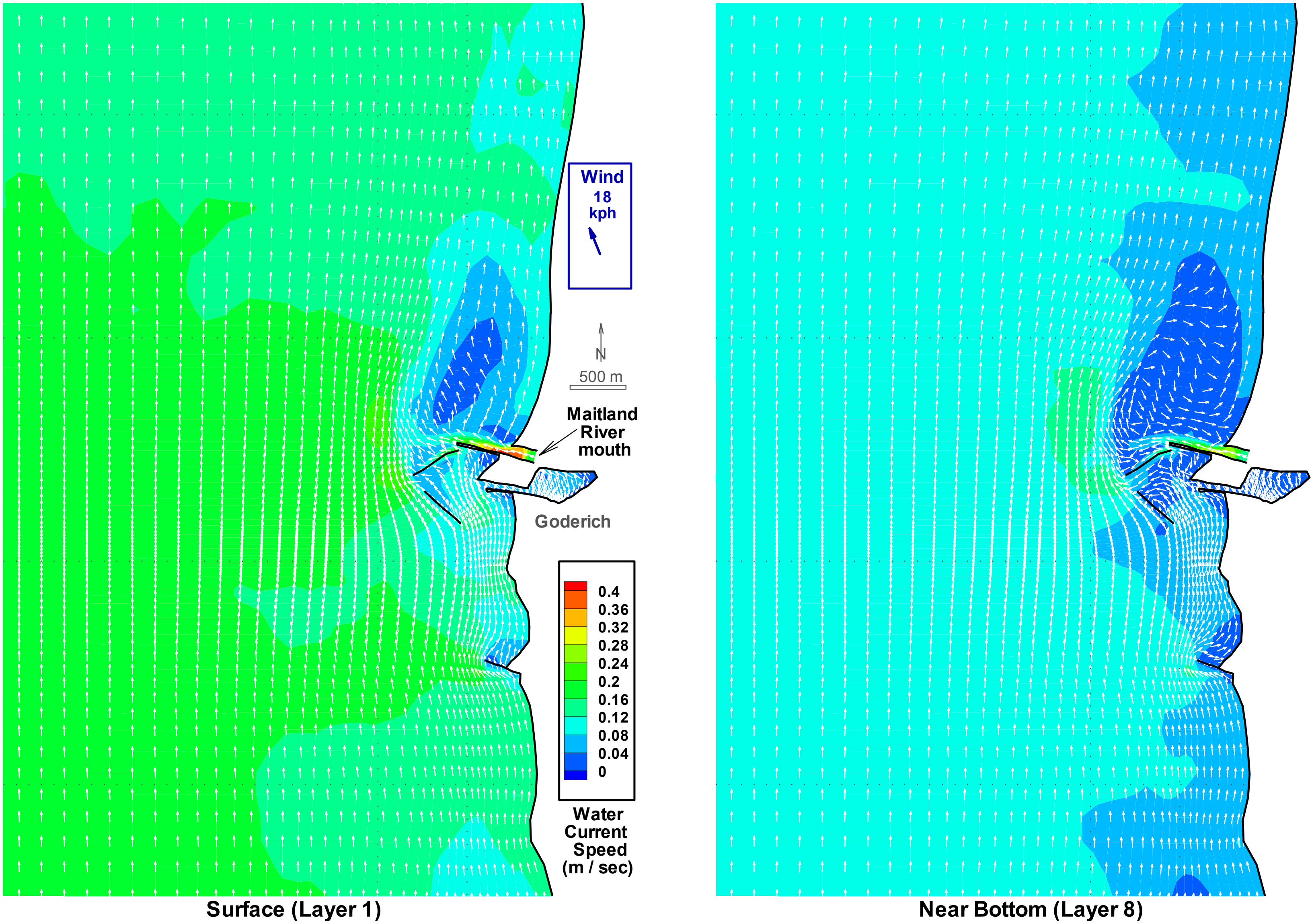


Figure 5.4U(c) Water current velocities at 00:00 hours on November 16, 2003; (directions indicated by arrows, speeds by contours).

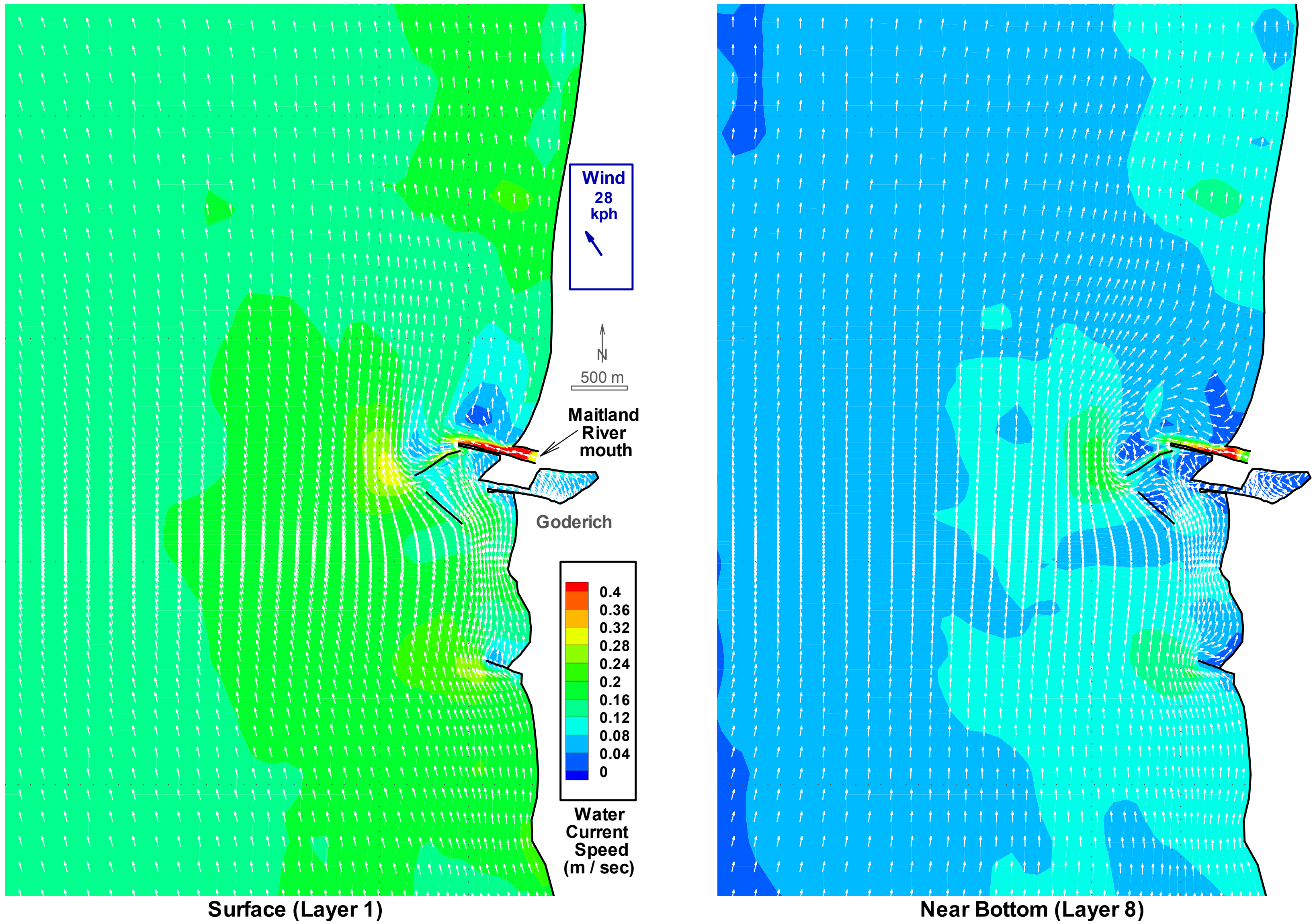


Figure 5.4U(d) Water current velocities at 00:00 hours on November 18, 2003; (directions indicated by arrows, speeds by contours).

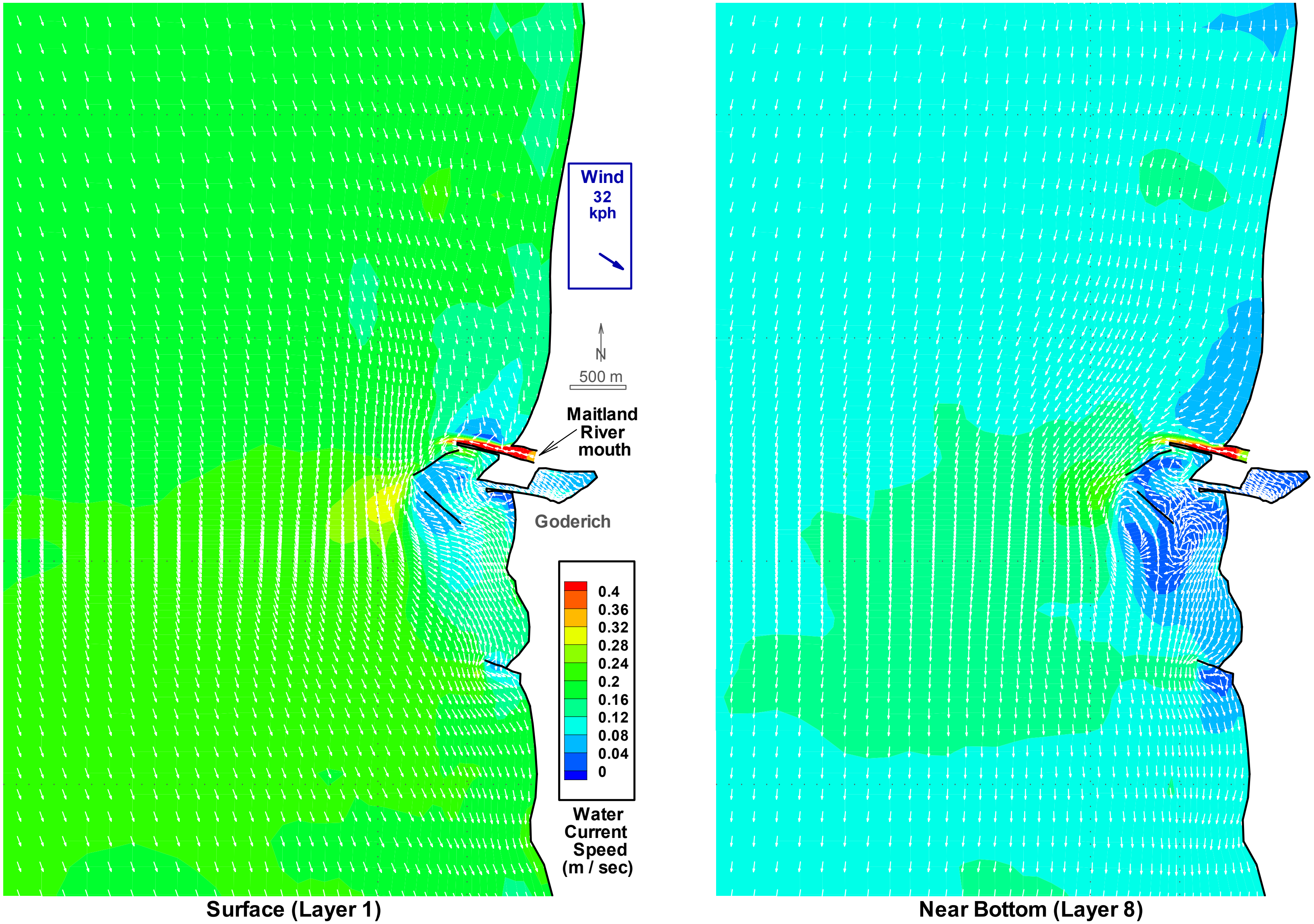
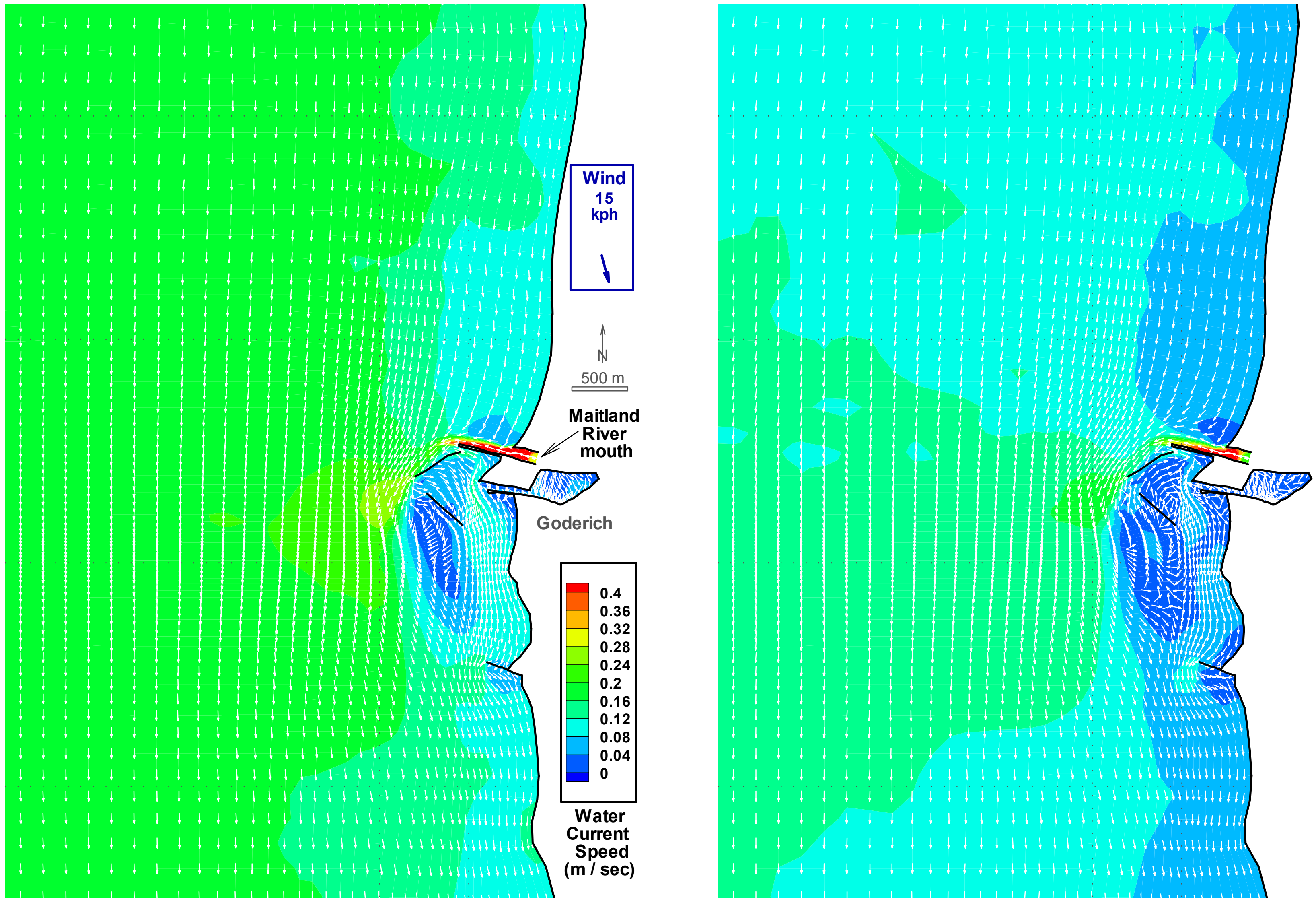


Figure 5.4U(e) Water current velocities at 00:00 hours on November 20, 2003; (directions indicated by arrows, speeds by contours).



Surface (Layer 1)

Near Bottom (Layer 8)

Figure 5.4U(f) Water current velocities at 00:00 hours on November 22, 2003; (directions indicated by arrows, speeds by contours).

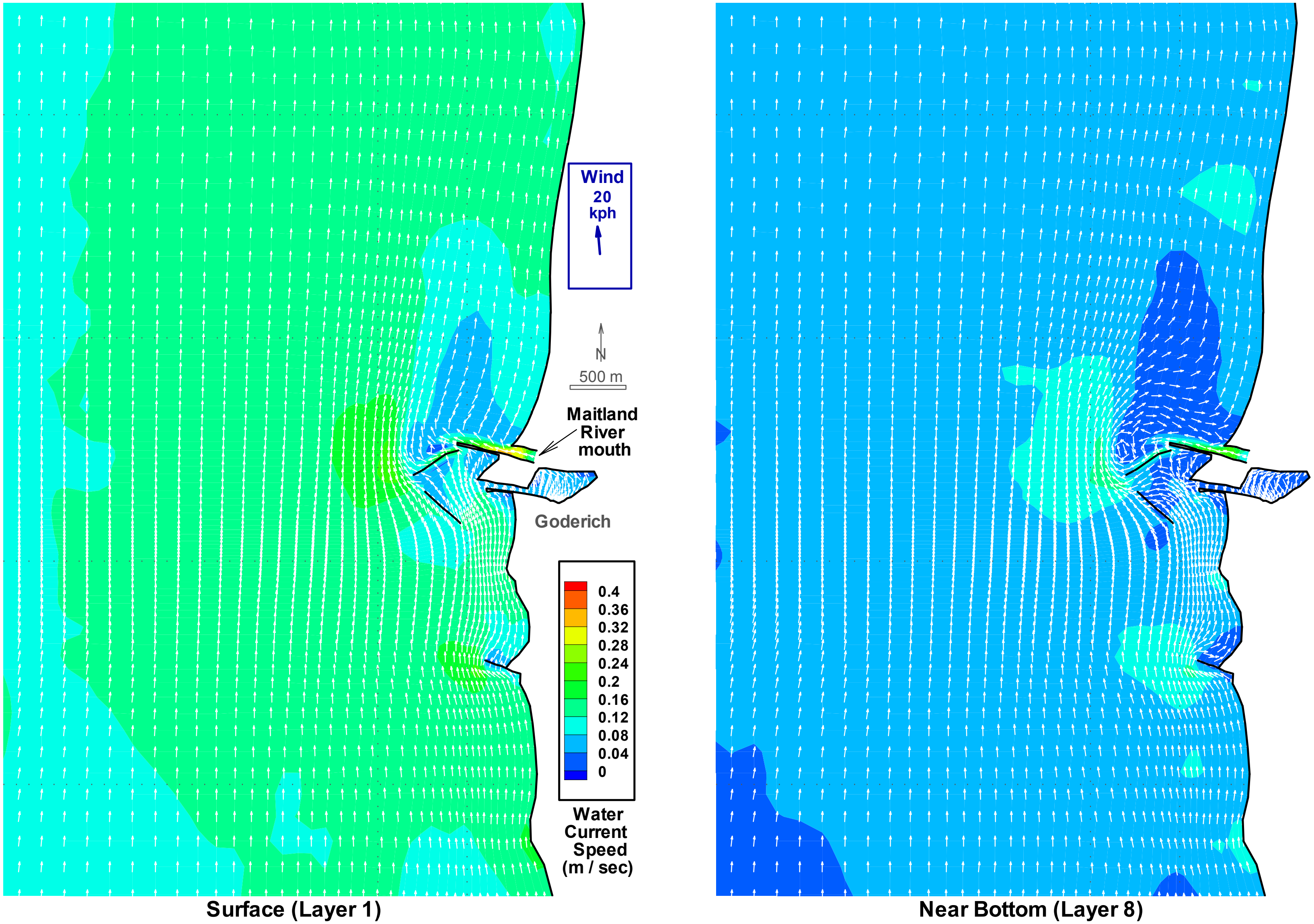


Figure 5.4U(g) Water current velocities at 00:00 hours on November 24, 2003; (directions indicated by arrows, speeds by contours).

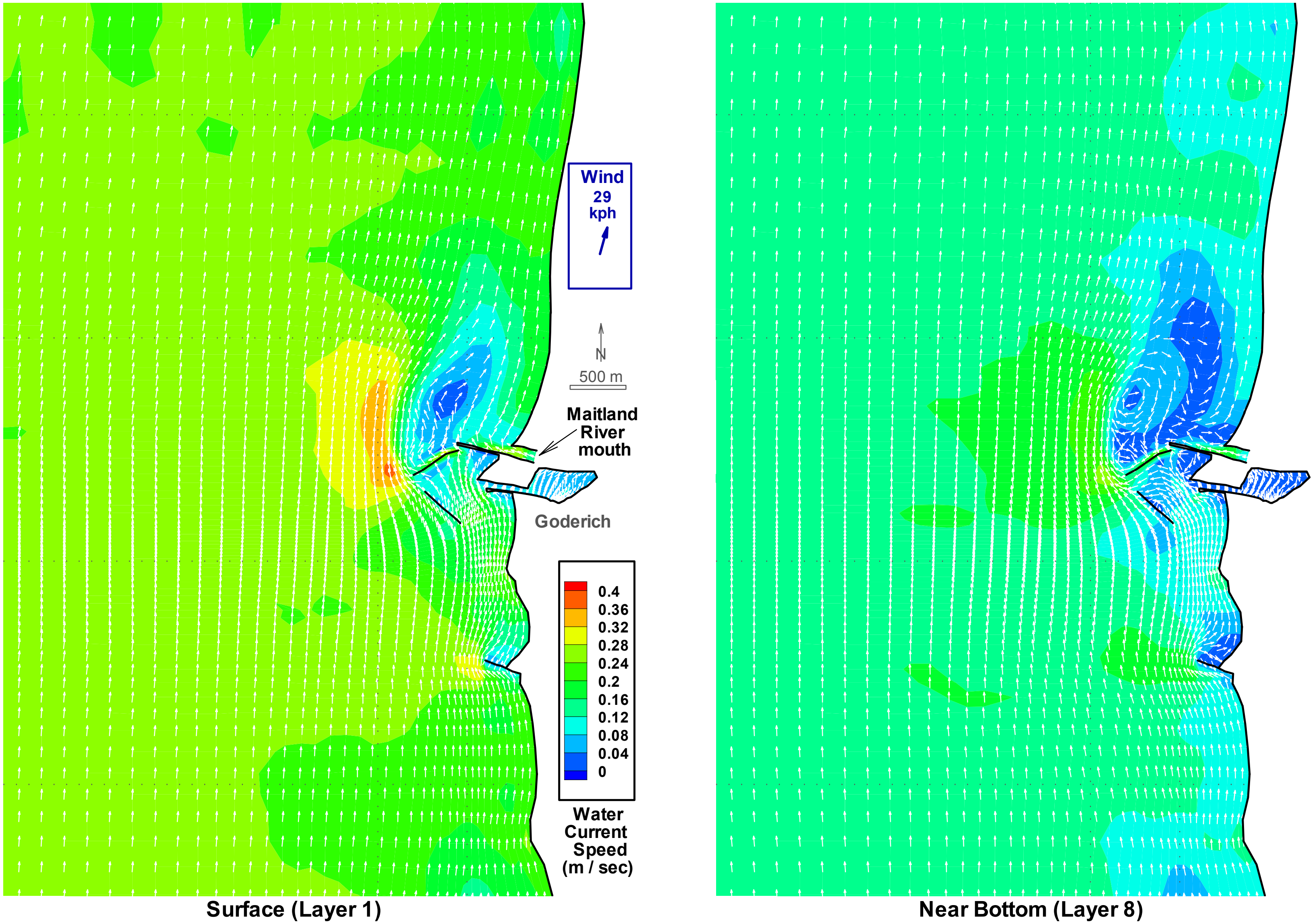


Figure 5.4U(h) Water current velocities at 00:00 hours on November 26, 2003; (directions indicated by arrows, speeds by contours).

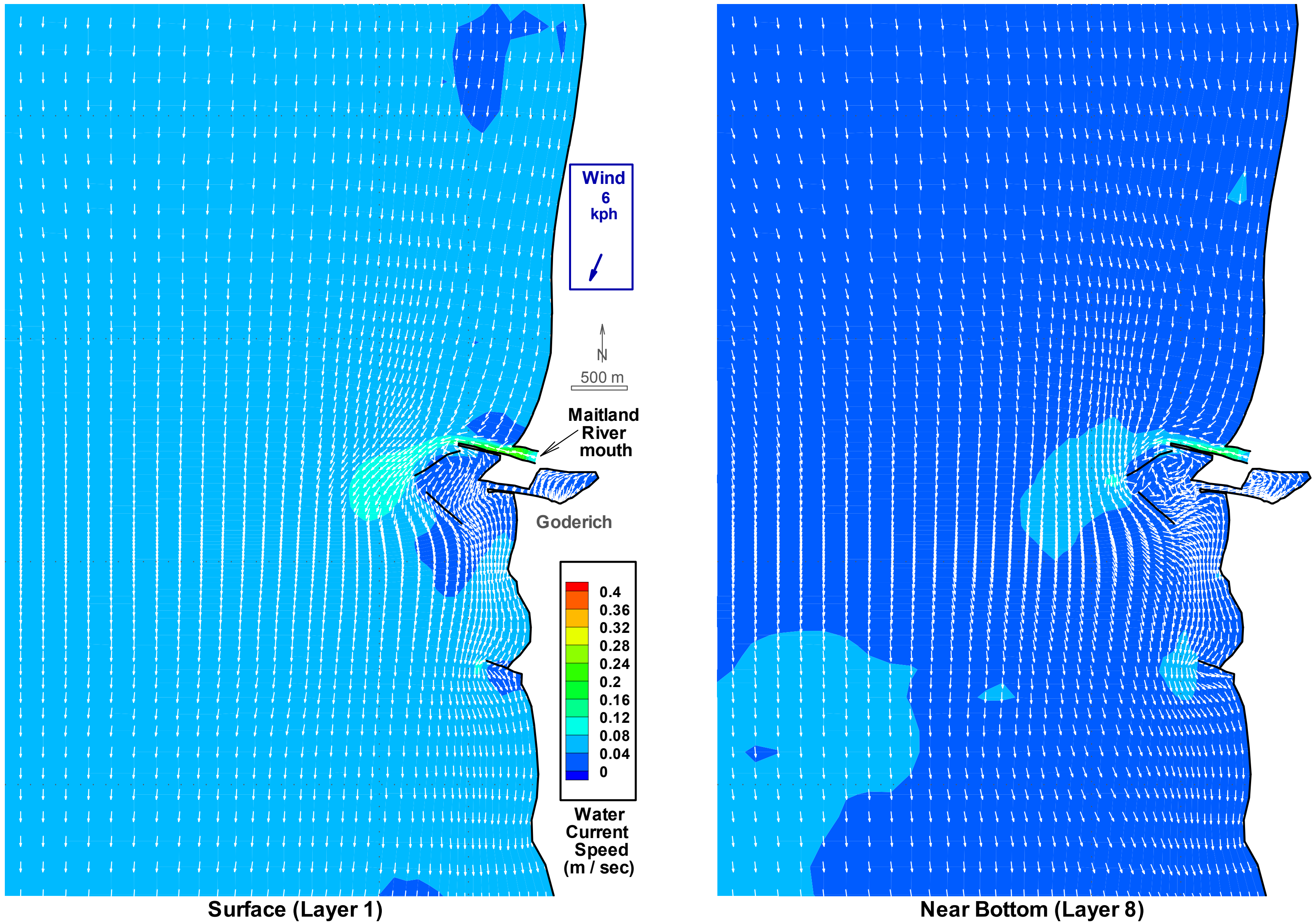


Figure 5.4U(i) Water current velocities at 00:00 hours on November 28, 2003; (directions indicated by arrows, speeds by contours).

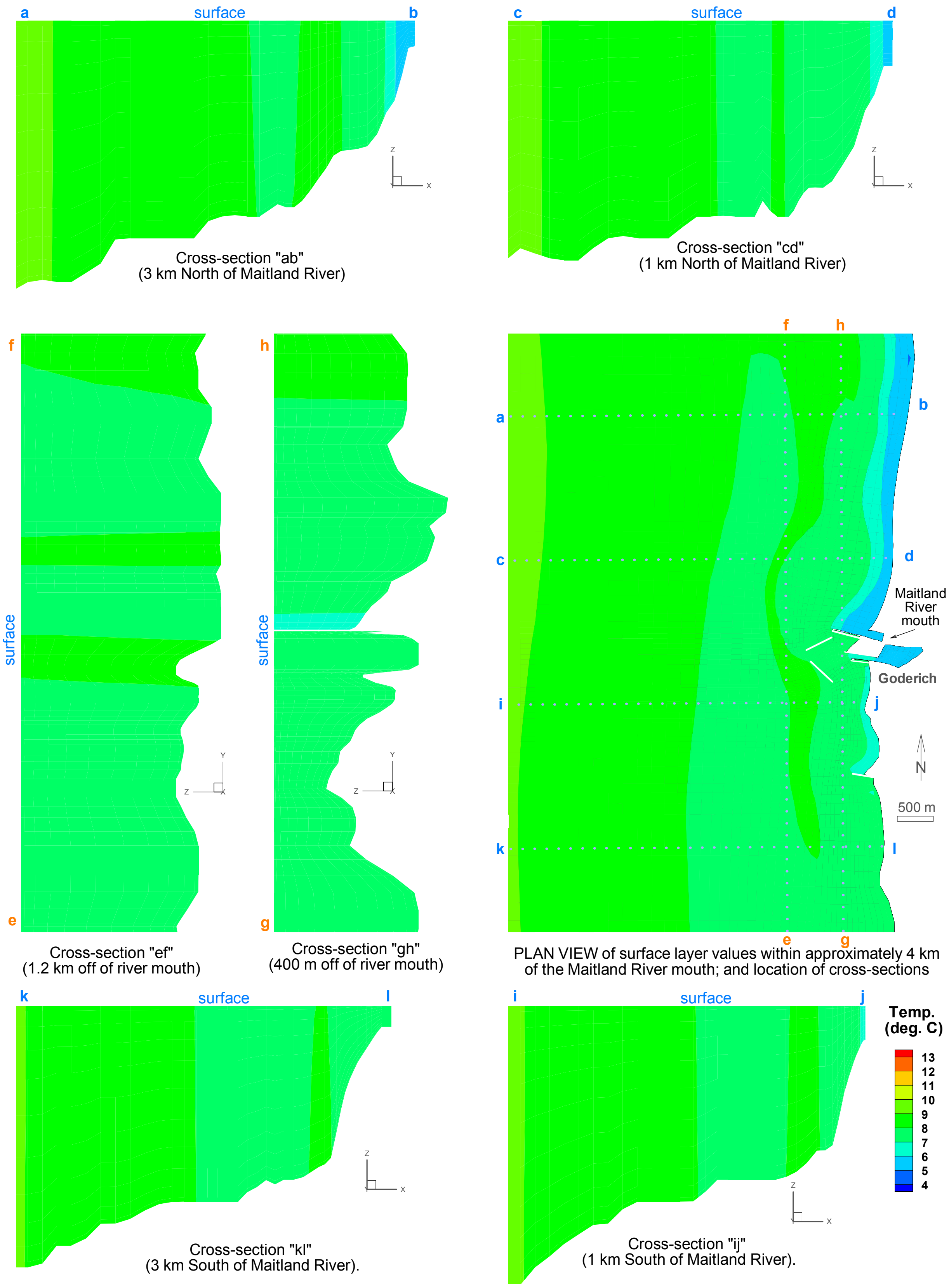
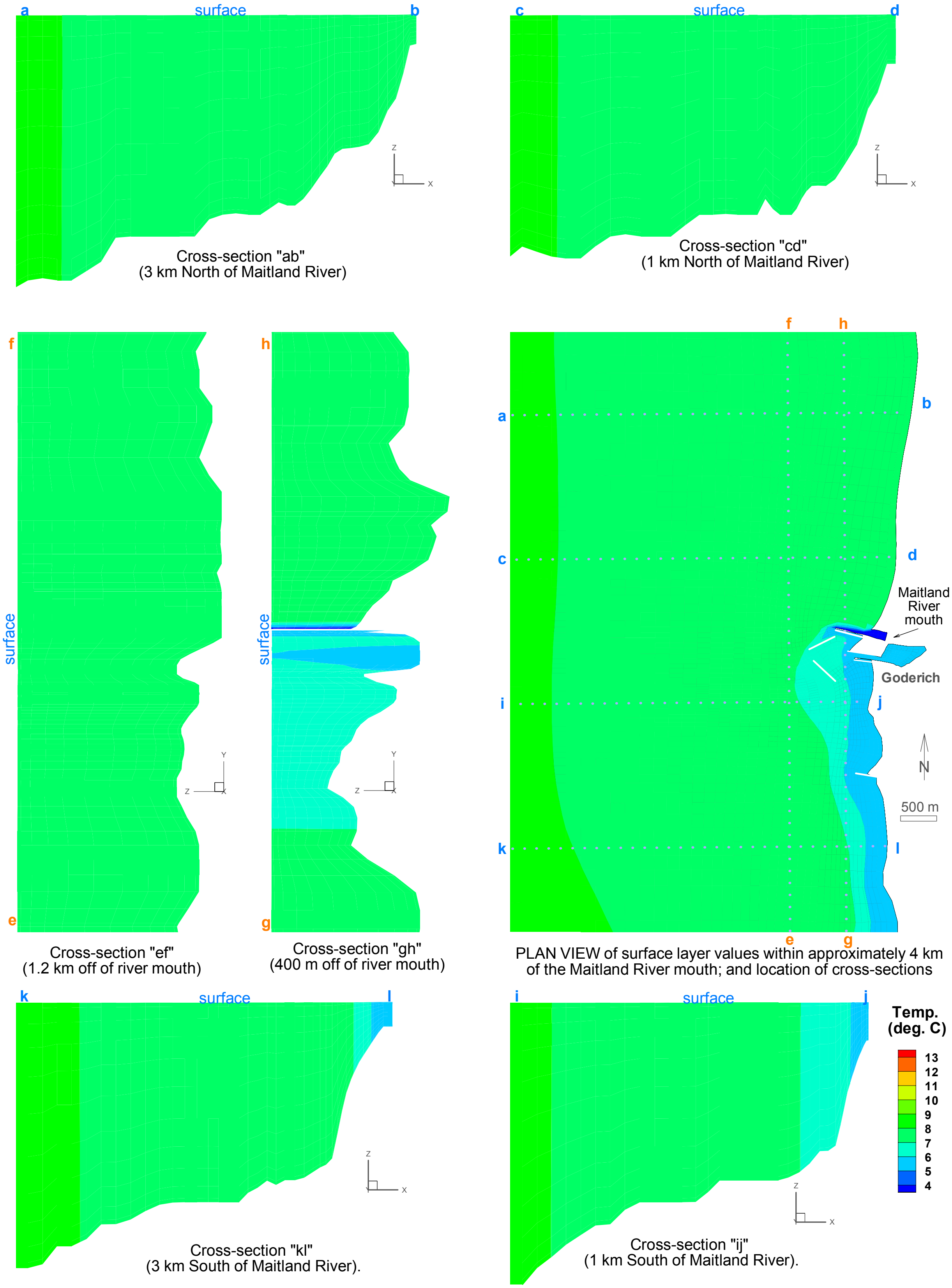


Figure 5.4T(a) Water temperature, (plan view and 6 cross-sections), at 00 hours on November 12, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

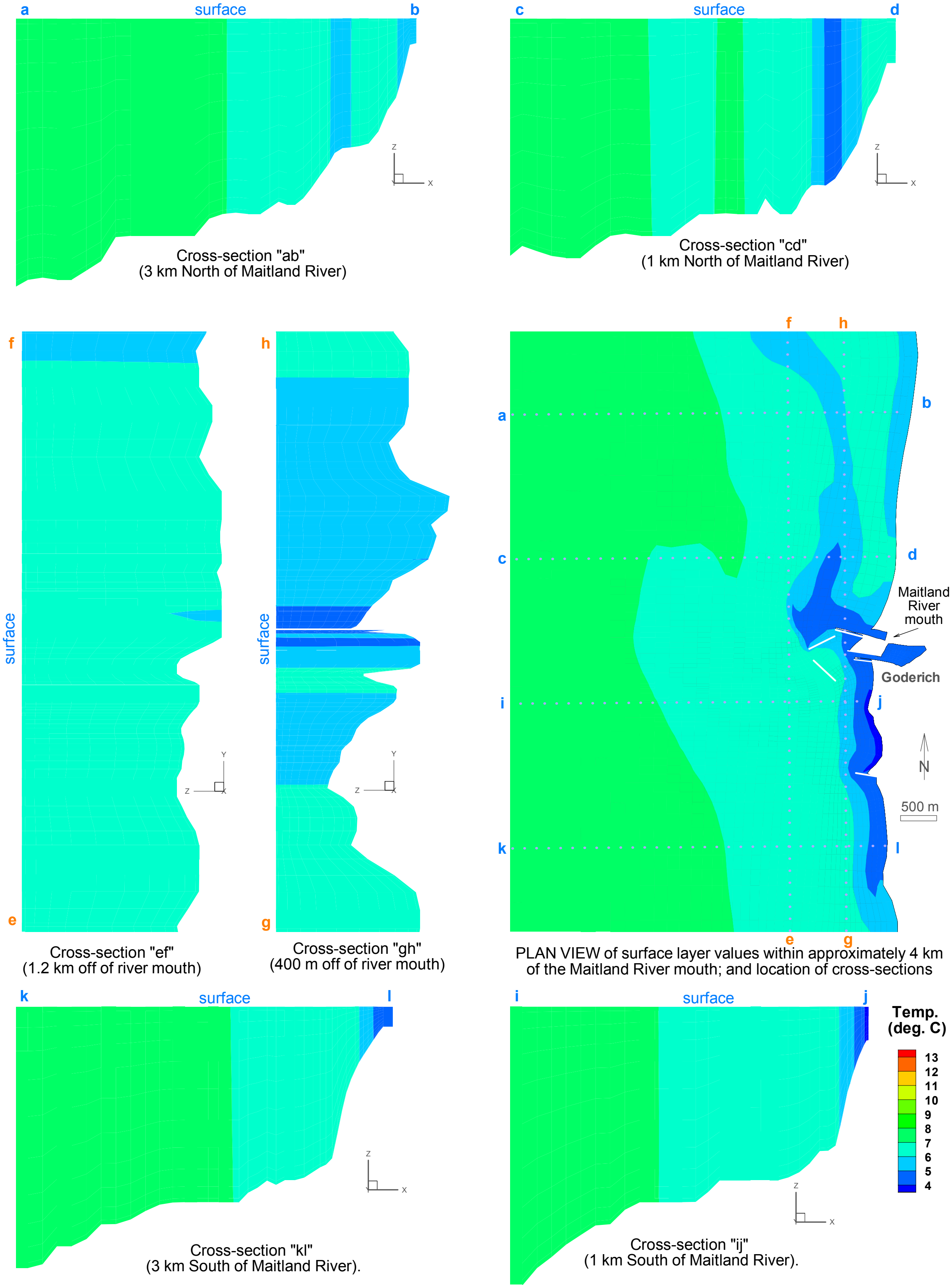
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4T(b) Water temperature, (plan view and 6 cross-sections), at 00 hours on November 14, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].


Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4T(c) Water temperature, (plan view and 6 cross-sections), at 00 hours on November 16, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

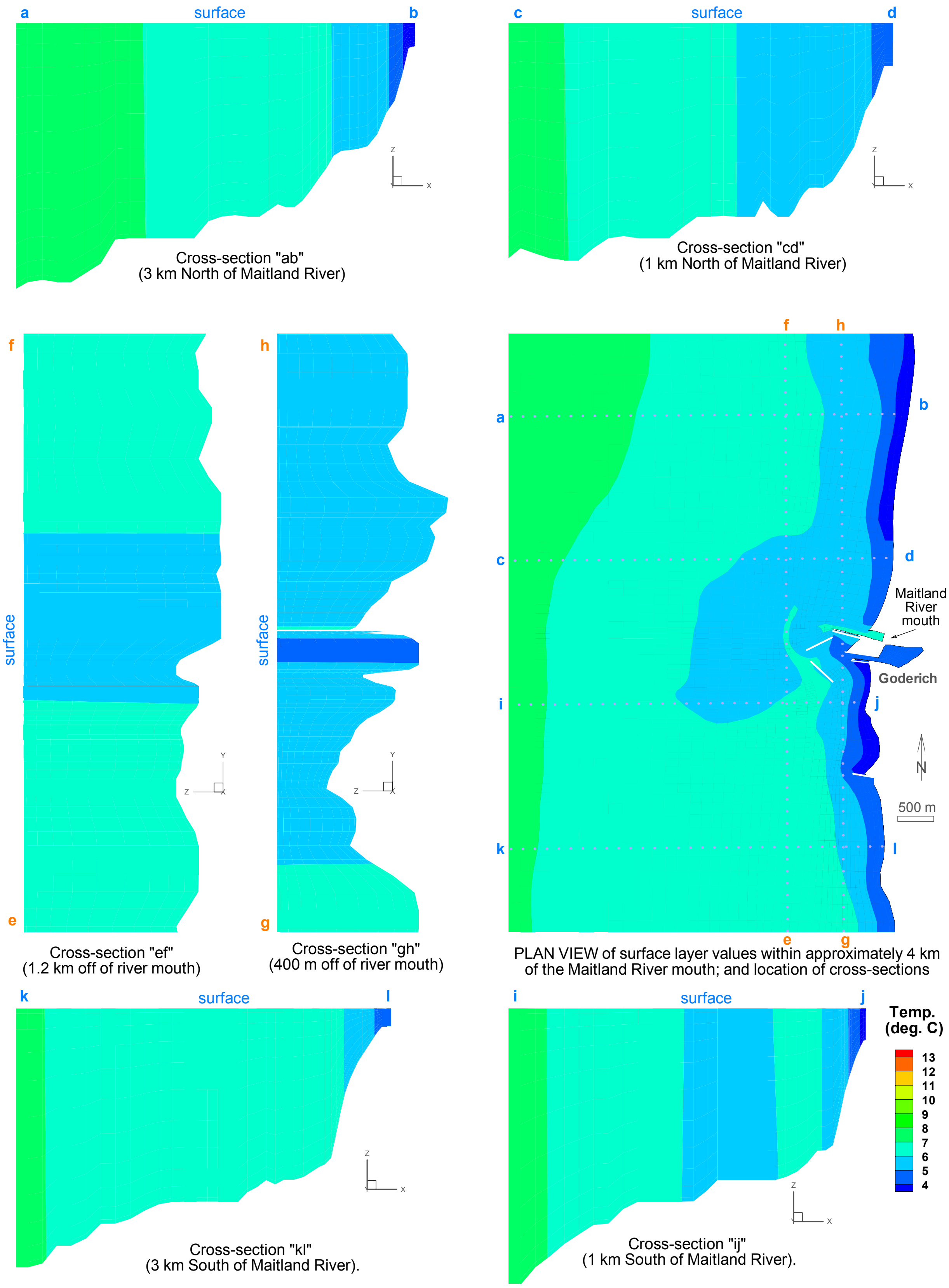
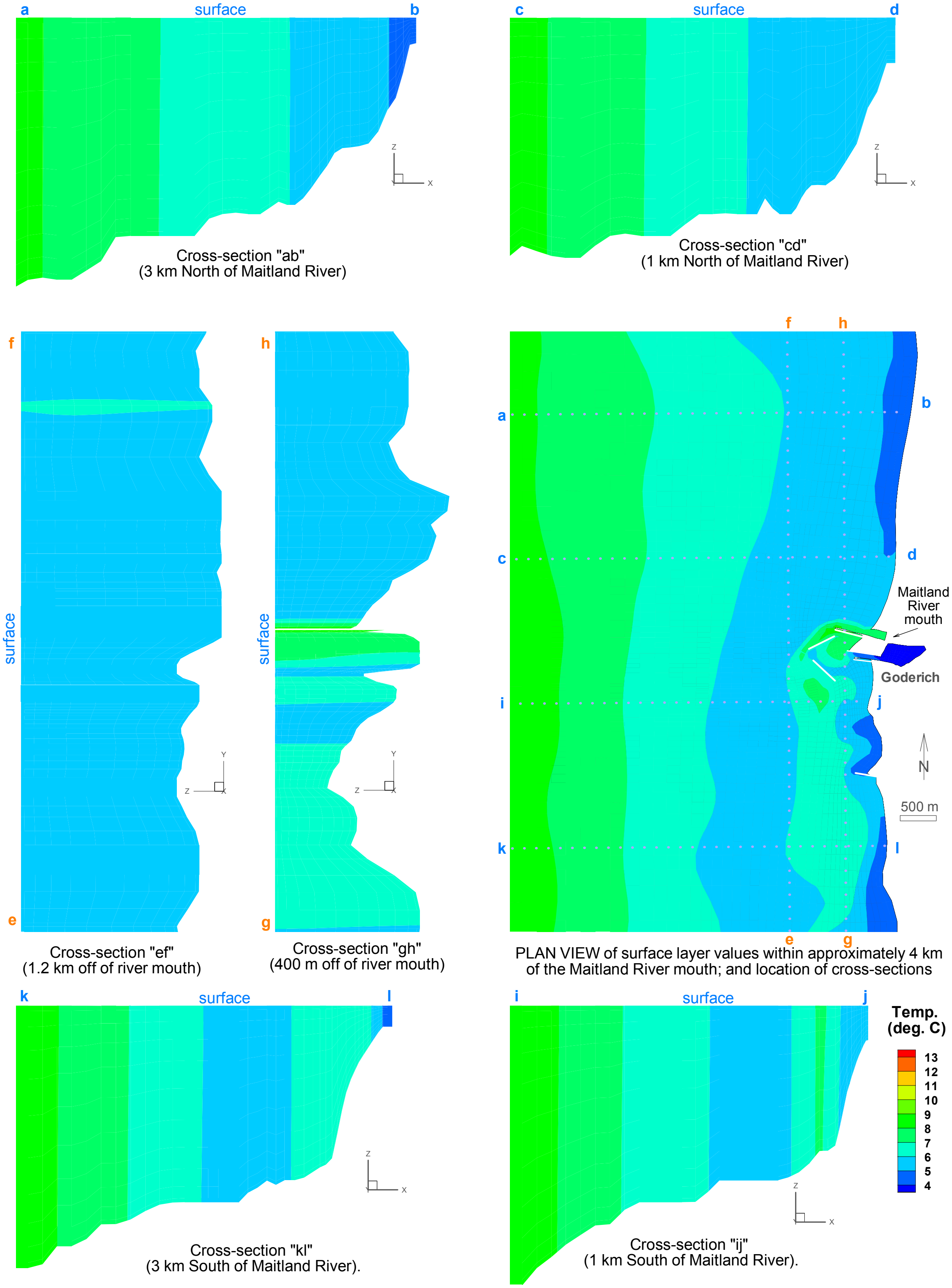


Figure 5.4T(d) **Water temperature, (plan view and 6 cross-sections), at 00 hours on November 18, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

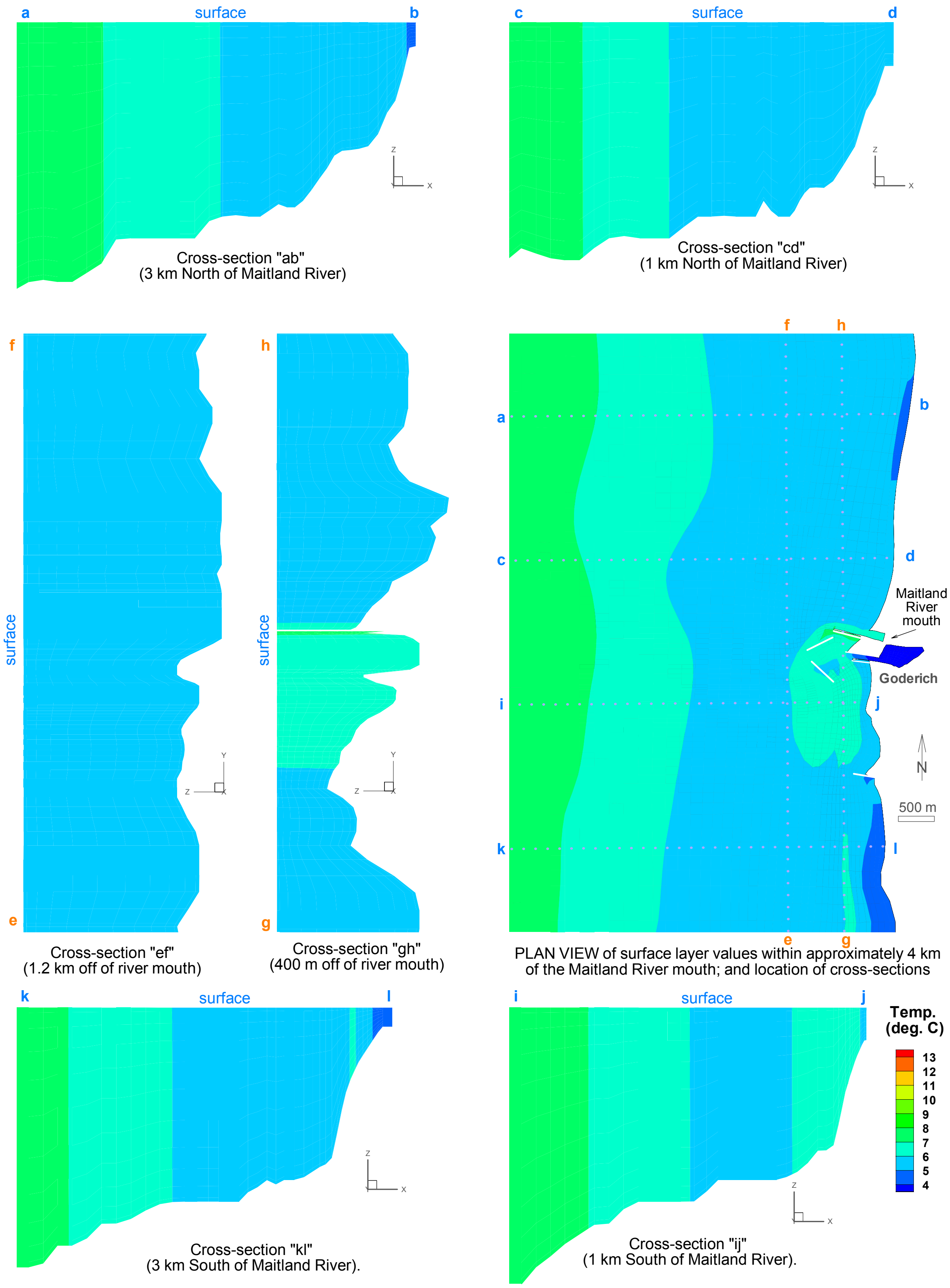
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4T(e) Water temperature, (plan view and 6 cross-sections), at 00 hours on November 20, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

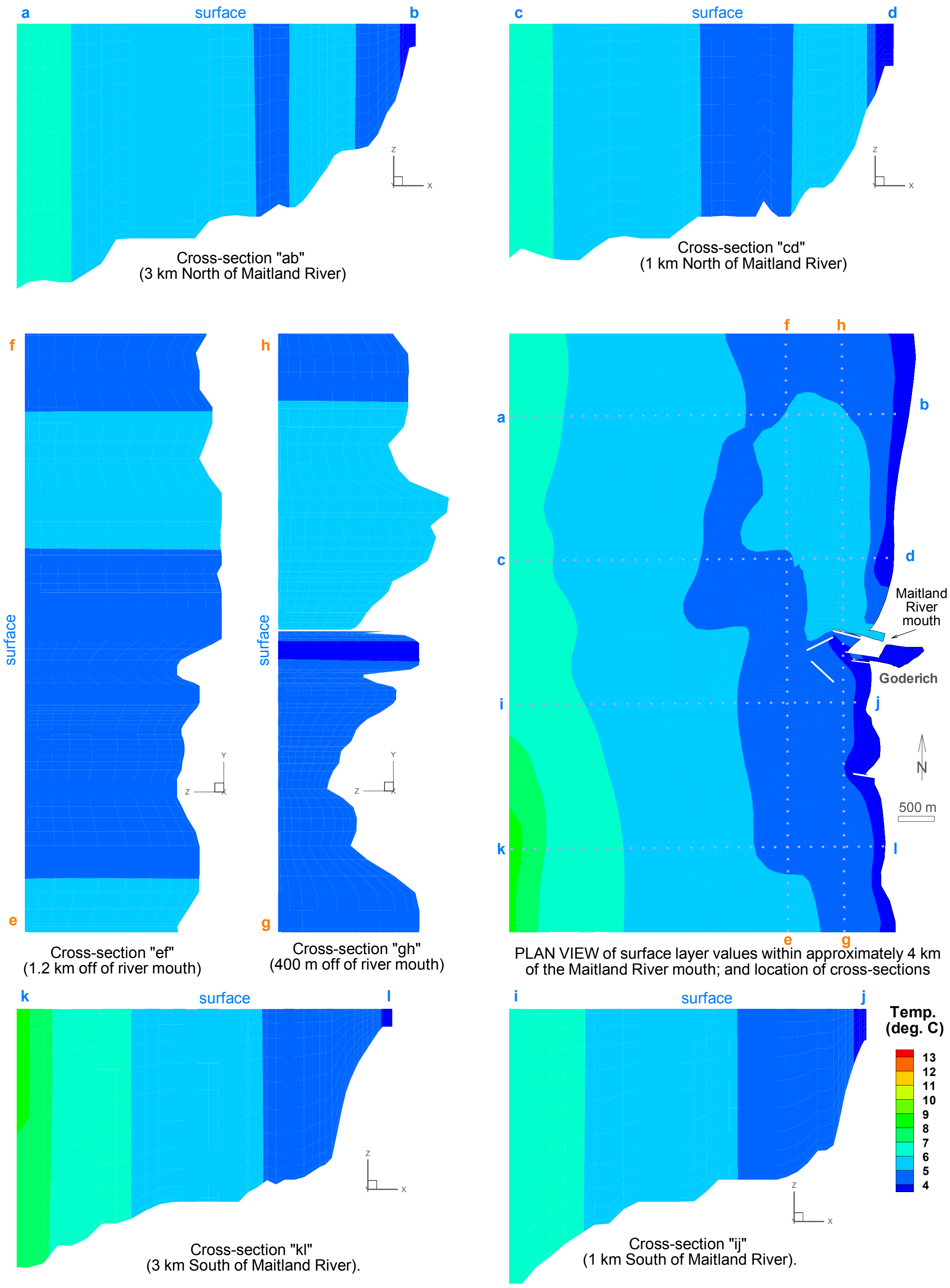
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4T(f) Water temperature, (plan view and 6 cross-sections), at 00 hours on November 22, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4T(g) Water temperature, (plan view and 6 cross-sections), at 00 hours on November 24, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

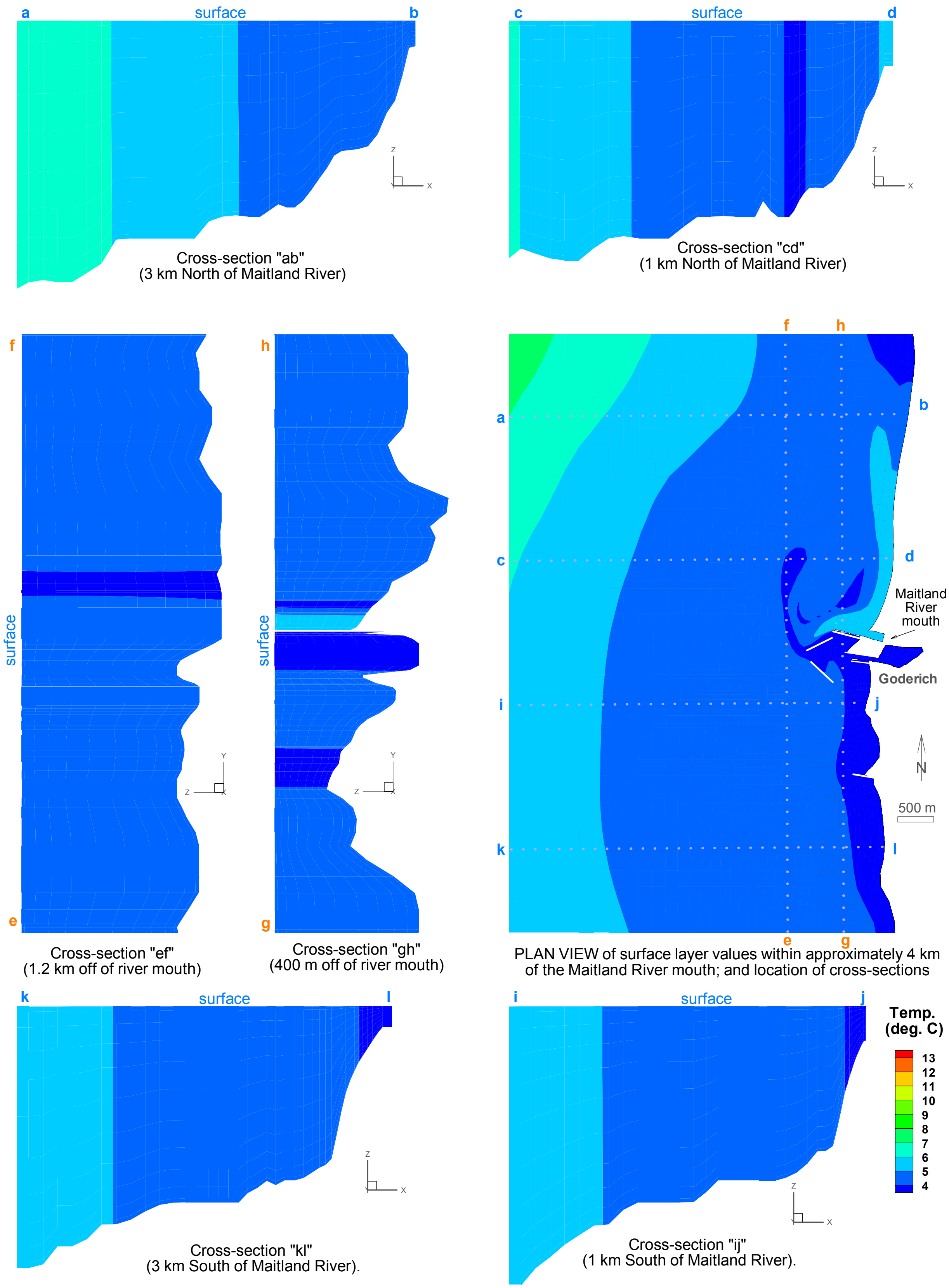


Figure 5.4T(h) **Water temperature, (plan view and 6 cross-sections), at 00 hours on November 26, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**

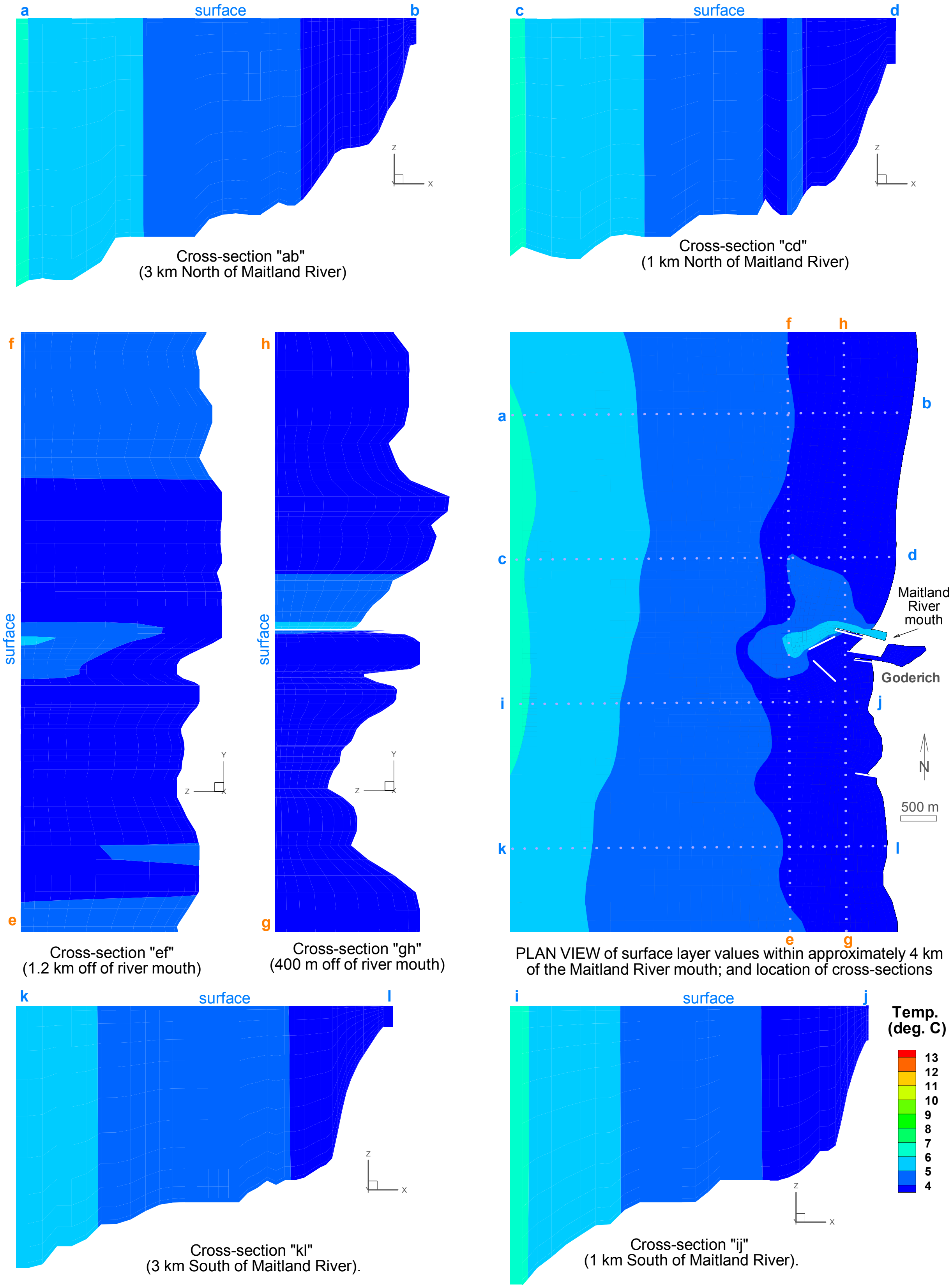


Figure 5.4T(i) Water temperature, (plan view and 6 cross-sections), at 00 hours on November 28, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

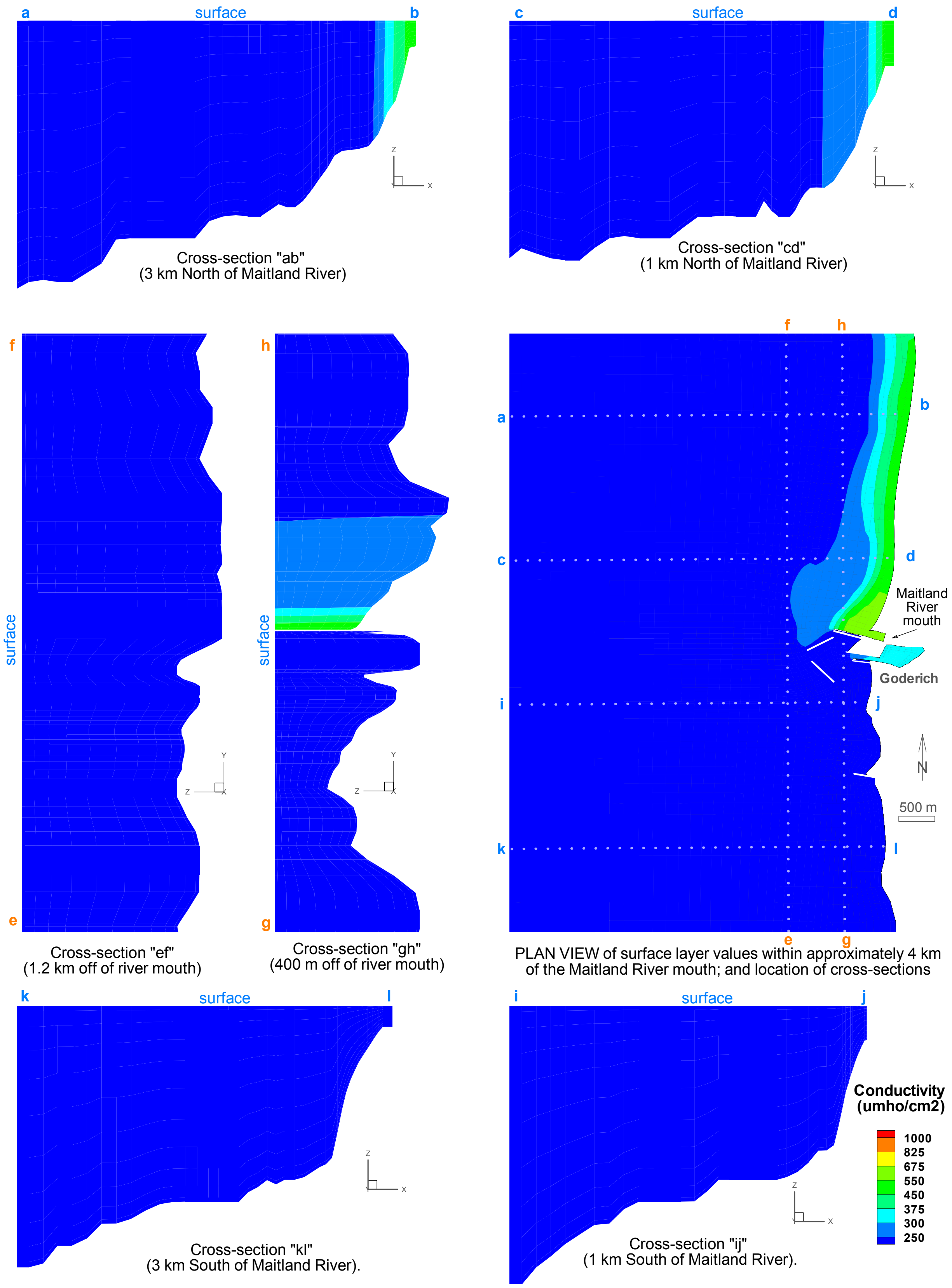
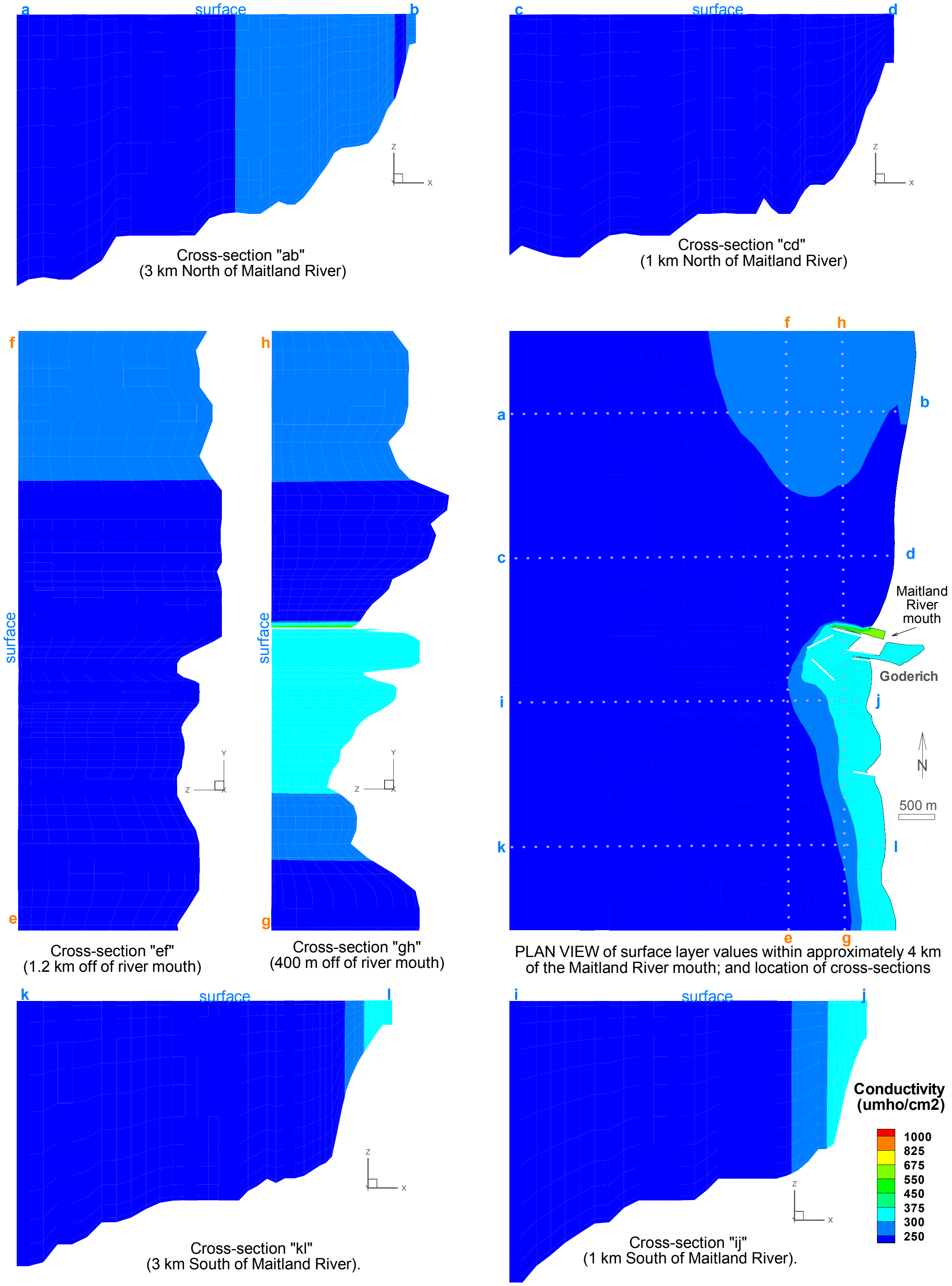


Figure 5.4C(a) Conductivity, (plan view and 6 cross-sections), at 00 hours on November 12, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

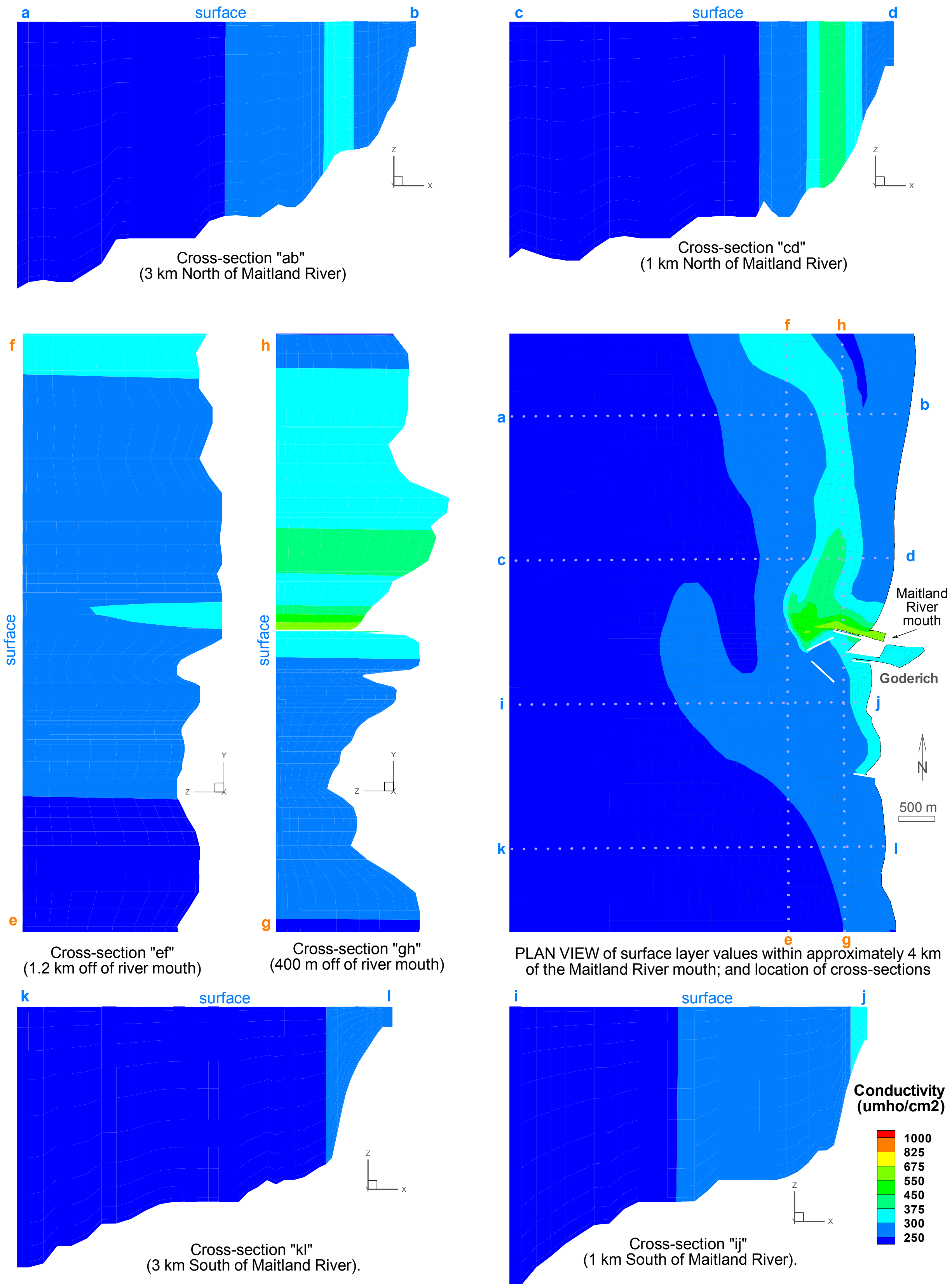
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4C(b) Conductivity, (plan view and 6 cross-sections), at 00 hours on November 14, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

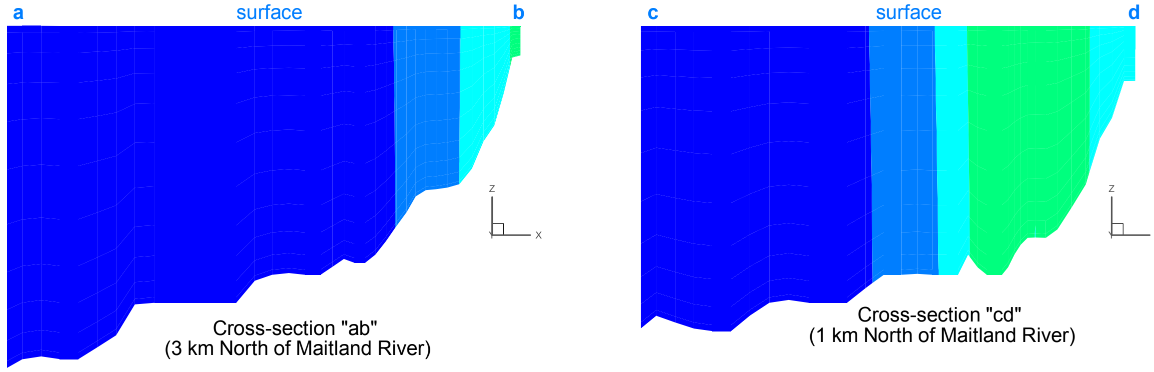
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

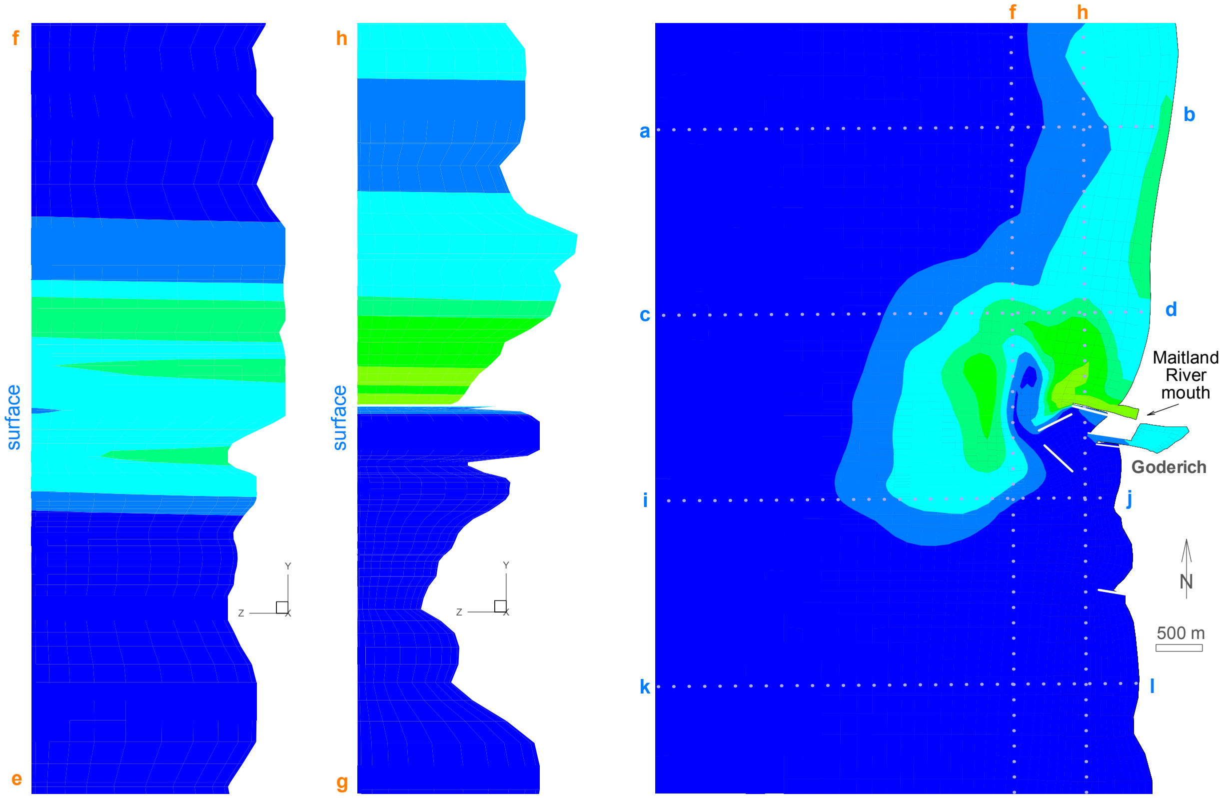
Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4C(c) Conductivity, (plan view and 6 cross-sections), at 00 hours on November 16, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

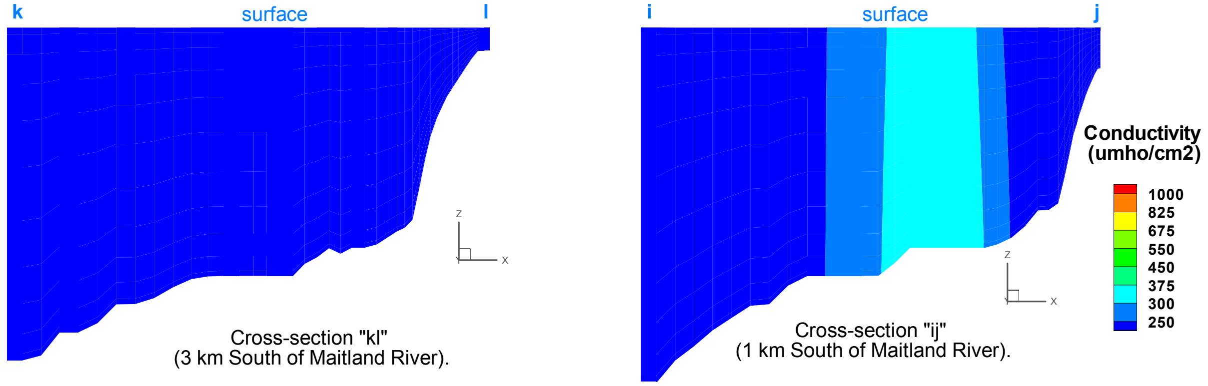
Cross-section "cd"
(1 km North of Maitland River)



Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

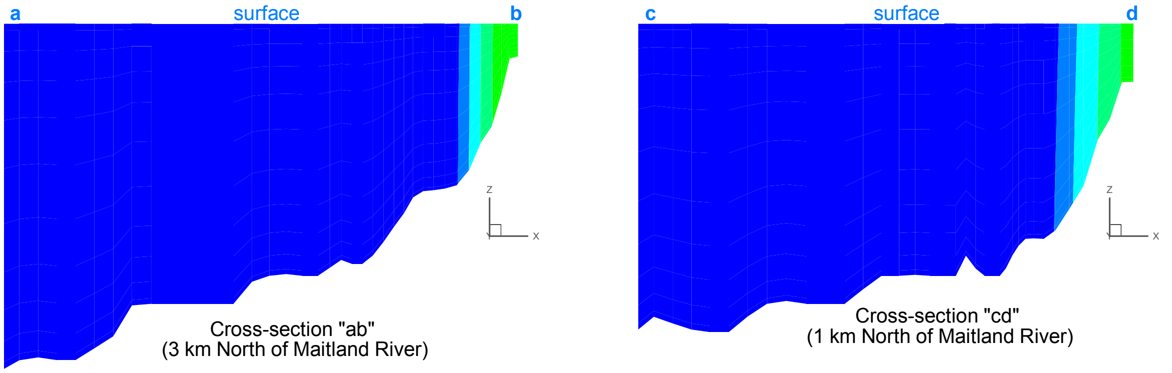
PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections



Cross-section "kl"
(3 km South of Maitland River).

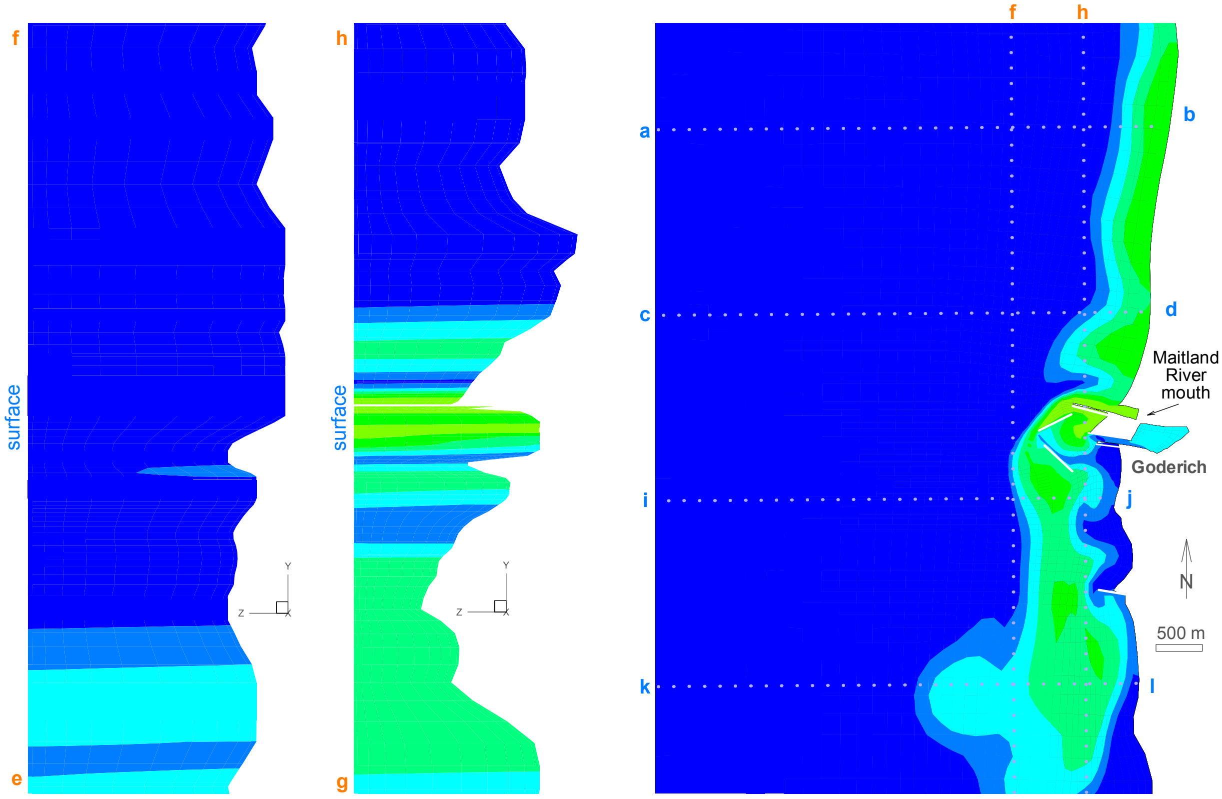
Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4C(d) Conductivity, (plan view and 6 cross-sections), at 00 hours on November 18, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

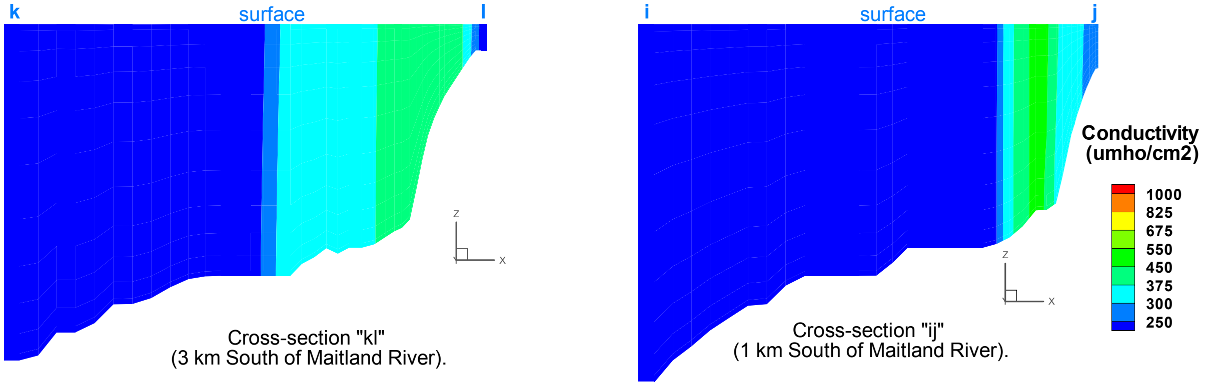
Cross-section "cd"
(1 km North of Maitland River)



Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections



Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4C(e) Conductivity, (plan view and 6 cross-sections), at 00 hours on November 20, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

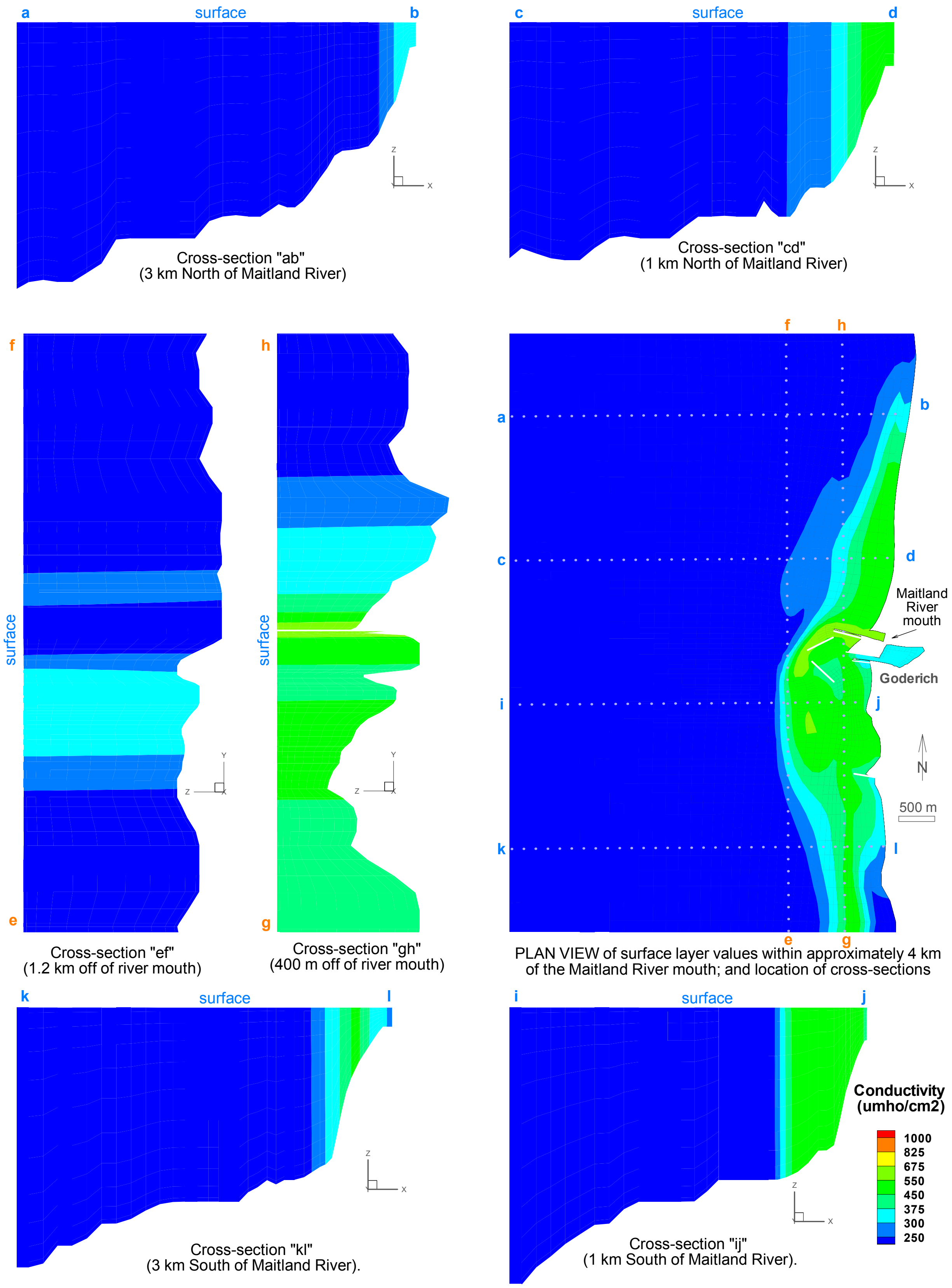
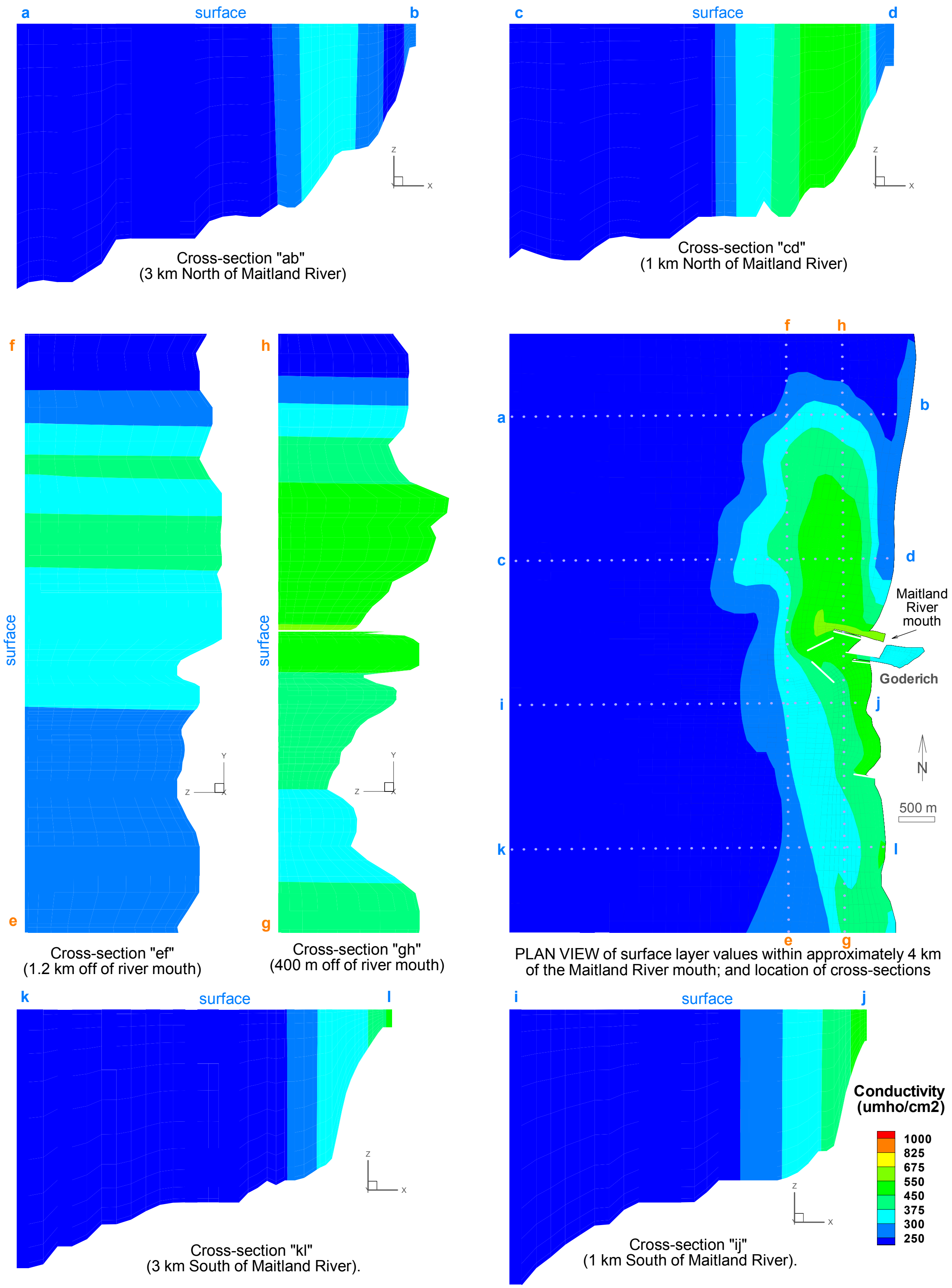


Figure 5.4C(f) Conductivity, (plan view and 6 cross-sections), at 00 hours on November 22, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

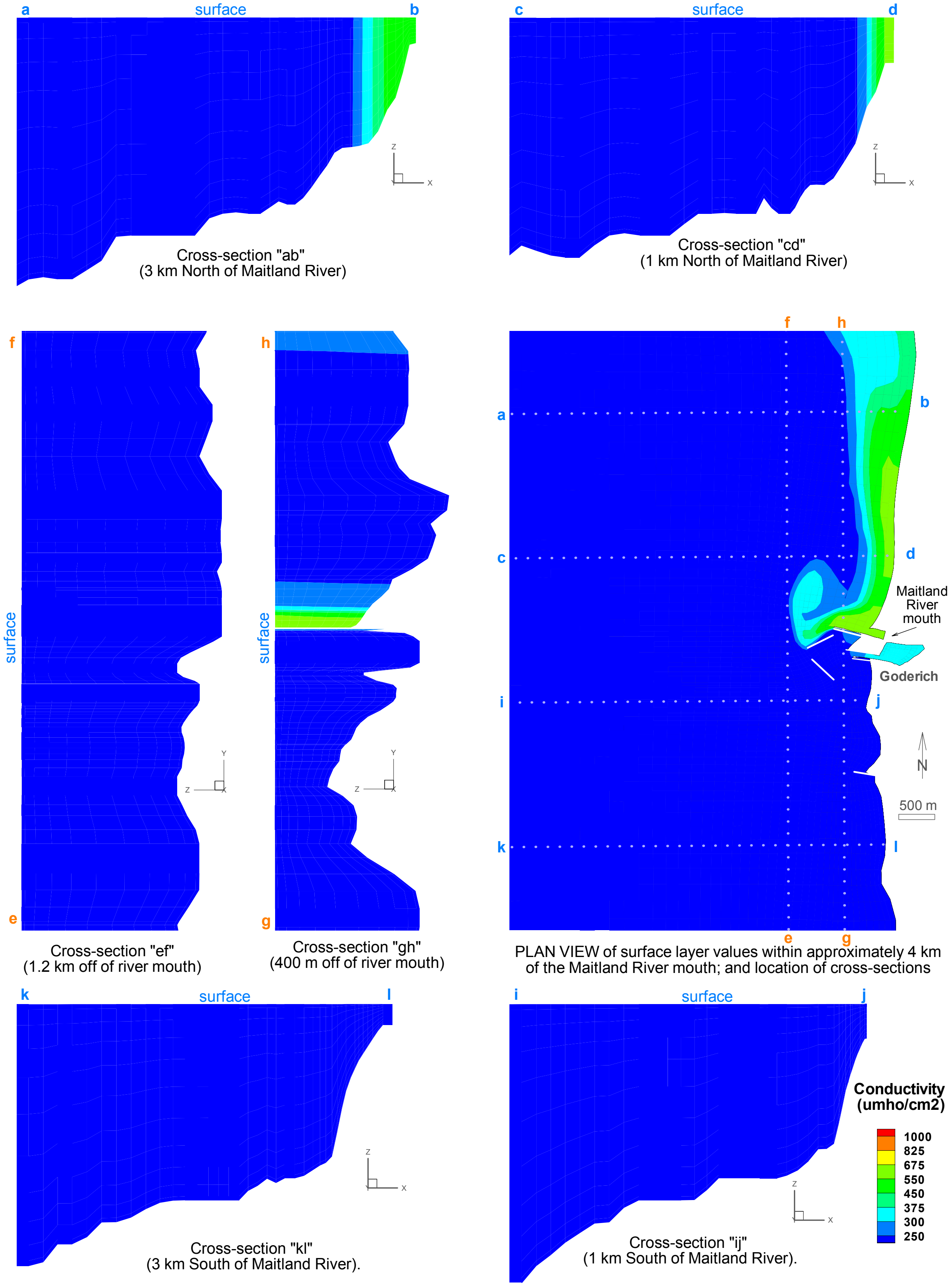
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4C(g) Conductivity, (plan view and 6 cross-sections), at 00 hours on November 24, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4C(h) Conductivity, (plan view and 6 cross-sections), at 00 hours on November 26, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

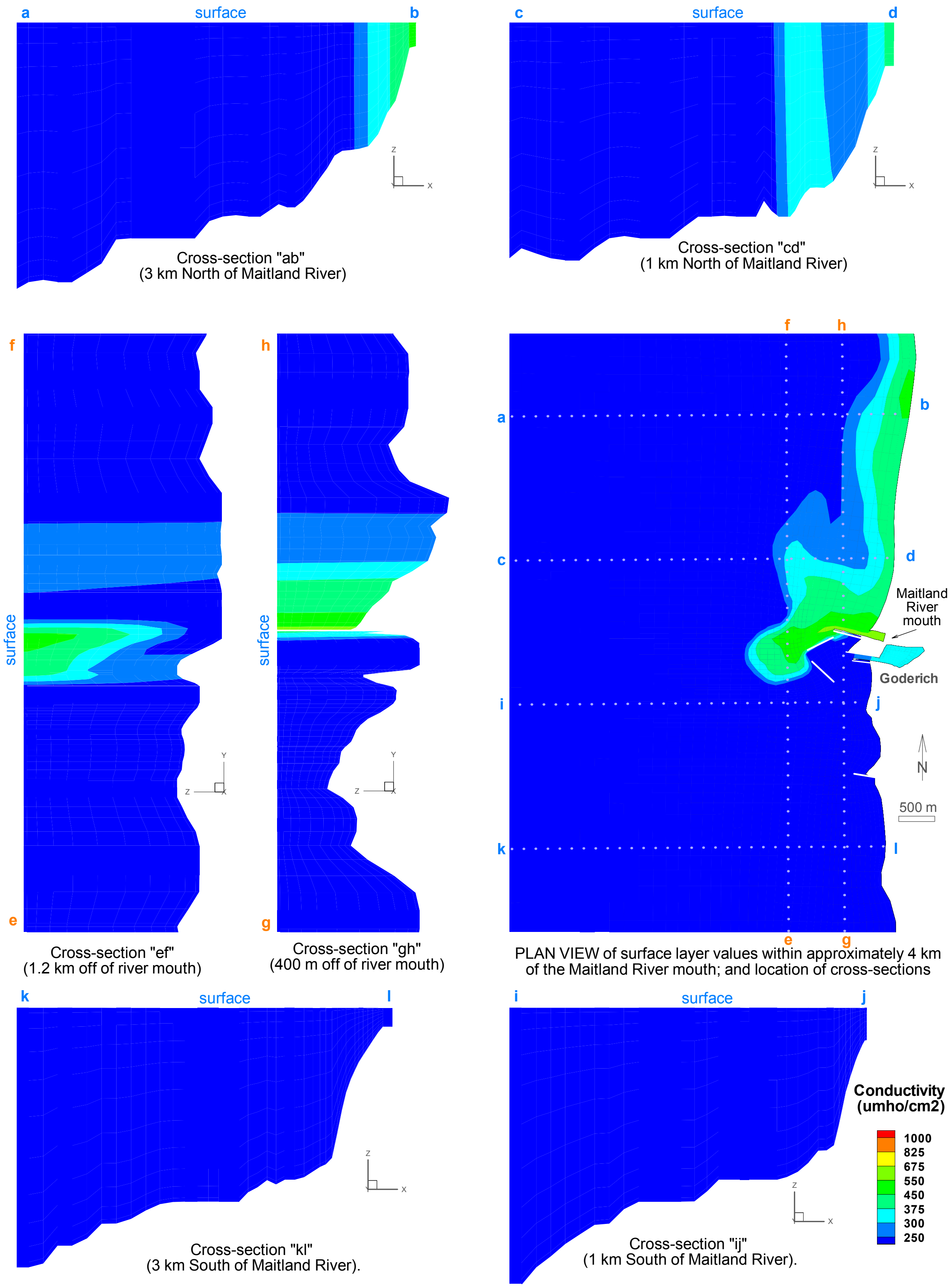


Figure 5.4C(i) Conductivity, (plan view and 6 cross-sections), at 00 hours on November 28, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

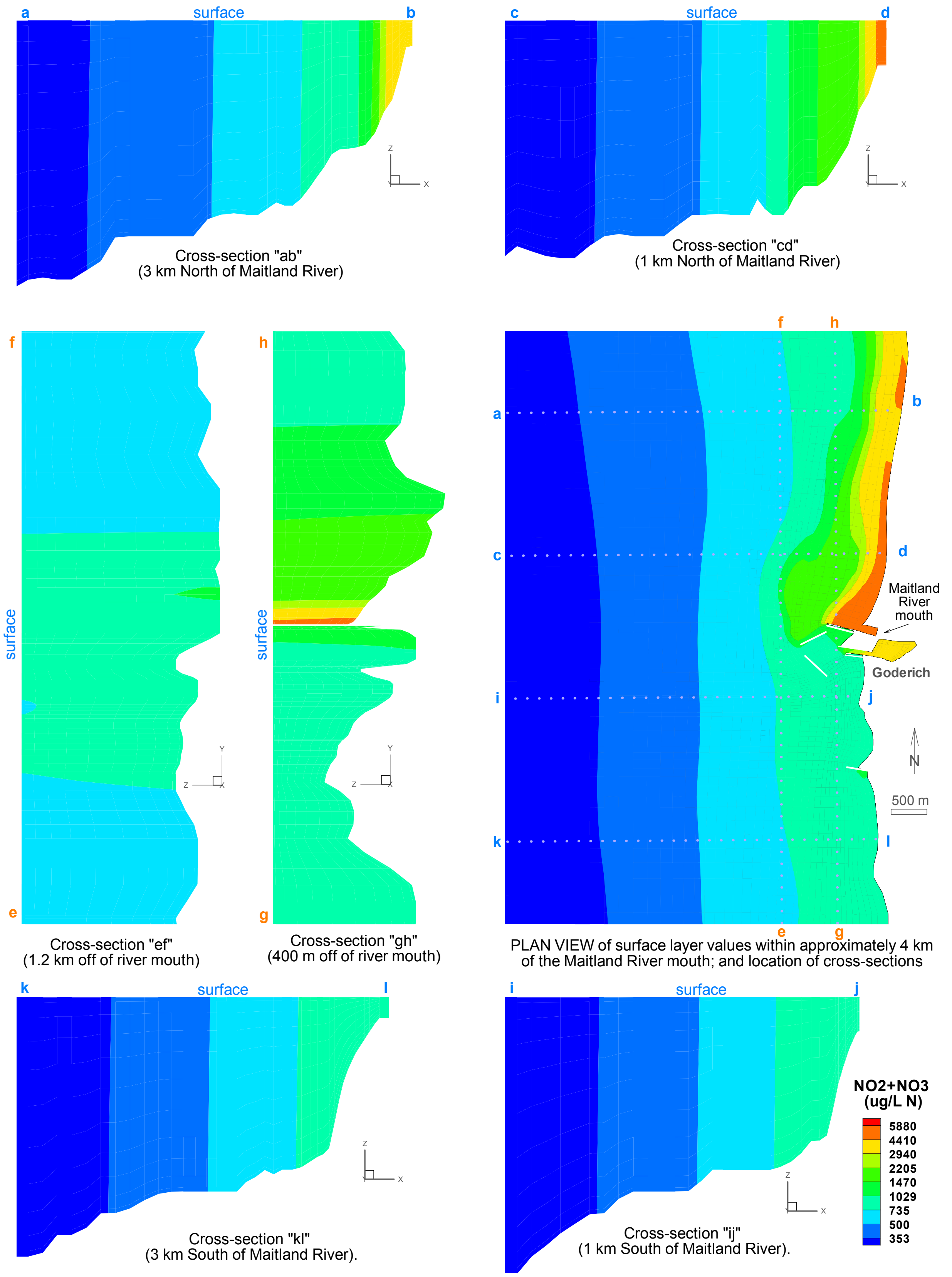
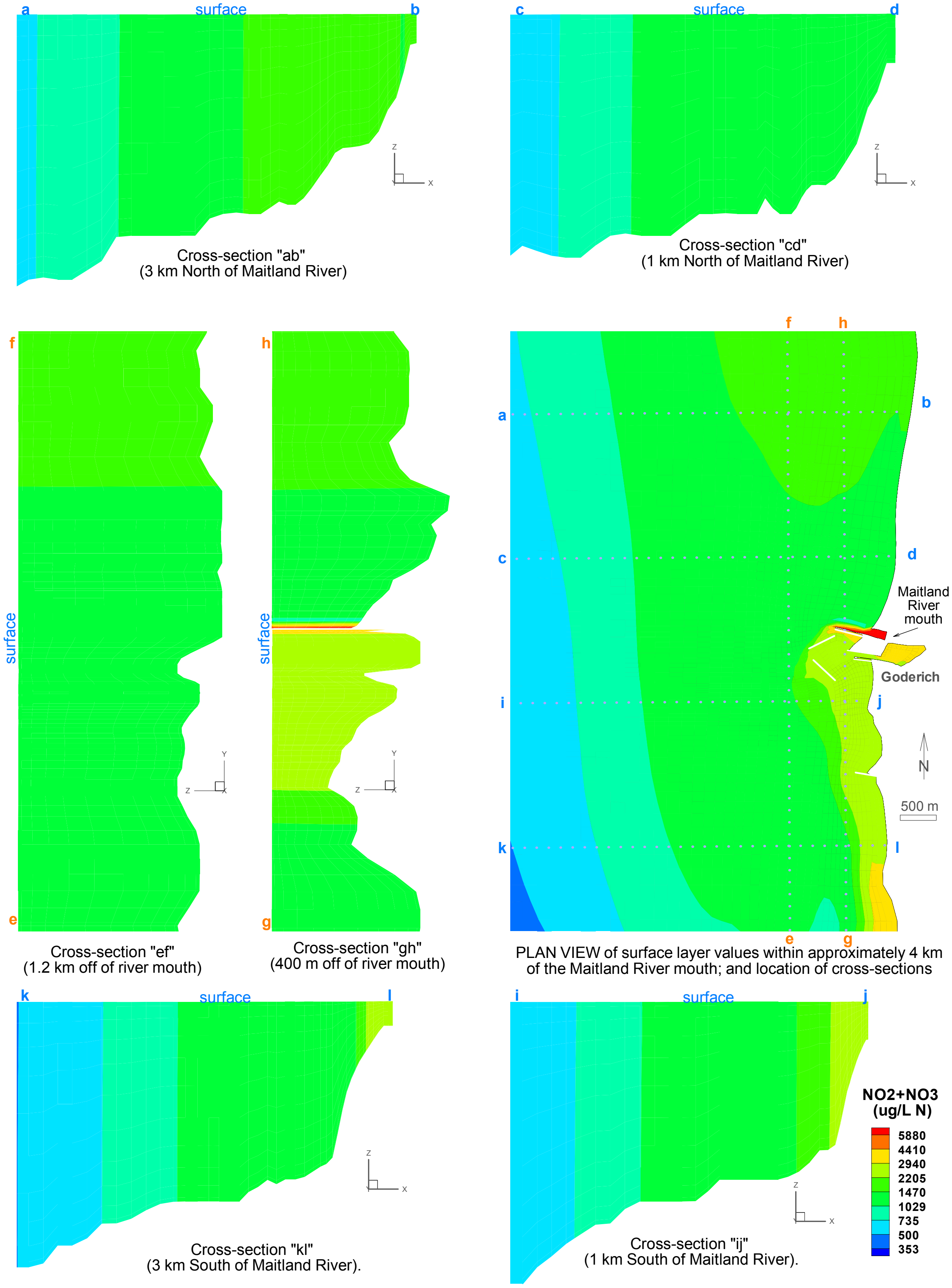


Figure 5.4N(a) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on November 12, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

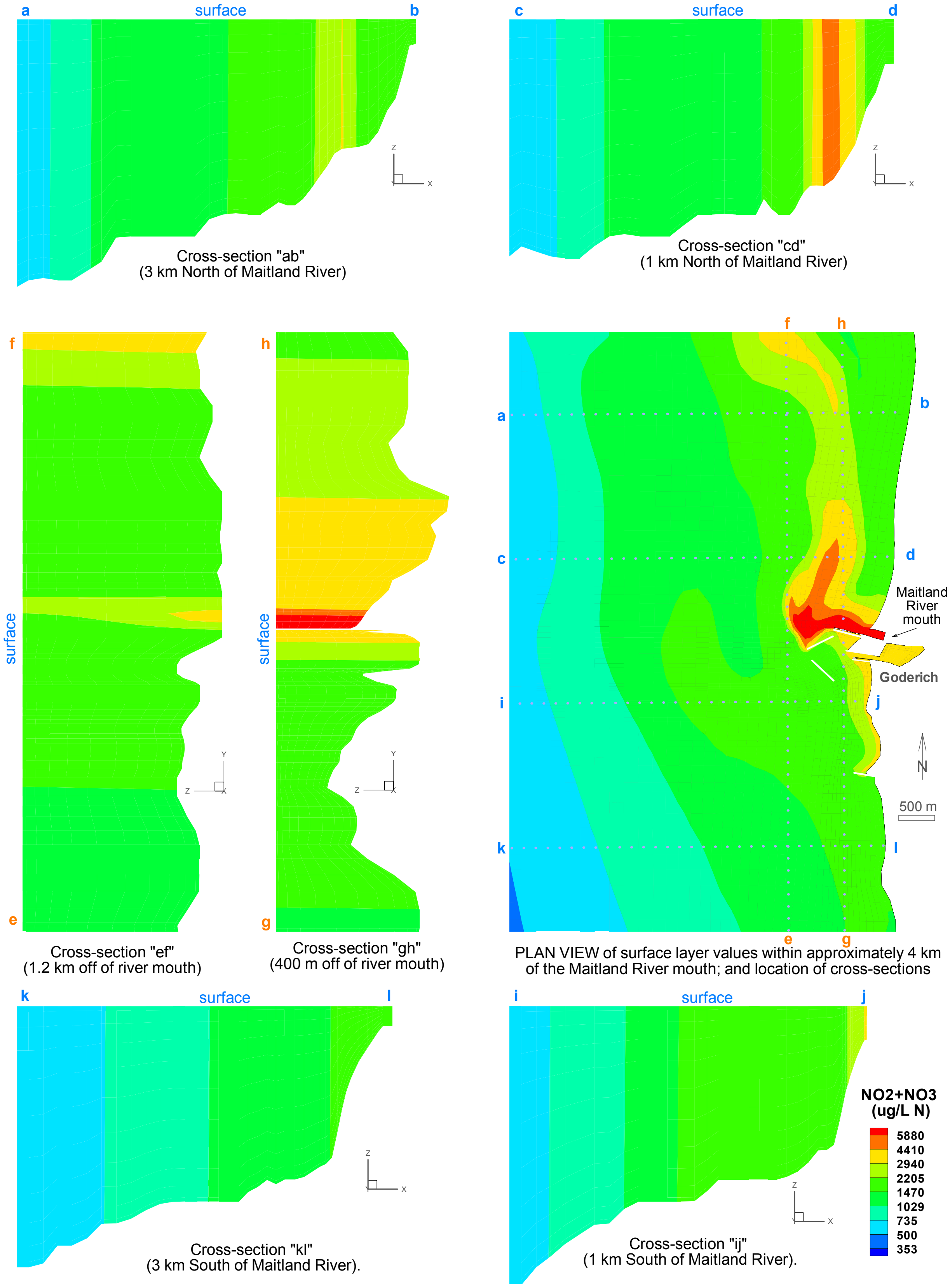
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4N(b) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on November 14, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

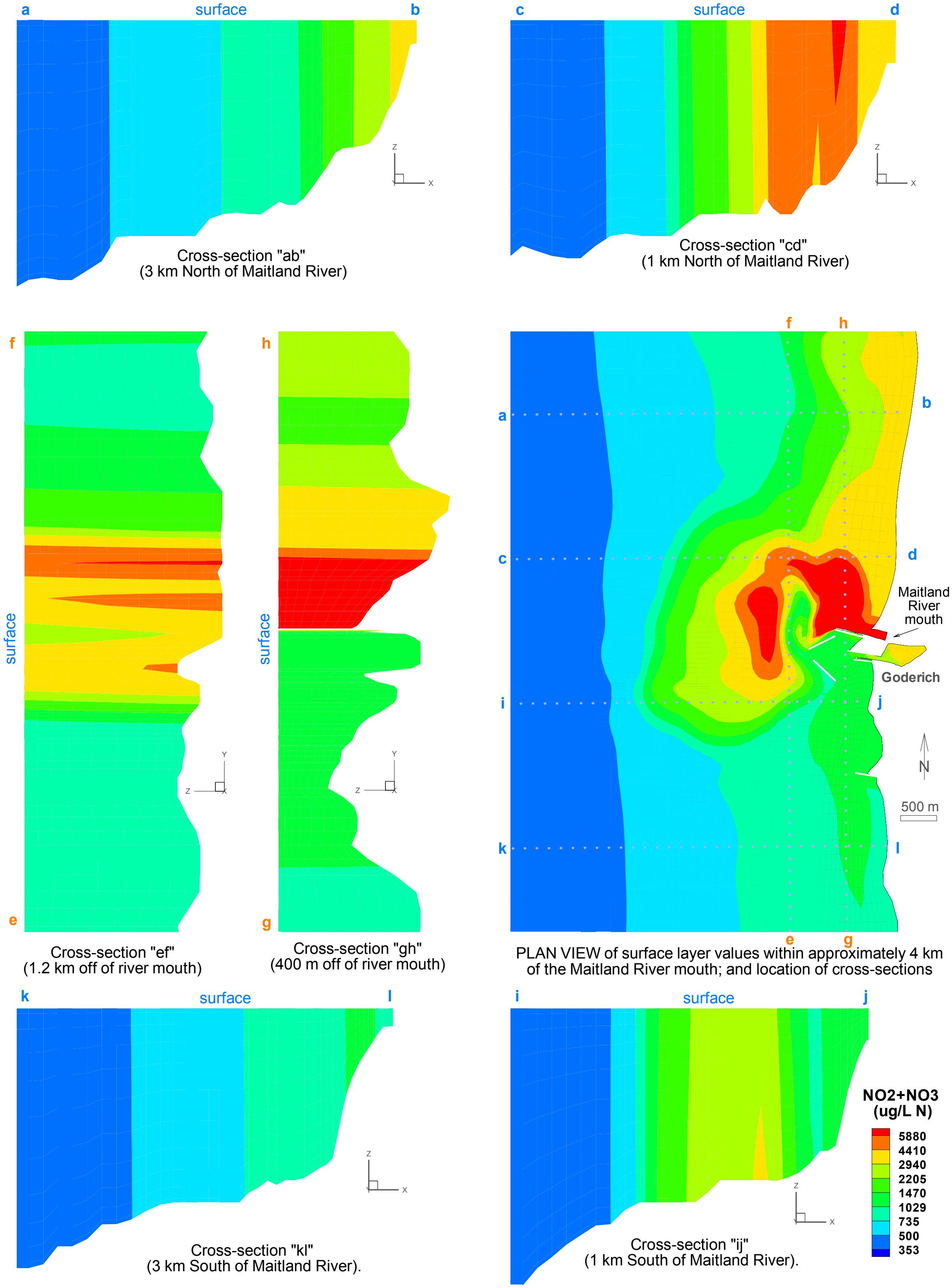
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4N(c) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on November 16, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4N(d) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on November 18, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

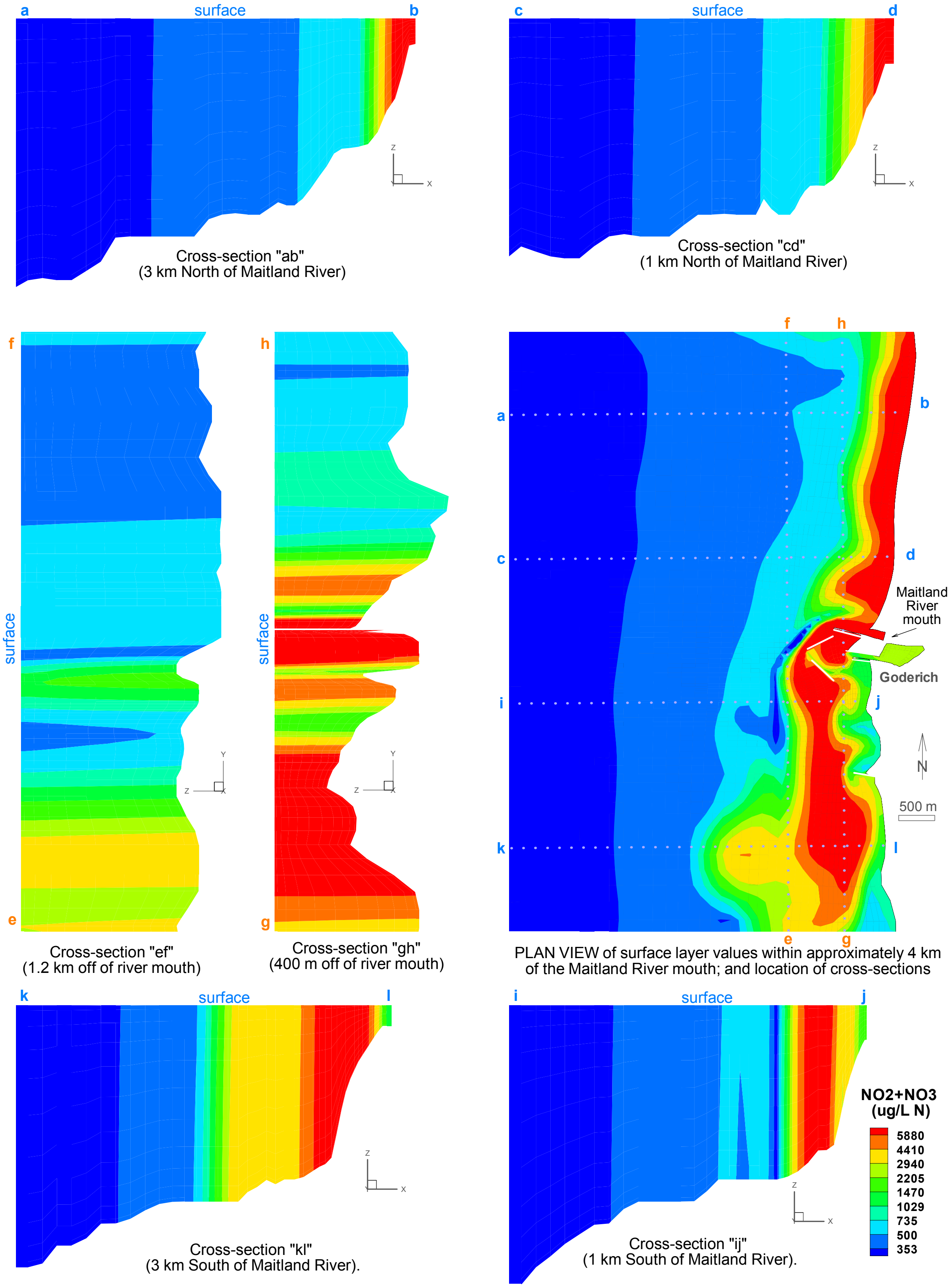
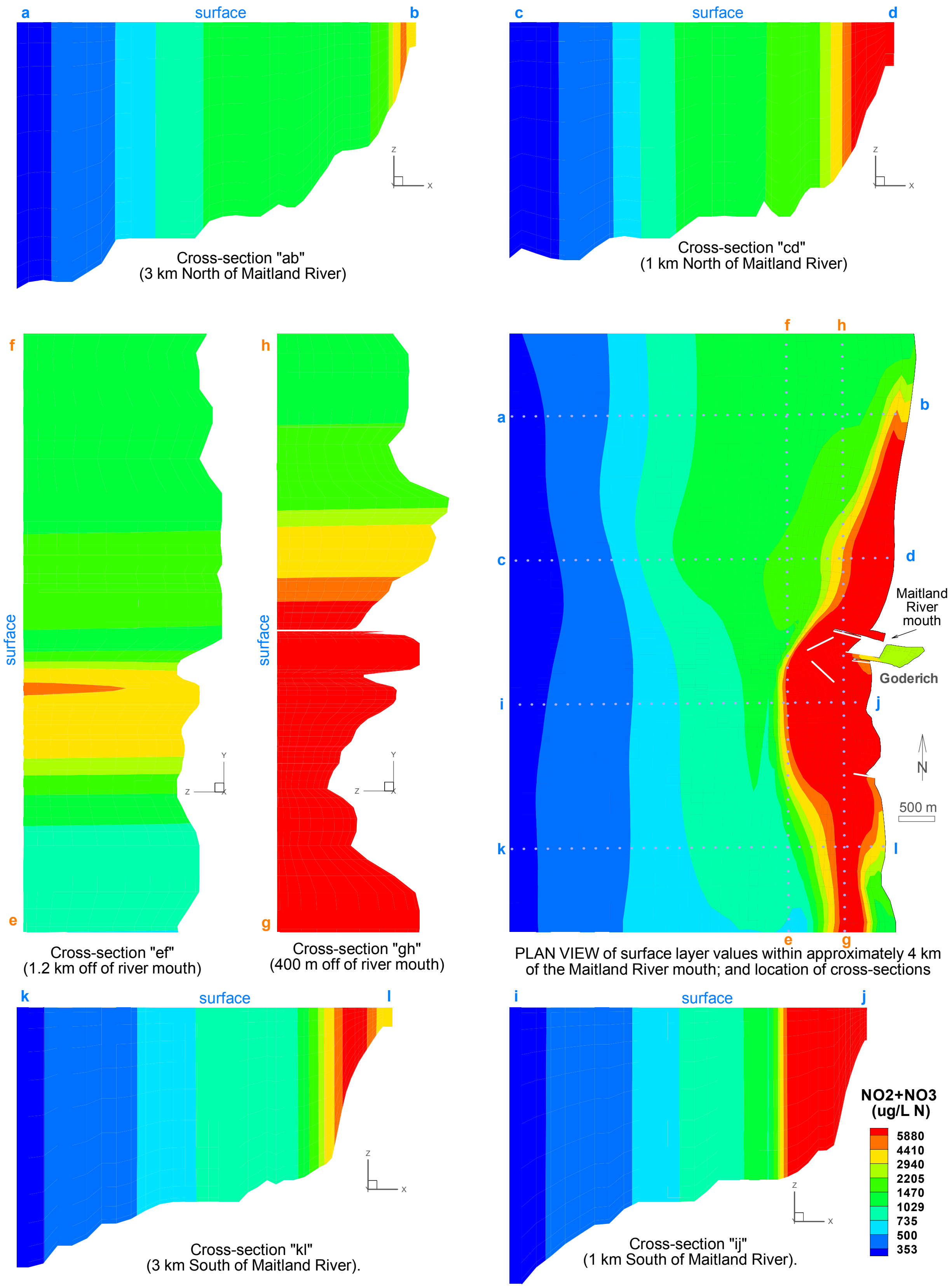


Figure 5.4N(e) **NO2+NO3, (plan view and 6 cross-sections), at 00 hours on November 20, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].**



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

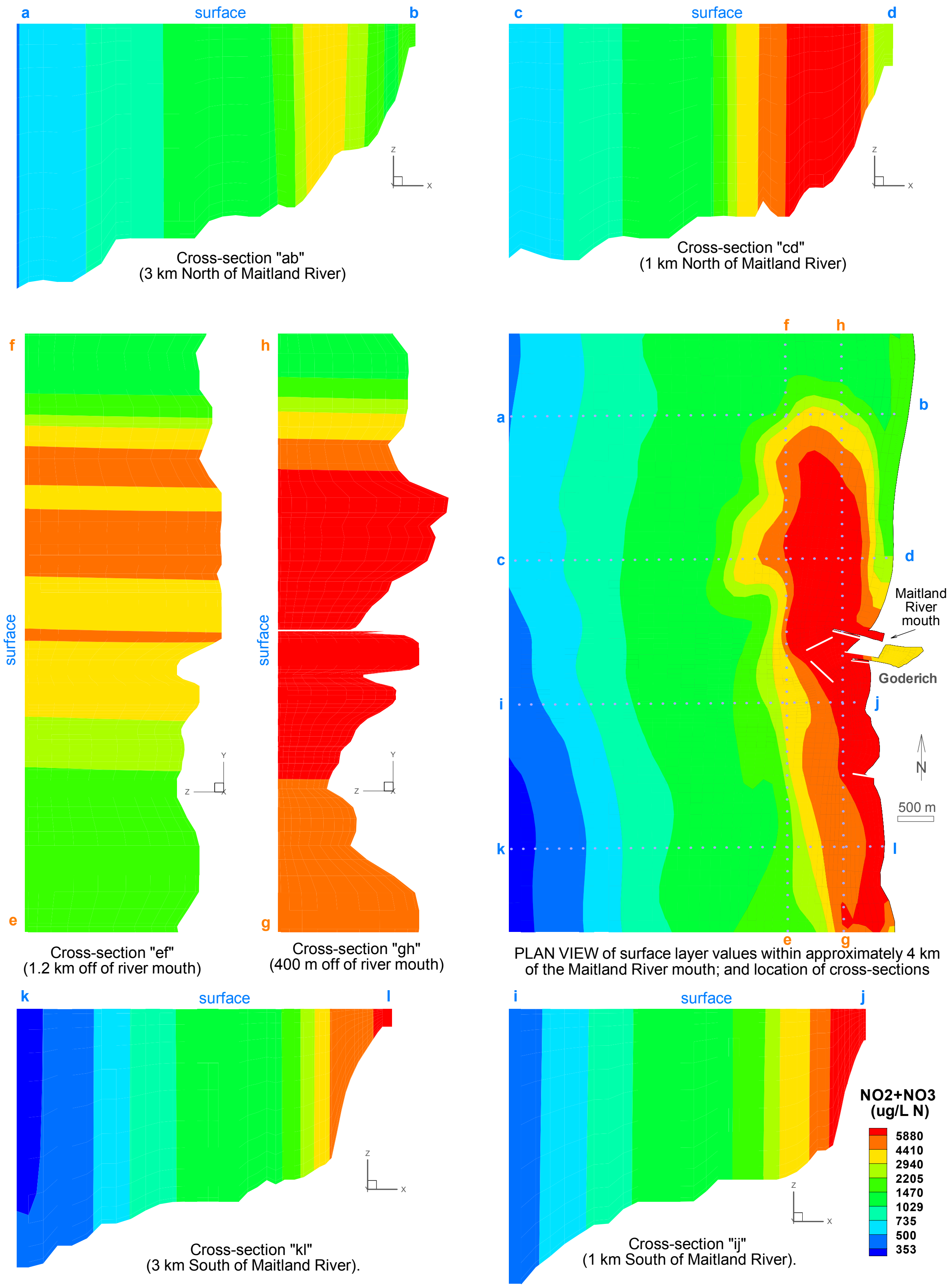
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4N(f) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on November 22, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

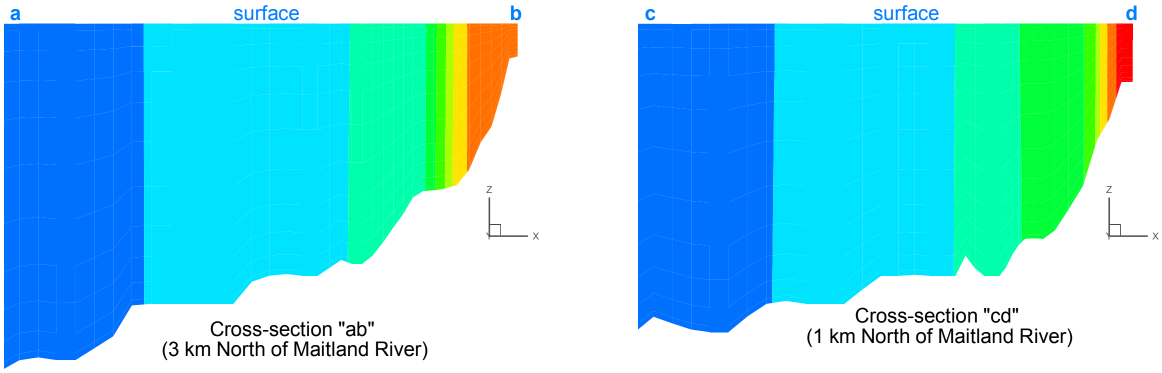
Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

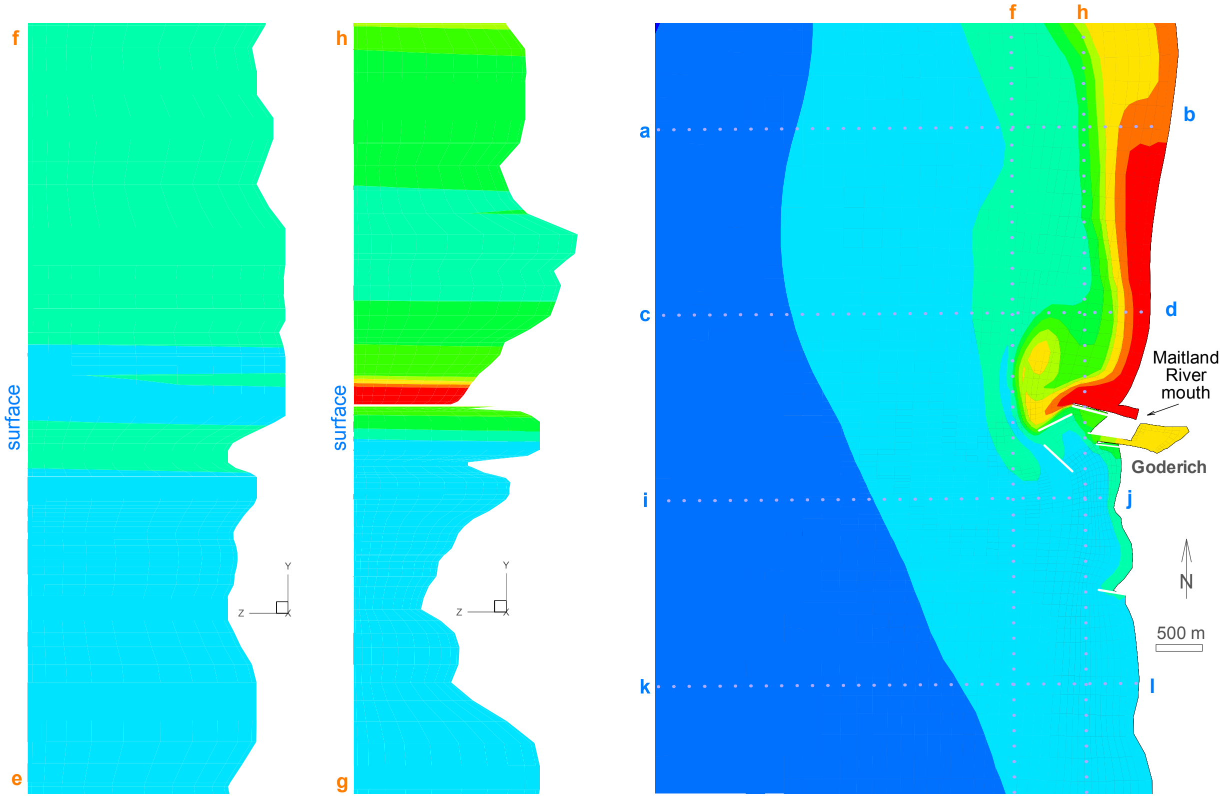
Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4N(g) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on November 24, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

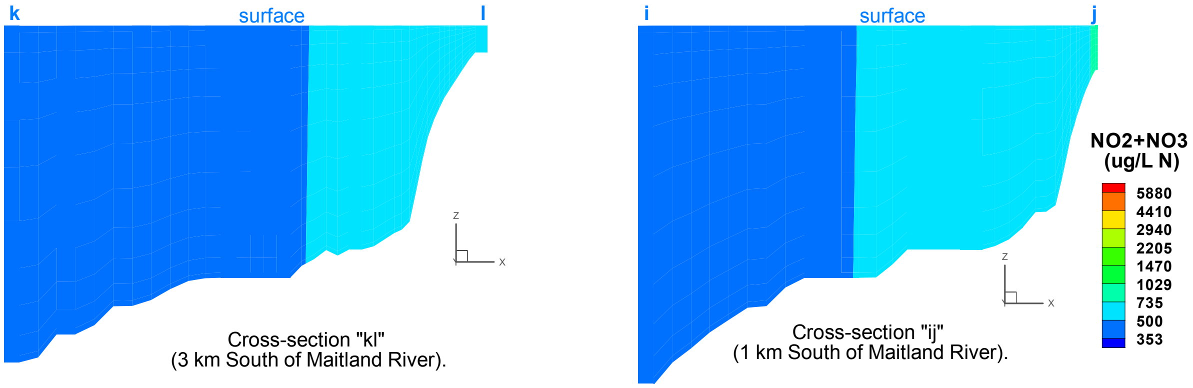
Cross-section "cd"
(1 km North of Maitland River)



Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

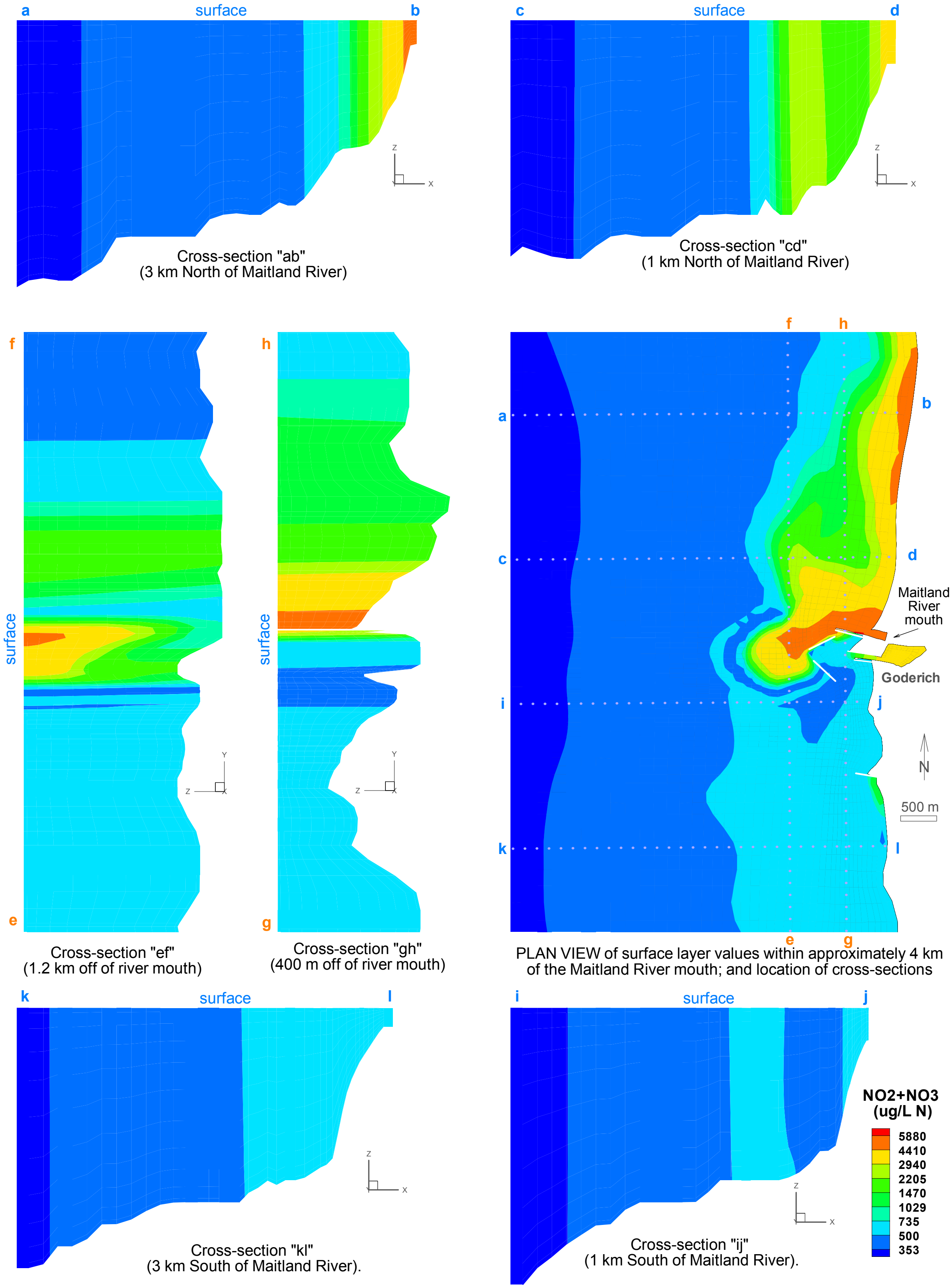
PLAN VIEW of surface layer values within approximately 4 km
of the Maitland River mouth; and location of cross-sections



Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4N(h) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on November 26, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].



Cross-section "ab"
(3 km North of Maitland River)

Cross-section "cd"
(1 km North of Maitland River)

Cross-section "ef"
(1.2 km off of river mouth)

Cross-section "gh"
(400 m off of river mouth)

PLAN VIEW of surface layer values within approximately 4 km of the Maitland River mouth; and location of cross-sections

Cross-section "kl"
(3 km South of Maitland River).

Cross-section "ij"
(1 km South of Maitland River).

Figure 5.4N(i) NO2+NO3, (plan view and 6 cross-sections), at 00 hours on November 28, 2003. [Note: the depth ("z"-dimension) is exaggerated 300 times].

APPENDIX II

3-D TEMPORAL IMPACTS
OF THE
MAITLAND RIVER DISCHARGE
FOR SELECTED EVENTS
AND SEASONS IN 2003

WATER QUALITY EXCEEDENCE ANALYSIS

The temporal exceedence analysis results are listed using the following naming system and order:

"Table 5.2 {number}[LETTER](letter)"

where:

number = 1……. for Event 1, (March 17 to April 6)
2……. for Event 2, (July 20 to 30)
3……. for Event 3, (August 2 to 15)
4……. for Event 4, (November 12 to 28)
5……. for Season 1, (March 16 to May 16)
6……. for Season 2, (May 16 to September 16)
7……. for Season 3, (September 16 to December 1), and
8……. for all (3) seasons (combined), (March 16 to December 1).

LETTER = C…… for conductivity,
N…… for NO2+NO3,
E0….. for E. coli under conservative behaviour, and
E1….. for E. coli under a deactivation rate of 1/day.

(letter) = (a)….. using the 1-hour (instantaneous) data,
(b)….. using 6-hour averaged data, and
(c)….. using 24-hour averaged data.

Table. 5.21C(a) Time-series impact analysis for levels of Conductivity , for time period of: Event 1 (March 17 to April 6).

Criterion = 400 umho / cm2 ; Length of time period (days)= 20 ; Data-averaging length (hours) = 1

Transect 1:	*(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R[1] during time period	0.52	0.52	0.58	0.58	0.71	0.71		
		% time period when C_R>1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**1.0**	**1.0**		
		Total number of exceedence episodes	0	0	0	0	**2**	**2**		
		Longest exceedence episode (in hours)					**4**	**4**		
		AVERAGE C_R during exceedence episodes					**1.01**	**1.01**		
		MAXIMUM C_R during time period	0.60	0.60	0.98	0.98	**1.01**	**1.01**		
Transect 2:	*(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R[1] during time period	0.51	0.51	0.59	0.59	0.77	0.77		
		% time period when C_R>1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**8.3**	**8.3**		
		Total number of exceedence episodes	0	0	0	0	**5**	**5**		
		Longest exceedence episode (in hours)					**17**	**17**		
		AVERAGE C_R during exceedence episodes					**1.09**	**1.09**		
		MAXIMUM C_R during time period	0.56	0.56	0.96	0.96	**1.19**	**1.19**		
Transect 3:	*(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth[3]** ***(0.0)***	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R[1] during time period	0.72	0.72	0.79	0.79			0.83	0.83
		% time period when C_R>1 (i.e. criterion exceeded)	**8.7**	**8.5**	**7.3**	**7.5**			**17.3**	**17.3**
		Total number of exceedence episodes	**9**	**8**	**4**	**5**			**7**	**7**
		Longest exceedence episode (in hours)	**21**	**20**	**25**	**25**			**39**	**39**
		AVERAGE C_R during exceedence episodes	**1.05**	**1.04**	**1.16**	**1.15**			**1.14**	**1.14**
		MAXIMUM C_R during time period	**1.14**	**1.12**	**1.28**	**1.28**			**1.30**	**1.30**
Transect 4:	*(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth[2]** ***(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R[1] during time period	0.72	0.71	**1.19**	**1.20**	**1.20**	**1.20**		
		% time period when C_R>1 (i.e. criterion exceeded)	**7.7**	**5.6**	**100.0**	**100.0**	**100.0**	**100.0**		
		Total number of exceedence episodes	**18**	**11**	**1**	**1**	**1**	**1**		
		Longest exceedence episode (in hours)	**5**	**5**	**480**	**480**	**480**	**480**		
		AVERAGE C_R during exceedence episodes	**1.06**	**1.06**	**1.19**	**1.20**	**1.20**	**1.20**		
		MAXIMUM C_R during time period	**1.22**	**1.18**	**1.33**	**1.33**	**1.33**	**1.33**		
Transect 5:	*(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
		AVERAGE C_R[1] during time period	0.58	0.59	0.65	0.65	0.74	0.74	0.79	0.79
		% time period when C_R>1 (i.e. criterion exceeded)	**1.0**	**1.2**	**2.3**	**1.9**	**6.7**	**6.2**	**27.9**	**27.7**
		Total number of exceedence episodes	**1**	**1**	**6**	**5**	**10**	**9**	**5**	**5**
		Longest exceedence episode (in hours)	**5**	**6**	**3**	**3**	**11**	**8**	**76**	**76**
		AVERAGE C_R during exceedence episodes	**1.05**	**1.05**	**1.03**	**1.04**	**1.03**	**1.02**	**1.07**	**1.07**
		MAXIMUM C_R during time period	**1.06**	**1.07**	**1.11**	**1.11**	**1.11**	**1.08**	**1.14**	**1.14**
Transect 6:	*(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R[1] during time period	0.52	0.52	0.70	0.70	0.75	0.75		
		% time period when C_R>1 (i.e. criterion exceeded)	0.0	0.0	**2.9**	**2.7**	**27.9**	**27.9**		
		Total number of exceedence episodes	0	0	**6**	**6**	**4**	**4**		
		Longest exceedence episode (in hours)			**3**	**3**	**73**	**73**		
		AVERAGE C_R during exceedence episodes			**1.02**	**1.02**	**1.06**	**1.06**		
		MAXIMUM C_R during time period	0.59	0.59	**1.04**	**1.04**	**1.13**	**1.13**		
Transect 7:	*(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542[4]**	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R[1] during time period	0.58	0.58	0.68	0.68			0.69	0.69
		% time period when C_R>1 (i.e. criterion exceeded)	0.0	0.0	**4.0**	**2.5**			0.0	0.0
		Total number of exceedence episodes	0	0	**5**	**4**			0	0
		Longest exceedence episode (in hours)			**11**	**8**				
		AVERAGE C_R during exceedence episodes			**1.01**	**1.01**				
		MAXIMUM C_R during time period	0.88	0.87	**1.03**	**1.03**			0.76	0.76
Transect 8:	*(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R[1] during time period	0.51	0.51	0.54	0.54	0.67	0.67		
		% time period when C_R>1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**17.3**	**17.3**		
		Total number of exceedence episodes	0	0	0	0	**4**	**4**		
		Longest exceedence episode (in hours)					**60**	**60**		
		AVERAGE C_R during exceedence episodes					**1.05**	**1.05**		
		MAXIMUM C_R during time period	0.57	0.57	0.65	0.64	**1.09**	**1.09**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when $C_R > 1$.

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.21C(b) Time-series impact analysis for levels of Conductivity , for time period of: Event 1 (March 17 to April 6).

Criterion = 400 umho / cm2 ; Length of time period (days)= 20 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.52	0.52	0.58	0.58	0.71	0.71		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**1.3**	**1.3**		
	Total number of exceedence episodes	0	0	0	0	**1**	**1**		
	Longest exceedence episode (in hours)					**6**	**6**		
	AVERAGE C_R during exceedence episodes					**1.00**	**1.00**		
	MAXIMUM C_R during time period	0.58	0.58	0.86	0.85	**1.00**	**1.00**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.59	0.59	0.77	0.77		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**8.8**	**8.8**		
	Total number of exceedence episodes	0	0	0	0	**3**	**3**		
	Longest exceedence episode (in hours)					**18**	**18**		
	AVERAGE C_R during exceedence episodes					**1.08**	**1.08**		
	MAXIMUM C_R during time period	0.55	0.55	0.91	0.91	**1.17**	**1.17**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.72	0.72	0.79	0.79			0.83	0.83
	% time period when C_R >1 (i.e. criterion exceeded)	**7.5**	**5.0**	**7.5**	**7.5**			**15.0**	**15.0**
	Total number of exceedence episodes	**3**	**2**	**2**	**2**			**3**	**3**
	Longest exceedence episode (in hours)	**18**	**18**	**24**	**24**			**36**	**36**
	AVERAGE C_R during exceedence episodes	**1.03**	**1.04**	**1.14**	**1.14**			**1.16**	**1.16**
	MAXIMUM C_R during time period	**1.06**	**1.05**	**1.26**	**1.26**			**1.30**	**1.30**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.72	0.71	**1.19**	**1.20**	**1.20**	**1.20**		
	% time period when C_R >1 (i.e. criterion exceeded)	**2.5**	**2.5**	**100.0**	**100.0**	**100.0**	**100.0**		
	Total number of exceedence episodes	**2**	**2**	**1**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)	**6**	**6**	**480**	**480**	**480**	**480**		
	AVERAGE C_R during exceedence episodes	**1.02**	**1.04**	**1.19**	**1.20**	**1.20**	**1.20**		
	MAXIMUM C_R during time period	**1.03**	**1.05**	**1.31**	**1.32**	**1.32**	**1.32**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.58	0.59	0.65	0.65	0.74	0.74	0.79	0.79
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**6.3**	**3.8**	**27.5**	**27.5**
	Total number of exceedence episodes	0	0	0	0	**4**	**3**	**4**	**4**
	Longest exceedence episode (in hours)					**12**	**6**	**84**	**84**
	AVERAGE C_R during exceedence episodes					**1.02**	**1.01**	**1.06**	**1.06**
	MAXIMUM C_R during time period	0.98	0.99	0.99	0.99	**1.03**	**1.02**	**1.11**	**1.11**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.52	0.52	0.70	0.70	0.75	0.75		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	**1.3**	**25.0**	**25.0**		
	Total number of exceedence episodes	0	0	0	**1**	**3**	**3**		
	Longest exceedence episode (in hours)				**6**	**72**	**72**		
	AVERAGE C_R during exceedence episodes				**1.00**	**1.07**	**1.07**		
	MAXIMUM C_R during time period	0.59	0.58	1.00	**1.00**	**1.11**	**1.11**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.58	0.58	0.68	0.68			0.69	0.69
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**3.8**	**1.3**			0.0	0.0
	Total number of exceedence episodes	0	0	**2**	**1**			0	0
	Longest exceedence episode (in hours)			**12**	**6**				
	AVERAGE C_R during exceedence episodes			**1.01**	**1.01**				
	MAXIMUM C_R during time period	0.81	0.82	**1.01**	**1.01**			0.76	0.76
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.54	0.54	0.67	0.67		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**16.3**	**16.3**		
	Total number of exceedence episodes	0	0	0	0	**2**	**2**		
	Longest exceedence episode (in hours)					**60**	**60**		
	AVERAGE C_R during exceedence episodes					**1.05**	**1.05**		
	MAXIMUM C_R during time period	0.57	0.57	0.64	0.64	**1.09**	**1.09**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.21C(c) Time-series impact analysis for levels of Conductivity , for time period of: Event 1 (March 17 to April 6).

Criterion = 400 umho / cm2 ; Length of time period (days)= 20 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.52	0.52	0.58	0.58	0.71	0.71		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.57	0.57	0.69	0.70	0.93	0.93		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.59	0.59	0.77	0.77		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.54	0.54	0.68	0.68	0.99	1.00		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.72	0.72	0.79	0.79			0.83	0.83
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**5.0**	**5.0**			**15.0**	**15.0**
	Total number of exceedence episodes	0	0	**1**	**1**			**2**	**2**
	Longest exceedence episode (in hours)			**24**	**24**			**48**	**48**
	AVERAGE C_R during exceedence episodes			**1.07**	**1.07**			**1.11**	**1.11**
	MAXIMUM C_R during time period	0.99	0.98	**1.07**	**1.07**			**1.14**	**1.15**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.72	0.71	**1.19**	**1.20**	**1.20**	**1.20**		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**100.0**	**100.0**	**100.0**	**100.0**		
	Total number of exceedence episodes	0	0	**1**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)			**480**	**480**	**480**	**480**		
	AVERAGE C_R during exceedence episodes			**1.19**	**1.20**	**1.20**	**1.20**		
	MAXIMUM C_R during time period	0.97	0.97	**1.29**	**1.29**	**1.30**	**1.30**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.58	0.59	0.65	0.65	0.74	0.74	0.79	0.79
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	**25.0**	**25.0**
	Total number of exceedence episodes	0	0	0	0	0	0	**3**	**3**
	Longest exceedence episode (in hours)							**72**	**72**
	AVERAGE C_R during exceedence episodes							**1.06**	**1.06**
	MAXIMUM C_R during time period	0.75	0.75	0.89	0.88	0.97	0.95	**1.09**	**1.09**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.52	0.52	0.70	0.70	0.75	0.75		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**20.0**	**20.0**		
	Total number of exceedence episodes	0	0	0	0	**3**	**3**		
	Longest exceedence episode (in hours)					**48**	**48**		
	AVERAGE C_R during exceedence episodes					**1.06**	**1.06**		
	MAXIMUM C_R during time period	0.56	0.56	0.97	0.95	**1.09**	**1.09**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.58	0.58	0.68	0.68			0.69	0.69
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.75	0.76	1.00	0.99			0.76	0.75
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.54	0.54	0.67	0.67		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**15.0**	**15.0**		
	Total number of exceedence episodes	0	0	0	0	**2**	**2**		
	Longest exceedence episode (in hours)					**48**	**48**		
	AVERAGE C_R during exceedence episodes					**1.03**	**1.03**		
	MAXIMUM C_R during time period	0.56	0.56	0.63	0.63	**1.07**	**1.07**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.21N(a) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 1 (March 17 to April 6).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 20 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.15	0.15	0.37	0.36	0.78	0.78		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**3.7**	**3.7**	**30.8**	**30.8**		
	Total number of exceedence episodes	0	0	**4**	**4**	**3**	**3**		
	Longest exceedence episode (in hours)			**9**	**9**	**90**	**90**		
	AVERAGE C_R during exceedence episodes			**1.61**	**1.61**	**1.47**	**1.47**		
	MAXIMUM C_R during time period	0.49	0.49	**2.27**	**2.25**	**2.25**	**2.25**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Offshore ADCP*(6.7)***		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.12	0.37	0.37	**1.02**	**1.02**		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**4.0**	**4.0**	**47.0**	**47.0**		
	Total number of exceedence episodes	0	0	**5**	**5**	**4**	**4**		
	Longest exceedence episode (in hours)			**8**	**8**	**153**	**153**		
	AVERAGE C_R during exceedence episodes			**1.56**	**1.56**	**1.67**	**1.67**		
	MAXIMUM C_R during time period	0.32	0.33	**2.12**	**2.12**	**2.82**	**2.82**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
		Surface	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.95	0.93	**1.12**	**1.12**			**1.23**	**1.23**
	% time period when C_R >1 (i.e. criterion exceeded)	**40.1**	**39.1**	**51.4**	**51.1**			**55.5**	**55.7**
	Total number of exceedence episodes	**14**	**14**	**7**	**7**			**9**	**9**
	Longest exceedence episode (in hours)	**80**	**80**	**150**	**149**			**137**	**138**
	AVERAGE C_R during exceedence episodes	**1.71**	**1.71**	**1.73**	**1.73**			**1.83**	**1.82**
	MAXIMUM C_R during time period	**2.95**	**2.96**	**2.97**	**2.97**			**2.96**	**2.96**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Nearshore ADCP*(1.2)***		**Station 539** *(0.3)*		**Mait. River mouth[2]*(0.0)***			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.88	0.86	**2.70**	**2.71**	**2.72**	**2.72**		
	% time period when C_R >1 (i.e. criterion exceeded)	**32.4**	**32.2**	**97.5**	**97.5**	**97.7**	**97.7**		
	Total number of exceedence episodes	**23**	**25**	**1**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)	**31**	**21**	**469**	**469**	**470**	**470**		
	AVERAGE C_R during exceedence episodes	**1.84**	**1.80**	**2.76**	**2.77**	**2.77**	**2.77**		
	MAXIMUM C_R during time period	**2.67**	**2.56**	**2.96**	**2.96**	**2.93**	**2.93**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.38	0.39	0.63	0.62	0.87	0.87	**1.03**	**1.03**
	% time period when C_R >1 (i.e. criterion exceeded)	**9.6**	**10.2**	**20.6**	**18.7**	**42.6**	**42.4**	**53.0**	**52.8**
	Total number of exceedence episodes	**3**	**3**	**13**	**12**	**13**	**11**	**4**	**4**
	Longest exceedence episode (in hours)	**31**	**31**	**40**	**40**	**75**	**72**	**156**	**156**
	AVERAGE C_R during exceedence episodes	**1.75**	**1.72**	**1.73**	**1.78**	**1.56**	**1.56**	**1.71**	**1.72**
	MAXIMUM C_R during time period	**2.34**	**2.35**	**2.58**	**2.56**	**2.51**	**2.52**	**2.34**	**2.34**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.14	0.14	0.73	0.72	0.86	0.86		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**33.5**	**33.7**	**41.0**	**41.0**		
	Total number of exceedence episodes	0	0	**10**	**9**	**4**	**4**		
	Longest exceedence episode (in hours)			**77**	**77**	**148**	**148**		
	AVERAGE C_R during exceedence episodes			**1.51**	**1.49**	**1.77**	**1.77**		
	MAXIMUM C_R during time period	0.44	0.43	**2.05**	**2.09**	**2.32**	**2.32**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
		Surface	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.35	0.35	0.65	0.64			0.36	0.36
	% time period when C_R >1 (i.e. criterion exceeded)	**7.3**	**7.3**	**28.5**	**28.1**			0.0	0.0
	Total number of exceedence episodes	**2**	**2**	**4**	**5**			0	0
	Longest exceedence episode (in hours)	**32**	**32**	**74**	**74**				
	AVERAGE C_R during exceedence episodes	**1.35**	**1.37**	**1.59**	**1.58**				
	MAXIMUM C_R during time period	**1.61**	**1.64**	**2.01**	**2.00**			0.78	0.77
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.12	0.20	0.20	0.59	0.59		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**23.7**	**23.7**		
	Total number of exceedence episodes	0	0	0	0	**5**	**5**		
	Longest exceedence episode (in hours)					**68**	**68**		
	AVERAGE C_R during exceedence episodes					**1.76**	**1.76**		
	MAXIMUM C_R during time period	0.37	0.36	0.69	0.69	**2.21**	**2.21**		

Notes: *(1)* *" C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.*
Thus an "exceedence episode" occurs when C_R > 1 .

(2) *This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.*

(3) *This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.*

(4) *Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.*

Table. 5.21N(b) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 1 (March 17 to April 6).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 20 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)* Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.15	0.15	0.37	0.36	0.78	0.78		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**5.0**	**5.0**	**32.5**	**32.5**		
Total number of exceedence episodes	0	0	**3**	**3**	**3**	**3**		
Longest exceedence episode (in hours)			**12**	**12**	**96**	**96**		
AVERAGE C_R during exceedence episodes			**1.33**	**1.34**	**1.44**	**1.44**		
MAXIMUM C_R during time period	0.41	0.42	**1.64**	**1.58**	**2.22**	**2.23**		
Transect 2: *(about 3.0 km North of Maitland River mouth)* Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.12	0.12	0.37	0.37	**1.02**	**1.02**		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**3.8**	**3.8**	**46.3**	**46.3**		
Total number of exceedence episodes	0	0	**3**	**3**	**3**	**3**		
Longest exceedence episode (in hours)			**6**	**6**	**150**	**150**		
AVERAGE C_R during exceedence episodes			**1.42**	**1.41**	**1.67**	**1.67**		
MAXIMUM C_R during time period	0.29	0.29	**1.90**	**1.90**	**2.56**	**2.56**		
Transect 3: *(about 0.9 km North of Maitland River mouth)* Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.95	0.93	**1.12**	**1.12**			**1.23**	**1.23**
% time period when C_R >1 (i.e. criterion exceeded)	**42.5**	**42.5**	**53.8**	**53.8**			**58.8**	**58.8**
Total number of exceedence episodes	**7**	**7**	**5**	**5**			**5**	**5**
Longest exceedence episode (in hours)	**126**	**126**	**150**	**150**			**168**	**168**
AVERAGE C_R during exceedence episodes	**1.64**	**1.63**	**1.68**	**1.68**			**1.76**	**1.76**
MAXIMUM C_R during time period	**2.77**	**2.71**	**2.82**	**2.80**			**2.95**	**2.95**
Transect 4: *(about 0.1 km North of Maitland River mouth)* Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.88	0.86	**2.70**	**2.71**	**2.72**	**2.72**		
% time period when C_R >1 (i.e. criterion exceeded)	**35.0**	**35.0**	**97.5**	**97.5**	**97.5**	**97.5**		
Total number of exceedence episodes	**10**	**10**	**1**	**1**	**1**	**1**		
Longest exceedence episode (in hours)	**36**	**36**	**468**	**468**	**468**	**468**		
AVERAGE C_R during exceedence episodes	**1.70**	**1.66**	**2.76**	**2.77**	**2.78**	**2.78**		
MAXIMUM C_R during time period	**2.13**	**2.12**	**2.95**	**2.95**	**2.93**	**2.93**		
Transect 5: *(about 0.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.39	0.39	0.63	0.62	0.87	0.87	**1.03**	**1.03**
% time period when C_R >1 (i.e. criterion exceeded)	**8.8**	**8.8**	**20.0**	**22.5**	**47.5**	**46.3**	**53.8**	**53.8**
Total number of exceedence episodes	**2**	**2**	**5**	**6**	**5**	**6**	**3**	**3**
Longest exceedence episode (in hours)	**30**	**30**	**48**	**54**	**90**	**72**	**156**	**156**
AVERAGE C_R during exceedence episodes	**1.70**	**1.72**	**1.62**	**1.53**	**1.49**	**1.49**	**1.70**	**1.70**
MAXIMUM C_R during time period	**1.94**	**2.00**	**2.43**	**2.39**	**2.43**	**2.43**	**2.28**	**2.28**
Transect 6: *(about 2.1 km South of Maitland River mouth)* Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.14	0.14	0.73	0.72	0.86	0.86		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**33.8**	**35.0**	**41.3**	**41.3**		
Total number of exceedence episodes	0	0	**4**	**4**	**2**	**2**		
Longest exceedence episode (in hours)			**84**	**84**	**150**	**150**		
AVERAGE C_R during exceedence episodes			**1.49**	**1.45**	**1.76**	**1.76**		
MAXIMUM C_R during time period	0.43	0.43	**1.89**	**1.91**	**2.29**	**2.29**		
Transect 7: *(about 3.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.35	0.35	0.65	0.64			0.36	0.36
% time period when C_R >1 (i.e. criterion exceeded)	**6.3**	**7.5**	**30.0**	**30.0**			0.0	0.0
Total number of exceedence episodes	**1**	**1**	**3**	**3**			0	0
Longest exceedence episode (in hours)	**30**	**36**	**78**	**78**				
AVERAGE C_R during exceedence episodes	**1.32**	**1.29**	**1.56**	**1.54**				
MAXIMUM C_R during time period	**1.55**	**1.56**	**1.93**	**1.92**			0.76	0.75
Transect 8: *(about 6.0 km South of Maitland River mouth)* Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.12	0.12	0.20	0.20	0.59	0.59		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**23.8**	**23.8**		
Total number of exceedence episodes	0	0	0	0	**4**	**4**		
Longest exceedence episode (in hours)					**66**	**66**		
AVERAGE C_R during exceedence episodes					**1.73**	**1.73**		
MAXIMUM C_R during time period	0.36	0.36	0.68	0.68	**2.19**	**2.19**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.21N(c) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 1 (March 17 to April 6).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 20 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.15	0.15	0.37	0.36	0.78	0.78		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**35.0**	**35.0**		
	Total number of exceedence episodes	0	0	0	0	**1**	**1**		
	Longest exceedence episode (in hours)					**168**	**168**		
	AVERAGE C_R during exceedence episodes					**1.37**	**1.37**		
	MAXIMUM C_R during time period	0.39	0.39	0.85	0.86	**1.82**	**1.82**		
Transect 2: *(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.12	0.37	0.37	**1.02**	**1.02**		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**55.0**	**55.0**		
	Total number of exceedence episodes	0	0	0	0	**2**	**2**		
	Longest exceedence episode (in hours)					**216**	**216**		
	AVERAGE C_R during exceedence episodes					**1.52**	**1.52**		
	MAXIMUM C_R during time period	0.25	0.24	0.80	0.80	**2.14**	**2.14**		
Transect 3: *(about 0.9 km North of*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.95	0.93	**1.12**	**1.12**			**1.23**	**1.23**
	% time period when C_R >1 (i.e. criterion exceeded)	**55.0**	**45.0**	**55.0**	**55.0**			**60.0**	**60.0**
	Total number of exceedence episodes	**3**	**3**	**2**	**2**			**2**	**2**
	Longest exceedence episode (in hours)	**144**	**144**	**216**	**216**			**240**	**240**
	AVERAGE C_R during exceedence episodes	**1.39**	**1.46**	**1.61**	**1.61**			**1.72**	**1.72**
	MAXIMUM C_R during time period	**1.92**	**1.93**	**2.23**	**2.23**			**2.42**	**2.43**
Transect 4: *(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** *(0.3)*		**Mait. River mouth[2]*(0.0)***			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.88	0.86	**2.70**	**2.71**	**2.72**	**2.72**		
	% time period when C_R >1 (i.e. criterion exceeded)	**35.0**	**35.0**	**100.0**	**100.0**	**100.0**	**100.0**		
	Total number of exceedence episodes	**5**	**4**	**1**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)	**48**	**72**	**480**	**480**	**480**	**480**		
	AVERAGE C_R during exceedence episodes	**1.41**	**1.38**	**2.70**	**2.71**	**2.72**	**2.72**		
	MAXIMUM C_R during time period	**1.85**	**1.83**	**2.92**	**2.92**	**2.92**	**2.92**		
Transect 5: *(about 0.8 km South of*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.39	0.39	0.63	0.62	0.87	0.87	**1.03**	**1.03**
	% time period when C_R >1 (i.e. criterion exceeded)	**10.0**	**10.0**	**20.0**	**15.0**	**55.0**	**55.0**	**45.0**	**45.0**
	Total number of exceedence episodes	**1**	**1**	**3**	**2**	**3**	**3**	**3**	**3**
	Longest exceedence episode (in hours)	**48**	**48**	**48**	**48**	**168**	**168**	**144**	**144**
	AVERAGE C_R during exceedence episodes	**1.17**	**1.17**	**1.45**	**1.56**	**1.33**	**1.33**	**1.78**	**1.78**
	MAXIMUM C_R during time period	**1.20**	**1.21**	**1.79**	**1.75**	**1.80**	**1.75**	**2.21**	**2.21**
Transect 6: *(about 2.1 km South of*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.14	0.14	0.73	0.72	0.86	0.86		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**35.0**	**30.0**	**40.0**	**40.0**		
	Total number of exceedence episodes	0	0	**3**	**3**	**2**	**2**		
	Longest exceedence episode (in hours)			**96**	**96**	**144**	**144**		
	AVERAGE C_R during exceedence episodes			**1.34**	**1.37**	**1.75**	**1.75**		
	MAXIMUM C_R during time period	0.35	0.34	**1.81**	**1.75**	**2.22**	**2.22**		
Transect 7: *(about 3.8 km South of*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.35	0.35	0.65	0.64			0.36	0.36
	% time period when C_R >1 (i.e. criterion exceeded)	**5.0**	**5.0**	**25.0**	**25.0**			0.0	0.0
	Total number of exceedence episodes	**1**	**1**	**3**	**3**			0	0
	Longest exceedence episode (in hours)	**24**	**24**	**72**	**72**				
	AVERAGE C_R during exceedence episodes	**1.24**	**1.29**	**1.60**	**1.58**				
	MAXIMUM C_R during time period	**1.24**	**1.29**	**1.90**	**1.88**			0.75	0.74
Transect 8: *(about 6.0 km South of*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.12	0.20	0.20	0.59	0.59		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**25.0**	**25.0**		
	Total number of exceedence episodes	0	0	0	0	**3**	**3**		
	Longest exceedence episode (in hours)					**72**	**72**		
	AVERAGE C_R during exceedence episodes					**1.66**	**1.66**		
	MAXIMUM C_R during time period	0.34	0.33	0.59	0.59	**2.13**	**2.13**		

Notes: *(1)* *" C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.*
Thus an "exceedence episode" occurs when C_R > 1 .

(2) *This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.*

(3) *This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.*

(4) *Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.*

Table. 5.21E0(a) Time-series impact analysis for levels of E. coli (NO losses) , for time period of: Event 1 (March 17 to April 6).

Criterion = 100 CFU/100mL ; Length of time period (hrs)= 480 ; Data-averaging length (hrs) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.02	0.02	0.09	0.09	0.23	0.23		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**4.0**	**4.0**		
	Total number of exceedence episodes	0	0	0	0	**2**	**2**		
	Longest exceedence episode (in hours)					**14**	**14**		
	AVERAGE C_R during exceedence episodes					**1.07**	**1.07**		
	MAXIMUM C_R during time period	0.07	0.07	0.86	0.85	**1.13**	**1.13**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** ***(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.01	0.01	0.09	0.09	0.25	0.25		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**0.6**	**0.6**		
	Total number of exceedence episodes	0	0	0	0	**1**	**1**		
	Longest exceedence episode (in hours)					**3**	**3**		
	AVERAGE C_R during exceedence episodes					**1.02**	**1.02**		
	MAXIMUM C_R during time period	0.05	0.05	0.94	0.96	**1.03**	**1.03**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth[3]** ***(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.26	0.26	0.06	0.06			0.25	0.25
	% time period when C_R >1 (i.e. criterion exceeded)	**8.5**	**7.3**	0.0	0.0			**0.8**	**0.8**
	Total number of exceedence episodes	**4**	**5**	0	0			**1**	**1**
	Longest exceedence episode (in hours)	**26**	**23**					**4**	**4**
	AVERAGE C_R during exceedence episodes	**1.23**	**1.25**					**1.07**	**1.07**
	MAXIMUM C_R during time period	**1.51**	**1.48**	0.38	0.39			**1.12**	**1.12**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** ***(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth[2]** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.23	0.23	0.62	0.63	0.63	0.63		
	% time period when C_R >1 (i.e. criterion exceeded)	**5.4**	**5.0**	**27.0**	**27.0**	**27.2**	**27.2**		
	Total number of exceedence episodes	**7**	**6**	**1**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)	**10**	**9**	**130**	**130**	**131**	**131**		
	AVERAGE C_R during exceedence episodes	**1.23**	**1.23**	**1.75**	**1.77**	**1.78**	**1.78**		
	MAXIMUM C_R during time period	**1.69**	**1.70**	**2.40**	**2.41**	**2.40**	**2.40**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.08	0.08	0.14	0.14	0.21	0.21	0.25	0.25
	% time period when C_R >1 (i.e. criterion exceeded)	**1.7**	**1.7**	**1.7**	**1.7**	**5.8**	**5.2**	**12.9**	**12.9**
	Total number of exceedence episodes	**1**	**1**	**2**	**1**	**3**	**2**	**1**	**1**
	Longest exceedence episode (in hours)	**8**	**8**	**7**	**8**	**22**	**22**	**62**	**62**
	AVERAGE C_R during exceedence episodes	**1.16**	**1.15**	**1.11**	**1.11**	**1.19**	**1.20**	**1.25**	**1.25**
	MAXIMUM C_R during time period	**1.23**	**1.24**	**1.19**	**1.20**	**1.27**	**1.27**	**1.50**	**1.50**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.02	0.02	0.16	0.15	0.21	0.21		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**2.5**	**1.9**	**9.8**	**9.8**		
	Total number of exceedence episodes	0	0	**2**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)			**10**	**9**	**47**	**47**		
	AVERAGE C_R during exceedence episodes			**1.13**	**1.17**	**1.33**	**1.33**		
	MAXIMUM C_R during time period	0.09	0.09	**1.37**	**1.37**	**1.49**	**1.49**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.06	0.06	0.14	0.13			0.14	0.14
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**1.9**	**1.7**			0.0	0.0
	Total number of exceedence episodes	0	0	**1**	**1**			0	0
	Longest exceedence episode (in hours)			**9**	**8**				
	AVERAGE C_R during exceedence episodes			**1.08**	**1.06**				
	MAXIMUM C_R during time period	0.21	0.22	**1.15**	**1.12**			0.18	0.18
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.01	0.01	0.04	0.03	0.12	0.12		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**5.6**	**5.6**		
	Total number of exceedence episodes	0	0	0	0	**1**	**1**		
	Longest exceedence episode (in hours)					**27**	**27**		
	AVERAGE C_R during exceedence episodes					**1.23**	**1.23**		
	MAXIMUM C_R during time period	0.07	0.07	0.15	0.15	**1.36**	**1.36**		

Notes: *(1)* *" C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.*
Thus an "exceedence episode" occurs when C_R > 1 .

(2) *This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.*

(3) *This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.*

(4) *Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.*

Table. 5.21E0(b) Time-series impact analysis for levels of E. coli (NO losses) , for time period of: Event 1 (March 17 to April 6).

Criterion = 100 CFU/100mL ; Length of time period (hrs)= 480 ; Data-averaging length (hrs) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.02	0.02	0.09	0.09	0.23	0.23		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**3.8**	**3.8**		
	Total number of exceedence episodes	0	0	0	0	**1**	**1**		
	Longest exceedence episode (in hours)					**18**	**18**		
	AVERAGE C_R during exceedence episodes					**1.07**	**1.07**		
	MAXIMUM C_R during time period	0.07	0.07	0.61	0.60	**1.08**	**1.08**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.01	0.01	0.09	0.09	0.25	0.25		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.05	0.04	0.62	0.62	0.96	0.96		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth^3** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R ^{1} during time period	0.26	0.26	0.06	0.06			0.25	0.25
	% time period when C_R >1 (i.e. criterion exceeded)	**7.5**	**7.5**	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	**3**	**3**	0	0			0	0
	Longest exceedence episode (in hours)	**24**	**24**						
	AVERAGE C_R during exceedence episodes	**1.23**	**1.22**						
	MAXIMUM C_R during time period	**1.37**	**1.37**	0.36	0.37			0.98	0.98
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth^2***(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.23	0.23	0.63	0.63	0.63	0.63		
	% time period when C_R >1 (i.e. criterion exceeded)	**5.0**	**3.8**	**27.5**	**27.5**	**27.5**	**27.5**		
	Total number of exceedence episodes	**2**	**3**	**1**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)	**18**	**6**	**132**	**132**	**132**	**132**		
	AVERAGE C_R during exceedence episodes	**1.14**	**1.18**	**1.74**	**1.76**	**1.77**	**1.77**		
	MAXIMUM C_R during time period	**1.25**	**1.28**	**2.32**	**2.34**	**2.38**	**2.38**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R ^{1} during time period	0.08	0.08	0.14	0.14	0.21	0.21	0.25	0.25
	% time period when C_R >1 (i.e. criterion exceeded)	**1.3**	**1.3**	0.0	0.0	**6.3**	**5.0**	**12.5**	**12.5**
	Total number of exceedence episodes	**1**	**1**	0	0	**2**	**1**	**1**	**1**
	Longest exceedence episode (in hours)	**6**	**6**			**24**	**24**	**60**	**60**
	AVERAGE C_R during exceedence episodes	**1.05**	**1.08**			**1.15**	**1.18**	**1.25**	**1.25**
	MAXIMUM C_R during time period	**1.05**	**1.08**	1.00	0.99	**1.25**	**1.25**	**1.47**	**1.47**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.02	0.02	0.16	0.15	0.21	0.21		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**2.5**	**2.5**	**10.0**	**10.0**		
	Total number of exceedence episodes	0	0	**1**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)			**12**	**12**	**48**	**48**		
	AVERAGE C_R during exceedence episodes			**1.11**	**1.10**	**1.32**	**1.32**		
	MAXIMUM C_R during time period	0.08	0.08	**1.18**	**1.16**	**1.42**	**1.42**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542^4**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R ^{1} during time period	0.06	0.06	0.14	0.13			0.14	0.14
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**2.5**	**1.3**			0.0	0.0
	Total number of exceedence episodes	0	0	**1**	**1**			0	0
	Longest exceedence episode (in hours)			**12**	**6**				
	AVERAGE C_R during exceedence episodes			**1.05**	**1.04**				
	MAXIMUM C_R during time period	0.20	0.20	**1.08**	**1.04**			0.18	0.18
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.01	0.01	0.03	0.03	0.12	0.12		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**6.3**	**6.3**		
	Total number of exceedence episodes	0	0	0	0	**1**	**1**		
	Longest exceedence episode (in hours)					**30**	**30**		
	AVERAGE C_R during exceedence episodes					**1.19**	**1.19**		
	MAXIMUM C_R during time period	0.07	0.07	0.15	0.15	**1.36**	**1.36**		

Notes: *(1)* *" C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.*
Thus an "exceedence episode" occurs when C_R > 1 .

(2) *This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.*

(3) *This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.*

(4) *Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.*

Table. 5.21E0(c) Time-series impact analysis for levels of E. coli (NO losses) , for time period of: Event 1 (March 17 to April 6).

Criterion = 100 CFU/100mL ; Length of time period (hrs)= 480 ; Data-averaging length (hrs) = 24

Transect 1: *(about 6.0 km North of*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.02	0.02	0.09	0.09	0.23	0.23		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	5.0	5.0		
	Total number of exceedence episodes	0	0	0	0	1	1		
	Longest exceedence episode (in hours)					24	24		
	AVERAGE C_R during exceedence episodes					1.03	1.03		
	MAXIMUM C_R during time period	0.06	0.06	0.28	0.28	1.03	1.03		
Transect 2: *(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.01	0.01	0.09	0.09	0.25	0.25		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.04	0.04	0.25	0.25	0.87	0.87		
Transect 3: *(about 0.9 km North of*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.26	0.26	0.06	0.06			0.25	0.25
	% time period when C_R >1 (i.e. criterion exceeded)	5.0	5.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	1	1	0	0			0	0
	Longest exceedence episode (in hours)	24	24						
	AVERAGE C_R during exceedence episodes	1.18	1.16						
	MAXIMUM C_R during time period	1.18	1.16	0.20	0.20			0.87	0.87
Transect 4: *(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]***(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.23	0.23	0.63	0.63	0.63	0.63		
	% time period when C_R >1 (i.e. criterion exceeded)	5.0	5.0	30.0	30.0	30.0	30.0		
	Total number of exceedence episodes	1	1	1	1	1	1		
	Longest exceedence episode (in hours)	24	24	144	144	144	144		
	AVERAGE C_R during exceedence episodes	1.08	1.07	1.64	1.65	1.67	1.67		
	MAXIMUM C_R during time period	1.08	1.07	2.16	2.23	2.30	2.30		
Transect 5: *(about 0.8 km South of*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.08	0.08	0.14	0.14	0.21	0.21	0.25	0.25
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	5.0	0.0	10.0	10.0
	Total number of exceedence episodes	0	0	0	0	1	0	1	1
	Longest exceedence episode (in hours)					24		48	48
	AVERAGE C_R during exceedence episodes					1.00		1.28	1.28
	MAXIMUM C_R during time period	0.32	0.32	0.60	0.58	1.00	0.98	1.39	1.39
Transect 6: *(about 2.1 km South of*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.02	0.02	0.16	0.15	0.21	0.21		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	10.0	10.0		
	Total number of exceedence episodes	0	0	0	0	1	1		
	Longest exceedence episode (in hours)					48	48		
	AVERAGE C_R during exceedence episodes					1.24	1.24		
	MAXIMUM C_R during time period	0.07	0.07	0.93	0.89	1.41	1.41		
Transect 7: *(about 3.8 km South of*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.06	0.06	0.14	0.13			0.14	0.14
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	5.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	1	0			0	0
	Longest exceedence episode (in hours)			24					
	AVERAGE C_R during exceedence episodes			1.01					
	MAXIMUM C_R during time period	0.16	0.17	1.01	0.97			0.18	0.18
Transect 8: *(about 6.0 km South of*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.01	0.01	0.03	0.03	0.12	0.12		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	5.0	5.0		
	Total number of exceedence episodes	0	0	0	0	1	1		
	Longest exceedence episode (in hours)					24	24		
	AVERAGE C_R during exceedence episodes					1.23	1.23		
	MAXIMUM C_R during time period	0.06	0.06	0.14	0.14	1.23	1.23		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.21E1(a) Time-series impact analysis for levels of E. coli (deact. 1/day) , for time period of: Event 1 (March 17 to April 6).

Criterion = 100 CFU/100mL ; Length of time period (hrs)= 480 ; Data-averaging length (hrs) = 1

Transect 1:	*(about 6.0 km North of*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.01	0.01	0.04	0.04	0.06	0.06		
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes		0	0	0	0	0	0		
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.06	0.06	0.35	0.34	0.25	0.25		
Transect 2:	*(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.01	0.01	0.03	0.03	0.04	0.04		
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes		0	0	0	0	0	0		
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.03	0.03	0.47	0.48	0.15	0.15		
Transect 3:	*(about 0.9 km North of*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth**[3] *(0.0)*	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period		0.13	0.13	0.06	0.06			0.07	0.07
	% time period when $C_R > 1$ (i.e. criterion exceeded)		**0.2**	**0.4**	0.0	0.0			0.0	0.0
	Total number of exceedence episodes		**1**	**1**	0	0			0	0
	Longest exceedence episode (in hours)		**1**	**2**						
	AVERAGE C_R during exceedence episodes		**1.16**	**1.08**						
	MAXIMUM C_R during time period		**1.16**	**1.14**	0.38	0.39			0.31	0.31
Transect 4:	*(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth**[2]*(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.14	0.13	0.62	0.62	0.63	0.63		
	% time period when $C_R > 1$ (i.e. criterion exceeded)		**1.7**	**1.5**	**27.2**	**27.0**	**27.2**	**27.2**		
	Total number of exceedence episodes		**3**	**2**	**1**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)		**5**	**5**	**131**	**130**	**131**	**131**		
	AVERAGE C_R during exceedence episodes		**1.17**	**1.17**	**1.73**	**1.75**	**1.78**	**1.78**		
	MAXIMUM C_R during time period		**1.50**	**1.52**	**2.35**	**2.36**	**2.40**	**2.40**		
Transect 5:	*(about 0.8 km South of*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period		0.03	0.03	0.07	0.07	0.08	0.08	0.09	0.09
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes		0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.75	0.76	0.80	0.82	0.74	0.75	0.98	0.98
Transect 6:	*(about 2.1 km South of*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.01	0.01	0.06	0.06	0.08	0.08		
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes		0	0	0	0	0	0		
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.03	0.03	0.58	0.58	0.89	0.89		
Transect 7:	*(about 3.8 km South of*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542**[4]	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period		0.02	0.02	0.05	0.05			0.00	0.00
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes		0	0	0	0			0	0
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.09	0.09	0.59	0.58			0.04	0.04
Transect 8:	*(about 6.0 km South of*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.01	0.01	0.02	0.02	0.05	0.05		
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes		0	0	0	0	0	0		
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.02	0.02	0.05	0.05	0.55	0.55		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when $C_R > 1$.

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.21E1(b) Time-series impact analysis for levels of E. coli (deact. 1/day) , for time period of: Event 1 (March 17 to April 6).

Criterion = 100 CFU/100mL ; Length of time period (hrs)= 480 ; Data-averaging length (hrs) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.01	0.01	0.04	0.04	0.06	0.06		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.06	0.06	0.18	0.17	0.23	0.23		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.01	0.01	0.03	0.03	0.04	0.04		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.03	0.03	0.23	0.23	0.13	0.13		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.13	0.13	0.06	0.06			0.07	0.07
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.88	0.88	0.36	0.37			0.28	0.27
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.14	0.13	0.62	0.63	0.63	0.63		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**27.5**	**27.5**	**27.5**	**27.5**		
	Total number of exceedence episodes	0	0	**1**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)			**132**	**132**	**132**	**132**		
	AVERAGE C_R during exceedence episodes			**1.72**	**1.74**	**1.77**	**1.77**		
	MAXIMUM C_R during time period	0.99	1.00	**2.27**	**2.29**	**2.38**	**2.38**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.03	0.03	0.07	0.07	0.08	0.08	0.09	0.09
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.54	0.56	0.60	0.60	0.68	0.70	0.97	0.97
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.01	0.01	0.06	0.06	0.08	0.08		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.03	0.03	0.52	0.51	0.88	0.88		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.02	0.02	0.05	0.05			0.00	0.00
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.06	0.06	0.55	0.54			0.03	0.04
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.01	0.01	0.02	0.02	0.05	0.05		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.02	0.02	0.05	0.05	0.54	0.54		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.21E1(c) Time-series impact analysis for levels of E. coli (deact. 1/day) , for time period of: Event 1 (March 17 to April 6).

Criterion = 100 CFU/100mL ; Length of time period (hrs)= 480 ; Data-averaging length (hrs) = 24

Transect 1:	*(about 6.0 km North of*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.01	0.01	0.04	0.04	0.06	0.06		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.05	0.05	0.13	0.13	0.16	0.16		
Transect 2:	*(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.01	0.01	0.03	0.03	0.04	0.04		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.02	0.02	0.10	0.10	0.11	0.11		
Transect 3:	*(about 0.9 km North of*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.13	0.13	0.06	0.06			0.07	0.07
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
		Total number of exceedence episodes	0	0	0	0			0	0
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.58	0.58	0.20	0.20			0.21	0.20
Transect 4:	*(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]***(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.14	0.13	0.62	0.63	0.63	0.63		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**30.0**	**30.0**	**30.0**	**30.0**		
		Total number of exceedence episodes	0	0	**1**	**1**	**1**	**1**		
		Longest exceedence episode (in hours)			**144**	**144**	**144**	**144**		
		AVERAGE C_R during exceedence episodes			**1.62**	**1.64**	**1.67**	**1.67**		
		MAXIMUM C_R during time period	0.74	0.73	**2.12**	**2.19**	**2.30**	**2.30**		
Transect 5:	*(about 0.8 km South of*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.03	0.03	0.07	0.07	0.08	0.08	0.09	0.09
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Total number of exceedence episodes	0	0	0	0	0	0	0	0
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.16	0.15	0.40	0.39	0.58	0.57	0.85	0.85
Transect 6:	*(about 2.1 km South of*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.01	0.01	0.06	0.06	0.08	0.08		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.03	0.03	0.49	0.47	0.79	0.79		
Transect 7:	*(about 3.8 km South of*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.02	0.02	0.05	0.05			0.00	0.00
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
		Total number of exceedence episodes	0	0	0	0			0	0
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.05	0.05	0.46	0.45			0.02	0.02
Transect 8:	*(about 6.0 km South of*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.01	0.01	0.02	0.02	0.05	0.05		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.01	0.01	0.04	0.04	0.49	0.49		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.22C(a) Time-series impact analysis for levels of Conductivity , for time period of: Event 2 (July 20 to 30).

Criterion = 400 umho / cm2 ; Length of time period (days)= 10 ; Data-averaging length (hours) = 1

Transect 1:	*(about 6.0 km North of Maitland River mouth)* Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.50	0.50	0.50	0.50	0.54	0.54		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.53	0.51	0.76	0.76		
Transect 2:	*(about 3.0 km North of Maitland River mouth)* Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.50	0.50	0.50	0.50	0.59	0.59		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.53	0.51	0.93	0.93		
Transect 3:	*(about 0.9 km North of Maitland River mouth)* Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth**[3] *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.52	0.51	0.59	0.55			0.72	0.67
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			**5.4**	**1.2**
	Total number of exceedence episodes	0	0	0	0			**4**	**1**
	Longest exceedence episode (in hours)							**4**	**3**
	AVERAGE C_R during exceedence episodes							**1.05**	**1.03**
	MAXIMUM C_R during time period	0.70	0.56	0.91	0.71			**1.11**	**1.04**
Transect 4:	*(about 0.1 km North of Maitland River mouth)* Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth**[2]*(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.51	0.50	0.74	0.61	**1.20**	**1.20**		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**12.9**	**1.2**	**100.0**	**100.0**		
	Total number of exceedence episodes	0	0	**7**	**2**	**1**	**1**		
	Longest exceedence episode (in hours)			**10**	**2**	**240**	**240**		
	AVERAGE C_R during exceedence episodes			**1.08**	**1.03**	**1.20**	**1.20**		
	MAXIMUM C_R during time period	0.59	0.52	**1.18**	**1.08**	**1.25**	**1.25**		
Transect 5:	*(about 0.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.50	0.50	0.51	0.50	0.52	0.51	0.53	0.53
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.52	0.51	0.56	0.53	0.59	0.58	0.64	0.64
Transect 6:	*(about 2.1 km South of Maitland River mouth)* Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.50	0.50	0.52	0.51	0.53	0.53		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.51	0.50	0.55	0.55	0.63	0.63		
Transect 7:	*(about 3.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542**[4]	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.50	0.50	0.51	0.51			0.53	0.51
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.51	0.51	0.55	0.54			0.59	0.56
Transect 8:	*(about 6.0 km South of Maitland River mouth)* Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.50	0.50	0.50	0.50	0.51	0.51		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.51	0.50	0.51	0.50	0.58	0.58		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.22C(b) Time-series impact analysis for levels of Conductivity , for time period of: Event 2 (July 20 to 30).

Criterion = 400 umho / cm2 ; Length of time period (days)= 10 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.54	0.54		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.53	0.50	0.74	0.75		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP**(*6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.59	0.59		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.52	0.51	0.86	0.86		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth**[3] *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.52	0.51	0.59	0.55			0.72	0.67
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			**2.5**	0.0
	Total number of exceedence episodes	0	0	0	0			**1**	0
	Longest exceedence episode (in hours)							**6**	
	AVERAGE C_R during exceedence episodes							**1.00**	
	MAXIMUM C_R during time period	0.60	0.55	0.83	0.67			**1.00**	0.99
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP**(*1.2)*		**Station 539** *(0.3)*		**Mait. River mouth**[2]*(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.50	0.74	0.61	**1.20**	**1.20**		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**12.5**	0.0	**100.0**	**100.0**		
	Total number of exceedence episodes	0	0	**4**	0	**1**	**1**		
	Longest exceedence episode (in hours)			**12**		**240**	**240**		
	AVERAGE C_R during exceedence episodes			**1.07**		**1.20**	**1.20**		
	MAXIMUM C_R during time period	0.57	0.51	**1.15**	0.91	**1.25**	**1.25**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.50	0.50	0.51	0.50	0.52	0.51	0.53	0.53
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.51	0.50	0.55	0.51	0.58	0.57	0.64	0.64
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.52	0.51	0.53	0.53		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.51	0.50	0.54	0.54	0.63	0.63		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542**[4]	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.50	0.50	0.51	0.51			0.53	0.51
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.51	0.51	0.55	0.53			0.58	0.55
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.51	0.51		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.51	0.50	0.51	0.50	0.57	0.57		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.22C(c) Time-series impact analysis for levels of Conductivity , for time period of: Event 2 (July 20 to 30).

Criterion = 400 umho / cm2 ; Length of time period (days)= 10 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.54	0.54		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.51	0.50	0.63	0.63		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.59	0.59		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.51	0.50	0.76	0.76		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.52	0.51	0.59	0.55			0.72	0.67
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.54	0.52	0.73	0.64			0.95	0.94
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.50	0.74	0.61	**1.20**	**1.20**		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**10.0**	0.0	**100.0**	**100.0**		
	Total number of exceedence episodes	0	0	**1**	0	**1**	**1**		
	Longest exceedence episode (in hours)			**24**		**240**	**240**		
	AVERAGE C_R during exceedence episodes			**1.06**		**1.20**	**1.20**		
	MAXIMUM C_R during time period	0.53	0.51	**1.06**	0.75	**1.24**	**1.24**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.50	0.50	0.51	0.50	0.52	0.51	0.53	0.53
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.53	0.51	0.54	0.54	0.58	0.58
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.52	0.51	0.53	0.53		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.52	0.52	0.60	0.60		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.50	0.50	0.51	0.51			0.53	0.51
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.51	0.50	0.53	0.52			0.57	0.53
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.51	0.51		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.51	0.50	0.56	0.56		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.22N(a) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 2 (July 20 to 30).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 10 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.11	0.11	0.15	0.15		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.12	0.11	0.15	0.12	0.35	0.35		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.11	0.11	0.19	0.19		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.11	0.11	0.14	0.12	0.50	0.50		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.12	0.12	0.19	0.15			0.29	0.25
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.30	0.17	0.49	0.31			0.72	0.57
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.11	0.32	0.21	0.70	0.70		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.20	0.14	0.79	0.61	0.95	0.95		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.11	0.11	0.12	0.11	0.13	0.12	0.14	0.14
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.14	0.12	0.17	0.14	0.22	0.20	0.27	0.27
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.12	0.12	0.14	0.14		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.12	0.11	0.16	0.17	0.26	0.26		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.11	0.11	0.12	0.12			0.14	0.12
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.12	0.12	0.16	0.16			0.21	0.18
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.11	0.11	0.12	0.12		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.12	0.11	0.12	0.11	0.18	0.18		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.22N(b) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 2 (July 20 to 30).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 10 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.11	0.11	0.15	0.15		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.11	0.11	0.14	0.12	0.34	0.34		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.11	0.11	0.19	0.19		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.11	0.11	0.13	0.12	0.44	0.44		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth[3]** ***(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.12	0.12	0.19	0.15			0.29	0.25
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.21	0.17	0.41	0.26			0.53	0.52
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.11	0.32	0.21	0.70	0.70		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.17	0.12	0.76	0.51	0.91	0.91		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.11	0.11	0.12	0.11	0.13	0.12	0.14	0.14
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.13	0.11	0.16	0.13	0.20	0.19	0.27	0.27
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.12	0.12	0.14	0.14		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.12	0.11	0.15	0.16	0.26	0.26		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.11	0.11	0.12	0.12			0.14	0.12
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.12	0.12	0.15	0.15			0.20	0.17
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.11	0.11	0.12	0.12		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.12	0.11	0.12	0.11	0.18	0.18		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value. Thus an "exceedence episode" occurs when $C_R > 1$.

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.22N(c) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 2 (July 20 to 30).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 10 ; Data-averaging length (hours) = 24

Transect 1:	*(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*		
			Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.11	0.11	0.11	0.11	0.15	0.15		
	% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes		0	0	0	0	0	0		
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.11	0.11	0.13	0.12	0.24	0.23		
Transect 2:	*(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*		
			Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.11	0.11	0.11	0.11	0.19	0.19		
	% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes		0	0	0	0	0	0		
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.11	0.11	0.12	0.12	0.35	0.35		
Transect 3:	*(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
			Surface	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period		0.12	0.12	0.19	0.15			0.29	0.25
	% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes		0	0	0	0			0	0
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.16	0.14	0.33	0.24			0.49	0.49
Transect 4:	*(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*		
			Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.12	0.11	0.32	0.21	0.70	0.70		
	% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes		0	0	0	0	0	0		
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.14	0.12	0.66	0.38	0.87	0.87		
Transect 5:	*(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
			Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period		0.11	0.11	0.12	0.11	0.13	0.12	0.14	0.14
	% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes		0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.12	0.11	0.14	0.12	0.16	0.15	0.20	0.20
Transect 6:	*(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*		
			Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.11	0.11	0.12	0.12	0.14	0.14		
	% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes		0	0	0	0	0	0		
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.11	0.11	0.14	0.14	0.22	0.22		
Transect 7:	*(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
			Surface	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period		0.11	0.11	0.12	0.12			0.14	0.12
	% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes		0	0	0	0			0	0
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.12	0.12	0.13	0.13			0.19	0.14
Transect 8:	*(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*		
			Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.11	0.11	0.11	0.11	0.12	0.12		
	% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes		0	0	0	0	0	0		
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.11	0.11	0.12	0.11	0.17	0.17		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.23C(a) Time-series impact analysis for levels of Conductivity , for time period of: Event 3 (August 2 to 15).

Criterion = 400 umho / cm2 ; Length of time period (days)= 13 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.51	0.51		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.55	0.50	0.61	0.61		
Transect 2: *(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.53	0.52		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.69	0.51	0.76	0.71		
Transect 3: *(about 0.9 km North of*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth**[3] *(0.0)*	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.59	0.50	0.64	0.53			0.80	0.65
	% time period when C_R >1 (i.e. criterion exceeded)	**3.8**	0.0	**6.1**	0.0			**30.0**	**6.4**
	Total number of exceedence episodes	**5**	0	**4**	0			**10**	**3**
	Longest exceedence episode (in hours)	**4**		**12**				**19**	**9**
	AVERAGE C_R during exceedence episodes	**1.05**		**1.07**				**1.09**	**1.07**
	MAXIMUM C_R during time period	**1.11**	0.58	**1.14**	0.70			**1.24**	**1.16**
Transect 4: *(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth**[2]*(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.61	0.50	**1.17**	0.76	**1.32**	**1.32**		
	% time period when C_R >1 (i.e. criterion exceeded)	**3.5**	0.0	**81.2**	**28.4**	**100.0**	**100.0**		
	Total number of exceedence episodes	**5**	0	**6**	**7**	**1**	**1**		
	Longest exceedence episode (in hours)	**4**		**186**	**54**	**312**	**312**		
	AVERAGE C_R during exceedence episodes	**1.11**		**1.27**	**1.32**	**1.32**	**1.32**		
	MAXIMUM C_R during time period	**1.22**	0.55	**1.47**	**1.48**	**1.44**	**1.44**		
Transect 5: *(about 0.8 km South of*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.51	0.50	0.58	0.50	0.53	0.51	0.53	0.53
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.72	0.50	0.98	0.53	0.79	0.58	0.67	0.66
Transect 6: *(about 2.1 km South of*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.52	0.50	0.53	0.53		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.60	0.50	0.69	0.55	0.63	0.63		
Transect 7: *(about 3.8 km South of*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542**[4]	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.51	0.50	0.51	0.51			0.51	0.50
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.73	0.52	0.56	0.55			0.55	0.56
Transect 8: *(about 6.0 km South of*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.51	0.50	0.52	0.52		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.59	0.50	0.65	0.51	0.57	0.57		

Notes: *(1)* *" C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.*
Thus an "exceedence episode" occurs when $C_R > 1$.

(2) *This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.*

(3) *This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.*

(4) *Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.*

Table. 5.23C(b) Time-series impact analysis for levels of Conductivity , for time period of: Event 3 (August 2 to 15).

Criterion = 400 umho / cm2 ; Length of time period (days)= 13 ; Data-averaging length (hours) = 6

Transect 1:	*(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.51	0.51		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.50	0.50	0.54	0.50	0.57	0.57		
Transect 2:	*(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.53	0.52		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.50	0.50	0.64	0.51	0.71	0.66		
Transect 3:	*(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.59	0.50	0.63	0.53			0.80	0.65
		% time period when C_R >1 (i.e. criterion exceeded)	**1.9**	0.0	**5.8**	0.0			**30.8**	**5.8**
		Total number of exceedence episodes	**1**	0	**2**	0			**7**	**2**
		Longest exceedence episode (in hours)	**6**		**12**				**36**	**12**
		AVERAGE C_R during exceedence episodes	**1.06**		**1.05**				**1.08**	**1.06**
		MAXIMUM C_R during time period	**1.06**	0.58	**1.12**	0.66			**1.20**	**1.12**
Transect 4:	*(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.61	0.50	**1.17**	0.76	**1.32**	**1.32**		
		% time period when C_R >1 (i.e. criterion exceeded)	**1.9**	0.0	**82.7**	**26.9**	**100.0**	**100.0**		
		Total number of exceedence episodes	**1**	0	**2**	**3**	**1**	**1**		
		Longest exceedence episode (in hours)	**6**		**198**	**54**	**312**	**312**		
		AVERAGE C_R during exceedence episodes	**1.03**		**1.27**	**1.32**	**1.32**	**1.32**		
		MAXIMUM C_R during time period	**1.03**	0.54	**1.45**	**1.45**	**1.44**	**1.44**		
Transect 5:	*(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.51	0.50	0.58	0.50	0.53	0.51	0.53	0.53
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Total number of exceedence episodes	0	0	0	0	0	0	0	0
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.61	0.50	0.91	0.53	0.76	0.55	0.64	0.61
Transect 6:	*(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.50	0.50	0.52	0.50	0.53	0.53		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.54	0.50	0.61	0.54	0.62	0.62		
Transect 7:	*(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.51	0.50	0.51	0.51			0.51	0.50
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
		Total number of exceedence episodes	0	0	0	0			0	0
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.69	0.51	0.56	0.53			0.54	0.55
Transect 8:	*(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.50	0.50	0.51	0.50	0.52	0.52		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.54	0.50	0.59	0.51	0.57	0.57		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.23C(c) Time-series impact analysis for levels of Conductivity , for time period of: Event 3 (August 2 to 15).

Criterion = 400 umho / cm2 ; Length of time period (days)= 13 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.51	0.51		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.51	0.50	0.56	0.56		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.53	0.52		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.50	0.50	0.55	0.50	0.61	0.60		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
		Surface	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.59	0.50	0.63	0.53			0.80	0.65
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			**23.1**	0.0
	Total number of exceedence episodes	0	0	0	0			**3**	0
	Longest exceedence episode (in hours)							**24**	
	AVERAGE C_R during exceedence episodes							**1.04**	
	MAXIMUM C_R during time period	0.83	0.53	0.93	0.58			**1.07**	0.98
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.61	0.50	**1.17**	0.76	**1.32**	**1.32**		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**76.9**	**30.8**	**100.0**	**100.0**		
	Total number of exceedence episodes	0	0	**2**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)			**192**	**96**	**312**	**312**		
	AVERAGE C_R during exceedence episodes			**1.28**	**1.17**	**1.32**	**1.32**		
	MAXIMUM C_R during time period	0.88	0.51	**1.41**	**1.32**	**1.42**	**1.42**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.51	0.50	0.58	0.50	0.53	0.51	0.53	0.53
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.55	0.50	0.79	0.51	0.63	0.53	0.58	0.58
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.52	0.50	0.53	0.53		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.51	0.50	0.57	0.52	0.58	0.58		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
		Surface	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.51	0.50	0.51	0.51			0.51	0.50
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.58	0.50	0.54	0.52			0.54	0.53
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.51	0.50	0.52	0.52		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.51	0.50	0.55	0.50	0.55	0.55		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.23N(a) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 3 (August 2 to 15).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 13 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.10	0.11	0.11	0.11	0.11		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.11	0.11	0.17	0.11	0.29	0.29		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.10	0.11	0.11	0.14	0.13		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.11	0.11	0.41	0.13	0.53	0.45		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.27	0.11	0.32	0.14			0.57	0.34
	% time period when C_R >1 (i.e. criterion exceeded)	**5.1**	0.0	**6.7**	0.0			**19.8**	**7.0**
	Total number of exceedence episodes	**4**	0	**4**	0			**7**	**3**
	Longest exceedence episode (in hours)	**7**		**13**				**20**	**10**
	AVERAGE C_R during exceedence episodes	**1.19**		**1.14**				**1.20**	**1.19**
	MAXIMUM C_R during time period	**1.39**	0.28	**1.32**	0.39			**1.43**	**1.36**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.30	0.11	**1.24**	0.65	**1.42**	**1.42**		
	% time period when C_R >1 (i.e. criterion exceeded)	**5.8**	0.0	**60.4**	**29.1**	**77.6**	**77.6**		
	Total number of exceedence episodes	**5**	0	**3**	**4**	**13**	**13**		
	Longest exceedence episode (in hours)	**6**		**152**	**54**	**154**	**154**		
	AVERAGE C_R during exceedence episodes	**1.25**		**1.65**	**1.82**	**1.60**	**1.60**		
	MAXIMUM C_R during time period	**1.80**	0.21	**2.43**	**2.46**	**2.39**	**2.39**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.12	0.11	0.25	0.11	0.17	0.12	0.16	0.15
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**0.6**	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	**2**	0	0	0	0	0
	Longest exceedence episode (in hours)			**1**					
	AVERAGE C_R during exceedence episodes			**1.02**					
	MAXIMUM C_R during time period	0.61	0.11	**1.02**	0.17	0.69	0.28	0.42	0.42
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.10	0.14	0.11	0.15	0.15		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.33	0.11	0.48	0.22	0.38	0.38		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.13	0.11	0.13	0.11			0.13	0.11
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.55	0.13	0.24	0.20			0.20	0.23
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.10	0.12	0.11	0.14	0.14		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.31	0.11	0.40	0.12	0.25	0.25		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.23N(b) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 3 (August 2 to 15).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 13 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)* Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R[1] during time period	0.11	0.10	0.11	0.11	0.11	0.11		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
Total number of exceedence episodes	0	0	0	0	0	0		
Longest exceedence episode (in hours)								
AVERAGE C_R during exceedence episodes								
MAXIMUM C_R during time period	0.11	0.11	0.16	0.11	0.21	0.20		
Transect 2: *(about 3.0 km North of Maitland River mouth)* Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R[1] during time period	0.11	0.10	0.11	0.11	0.14	0.13		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
Total number of exceedence episodes	0	0	0	0	0	0		
Longest exceedence episode (in hours)								
AVERAGE C_R during exceedence episodes								
MAXIMUM C_R during time period	0.11	0.11	0.32	0.13	0.43	0.36		
Transect 3: *(about 0.9 km North of Maitland River mouth)* Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R[1] during time period	0.27	0.11	0.32	0.14			0.57	0.34
% time period when C_R >1 (i.e. criterion exceeded)	**3.8**	0.0	**5.8**	0.0			**19.2**	**5.8**
Total number of exceedence episodes	**2**	0	**2**	0			**5**	**2**
Longest exceedence episode (in hours)	**6**		**12**				**24**	**12**
AVERAGE C_R during exceedence episodes	**1.19**		**1.14**				**1.17**	**1.17**
MAXIMUM C_R during time period	**1.29**	0.26	**1.27**	0.32			**1.35**	**1.26**
Transect 4: *(about 0.1 km North of Maitland River mouth)* Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R[1] during time period	0.30	0.11	**1.24**	0.65	**1.42**	**1.42**		
% time period when C_R >1 (i.e. criterion exceeded)	**3.8**	0.0	**59.6**	**30.8**	**76.9**	**76.9**		
Total number of exceedence episodes	**2**	0	**2**	**2**	**4**	**4**		
Longest exceedence episode (in hours)	**6**		**150**	**54**	**162**	**162**		
AVERAGE C_R during exceedence episodes	**1.05**		**1.66**	**1.76**	**1.60**	**1.60**		
MAXIMUM C_R during time period	**1.08**	0.19	**2.34**	**2.35**	**2.35**	**2.35**		
Transect 5: *(about 0.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
AVERAGE C_R[1] during time period	0.12	0.11	0.25	0.11	0.17	0.12	0.16	0.15
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total number of exceedence episodes	0	0	0	0	0	0	0	0
Longest exceedence episode (in hours)								
AVERAGE C_R during exceedence episodes								
MAXIMUM C_R during time period	0.35	0.11	0.89	0.16	0.61	0.21	0.37	0.33
Transect 6: *(about 2.1 km South of Maitland River mouth)* Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R[1] during time period	0.11	0.10	0.14	0.11	0.15	0.15		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
Total number of exceedence episodes	0	0	0	0	0	0		
Longest exceedence episode (in hours)								
AVERAGE C_R during exceedence episodes								
MAXIMUM C_R during time period	0.20	0.11	0.33	0.19	0.36	0.36		
Transect 7: *(about 3.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R[1] during time period	0.13	0.11	0.13	0.11			0.13	0.11
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
Total number of exceedence episodes	0	0	0	0			0	0
Longest exceedence episode (in hours)								
AVERAGE C_R during exceedence episodes								
MAXIMUM C_R during time period	0.50	0.12	0.23	0.17			0.18	0.23
Transect 8: *(about 6.0 km South of Maitland River mouth)* Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R[1] during time period	0.11	0.10	0.12	0.11	0.14	0.14		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
Total number of exceedence episodes	0	0	0	0	0	0		
Longest exceedence episode (in hours)								
AVERAGE C_R during exceedence episodes								
MAXIMUM C_R during time period	0.20	0.11	0.28	0.11	0.24	0.24		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when $C_R > 1$.

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.23N(c) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 3 (August 2 to 15).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 13 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.11	0.10	0.11	0.11	0.11	0.11		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.11	0.11	0.12	0.11	0.15	0.15		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.11	0.10	0.11	0.11	0.14	0.13		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.11	0.11	0.18	0.12	0.27	0.20		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth**[3] *(0.0)*	
		Surface	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.27	0.11	0.32	0.14			0.57	0.34
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			**23.1**	**7.7**
	Total number of exceedence episodes	0	0	0	0			**3**	**1**
	Longest exceedence episode (in hours)							**24**	**24**
	AVERAGE C_R during exceedence episodes							**1.09**	**1.02**
	MAXIMUM C_R during time period	0.74	0.16	0.91	0.25			**1.16**	**1.02**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth**[2] *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.30	0.11	**1.24**	0.65	**1.42**	**1.42**		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**69.2**	**30.8**	**84.6**	**84.6**		
	Total number of exceedence episodes	0	0	**2**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)			**168**	**96**	**264**	**264**		
	AVERAGE C_R during exceedence episodes			**1.56**	**1.58**	**1.55**	**1.55**		
	MAXIMUM C_R during time period	0.88	0.13	**2.12**	**1.97**	**2.18**	**2.18**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.12	0.11	0.25	0.11	0.17	0.12	0.16	0.15
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.21	0.11	0.64	0.13	0.35	0.17	0.26	0.25
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.11	0.10	0.14	0.11	0.15	0.15		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.14	0.11	0.25	0.14	0.27	0.27		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542**[4]	
		Surface	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.13	0.11	0.13	0.11			0.13	0.11
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.26	0.11	0.19	0.15			0.18	0.18
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.11	0.10	0.12	0.11	0.14	0.14		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.13	0.11	0.19	0.11	0.22	0.22		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.24C(a) Time-series impact analysis for levels of Conductivity , for time period of: Event 4 (November 12 to 28).

Criterion = 400 umho / cm2 ; Length of time period (days)= 16 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.52	0.52	0.55	0.55	0.74	0.74		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**14.0**	**14.0**		
	Total number of exceedence episodes	0	0	0	0	**5**	**5**		
	Longest exceedence episode (in hours)					**21**	**21**		
	AVERAGE C_R during exceedence episodes					**1.15**	**1.15**		
	MAXIMUM C_R during time period	0.56	0.56	0.69	0.68	**1.40**	**1.40**		
Transect 2: *(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.55	0.56	0.89	0.89		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**40.5**	**40.5**		
	Total number of exceedence episodes	0	0	0	0	**10**	**10**		
	Longest exceedence episode (in hours)					**51**	**51**		
	AVERAGE C_R during exceedence episodes					**1.23**	**1.23**		
	MAXIMUM C_R during time period	0.55	0.55	0.86	0.86	**1.49**	**1.49**		
Transect 3: *(about 0.9 km North of*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** [3] *(0.0)*	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.74	0.74	0.93	0.93			**1.11**	**1.11**
	% time period when C_R >1 (i.e. criterion exceeded)	**13.8**	**13.8**	**38.2**	**38.7**			**59.2**	**59.0**
	Total number of exceedence episodes	**7**	**9**	**12**	**12**			**6**	**6**
	Longest exceedence episode (in hours)	**18**	**17**	**39**	**38**			**82**	**81**
	AVERAGE C_R during exceedence episodes	**1.14**	**1.13**	**1.24**	**1.24**			**1.35**	**1.35**
	MAXIMUM C_R during time period	**1.36**	**1.35**	**1.47**	**1.47**			**1.55**	**1.55**
Transect 4: *(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** [2] *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.64	0.67	**1.46**	**1.46**	**1.48**	**1.48**		
	% time period when C_R >1 (i.e. criterion exceeded)	**8.3**	**10.4**	**98.4**	**100.0**	**100.0**	**100.0**		
	Total number of exceedence episodes	**6**	**10**	**3**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)	**18**	**17**	**336**	**384**	**384**	**384**		
	AVERAGE C_R during exceedence episodes	**1.18**	**1.16**	**1.46**	**1.46**	**1.48**	**1.48**		
	MAXIMUM C_R during time period	**1.48**	**1.52**	**1.60**	**1.60**	**1.59**	**1.59**		
Transect 5: *(about 0.8 km South of*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.53	0.53	0.59	0.59	0.71	0.71	0.74	0.74
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**2.1**	**2.6**	**17.1**	**17.1**	**20.5**	**20.5**
	Total number of exceedence episodes	0	0	**4**	**5**	**3**	**3**	**2**	**2**
	Longest exceedence episode (in hours)			**3**	**3**	**52**	**52**	**65**	**65**
	AVERAGE C_R during exceedence episodes			**1.13**	**1.09**	**1.17**	**1.17**	**1.17**	**1.17**
	MAXIMUM C_R during time period	0.57	0.58	**1.27**	**1.25**	**1.30**	**1.32**	**1.35**	**1.35**
Transect 6: *(about 2.1 km South of*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.68	0.68	0.73	0.72		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**15.3**	**15.3**	**18.4**	**18.4**		
	Total number of exceedence episodes	0	0	**4**	**5**	**2**	**2**		
	Longest exceedence episode (in hours)			**41**	**40**	**62**	**62**		
	AVERAGE C_R during exceedence episodes			**1.15**	**1.15**	**1.13**	**1.13**		
	MAXIMUM C_R during time period	0.55	0.55	**1.30**	**1.30**	**1.20**	**1.20**		
Transect 7: *(about 3.8 km South of*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542** [4]	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.54	0.54	0.64	0.64			0.73	0.74
	% time period when C_R >1 (i.e. criterion exceeded)	**0.3**	**0.3**	**8.8**	**8.6**			0.0	0.0
	Total number of exceedence episodes	**1**	**1**	**2**	**2**			0	0
	Longest exceedence episode (in hours)	**1**	**1**	**32**	**31**				
	AVERAGE C_R during exceedence episodes	**1.03**	**1.07**	**1.07**	**1.08**				
	MAXIMUM C_R during time period	**1.03**	**1.07**	**1.16**	**1.16**			0.79	0.80
Transect 8: *(about 6.0 km South of*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.52	0.57	0.57		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.54	0.54	0.57	0.57	0.96	0.96		

Notes: *(1)* *" C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.*
Thus an "exceedence episode" occurs when C_R > 1 .

(2) *This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.*

(3) *This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.*

(4) *Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.*

Table. 5.24C(b) Time-series impact analysis for levels of Conductivity , for time period of: Event 4 (November 12 to 28).

Criterion = 400 umho / cm2 ; Length of time period (days)= 16 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.52	0.52	0.55	0.55	0.74	0.74		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	15.6	15.6		
	Total number of exceedence episodes	0	0	0	0	4	4		
	Longest exceedence episode (in hours)					24	24		
	AVERAGE C_R during exceedence episodes					1.13	1.13		
	MAXIMUM C_R during time period	0.55	0.55	0.63	0.62	1.35	1.35		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.55	0.56	0.89	0.89		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	42.2	42.2		
	Total number of exceedence episodes	0	0	0	0	6	6		
	Longest exceedence episode (in hours)					54	54		
	AVERAGE C_R during exceedence episodes					1.21	1.21		
	MAXIMUM C_R during time period	0.55	0.55	0.67	0.71	1.47	1.47		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.74	0.74	0.93	0.93			1.11	1.11
	% time period when C_R >1 (i.e. criterion exceeded)	12.5	12.5	42.2	42.2			60.9	60.9
	Total number of exceedence episodes	2	2	7	7			3	3
	Longest exceedence episode (in hours)	30	30	48	48			114	114
	AVERAGE C_R during exceedence episodes	1.14	1.12	1.20	1.20			1.33	1.33
	MAXIMUM C_R during time period	1.27	1.26	1.42	1.41			1.55	1.55
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.64	0.67	1.46	1.46	1.48	1.48		
	% time period when C_R >1 (i.e. criterion exceeded)	6.3	6.3	98.4	100.0	100.0	100.0		
	Total number of exceedence episodes	2	2	2	1	1	1		
	Longest exceedence episode (in hours)	18	18	336	384	384	384		
	AVERAGE C_R during exceedence episodes	1.13	1.16	1.46	1.46	1.48	1.48		
	MAXIMUM C_R during time period	1.20	1.20	1.59	1.59	1.59	1.59		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.53	0.53	0.59	0.59	0.71	0.71	0.74	0.74
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	17.2	17.2	20.3	20.3
	Total number of exceedence episodes	0	0	0	0	2	2	2	2
	Longest exceedence episode (in hours)					54	54	66	66
	AVERAGE C_R during exceedence episodes					1.16	1.16	1.17	1.17
	MAXIMUM C_R during time period	0.57	0.57	0.99	0.96	1.25	1.26	1.34	1.34
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.68	0.68	0.73	0.73		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	17.2	17.2	17.2	17.2		
	Total number of exceedence episodes	0	0	2	2	2	2		
	Longest exceedence episode (in hours)			48	48	60	60		
	AVERAGE C_R during exceedence episodes			1.13	1.13	1.13	1.13		
	MAXIMUM C_R during time period	0.55	0.55	1.23	1.22	1.19	1.19		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.54	0.54	0.64	0.64			0.73	0.74
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	7.8	7.8			0.0	0.0
	Total number of exceedence episodes	0	0	1	1			0	0
	Longest exceedence episode (in hours)			30	30				
	AVERAGE C_R during exceedence episodes			1.08	1.07				
	MAXIMUM C_R during time period	0.72	0.73	1.13	1.13			0.79	0.80
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.52	0.57	0.57		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.53	0.53	0.57	0.57	0.90	0.90		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value. Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.24C(c) Time-series impact analysis for levels of Conductivity , for time period of: Event 4 (November 12 to 28).

Criterion = 400 umho / cm2 ; Length of time period (days)= 16 ; Data-averaging length (hours) = 24

Transect 1:	*(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 528** *(4.9)* *Surface*	*Bottom*	**Station 529** *(2.0)* *Surface*	*Bottom*	**Wright Pt.** *(0.0)* *Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.52	0.52	0.55	0.55	0.74	0.74		
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	**12.5**	**12.5**		
	Total number of exceedence episodes		0	0	0	0	**2**	**2**		
	Longest exceedence episode (in hours)						**24**	**24**		
	AVERAGE C_R during exceedence episodes						**1.06**	**1.06**		
	MAXIMUM C_R during time period		0.55	0.55	0.58	0.58	**1.09**	**1.09**		
Transect 2:	*(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Offshore ADCP** *(6.7)* *Surface*	*Bottom*	**Station 532** *(2.2)* *Surface*	*Bottom*	**Sunset Beach** *(0.0)* *Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.51	0.51	0.55	0.56	0.89	0.89		
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	**43.8**	**43.8**		
	Total number of exceedence episodes		0	0	0	0	**4**	**4**		
	Longest exceedence episode (in hours)						**72**	**72**		
	AVERAGE C_R during exceedence episodes						**1.17**	**1.17**		
	MAXIMUM C_R during time period		0.54	0.54	0.60	0.65	**1.39**	**1.39**		
Transect 3:	*(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 535** *(0.9)* *Surface*	*Bottom*	**Station 538** *(0.2)* *Surface*	*Bottom*			**200 m North of mouth**[3] *(0.0)* *Surface*	*Bottom*
	AVERAGE C_R [1] during time period		0.74	0.74	0.93	0.93			**1.11**	**1.11**
	% time period when $C_R > 1$ (i.e. criterion exceeded)		**6.3**	**6.3**	**37.5**	**43.8**			**62.5**	**62.5**
	Total number of exceedence episodes		**1**	**1**	**3**	**2**			**3**	**3**
	Longest exceedence episode (in hours)		**24**	**24**	**96**	**96**			**120**	**120**
	AVERAGE C_R during exceedence episodes		**1.03**	**1.02**	**1.18**	**1.16**			**1.30**	**1.30**
	MAXIMUM C_R during time period		**1.03**	**1.02**	**1.29**	**1.30**			**1.46**	**1.46**
Transect 4:	*(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Nearshore ADCP** *(1.2)* *Surface*	*Bottom*	**Station 539** *(0.3)* *Surface*	*Bottom*	**Mait. River mouth**[2] *(0.0)* *Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.64	0.67	**1.46**	**1.46**	**1.48**	**1.48**		
	% time period when $C_R > 1$ (i.e. criterion exceeded)		**6.3**	**6.3**	**100.0**	**100.0**	**100.0**	**100.0**		
	Total number of exceedence episodes		**1**	**1**	**1**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)		**24**	**24**	**384**	**384**	**384**	**384**		
	AVERAGE C_R during exceedence episodes		**1.06**	**1.02**	**1.46**	**1.46**	**1.48**	**1.48**		
	MAXIMUM C_R during time period		**1.06**	**1.02**	**1.58**	**1.58**	**1.58**	**1.58**		
Transect 5:	*(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 537** *(2.9)* *Surface*	*Bottom*	**Station 541** *(1.3)* *Surface*	*Bottom*	**Station 543** *(0.4)* *Surface*	*Bottom*	**St. Christopher Beach (0.0)** *Surface*	*Bottom*
	AVERAGE C_R [1] during time period		0.53	0.53	0.59	0.59	0.71	0.71	0.74	0.74
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	**18.8**	**18.8**	**12.5**	**12.5**
	Total number of exceedence episodes		0	0	0	0	**2**	**2**	**1**	**1**
	Longest exceedence episode (in hours)						**48**	**48**	**48**	**48**
	AVERAGE C_R during exceedence episodes						**1.13**	**1.13**	**1.21**	**1.21**
	MAXIMUM C_R during time period		0.56	0.57	0.76	0.73	**1.19**	**1.19**	**1.26**	**1.26**
Transect 6:	*(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 540** *(5.2)* *Surface*	*Bottom*	**Station 544** *(0.5)* *Surface*	*Bottom*	**The Cove Beach** *(0.0)* *Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.51	0.51	0.68	0.68	0.73	0.73		
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	**12.5**	**12.5**	**12.5**	**12.5**		
	Total number of exceedence episodes		0	0	**1**	**1**	**1**	**1**		
	Longest exceedence episode (in hours)				**48**	**48**	**48**	**48**		
	AVERAGE C_R during exceedence episodes				**1.12**	**1.12**	**1.15**	**1.15**		
	MAXIMUM C_R during time period		0.54	0.55	**1.16**	**1.16**	**1.16**	**1.16**		
Transect 7:	*(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 545** *(2.1)* *Surface*	*Bottom*	**Station 546** *(0.3)* *Surface*	*Bottom*			**Station 542**[4] *Surface*	*Bottom*
	AVERAGE C_R [1] during time period		0.54	0.54	0.64	0.64			0.73	0.74
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	**6.3**	**6.3**			0.0	0.0
	Total number of exceedence episodes		0	0	**1**	**1**			0	0
	Longest exceedence episode (in hours)				**24**	**24**				
	AVERAGE C_R during exceedence episodes				**1.04**	**1.05**				
	MAXIMUM C_R during time period		0.58	0.58	**1.04**	**1.05**			0.76	0.78
Transect 8:	*(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 550** *(5.3)* *Surface*	*Bottom*	**Station 549** *(2.5)* *Surface*	*Bottom*	**Black's Pt. Beach** *(0.0)* *Surface*	*Bottom*		
	AVERAGE C_R [1] during time period		0.51	0.51	0.52	0.52	0.57	0.57		
	% time period when $C_R > 1$ (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes		0	0	0	0	0	0		
	Longest exceedence episode (in hours)									
	AVERAGE C_R during exceedence episodes									
	MAXIMUM C_R during time period		0.52	0.52	0.56	0.56	0.76	0.76		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when $C_R > 1$.

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.24N(a) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 4 (November 12 to 28).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 16 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period		0.16	0.16	0.25	0.25	0.81	0.81		
% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	**35.6**	**35.6**		
Total number of exceedence episodes		0	0	0	0	**6**	**6**		
Longest exceedence episode (in hours)						**71**	**71**		
AVERAGE C_R during exceedence episodes						**1.60**	**1.60**		
MAXIMUM C_R during time period		0.28	0.28	0.68	0.65	**3.29**	**3.29**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period		0.14	0.14	0.26	0.28	**1.28**	**1.28**		
% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	**0.3**	**0.3**	**49.6**	**49.6**		
Total number of exceedence episodes		0	0	**1**	**1**	**6**	**6**		
Longest exceedence episode (in hours)				**1**	**1**	**84**	**84**		
AVERAGE C_R during exceedence episodes				**1.36**	**1.33**	**2.12**	**2.12**		
MAXIMUM C_R during time period		0.26	0.26	**1.36**	**1.33**	**3.89**	**3.90**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth[3]** ***(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R [1] during time period		0.86	0.87	**1.45**	**1.46**			**1.92**	**1.92**
% time period when C_R >1 (i.e. criterion exceeded)		**31.7**	**34.8**	**53.8**	**53.2**			**75.8**	**75.8**
Total number of exceedence episodes		**8**	**10**	**6**	**6**			**5**	**5**
Longest exceedence episode (in hours)		**34**	**35**	**78**	**78**			**122**	**122**
AVERAGE C_R during exceedence episodes		**1.72**	**1.67**	**2.18**	**2.21**			**2.34**	**2.34**
MAXIMUM C_R during time period		**3.51**	**3.40**	**4.12**	**4.12**			**4.48**	**4.48**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period		0.57	0.66	**2.93**	**2.94**	**2.99**	**2.99**		
% time period when C_R >1 (i.e. criterion exceeded)		**15.1**	**21.8**	**100.0**	**100.0**	**100.0**	**100.0**		
Total number of exceedence episodes		**10**	**14**	**1**	**1**	**1**	**1**		
Longest exceedence episode (in hours)		**29**	**28**	**384**	**384**	**384**	**384**		
AVERAGE C_R during exceedence episodes		**1.98**	**1.81**	**2.93**	**2.94**	**2.99**	**2.99**		
MAXIMUM C_R during time period		**4.15**	**4.28**	**4.71**	**4.71**	**4.71**	**4.71**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
AVERAGE C_R [1] during time period		0.20	0.20	0.42	0.42	0.84	0.84	0.94	0.94
% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	**10.9**	**10.6**	**25.7**	**25.7**	**28.8**	**28.8**
Total number of exceedence episodes		0	0	**10**	**10**	**4**	**3**	**4**	**4**
Longest exceedence episode (in hours)				**8**	**10**	**71**	**71**	**73**	**73**
AVERAGE C_R during exceedence episodes				**1.58**	**1.57**	**2.28**	**2.28**	**2.30**	**2.30**
MAXIMUM C_R during time period		0.32	0.35	**3.13**	**3.00**	**3.17**	**3.27**	**3.27**	**3.27**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period		0.15	0.15	0.76	0.76	0.89	0.89		
% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	**23.6**	**23.9**	**28.8**	**28.6**		
Total number of exceedence episodes		0	0	**2**	**2**	**4**	**4**		
Longest exceedence episode (in hours)				**64**	**65**	**74**	**74**		
AVERAGE C_R during exceedence episodes				**2.28**	**2.26**	**2.11**	**2.12**		
MAXIMUM C_R during time period		0.27	0.27	**3.36**	**3.36**	**2.79**	**2.79**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R [1] during time period		0.23	0.23	0.59	0.59			0.86	0.86
% time period when C_R >1 (i.e. criterion exceeded)		**0.8**	**0.8**	**17.9**	**17.9**			**2.3**	**3.6**
Total number of exceedence episodes		**2**	**2**	**3**	**3**			**1**	**1**
Longest exceedence episode (in hours)		**2**	**2**	**51**	**51**			**9**	**14**
AVERAGE C_R during exceedence episodes		**1.71**	**1.74**	**2.00**	**2.00**			**1.07**	**1.08**
MAXIMUM C_R during time period		**2.29**	**2.42**	**2.71**	**2.71**			**1.09**	**1.10**
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period		0.13	0.13	0.18	0.18	0.34	0.34		
% time period when C_R >1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	**4.7**	**4.7**		
Total number of exceedence episodes		0	0	0	0	**2**	**2**		
Longest exceedence episode (in hours)						**17**	**17**		
AVERAGE C_R during exceedence episodes						**1.50**	**1.50**		
MAXIMUM C_R during time period		0.22	0.22	0.37	0.37	**1.96**	**1.96**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.24N(b) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 4 (November 12 to 28).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 16 ; Data-averaging length (hours) = 6

Transect 1:	*(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.16	0.16	0.25	0.25	0.81	0.81		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	37.5	37.5		
		Total number of exceedence episodes	0	0	0	0	4	4		
		Longest exceedence episode (in hours)					72	72		
		AVERAGE C_R during exceedence episodes					1.54	1.54		
		MAXIMUM C_R during time period	0.28	0.28	0.48	0.46	3.12	3.13		
Transect 2:	*(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.14	0.14	0.26	0.28	1.28	1.28		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	51.6	51.6		
		Total number of exceedence episodes	0	0	0	0	4	4		
		Longest exceedence episode (in hours)					84	84		
		AVERAGE C_R during exceedence episodes					2.07	2.07		
		MAXIMUM C_R during time period	0.25	0.26	0.61	0.72	3.58	3.58		
Transect 3:	*(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.86	0.88	1.45	1.46			1.92	1.92
		% time period when C_R >1 (i.e. criterion exceeded)	31.3	35.9	54.7	56.3			76.6	76.6
		Total number of exceedence episodes	6	5	5	4			5	5
		Longest exceedence episode (in hours)	36	72	114	114			120	120
		AVERAGE C_R during exceedence episodes	1.71	1.63	2.15	2.13			2.32	2.32
		MAXIMUM C_R during time period	2.72	2.63	3.62	3.65			4.33	4.33
Transect 4:	*(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.57	0.67	2.93	2.94	2.99	2.99		
		% time period when C_R >1 (i.e. criterion exceeded)	17.2	23.4	100.0	100.0	100.0	100.0		
		Total number of exceedence episodes	5	6	1	1	1	1		
		Longest exceedence episode (in hours)	30	36	384	384	384	384		
		AVERAGE C_R during exceedence episodes	1.63	1.54	2.93	2.94	2.99	2.99		
		MAXIMUM C_R during time period	2.56	2.53	4.69	4.69	4.68	4.68		
Transect 5:	*(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.20	0.20	0.42	0.42	0.84	0.84	0.94	0.94
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	12.5	10.9	23.4	25.0	29.7	29.7
		Total number of exceedence episodes	0	0	5	5	2	2	3	3
		Longest exceedence episode (in hours)			18	12	66	72	72	72
		AVERAGE C_R during exceedence episodes			1.25	1.31	2.38	2.29	2.24	2.24
		MAXIMUM C_R during time period	0.32	0.32	1.98	1.89	2.89	2.90	3.24	3.24
Transect 6:	*(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.15	0.15	0.76	0.76	0.89	0.89		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	25.0	23.4	29.7	29.7		
		Total number of exceedence episodes	0	0	2	2	3	3		
		Longest exceedence episode (in hours)			66	66	78	78		
		AVERAGE C_R during exceedence episodes			2.17	2.25	2.06	2.06		
		MAXIMUM C_R during time period	0.27	0.27	3.00	3.00	2.78	2.78		
Transect 7:	*(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.23	0.23	0.60	0.60			0.86	0.86
		% time period when C_R >1 (i.e. criterion exceeded)	1.6	1.6	20.3	20.3			1.6	3.1
		Total number of exceedence episodes	1	1	2	2			1	1
		Longest exceedence episode (in hours)	6	6	54	54			6	12
		AVERAGE C_R during exceedence episodes	1.01	1.04	1.84	1.83			1.08	1.09
		MAXIMUM C_R during time period	1.01	1.04	2.61	2.61			1.08	1.09
Transect 8:	*(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.13	0.13	0.18	0.18	0.34	0.34		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	3.1	3.1		
		Total number of exceedence episodes	0	0	0	0	1	1		
		Longest exceedence episode (in hours)					12	12		
		AVERAGE C_R during exceedence episodes					1.65	1.65		
		MAXIMUM C_R during time period	0.20	0.20	0.36	0.36	1.69	1.69		

Notes:

(1) "C_R" is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when $C_R > 1$.

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.24N(c) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Event 4 (November 12 to 28).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 16 ; Data-averaging length (hours) = 24

Transect 1:	*(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R[1] during time period	0.16	0.16	0.25	0.25	0.81	0.81		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	43.8	43.8		
		Total number of exceedence episodes	0	0	0	0	4	4		
		Longest exceedence episode (in hours)					72	72		
		AVERAGE C_R during exceedence episodes					1.41	1.41		
		MAXIMUM C_R during time period	0.26	0.26	0.36	0.36	2.18	2.19		
Transect 2:	*(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R[1] during time period	0.14	0.14	0.26	0.28	1.28	1.28		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	56.3	56.3		
		Total number of exceedence episodes	0	0	0	0	3	3		
		Longest exceedence episode (in hours)					96	96		
		AVERAGE C_R during exceedence episodes					1.91	1.91		
		MAXIMUM C_R during time period	0.24	0.24	0.45	0.52	3.25	3.25		
Transect 3:	*(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R[1] during time period	0.86	0.88	1.45	1.46			1.92	1.92
		% time period when C_R >1 (i.e. criterion exceeded)	31.3	37.5	56.3	56.3			75.0	81.3
		Total number of exceedence episodes	4	3	2	3			4	3
		Longest exceedence episode (in hours)	48	72	120	120			120	168
		AVERAGE C_R during exceedence episodes	1.48	1.42	2.08	2.09			2.33	2.22
		MAXIMUM C_R during time period	1.97	1.95	3.31	3.32			3.93	3.93
Transect 4:	*(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R[1] during time period	0.57	0.67	2.93	2.94	2.99	2.99		
		% time period when C_R >1 (i.e. criterion exceeded)	6.3	18.8	100.0	100.0	100.0	100.0		
		Total number of exceedence episodes	1	2	1	1	1	1		
		Longest exceedence episode (in hours)	24	48	384	384	384	384		
		AVERAGE C_R during exceedence episodes	2.04	1.53	2.93	2.94	2.99	2.99		
		MAXIMUM C_R during time period	2.04	1.92	4.50	4.50	4.52	4.52		
Transect 5:	*(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
		AVERAGE C_R[1] during time period	0.20	0.20	0.42	0.42	0.84	0.84	0.94	0.94
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	31.3	25.0	37.5	37.5
		Total number of exceedence episodes	0	0	0	0	1	2	2	2
		Longest exceedence episode (in hours)					120	72	120	120
		AVERAGE C_R during exceedence episodes					1.95	2.19	1.93	1.92
		MAXIMUM C_R during time period	0.31	0.31	1.00	0.89	2.75	2.75	2.99	2.99
Transect 6:	*(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R[1] during time period	0.15	0.15	0.76	0.76	0.89	0.89		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	25.0	25.0	31.3	31.3		
		Total number of exceedence episodes	0	0	1	1	3	3		
		Longest exceedence episode (in hours)			96	96	72	72		
		AVERAGE C_R during exceedence episodes			2.02	2.02	1.95	1.95		
		MAXIMUM C_R during time period	0.25	0.25	2.70	2.69	2.70	2.70		
Transect 7:	*(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R[1] during time period	0.23	0.23	0.60	0.60			0.86	0.86
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	18.8	18.8			0.0	6.3
		Total number of exceedence episodes	0	0	2	2			0	1
		Longest exceedence episode (in hours)			48	48				24
		AVERAGE C_R during exceedence episodes			1.90	1.89				1.02
		MAXIMUM C_R during time period	0.40	0.39	2.27	2.28			0.98	1.02
Transect 8:	*(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R[1] during time period	0.13	0.13	0.18	0.18	0.34	0.34		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.18	0.18	0.32	0.31	0.88	0.89		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value. Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.25C(a) Time-series impact analysis for levels of Conductivity , for time period of: Season 1 (March 16 to May 16).

Criterion = 400 umho / cm2 ; Length of time period (days)= 61 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.51	0.51	0.54	0.54	0.60	0.60		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**1.7**	**1.7**		
	Total number of exceedence episodes	0	0	0	0	**4**	**4**		
	Longest exceedence episode (in hours)					**13**	**13**		
	AVERAGE C_R during exceedence episodes					**1.01**	**1.01**		
	MAXIMUM C_R during time period	0.60	0.60	0.98	0.98	**1.02**	**1.03**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.50	0.50	0.55	0.54	0.67	0.67		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**0.1**	0.0	**10.9**	**10.9**		
	Total number of exceedence episodes	0	0	**2**	0	**12**	**12**		
	Longest exceedence episode (in hours)			**1**		**45**	**45**		
	AVERAGE C_R during exceedence episodes			**1.01**		**1.11**	**1.11**		
	MAXIMUM C_R during time period	0.56	0.56	**1.03**	0.96	**1.22**	**1.22**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.64	0.61	0.72	0.71			0.80	0.78
	% time period when C_R >1 (i.e. criterion exceeded)	**4.6**	**2.9**	**12.3**	**10.9**			**25.8**	**21.9**
	Total number of exceedence episodes	**15**	**9**	**15**	**14**			**22**	**14**
	Longest exceedence episode (in hours)	**21**	**20**	**66**	**46**			**76**	**59**
	AVERAGE C_R during exceedence episodes	**1.07**	**1.04**	**1.12**	**1.11**			**1.17**	**1.18**
	MAXIMUM C_R during time period	**1.31**	**1.12**	**1.31**	**1.30**			**1.42**	**1.41**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.65	0.60	**1.23**	**1.17**	**1.29**	**1.29**		
	% time period when C_R >1 (i.e. criterion exceeded)	**6.3**	**1.8**	**91.9**	**83.2**	**100.0**	**100.0**		
	Total number of exceedence episodes	**27**	**11**	**17**	**20**	**1**	**1**		
	Longest exceedence episode (in hours)	**24**	**5**	**512**	**516**	**1,464**	**1,464**		
	AVERAGE C_R during exceedence episodes	**1.08**	**1.06**	**1.26**	**1.26**	**1.29**	**1.29**		
	MAXIMUM C_R during time period	**1.42**	**1.18**	**1.57**	**1.57**	**1.58**	**1.58**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.54	0.54	0.62	0.58	0.70	0.69	0.77	0.77
	% time period when C_R >1 (i.e. criterion exceeded)	**0.3**	**0.4**	**3.0**	**0.6**	**5.6**	**4.9**	**20.2**	**19.8**
	Total number of exceedence episodes	**1**	**1**	**18**	**5**	**15**	**13**	**9**	**9**
	Longest exceedence episode (in hours)	**5**	**6**	**9**	**3**	**23**	**23**	**76**	**76**
	AVERAGE C_R during exceedence episodes	**1.05**	**1.05**	**1.10**	**1.04**	**1.09**	**1.10**	**1.08**	**1.07**
	MAXIMUM C_R during time period	**1.06**	**1.07**	**1.37**	**1.11**	**1.33**	**1.34**	**1.27**	**1.27**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.51	0.51	0.67	0.66	0.76	0.76		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**2.8**	**2.0**	**19.6**	**19.6**		
	Total number of exceedence episodes	0	0	**10**	**9**	**8**	**8**		
	Longest exceedence episode (in hours)			**11**	**7**	**73**	**73**		
	AVERAGE C_R during exceedence episodes			**1.05**	**1.05**	**1.08**	**1.08**		
	MAXIMUM C_R during time period	0.59	0.59	**1.14**	**1.14**	**1.25**	**1.25**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.56	0.55	0.67	0.66			0.72	0.72
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**3.8**	**2.5**			0.0	**0.6**
	Total number of exceedence episodes	0	0	**8**	**7**			0	**4**
	Longest exceedence episode (in hours)			**30**	**20**				**3**
	AVERAGE C_R during exceedence episodes			**1.07**	**1.08**				**1.01**
	MAXIMUM C_R during time period	0.88	0.87	**1.17**	**1.17**			0.92	**1.01**
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.51	0.51	0.54	0.53	0.67	0.67		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**8.7**	**8.7**		
	Total number of exceedence episodes	0	0	0	0	**8**	**8**		
	Longest exceedence episode (in hours)					**60**	**60**		
	AVERAGE C_R during exceedence episodes					**1.04**	**1.04**		
	MAXIMUM C_R during time period	0.57	0.57	0.65	0.64	**1.09**	**1.09**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.25C(b) Time-series impact analysis for levels of Conductivity , for time period of: Season 1 (March 16 to May 16).

Criterion = 400 umho / cm2 ; Length of time period (days)= 61 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.51	0.51	0.54	0.54	0.60	0.60		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**1.2**	**1.2**		
	Total number of exceedence episodes	0	0	0	0	**3**	**3**		
	Longest exceedence episode (in hours)					**6**	**6**		
	AVERAGE C_R during exceedence episodes					**1.01**	**1.01**		
	MAXIMUM C_R during time period	0.58	0.58	0.86	0.85	**1.01**	**1.01**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.50	0.50	0.55	0.54	0.67	0.67		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**10.2**	**10.2**		
	Total number of exceedence episodes	0	0	0	0	**8**	**8**		
	Longest exceedence episode (in hours)					**42**	**42**		
	AVERAGE C_R during exceedence episodes					**1.11**	**1.11**		
	MAXIMUM C_R during time period	0.55	0.55	0.93	0.91	**1.21**	**1.21**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.64	0.61	0.72	0.71			0.80	0.78
	% time period when C_R >1 (i.e. criterion exceeded)	**4.5**	**1.6**	**11.9**	**10.2**			**24.2**	**21.3**
	Total number of exceedence episodes	**6**	**2**	**8**	**4**			**12**	**8**
	Longest exceedence episode (in hours)	**18**	**18**	**66**	**66**			**72**	**72**
	AVERAGE C_R during exceedence episodes	**1.03**	**1.04**	**1.11**	**1.11**			**1.17**	**1.17**
	MAXIMUM C_R during time period	**1.07**	**1.05**	**1.26**	**1.26**			**1.39**	**1.39**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.65	0.60	**1.23**	**1.17**	**1.29**	**1.29**		
	% time period when C_R >1 (i.e. criterion exceeded)	**4.9**	**0.8**	**92.6**	**82.8**	**100.0**	**100.0**		
	Total number of exceedence episodes	**6**	**2**	**8**	**7**	**1**	**1**		
	Longest exceedence episode (in hours)	**36**	**6**	**534**	**534**	**1,464**	**1,464**		
	AVERAGE C_R during exceedence episodes	**1.05**	**1.04**	**1.26**	**1.26**	**1.29**	**1.29**		
	MAXIMUM C_R during time period	**1.14**	**1.05**	**1.57**	**1.57**	**1.57**	**1.57**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.54	0.54	0.62	0.58	0.70	0.69	0.77	0.77
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**1.2**	0.0	**4.9**	**3.7**	**20.5**	**20.1**
	Total number of exceedence episodes	0	0	**3**	0	**7**	**5**	**8**	**8**
	Longest exceedence episode (in hours)			**6**		**24**	**24**	**102**	**102**
	AVERAGE C_R during exceedence episodes			**1.09**		**1.09**	**1.12**	**1.07**	**1.07**
	MAXIMUM C_R during time period	0.98	0.99	**1.20**	0.99	**1.29**	**1.30**	**1.27**	**1.27**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.51	0.51	0.67	0.66	0.76	0.76		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**1.6**	**1.2**	**18.9**	**18.9**		
	Total number of exceedence episodes	0	0	**3**	**3**	**7**	**7**		
	Longest exceedence episode (in hours)			**12**	**6**	**72**	**72**		
	AVERAGE C_R during exceedence episodes			**1.07**	**1.06**	**1.08**	**1.08**		
	MAXIMUM C_R during time period	0.59	0.58	**1.09**	**1.08**	**1.25**	**1.25**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.56	0.55	0.67	0.66			0.72	0.72
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**3.3**	**1.6**			0.0	0.0
	Total number of exceedence episodes	0	0	**3**	**2**			0	0
	Longest exceedence episode (in hours)			**30**	**18**				
	AVERAGE C_R during exceedence episodes			**1.08**	**1.11**				
	MAXIMUM C_R during time period	0.81	0.82	**1.16**	**1.17**			0.92	1.00
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.51	0.51	0.54	0.53	0.67	0.67		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**7.8**	**7.8**		
	Total number of exceedence episodes	0	0	0	0	**5**	**5**		
	Longest exceedence episode (in hours)					**60**	**60**		
	AVERAGE C_R during exceedence episodes					**1.04**	**1.04**		
	MAXIMUM C_R during time period	0.57	0.57	0.64	0.64	**1.09**	**1.09**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.25C(c) Time-series impact analysis for levels of Conductivity , for time period of: Season 1 (March 16 to May 16).

Criterion = 400 umho / cm2 ; Length of time period (days)= 61 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of*	Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.54	0.54	0.60	0.60		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.57	0.57	0.69	0.70	0.93	0.93		
Transect 2: *(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.55	0.54	0.67	0.67		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**4.9**	**4.9**		
	Total number of exceedence episodes	0	0	0	0	**3**	**3**		
	Longest exceedence episode (in hours)					**24**	**24**		
	AVERAGE C_R during exceedence episodes					**1.11**	**1.11**		
	MAXIMUM C_R during time period	0.54	0.54	0.82	0.68	**1.17**	**1.17**		
Transect 3: *(about 0.9 km North of*	Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth[3]** ***(0.0)***	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.64	0.61	0.72	0.71			0.80	0.78
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**9.8**	**9.8**			**23.0**	**21.3**
	Total number of exceedence episodes	0	0	**3**	**3**			**6**	**6**
	Longest exceedence episode (in hours)			**72**	**72**			**72**	**72**
	AVERAGE C_R during exceedence episodes			**1.09**	**1.07**			**1.15**	**1.14**
	MAXIMUM C_R during time period	0.99	0.98	**1.16**	**1.16**			**1.35**	**1.35**
Transect 4: *(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth[2]*(0.0)***			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.65	0.60	**1.23**	**1.17**	**1.29**	**1.29**		
	% time period when C_R >1 (i.e. criterion exceeded)	**3.3**	0.0	**91.8**	**80.3**	**100.0**	**100.0**		
	Total number of exceedence episodes	**1**	0	**6**	**3**	**1**	**1**		
	Longest exceedence episode (in hours)	**48**		**528**	**984**	**1,464**	**1,464**		
	AVERAGE C_R during exceedence episodes	**1.03**		**1.25**	**1.25**	**1.29**	**1.29**		
	MAXIMUM C_R during time period	**1.07**	0.97	**1.55**	**1.55**	**1.56**	**1.56**		
Transect 5: *(about 0.8 km South of*	Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.54	0.54	0.62	0.58	0.70	0.69	0.77	0.77
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**4.9**	**3.3**	**18.0**	**18.0**
	Total number of exceedence episodes	0	0	0	0	**2**	**2**	**6**	**6**
	Longest exceedence episode (in hours)					**48**	**24**	**96**	**96**
	AVERAGE C_R during exceedence episodes					**1.06**	**1.05**	**1.07**	**1.07**
	MAXIMUM C_R during time period	0.75	0.75	0.92	0.88	**1.09**	**1.10**	**1.20**	**1.15**
Transect 6: *(about 2.1 km South of*	Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.67	0.66	0.76	0.76		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**16.4**	**16.4**		
	Total number of exceedence episodes	0	0	0	0	**7**	**7**		
	Longest exceedence episode (in hours)					**48**	**48**		
	AVERAGE C_R during exceedence episodes					**1.07**	**1.07**		
	MAXIMUM C_R during time period	0.56	0.56	0.97	0.97	**1.24**	**1.24**		
Transect 7: *(about 3.8 km South of*	Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542[4]**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.56	0.55	0.67	0.66			0.72	0.72
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**1.6**	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	**1**	0			0	0
	Longest exceedence episode (in hours)			**24**					
	AVERAGE C_R during exceedence episodes			**1.13**					
	MAXIMUM C_R during time period	0.75	0.76	**1.13**	0.99			0.91	0.93
Transect 8: *(about 6.0 km South of*	Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.54	0.53	0.67	0.67		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**6.6**	**6.6**		
	Total number of exceedence episodes	0	0	0	0	**3**	**3**		
	Longest exceedence episode (in hours)					**48**	**48**		
	AVERAGE C_R during exceedence episodes					**1.02**	**1.02**		
	MAXIMUM C_R during time period	0.56	0.56	0.63	0.63	**1.07**	**1.07**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.25N(a) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Season 1 (March 16 to May 16).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 61 ; Data-averaging length (hours) = 1

Transect 1:	*(about 6.0 km North of Maitland River mouth)* Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.12	0.12	0.21	0.21	0.38	0.38		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	1.2	1.2	12.2	12.2		
	Total number of exceedence episodes	0	0	4	4	5	5		
	Longest exceedence episode (in hours)			9	9	90	90		
	AVERAGE C_R during exceedence episodes			1.61	1.61	1.44	1.44		
	MAXIMUM C_R during time period	0.49	0.49	2.27	2.25	2.25	2.25		
Transect 2:	*(about 3.0 km North of Maitland River mouth)* Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.11	0.11	0.25	0.22	0.57	0.57		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	3.0	1.3	22.3	22.4		
	Total number of exceedence episodes	0	0	6	5	7	7		
	Longest exceedence episode (in hours)			25	8	153	153		
	AVERAGE C_R during exceedence episodes			1.49	1.56	1.64	1.64		
	MAXIMUM C_R during time period	0.32	0.33	2.12	2.12	2.82	2.82		
Transect 3:	*(about 0.9 km North of Maitland River mouth)* Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth**^{3} *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R ^{1} during time period	0.55	0.48	0.68	0.66			0.81	0.79
	% time period when C_R >1 (i.e. criterion exceeded)	17.5	14.5	27.4	26.3			34.1	32.5
	Total number of exceedence episodes	22	19	13	12			19	15
	Longest exceedence episode (in hours)	80	80	150	149			137	138
	AVERAGE C_R during exceedence episodes	1.69	1.66	1.62	1.63			1.68	1.70
	MAXIMUM C_R during time period	3.16	2.96	2.97	2.97			2.96	2.96
Transect 4:	*(about 0.1 km North of Maitland River mouth)* Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth**^{2} *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.57	0.42	2.08	2.00	2.20	2.20		
	% time period when C_R >1 (i.e. criterion exceeded)	16.9	10.8	85.7	78.4	93.1	93.1		
	Total number of exceedence episodes	32	27	10	8	7	7		
	Longest exceedence episode (in hours)	46	21	884	825	1,003	1,003		
	AVERAGE C_R during exceedence episodes	1.82	1.79	2.32	2.42	2.30	2.30		
	MAXIMUM C_R during time period	3.65	2.56	4.34	4.33	4.40	4.40		
Transect 5:	*(about 0.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R ^{1} during time period	0.24	0.22	0.48	0.35	0.69	0.65	0.88	0.87
	% time period when C_R >1 (i.e. criterion exceeded)	3.1	3.3	11.8	6.3	23.6	22.7	38.6	37.9
	Total number of exceedence episodes	3	3	25	14	17	15	9	10
	Longest exceedence episode (in hours)	31	31	40	40	75	72	263	261
	AVERAGE C_R during exceedence episodes	1.75	1.72	1.73	1.76	1.61	1.59	1.64	1.65
	MAXIMUM C_R during time period	2.34	2.35	3.44	2.56	3.10	3.14	2.86	2.85
Transect 6:	*(about 2.1 km South of Maitland River mouth)* Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.12	0.12	0.60	0.55	0.83	0.82		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	20.4	18.2	34.2	34.2		
	Total number of exceedence episodes	0	0	16	14	8	8		
	Longest exceedence episode (in hours)			77	77	148	148		
	AVERAGE C_R during exceedence episodes			1.48	1.46	1.67	1.67		
	MAXIMUM C_R during time period	0.44	0.43	2.28	2.16	2.76	2.76		
Transect 7:	*(about 3.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542**^{4}	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R ^{1} during time period	0.27	0.25	0.58	0.54			0.61	0.60
	% time period when C_R >1 (i.e. criterion exceeded)	2.5	2.4	18.6	17.6			19.2	20.6
	Total number of exceedence episodes	3	2	8	8			2	5
	Longest exceedence episode (in hours)	32	32	74	74			280	265
	AVERAGE C_R during exceedence episodes	1.34	1.37	1.55	1.52			1.19	1.23
	MAXIMUM C_R during time period	1.61	1.64	2.31	2.32			1.24	1.75
Transect 8:	*(about 6.0 km South of Maitland River mouth)* Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.12	0.11	0.19	0.18	0.58	0.58		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	20.9	20.8		
	Total number of exceedence episodes	0	0	0	0	12	13		
	Longest exceedence episode (in hours)					74	74		
	AVERAGE C_R during exceedence episodes					1.51	1.51		
	MAXIMUM C_R during time period	0.37	0.36	0.69	0.69	2.21	2.21		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.25N(b) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Season 1 (March 16 to May 16).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 61 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.12	0.21	0.21	0.38	0.39		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	1.6	1.6	13.1	13.1		
	Total number of exceedence episodes	0	0	3	3	5	5		
	Longest exceedence episode (in hours)			12	12	96	96		
	AVERAGE C_R during exceedence episodes			1.33	1.34	1.40	1.40		
	MAXIMUM C_R during time period	0.41	0.42	1.64	1.58	2.22	2.23		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.25	0.22	0.57	0.57		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	2.9	1.2	21.7	21.7		
	Total number of exceedence episodes	0	0	4	3	6	6		
	Longest exceedence episode (in hours)			24	6	150	150		
	AVERAGE C_R during exceedence episodes			1.44	1.41	1.65	1.65		
	MAXIMUM C_R during time period	0.29	0.29	1.90	1.90	2.56	2.56		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.55	0.48	0.68	0.66			0.82	0.79
	% time period when C_R >1 (i.e. criterion exceeded)	17.6	16.0	27.5	27.5			35.7	33.6
	Total number of exceedence episodes	9	8	9	8			13	11
	Longest exceedence episode (in hours)	126	126	150	150			168	168
	AVERAGE C_R during exceedence episodes	1.64	1.57	1.60	1.59			1.63	1.66
	MAXIMUM C_R during time period	2.77	2.71	2.82	2.80			2.95	2.95
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.57	0.42	2.08	2.00	2.20	2.20		
	% time period when C_R >1 (i.e. criterion exceeded)	16.8	11.9	84.8	78.7	93.9	93.9		
	Total number of exceedence episodes	14	11	6	5	2	2		
	Longest exceedence episode (in hours)	48	36	882	942	1,020	1,020		
	AVERAGE C_R during exceedence episodes	1.74	1.64	2.33	2.41	2.29	2.29		
	MAXIMUM C_R during time period	2.41	2.12	4.32	4.31	4.35	4.35		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.23	0.22	0.48	0.35	0.69	0.65	0.88	0.87
	% time period when C_R >1 (i.e. criterion exceeded)	2.9	2.9	12.3	7.4	25.0	23.4	38.5	38.5
	Total number of exceedence episodes	2	2	11	6	9	10	6	6
	Longest exceedence episode (in hours)	30	30	48	54	90	72	264	264
	AVERAGE C_R during exceedence episodes	1.70	1.72	1.57	1.53	1.56	1.55	1.64	1.63
	MAXIMUM C_R during time period	1.94	2.00	2.76	2.39	2.93	3.00	2.85	2.85
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.12	0.60	0.55	0.83	0.82		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	20.5	18.9	34.4	34.4		
	Total number of exceedence episodes	0	0	8	8	5	5		
	Longest exceedence episode (in hours)			84	84	264	264		
	AVERAGE C_R during exceedence episodes			1.46	1.43	1.66	1.66		
	MAXIMUM C_R during time period	0.43	0.43	2.15	2.01	2.74	2.75		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.27	0.25	0.58	0.54			0.61	0.60
	% time period when C_R >1 (i.e. criterion exceeded)	2.0	2.5	19.3	18.0			19.3	20.1
	Total number of exceedence episodes	1	1	6	6			1	4
	Longest exceedence episode (in hours)	30	36	126	120			282	264
	AVERAGE C_R during exceedence episodes	1.32	1.29	1.52	1.50			1.19	1.23
	MAXIMUM C_R during time period	1.55	1.56	2.29	2.31			1.24	1.71
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.11	0.19	0.18	0.58	0.58		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	21.7	21.7		
	Total number of exceedence episodes	0	0	0	0	9	9		
	Longest exceedence episode (in hours)					84	84		
	AVERAGE C_R during exceedence episodes					1.48	1.48		
	MAXIMUM C_R during time period	0.36	0.36	0.68	0.68	2.19	2.19		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.25N(c) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Season 1 (March 16 to May 16).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 61 ; Data-averaging length (hours) = 24

Transect 1:	*(about 6.0 km North of*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.12	0.12	0.21	0.21	0.38	0.39		
		% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**11.5**	**11.5**		
		Total number of exceedence episodes	0	0	0	0	**1**	**1**		
		Longest exceedence episode (in hours)					**168**	**168**		
		AVERAGE C_R during exceedence episodes					**1.37**	**1.37**		
		MAXIMUM C_R during time period	0.39	0.39	0.85	0.86	**1.82**	**1.82**		
Transect 2:	*(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.11	0.11	0.25	0.22	0.57	0.57		
		% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	**1.6**	0.0	**23.0**	**23.0**		
		Total number of exceedence episodes	0	0	**1**	0	**4**	**4**		
		Longest exceedence episode (in hours)			**24**		**216**	**216**		
		AVERAGE C_R during exceedence episodes			**1.26**		**1.56**	**1.56**		
		MAXIMUM C_R during time period	0.25	0.24	**1.26**	0.80	**2.24**	**2.24**		
Transect 3:	*(about 0.9 km North of*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.55	0.48	0.68	0.66			0.82	0.79
		% time period when $C_R > 1$ (i.e. criterion exceeded)	**23.0**	**14.8**	**26.2**	**26.2**			**32.8**	**32.8**
		Total number of exceedence episodes	**5**	**3**	**4**	**4**			**5**	**5**
		Longest exceedence episode (in hours)	**144**	**144**	**216**	**216**			**240**	**240**
		AVERAGE C_R during exceedence episodes	**1.38**	**1.46**	**1.55**	**1.55**			**1.63**	**1.62**
		MAXIMUM C_R during time period	**1.92**	**1.93**	**2.23**	**2.23**			**2.45**	**2.45**
Transect 4:	*(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.57	0.42	**2.08**	**2.00**	**2.20**	**2.20**		
		% time period when $C_R > 1$ (i.e. criterion exceeded)	**16.4**	**11.5**	**85.2**	**78.7**	**95.1**	**95.1**		
		Total number of exceedence episodes	**7**	**4**	**3**	**3**	**2**	**2**		
		Longest exceedence episode (in hours)	**48**	**72**	**960**	**960**	**1,032**	**1,032**		
		AVERAGE C_R during exceedence episodes	**1.48**	**1.38**	**2.32**	**2.40**	**2.27**	**2.27**		
		MAXIMUM C_R during time period	**2.16**	**1.83**	**4.09**	**4.11**	**4.18**	**4.18**		
Transect 5:	*(about 0.8 km South of*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.23	0.22	0.48	0.35	0.69	0.65	0.88	0.87
		% time period when $C_R > 1$ (i.e. criterion exceeded)	**3.3**	**3.3**	**11.5**	**4.9**	**26.2**	**26.2**	**37.7**	**36.1**
		Total number of exceedence episodes	**1**	**1**	**6**	**2**	**5**	**5**	**6**	**6**
		Longest exceedence episode (in hours)	**48**	**48**	**48**	**48**	**192**	**192**	**264**	**240**
		AVERAGE C_R during exceedence episodes	**1.17**	**1.17**	**1.44**	**1.56**	**1.45**	**1.42**	**1.62**	**1.63**
		MAXIMUM C_R during time period	**1.20**	**1.21**	**1.79**	**1.75**	**2.08**	**2.01**	**2.60**	**2.43**
Transect 6:	*(about 2.1 km South of*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.12	0.12	0.60	0.55	0.83	0.82		
		% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	**19.7**	**18.0**	**34.4**	**34.4**		
		Total number of exceedence episodes	0	0	**6**	**6**	**5**	**5**		
		Longest exceedence episode (in hours)			**120**	**120**	**264**	**264**		
		AVERAGE C_R during exceedence episodes			**1.37**	**1.32**	**1.63**	**1.63**		
		MAXIMUM C_R during time period	0.35	0.34	**1.81**	**1.75**	**2.71**	**2.70**		
Transect 7:	*(about 3.8 km South of*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.27	0.25	0.58	0.54			0.61	0.60
		% time period when $C_R > 1$ (i.e. criterion exceeded)	**1.6**	**1.6**	**19.7**	**18.0**			**18.0**	**19.7**
		Total number of exceedence episodes	**1**	**1**	**6**	**6**			**1**	**2**
		Longest exceedence episode (in hours)	**24**	**24**	**120**	**120**			**264**	**264**
		AVERAGE C_R during exceedence episodes	**1.24**	**1.29**	**1.44**	**1.42**			**1.20**	**1.22**
		MAXIMUM C_R during time period	**1.24**	**1.29**	**2.15**	**1.88**			**1.23**	**1.46**
Transect 8:	*(about 6.0 km South of*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.12	0.11	0.19	0.18	0.58	0.58		
		% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**21.3**	**21.3**		
		Total number of exceedence episodes	0	0	0	0	**6**	**6**		
		Longest exceedence episode (in hours)					**144**	**144**		
		AVERAGE C_R during exceedence episodes					**1.46**	**1.45**		
		MAXIMUM C_R during time period	0.34	0.33	0.59	0.59	**2.13**	**2.13**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when $C_R > 1$.

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.26C(a) Time-series impact analysis for levels of Conductivity , for time period of: Season 2 (May 16 to Sep. 16).

Criterion = 400 umho / cm2 ; Length of time period (days)= 123 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.50	0.50	0.50	0.50	0.53	0.53		
	% time period when C_R>1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.62	0.51	0.56	0.52	0.82	0.82		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.50	0.50	0.51	0.50	0.57	0.57		
	% time period when C_R>1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**0.2**	**0.2**		
	Total number of exceedence episodes	0	0	0	0	**1**	**1**		
	Longest exceedence episode (in hours)					**7**	**7**		
	AVERAGE C_R during exceedence episodes					**1.05**	**1.04**		
	MAXIMUM C_R during time period	0.57	0.51	0.69	0.53	**1.08**	**1.07**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.55	0.51	0.62	0.57			0.77	0.67
	% time period when C_R>1 (i.e. criterion exceeded)	**1.0**	0.0	**3.1**	**0.6**			**16.5**	**7.5**
	Total number of exceedence episodes	**12**	0	**16**	**4**			**62**	**22**
	Longest exceedence episode (in hours)	**5**		**19**	**10**			**31**	**22**
	AVERAGE C_R during exceedence episodes	**1.07**		**1.09**	**1.06**			**1.12**	**1.14**
	MAXIMUM C_R during time period	**1.21**	0.61	**1.32**	**1.11**			**1.44**	**1.44**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.56	0.51	0.95	0.70	**1.24**	**1.24**		
	% time period when C_R>1 (i.e. criterion exceeded)	**1.4**	0.0	**46.0**	**17.7**	**100.0**	**100.0**		
	Total number of exceedence episodes	**14**	0	**68**	**33**	**1**	**1**		
	Longest exceedence episode (in hours)	**10**		**257**	**116**	**2,952**	**2,952**		
	AVERAGE C_R during exceedence episodes	**1.11**		**1.25**	**1.30**	**1.24**	**1.24**		
	MAXIMUM C_R during time period	**1.25**	0.61	**1.51**	**1.51**	**1.50**	**1.50**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.51	0.50	0.54	0.51	0.53	0.52	0.54	0.54
	% time period when C_R>1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	**1**	0	0	0	0	0
	Longest exceedence episode (in hours)			**1**					
	AVERAGE C_R during exceedence episodes			**1.05**					
	MAXIMUM C_R during time period	0.82	0.56	**1.05**	0.67	0.79	0.70	0.76	0.76
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.50	0.50	0.52	0.52	0.54	0.54		
	% time period when C_R>1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.62	0.52	0.70	0.64	0.80	0.80		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.51	0.51	0.52	0.52			0.53	0.52
	% time period when C_R>1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.75	0.64	0.70	0.68			0.68	0.71
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.51	0.50	0.51	0.51	0.52	0.52		
	% time period when C_R>1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.60	0.52	0.65	0.58	0.78	0.78		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.26C(b) Time-series impact analysis for levels of Conductivity , for time period of: Season 2 (May 16 to Sep. 16).

Criterion = 400 umho / cm2 ; Length of time period (days)= 123 ; Data-averaging length (hours) = 6

Transect 1:	(about 6.0 km North of Maitland River mouth)	Station (km offshore)	Station 528 (4.9)		Station 529 (2.0)		Wright Pt. (0.0)			
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom		
		AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.53	0.53		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.61	0.51	0.55	0.52	0.80	0.80		
Transect 2:	(about 3.0 km North of Maitland River mouth)	Station (km offshore)	Offshore ADCP (6.7)		Station 532 (2.2)		Sunset Beach (0.0)			
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom		
		AVERAGE C_R [1] during time period	0.50	0.50	0.51	0.50	0.57	0.57		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.2	0.2		
		Total number of exceedence episodes	0	0	0	0	1	1		
		Longest exceedence episode (in hours)					6	6		
		AVERAGE C_R during exceedence episodes					1.02	1.02		
		MAXIMUM C_R during time period	0.57	0.51	0.64	0.53	1.02	1.02		
Transect 3:	(about 0.9 km North of Maitland River mouth)	Station (km offshore)	Station 535 (0.9)		Station 538 (0.2)				200 m North of mouth[3] (0.0)	
		water-column location	Surface	Bottom	Surface	Bottom			Surface	Bottom
		AVERAGE C_R [1] during time period	0.55	0.51	0.62	0.57			0.77	0.67
		% time period when C_R >1 (i.e. criterion exceeded)	0.6	0.0	2.4	0.6			15.0	6.5
		Total number of exceedence episodes	3	0	9	2			27	16
		Longest exceedence episode (in hours)	6		18	12			36	18
		AVERAGE C_R during exceedence episodes	1.07		1.08	1.02			1.12	1.14
		MAXIMUM C_R during time period	1.08	0.60	1.29	1.05			1.42	1.42
Transect 4:	(about 0.1 km North of Maitland River mouth)	Station (km offshore)	Nearshore ADCP (1.2)		Station 539 (0.3)		Mait. River mouth[2] (0.0)			
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom		
		AVERAGE C_R [1] during time period	0.56	0.51	0.95	0.70	1.24	1.24		
		% time period when C_R >1 (i.e. criterion exceeded)	0.8	0.0	46.1	18.1	100.0	100.0		
		Total number of exceedence episodes	4	0	28	19	1	1		
		Longest exceedence episode (in hours)	6		312	120	2,952	2,952		
		AVERAGE C_R during exceedence episodes	1.09		1.24	1.28	1.24	1.24		
		MAXIMUM C_R during time period	1.21	0.58	1.50	1.50	1.50	1.50		
Transect 5:	(about 0.8 km South of Maitland River mouth)	Station (km offshore)	Station 537 (2.9)		Station 541 (1.3)		Station 543 (0.4)		St. Christopher Beach (0.0)	
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom
		AVERAGE C_R [1] during time period	0.51	0.50	0.54	0.51	0.53	0.52	0.54	0.54
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Total number of exceedence episodes	0	0	0	0	0	0	0	0
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.73	0.54	0.91	0.65	0.76	0.67	0.76	0.76
Transect 6:	(about 2.1 km South of Maitland River mouth)	Station (km offshore)	Station 540 (5.2)		Station 544 (0.5)		The Cove Beach (0.0)			
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom		
		AVERAGE C_R [1] during time period	0.50	0.50	0.52	0.52	0.54	0.54		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.61	0.52	0.69	0.62	0.79	0.79		
Transect 7:	(about 3.8 km South of Maitland River mouth)	Station (km offshore)	Station 545 (2.1)		Station 546 (0.3)				Station 542[4]	
		water-column location	Surface	Bottom	Surface	Bottom			Surface	Bottom
		AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.52			0.53	0.52
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
		Total number of exceedence episodes	0	0	0	0			0	0
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.71	0.64	0.69	0.67			0.67	0.68
Transect 8:	(about 6.0 km South of Maitland River mouth)	Station (km offshore)	Station 550 (5.3)		Station 549 (2.5)		Black's Pt. Beach (0.0)			
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom		
		AVERAGE C_R [1] during time period	0.51	0.50	0.51	0.51	0.52	0.52		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.59	0.52	0.63	0.56	0.77	0.77		

Notes: *(1)* *" C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.*
Thus an "exceedence episode" occurs when C_R > 1 .

(2) *This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case*
(i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) *This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth.*
When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth),
an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) *Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.*

Table. 5.26C(c) Time-series impact analysis for levels of Conductivity , for time period of: Season 2 (May 16 to Sep. 16).

Criterion = 400 umho / cm2 ; Length of time period (days)= 123 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of*	Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.50	0.50	0.53	0.53		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.54	0.51	0.53	0.52	0.74	0.74		
Transect 2: *(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.51	0.50	0.57	0.57		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.55	0.51	0.55	0.52	0.94	0.91		
Transect 3: *(about 0.9 km North of*	Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth[3]** ***(0.0)***	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.55	0.51	0.62	0.57			0.77	0.67
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			**13.8**	**5.7**
	Total number of exceedence episodes	0	0	0	0			**13**	**7**
	Longest exceedence episode (in hours)							**72**	**24**
	AVERAGE C_R during exceedence episodes							**1.10**	**1.08**
	MAXIMUM C_R during time period	0.86	0.56	1.00	0.92			**1.28**	**1.19**
Transect 4: *(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth[2]*(0.0)***			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.56	0.51	0.95	0.70	**1.24**	**1.24**		
	% time period when C_R >1 (i.e. criterion exceeded)	**0.8**	0.0	**43.9**	**15.4**	**100.0**	**100.0**		
	Total number of exceedence episodes	**1**	0	**10**	**5**	**1**	**1**		
	Longest exceedence episode (in hours)	**24**		**336**	**168**	**2,952**	**2,952**		
	AVERAGE C_R during exceedence episodes	**1.03**		**1.24**	**1.23**	**1.24**	**1.24**		
	MAXIMUM C_R during time period	**1.03**	0.55	**1.49**	**1.49**	**1.50**	**1.50**		
Transect 5: *(about 0.8 km South of*	Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.51	0.50	0.54	0.51	0.53	0.52	0.54	0.54
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.62	0.52	0.79	0.59	0.67	0.62	0.73	0.73
Transect 6: *(about 2.1 km South of*	Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.52	0.52	0.54	0.54		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.57	0.51	0.63	0.59	0.73	0.73		
Transect 7: *(about 3.8 km South of*	Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542[4]**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.52			0.53	0.52
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.63	0.62	0.67	0.64			0.65	0.64
Transect 8: *(about 6.0 km South of*	Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.50	0.51	0.51	0.52	0.52		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.57	0.51	0.58	0.55	0.72	0.72		

Notes: *(1)* *" C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.*
Thus an "exceedence episode" occurs when C_R > 1 .

(2) *This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.*

(3) *This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.*

(4) *Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.*

Table. 5.26N(a) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Season 2 (May 16 to Sep. 16).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 123 ; Data-averaging length (hours) = 1

Transect 1:	*(about 6.0 km North of Maitland River mouth)* Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.11	0.11	0.11	0.11	0.13	0.13		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.52	0.13	0.19	0.15	0.60	0.60		
Transect 2:	*(about 3.0 km North of Maitland River mouth)* Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.11	0.11	0.12	0.11	0.19	0.18		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**0.2**	**0.2**		
	Total number of exceedence episodes	0	0	0	0	**1**	**1**		
	Longest exceedence episode (in hours)					**7**	**6**		
	AVERAGE C_R during exceedence episodes					**1.11**	**1.12**		
	MAXIMUM C_R during time period	0.35	0.12	0.41	0.22	**1.17**	**1.16**		
Transect 3:	*(about 0.9 km North of Maitland River mouth)* Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth^3** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R ^{1} during time period	0.18	0.12	0.27	0.19			0.44	0.32
	% time period when C_R >1 (i.e. criterion exceeded)	**1.4**	0.0	**3.0**	**0.4**			**8.5**	**4.3**
	Total number of exceedence episodes	**8**	0	**15**	**2**			**31**	**13**
	Longest exceedence episode (in hours)	**15**		**20**	**10**			**27**	**20**
	AVERAGE C_R during exceedence episodes	**1.35**		**1.19**	**1.12**			**1.23**	**1.26**
	MAXIMUM C_R during time period	**1.97**	0.51	**1.67**	**1.24**			**1.89**	**1.89**
Transect 4:	*(about 0.1 km North of Maitland River mouth)* Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth^2***(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.22	0.12	0.76	0.46	**1.01**	**1.01**		
	% time period when C_R >1 (i.e. criterion exceeded)	**2.8**	0.0	**30.0**	**15.2**	**40.7**	**40.7**		
	Total number of exceedence episodes	**17**	0	**31**	**21**	**22**	**22**		
	Longest exceedence episode (in hours)	**16**		**244**	**117**	**455**	**455**		
	AVERAGE C_R during exceedence episodes	**1.44**		**1.63**	**1.83**	**1.55**	**1.55**		
	MAXIMUM C_R during time period	**2.37**	0.48	**3.18**	**3.17**	**3.18**	**3.18**		
Transect 5:	*(about 0.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R ^{1} during time period	0.13	0.11	0.18	0.12	0.16	0.14	0.18	0.17
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**0.9**	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	**1**	0	**8**	0	0	0	0	0
	Longest exceedence episode (in hours)	**1**		**9**					
	AVERAGE C_R during exceedence episodes	**1.03**		**1.17**					
	MAXIMUM C_R during time period	**1.03**	0.29	**1.72**	0.64	0.69	0.50	0.64	0.64
Transect 6:	*(about 2.1 km South of Maitland River mouth)* Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.12	0.11	0.15	0.13	0.18	0.18		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.49	0.17	0.52	0.41	0.73	0.73		
Transect 7:	*(about 3.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542^4**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R ^{1} during time period	0.14	0.12	0.15	0.14			0.16	0.14
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.83	0.54	0.47	0.50			0.74	0.62
Transect 8:	*(about 6.0 km South of Maitland River mouth)* Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R ^{1} during time period	0.12	0.11	0.13	0.12	0.16	0.16		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.41	0.16	0.51	0.35	0.77	0.77		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.26N(b) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Season 2 (May 16 to Sep. 16).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 123 ; Data-averaging length (hours) = 6

Transect 1:	*(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.11	0.11	0.11	0.11	0.13	0.13		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.48	0.13	0.17	0.14	0.55	0.55		
Transect 2:	*(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.11	0.11	0.12	0.11	0.19	0.18		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**0.2**	**0.2**		
		Total number of exceedence episodes	0	0	0	0	**1**	**1**		
		Longest exceedence episode (in hours)					**6**	**6**		
		AVERAGE C_R during exceedence episodes					**1.08**	**1.07**		
		MAXIMUM C_R during time period	0.33	0.12	0.32	0.19	**1.08**	**1.07**		
Transect 3:	*(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** [3] *(0.0)*	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.18	0.12	0.27	0.19			0.44	0.32
		% time period when C_R >1 (i.e. criterion exceeded)	**1.2**	0.0	**2.6**	**0.4**			**7.7**	**3.7**
		Total number of exceedence episodes	**5**	0	**10**	**1**			**18**	**10**
		Longest exceedence episode (in hours)	**12**		**18**	**12**			**24**	**24**
		AVERAGE C_R during exceedence episodes	**1.33**		**1.17**	**1.08**			**1.22**	**1.26**
		MAXIMUM C_R during time period	**1.79**	0.46	**1.61**	**1.11**			**1.86**	**1.85**
Transect 4:	*(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** [2] *(0.0)*			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.22	0.12	0.76	0.46	**1.01**	**1.01**		
		% time period when C_R >1 (i.e. criterion exceeded)	**2.6**	0.0	**29.5**	**15.2**	**40.7**	**40.7**		
		Total number of exceedence episodes	**6**	0	**11**	**14**	**8**	**8**		
		Longest exceedence episode (in hours)	**48**		**258**	**126**	**456**	**456**		
		AVERAGE C_R during exceedence episodes	**1.37**		**1.63**	**1.81**	**1.55**	**1.55**		
		MAXIMUM C_R during time period	**2.25**	0.41	**3.13**	**3.13**	**3.14**	**3.14**		
Transect 5:	*(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.13	0.11	0.18	0.12	0.16	0.14	0.18	0.17
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**0.6**	0.0	0.0	0.0	0.0	0.0
		Total number of exceedence episodes	0	0	**2**	0	0	0	0	0
		Longest exceedence episode (in hours)			**12**					
		AVERAGE C_R during exceedence episodes			**1.16**					
		MAXIMUM C_R during time period	0.85	0.26	**1.26**	0.60	0.61	0.49	0.63	0.63
Transect 6:	*(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.12	0.11	0.15	0.13	0.18	0.18		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.44	0.17	0.43	0.39	0.60	0.60		
Transect 7:	*(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542** [4]	
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.14	0.12	0.15	0.14			0.16	0.14
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
		Total number of exceedence episodes	0	0	0	0			0	0
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.72	0.54	0.44	0.48			0.70	0.59
Transect 8:	*(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
		water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.12	0.11	0.13	0.12	0.16	0.16		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
		Total number of exceedence episodes	0	0	0	0	0	0		
		Longest exceedence episode (in hours)								
		AVERAGE C_R during exceedence episodes								
		MAXIMUM C_R during time period	0.40	0.16	0.46	0.30	0.73	0.73		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.26N(c) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Season 2 (May 16 to Sep. 16).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 123 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.11	0.11	0.13	0.13		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.25	0.12	0.15	0.14	0.41	0.41		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.12	0.11	0.19	0.18		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.29	0.12	0.18	0.16	0.88	0.84		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.18	0.12	0.27	0.19			0.44	0.32
	% time period when C_R >1 (i.e. criterion exceeded)	**0.8**	0.0	0.0	0.0			**8.1**	**2.4**
	Total number of exceedence episodes	**1**	0	0	0			**8**	**3**
	Longest exceedence episode (in hours)	**24**						**72**	**24**
	AVERAGE C_R during exceedence episodes	**1.10**						**1.15**	**1.17**
	MAXIMUM C_R during time period	**1.10**	0.31	0.93	0.84			**1.51**	**1.36**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.22	0.12	0.76	0.46	**1.01**	**1.01**		
	% time period when C_R >1 (i.e. criterion exceeded)	**1.6**	0.0	**29.3**	**13.8**	**40.7**	**40.7**		
	Total number of exceedence episodes	**1**	0	**7**	**7**	**5**	**5**		
	Longest exceedence episode (in hours)	**48**		**264**	**120**	**456**	**456**		
	AVERAGE C_R during exceedence episodes	**1.42**		**1.62**	**1.74**	**1.55**	**1.55**		
	MAXIMUM C_R during time period	**1.69**	0.30	**3.09**	**3.08**	**3.11**	**3.11**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.13	0.11	0.18	0.12	0.16	0.14	0.18	0.17
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total number of exceedence episodes	0	0	0	0	0	0	0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.52	0.19	0.91	0.39	0.46	0.41	0.62	0.62
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.11	0.15	0.13	0.18	0.18		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.31	0.15	0.38	0.36	0.55	0.55		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.14	0.12	0.15	0.14			0.16	0.14
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0			0.0	0.0
	Total number of exceedence episodes	0	0	0	0			0	0
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.52	0.50	0.42	0.35			0.63	0.58
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.11	0.13	0.12	0.16	0.16		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	0.0	0.0		
	Total number of exceedence episodes	0	0	0	0	0	0		
	Longest exceedence episode (in hours)								
	AVERAGE C_R during exceedence episodes								
	MAXIMUM C_R during time period	0.33	0.13	0.37	0.27	0.64	0.64		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.27C(a) Time-series impact analysis for levels of Conductivity , for time period of: Season 3 (Sep. 16 to Dec. 1).
Criterion = 400 umho / cm2 ; Length of time period (days)= 76 ; Data-averaging length (hours) = 1

Transect 1:	*(about 6.0 km North of*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.53	0.63	0.63		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**5.8**	**5.8**		
		Total number of exceedence episodes	0	0	0	0	**9**	**9**		
		Longest exceedence episode (in hours)					**28**	**28**		
		AVERAGE C_R during exceedence episodes					**1.13**	**1.13**		
		MAXIMUM C_R during time period	0.56	0.57	0.70	0.72	**1.40**	**1.40**		
Transect 2:	*(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.51	0.51	0.53	0.53	0.72	0.72		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**18.7**	**18.7**		
		Total number of exceedence episodes	0	0	0	0	**22**	**22**		
		Longest exceedence episode (in hours)					**61**	**61**		
		AVERAGE C_R during exceedence episodes					**1.19**	**1.19**		
		MAXIMUM C_R during time period	0.55	0.55	0.87	0.89	**1.49**	**1.49**		
Transect 3:	*(about 0.9 km North of*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.61	0.63	0.73	0.74			0.93	0.93
		% time period when C_R >1 (i.e. criterion exceeded)	**5.4**	**6.5**	**14.7**	**15.0**			**41.9**	**42.0**
		Total number of exceedence episodes	**12**	**19**	**35**	**35**			**32**	**31**
		Longest exceedence episode (in hours)	**20**	**20**	**39**	**38**			**100**	**100**
		AVERAGE C_R during exceedence episodes	**1.20**	**1.16**	**1.19**	**1.19**			**1.28**	**1.27**
		MAXIMUM C_R during time period	**1.56**	**1.55**	**1.47**	**1.47**			**1.55**	**1.55**
Transect 4:	*(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.57	0.64	**1.15**	**1.19**	**1.38**	**1.38**		
		% time period when C_R >1 (i.e. criterion exceeded)	**3.0**	**9.8**	**66.6**	**73.6**	**100.0**	**100.0**		
		Total number of exceedence episodes	**14**	**32**	**27**	**22**	1	1		
		Longest exceedence episode (in hours)	**18**	**22**	**408**	**463**	**1,824**	**1,824**		
		AVERAGE C_R during exceedence episodes	**1.16**	**1.12**	**1.40**	**1.39**	**1.38**	**1.38**		
		MAXIMUM C_R during time period	**1.48**	**1.52**	**1.61**	**1.61**	**1.61**	**1.61**		
Transect 5:	*(about 0.8 km South of*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.52	0.52	0.56	0.59	0.65	0.65	0.69	0.69
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**1.3**	**2.0**	**7.6**	**7.7**	**12.4**	**12.5**
		Total number of exceedence episodes	0	0	**11**	**13**	**11**	**10**	**11**	**11**
		Longest exceedence episode (in hours)			**6**	**9**	**52**	**52**	**65**	**65**
		AVERAGE C_R during exceedence episodes			**1.16**	**1.17**	**1.13**	**1.13**	**1.13**	**1.13**
		MAXIMUM C_R during time period	0.65	0.77	**1.41**	**1.44**	**1.32**	**1.32**	**1.35**	**1.35**
Transect 6:	*(about 2.1 km South of*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.51	0.51	0.62	0.62	0.68	0.68		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**5.3**	**5.3**	**12.1**	**12.1**		
		Total number of exceedence episodes	0	0	**11**	**12**	**8**	**8**		
		Longest exceedence episode (in hours)			**41**	**40**	**62**	**62**		
		AVERAGE C_R during exceedence episodes			**1.16**	**1.16**	**1.11**	**1.11**		
		MAXIMUM C_R during time period	0.57	0.57	**1.36**	**1.36**	**1.26**	**1.26**		
Transect 7:	*(about 3.8 km South of*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
		AVERAGE C_R [1] during time period	0.53	0.53	0.61	0.61			0.63	0.64
		% time period when C_R >1 (i.e. criterion exceeded)	**0.1**	**0.1**	**3.8**	**3.8**			0.0	0.0
		Total number of exceedence episodes	**2**	**2**	**11**	**11**			0	0
		Longest exceedence episode (in hours)	**1**	**1**	**32**	**31**				
		AVERAGE C_R during exceedence episodes	**1.04**	**1.06**	**1.06**	**1.06**				
		MAXIMUM C_R during time period	**1.06**	**1.07**	**1.23**	**1.23**			0.80	0.97
Transect 8:	*(about 6.0 km South of*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
		AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.52	0.58	0.58		
		% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**2.2**	**2.2**		
		Total number of exceedence episodes	0	0	0	0	**4**	**4**		
		Longest exceedence episode (in hours)					**19**	**19**		
		AVERAGE C_R during exceedence episodes					**1.08**	**1.08**		
		MAXIMUM C_R during time period	0.56	0.56	0.67	0.73	**1.12**	**1.12**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when $C_R > 1$.

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.27C(b) Time-series impact analysis for levels of Conductivity , for time period of: Season 3 (Sep. 16 to Dec. 1).

Criterion = 400 umho / cm2 ; Length of time period (days)= 76 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.53	0.63	0.63		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**6.6**	**6.6**		
	Total number of exceedence episodes	0	0	0	0	**8**	**8**		
	Longest exceedence episode (in hours)					**30**	**30**		
	AVERAGE C_R during exceedence episodes					**1.11**	**1.11**		
	MAXIMUM C_R during time period	0.56	0.56	0.63	0.63	**1.35**	**1.35**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** ***(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.53	0.53	0.72	0.72		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**18.4**	**18.4**		
	Total number of exceedence episodes	0	0	0	0	**14**	**14**		
	Longest exceedence episode (in hours)					**66**	**66**		
	AVERAGE C_R during exceedence episodes					**1.18**	**1.18**		
	MAXIMUM C_R during time period	0.55	0.55	0.67	0.71	**1.47**	**1.47**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth[3]** ***(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.61	0.63	0.73	0.74			0.93	0.93
	% time period when C_R >1 (i.e. criterion exceeded)	**4.6**	**5.6**	**15.1**	**15.1**			**43.1**	**43.1**
	Total number of exceedence episodes	**4**	**6**	**16**	**17**			**20**	**20**
	Longest exceedence episode (in hours)	**30**	**30**	**48**	**48**			**114**	**114**
	AVERAGE C_R during exceedence episodes	**1.20**	**1.16**	**1.16**	**1.16**			**1.26**	**1.26**
	MAXIMUM C_R during time period	**1.43**	**1.48**	**1.42**	**1.41**			**1.55**	**1.55**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** ***(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth[2]** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.57	0.64	**1.15**	**1.19**	**1.38**	**1.38**		
	% time period when C_R >1 (i.e. criterion exceeded)	**2.3**	**7.9**	**67.1**	**74.0**	**100.0**	**100.0**		
	Total number of exceedence episodes	**5**	**10**	**19**	**16**	**1**	**1**		
	Longest exceedence episode (in hours)	**18**	**42**	**408**	**462**	**1,824**	**1,824**		
	AVERAGE C_R during exceedence episodes	**1.09**	**1.09**	**1.39**	**1.38**	**1.38**	**1.38**		
	MAXIMUM C_R during time period	**1.20**	**1.26**	**1.61**	**1.61**	**1.61**	**1.61**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.52	0.52	0.56	0.59	0.65	0.65	0.69	0.69
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**0.3**	**1.0**	**6.6**	**6.6**	**12.5**	**12.5**
	Total number of exceedence episodes	0	0	**1**	**2**	**5**	**6**	**6**	**6**
	Longest exceedence episode (in hours)			**6**	**12**	**54**	**54**	**72**	**72**
	AVERAGE C_R during exceedence episodes			**1.19**	**1.22**	**1.13**	**1.14**	**1.13**	**1.13**
	MAXIMUM C_R during time period	0.60	0.72	**1.19**	**1.29**	**1.25**	**1.26**	**1.34**	**1.34**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.62	0.62	0.68	0.68		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**5.6**	**5.3**	**11.5**	**11.5**		
	Total number of exceedence episodes	0	0	**5**	**5**	**6**	**6**		
	Longest exceedence episode (in hours)			**48**	**48**	**60**	**60**		
	AVERAGE C_R during exceedence episodes			**1.13**	**1.14**	**1.12**	**1.12**		
	MAXIMUM C_R during time period	0.56	0.56	**1.35**	**1.35**	**1.24**	**1.24**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.53	0.53	0.61	0.61			0.63	0.64
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**3.0**	**3.3**			0.0	0.0
	Total number of exceedence episodes	0	0	**4**	**5**			0	0
	Longest exceedence episode (in hours)			**30**	**30**				
	AVERAGE C_R during exceedence episodes			**1.06**	**1.05**				
	MAXIMUM C_R during time period	0.82	0.82	**1.13**	**1.14**			0.80	0.95
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.52	0.58	0.58		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**1.6**	**1.6**		
	Total number of exceedence episodes	0	0	0	0	**3**	**3**		
	Longest exceedence episode (in hours)					**18**	**18**		
	AVERAGE C_R during exceedence episodes					**1.08**	**1.08**		
	MAXIMUM C_R during time period	0.56	0.56	0.64	0.64	**1.11**	**1.11**		

Notes: *(1)* *" C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.*
Thus an "exceedence episode" occurs when C_R > 1 .

(2) *This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.*

(3) *This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.*

(4) *Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.*

Table. 5.27C(c) Time-series impact analysis for levels of Conductivity , for time period of: Season 3 (Sep. 16 to Dec. 1).

Criterion = 400 umho / cm2 ; Length of time period (days)= 76 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.53	0.63	0.63		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**5.3**	**5.3**		
	Total number of exceedence episodes	0	0	0	0	**4**	**4**		
	Longest exceedence episode (in hours)					**24**	**24**		
	AVERAGE C_R during exceedence episodes					**1.07**	**1.07**		
	MAXIMUM C_R during time period	0.55	0.55	0.58	0.59	**1.12**	**1.12**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.53	0.53	0.72	0.72		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**15.8**	**15.8**		
	Total number of exceedence episodes	0	0	0	0	**5**	**5**		
	Longest exceedence episode (in hours)					**72**	**72**		
	AVERAGE C_R during exceedence episodes					**1.16**	**1.16**		
	MAXIMUM C_R during time period	0.54	0.54	0.60	0.65	**1.39**	**1.39**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.61	0.63	0.73	0.74			0.93	0.93
	% time period when C_R >1 (i.e. criterion exceeded)	**3.9**	**3.9**	**11.8**	**13.2**			**42.1**	**42.1**
	Total number of exceedence episodes	**3**	**3**	**6**	**5**			**13**	**13**
	Longest exceedence episode (in hours)	**24**	**24**	**96**	**96**			**120**	**120**
	AVERAGE C_R during exceedence episodes	**1.12**	**1.13**	**1.15**	**1.14**			**1.22**	**1.22**
	MAXIMUM C_R during time period	**1.19**	**1.19**	**1.29**	**1.30**			**1.46**	**1.46**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.57	0.64	**1.15**	**1.19**	**1.38**	**1.38**		
	% time period when C_R >1 (i.e. criterion exceeded)	**1.3**	**3.9**	**68.4**	**75.0**	**100.0**	**100.0**		
	Total number of exceedence episodes	**1**	**3**	**5**	**7**	**1**	**1**		
	Longest exceedence episode (in hours)	**24**	**24**	**456**	**456**	**1,824**	**1,824**		
	AVERAGE C_R during exceedence episodes	**1.06**	**1.04**	**1.36**	**1.36**	**1.38**	**1.38**		
	MAXIMUM C_R during time period	**1.06**	**1.04**	**1.60**	**1.60**	**1.60**	**1.60**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.52	0.52	0.56	0.59	0.65	0.65	0.69	0.69
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**6.6**	**7.9**	**10.5**	**10.5**
	Total number of exceedence episodes	0	0	0	0	**4**	**5**	**4**	**4**
	Longest exceedence episode (in hours)					**48**	**48**	**72**	**72**
	AVERAGE C_R during exceedence episodes					**1.11**	**1.09**	**1.13**	**1.13**
	MAXIMUM C_R during time period	0.58	0.63	0.85	0.98	**1.19**	**1.19**	**1.26**	**1.26**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.62	0.62	0.68	0.68		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**3.9**	**3.9**	**10.5**	**10.5**		
	Total number of exceedence episodes	0	0	**2**	**2**	**4**	**4**		
	Longest exceedence episode (in hours)			**48**	**48**	**72**	**72**		
	AVERAGE C_R during exceedence episodes			**1.14**	**1.14**	**1.11**	**1.11**		
	MAXIMUM C_R during time period	0.54	0.55	**1.18**	**1.19**	**1.18**	**1.18**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.53	0.53	0.61	0.61			0.63	0.64
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**1.3**	**1.3**			0.0	0.0
	Total number of exceedence episodes	0	0	**1**	**1**			0	0
	Longest exceedence episode (in hours)			**24**	**24**				
	AVERAGE C_R during exceedence episodes			**1.04**	**1.05**				
	MAXIMUM C_R during time period	0.66	0.66	**1.04**	**1.05**			0.80	0.80
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.52	0.58	0.58		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**1.3**	**1.3**		
	Total number of exceedence episodes	0	0	0	0	**1**	**1**		
	Longest exceedence episode (in hours)					**24**	**24**		
	AVERAGE C_R during exceedence episodes					**1.01**	**1.01**		
	MAXIMUM C_R during time period	0.55	0.55	0.61	0.62	**1.01**	**1.01**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.27N(a) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Season 3 (Sep. 16 to Dec. 1).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 76 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)* Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.13	0.13	0.18	0.18	0.41	0.41		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**11.1**	**11.1**		
Total number of exceedence episodes	0	0	0	0	**9**	**9**		
Longest exceedence episode (in hours)					**71**	**71**		
AVERAGE C_R during exceedence episodes					**1.50**	**1.50**		
MAXIMUM C_R during time period	0.33	0.33	0.86	0.93	**3.29**	**3.29**		
Transect 2: *(about 3.0 km North of Maitland River mouth)* Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.12	0.12	0.19	0.19	0.62	0.62		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**0.2**	**0.3**	**22.2**	**22.2**		
Total number of exceedence episodes	0	0	**3**	**4**	**14**	**14**		
Longest exceedence episode (in hours)			**2**	**2**	**101**	**101**		
AVERAGE C_R during exceedence episodes			**1.38**	**1.39**	**1.74**	**1.74**		
MAXIMUM C_R during time period	0.27	0.27	**1.49**	**1.58**	**3.89**	**3.90**		
Transect 3: *(about 0.9 km North of Maitland River mouth)* Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** [3] *(0.0)*	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.44	0.48	0.69	0.69			**1.04**	**1.04**
% time period when C_R >1 (i.e. criterion exceeded)	**10.7**	**13.0**	**22.6**	**22.5**			**40.7**	**40.8**
Total number of exceedence episodes	**16**	**21**	**25**	**25**			**25**	**24**
Longest exceedence episode (in hours)	**34**	**35**	**78**	**78**			**122**	**122**
AVERAGE C_R during exceedence episodes	**1.95**	**1.87**	**1.83**	**1.85**			**1.94**	**1.94**
MAXIMUM C_R during time period	**4.62**	**4.61**	**4.12**	**4.12**			**4.48**	**4.48**
Transect 4: *(about 0.1 km North of Maitland River mouth)* Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** [2] *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.33	0.50	**1.79**	**1.85**	**2.10**	**2.10**		
% time period when C_R >1 (i.e. criterion exceeded)	**5.7**	**15.3**	**65.4**	**69.5**	**85.9**	**85.9**		
Total number of exceedence episodes	**19**	**37**	**19**	**22**	**4**	**4**		
Longest exceedence episode (in hours)	**29**	**43**	**463**	**464**	**1,135**	**1,135**		
AVERAGE C_R during exceedence episodes	**1.96**	**1.73**	**2.55**	**2.50**	**2.33**	**2.33**		
MAXIMUM C_R during time period	**4.15**	**4.28**	**4.99**	**4.99**	**5.00**	**5.00**		
Transect 5: *(about 0.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.17	0.17	0.30	0.36	0.54	0.55	0.66	0.66
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**4.7**	**7.6**	**13.6**	**14.8**	**20.6**	**20.7**
Total number of exceedence episodes	0	0	**19**	**24**	**13**	**17**	**10**	**10**
Longest exceedence episode (in hours)			**9**	**24**	**71**	**71**	**103**	**103**
AVERAGE C_R during exceedence episodes			**1.78**	**1.72**	**1.97**	**1.92**	**1.93**	**1.93**
MAXIMUM C_R during time period	0.65	0.94	**4.02**	**4.11**	**3.58**	**3.59**	**3.27**	**3.27**
Transect 6: *(about 2.1 km South of Maitland River mouth)* Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.13	0.13	0.48	0.48	0.64	0.64		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**10.6**	**10.7**	**19.3**	**19.3**		
Total number of exceedence episodes	0	0	**11**	**12**	**10**	**10**		
Longest exceedence episode (in hours)			**64**	**65**	**102**	**102**		
AVERAGE C_R during exceedence episodes			**2.11**	**2.10**	**1.91**	**1.91**		
MAXIMUM C_R during time period	0.33	0.33	**3.76**	**3.77**	**3.09**	**3.09**		
Transect 7: *(about 3.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542** [4]	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.20	0.20	0.43	0.43			0.49	0.51
% time period when C_R >1 (i.e. criterion exceeded)	**0.7**	**0.8**	**10.5**	**11.0**			**6.3**	**7.6**
Total number of exceedence episodes	**6**	**6**	**11**	**9**			**1**	**2**
Longest exceedence episode (in hours)	**4**	**4**	**51**	**51**			**115**	**118**
AVERAGE C_R during exceedence episodes	**1.58**	**1.56**	**1.76**	**1.74**			**1.09**	**1.13**
MAXIMUM C_R during time period	**2.37**	**2.42**	**3.19**	**3.16**			**1.11**	**1.56**
Transect 8: *(about 6.0 km South of Maitland River mouth)* Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.13	0.13	0.17	0.17	0.33	0.33		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	**0.1**	**5.5**	**5.5**		
Total number of exceedence episodes	0	0	0	**1**	**6**	**6**		
Longest exceedence episode (in hours)				**1**	**33**	**33**		
AVERAGE C_R during exceedence episodes				**1.01**	**1.57**	**1.57**		
MAXIMUM C_R during time period	0.30	0.30	0.78	**1.01**	**2.19**	**2.19**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.27N(b) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Season 3 (Sep. 16 to Dec. 1).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 76 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)* Station *(km offshore)*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.13	0.13	0.18	0.18	0.41	0.41		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**11.2**	**11.2**		
Total number of exceedence episodes	0	0	0	0	**7**	**7**		
Longest exceedence episode (in hours)					**72**	**72**		
AVERAGE C_R during exceedence episodes					**1.48**	**1.48**		
MAXIMUM C_R during time period	0.32	0.32	0.51	0.51	**3.12**	**3.13**		
Transect 2: *(about 3.0 km North of Maitland River mouth)* Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.12	0.12	0.19	0.19	0.62	0.62		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**22.7**	**22.7**		
Total number of exceedence episodes	0	0	0	0	**10**	**10**		
Longest exceedence episode (in hours)					**102**	**102**		
AVERAGE C_R during exceedence episodes					**1.71**	**1.71**		
MAXIMUM C_R during time period	0.26	0.26	0.65	0.73	**3.58**	**3.58**		
Transect 3: *(about 0.9 km North of Maitland River mouth)* Station *(km offshore)*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.44	0.48	0.69	0.69			**1.04**	**1.04**
% time period when C_R >1 (i.e. criterion exceeded)	**10.2**	**12.8**	**24.0**	**24.0**			**41.8**	**41.8**
Total number of exceedence episodes	**9**	**11**	**17**	**17**			**21**	**21**
Longest exceedence episode (in hours)	**36**	**72**	**114**	**114**			**120**	**120**
AVERAGE C_R during exceedence episodes	**1.94**	**1.83**	**1.75**	**1.77**			**1.90**	**1.90**
MAXIMUM C_R during time period	**4.02**	**4.23**	**3.62**	**3.65**			**4.33**	**4.33**
Transect 4: *(about 0.1 km North of Maitland River mouth)* Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.33	0.50	**1.79**	**1.85**	**2.09**	**2.09**		
% time period when C_R >1 (i.e. criterion exceeded)	**6.9**	**16.8**	**65.8**	**70.4**	**85.5**	**85.5**		
Total number of exceedence episodes	**10**	**15**	**13**	**13**	**2**	**2**		
Longest exceedence episode (in hours)	**30**	**48**	**462**	**462**	**1,134**	**1,134**		
AVERAGE C_R during exceedence episodes	**1.56**	**1.53**	**2.53**	**2.47**	**2.34**	**2.34**		
MAXIMUM C_R during time period	**2.56**	**2.80**	**4.97**	**4.97**	**4.97**	**4.97**		
Transect 5: *(about 0.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.17	0.17	0.30	0.36	0.54	0.55	0.66	0.66
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**5.6**	**7.6**	**13.2**	**15.5**	**21.1**	**21.1**
Total number of exceedence episodes	0	0	**11**	**13**	**7**	**9**	**9**	**9**
Longest exceedence episode (in hours)			**18**	**24**	**72**	**84**	**108**	**108**
AVERAGE C_R during exceedence episodes			**1.43**	**1.55**	**1.98**	**1.86**	**1.90**	**1.90**
MAXIMUM C_R during time period	0.46	0.59	**2.99**	**3.42**	**3.01**	**3.02**	**3.24**	**3.24**
Transect 6: *(about 2.1 km South of Maitland River mouth)* Station *(km offshore)*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.13	0.13	0.48	0.48	0.64	0.64		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**11.5**	**11.5**	**19.7**	**19.7**		
Total number of exceedence episodes	0	0	**6**	**7**	**8**	**8**		
Longest exceedence episode (in hours)			**72**	**72**	**102**	**102**		
AVERAGE C_R during exceedence episodes			**1.99**	**1.99**	**1.88**	**1.88**		
MAXIMUM C_R during time period	0.31	0.31	**3.69**	**3.70**	**3.03**	**3.03**		
Transect 7: *(about 3.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.20	0.20	0.43	0.43			0.49	0.51
% time period when C_R >1 (i.e. criterion exceeded)	**0.7**	**0.7**	**11.5**	**12.2**			**6.3**	**7.2**
Total number of exceedence episodes	**2**	**2**	**6**	**6**			**1**	**2**
Longest exceedence episode (in hours)	**6**	**6**	**90**	**90**			**114**	**114**
AVERAGE C_R during exceedence episodes	**1.20**	**1.22**	**1.66**	**1.63**			**1.09**	**1.13**
MAXIMUM C_R during time period	**1.38**	**1.41**	**2.73**	**2.76**			**1.11**	**1.50**
Transect 8: *(about 6.0 km South of Maitland River mouth)* Station *(km offshore)*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.13	0.13	0.17	0.17	0.33	0.33		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**5.3**	**5.3**		
Total number of exceedence episodes	0	0	0	0	**5**	**5**		
Longest exceedence episode (in hours)					**36**	**36**		
AVERAGE C_R during exceedence episodes					**1.56**	**1.56**		
MAXIMUM C_R during time period	0.30	0.30	0.60	0.62	**2.14**	**2.14**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value. Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.27N(c) Time-series impact analysis for levels of NO2 + NO3 , for time period of: Season 3 (Sep. 16 to Dec. 1).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 76 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 528 *(4.9)***		**Station 529 *(2.0)***		**Wright Pt. *(0.0)***			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.13	0.13	0.18	0.18	0.41	0.41		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**11.8**	**11.8**		
	Total number of exceedence episodes	0	0	0	0	**5**	**5**		
	Longest exceedence episode (in hours)					**72**	**72**		
	AVERAGE C_R during exceedence episodes					**1.38**	**1.38**		
	MAXIMUM C_R during time period	0.26	0.26	0.38	0.38	**2.18**	**2.19**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Offshore ADCP*(6.7)***		**Station 532 *(2.2)***		**Sunset Beach *(0.0)***			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.12	0.19	0.19	0.62	0.62		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**21.1**	**21.1**		
	Total number of exceedence episodes	0	0	0	0	**5**	**5**		
	Longest exceedence episode (in hours)					**120**	**120**		
	AVERAGE C_R during exceedence episodes					**1.66**	**1.66**		
	MAXIMUM C_R during time period	0.24	0.24	0.45	0.52	**3.25**	**3.25**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 535 *(0.9)***		**Station 538 *(0.2)***				**200 m North of mouth[3] *(0.0)***	
		Surface	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.44	0.48	0.69	0.69			**1.04**	**1.04**
	% time period when C_R >1 (i.e. criterion exceeded)	**10.5**	**11.8**	**22.4**	**22.4**			**40.8**	**42.1**
	Total number of exceedence episodes	**7**	**6**	**6**	**6**			**11**	**10**
	Longest exceedence episode (in hours)	**48**	**72**	**120**	**120**			**120**	**168**
	AVERAGE C_R during exceedence episodes	**1.69**	**1.64**	**1.73**	**1.74**			**1.85**	**1.82**
	MAXIMUM C_R during time period	**2.71**	**2.92**	**3.31**	**3.32**			**3.93**	**3.93**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Nearshore ADCP*(1.2)***		**Station 539 *(0.3)***		**Mait. River mouth[2]*(0.0)***			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.33	0.50	**1.79**	**1.85**	**2.09**	**2.09**		
	% time period when C_R >1 (i.e. criterion exceeded)	**2.6**	**17.1**	**68.4**	**72.4**	**85.5**	**85.5**		
	Total number of exceedence episodes	**2**	**5**	**5**	**6**	**2**	**2**		
	Longest exceedence episode (in hours)	**24**	**96**	**456**	**456**	**1,128**	**1,128**		
	AVERAGE C_R during exceedence episodes	**1.92**	**1.34**	**2.44**	**2.40**	**2.34**	**2.34**		
	MAXIMUM C_R during time period	**2.04**	**2.12**	**4.90**	**4.91**	**4.90**	**4.90**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 537 *(2.9)***		**Station 541 *(1.3)***		**Station 543 *(0.4)***		**St. Christopher Beach (0.0)**	
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.17	0.17	0.30	0.36	0.54	0.55	0.66	0.66
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**2.6**	**3.9**	**13.2**	**11.8**	**22.4**	**22.4**
	Total number of exceedence episodes	0	0	**1**	**2**	**4**	**5**	**7**	**7**
	Longest exceedence episode (in hours)			**48**	**48**	**120**	**72**	**120**	**120**
	AVERAGE C_R during exceedence episodes			**1.36**	**1.62**	**1.88**	**2.00**	**1.79**	**1.79**
	MAXIMUM C_R during time period	0.39	0.39	**1.49**	**2.08**	**2.75**	**2.77**	**2.99**	**2.99**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 540 *(5.2)***		**Station 544 *(0.5)***		**The Cove Beach *(0.0)***			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.13	0.13	0.48	0.48	0.64	0.64		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**10.5**	**10.5**	**19.7**	**19.7**		
	Total number of exceedence episodes	0	0	**3**	**3**	**8**	**8**		
	Longest exceedence episode (in hours)			**96**	**96**	**96**	**96**		
	AVERAGE C_R during exceedence episodes			**1.94**	**1.93**	**1.84**	**1.84**		
	MAXIMUM C_R during time period	0.25	0.25	**2.96**	**2.97**	**2.72**	**2.73**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 545 *(2.1)***		**Station 546 *(0.3)***				**Station 542[4]**	
		Surface	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.20	0.20	0.43	0.43			0.49	0.51
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**11.8**	**11.8**			**5.3**	**7.9**
	Total number of exceedence episodes	0	0	**5**	**5**			**1**	**2**
	Longest exceedence episode (in hours)			**96**	**96**			**96**	**120**
	AVERAGE C_R during exceedence episodes			**1.61**	**1.62**			**1.10**	**1.07**
	MAXIMUM C_R during time period	0.70	0.71	**2.27**	**2.28**			**1.10**	**1.10**
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)* *water-column location*	**Station 550 *(5.3)***		**Station 549 *(2.5)***		**Black's Pt. Beach *(0.0)***			
		Surface	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.13	0.13	0.17	0.17	0.33	0.33		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**5.3**	**5.3**		
	Total number of exceedence episodes	0	0	0	0	**3**	**3**		
	Longest exceedence episode (in hours)					**48**	**48**		
	AVERAGE C_R during exceedence episodes					**1.33**	**1.33**		
	MAXIMUM C_R during time period	0.26	0.26	0.51	0.52	**2.01**	**2.01**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.28C(a) Time-series impact analysis for levels of Conductivity , for time period of: All seasons (March 16 to Dec. 1).

Criterion = 400 umho / cm2 ; Length of time period (days)= 260 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.52	0.57	0.57		
	% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**2.1**	**2.1**		
	Total number of exceedence episodes	0	0	0	0	**13**	**13**		
	Longest exceedence episode (in hours)					**28**	**28**		
	AVERAGE C_R during exceedence episodes					**1.11**	**1.11**		
	MAXIMUM C_R during time period	0.62	0.60	0.98	0.98	**1.40**	**1.40**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.50	0.50	0.52	0.52	0.64	0.64		
	% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**8.1**	**8.1**		
	Total number of exceedence episodes	0	0	**2**	0	**35**	**35**		
	Longest exceedence episode (in hours)			**1**		**61**	**61**		
	AVERAGE C_R during exceedence episodes			**1.01**		**1.16**	**1.16**		
	MAXIMUM C_R during time period	0.57	0.56	**1.03**	0.96	**1.49**	**1.49**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth[3]** ***(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.59	0.57	0.68	0.65			0.82	0.77
	% time period when $C_R > 1$ (i.e. criterion exceeded)	**3.2**	**2.6**	**8.7**	**7.2**			**26.1**	**21.0**
	Total number of exceedence episodes	**39**	**28**	**66**	**53**			**116**	**67**
	Longest exceedence episode (in hours)	**21**	**20**	**66**	**46**			**100**	**100**
	AVERAGE C_R during exceedence episodes	**1.13**	**1.13**	**1.15**	**1.16**			**1.21**	**1.23**
	MAXIMUM C_R during time period	**1.56**	**1.55**	**1.47**	**1.47**			**1.55**	**1.55**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.58	0.57	**1.07**	0.95	**1.30**	**1.30**		
	% time period when $C_R > 1$ (i.e. criterion exceeded)	**3.0**	**3.3**	**62.8**	**49.4**	**100.0**	**100.0**		
	Total number of exceedence episodes	**54**	**43**	**111**	**74**	**1**	**1**		
	Longest exceedence episode (in hours)	**24**	**22**	**512**	**516**	**6,240**	**6,240**		
	AVERAGE C_R during exceedence episodes	**1.11**	**1.11**	**1.30**	**1.32**	**1.30**	**1.30**		
	MAXIMUM C_R during time period	**1.48**	**1.52**	**1.61**	**1.61**	**1.61**	**1.61**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.52	0.52	0.56	0.55	0.61	0.60	0.64	0.64
	% time period when $C_R > 1$ (i.e. criterion exceeded)	**0.1**	**0.1**	**1.1**	**0.7**	**3.5**	**3.4**	**8.4**	**8.3**
	Total number of exceedence episodes	**1**	**1**	**30**	**18**	**26**	**23**	**20**	**20**
	Longest exceedence episode (in hours)	**5**	**6**	**9**	**9**	**52**	**52**	**76**	**76**
	AVERAGE C_R during exceedence episodes	**1.05**	**1.05**	**1.12**	**1.14**	**1.11**	**1.12**	**1.10**	**1.10**
	MAXIMUM C_R during time period	**1.06**	**1.07**	**1.41**	**1.44**	**1.33**	**1.34**	**1.35**	**1.35**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.59	0.58	0.63	0.63		
	% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	**2.2**	**2.0**	**8.1**	**8.1**		
	Total number of exceedence episodes	0	0	**21**	**21**	**16**	**16**		
	Longest exceedence episode (in hours)			**41**	**40**	**73**	**73**		
	AVERAGE C_R during exceedence episodes			**1.13**	**1.14**	**1.10**	**1.10**		
	MAXIMUM C_R during time period	0.62	0.59	**1.36**	**1.36**	**1.26**	**1.26**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.53	0.53	0.58	0.58			0.60	0.60
	% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	**2.0**	**1.7**			0.0	**0.1**
	Total number of exceedence episodes	**2**	**2**	**19**	**18**			0	**4**
	Longest exceedence episode (in hours)	**1**	**1**	**32**	**31**				**3**
	AVERAGE C_R during exceedence episodes	**1.04**	**1.06**	**1.07**	**1.07**				**1.01**
	MAXIMUM C_R during time period	**1.06**	**1.07**	**1.23**	**1.23**			0.92	**1.01**
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.52	0.58	0.58		
	% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**2.7**	**2.7**		
	Total number of exceedence episodes	0	0	0	0	**12**	**12**		
	Longest exceedence episode (in hours)					**60**	**60**		
	AVERAGE C_R during exceedence episodes					**1.05**	**1.05**		
	MAXIMUM C_R during time period	0.60	0.57	0.67	0.73	**1.12**	**1.12**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when $C_R > 1$.

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.28C(b) Time-series impact analysis for levels of Conductivity , for time period of: All seasons (March 16 to Dec. 1).

Criterion = 400 umho / cm2 ; Length of time period (days)= 260 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)* Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.52	0.57	0.57		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**2.2**	**2.2**		
Total number of exceedence episodes	0	0	0	0	**11**	**11**		
Longest exceedence episode (in hours)					**30**	**30**		
AVERAGE C_R during exceedence episodes					**1.10**	**1.10**		
MAXIMUM C_R during time period	0.61	0.58	0.86	0.85	**1.35**	**1.35**		
Transect 2: *(about 3.0 km North of Maitland River mouth)* Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.50	0.50	0.52	0.52	0.64	0.64		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**7.9**	**7.9**		
Total number of exceedence episodes	0	0	0	0	**23**	**23**		
Longest exceedence episode (in hours)					**66**	**66**		
AVERAGE C_R during exceedence episodes					**1.16**	**1.16**		
MAXIMUM C_R during time period	0.57	0.55	0.93	0.91	**1.47**	**1.47**		
Transect 3: *(about 0.9 km North of Maitland River mouth)* Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth[3]** ***(0.0)***	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.59	0.57	0.68	0.65			0.82	0.77
% time period when C_R >1 (i.e. criterion exceeded)	**2.7**	**2.0**	**8.4**	**7.1**			**25.4**	**20.7**
Total number of exceedence episodes	**13**	**8**	**33**	**23**			**59**	**44**
Longest exceedence episode (in hours)	**30**	**30**	**66**	**66**			**114**	**114**
AVERAGE C_R during exceedence episodes	**1.12**	**1.14**	**1.13**	**1.14**			**1.20**	**1.22**
MAXIMUM C_R during time period	**1.43**	**1.48**	**1.42**	**1.41**			**1.55**	**1.55**
Transect 4: *(about 0.1 km North of Maitland River mouth)* Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth[2]** ***(0.0)***			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.58	0.57	**1.07**	0.95	**1.30**	**1.30**		
% time period when C_R >1 (i.e. criterion exceeded)	**2.2**	**2.5**	**63.2**	**49.6**	**100.0**	**100.0**		
Total number of exceedence episodes	**15**	**12**	**54**	**41**	**1**	**1**		
Longest exceedence episode (in hours)	**36**	**42**	**534**	**534**	**6,240**	**6,240**		
AVERAGE C_R during exceedence episodes	**1.07**	**1.09**	**1.29**	**1.31**	**1.30**	**1.30**		
MAXIMUM C_R during time period	**1.21**	**1.26**	**1.61**	**1.61**	**1.61**	**1.61**		
Transect 5: *(about 0.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.52	0.52	0.56	0.55	0.61	0.60	0.64	0.64
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**0.4**	**0.3**	**3.1**	**2.8**	**8.5**	**8.4**
Total number of exceedence episodes	0	0	**4**	**2**	**12**	**11**	**14**	**14**
Longest exceedence episode (in hours)			**6**	**12**	**54**	**54**	**102**	**102**
AVERAGE C_R during exceedence episodes			**1.11**	**1.22**	**1.12**	**1.13**	**1.10**	**1.10**
MAXIMUM C_R during time period	0.98	0.99	**1.20**	**1.29**	**1.29**	**1.30**	**1.34**	**1.34**
Transect 6: *(about 2.1 km South of Maitland River mouth)* Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.51	0.51	0.59	0.58	0.63	0.63		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**2.0**	**1.8**	**7.8**	**7.8**		
Total number of exceedence episodes	0	0	**8**	**8**	**13**	**13**		
Longest exceedence episode (in hours)			**48**	**48**	**72**	**72**		
AVERAGE C_R during exceedence episodes			**1.12**	**1.13**	**1.10**	**1.10**		
MAXIMUM C_R during time period	0.61	0.58	**1.35**	**1.35**	**1.25**	**1.25**		
Transect 7: *(about 3.8 km South of Maitland River mouth)* Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542[4]**	
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
AVERAGE C_R [1] during time period	0.53	0.53	0.58	0.58			0.60	0.60
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**1.6**	**1.3**			0.0	0.0
Total number of exceedence episodes	0	0	**7**	**7**			0	0
Longest exceedence episode (in hours)			**30**	**30**				
AVERAGE C_R during exceedence episodes			**1.07**	**1.07**				
MAXIMUM C_R during time period	0.82	0.82	**1.16**	**1.17**			0.92	1.00
Transect 8: *(about 6.0 km South of Maitland River mouth)* Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
AVERAGE C_R [1] during time period	0.51	0.51	0.52	0.52	0.58	0.58		
% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**2.3**	**2.3**		
Total number of exceedence episodes	0	0	0	0	**8**	**8**		
Longest exceedence episode (in hours)					**60**	**60**		
AVERAGE C_R during exceedence episodes					**1.05**	**1.05**		
MAXIMUM C_R during time period	0.59	0.57	0.64	0.64	**1.11**	**1.11**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.28C(c) Time-series impact analysis for levels of Conductivity , for time period of: All seasons (March 16 to Dec. 1).

Criterion = 400 umho / cm2 ; Length of time period (days)= 260 ; Data-averaging length (hours) = 24

Transect 1:	(about 6.0 km North of Maitland River mouth)	Station (km offshore)	Station 528 (4.9)		Station 529 (2.0)		Wright Pt. (0.0)			
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom		
	AVERAGE C_R[1] during time period		0.51	0.51	0.52	0.52	0.57	0.57		
	% time period when C_R>1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	1.5	1.5		
	Total number of exceedence episodes		0	0	0	0	4	4		
	Longest exceedence episode (in hours)						24	24		
	AVERAGE C_R during exceedence episodes						1.07	1.07		
	MAXIMUM C_R during time period		0.57	0.57	0.69	0.70	1.12	1.12		
Transect 2:	(about 3.0 km North of Maitland River mouth)	Station (km offshore)	Offshore ADCP(6.7)		Station 532 (2.2)		Sunset Beach (0.0)			
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom		
	AVERAGE C_R[1] during time period		0.50	0.50	0.52	0.52	0.64	0.64		
	% time period when C_R>1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	5.8	5.8		
	Total number of exceedence episodes		0	0	0	0	8	8		
	Longest exceedence episode (in hours)						72	72		
	AVERAGE C_R during exceedence episodes						1.15	1.15		
	MAXIMUM C_R during time period		0.55	0.54	0.82	0.68	1.39	1.39		
Transect 3:	(about 0.9 km North of Maitland River mouth)	Station (km offshore)	Station 535 (0.9)		Station 538 (0.2)				200 m North of mouth[3] (0.0)	
		water-column location	Surface	Bottom	Surface	Bottom			Surface	Bottom
	AVERAGE C_R[1] during time period		0.59	0.57	0.68	0.65			0.82	0.77
	% time period when C_R>1 (i.e. criterion exceeded)		1.2	1.2	5.8	6.2			24.2	20.0
	Total number of exceedence episodes		3	3	9	8			32	26
	Longest exceedence episode (in hours)		24	24	96	96			120	120
	AVERAGE C_R during exceedence episodes		1.12	1.13	1.13	1.12			1.17	1.18
	MAXIMUM C_R during time period		1.19	1.19	1.29	1.30			1.46	1.46
Transect 4:	(about 0.1 km North of Maitland River mouth)	Station (km offshore)	Nearshore ADCP(1.2)		Station 539 (0.3)		Mait. River mouth[2](0.0)			
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom		
	AVERAGE C_R[1] during time period		0.58	0.57	1.07	0.95	1.30	1.30		
	% time period when C_R>1 (i.e. criterion exceeded)		1.5	1.2	62.3	48.1	100.0	100.0		
	Total number of exceedence episodes		3	3	20	14	1	1		
	Longest exceedence episode (in hours)		48	24	528	984	6,240	6,240		
	AVERAGE C_R during exceedence episodes		1.04	1.04	1.28	1.30	1.30	1.30		
	MAXIMUM C_R during time period		1.07	1.04	1.60	1.60	1.60	1.60		
Transect 5:	(about 0.8 km South of Maitland River mouth)	Station (km offshore)	Station 537 (2.9)		Station 541 (1.3)		Station 543 (0.4)		St. Christopher Beach (0.0)	
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom	Surface	Bottom
	AVERAGE C_R[1] during time period		0.52	0.52	0.56	0.55	0.61	0.60	0.64	0.64
	% time period when C_R>1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	3.1	3.1	7.3	7.3
	Total number of exceedence episodes		0	0	0	0	6	7	10	10
	Longest exceedence episode (in hours)						48	48	96	96
	AVERAGE C_R during exceedence episodes						1.09	1.08	1.10	1.10
	MAXIMUM C_R during time period		0.75	0.75	0.92	0.98	1.19	1.19	1.26	1.26
Transect 6:	(about 2.1 km South of Maitland River mouth)	Station (km offshore)	Station 540 (5.2)		Station 544 (0.5)		The Cove Beach (0.0)			
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom		
	AVERAGE C_R[1] during time period		0.51	0.51	0.59	0.58	0.63	0.63		
	% time period when C_R>1 (i.e. criterion exceeded)		0.0	0.0	1.2	1.2	6.9	6.9		
	Total number of exceedence episodes		0	0	2	2	11	11		
	Longest exceedence episode (in hours)				48	48	72	72		
	AVERAGE C_R during exceedence episodes				1.14	1.14	1.09	1.09		
	MAXIMUM C_R during time period		0.57	0.56	1.18	1.19	1.24	1.24		
Transect 7:	(about 3.8 km South of Maitland River mouth)	Station (km offshore)	Station 545 (2.1)		Station 546 (0.3)				Station 542[4]	
		water-column location	Surface	Bottom	Surface	Bottom			Surface	Bottom
	AVERAGE C_R[1] during time period		0.53	0.53	0.58	0.58			0.60	0.60
	% time period when C_R>1 (i.e. criterion exceeded)		0.0	0.0	0.8	0.4			0.0	0.0
	Total number of exceedence episodes		0	0	2	1			0	0
	Longest exceedence episode (in hours)				24	24				
	AVERAGE C_R during exceedence episodes				1.09	1.05				
	MAXIMUM C_R during time period		0.75	0.76	1.13	1.05			0.91	0.93
Transect 8:	(about 6.0 km South of Maitland River mouth)	Station (km offshore)	Station 550 (5.3)		Station 549 (2.5)		Black's Pt. Beach (0.0)			
		water-column location	Surface	Bottom	Surface	Bottom	Surface	Bottom		
	AVERAGE C_R[1] during time period		0.51	0.51	0.52	0.52	0.58	0.58		
	% time period when C_R>1 (i.e. criterion exceeded)		0.0	0.0	0.0	0.0	1.9	1.9		
	Total number of exceedence episodes		0	0	0	0	4	4		
	Longest exceedence episode (in hours)						48	48		
	AVERAGE C_R during exceedence episodes						1.02	1.02		
	MAXIMUM C_R during time period		0.57	0.56	0.63	0.63	1.07	1.07		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.28N(a) Time-series impact analysis for levels of NO2 + NO3 , for time period of: All seasons (March 16 to Dec. 1).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 260 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.12	0.12	0.15	0.15	0.27	0.27		
	% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	**0.3**	**0.3**	**6.1**	**6.1**		
	Total number of exceedence episodes	0	0	**4**	**4**	**14**	**14**		
	Longest exceedence episode (in hours)			**9**	**9**	**90**	**90**		
	AVERAGE C_R during exceedence episodes			**1.61**	**1.61**	**1.47**	**1.47**		
	MAXIMUM C_R during time period	0.52	0.49	**2.27**	**2.25**	**3.29**	**3.29**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.11	0.11	0.17	0.16	0.40	0.40		
	% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	**0.8**	**0.4**	**11.8**	**11.8**		
	Total number of exceedence episodes	0	0	**9**	**9**	**22**	**22**		
	Longest exceedence episode (in hours)			**25**	**8**	**153**	**153**		
	AVERAGE C_R during exceedence episodes			**1.48**	**1.52**	**1.69**	**1.69**		
	MAXIMUM C_R during time period	0.35	0.33	**2.12**	**2.12**	**3.89**	**3.90**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.35	0.31	0.49	0.45			0.70	0.64
	% time period when $C_R > 1$ (i.e. criterion exceeded)	**7.9**	**7.2**	**14.4**	**13.0**			**23.9**	**21.6**
	Total number of exceedence episodes	**46**	**40**	**53**	**39**			**75**	**52**
	Longest exceedence episode (in hours)	**80**	**80**	**150**	**149**			**137**	**138**
	AVERAGE C_R during exceedence episodes	**1.76**	**1.77**	**1.67**	**1.73**			**1.73**	**1.79**
	MAXIMUM C_R during time period	**4.62**	**4.61**	**4.12**	**4.12**			**4.48**	**4.48**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** *(0.3)*		**Mait. River mouth[2]*(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.33	0.30	**1.37**	**1.23**	**1.60**	**1.60**		
	% time period when $C_R > 1$ (i.e. criterion exceeded)	**7.0**	**7.0**	**53.4**	**45.9**	**66.2**	**66.2**		
	Total number of exceedence episodes	**67**	**64**	**59**	**50**	**32**	**32**		
	Longest exceedence episode (in hours)	**52**	**43**	**884**	**825**	**1,135**	**1,135**		
	AVERAGE C_R during exceedence episodes	**1.78**	**1.75**	**2.22**	**2.36**	**2.10**	**2.10**		
	MAXIMUM C_R during time period	**4.15**	**4.28**	**4.99**	**4.99**	**5.00**	**5.00**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.16	0.16	0.28	0.25	0.40	0.38	0.48	0.48
	% time period when $C_R > 1$ (i.e. criterion exceeded)	**0.8**	**0.8**	**4.6**	**3.7**	**9.5**	**9.7**	**15.1**	**14.9**
	Total number of exceedence episodes	**4**	**3**	**52**	**38**	**30**	**32**	**19**	**20**
	Longest exceedence episode (in hours)	**31**	**31**	**40**	**40**	**75**	**72**	**263**	**261**
	AVERAGE C_R during exceedence episodes	**1.73**	**1.72**	**1.70**	**1.74**	**1.76**	**1.74**	**1.76**	**1.76**
	MAXIMUM C_R during time period	**2.34**	**2.35**	**4.02**	**4.11**	**3.58**	**3.59**	**3.27**	**3.27**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.12	0.12	0.35	0.33	0.46	0.46		
	% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	**7.9**	**7.4**	**13.7**	**13.7**		
	Total number of exceedence episodes	0	0	**27**	**26**	**18**	**18**		
	Longest exceedence episode (in hours)			**77**	**77**	**148**	**148**		
	AVERAGE C_R during exceedence episodes			**1.73**	**1.73**	**1.77**	**1.77**		
	MAXIMUM C_R during time period	0.49	0.43	**3.76**	**3.77**	**3.09**	**3.09**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.19	0.18	0.33	0.32			0.36	0.36
	% time period when $C_R > 1$ (i.e. criterion exceeded)	**0.8**	**0.8**	**7.5**	**7.3**			**6.4**	**7.1**
	Total number of exceedence episodes	**9**	**8**	**19**	**17**			**3**	**7**
	Longest exceedence episode (in hours)	**32**	**32**	**74**	**74**			**280**	**265**
	AVERAGE C_R during exceedence episodes	**1.40**	**1.42**	**1.64**	**1.62**			**1.16**	**1.20**
	MAXIMUM C_R during time period	**2.37**	**2.42**	**3.19**	**3.16**			**1.24**	**1.75**
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.12	0.12	0.16	0.15	0.31	0.31		
	% time period when $C_R > 1$ (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**6.5**	**6.5**		
	Total number of exceedence episodes	0	0	0	**1**	**18**	**19**		
	Longest exceedence episode (in hours)				**1**	**74**	**74**		
	AVERAGE C_R during exceedence episodes				**1.01**	**1.53**	**1.53**		
	MAXIMUM C_R during time period	0.41	0.36	0.78	**1.01**	**2.21**	**2.21**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when $C_R > 1$.

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.28N(b) Time-series impact analysis for levels of NO2 + NO3 , for time period of: All seasons (March 16 to Dec. 1).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 260 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.12	0.15	0.15	0.27	0.27		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**0.4**	**0.4**	**6.3**	**6.3**		
	Total number of exceedence episodes	0	0	**3**	**3**	**12**	**12**		
	Longest exceedence episode (in hours)			**12**	**12**	**96**	**96**		
	AVERAGE C_R during exceedence episodes			**1.33**	**1.34**	**1.44**	**1.44**		
	MAXIMUM C_R during time period	0.48	0.42	**1.64**	**1.58**	**3.12**	**3.13**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** ***(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.11	0.11	0.17	0.16	0.40	0.40		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**0.7**	**0.3**	**11.8**	**11.8**		
	Total number of exceedence episodes	0	0	**4**	**3**	**17**	**17**		
	Longest exceedence episode (in hours)			**24**	**6**	**150**	**150**		
	AVERAGE C_R during exceedence episodes			**1.44**	**1.41**	**1.68**	**1.68**		
	MAXIMUM C_R during time period	0.33	0.29	**1.90**	**1.90**	**3.58**	**3.58**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth[3]** ***(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.35	0.31	0.49	0.45			0.70	0.64
	% time period when C_R >1 (i.e. criterion exceeded)	**7.7**	**7.5**	**14.7**	**13.7**			**24.2**	**21.8**
	Total number of exceedence episodes	**23**	**19**	**36**	**26**			**52**	**42**
	Longest exceedence episode (in hours)	**126**	**126**	**150**	**150**			**168**	**168**
	AVERAGE C_R during exceedence episodes	**1.74**	**1.70**	**1.64**	**1.67**			**1.71**	**1.76**
	MAXIMUM C_R during time period	**4.02**	**4.23**	**3.62**	**3.65**			**4.33**	**4.33**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** ***(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth[2]** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.33	0.30	**1.37**	**1.23**	**1.60**	**1.60**		
	% time period when C_R >1 (i.e. criterion exceeded)	**7.2**	**7.7**	**53.1**	**46.3**	**66.3**	**66.3**		
	Total number of exceedence episodes	**29**	**26**	**29**	**31**	**11**	**11**		
	Longest exceedence episode (in hours)	**54**	**48**	**882**	**942**	**1,134**	**1,134**		
	AVERAGE C_R during exceedence episodes	**1.62**	**1.57**	**2.22**	**2.34**	**2.09**	**2.09**		
	MAXIMUM C_R during time period	**2.56**	**2.80**	**4.97**	**4.97**	**4.97**	**4.97**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.16	0.16	0.28	0.25	0.40	0.38	0.48	0.48
	% time period when C_R >1 (i.e. criterion exceeded)	**0.7**	**0.7**	**4.8**	**3.9**	**9.7**	**10.0**	**15.2**	**15.2**
	Total number of exceedence episodes	**2**	**2**	**24**	**19**	**16**	**19**	**15**	**15**
	Longest exceedence episode (in hours)	**30**	**30**	**48**	**54**	**90**	**84**	**264**	**264**
	AVERAGE C_R during exceedence episodes	**1.70**	**1.72**	**1.50**	**1.54**	**1.72**	**1.69**	**1.75**	**1.74**
	MAXIMUM C_R during time period	**1.94**	**2.00**	**2.99**	**3.42**	**3.01**	**3.02**	**3.24**	**3.24**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.12	0.35	0.33	0.46	0.46		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**8.2**	**7.8**	**13.8**	**13.8**		
	Total number of exceedence episodes	0	0	**14**	**15**	**13**	**13**		
	Longest exceedence episode (in hours)			**84**	**84**	**264**	**264**		
	AVERAGE C_R during exceedence episodes			**1.68**	**1.67**	**1.75**	**1.75**		
	MAXIMUM C_R during time period	0.44	0.43	**3.69**	**3.70**	**3.03**	**3.03**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R [1] during time period	0.19	0.18	0.33	0.32			0.36	0.36
	% time period when C_R >1 (i.e. criterion exceeded)	**0.7**	**0.8**	**7.9**	**7.8**			**6.3**	**6.8**
	Total number of exceedence episodes	**3**	**3**	**12**	**12**			**2**	**6**
	Longest exceedence episode (in hours)	**30**	**36**	**126**	**120**			**282**	**264**
	AVERAGE C_R during exceedence episodes	**1.29**	**1.27**	**1.58**	**1.56**			**1.16**	**1.20**
	MAXIMUM C_R during time period	**1.55**	**1.56**	**2.73**	**2.76**			**1.24**	**1.71**
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R [1] during time period	0.12	0.12	0.16	0.15	0.31	0.31		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**6.6**	**6.6**		
	Total number of exceedence episodes	0	0	0	0	**14**	**14**		
	Longest exceedence episode (in hours)					**84**	**84**		
	AVERAGE C_R during exceedence episodes					**1.50**	**1.50**		
	MAXIMUM C_R during time period	0.40	0.36	0.68	0.68	**2.19**	**2.19**		

Notes:

(1) " C_R " is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value. Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

Table. 5.28N(c) Time-series impact analysis for levels of NO2 + NO3 , for time period of: All seasons (March 16 to Dec. 1).

Criterion = 2,940 ug/L (as N) ; Length of time period (days)= 260 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.12	0.12	0.15	0.15	0.27	0.27		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**6.2**	**6.2**		
	Total number of exceedence episodes	0	0	0	0	**6**	**6**		
	Longest exceedence episode (in hours)					**168**	**168**		
	AVERAGE C_R during exceedence episodes					**1.37**	**1.37**		
	MAXIMUM C_R during time period	0.39	0.39	0.85	0.86	**2.18**	**2.19**		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.11	0.11	0.17	0.16	0.40	0.40		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**0.4**	0.0	**11.5**	**11.5**		
	Total number of exceedence episodes	0	0	**1**	0	**9**	**9**		
	Longest exceedence episode (in hours)			**24**		**216**	**216**		
	AVERAGE C_R during exceedence episodes			**1.26**		**1.62**	**1.62**		
	MAXIMUM C_R during time period	0.29	0.24	**1.26**	0.80	**3.25**	**3.25**		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth[3]** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.35	0.31	0.49	0.45			0.70	0.64
	% time period when C_R >1 (i.e. criterion exceeded)	**8.8**	**6.9**	**12.7**	**12.7**			**23.5**	**21.2**
	Total number of exceedence episodes	**13**	**9**	**10**	**10**			**24**	**18**
	Longest exceedence episode (in hours)	**144**	**144**	**216**	**216**			**240**	**240**
	AVERAGE C_R during exceedence episodes	**1.48**	**1.55**	**1.65**	**1.65**			**1.66**	**1.71**
	MAXIMUM C_R during time period	**2.71**	**2.92**	**3.31**	**3.32**			**3.93**	**3.93**
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth[2]** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.33	0.30	**1.37**	**1.23**	**1.60**	**1.60**		
	% time period when C_R >1 (i.e. criterion exceeded)	**5.4**	**7.7**	**53.8**	**46.2**	**66.5**	**66.5**		
	Total number of exceedence episodes	**10**	**9**	**14**	**15**	**8**	**8**		
	Longest exceedence episode (in hours)	**48**	**96**	**960**	**960**	**1,128**	**1,128**		
	AVERAGE C_R during exceedence episodes	**1.53**	**1.36**	**2.18**	**2.31**	**2.09**	**2.09**		
	MAXIMUM C_R during time period	**2.16**	**2.12**	**4.90**	**4.91**	**4.90**	**4.90**		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.16	0.16	0.28	0.25	0.40	0.38	0.48	0.48
	% time period when C_R >1 (i.e. criterion exceeded)	**0.8**	**0.8**	**3.5**	**2.3**	**10.0**	**9.6**	**15.4**	**15.0**
	Total number of exceedence episodes	**1**	**1**	**7**	**4**	**9**	**10**	**13**	**13**
	Longest exceedence episode (in hours)	**48**	**48**	**48**	**48**	**192**	**192**	**264**	**240**
	AVERAGE C_R during exceedence episodes	**1.17**	**1.17**	**1.42**	**1.59**	**1.62**	**1.63**	**1.69**	**1.70**
	MAXIMUM C_R during time period	**1.20**	**1.21**	**1.79**	**2.08**	**2.75**	**2.77**	**2.99**	**2.99**
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.12	0.12	0.35	0.33	0.46	0.46		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	**7.7**	**7.3**	**13.8**	**13.8**		
	Total number of exceedence episodes	0	0	**9**	**9**	**13**	**13**		
	Longest exceedence episode (in hours)			**120**	**120**	**264**	**264**		
	AVERAGE C_R during exceedence episodes			**1.60**	**1.58**	**1.72**	**1.72**		
	MAXIMUM C_R during time period	0.35	0.34	**2.96**	**2.97**	**2.72**	**2.73**		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542[4]**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
	AVERAGE C_R[1] during time period	0.19	0.18	0.33	0.32			0.36	0.36
	% time period when C_R >1 (i.e. criterion exceeded)	**0.4**	**0.4**	**8.1**	**7.7**			**5.8**	**6.9**
	Total number of exceedence episodes	**1**	**1**	**11**	**11**			**2**	**4**
	Longest exceedence episode (in hours)	**24**	**24**	**120**	**120**			**264**	**264**
	AVERAGE C_R during exceedence episodes	**1.24**	**1.29**	**1.52**	**1.51**			**1.17**	**1.17**
	MAXIMUM C_R during time period	**1.24**	**1.29**	**2.27**	**2.28**			**1.23**	**1.46**
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
	AVERAGE C_R[1] during time period	0.12	0.12	0.16	0.15	0.31	0.31		
	% time period when C_R >1 (i.e. criterion exceeded)	0.0	0.0	0.0	0.0	**6.5**	**6.5**		
	Total number of exceedence episodes	0	0	0	0	**9**	**9**		
	Longest exceedence episode (in hours)					**144**	**144**		
	AVERAGE C_R during exceedence episodes					**1.43**	**1.43**		
	MAXIMUM C_R during time period	0.34	0.33	0.59	0.59	**2.13**	**2.13**		

Notes:

(1) "C_R" is the "concentration ratio" equal to the value of: the actual parameter value divided by the criterion value.
Thus an "exceedence episode" occurs when C_R > 1 .

(2) This location represents the actual Maitland River plume as it enters the lake. As such, it represents the worse-case (i.e. non-diluted) river plume condition, and can be used for comparing the other (lake) station location results with.

(3) This station is not aligned with any transect. It is located at the shore, about 200 m North of the Maitland River mouth. When it is compared with Station 539 (which is located about 300 m directly offshore of the Maitland River mouth), an indication of significance of the initial momentum of the Maitland River plume can be obtained.

(4) Station 542 is not aligned with any of the transects. It is located within the approximate centre of the inner harbour.

APPENDIX III

3-D TEMPORAL IMPACTS OF THE MAITLAND RIVER DISCHARGE FOR SELECTED EVENTS AND SEASONS IN 2003

MAITLAND RIVER DILUTION ANALYSIS

The temporal Maitland River Dilution analysis results are listed using the following naming system and order:

“Table 5.3 {number}(letter)”

where:

number = 1……. for Event 1, (March 17 to April 6)
2……. for Event 2, (July 20 to 30)
3……. for Event 3, (August 2 to 15)
4……. for Event 4, (November 12 to 28)
5……. for Season 1, (March 16 to May 16)
6……. for Season 2, (May 16 to September 16)
7……. for Season 3, (September 16 to December 1), and
8……. for all (3) seasons (combined), (March 16 to December 1).

(letter) = (a)….. using the 1-hour (instantaneous) data,
(b)….. using 6-hour averaged data, and
(c)….. using 24-hour averaged data.

Table. 5.31(a) Dilution of Maitland River water in the near-shore , during the time period of : Event 1 (March 17 to April 6).

Length of time period (days)= 20 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	202.9	215.2	399.6	360.1	32.3	32.3		
	95%	83.3	82.9	64.9	64.4	25.3	25.3		
	75%	45.6	45.6	28.1	28.2	14.4	14.3		
	50%	30.5	30.3	12.6	12.6	5.8	5.8		
	25%	14.8	15.1	6.6	6.6	2.1	2.1		
	5%	10.1	10.0	2.8	2.6	1.3	1.3		
	0% (MIN. dilution)	8.7	8.7	1.3	1.3	1.1	1.1		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	196.5	204.3	>1000000	>1000000	37.1	37.1		
	95%	156.7	155.8	124.2	122.4	20.8	20.8		
	75%	78.9	78.4	26.7	26.5	7.4	7.4		
	50%	46.2	46.9	13.0	12.8	2.7	2.7		
	25%	31.3	30.7	6.3	6.3	2.0	2.0		
	5%	14.1	14.0	3.3	3.4	1.3	1.3		
	0% (MIN. dilution)	11.7	11.7	1.4	1.4	1.0	1.0		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	28.0	27.8			26.0	23.2
	95%	40.8	40.0	17.7	17.9			17.0	17.0
	75%	11.9	11.9	6.6	6.6			6.4	6.4
	50%	5.8	5.9	2.5	2.5			2.3	2.3
	25%	2.2	2.2	1.9	1.9			1.8	1.8
	5%	1.3	1.3	1.2	1.3			1.0	1.0
	0% (MIN. dilution)	1.0	1.0	1.0	1.0			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	3,233.0	1.3	1.2	1.0	1.0		
	95%	86.1	76.5	1.1	1.1	1.0	1.0		
	75%	15.2	14.2	1.0	1.0	1.0	1.0		
	50%	6.3	6.0	1.0	1.0	1.0	1.0		
	25%	1.8	1.8	1.0	1.0	1.0	1.0		
	5%	1.2	1.3	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.0	1.1	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	9,605.8	205.3	3,045.7	1,081.2	217.7	215.7	322.8	323.3
	95%	146.0	134.3	181.3	183.1	101.4	101.6	96.7	96.8
	75%	57.8	57.8	24.4	24.6	20.9	20.2	22.3	22.3
	50%	19.6	19.5	10.4	10.3	3.6	3.6	2.6	2.6
	25%	8.4	8.5	4.4	5.0	2.0	2.0	1.5	1.5
	5%	1.5	1.5	1.2	1.2	1.4	1.4	1.3	1.3
	0% (MIN. dilution)	1.2	1.2	1.1	1.1	1.2	1.2	1.3	1.3
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	9,699.0	310.8	421.5	10,090.9	272.7	272.8		
	95%	181.1	180.3	121.1	115.3	103.6	103.4		
	75%	88.7	86.9	24.5	24.6	32.7	32.6		
	50%	40.2	39.9	5.5	5.4	6.3	6.3		
	25%	27.7	27.2	2.4	2.4	1.5	1.5		
	5%	10.7	10.8	1.7	1.7	1.3	1.3		
	0% (MIN. dilution)	10.2	10.3	1.3	1.3	1.3	1.3		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	6,403.8	3,902.3	704.0	906.5			4.1	4.1
	95%	287.1	289.6	228.5	228.6			4.0	4.0
	75%	55.2	54.6	50.4	49.8			3.8	3.7
	50%	17.3	17.3	11.6	11.5			3.6	3.6
	25%	8.3	8.1	2.2	2.2			3.4	3.4
	5%	3.4	3.3	1.6	1.6			2.9	2.9
	0% (MIN. dilution)	1.9	1.9	1.4	1.4			2.8	2.8
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	271.7	276.0	>1000000	>1000000	>1000000	>1000000		
	95%	242.2	244.3	282.4	288.3	447.0	447.2		
	75%	110.6	113.1	90.3	89.6	74.7	74.4		
	50%	64.0	64.2	25.9	25.8	17.8	17.8		
	25%	37.2	37.8	16.3	16.3	3.3	3.3		
	5%	12.5	12.8	7.6	7.6	1.4	1.4		
	0% (MIN. dilution)	11.4	11.6	6.1	6.2	1.3	1.3		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.31(b) Dilution of Maitland River water in the near-shore , during the time period of : Event 1 (March 17 to April 6).

Length of time period (days)= 20 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	87.5	88.6	124.1	122.9	31.1	31.0		
	95%	71.9	70.8	64.2	64.0	25.0	25.0		
	75%	44.0	44.0	27.1	27.5	12.7	12.6		
	50%	31.2	30.8	11.9	12.1	5.7	5.7		
	25%	14.9	15.1	6.6	6.6	2.1	2.1		
	5%	10.1	10.1	3.0	3.0	1.3	1.3		
	0% (MIN. dilution)	9.4	9.4	1.7	1.6	1.2	1.2		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	194.9	200.8	163.9	175.7	25.3	25.2		
	95%	155.9	153.4	113.8	114.0	20.7	20.7		
	75%	78.8	78.4	26.1	25.9	7.2	7.2		
	50%	46.6	47.0	11.1	11.2	2.5	2.5		
	25%	31.1	30.6	6.2	6.3	2.0	2.0		
	5%	14.6	14.8	3.6	3.6	1.3	1.3		
	0% (MIN. dilution)	12.4	12.5	1.6	1.5	1.0	1.0		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	67.7	128.8	22.2	22.1			19.7	19.2
	95%	29.2	30.2	17.1	17.1			16.0	16.0
	75%	11.4	11.9	6.0	6.0			5.9	6.0
	50%	4.9	5.0	2.5	2.5			2.3	2.3
	25%	2.2	2.3	1.9	1.9			1.8	1.8
	5%	1.3	1.3	1.3	1.3			1.0	1.0
	0% (MIN. dilution)	1.1	1.1	1.1	1.2			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	89.3	54.5	1.2	1.1	1.0	1.0		
	95%	28.7	28.9	1.1	1.1	1.0	1.0		
	75%	11.2	10.6	1.0	1.0	1.0	1.0		
	50%	5.1	4.7	1.0	1.0	1.0	1.0		
	25%	1.7	1.8	1.0	1.0	1.0	1.0		
	5%	1.5	1.5	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.3	1.3	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	197.9	199.5	258.5	261.8	208.7	206.9	258.2	258.9
	95%	113.1	113.0	107.4	107.8	98.5	98.5	96.8	96.9
	75%	54.3	54.5	22.4	22.1	19.9	19.5	21.7	21.7
	50%	18.8	18.7	9.0	9.1	3.4	3.6	2.7	2.8
	25%	8.2	8.2	4.1	4.1	2.1	2.1	1.6	1.6
	5%	1.5	1.5	1.3	1.3	1.5	1.5	1.3	1.3
	0% (MIN. dilution)	1.3	1.3	1.2	1.2	1.2	1.2	1.3	1.3
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	370.1	197.2	234.7	234.0	259.3	259.1		
	95%	176.0	177.0	107.0	106.3	102.2	102.0		
	75%	87.8	84.9	22.2	22.2	32.8	32.7		
	50%	40.8	40.9	5.2	5.0	6.1	6.1		
	25%	28.3	28.0	2.4	2.5	1.5	1.5		
	5%	11.0	11.1	1.7	1.7	1.4	1.4		
	0% (MIN. dilution)	10.4	10.5	1.6	1.6	1.3	1.3		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	395.9	398.0	433.4	433.1			4.0	4.0
	95%	198.7	199.2	216.2	221.8			4.0	4.0
	75%	48.8	51.3	45.5	45.4			3.7	3.7
	50%	17.2	17.3	10.9	10.8			3.6	3.6
	25%	8.5	8.5	2.3	2.3			3.4	3.4
	5%	3.4	3.4	1.6	1.6			3.0	2.9
	0% (MIN. dilution)	2.6	2.7	1.4	1.5			2.8	2.8
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	271.4	275.1	334.4	338.3	536.0	536.1		
	95%	236.3	234.6	267.5	297.8	273.2	273.0		
	75%	111.0	111.7	87.7	87.5	73.2	72.6		
	50%	60.8	61.6	25.5	25.4	16.5	16.5		
	25%	37.2	37.9	16.3	16.5	3.8	3.8		
	5%	12.9	13.3	7.7	7.7	1.5	1.5		
	0% (MIN. dilution)	11.7	11.9	6.4	6.5	1.4	1.4		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.31(c) Dilution of Maitland River water in the near-shore , during the time period of : Event 1 (March 17 to April 6).

Length of time period (days)= 20 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	71.7	71.4	38.0	38.0	26.0	26.0		
	95%	50.6	49.9	35.2	35.1	24.7	24.7		
	75%	40.1	40.5	25.3	25.4	9.1	9.1		
	50%	30.7	30.7	8.9	8.9	4.8	4.8		
	25%	16.6	16.7	6.5	6.5	3.1	3.1		
	5%	10.2	10.3	4.3	4.4	1.5	1.5		
	0% (MIN. dilution)	9.9	9.9	2.8	2.8	1.3	1.3		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	136.2	135.1	83.3	82.4	22.3	22.3		
	95%	106.9	104.2	62.6	62.1	19.1	19.1		
	75%	71.1	71.5	22.5	22.6	6.0	6.0		
	50%	46.8	47.6	8.8	8.8	2.4	2.4		
	25%	33.2	33.9	6.2	6.2	2.1	2.1		
	5%	15.3	15.7	4.6	4.6	1.5	1.5		
	0% (MIN. dilution)	14.7	14.6	3.8	3.8	1.3	1.3		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	24.1	23.6	17.2	17.2			15.7	15.8
	95%	23.7	23.6	10.4	10.4			13.5	13.5
	75%	8.8	9.1	5.5	5.4			4.8	4.8
	50%	4.3	4.6	2.5	2.6			2.1	2.1
	25%	2.2	2.2	2.1	2.1			1.9	1.9
	5%	1.7	1.7	1.5	1.5			1.3	1.3
	0% (MIN. dilution)	1.5	1.5	1.4	1.4			1.1	1.1
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	18.6	18.6	1.1	1.1	1.0	1.0		
	95%	11.9	11.8	1.1	1.0	1.0	1.0		
	75%	5.6	5.7	1.0	1.0	1.0	1.0		
	50%	3.6	3.7	1.0	1.0	1.0	1.0		
	25%	2.7	2.8	1.0	1.0	1.0	1.0		
	5%	1.5	1.5	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.5	1.5	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	111.4	111.5	219.6	222.3	95.3	92.0	106.6	106.3
	95%	74.3	74.3	69.6	58.5	67.9	67.2	68.4	68.4
	75%	33.7	33.7	14.1	14.9	8.1	8.2	17.0	17.0
	50%	13.4	13.3	6.7	6.9	3.0	3.0	2.9	2.9
	25%	8.0	7.9	4.2	4.1	2.1	2.1	1.6	1.6
	5%	2.3	2.4	1.9	1.9	1.9	1.9	1.4	1.4
	0% (MIN. dilution)	2.3	2.3	1.2	1.2	1.8	1.8	1.4	1.4
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	150.2	151.6	112.6	109.8	114.4	114.1		
	95%	144.8	144.3	76.4	75.9	75.7	75.7		
	75%	89.9	87.9	13.7	13.7	23.9	23.9		
	50%	39.0	38.5	4.3	4.2	5.2	5.2		
	25%	26.5	26.2	2.7	2.7	1.7	1.7		
	5%	11.3	11.4	1.9	2.0	1.4	1.4		
	0% (MIN. dilution)	11.1	11.2	1.9	1.9	1.4	1.4		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	282.9	284.4	286.8	292.4			4.0	4.0
	95%	111.0	111.1	112.3	112.7			4.0	4.0
	75%	27.3	27.0	25.3	24.7			3.7	3.7
	50%	15.3	15.4	6.0	6.0			3.6	3.6
	25%	7.9	7.9	3.8	3.9			3.4	3.4
	5%	6.4	6.5	1.7	1.7			3.1	3.1
	0% (MIN. dilution)	3.1	3.1	1.7	1.7			2.9	2.9
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	236.6	235.8	251.6	253.3	396.1	396.0		
	95%	208.2	208.9	119.2	122.4	130.6	130.7		
	75%	99.9	99.4	78.4	79.3	34.1	34.1		
	50%	57.2	58.9	21.8	21.7	19.1	19.1		
	25%	37.5	38.3	18.6	18.4	3.8	3.8		
	5%	15.4	15.4	7.9	7.9	1.6	1.6		
	0% (MIN. dilution)	11.9	12.1	7.7	7.8	1.5	1.5		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.32(a) Dilution of Maitland River water in the near-shore , during the time period of : Event 2 (July 20 to 30).

Length of time period (days)= 10 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	353.1	682.8	263.5	529.4	1,621.8	1,578.2		
	95%	295.8	640.0	242.8	464.0	241.2	241.3		
	75%	257.6	374.3	184.5	232.2	180.6	180.6		
	50%	216.2	262.8	136.1	141.3	112.0	112.3		
	25%	190.7	228.9	116.1	115.9	13.2	13.3		
	5%	141.4	207.6	82.3	99.4	3.6	3.6		
	0% (MIN. dilution)	101.6	144.5	19.8	84.9	2.8	2.8		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	411.3	843.0	290.2	587.6	1,746.5	1,532.2		
	95%	364.1	827.7	264.1	539.4	212.0	212.0		
	75%	290.6	608.0	194.7	290.7	122.3	122.3		
	50%	263.3	366.2	131.7	145.0	18.8	18.7		
	25%	214.9	315.2	112.6	111.7	4.3	4.4		
	5%	159.1	263.0	80.6	97.0	2.8	2.8		
	0% (MIN. dilution)	102.7	204.4	22.8	72.0	1.7	1.7		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	995.0	622.8	1,284.1	695.7			229.5	202.1
	95%	268.4	454.3	207.6	237.3			175.3	172.3
	75%	142.0	168.9	43.5	68.9			29.3	36.4
	50%	93.4	106.6	11.5	22.1			2.8	5.3
	25%	37.0	62.5	4.9	9.1			1.9	2.5
	5%	12.7	29.1	2.8	4.3			1.3	1.6
	0% (MIN. dilution)	3.8	13.0	1.8	3.4			1.1	1.3
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	351.9	7,455.2	>1000000	11,892.9	1.0	1.0		
	95%	245.0	493.8	115.9	267.5	1.0	1.0		
	75%	162.1	222.9	17.6	58.7	1.0	1.0		
	50%	105.4	132.2	3.5	18.0	1.0	1.0		
	25%	55.6	94.5	1.8	3.6	1.0	1.0		
	5%	17.5	58.9	1.2	1.6	1.0	1.0		
	0% (MIN. dilution)	7.8	30.3	1.1	1.2	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	330.9	803.1	1,966.5	1,247.2	165.7	>1000000	171.2	171.1
	95%	287.3	614.0	233.5	465.7	155.9	475.9	152.6	152.5
	75%	223.7	398.3	136.1	238.9	81.1	138.9	57.7	57.6
	50%	173.1	221.9	100.8	139.4	30.0	75.1	24.9	25.7
	25%	136.0	155.9	72.1	99.6	18.6	30.9	13.6	13.8
	5%	99.7	122.1	17.8	70.3	12.8	16.6	8.6	8.6
	0% (MIN. dilution)	25.6	84.7	11.6	26.2	7.9	9.7	5.3	5.3
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	392.1	899.2	173.0	>1000000	173.6	173.6		
	95%	331.8	864.9	164.9	1,165.7	150.4	150.7		
	75%	284.1	671.8	101.1	141.4	55.6	54.9		
	50%	249.6	328.4	42.9	81.9	28.4	28.4		
	25%	204.4	289.0	25.9	38.7	16.9	16.9		
	5%	133.9	182.5	19.1	23.7	6.9	6.9		
	0% (MIN. dilution)	46.4	151.5	15.7	15.6	5.5	5.5		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	309.6	>1000000	209.0	>1000000			100.6	739.5
	95%	230.5	1,058.3	185.2	255.4			79.9	329.3
	75%	182.0	271.5	132.7	149.3			44.6	108.0
	50%	140.7	186.9	70.7	99.7			41.4	45.3
	25%	97.5	136.5	30.5	46.9			19.9	37.0
	5%	57.8	88.9	15.2	24.4			10.7	15.8
	0% (MIN. dilution)	46.3	59.9	12.6	16.8			8.5	11.9
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	434.0	1,417.0	330.5	789.1	239.7	239.7		
	95%	388.6	919.9	285.4	675.5	218.6	218.6		
	75%	334.2	573.8	238.0	413.0	169.0	169.1		
	50%	283.4	362.4	188.3	243.0	130.7	130.9		
	25%	220.8	282.4	138.5	182.6	59.1	58.5		
	5%	133.1	233.5	82.3	149.3	11.1	11.1		
	0% (MIN. dilution)	50.3	215.4	65.1	132.5	9.1	9.1		

Note: (1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.32(b) Dilution of Maitland River water in the near-shore , during the time period of : Event 2 (July 20 to 30).

Length of time period (days)= 10 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	317.6	669.3	257.6	516.3	242.4	242.8		
	95%	275.4	604.1	239.6	446.9	240.2	240.3		
	75%	258.9	360.8	182.3	234.0	175.7	175.7		
	50%	214.5	272.9	135.6	141.2	110.4	110.3		
	25%	189.5	227.7	116.6	115.9	13.7	14.7		
	5%	148.1	212.5	58.2	101.0	3.7	3.9		
	0% (MIN. dilution)	132.9	171.3	22.3	94.4	3.0	2.9		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	369.1	835.2	275.2	552.1	214.7	214.8		
	95%	359.1	819.3	259.8	531.2	205.9	206.8		
	75%	289.6	610.2	193.2	276.7	106.4	106.4		
	50%	268.3	368.8	129.1	138.6	22.8	22.7		
	25%	217.3	315.5	112.0	112.4	4.4	4.5		
	5%	157.3	268.3	81.1	104.4	2.9	2.9		
	0% (MIN. dilution)	145.3	239.5	35.1	83.6	2.0	2.0		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	305.5	478.8	220.9	431.1			189.5	188.3
	95%	238.0	447.9	198.7	225.4			169.8	169.5
	75%	139.9	165.8	42.8	53.5			25.3	29.6
	50%	79.6	106.9	12.4	19.1			2.7	4.6
	25%	34.7	64.1	4.4	9.3			2.0	2.6
	5%	13.4	34.7	3.0	4.8			1.4	1.6
	0% (MIN. dilution)	7.5	14.3	2.2	4.0			1.4	1.4
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	293.2	513.6	158.1	671.2	1.0	1.0		
	95%	242.9	445.0	80.0	168.5	1.0	1.0		
	75%	153.7	196.6	12.8	57.7	1.0	1.0		
	50%	105.2	130.0	3.2	13.4	1.0	1.0		
	25%	45.4	94.8	1.7	3.3	1.0	1.0		
	5%	23.1	58.6	1.3	1.8	1.0	1.0		
	0% (MIN. dilution)	9.4	55.9	1.1	1.7	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	300.4	644.6	267.1	564.8	164.9	323.4	169.6	169.5
	95%	289.7	609.1	189.2	464.3	143.3	269.4	141.8	142.2
	75%	225.2	386.1	128.7	228.3	69.7	133.1	49.8	50.9
	50%	176.7	220.5	94.8	134.2	30.6	72.6	23.9	23.6
	25%	136.8	160.6	65.2	97.3	18.9	36.7	14.0	14.1
	5%	104.8	119.2	24.5	73.2	13.6	18.9	8.7	8.7
	0% (MIN. dilution)	41.7	114.2	14.8	40.0	9.4	10.9	5.5	5.5
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	368.5	872.2	171.4	1,310.7	166.1	166.2		
	95%	329.4	846.1	163.3	459.1	147.5	147.5		
	75%	276.9	656.1	86.5	136.2	54.5	52.0		
	50%	248.0	330.3	40.4	83.3	28.7	28.7		
	25%	205.0	295.2	27.6	40.2	17.4	17.4		
	5%	133.6	197.8	20.1	26.6	8.3	8.3		
	0% (MIN. dilution)	80.5	155.9	19.1	18.9	5.6	5.6		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	261.0	1,727.9	205.6	327.3			91.0	416.0
	95%	224.2	878.0	180.8	208.3			80.1	337.5
	75%	179.7	280.1	132.3	137.6			44.4	107.4
	50%	140.3	189.0	62.7	93.5			40.7	44.9
	25%	98.1	143.5	31.0	56.0			20.0	36.6
	5%	60.5	88.8	16.4	24.2			11.0	17.9
	0% (MIN. dilution)	56.6	81.4	13.2	21.2			9.3	13.8
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	418.8	1,124.4	290.6	714.2	236.2	236.3		
	95%	375.4	863.3	279.8	621.7	215.2	215.3		
	75%	335.5	582.5	233.9	409.4	164.8	164.7		
	50%	269.8	356.5	187.1	237.8	130.2	130.1		
	25%	220.5	283.0	142.9	186.5	76.2	76.1		
	5%	140.8	245.0	83.5	151.1	11.8	11.8		
	0% (MIN. dilution)	66.6	218.2	73.9	133.6	9.6	9.6		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.32(c) Dilution of Maitland River water in the near-shore , during the time period of : Event 2 (July 20 to 30).

Length of time period (days)= 10 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function	100% (MAX. dilution)	264.7	574.7	241.1	369.8	229.9	230.1		
of the % of time during the period)	95%	264.1	539.8	230.0	354.9	211.3	211.3		
	75%	251.2	369.5	172.8	222.6	156.3	156.7		
	50%	215.4	251.9	133.8	137.5	112.0	112.3		
	25%	192.5	228.2	115.3	116.7	9.0	9.0		
	5%	168.6	222.2	68.7	113.4	5.6	6.1		
	0% (MIN. dilution)	150.8	221.9	41.1	112.0	5.4	5.9		
Transect 2: *(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function	100% (MAX. dilution)	340.4	821.9	238.3	510.4	202.5	202.5		
of the % of time during the period)	95%	334.1	755.6	224.0	445.1	182.6	182.5		
	75%	277.6	542.4	187.2	226.7	47.0	46.9		
	50%	265.8	348.5	128.5	149.8	15.9	16.0		
	25%	220.5	327.0	112.0	120.2	5.0	5.2		
	5%	179.1	281.2	77.6	103.6	3.0	3.0		
	0% (MIN. dilution)	157.7	258.1	63.0	99.0	2.8	2.8		
Transect 3: *(about 0.9 km North of*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function	100% (MAX. dilution)	198.3	446.2	158.2	220.7			131.4	131.1
of the % of time during the period)	95%	183.1	375.0	140.4	197.2			86.7	104.0
	75%	129.4	137.3	34.7	36.7			6.9	26.0
	50%	70.6	84.6	10.0	13.5			3.1	3.5
	25%	28.2	67.1	5.0	11.6			2.3	2.8
	5%	16.6	40.5	3.5	6.1			1.5	2.0
	0% (MIN. dilution)	16.3	28.8	3.4	5.1			1.5	1.6
Transect 4: *(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function	100% (MAX. dilution)	198.5	445.1	42.6	89.9	1.0	1.0		
of the % of time during the period)	95%	179.3	381.1	28.0	68.4	1.0	1.0		
	75%	126.2	153.7	6.7	31.2	1.0	1.0		
	50%	74.5	125.6	2.9	7.9	1.0	1.0		
	25%	56.9	102.1	2.1	3.6	1.0	1.0		
	5%	28.5	72.3	1.5	3.2	1.0	1.0		
	0% (MIN. dilution)	19.5	64.4	1.3	2.9	1.0	1.0		
Transect 5: *(about 0.8 km South of*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function	100% (MAX. dilution)	263.4	521.6	171.4	422.4	149.9	153.3	150.9	151.2
of the % of time during the period)	95%	246.2	469.8	153.2	354.0	126.6	135.3	112.3	113.3
	75%	205.3	363.0	95.4	167.8	53.8	94.2	54.5	56.0
	50%	173.3	220.5	75.9	130.8	28.3	74.8	23.2	23.2
	25%	131.2	168.7	60.3	121.8	18.0	34.2	13.4	13.5
	5%	95.7	141.4	40.5	74.5	17.0	23.5	10.0	10.0
	0% (MIN. dilution)	94.7	126.7	26.9	65.2	16.9	19.0	9.3	9.3
Transect 6: *(about 2.1 km South of*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function	100% (MAX. dilution)	315.0	814.5	161.7	161.8	150.4	150.4		
of the % of time during the period)	95%	310.2	769.7	137.5	145.4	106.1	105.5		
	75%	273.8	506.0	84.0	108.2	45.1	45.2		
	50%	226.2	329.5	33.6	83.2	23.1	23.1		
	25%	213.6	303.8	28.5	44.3	16.4	16.4		
	5%	151.6	211.6	25.8	29.5	9.9	9.9		
	0% (MIN. dilution)	104.9	205.7	25.4	28.4	7.7	7.7		
Transect 7: *(about 3.8 km South of*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function	100% (MAX. dilution)	212.1	492.3	185.6	185.7			74.1	190.7
of the % of time during the period)	95%	201.3	419.9	162.5	165.4			64.8	179.9
	75%	159.8	210.0	113.7	121.0			44.1	111.5
	50%	123.6	192.5	40.8	78.4			38.3	44.7
	25%	100.2	154.6	33.0	47.7			23.0	29.2
	5%	80.3	112.2	27.1	36.2			11.2	24.4
	0% (MIN. dilution)	73.1	107.8	23.5	30.9			10.4	23.1
Transect 8: *(about 6.0 km South of*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function	100% (MAX. dilution)	386.1	851.8	261.7	635.2	215.4	215.4		
of the % of time during the period)	95%	366.7	802.7	251.8	569.7	195.0	195.1		
	75%	297.7	511.8	212.2	368.1	157.6	157.7		
	50%	261.0	352.2	167.6	236.5	124.6	124.6		
	25%	249.9	305.5	154.6	188.1	48.7	48.8		
	5%	142.8	256.1	105.8	163.4	18.6	18.6		
	0% (MIN. dilution)	106.5	238.3	90.0	154.6	11.9	11.8		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.33(a) Dilution of Maitland River water in the near-shore , during the time period of : Event 3 (August 2 to 15).

Length of time period (days)= 13 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function	100% (MAX. dilution)	830.4	993.0	>1000000	740.5	1,309.3	828.4		
of the % of time during the period)	95%	695.4	893.6	608.8	723.3	636.2	633.8		
	75%	475.7	768.5	459.3	662.0	504.0	505.1		
	50%	399.4	426.9	336.8	356.9	208.6	208.5		
	25%	270.1	287.8	219.9	243.4	52.8	57.3		
	5%	217.5	212.9	194.0	186.3	10.7	11.0		
	0% (MIN. dilution)	209.7	192.6	18.3	183.9	8.0	8.0		
Transect 2: *(about 3.0 km North of*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function	100% (MAX. dilution)	701.1	1,277.5	>1000000	723.9	71,357.1	71,357.1		
of the % of time during the period)	95%	675.5	1,053.6	599.0	717.0	586.3	587.6		
	75%	539.7	813.5	455.7	578.8	435.1	436.4		
	50%	424.6	588.7	341.2	370.7	109.7	110.4		
	25%	261.9	377.7	196.6	235.5	29.0	37.0		
	5%	205.7	268.4	32.7	95.6	6.1	6.4		
	0% (MIN. dilution)	161.7	256.1	4.4	47.5	3.2	3.8		
Transect 3: *(about 0.9 km North of*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function	100% (MAX. dilution)	>1000000	>1000000	980.4	>1000000			>1000000	>1000000
of the % of time during the period)	95%	560.4	731.9	543.2	606.2			706.2	745.3
	75%	410.9	545.0	317.5	421.3			59.7	69.2
	50%	55.9	424.0	12.4	94.6			2.5	9.7
	25%	11.7	260.5	4.2	25.8			1.6	3.0
	5%	1.8	54.6	1.6	6.3			1.3	1.7
	0% (MIN. dilution)	1.5	10.2	1.3	3.8			1.1	1.3
Transect 4: *(about 0.1 km North of*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function	100% (MAX. dilution)	5,550.0	>1000000	>1000000	>1000000	1.0	1.0		
of the % of time during the period)	95%	549.1	1,165.2	20.5	2,489.0	1.0	1.0		
	75%	355.5	554.1	1.4	167.1	1.0	1.0		
	50%	62.3	386.8	1.1	27.3	1.0	1.0		
	25%	5.3	269.1	1.0	1.4	1.0	1.0		
	5%	2.0	61.1	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.3	13.7	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function	100% (MAX. dilution)	>1000000	8,687.0	>1000000	>1000000	396.0	>1000000	405.9	540.6
of the % of time during the period)	95%	668.4	708.7	567.2	1,042.2	384.1	1,178.8	377.7	375.9
	75%	409.4	581.8	275.8	545.9	88.8	372.5	135.4	158.2
	50%	363.0	385.6	49.6	375.7	38.5	188.4	41.2	50.1
	25%	171.9	312.9	7.0	296.6	16.6	77.0	19.1	19.2
	5%	10.5	276.6	2.6	43.3	6.8	17.7	8.6	9.1
	0% (MIN. dilution)	4.0	140.7	1.9	25.4	3.1	11.1	5.4	5.6
Transect 6: *(about 2.1 km South of*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function	100% (MAX. dilution)	870.2	914.0	788.5	>1000000	397.8	397.7		
of the % of time during the period)	95%	702.7	853.8	397.4	617.3	396.0	395.9		
	75%	452.4	639.6	266.3	371.0	214.1	178.7		
	50%	386.5	510.7	67.1	281.6	42.6	42.6		
	25%	219.7	350.4	38.2	90.1	18.6	18.6		
	5%	67.4	328.0	11.1	31.2	10.8	10.7		
	0% (MIN. dilution)	9.2	316.0	5.4	15.5	7.0	7.0		
Transect 7: *(about 3.8 km South of*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function	100% (MAX. dilution)	>1000000	>1000000	2,006.0	>1000000			218.9	2,401.4
of the % of time during the period)	95%	540.5	649.4	398.6	409.2			162.6	653.9
	75%	396.9	493.8	371.1	366.1			130.9	373.9
	50%	170.3	392.5	96.0	163.7			53.9	164.4
	25%	57.0	308.1	33.8	88.7			38.4	60.0
	5%	17.0	136.2	22.1	29.6			21.5	20.9
	0% (MIN. dilution)	3.7	30.2	13.3	18.1			17.6	15.1
Transect 8: *(about 6.0 km South of*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
Maitland River mouth)	*water-column location*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function	100% (MAX. dilution)	900.8	1,611.3	1,387.5	1,924.9	469.9	595.4		
of the % of time during the period)	95%	700.3	1,014.7	574.1	684.6	401.4	401.4		
	75%	472.6	765.5	401.9	440.5	392.7	384.7		
	50%	386.3	360.5	288.8	342.5	78.0	77.9		
	25%	292.3	331.5	106.5	261.5	25.0	25.9		
	5%	54.4	295.3	21.5	145.0	14.4	14.4		
	0% (MIN. dilution)	9.9	207.8	5.6	52.5	10.7	10.6		

Note: *(1) Dilution = (C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd}) ; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.33(b) Dilution of Maitland River water in the near-shore , during the time period of : Event 3 (August 2 to 15).

Length of time period (days)= 13 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	714.6	958.1	948.1	735.7	640.4	640.4		
	95%	699.5	881.2	605.4	712.5	632.3	632.2		
	75%	470.0	758.9	458.4	658.4	503.0	505.3		
	50%	392.0	415.4	330.5	363.1	217.1	217.0		
	25%	271.6	291.2	221.1	247.5	53.0	57.3		
	5%	219.7	214.8	190.8	187.3	12.2	12.5		
	0% (MIN. dilution)	211.9	199.7	23.4	184.4	8.9	8.9		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	694.3	1,170.5	645.3	721.7	598.0	654.9		
	95%	665.9	1,050.0	601.5	698.9	579.0	587.6		
	75%	531.4	802.0	452.9	573.7	427.7	438.1		
	50%	425.5	580.4	329.4	368.5	108.8	109.5		
	25%	261.3	380.4	187.6	241.4	28.9	35.1		
	5%	205.1	267.8	53.5	113.1	6.0	6.5		
	0% (MIN. dilution)	189.1	259.5	6.1	48.8	3.9	6.1		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	580.0	1,187.8	550.8	852.3			1,283.5	1,086.7
	95%	559.3	635.4	544.7	588.2			527.6	510.6
	75%	384.0	534.4	291.7	398.6			49.2	74.7
	50%	43.9	399.0	9.4	77.2			2.6	9.0
	25%	8.3	239.2	4.1	26.2			1.6	3.2
	5%	2.0	47.6	1.9	7.2			1.3	1.8
	0% (MIN. dilution)	1.6	11.2	1.4	4.8			1.2	1.4
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	565.8	>1000000	84.6	7,470.1	1.0	1.0		
	95%	550.2	877.2	13.6	814.9	1.0	1.0		
	75%	297.4	547.3	1.3	86.2	1.0	1.0		
	50%	18.4	381.7	1.1	24.1	1.0	1.0		
	25%	5.0	264.3	1.0	1.2	1.0	1.0		
	5%	2.3	79.5	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.7	17.0	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	1,707.7	855.9	772.3	1,375.4	394.2	1,515.2	380.2	377.9
	95%	600.4	670.7	406.9	833.6	383.0	603.7	372.9	372.9
	75%	391.6	572.7	244.9	502.8	76.7	350.7	107.1	139.5
	50%	306.3	381.7	23.3	380.3	35.0	167.2	42.2	52.1
	25%	98.6	319.3	8.5	250.9	15.7	77.9	18.6	18.9
	5%	12.5	267.1	2.9	66.2	8.0	19.0	9.3	9.0
	0% (MIN. dilution)	7.1	157.5	2.3	28.9	3.5	17.2	6.5	7.6
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	698.7	869.2	397.7	877.7	397.2	397.0		
	95%	685.8	848.3	396.8	445.3	395.2	395.2		
	75%	445.5	638.0	216.3	366.3	182.2	188.7		
	50%	370.2	523.0	59.1	262.3	42.7	42.9		
	25%	208.2	350.6	38.8	86.2	18.3	18.3		
	5%	58.7	329.5	13.0	33.8	11.1	11.0		
	0% (MIN. dilution)	21.7	322.6	8.9	18.9	7.5	7.4		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	564.2	793.3	398.9	2,673.0			171.3	1,061.6
	95%	503.5	586.0	398.6	398.2			159.8	542.1
	75%	393.8	438.0	333.5	351.6			130.4	373.6
	50%	133.2	386.2	89.6	164.9			53.5	163.1
	25%	59.7	315.6	35.5	88.9			37.1	63.2
	5%	20.0	151.6	21.3	30.0			21.6	24.3
	0% (MIN. dilution)	4.2	65.0	14.9	23.9			20.2	15.4
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	750.4	1,107.3	577.6	1,091.8	411.1	426.0		
	95%	680.3	928.3	564.7	645.1	401.4	401.4		
	75%	461.8	722.8	400.9	399.6	392.7	393.4		
	50%	385.5	362.3	241.7	339.3	76.9	74.6		
	25%	282.0	332.1	109.0	271.6	28.4	28.3		
	5%	66.4	292.0	19.9	146.4	14.6	14.6		
	0% (MIN. dilution)	20.5	254.3	8.8	99.6	11.2	11.1		

Note: (1) *Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.33(c) Dilution of Maitland River water in the near-shore , during the time period of : Event 3 (August 2 to 15).

Length of time period (days)= 13 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	693.4	866.2	602.4	695.7	630.6	630.5		
	95%	682.5	859.3	578.2	687.4	588.6	588.6		
	75%	457.8	773.0	423.9	650.0	480.8	480.6		
	50%	387.5	363.0	315.3	340.1	204.1	203.3		
	25%	279.9	294.8	204.2	264.6	49.3	56.2		
	5%	227.5	222.8	149.0	196.9	15.1	15.4		
	0% (MIN. dilution)	221.3	211.2	78.6	186.2	10.6	10.6		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	676.7	1,054.9	600.1	668.0	576.5	576.4		
	95%	661.2	1,041.8	588.4	623.4	549.4	549.4		
	75%	506.3	752.3	420.9	580.4	400.9	400.7		
	50%	427.8	571.9	320.8	373.5	89.7	89.6		
	25%	293.9	373.0	134.6	231.9	16.6	19.6		
	5%	215.8	300.6	64.6	112.3	7.1	9.5		
	0% (MIN. dilution)	213.9	264.8	16.4	103.2	6.6	6.7		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	561.9	572.6	544.8	591.8			731.0	665.8
	95%	553.1	557.4	537.5	556.4			336.8	327.9
	75%	357.6	490.2	41.6	311.3			3.5	13.5
	50%	16.0	340.8	7.0	42.6			2.5	8.4
	25%	8.1	219.1	4.5	14.4			1.8	4.0
	5%	2.8	37.4	2.2	10.3			1.5	2.1
	0% (MIN. dilution)	2.6	28.2	2.0	10.2			1.5	1.8
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	548.0	627.2	11.6	147.1	1.0	1.0		
	95%	438.3	610.5	5.8	122.7	1.0	1.0		
	75%	21.5	493.9	1.3	83.2	1.0	1.0		
	50%	9.0	354.2	1.1	14.4	1.0	1.0		
	25%	6.8	263.2	1.1	1.6	1.0	1.0		
	5%	3.3	52.7	1.0	1.2	1.0	1.0		
	0% (MIN. dilution)	2.5	47.9	1.0	1.1	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	560.1	665.2	386.0	803.1	375.2	369.2	345.6	341.0
	95%	558.6	622.0	367.4	705.7	364.9	362.3	342.9	336.4
	75%	389.9	558.0	51.6	385.6	48.6	297.1	56.2	129.4
	50%	163.0	380.5	14.4	326.5	33.6	118.6	46.4	51.7
	25%	60.0	323.8	9.0	232.2	15.0	65.1	15.8	18.4
	5%	18.1	279.2	4.9	85.0	10.2	32.6	12.8	13.1
	0% (MIN. dilution)	16.8	246.2	3.1	53.8	7.3	22.0	11.2	11.3
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	687.4	844.0	395.5	395.5	395.2	395.1		
	95%	596.4	786.3	388.1	381.3	390.0	389.3		
	75%	405.9	629.7	77.6	339.8	85.4	98.6		
	50%	296.2	550.0	50.8	109.7	36.0	35.5		
	25%	153.9	352.6	34.4	71.9	18.4	18.4		
	5%	87.7	332.7	20.0	47.9	12.3	12.2		
	0% (MIN. dilution)	57.1	329.5	13.4	42.0	11.9	11.9		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	399.2	557.0	398.7	397.3			160.3	555.0
	95%	396.5	555.0	398.0	389.9			148.5	503.2
	75%	229.5	394.2	283.9	331.9			108.5	302.6
	50%	99.4	337.2	55.2	122.6			51.2	163.6
	25%	56.8	294.4	46.0	107.5			35.4	58.3
	5%	22.1	185.9	26.8	42.0			22.2	31.5
	0% (MIN. dilution)	9.7	181.3	22.4	35.8			22.2	23.9
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	658.8	942.3	522.4	549.8	400.0	399.9		
	95%	566.0	854.0	466.1	529.7	398.2	398.2		
	75%	449.7	724.8	396.6	347.2	360.6	376.7		
	50%	322.3	344.6	183.9	334.1	37.9	37.9		
	25%	228.6	332.5	62.7	229.7	32.4	31.4		
	5%	84.4	314.2	27.8	188.9	18.2	18.2		
	0% (MIN. dilution)	61.8	289.5	16.7	183.1	16.6	16.6		

Note: (1) *Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.34(a) **Dilution of Maitland River water in the near-shore , during the time period of : Event 4 (November 12 to 28).**

Length of time period (days)= 16 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	5,313.8	4,582.6	1,241.0	787.2	25.8	25.8		
	95%	1,231.2	1,260.2	352.0	340.1	20.5	20.5		
	75%	327.0	327.2	46.3	44.8	17.8	17.8		
	50%	77.6	76.7	20.6	20.8	9.9	9.9		
	25%	40.3	40.5	17.0	17.0	2.3	2.3		
	5%	20.1	20.0	14.3	14.2	1.4	1.4		
	0% (MIN. dilution)	18.0	18.1	5.4	5.7	1.2	1.2		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	13,875.0	14,910.4	19.3	19.3		
	95%	193,140.0	193,140.0	1,640.1	1,527.4	17.5	17.5		
	75%	1,437.4	1,460.5	58.2	56.9	13.3	13.3		
	50%	265.9	253.4	20.1	19.3	3.3	3.3		
	25%	75.5	76.8	16.0	15.5	1.5	1.5		
	5%	22.2	22.1	11.3	5.4	1.1	1.1		
	0% (MIN. dilution)	20.7	20.6	2.9	2.9	1.1	1.1		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth** ***(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	397.4	322.9	27.1	25.9			19.7	19.7
	95%	42.9	42.2	14.8	14.8			13.6	13.7
	75%	14.6	14.6	4.4	4.3			2.8	2.8
	50%	6.1	5.8	2.7	2.7			1.5	1.5
	25%	2.7	2.6	1.5	1.5			1.1	1.1
	5%	1.6	1.6	1.1	1.1			1.0	1.0
	0% (MIN. dilution)	1.1	1.2	1.0	1.0			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	2.1	1.6	1.0	1.0		
	95%	426.2	280.1	1.3	1.1	1.0	1.0		
	75%	34.5	30.2	1.0	1.0	1.0	1.0		
	50%	16.5	14.3	1.0	1.0	1.0	1.0		
	25%	6.8	4.0	1.0	1.0	1.0	1.0		
	5%	1.6	1.6	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.1	1.1	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	2,107.6	1,588.2	1,210.9	1,209.4
	95%	108,780.0	81,969.2	1,913.1	1,856.2	762.8	697.3	440.8	440.7
	75%	153.7	153.3	61.5	61.3	36.9	37.6	37.9	37.9
	50%	52.1	51.9	24.0	24.0	14.0	13.8	10.8	10.8
	25%	21.5	21.7	13.1	13.2	2.8	2.8	2.6	2.6
	5%	15.2	15.2	2.7	2.7	1.5	1.5	1.4	1.4
	0% (MIN. dilution)	14.8	12.8	1.4	1.4	1.3	1.3	1.2	1.2
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	1,951.2	1,913.8	2,064.0	2,068.3		
	95%	>1000000	>1000000	1,109.8	1,122.7	228.9	230.5		
	75%	738.9	721.8	53.6	53.4	42.1	42.3		
	50%	318.7	312.6	18.4	18.6	10.9	10.9		
	25%	68.9	63.0	4.3	4.4	2.7	2.7		
	5%	21.5	21.3	1.5	1.5	1.6	1.6		
	0% (MIN. dilution)	19.3	19.1	1.4	1.4	1.5	1.5		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	8,395.0	8,687.0			6.5	5.1
	95%	999,000.0	>1000000	4,786.5	4,994.9			5.0	5.0
	75%	156.3	154.7	79.2	79.9			4.6	4.6
	50%	45.5	43.9	23.4	23.3			4.2	4.2
	25%	20.5	20.8	4.5	4.4			4.0	4.0
	5%	13.5	13.7	2.0	2.0			3.9	3.9
	0% (MIN. dilution)	2.1	2.0	1.6	1.6			3.4	3.4
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	75%	1,888.5	1,924.9	308.8	300.8	167.4	168.2		
	50%	542.6	541.2	94.8	95.1	36.2	36.2		
	25%	124.8	137.4	35.7	35.9	16.0	16.0		
	5%	49.3	49.3	17.5	17.5	3.0	3.0		
	0% (MIN. dilution)	29.5	28.8	15.1	15.2	2.4	2.4		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.34(b) Dilution of Maitland River water in the near-shore , during the time period of : Event 4 (November 12 to 28).

Length of time period (days)= 16 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	4,145.2	4,128.1	711.4	739.0	25.0	25.0		
	95%	955.1	918.3	293.2	283.5	19.4	19.4		
	75%	307.7	298.3	40.0	39.3	17.3	17.4		
	50%	73.8	72.8	20.7	20.6	8.1	8.1		
	25%	40.8	41.0	17.1	17.2	2.3	2.3		
	5%	20.2	20.0	14.6	14.3	1.5	1.5		
	0% (MIN. dilution)	18.4	18.4	8.1	8.6	1.2	1.2		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	12,618.9	13,843.0	17.6	17.6		
	95%	64,586.9	63,327.0	1,186.2	1,122.7	17.1	17.1		
	75%	1,361.6	1,338.8	49.5	49.2	13.1	13.1		
	50%	235.2	227.9	19.3	19.0	2.6	2.6		
	25%	76.2	74.2	16.1	15.2	1.5	1.5		
	5%	22.4	22.1	10.4	6.6	1.2	1.2		
	0% (MIN. dilution)	21.2	21.1	6.0	4.6	1.1	1.1		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	55.8	64.1	17.1	17.0			15.5	15.5
	95%	26.9	27.1	14.8	14.8			13.5	13.5
	75%	14.3	13.9	3.7	3.7			2.9	2.8
	50%	6.2	6.0	2.5	2.5			1.4	1.4
	25%	2.8	2.6	1.5	1.5			1.1	1.1
	5%	1.6	1.7	1.2	1.2			1.0	1.0
	0% (MIN. dilution)	1.3	1.3	1.1	1.1			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	346.1	301.6	2.0	1.6	1.0	1.0		
	95%	150.9	111.1	1.1	1.1	1.0	1.0		
	75%	30.1	24.3	1.0	1.0	1.0	1.0		
	50%	15.6	11.0	1.0	1.0	1.0	1.0		
	25%	6.0	4.0	1.0	1.0	1.0	1.0		
	5%	2.1	1.7	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.5	1.4	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	982,623.0	>1000000	4,949.6	5,489.0	1,517.5	1,482.2	1,074.6	1,081.2
	95%	35,612.5	29,843.0	1,780.6	1,810.7	608.5	587.8	397.0	395.9
	75%	107.5	107.0	51.8	51.5	36.2	36.5	38.2	38.2
	50%	52.5	52.3	23.3	23.2	12.3	12.1	8.4	8.5
	25%	21.5	21.8	8.6	8.5	2.8	2.8	2.7	2.7
	5%	15.3	15.3	3.6	3.2	1.5	1.5	1.5	1.5
	0% (MIN. dilution)	15.1	15.0	2.2	2.3	1.4	1.4	1.3	1.3
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	1,860.9	1,825.2	1,760.4	1,789.3		
	95%	>1000000	>1000000	1,035.1	1,043.3	183.8	184.3		
	75%	733.2	699.8	48.2	48.7	37.9	38.0		
	50%	292.5	287.5	15.0	14.9	10.7	10.7		
	25%	68.5	64.3	4.6	4.7	2.7	2.7		
	5%	21.9	21.7	1.5	1.5	1.6	1.6		
	0% (MIN. dilution)	19.4	19.3	1.5	1.5	1.5	1.5		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	7,764.2	7,907.7			5.1	5.1
	95%	659,423.9	499,809.3	3,826.1	4,066.2			5.0	5.0
	75%	146.4	144.0	76.2	75.9			4.6	4.6
	50%	37.4	37.5	23.3	23.2			4.2	4.2
	25%	19.3	19.6	4.2	4.1			4.0	4.0
	5%	13.5	14.0	2.0	2.0			4.0	3.9
	0% (MIN. dilution)	5.1	4.9	1.7	1.7			3.4	3.4
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	75%	1,377.4	1,585.7	313.6	312.0	155.9	155.9		
	50%	542.4	547.5	86.7	93.5	38.4	38.4		
	25%	131.6	142.4	37.0	37.3	16.2	16.2		
	5%	51.5	51.0	17.7	17.7	3.1	3.1		
	0% (MIN. dilution)	35.2	34.6	16.7	16.7	2.6	2.6		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.34(c) Dilution of Maitland River water in the near-shore , during the time period of : Event 4 (November 12 to 28).
Length of time period (days)= 16 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	1,835.8	1,764.5	467.3	461.2	22.3	22.3		
	95%	949.1	919.2	175.2	172.5	19.7	19.7		
	75%	172.6	170.5	31.9	31.5	15.7	15.7		
	50%	75.1	74.4	20.6	20.6	6.4	6.4		
	25%	43.7	44.3	17.7	17.7	2.1	2.1		
	5%	21.3	21.2	14.9	14.8	1.8	1.8		
	0% (MIN. dilution)	20.1	20.2	11.9	11.8	1.8	1.8		

Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	218,360.7	236,683.1	2,864.2	2,766.7	16.1	16.1		
	95%	57,650.4	61,784.8	860.7	834.7	15.1	15.1		
	75%	661.3	660.1	35.9	35.7	11.0	11.0		
	50%	208.6	204.4	19.1	18.8	3.0	3.0		
	25%	98.1	102.8	15.9	15.4	1.6	1.6		
	5%	24.3	23.9	11.3	9.9	1.3	1.3		
	0% (MIN. dilution)	24.1	23.8	11.0	6.8	1.2	1.2		

Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	13.6	13.6	14.3	14.3			11.0	11.0
	95%	13.3	13.2	14.2	14.2			7.0	7.1
	75%	9.6	10.0	3.6	3.6			2.5	2.5
	50%	4.9	4.5	2.3	2.3			1.6	1.6
	25%	3.1	3.0	1.6	1.6			1.2	1.1
	5%	2.2	2.2	1.3	1.3			1.1	1.1
	0% (MIN. dilution)	2.0	2.0	1.3	1.3			1.0	1.0

Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	41.9	25.7	1.3	1.2	1.0	1.0		
	95%	33.8	23.2	1.2	1.1	1.0	1.0		
	75%	24.4	17.8	1.0	1.0	1.0	1.0		
	50%	8.0	7.0	1.0	1.0	1.0	1.0		
	25%	6.3	4.8	1.0	1.0	1.0	1.0		
	5%	4.1	2.0	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.8	2.0	1.0	1.0	1.0	1.0		

Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	113,041.0	97,305.2	1,757.0	1,753.0	984.9	957.0	658.2	660.5
	95%	28,806.1	24,856.6	772.1	761.7	369.2	359.4	253.8	253.9
	75%	83.8	84.1	33.6	33.1	24.7	28.7	32.0	32.0
	50%	50.5	50.4	12.5	12.3	8.6	8.5	6.0	6.0
	25%	22.0	22.3	8.0	7.0	3.9	3.8	2.6	2.6
	5%	15.8	15.7	5.2	4.8	1.6	1.6	1.5	1.5
	0% (MIN. dilution)	15.6	15.3	4.0	4.6	1.6	1.6	1.4	1.4

Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	1,375.9	1,360.8	388.3	391.9		
	95%	>1000000	>1000000	513.0	505.8	202.1	203.2		
	75%	626.8	606.2	31.4	31.3	31.7	31.7		
	50%	266.3	264.2	11.3	11.2	6.6	6.6		
	25%	85.3	81.8	5.1	5.1	2.8	2.8		
	5%	28.4	28.0	1.8	1.8	1.7	1.7		
	0% (MIN. dilution)	22.8	22.6	1.6	1.6	1.7	1.7		

Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	943,937.0	982,623.0	5,802.5	5,766.2			5.0	5.0
	95%	237,641.7	247,258.1	1,986.8	1,989.5			4.9	4.9
	75%	68.1	68.1	55.9	55.7			4.5	4.6
	50%	34.1	33.7	20.3	20.3			4.2	4.1
	25%	19.5	19.3	5.6	5.5			4.1	4.1
	5%	14.4	14.5	2.1	2.1			4.0	3.9
	0% (MIN. dilution)	13.6	13.9	2.0	2.0			3.8	3.6

Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	>1000000	>1000000	>1000000	>1000000	361,118.9	323,149.5		
	75%	851.1	835.0	158.7	156.5	87.1	87.0		
	50%	502.3	516.4	105.9	107.3	30.4	30.4		
	25%	179.3	195.8	41.9	41.4	11.1	11.1		
	5%	57.3	57.2	20.8	20.8	5.1	5.1		
	0% (MIN. dilution)	45.1	44.0	20.4	20.7	3.7	3.7		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.35(a) Dilution of Maitland River water in the near-shore , during the time period of : Season 1 (March 16 to May 16).

Length of time period (days)= 61 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,790.5	2,798.3	>1000000	>1000000	>1000000	>1000000		
	95%	2,175.5	2,138.3	2,344.0	2,371.8	11,563.5	11,752.9		
	75%	1,019.4	1,070.7	757.4	774.4	1,032.0	1,032.0		
	50%	323.0	323.4	95.8	119.2	171.6	171.2		
	25%	41.8	42.1	19.9	20.8	6.0	6.0		
	5%	11.8	11.9	5.9	6.0	1.7	1.7		
	0% (MIN. dilution)	8.7	8.7	1.3	1.3	1.1	1.1		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,107.6	2,116.5	>1000000	>1000000	>1000000	>1000000		
	95%	1,672.2	1,653.4	2,106.7	2,068.3	1,697.3	1,717.1		
	75%	768.5	838.8	273.2	300.3	240.3	241.9		
	50%	252.8	305.8	51.9	63.1	19.6	19.7		
	25%	66.6	67.7	17.3	18.4	2.2	2.2		
	5%	18.4	18.5	4.8	5.3	1.2	1.2		
	0% (MIN. dilution)	11.7	11.7	1.4	1.4	1.0	1.0		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000			>1000000	>1000000
	95%	1,549.9	1,629.2	1,420.3	1,426.7			983.9	762.0
	75%	56.2	87.8	57.9	57.4			38.4	39.9
	50%	11.7	18.1	6.3	7.6			3.4	4.8
	25%	4.3	6.8	2.1	2.2			1.5	1.9
	5%	1.5	1.6	1.3	1.3			1.0	1.0
	0% (MIN. dilution)	1.0	1.0	1.0	1.0			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	52.2	3,646.0	1.0	1.0		
	95%	531.3	1,567.3	2.1	12.3	1.0	1.0		
	75%	35.2	96.1	1.1	1.4	1.0	1.0		
	50%	13.1	21.7	1.0	1.0	1.0	1.0		
	25%	4.2	9.3	1.0	1.0	1.0	1.0		
	5%	1.4	1.5	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.0	1.1	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	4,849.5	>1000000	>1000000	217.7	982.3	322.8	323.3
	95%	1,480.0	1,531.3	222.5	436.7	51.7	92.0	44.7	47.1
	75%	130.0	148.4	32.3	62.2	15.3	20.7	14.3	14.5
	50%	46.1	62.6	15.1	20.9	5.6	7.3	3.8	4.0
	25%	21.7	22.9	6.3	11.5	2.8	3.0	2.0	2.1
	5%	6.9	7.1	1.4	1.7	1.5	1.6	1.4	1.4
	0% (MIN. dilution)	1.2	1.2	1.1	1.1	1.2	1.2	1.3	1.3
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	2,714.7	421.5	10,090.9	272.7	272.8		
	95%	1,534.6	1,567.8	52.7	68.4	58.2	57.1		
	75%	273.6	323.6	17.3	22.0	15.0	15.0		
	50%	96.7	121.4	7.5	9.5	4.3	4.3		
	25%	44.8	45.8	3.6	4.3	2.2	2.2		
	5%	15.3	15.2	1.8	1.9	1.4	1.4		
	0% (MIN. dilution)	10.2	10.3	1.3	1.3	1.3	1.3		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	704.0	906.5			15.7	44.0
	95%	257.5	423.7	99.4	100.1			15.3	16.0
	75%	58.3	73.0	23.0	30.1			4.1	6.5
	50%	21.5	24.4	8.8	12.1			3.6	3.6
	25%	15.0	16.6	3.8	4.6			2.7	2.8
	5%	6.1	6.5	1.7	1.8			2.5	2.4
	0% (MIN. dilution)	1.9	1.9	1.4	1.4			2.4	1.8
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,912.5	1,716.5	>1000000	>1000000	>1000000	>1000000		
	95%	469.4	1,052.0	207.8	470.9	117.2	117.2		
	75%	165.4	227.9	73.3	91.5	27.6	27.5		
	50%	80.7	94.8	29.4	34.5	13.8	13.8		
	25%	46.7	51.0	20.7	21.5	3.7	3.7		
	5%	18.9	20.0	9.7	10.4	1.6	1.6		
	0% (MIN. dilution)	11.4	11.6	6.1	6.2	1.3	1.3		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.35(b) Dilution of Maitland River water in the near-shore , during the time period of : Season 1 (March 16 to May 16).

Length of time period (days)= 61 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,614.0	2,628.9	9,424.5	9,652.2	419,160.8	419,160.8		
	95%	2,167.6	2,145.7	2,183.2	2,257.1	7,656.2	8,089.8		
	75%	996.7	1,060.1	733.8	769.2	1,011.2	1,023.5		
	50%	308.5	312.7	95.1	117.8	157.6	155.6		
	25%	42.0	42.5	19.4	20.3	5.9	5.9		
	5%	11.8	11.8	5.8	6.0	1.8	1.8		
	0% (MIN. dilution)	9.4	9.4	1.7	1.6	1.2	1.2		

Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,103.2	2,097.3	17,781.1	17,946.1	344,482.8	344,482.8		
	95%	1,637.8	1,639.6	2,036.6	2,046.0	1,613.2	1,648.3		
	75%	762.8	799.2	240.0	272.6	218.4	221.5		
	50%	257.5	303.9	46.1	57.6	18.8	18.9		
	25%	67.5	67.2	17.0	18.1	2.2	2.2		
	5%	18.3	18.7	4.8	5.2	1.3	1.3		
	0% (MIN. dilution)	12.4	12.5	1.6	1.5	1.0	1.0		

Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	7,187.1	7,135.7			>1000000	>1000000
	95%	1,353.4	1,426.7	1,364.4	1,376.4			588.5	367.7
	75%	46.7	74.5	56.3	54.4			32.4	33.0
	50%	11.2	18.2	5.9	7.1			3.3	4.3
	25%	4.0	6.1	2.2	2.2			1.6	1.9
	5%	1.7	1.7	1.3	1.3			1.0	1.0
	0% (MIN. dilution)	1.1	1.1	1.1	1.1			1.0	1.0

Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	237,857.1	>1000000	12.1	88.4	1.0	1.0		
	95%	257.0	1,430.9	2.0	9.1	1.0	1.0		
	75%	25.0	82.1	1.1	1.4	1.0	1.0		
	50%	10.7	20.2	1.0	1.0	1.0	1.0		
	25%	4.0	8.3	1.0	1.0	1.0	1.0		
	5%	1.6	1.6	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.3	1.3	1.0	1.0	1.0	1.0		

Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	4,302.9	4,368.8	8,658.1	8,174.0	208.7	350.1	258.2	258.9
	95%	1,365.4	1,540.5	165.0	259.2	46.7	76.1	42.7	43.2
	75%	114.9	147.8	29.4	54.7	14.7	19.5	13.1	13.7
	50%	44.0	62.6	13.8	21.3	5.6	7.3	3.8	3.9
	25%	21.5	22.5	5.7	10.6	2.9	3.0	2.0	2.1
	5%	6.9	7.0	1.6	2.0	1.6	1.6	1.4	1.4
	0% (MIN. dilution)	1.3	1.3	1.2	1.2	1.2	1.2	1.3	1.3

Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,536.6	2,553.9	234.7	234.0	259.3	259.1		
	95%	1,492.7	1,486.8	48.3	55.0	51.6	51.7		
	75%	270.6	311.4	16.7	19.5	15.0	15.0		
	50%	95.8	114.7	7.4	9.1	4.2	4.2		
	25%	45.0	46.5	3.5	4.2	2.2	2.2		
	5%	15.1	15.1	1.9	1.9	1.4	1.4		
	0% (MIN. dilution)	10.4	10.5	1.6	1.6	1.3	1.3		

Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	3,470.4	17,712.8	433.4	433.1			15.6	37.5
	95%	185.4	338.0	92.5	90.7			15.4	16.0
	75%	55.8	70.9	22.5	30.4			4.2	6.2
	50%	20.9	24.2	8.5	11.5			3.6	3.6
	25%	15.3	16.6	3.9	4.9			2.7	2.8
	5%	6.2	6.7	1.7	1.8			2.5	2.4
	0% (MIN. dilution)	2.6	2.7	1.4	1.5			2.4	1.9

Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,523.8	1,575.3	1,935.4	1,620.4	536.0	536.1		
	95%	389.6	1,013.5	184.3	387.5	100.1	100.6		
	75%	169.2	223.5	71.6	90.2	26.4	26.4		
	50%	78.7	96.2	29.9	34.1	13.6	13.6		
	25%	46.5	50.1	20.9	21.6	3.7	3.7		
	5%	18.1	21.5	9.8	10.6	1.6	1.6		
	0% (MIN. dilution)	11.7	11.9	6.4	6.5	1.4	1.4		

Note: (1) *Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.35(c) Dilution of Maitland River water in the near-shore , during the time period of : Season 1 (March 16 to May 16).

Length of time period (days)= 61 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,464.6	2,417.9	2,550.6	2,489.7	6,931.5	6,996.2		
	95%	1,730.1	1,633.6	1,893.7	1,921.0	2,612.5	2,618.5		
	75%	821.5	968.7	379.7	410.1	820.7	822.3		
	50%	256.6	255.0	60.7	74.6	141.9	141.6		
	25%	38.8	39.3	21.1	21.5	5.1	5.1		
	5%	11.9	12.0	5.6	5.6	2.0	2.0		
	0% (MIN. dilution)	9.9	9.9	2.8	2.8	1.3	1.3		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,071.4	1,976.3	5,297.3	5,368.6	2,247.0	2,253.8		
	95%	1,530.6	1,528.0	1,484.6	1,521.2	1,275.5	1,568.8		
	75%	689.1	686.8	151.8	196.1	136.9	139.0		
	50%	266.0	287.5	43.0	50.7	11.6	11.6		
	25%	70.6	70.0	14.9	15.8	2.3	2.3		
	5%	17.9	18.2	4.8	5.3	1.3	1.3		
	0% (MIN. dilution)	14.7	14.6	3.2	3.8	1.1	1.1		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	3,314.8	3,208.8	5,205.4	5,176.2			1,945.5	2,376.9
	95%	243.2	1,057.0	239.9	1,057.5			105.1	145.4
	75%	31.4	43.3	20.2	19.2			13.9	15.8
	50%	8.1	18.1	5.2	6.3			3.2	4.3
	25%	3.9	5.9	2.2	2.4			1.7	1.9
	5%	1.8	1.8	1.5	1.5			1.2	1.3
	0% (MIN. dilution)	1.5	1.5	1.2	1.2			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	84.3	2,304.9	4.2	20.7	1.0	1.0		
	95%	60.3	257.0	1.8	4.3	1.0	1.0		
	75%	15.6	52.3	1.1	1.4	1.0	1.0		
	50%	7.8	19.5	1.0	1.0	1.0	1.0		
	25%	4.0	6.4	1.0	1.0	1.0	1.0		
	5%	1.8	2.4	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.5	1.5	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,763.5	2,670.5	219.6	258.9	95.3	92.0	106.6	106.3
	95%	399.9	1,348.9	56.1	200.9	37.2	65.9	32.3	33.6
	75%	79.2	111.5	20.2	40.2	10.6	16.8	9.7	10.5
	50%	39.7	52.3	10.5	19.0	5.5	6.4	3.6	3.9
	25%	18.3	22.9	5.7	8.9	2.9	2.9	2.2	2.2
	5%	7.2	7.2	2.0	2.4	1.9	1.9	1.4	1.4
	0% (MIN. dilution)	2.3	2.3	1.2	1.2	1.7	1.7	1.4	1.4
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,221.9	2,201.7	112.6	109.8	114.4	114.1		
	95%	943.2	1,406.7	41.3	41.4	44.0	44.1		
	75%	240.9	276.1	14.2	17.6	10.5	10.5		
	50%	107.4	114.2	6.5	8.4	4.1	4.2		
	25%	45.1	46.0	3.4	4.1	2.2	2.2		
	5%	17.9	17.9	2.1	2.2	1.4	1.4		
	0% (MIN. dilution)	11.1	11.2	1.9	1.9	1.4	1.4		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	282.9	2,762.7	286.8	292.4			15.5	23.6
	95%	89.2	101.9	56.5	56.6			15.2	15.9
	75%	42.7	50.9	22.1	22.6			4.1	5.7
	50%	20.7	23.8	7.3	9.9			3.6	3.7
	25%	14.9	17.0	4.4	4.9			2.7	2.8
	5%	7.1	7.2	1.8	1.9			2.5	2.4
	0% (MIN. dilution)	3.1	3.1	1.6	1.7			2.4	2.3
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	1,348.1	1,150.6	497.8	751.2	396.1	396.0		
	95%	300.5	778.3	112.2	253.3	72.6	72.5		
	75%	139.4	198.8	58.2	85.2	23.8	23.7		
	50%	73.2	86.5	28.3	30.7	9.2	9.1		
	25%	45.2	56.6	21.4	22.0	3.5	3.5		
	5%	21.9	21.6	15.2	15.1	1.8	1.8		
	0% (MIN. dilution)	11.9	12.1	7.7	7.8	1.5	1.5		

Note: (1) *Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.36(a) Dilution of Maitland River water in the near-shore , during the time period of : Season 2 (May 16 to Sep. 16).

Length of time period (days)= 123 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	6,842.5	>1000000	>1000000	>1000000	>1000000		
	95%	3,375.0	2,247.0	5,096.9	3,697.3	6,956.9	6,814.5		
	75%	606.6	606.6	453.7	495.0	502.8	503.5		
	50%	265.6	300.0	177.2	196.0	112.9	113.1		
	25%	185.3	203.1	113.5	114.9	20.5	22.6		
	5%	118.5	107.0	55.1	65.7	6.0	6.0		
	0% (MIN. dilution)	8.5	58.3	11.7	37.5	2.4	2.4		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	6,403.8	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	2,651.3	1,499.6	4,240.3	3,241.4	3,258.3	3,301.4		
	75%	512.0	705.5	346.6	399.9	141.3	144.4		
	50%	307.3	422.2	159.8	180.3	24.0	25.4		
	25%	204.7	287.2	91.7	104.3	6.5	6.8		
	5%	114.6	134.3	35.2	50.8	3.0	3.1		
	0% (MIN. dilution)	13.9	71.3	4.4	27.4	1.0	1.0		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000			>1000000	>1000000
	95%	1,912.7	2,510.1	931.9	1,007.9			195.9	206.1
	75%	136.8	260.5	35.5	71.9			8.6	17.9
	50%	59.0	102.0	9.0	18.2			2.9	6.2
	25%	22.1	51.1	4.2	8.5			1.8	2.9
	5%	3.1	23.5	1.9	3.4			1.2	1.4
	0% (MIN. dilution)	1.3	7.8	1.1	1.3			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	1.0	1.0		
	95%	531.0	1,911.7	107.7	575.0	1.0	1.0		
	75%	152.7	296.4	4.4	72.5	1.0	1.0		
	50%	69.2	146.8	1.6	18.8	1.0	1.0		
	25%	21.0	75.3	1.1	2.6	1.0	1.0		
	5%	2.7	30.2	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.3	9.3	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	552.2	>1000000	536.2	540.6
	95%	2,454.5	1,668.9	398.0	1,449.6	244.8	455.6	241.6	249.2
	75%	296.3	405.3	161.0	285.8	103.8	164.1	88.6	94.6
	50%	168.4	229.9	75.1	150.1	43.0	79.6	31.0	32.4
	25%	90.2	138.2	22.1	80.6	17.8	33.2	12.9	13.1
	5%	21.2	56.5	4.5	29.3	7.5	10.8	5.6	5.6
	0% (MIN. dilution)	2.9	14.7	1.9	5.7	3.0	4.3	3.2	3.2
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	788.5	>1000000	545.0	545.0		
	95%	2,422.7	1,155.4	284.5	396.3	269.0	265.6		
	75%	401.0	556.9	134.9	166.3	94.7	95.1		
	50%	249.1	338.3	50.9	78.2	31.7	31.9		
	25%	134.3	199.3	23.2	35.9	13.5	13.5		
	5%	45.5	77.3	9.5	13.1	5.5	5.6		
	0% (MIN. dilution)	8.0	44.6	4.3	6.2	2.8	2.8		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	2,006.0	>1000000			218.9	2,401.4
	95%	399.7	640.4	362.0	371.9			143.4	275.1
	75%	199.6	273.2	159.4	168.2			46.3	84.5
	50%	116.9	166.1	66.8	85.3			33.5	43.4
	25%	46.3	88.4	23.8	35.0			22.1	26.5
	5%	14.6	31.0	10.1	12.5			11.0	12.8
	0% (MIN. dilution)	3.7	7.1	4.4	4.7			5.4	4.2
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	4,826.1	18,500.0	999,000.0	>1000000	600.7	600.7		
	95%	580.1	871.3	484.2	663.2	394.8	393.6		
	75%	373.6	499.7	251.4	334.3	179.8	180.1		
	50%	244.3	310.2	155.8	193.8	91.3	93.1		
	25%	89.0	182.8	51.7	113.7	25.1	25.2		
	5%	37.0	84.1	17.3	41.8	8.5	8.5		
	0% (MIN. dilution)	9.9	45.3	5.6	13.0	3.0	3.0		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.36(b) Dilution of Maitland River water in the near-shore , during the time period of : Season 2 (May 16 to Sep. 16).

Length of time period (days)= 123 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	5,899.6	>1000000	>1000000	>1000000	>1000000		
	95%	3,331.3	2,239.7	4,801.8	3,586.8	5,561.7	5,562.6		
	75%	606.7	604.6	447.2	469.6	477.2	469.7		
	50%	264.1	300.6	174.5	190.6	111.2	111.2		
	25%	186.4	203.4	113.7	114.7	21.9	22.6		
	5%	120.8	109.6	56.0	67.2	5.8	5.8		
	0% (MIN. dilution)	9.3	71.0	15.8	40.0	2.5	2.5		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	5,686.9	4,442.6	>1000000	>1000000	>1000000	>1000000		
	95%	2,607.8	1,493.2	4,172.2	2,783.1	2,651.0	2,653.7		
	75%	510.8	695.8	334.2	383.1	118.2	134.7		
	50%	310.4	419.8	153.9	174.5	23.6	24.6		
	25%	204.5	288.3	89.4	105.3	6.1	6.6		
	5%	115.0	134.3	34.1	50.6	3.2	3.2		
	0% (MIN. dilution)	14.6	73.3	6.1	29.1	1.7	1.7		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000			>1000000	>1000000
	95%	893.9	2,249.8	761.3	921.6			162.7	161.3
	75%	123.4	240.3	29.9	65.7			7.9	15.1
	50%	51.4	100.5	8.3	16.7			2.9	5.8
	25%	19.3	51.3	4.2	8.4			1.9	3.0
	5%	3.5	23.6	2.0	3.6			1.2	1.4
	0% (MIN. dilution)	1.6	10.4	1.1	1.6			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	999,000.0	>1000000	2,063.3	7,470.1	1.0	1.0		
	95%	490.6	1,752.0	74.0	333.1	1.0	1.0		
	75%	141.6	282.9	3.9	60.4	1.0	1.0		
	50%	58.8	141.4	1.6	15.5	1.0	1.0		
	25%	16.9	74.0	1.1	2.6	1.0	1.0		
	5%	3.0	29.7	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.4	11.9	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	79,707.4	102,989.7	>1000000	>1000000	529.6	40,093.6	532.4	532.4
	95%	1,432.0	1,604.1	387.6	899.6	233.4	386.4	235.3	243.7
	75%	283.6	387.2	157.2	270.1	96.9	160.2	85.1	92.3
	50%	159.4	228.4	66.3	147.8	39.1	76.2	31.2	32.5
	25%	81.1	143.4	18.0	78.8	17.4	35.0	12.9	13.1
	5%	19.8	57.0	4.9	29.2	7.8	10.7	5.9	6.0
	0% (MIN. dilution)	4.3	21.9	2.3	6.7	3.5	4.9	3.3	3.3
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	14,947.6	4,391.2	545.4	12,453.8	538.2	538.2		
	95%	2,174.2	1,096.5	281.9	386.4	258.1	255.8		
	75%	394.0	549.9	129.2	164.1	92.1	92.1		
	50%	245.6	336.8	48.0	75.6	30.4	30.9		
	25%	130.9	201.4	22.9	36.1	13.5	13.5		
	5%	46.3	78.9	9.9	13.3	5.6	5.6		
	0% (MIN. dilution)	9.2	47.3	4.5	7.0	2.9	2.9		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	568.7	2,673.0			176.9	1,061.6
	95%	399.1	593.5	340.4	342.7			143.5	272.9
	75%	193.1	266.7	157.6	166.8			45.6	84.6
	50%	111.6	168.5	62.7	83.4			33.4	43.0
	25%	45.7	85.4	23.6	34.0			22.2	25.9
	5%	14.6	30.8	10.2	12.3			11.4	12.8
	0% (MIN. dilution)	4.2	7.1	4.6	5.0			5.8	4.9
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	3,435.0	6,154.0	171,257.1	155,688.3	598.0	598.0		
	95%	562.8	843.5	456.9	640.6	393.9	394.0		
	75%	372.5	489.7	241.7	330.9	178.1	177.7		
	50%	242.4	311.0	152.7	191.0	86.6	86.8		
	25%	85.5	183.2	51.2	113.9	24.4	24.8		
	5%	38.0	84.1	18.3	41.4	8.7	8.7		
	0% (MIN. dilution)	10.5	45.6	7.8	15.9	3.2	3.2		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.36(c) Dilution of Maitland River water in the near-shore , during the time period of : Season 2 (May 16 to Sep. 16).

Length of time period (days)= 123 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** ***(4.9)***		**Station 529** ***(2.0)***		**Wright Pt.** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	7,918.4	2,893.9	30,387.8	17,629.4	68,600.9	67,824.6		
	95%	3,293.8	2,126.0	4,518.8	2,996.9	3,500.3	3,494.0		
	75%	536.7	575.8	365.5	424.8	298.3	292.8		
	50%	266.1	290.3	162.2	180.4	106.0	106.9		
	25%	190.4	212.4	108.5	113.8	18.1	18.4		
	5%	130.5	111.8	60.2	70.7	6.3	6.4		
	0% (MIN. dilution)	22.2	87.8	22.4	47.9	3.2	3.2		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** ***(2.2)***		**Sunset Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	3,411.5	1,966.5	28,782.7	25,019.3	13,211.4	13,328.9		
	95%	2,592.5	1,374.8	2,675.7	2,417.3	1,976.7	1,811.6		
	75%	500.7	622.3	276.7	341.6	72.8	78.5		
	50%	284.7	422.1	138.5	166.1	17.4	17.5		
	25%	210.0	308.5	84.3	101.2	6.8	7.2		
	5%	131.9	135.7	41.7	57.3	3.3	3.4		
	0% (MIN. dilution)	17.8	83.8	15.0	36.5	2.0	2.1		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** ***(0.9)***		**Station 538** ***(0.2)***				**200 m North of mouth** ***(0.0)***	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	80,429.4	161,890.6	12,695.1	12,438.3			731.0	665.8
	95%	549.0	1,625.3	504.4	524.0			54.6	70.6
	75%	89.2	212.1	16.0	40.1			4.7	10.9
	50%	35.4	83.4	7.3	13.6			2.9	4.9
	25%	16.1	52.1	4.4	8.3			2.0	3.1
	5%	3.8	26.5	2.2	4.2			1.3	1.6
	0% (MIN. dilution)	2.5	17.1	1.7	2.0			1.1	1.2
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** ***(0.3)***		**Mait. River mouth** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	124,228.0	225,126.8	336.2	393.2	1.0	1.0		
	95%	328.9	1,120.1	10.4	129.5	1.0	1.0		
	75%	112.5	248.5	3.5	42.0	1.0	1.0		
	50%	43.8	128.2	1.7	10.0	1.0	1.0		
	25%	12.4	69.1	1.1	2.6	1.0	1.0		
	5%	3.5	38.5	1.0	1.1	1.0	1.0		
	0% (MIN. dilution)	1.9	17.6	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** ***(2.9)***		**Station 541** ***(1.3)***		**Station 543** ***(0.4)***		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	11,064.1	12,267.7	520.7	2,445.9	427.7	427.9	517.6	517.5
	95%	917.0	1,477.3	332.5	523.0	181.6	295.2	225.5	219.4
	75%	241.5	344.4	114.8	225.7	80.7	146.5	66.6	72.3
	50%	143.8	222.5	51.6	132.1	35.0	65.1	23.6	25.0
	25%	70.1	138.9	17.9	79.2	16.8	30.6	13.4	14.1
	5%	17.0	59.2	6.0	28.1	9.0	11.9	6.5	6.5
	0% (MIN. dilution)	8.1	38.4	3.1	10.4	4.9	7.1	3.8	3.8
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** ***(5.2)***		**Station 544** ***(0.5)***		**The Cove Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	7,298.6	2,565.7	450.8	457.9	530.5	530.6		
	95%	1,347.7	905.5	266.1	333.7	234.4	235.0		
	75%	371.8	510.7	106.0	148.3	82.2	84.1		
	50%	226.1	326.0	43.8	65.3	25.7	25.8		
	25%	125.6	199.9	23.9	34.1	13.0	13.0		
	5%	50.7	79.7	11.0	17.5	5.7	5.7		
	0% (MIN. dilution)	14.0	58.6	6.3	9.1	3.7	3.7		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** ***(2.1)***		**Station 546** ***(0.3)***				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	565.2	654.9	550.1	550.2			160.3	555.0
	95%	369.3	421.7	298.5	329.0			135.9	223.1
	75%	178.3	219.8	134.2	144.1			44.8	75.2
	50%	99.4	159.8	55.2	81.9			33.4	42.4
	25%	46.2	93.6	23.1	32.5			22.2	26.4
	5%	15.3	32.0	10.6	14.2			11.8	13.5
	0% (MIN. dilution)	7.4	7.8	5.0	6.2			6.5	7.0
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** ***(5.3)***		**Station 549** ***(2.5)***		**Black's Pt. Beach** ***(0.0)***			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	1,386.9	2,147.4	569.2	1,615.7	590.6	590.6		
	95%	513.9	742.1	396.5	548.9	377.4	378.9		
	75%	354.9	454.0	222.5	299.0	169.7	169.8		
	50%	236.3	305.3	142.1	187.3	72.3	72.4		
	25%	81.9	186.5	52.0	110.0	24.0	24.1		
	5%	40.6	94.2	16.9	45.1	9.3	9.3		
	0% (MIN. dilution)	13.6	70.6	11.3	18.5	3.9	3.9		

Note: (1) *Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.37(a) Dilution of Maitland River water in the near-shore , during the time period of : Season 3 (Sep. 16 to Dec. 1).

Length of time period (days)= 76 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	62,437.5	30,272.7	>1000000	>1000000	>1000000	>1000000		
	95%	986.2	985.0	882.0	883.0	589.7	590.0		
	75%	469.5	485.4	268.1	266.5	146.5	146.7		
	50%	185.1	182.7	71.3	70.2	18.9	18.9		
	25%	69.4	69.2	25.1	24.6	4.5	4.5		
	5%	34.7	34.2	15.2	13.4	1.7	1.7		
	0% (MIN. dilution)	15.5	15.4	5.1	4.7	1.2	1.2		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	2,054.7	1,977.4	1,027.1	1,060.0	359.7	374.1		
	75%	667.3	714.1	272.4	270.8	33.2	33.1		
	50%	252.8	288.1	56.0	55.2	9.1	9.1		
	25%	104.7	103.4	22.6	22.6	2.2	2.2		
	5%	48.1	48.7	13.6	12.0	1.2	1.2		
	0% (MIN. dilution)	20.4	20.2	2.9	2.7	1.0	1.0		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	4,197.5	>1000000			>1000000	>1000000
	95%	628.7	635.8	185.4	185.1			177.7	172.6
	75%	91.7	85.3	15.3	15.1			6.9	7.0
	50%	19.3	17.1	5.7	5.5			2.2	2.2
	25%	7.6	6.2	2.6	2.5			1.2	1.2
	5%	2.1	1.9	1.3	1.3			1.0	1.0
	0% (MIN. dilution)	1.0	1.0	1.0	1.0			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	1.0	1.0		
	95%	932.8	780.7	127.8	172.6	1.0	1.0		
	75%	120.9	89.0	2.9	1.7	1.0	1.0		
	50%	29.0	19.9	1.0	1.0	1.0	1.0		
	25%	14.0	5.3	1.0	1.0	1.0	1.0		
	5%	3.0	1.6	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.1	1.1	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000	2,275.6	2,275.6
	95%	1,099.5	1,106.6	1,239.8	1,215.0	842.7	821.7	871.9	875.6
	75%	419.4	415.0	134.2	126.9	49.8	50.4	50.3	50.3
	50%	65.8	63.9	30.1	26.4	12.1	11.7	9.2	9.2
	25%	31.2	30.1	14.7	11.3	4.5	4.0	3.0	3.1
	5%	15.7	15.0	3.9	2.5	1.8	1.8	1.6	1.6
	0% (MIN. dilution)	6.9	3.7	1.2	1.2	1.3	1.3	1.2	1.2
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	2,806.2	2,759.7	2,286.0	2,286.0		
	95%	1,536.5	1,460.5	929.1	940.7	924.8	924.8		
	75%	631.1	639.6	67.8	67.6	57.7	57.3		
	50%	145.9	147.2	16.3	16.3	11.4	11.5		
	25%	62.8	62.0	6.9	6.9	3.1	3.1		
	5%	34.4	34.1	2.0	2.0	1.6	1.6		
	0% (MIN. dilution)	15.4	15.3	1.3	1.3	1.3	1.3		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	8,395.0	8,687.0			49.9	50.0
	95%	1,268.1	1,274.6	1,217.4	1,222.2			41.8	41.5
	75%	327.9	325.9	104.2	104.0			21.2	21.2
	50%	44.2	44.0	23.4	23.2			7.7	7.6
	25%	24.0	23.9	6.3	6.1			4.4	4.3
	5%	9.9	9.6	2.2	2.2			3.4	3.4
	0% (MIN. dilution)	1.9	1.9	1.5	1.5			3.3	2.1
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	3,697.3	5,132.4	1,421.6	1,425.9	1,414.3	1,415.1		
	75%	673.6	710.5	498.5	498.3	205.8	205.4		
	50%	174.6	181.7	69.3	68.7	32.9	32.9		
	25%	67.9	68.1	30.3	29.8	9.1	9.1		
	5%	36.3	36.9	14.9	12.5	2.8	2.8		
	0% (MIN. dilution)	17.6	17.3	5.6	4.5	1.5	1.5		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.37(b) Dilution of Maitland River water in the near-shore , during the time period of : Season 3 (Sep. 16 to Dec. 1).

Length of time period (days)= 76 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	4,145.2	4,128.1	1,725.4	1,715.5	59,940.0	58,764.7		
	95%	957.9	944.6	736.5	737.8	562.3	562.1		
	75%	449.8	469.6	270.8	270.9	138.3	138.4		
	50%	179.2	176.7	63.5	62.3	18.7	18.7		
	25%	68.8	69.1	25.1	24.3	4.5	4.6		
	5%	34.8	34.2	15.6	13.7	1.7	1.7		
	0% (MIN. dilution)	15.8	15.7	8.1	7.2	1.2	1.2		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP*(6.7)***		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	12,618.9	13,843.0	4,909.1	4,913.1		
	95%	1,620.1	1,721.6	950.1	945.0	247.0	247.0		
	75%	662.1	697.1	245.7	245.1	29.3	29.3		
	50%	242.3	279.9	53.7	52.3	8.6	8.6		
	25%	107.0	104.3	22.4	22.5	2.3	2.3		
	5%	48.1	48.7	13.0	11.9	1.3	1.3		
	0% (MIN. dilution)	21.2	20.8	6.0	4.6	1.0	1.0		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth***(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	1,726.4	1,753.1	3,663.8	3,672.8			3,519.7	5,109.5
	95%	557.7	557.7	157.0	156.7			134.4	129.4
	75%	71.0	64.2	14.5	14.5			6.3	6.2
	50%	18.8	16.6	5.7	5.3			2.1	2.1
	25%	7.8	5.9	2.5	2.4			1.2	1.2
	5%	2.3	2.0	1.4	1.4			1.0	1.0
	0% (MIN. dilution)	1.2	1.1	1.1	1.1			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP*(1.2)***		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	2,123.3	2,117.3	5,135.4	>1000000	1.0	1.0		
	95%	716.4	716.3	54.8	90.0	1.0	1.0		
	75%	104.9	66.5	2.4	1.6	1.0	1.0		
	50%	27.3	15.3	1.1	1.0	1.0	1.0		
	25%	13.4	4.7	1.0	1.0	1.0	1.0		
	5%	3.5	1.7	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.5	1.4	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	982,623.0	>1000000	4,949.6	5,489.0	1,762.9	1,772.8	2,161.6	2,157.7
	95%	1,095.9	1,101.2	1,159.7	1,149.2	736.2	724.8	788.4	788.2
	75%	400.9	398.8	97.4	91.7	45.7	45.7	50.5	51.1
	50%	63.8	61.6	28.8	25.3	11.4	11.2	8.7	8.7
	25%	31.0	29.2	14.1	9.3	4.6	4.2	3.1	3.1
	5%	16.3	15.1	3.9	2.7	1.8	1.8	1.6	1.6
	0% (MIN. dilution)	10.1	4.1	1.6	1.4	1.4	1.4	1.3	1.3
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	2,376.7	2,298.3	2,213.4	2,210.2		
	95%	1,277.9	1,245.3	892.2	895.8	893.5	893.4		
	75%	626.7	637.1	63.2	63.1	56.3	56.4		
	50%	147.8	147.2	14.9	14.8	11.4	11.4		
	25%	62.2	61.6	6.9	6.8	3.3	3.3		
	5%	34.8	34.7	2.1	2.1	1.6	1.6		
	0% (MIN. dilution)	16.3	16.1	1.3	1.3	1.4	1.4		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	7,764.2	7,907.7			49.4	49.5
	95%	1,186.7	1,190.2	1,211.2	1,211.2			41.7	41.5
	75%	339.1	335.3	96.9	96.9			21.0	21.2
	50%	42.8	42.4	22.9	22.8			7.7	7.5
	25%	24.0	23.6	6.1	5.9			4.4	4.3
	5%	9.3	9.4	2.3	2.2			3.5	3.4
	0% (MIN. dilution)	3.3	3.3	1.7	1.7			3.3	2.2
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	3,308.0	3,374.6	1,326.6	1,328.9	1,322.3	1,322.4		
	75%	675.2	736.6	489.0	483.6	210.2	210.0		
	50%	169.8	183.8	69.1	68.0	32.4	32.4		
	25%	68.5	67.6	29.9	29.2	8.6	8.6		
	5%	36.8	36.5	15.0	12.8	2.8	2.8		
	0% (MIN. dilution)	17.7	17.4	7.5	7.4	1.6	1.6		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.37(c) Dilution of Maitland River water in the near-shore , during the time period of : Season 3 (Sep. 16 to Dec. 1).

Length of time period (days)= 76 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	1,835.8	1,764.5	1,254.3	1,267.8	1,137.7	1,139.1		
	95%	841.4	839.7	669.2	668.9	372.9	372.8		
	75%	397.7	396.6	196.2	196.7	71.8	71.9		
	50%	160.9	158.7	59.1	54.5	14.4	14.4		
	25%	74.7	74.0	26.2	25.3	4.8	4.8		
	5%	36.6	36.8	16.6	15.3	1.9	1.9		
	0% (MIN. dilution)	20.1	20.2	11.9	11.0	1.4	1.4		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	218,360.7	236,683.1	2,864.2	2,766.7	969.3	967.1		
	95%	1,014.6	1,055.0	749.5	745.0	177.6	177.6		
	75%	622.7	682.5	194.1	192.3	16.6	16.6		
	50%	229.6	257.6	38.8	38.5	6.6	6.7		
	25%	109.5	109.2	22.3	22.2	2.4	2.4		
	5%	52.7	53.6	14.9	13.7	1.4	1.4		
	0% (MIN. dilution)	24.1	23.8	10.6	6.8	1.2	1.2		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	703.0	705.5	899.1	901.4			2,291.5	2,720.7
	95%	337.8	337.4	57.0	58.8			43.8	42.2
	75%	60.8	56.7	11.1	11.0			5.2	5.2
	50%	15.0	13.0	4.9	4.8			1.9	1.9
	25%	6.8	5.4	2.6	2.6			1.4	1.4
	5%	2.4	2.4	1.5	1.5			1.0	1.0
	0% (MIN. dilution)	1.5	1.5	1.3	1.3			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	1,307.8	1,039.0	63.0	94.6	1.0	1.0		
	95%	520.4	486.2	29.3	45.9	1.0	1.0		
	75%	60.1	28.2	2.1	1.5	1.0	1.0		
	50%	23.6	10.3	1.1	1.1	1.0	1.0		
	25%	10.0	5.2	1.0	1.0	1.0	1.0		
	5%	4.9	2.0	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.8	1.6	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	113,041.0	97,305.2	1,757.0	1,753.0	1,418.7	1,422.7	1,487.3	1,488.7
	95%	808.8	809.9	718.6	719.9	701.7	699.2	622.9	622.7
	75%	345.3	339.6	55.0	47.2	32.3	32.4	40.7	40.7
	50%	54.7	52.2	25.4	21.9	9.9	9.5	7.3	7.3
	25%	31.7	30.1	12.1	8.2	4.3	4.0	3.4	3.4
	5%	19.2	15.3	5.6	3.7	2.0	1.9	1.7	1.7
	0% (MIN. dilution)	12.2	6.9	3.1	2.1	1.6	1.6	1.4	1.4
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	1,375.9	1,360.8	1,541.3	1,542.9		
	95%	1,098.8	1,087.7	747.0	743.1	642.7	642.7		
	75%	584.5	592.7	38.3	37.7	42.5	42.5		
	50%	151.4	157.0	13.0	13.1	7.7	7.7		
	25%	61.1	61.0	6.2	6.1	3.4	3.4		
	5%	35.2	35.2	2.3	2.3	1.7	1.7		
	0% (MIN. dilution)	22.8	22.6	1.6	1.6	1.5	1.5		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	943,937.0	982,623.0	5,802.5	5,766.2			46.9	46.9
	95%	1,088.6	1,093.7	887.7	887.9			41.0	40.6
	75%	203.3	202.0	65.4	65.5			19.8	19.7
	50%	38.0	37.8	16.9	16.7			7.8	7.5
	25%	21.1	20.8	6.8	6.2			4.4	4.3
	5%	11.5	11.0	2.2	2.2			3.6	3.4
	0% (MIN. dilution)	6.7	6.5	2.0	2.0			3.4	3.3
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	1,401.3	1,366.0	1,219.6	1,221.0	1,348.9	1,348.8		
	75%	642.8	662.8	364.5	404.2	112.4	112.4		
	50%	164.9	168.0	60.3	60.1	26.7	26.7		
	25%	64.4	63.8	32.2	31.0	7.2	7.2		
	5%	41.3	40.6	15.4	13.3	2.9	2.9		
	0% (MIN. dilution)	21.6	21.2	9.0	8.8	2.0	2.0		

Note: (1) *Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.38(a) Dilution of Maitland River water in the near-shore , during the time period of : All seasons (March 16 to Dec. 1).

Length of time period (days)= 260 ; Data-averaging length (hours) = 1

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	30,272.7	>1000000	>1000000	>1000000	>1000000		
	95%	2,664.0	1,990.0	3,375.0	2,588.1	4,897.1	4,873.2		
	75%	625.2	627.9	428.6	461.4	325.1	325.1		
	50%	251.1	279.7	149.6	159.8	83.5	83.6		
	25%	130.3	123.2	50.2	58.2	12.2	12.5		
	5%	28.5	29.5	12.7	11.4	2.0	2.0		
	0% (MIN. dilution)	8.5	8.7	1.3	1.3	1.1	1.1		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP** *(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	2,255.1	1,627.0	2,671.1	2,224.9	2,051.3	2,116.5		
	75%	622.8	718.2	311.8	366.5	121.9	122.5		
	50%	290.4	375.6	125.4	138.8	15.5	15.9		
	25%	141.1	152.7	35.9	44.8	4.3	4.4		
	5%	41.9	44.6	10.1	11.2	1.4	1.4		
	0% (MIN. dilution)	11.7	11.7	1.4	1.4	1.0	1.0		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000			>1000000	>1000000
	95%	938.9	1,731.4	756.8	925.9			308.1	284.9
	75%	111.4	156.7	29.7	47.0			11.6	16.8
	50%	34.7	56.9	7.4	11.6			2.8	4.4
	25%	9.2	15.7	3.0	4.1			1.6	1.9
	5%	2.1	2.5	1.5	1.5			1.0	1.0
	0% (MIN. dilution)	1.0	1.0	1.0	1.0			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP** *(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	1.0	1.0		
	95%	688.0	1,460.5	72.0	328.6	1.0	1.0		
	75%	126.1	211.4	2.7	23.6	1.0	1.0		
	50%	36.2	75.1	1.1	1.7	1.0	1.0		
	25%	10.5	18.2	1.0	1.0	1.0	1.0		
	5%	2.0	1.9	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.0	1.1	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000	2,275.6	2,275.6
	95%	1,493.3	1,548.8	669.6	1,160.3	386.3	538.3	380.9	378.4
	75%	275.3	352.3	127.6	200.1	63.5	108.8	53.9	58.4
	50%	110.6	151.6	36.6	77.0	21.0	30.9	15.8	16.0
	25%	39.7	51.8	13.3	20.8	6.5	7.9	4.7	4.8
	5%	12.0	15.4	3.1	3.8	2.0	2.0	1.6	1.6
	0% (MIN. dilution)	1.2	1.2	1.1	1.1	1.2	1.2	1.2	1.2
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	2,806.2	>1000000	2,286.0	2,286.0		
	95%	1,755.7	1,295.7	445.0	547.4	417.3	417.6		
	75%	432.3	543.8	86.6	114.4	59.7	60.0		
	50%	204.2	255.0	25.7	34.4	17.4	17.5		
	25%	75.1	89.0	8.9	10.3	5.0	5.0		
	5%	27.8	33.3	2.3	2.4	1.6	1.6		
	0% (MIN. dilution)	8.0	10.3	1.3	1.3	1.3	1.3		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	8,395.0	>1000000			218.9	2,401.4
	95%	723.4	867.9	540.6	560.6			91.3	180.8
	75%	177.5	226.3	111.8	129.5			34.8	43.1
	50%	62.8	91.4	30.7	37.8			15.0	17.2
	25%	23.5	30.2	9.7	11.5			4.5	4.5
	5%	9.0	10.1	2.2	2.3			2.6	2.6
	0% (MIN. dilution)	1.9	1.9	1.4	1.4			2.4	1.8
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	1,031.0	1,118.7	718.2	862.7	666.0	663.8		
	75%	377.1	507.1	222.4	295.7	149.3	149.6		
	50%	165.8	239.6	79.3	119.5	40.0	40.0		
	25%	66.9	94.4	29.9	40.0	12.7	12.8		
	5%	32.3	39.1	13.9	16.6	2.4	2.4		
	0% (MIN. dilution)	9.9	11.6	5.6	4.5	1.3	1.3		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.38(b) Dilution of Maitland River water in the near-shore , during the time period of : All seasons (March 16 to Dec. 1).

Length of time period (days)= 260 ; Data-averaging length (hours) = 6

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	5,899.6	>1000000	>1000000	>1000000	>1000000		
	95%	2,600.0	1,958.6	3,201.1	2,519.7	4,098.8	4,319.3		
	75%	616.8	619.6	399.7	444.3	317.1	316.9		
	50%	249.6	275.9	145.9	154.8	76.8	78.0		
	25%	128.7	123.0	47.1	56.5	11.9	12.1		
	5%	28.1	28.7	12.1	11.6	2.0	2.0		
	0% (MIN. dilution)	9.3	9.4	1.7	1.6	1.2	1.2		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	2,140.0	1,589.5	2,445.0	2,113.9	1,615.2	1,627.1		
	75%	614.8	706.9	298.1	359.1	112.9	115.4		
	50%	287.2	375.8	117.9	135.0	14.1	14.6		
	25%	142.8	153.2	35.3	43.1	4.3	4.5		
	5%	40.6	45.8	10.1	10.7	1.4	1.4		
	0% (MIN. dilution)	12.4	12.5	1.6	1.5	1.0	1.0		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000			>1000000	>1000000
	95%	786.7	1,422.7	573.4	833.0			185.9	188.2
	75%	101.1	148.6	25.1	40.1			9.8	14.6
	50%	28.9	52.9	7.1	11.0			2.7	4.1
	25%	8.8	15.6	3.2	4.0			1.6	1.9
	5%	2.3	2.5	1.5	1.6			1.0	1.0
	0% (MIN. dilution)	1.1	1.1	1.1	1.1			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	999,000.0	>1000000	5,135.4	>1000000	1.0	1.0		
	95%	567.0	1,205.9	47.9	178.5	1.0	1.0		
	75%	107.0	189.4	2.6	21.0	1.0	1.0		
	50%	30.9	69.6	1.2	1.7	1.0	1.0		
	25%	9.1	15.6	1.0	1.0	1.0	1.0		
	5%	2.1	2.2	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.3	1.3	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	982,623.0	>1000000	>1000000	>1000000	1,762.9	40,093.6	2,161.6	2,157.7
	95%	1,193.3	1,506.2	540.8	810.1	381.9	492.0	372.7	372.6
	75%	259.8	348.9	112.7	191.1	59.0	100.6	50.8	54.0
	50%	103.8	149.6	33.7	71.7	20.3	30.0	15.6	16.0
	25%	39.1	51.2	12.0	19.7	6.4	7.9	4.7	4.7
	5%	12.2	15.3	3.4	4.0	2.1	2.2	1.6	1.6
	0% (MIN. dilution)	1.3	1.3	1.2	1.2	1.2	1.2	1.3	1.3
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	2,376.7	12,453.8	2,213.4	2,210.2		
	95%	1,567.8	1,266.2	404.8	495.7	421.5	421.8		
	75%	419.9	535.0	82.6	108.5	57.3	57.8		
	50%	200.5	251.6	25.3	33.2	16.9	17.0		
	25%	75.6	87.5	8.8	10.4	5.0	5.0		
	5%	28.4	33.6	2.3	2.4	1.6	1.6		
	0% (MIN. dilution)	9.2	10.5	1.3	1.3	1.3	1.3		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	7,764.2	7,907.7			176.9	1,061.6
	95%	714.7	791.7	515.5	541.1			87.6	169.5
	75%	173.0	218.2	108.4	125.0			34.5	42.7
	50%	60.8	88.7	29.6	36.8			15.0	17.5
	25%	23.2	28.9	9.5	11.0			4.5	4.5
	5%	9.0	10.0	2.3	2.4			2.6	2.6
	0% (MIN. dilution)	2.6	2.7	1.4	1.5			2.4	1.9
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	995.8	1,098.9	686.5	823.8	630.7	630.5		
	75%	375.2	500.7	215.4	295.3	148.0	148.4		
	50%	161.6	240.3	79.8	118.3	39.2	39.5		
	25%	66.6	95.7	30.1	39.4	12.3	12.5		
	5%	33.1	38.8	13.7	16.7	2.4	2.4		
	0% (MIN. dilution)	10.5	11.9	6.4	6.5	1.4	1.4		

Note: *(1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.*

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)

Table. 5.38(c) Dilution of Maitland River water in the near-shore , during the time period of : All seasons (March 16 to Dec. 1).

Length of time period (days)= 260 ; Data-averaging length (hours) = 24

Transect 1: *(about 6.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 528** *(4.9)*		**Station 529** *(2.0)*		**Wright Pt.** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	7,918.4	2,893.9	30,387.8	17,629.4	68,600.9	67,824.6		
	95%	2,452.9	1,813.9	2,498.4	2,319.7	2,750.8	2,738.4		
	75%	562.3	574.2	324.2	364.0	261.6	261.9		
	50%	238.7	271.5	131.4	137.3	51.3	54.1		
	25%	122.9	116.6	39.7	51.1	9.0	9.1		
	5%	28.6	30.4	12.4	11.8	2.2	2.2		
	0% (MIN. dilution)	9.9	9.9	2.8	2.8	1.3	1.3		
Transect 2: *(about 3.0 km North of Maitland River mouth)*	Station *(km offshore)*	**Offshore ADCP***(6.7)*		**Station 532** *(2.2)*		**Sunset Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	218,360.7	236,683.1	28,782.7	25,019.3	13,211.4	13,328.9		
	95%	1,991.3	1,412.0	1,756.6	1,765.3	1,085.7	1,278.9		
	75%	535.0	660.3	215.8	269.2	67.7	75.2		
	50%	278.9	370.3	99.6	112.0	11.9	12.0		
	25%	139.1	142.3	32.2	37.8	4.3	4.3		
	5%	43.2	47.0	10.5	10.9	1.6	1.6		
	0% (MIN. dilution)	14.7	14.6	3.2	3.8	1.1	1.1		
Transect 3: *(about 0.9 km North of Maitland River mouth)*	Station *(km offshore)*	**Station 535** *(0.9)*		**Station 538** *(0.2)*				**200 m North of mouth** *(0.0)*	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	80,429.4	161,890.6	12,695.1	12,438.3			2,291.5	2,720.7
	95%	547.2	777.6	239.3	413.3			95.2	102.9
	75%	65.5	115.7	15.5	24.5			5.8	9.6
	50%	22.2	50.3	6.2	9.8			2.7	4.1
	25%	7.9	13.3	3.2	3.8			1.6	1.9
	5%	2.5	3.0	1.7	1.7			1.1	1.1
	0% (MIN. dilution)	1.5	1.5	1.2	1.2			1.0	1.0
Transect 4: *(about 0.1 km North of Maitland River mouth)*	Station *(km offshore)*	**Nearshore ADCP***(1.2)*		**Station 539** *(0.3)*		**Mait. River mouth** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	124,228.0	225,126.8	336.2	393.2	1.0	1.0		
	95%	340.8	802.5	10.5	94.7	1.0	1.0		
	75%	63.3	150.5	2.4	14.3	1.0	1.0		
	50%	22.9	59.1	1.2	1.8	1.0	1.0		
	25%	7.4	13.0	1.0	1.0	1.0	1.0		
	5%	2.7	2.7	1.0	1.0	1.0	1.0		
	0% (MIN. dilution)	1.5	1.5	1.0	1.0	1.0	1.0		
Transect 5: *(about 0.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 537** *(2.9)*		**Station 541** *(1.3)*		**Station 543** *(0.4)*		**St. Christopher Beach (0.0)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	113,041.0	97,305.2	1,757.0	2,445.9	1,418.7	1,422.7	1,487.3	1,488.7
	95%	881.2	1,451.9	388.9	552.1	273.3	353.9	293.8	293.7
	75%	223.2	310.5	75.0	167.2	51.7	81.9	42.3	42.0
	50%	86.4	145.7	26.4	60.1	17.6	26.7	14.6	15.0
	25%	35.3	45.6	10.6	17.3	5.9	6.9	4.7	4.7
	5%	12.6	13.4	3.8	4.8	2.1	2.1	1.6	1.6
	0% (MIN. dilution)	2.3	2.3	1.2	1.2	1.6	1.6	1.4	1.4
Transect 6: *(about 2.1 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 540** *(5.2)*		**Station 544** *(0.5)*		**The Cove Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	1,375.9	1,360.8	1,541.3	1,542.9		
	95%	1,286.4	1,204.7	383.8	373.0	386.7	385.7		
	75%	371.7	492.8	67.3	87.6	44.5	44.5		
	50%	179.8	241.2	23.8	30.9	15.7	15.7		
	25%	74.0	89.4	8.1	9.3	4.9	4.9		
	5%	30.2	33.9	2.4	2.7	1.7	1.7		
	0% (MIN. dilution)	11.1	11.2	1.6	1.6	1.4	1.4		
Transect 7: *(about 3.8 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 545** *(2.1)*		**Station 546** *(0.3)*				**Station 542 (inner harbour)**	
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*			*Surface*	*Bottom*
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	943,937.0	982,623.0	5,802.5	5,766.2			160.3	555.0
	95%	568.0	638.3	483.9	485.9			84.6	163.7
	75%	148.4	189.1	95.1	107.0			34.8	42.3
	50%	56.3	79.3	26.0	31.5			14.9	18.3
	25%	21.8	26.9	8.5	10.1			4.4	4.5
	5%	10.2	10.8	2.5	2.5			2.6	2.7
	0% (MIN. dilution)	3.1	3.1	1.6	1.7			2.4	2.3
Transect 8: *(about 6.0 km South of Maitland River mouth)*	Station *(km offshore)*	**Station 550** *(5.3)*		**Station 549** *(2.5)*		**Black's Pt. Beach** *(0.0)*			
	water-column location	*Surface*	*Bottom*	*Surface*	*Bottom*	*Surface*	*Bottom*		
Maximum dilution (as a function of the % of time during the period)	100% (MAX. dilution)	>1000000	>1000000	>1000000	>1000000	>1000000	>1000000		
	95%	788.2	928.8	644.1	722.8	573.5	573.7		
	75%	339.3	452.2	195.2	255.1	130.5	130.8		
	50%	155.2	222.7	73.6	114.3	32.1	31.6		
	25%	63.6	92.7	29.1	40.3	11.5	11.5		
	5%	34.2	40.8	15.1	17.6	2.6	2.6		
	0% (MIN. dilution)	11.9	12.1	7.7	7.8	1.5	1.5		

Note: (1) Dilution = $(C_{TRiver} - C_{LBgd}) / (C_{TStn} - C_{LBgd})$; where: C_{TRiver}, C_{TStn} are the total concentration in the River and Lake-Station, respectively; and C_{LBgd} is the general Lake background concentration.

(2) Dilution range classification: proportion of river water within lake is: Dominant (1.0 to 2.0) Very high (2.1 to 10.0) Significant (10.1 to 100.0)