S2 and S7 Waste Rock Landforms Hydrology Study

Groundwater Modelling

Talison Lithium Pty Ltd

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→ **The Power of Commitment**

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1. Introduction

1.1 Background

GHD Pty Ltd (GHD) was engaged by Talison Lithium Pty Ltd (Talison) to undertake a study (the Study) of additional proposed open pits and Waste Rock Landforms (WRLs). The Study includes hydrological and hydrogeological modelling of the proposed facilities and subsequent preliminary assessments of the environmental and human health risks arising from these facilities. The Study is focussed on the following facilities (see **Figure 1.1**):

– Expansion of existing open cut pits and development of new open cut pits.
– Establishment of the new Floyds Stage 2 (S2) and Stage 7 (S7) WRLs.

Assessments of the southern and eastern parts of the mine site and receiving catchments have been undertaken through the TSF4 Seepage Assessment (Woljenup Creek) and Eastern Catchments Hydrology Study (Hester Brook and its tributaries Salt Water Gully and Cascades Creek). The following reports are therefore referred to in this Study:

– TSF4 Seepage Assessment: Conceptual Hydrogeological Model (GHD, 2023a).
– TSF4 Seepage Assessment: Groundwater Model Update and Site Assessment (GHD, 2023b).
– TSF4 Seepage Assessment: Human Health and Environmental Risk Assessment (GHD, 2023c).
– TSF4 Seepage Assessment: Seepage Monitoring and Management Plan (GHD, 2023d).
– TSF4 Seepage Assessment: Woljenup Creek Hydrological Assessment. (GHD, 2023e).
– Eastern Catchments Study: Gap Analysis Report (GHD, 2023f).
– Eastern Catchments Study: Conceptual Hydrogeological Model (GHD, 2023g).
– Eastern Catchments Study: Water and Mass Balance Modelling Report (GHD, 2023h).
– Eastern Catchments Study: Groundwater Modelling Report (GHD, 2023i).
– Eastern Catchments Study: Preliminary Risk Assessment Report (GHD, 2023j).
– Eastern Catchments Study: Monitoring Plan (GHD, 2023k).
– TSF1 Seepage Assessment: Human Health and Environmental Risk Assessment (GHD, 2023l).

The purpose of this Study is to:

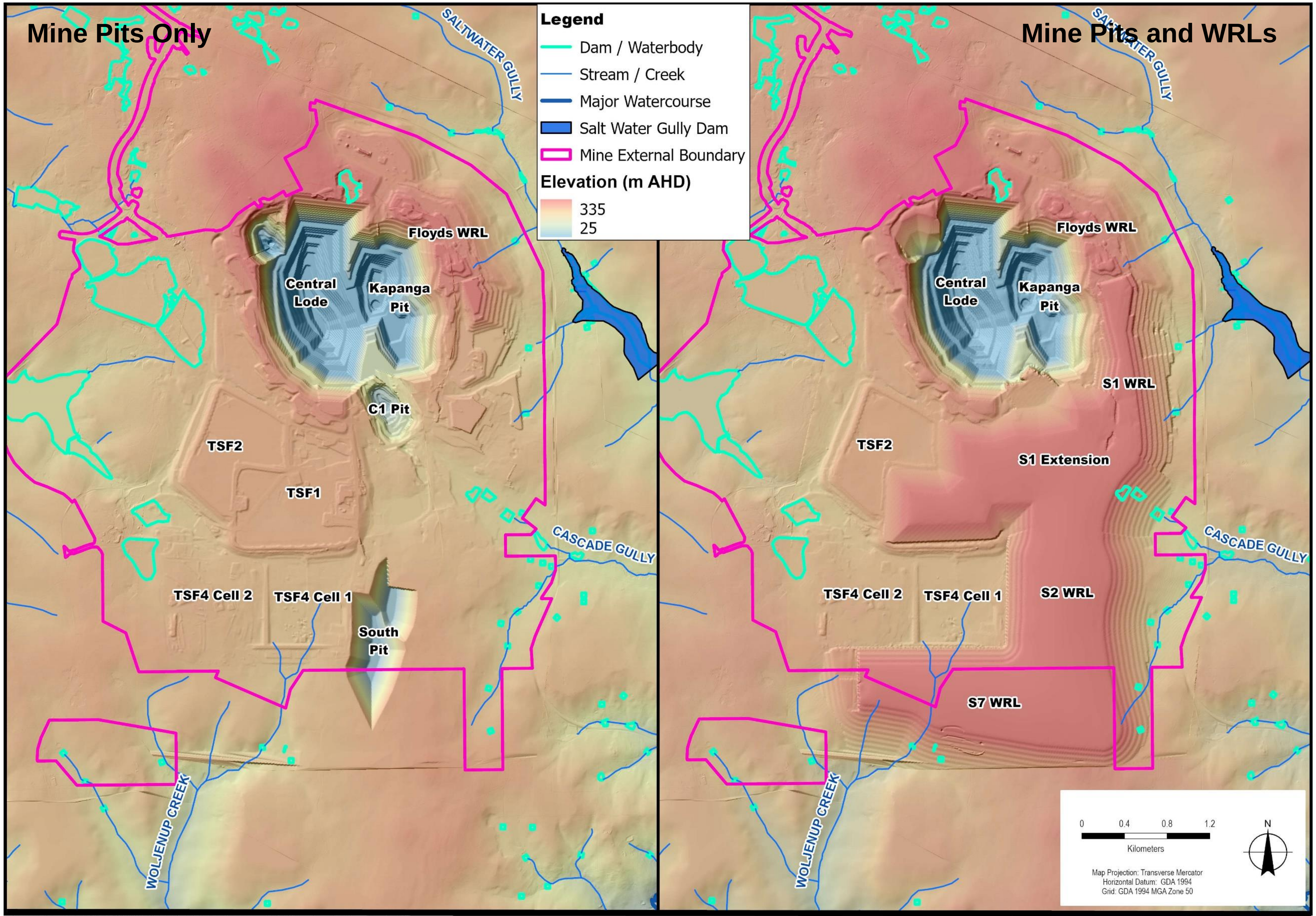
– Complete a baseline investigation.
– Assess the efficacy of existing management and monitoring of the existing and approved facilities as well as the proposed S2 and S7 WRLs.
– Complete a preliminary risk assessment of the proposed facilities.

The Study also intends to inform the need for management measures for incorporation into the proposed facility designs. The findings will be considered and incorporated into various Environmental Management Plans as appropriate. In doing so, the Study will support the applications for the various environmental approvals for the facilities.

The Study deliverables are:

– Gap Analysis (GHD, 2024a).
– Conceptual Hydrogeological Model (GHD, 2024b).
– Groundwater Modelling (this report).
– Surface Water and Mass Balance Modelling (GHD, 2024c).
– Preliminary Risk Assessment (GHD, 2024d).
– Water Resources Monitoring Plan (GHD, 2024e).

This report documents the groundwater modelling and fate and transport of key Contaminants of Potential Concern (CoPCs) emanating from the proposed new facilities on the mine site.



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Data source: GHD - Mine Facilities/ Landform Boundaries (2024). Talison Lithium - Mine External Boundary (2023), Mine Act Tenure Boundary (2024). Elevation (2022), 2052 WRL and Pit Shells Surface (2023) (GHD Edited 2024). Landgate - Dam / Waterbody, Major Watercourse, Stream / Creek (2020), Elevation (2020). Created by: hzhang4

Figure 1.1: Plan of the Proposed Facilities

1.2 Study Area

A site-wide groundwater model has been configured and calibrated for the mine site (GHD, 2023i). The model domain includes the potential groundwater impact areas downgradient of the proposed TSFs and pits. The groundwater model domain also matches the surface water model domain in this area. A plan of the groundwater model domain is provided in **Figure 1.2**.

1.3 Purpose of this Report

The purpose of this report is to present the understanding of groundwater flow and solute transport in and around the mine site, the potential impacts that the historical WRLs and TSFs have had on the chemistry of the groundwater in the receiving environment (i.e. current baseline), and the potential future impacts that proposed pits and WRLs may have on the groundwater chemistry. The understanding of potential impacts is presented in a hydrogeological conceptual model (GHD, 2024b) based on the following inputs:

- Local and regional hydrogeology.
- Potential interaction between the surface water and groundwater.
- Groundwater flow within water-bearing basement rock.
- Solute transport, including adsorption, within the aquifer and discharges to surface water (site drainage and natural waterways).
- Beneficial use of the groundwater.

This report should be considered an addendum to *Eastern Catchments Study: Groundwater Modelling Report* (GHD, 2023i), and should be read in conjunction with the referenced report. This report only documents the modification of the numerical groundwater flow and solute transport model detailed in the *Eastern Catchments Study: Groundwater Modelling Report* (GHD, 2023i) for application to this Study.

1.4 Scope and Limitations

1.4.1 General Limitations

This report has been prepared by GHD for Talison and may only be used and relied on by Talison for the purpose agreed between GHD and Talison as set out in **Section 1.3** of this report.

GHD otherwise disclaims responsibility to any person other than Talison arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

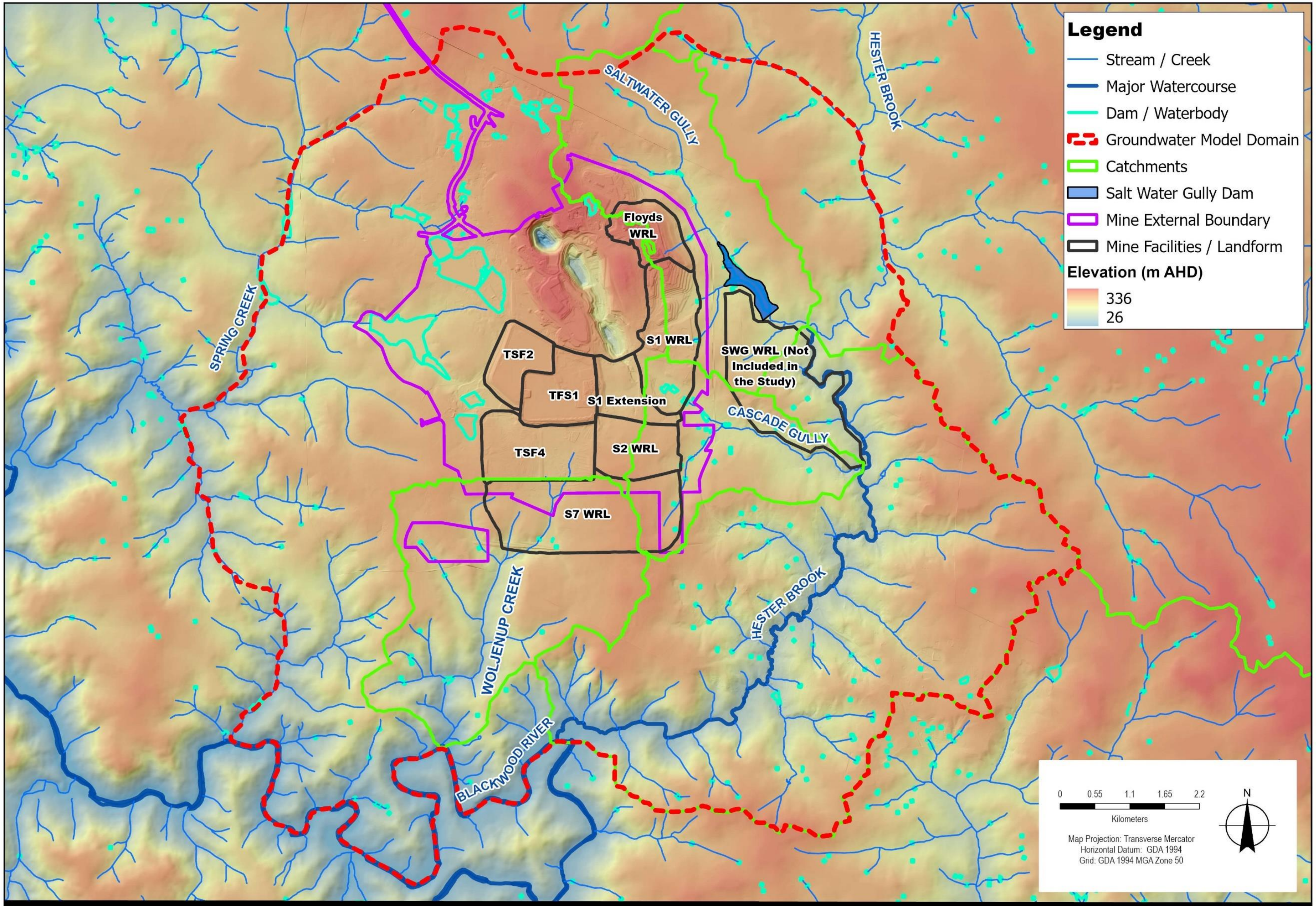
The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer **Section 1.5** of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

GHD has prepared this report on the basis of information provided by Talison and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.



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Data source: GHD - Catchments (2024), Groundwater Model Domain (2023), Salt Water Gully Dam (2023), Mine Facilities / Landform (2024). Talison Lithium - Mine External Boundary (2023), Mine Elevation (2023), Elevation (2022). Landgate - Dam / Waterbody, Major Watercourse, Stream / Creek (2020), Elevation (2020).
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Figure 1.2: Groundwater Model Domain

1.4.2 Groundwater Model Limitations

Numerical groundwater models are a mathematical representation of complex real-world systems. The physical domain of interest, comprising layers of rocks and sediments, is discretised into a number of cells and the parameters that control the movement of groundwater and solutes through these layers is prescribed to each cell. Inputs that vary over time are discretised into a limited number of stress periods and time steps. The governing groundwater flow and solute transport equations are solved by the code to compute hydraulic head, concentrations, and fluxes into and out of each cell. This mathematical representation of a natural physical system, using a finite number of cells, is a necessary simplification that is inherent in all numerical modelling. The degree of simplification is influenced by factors including the availability of data, scale of the model, intended model use and computational demand of modelling techniques.

As with all models, the level of uncertainty is larger in parts of the model where observations are not available to constrain the model parameters or benchmark the performance of the model. Site-specific data are available for parameters such as horizontal hydraulic conductivity of the upper weathered materials, but uncertainty remains in areas where data is currently absent or limited, such as the physical and chemical properties of the tailings and the chemical properties of the underlying sediments and rock. As additional data become available over time, the model can be periodically updated and the level of confidence in model's outputs would increase accordingly.

An important limitation of the modelling and associated conclusions of this report are based on observation data from a very limited period of time. For this model, as is typical for most mine simulations, in the order of decades of water level and mine progression data are available for calibration, but the model needs to run for hundreds of years post-closure until quasi-steady-state conditions are achieved. As such, the data are only representative of current climatic conditions, and the system may behave differently beyond those conditions experienced in the limited observation data set. This may have important implications for the effectiveness of the remedial system as modelled in this study under significantly different long-term climatic conditions. However, the limited fluctuation in groundwater levels in response to seasonal rainfall variations suggests that climate variability impact would not be significant, compared to other impacts such as mine dewatering.

1.5 Assumptions

This report is based on the assumptions that the previously used hydraulic and geochemical properties (GHD, 2020), (GHD, 2023a), (GHD, 2024b), and the current WRL designs are representative of future site conditions. Site-specific adsorption isotherms based on adsorption testing have been used in solute transport modelling and are assumed to be appropriate given the relatively low concentrations of key solutes present in the leachate and decant.

2. Model Background

2.1 Objectives of the Modelling

The objectives of the groundwater modelling are to predict the collective seepage from the existing and proposed facilities:

– Tailings Storage Facilities (TSF1, TSF2, and TSF4).
– Waste Rock Landforms (Floyds, S1, S2, and S7 WRLs).

and to assess the flow rate and chemistry of groundwater discharging to surface water systems in the Study Area. The modelling considers the progression and backfilling of the various mine pits over time.

Two development scenarios have been adopted to assess the impacts on groundwater of constructing the proposed S2, and S7 WRLs, these being:

– **Base Case:** Groundwater impacts of the mine site facilities as they currently exist.
– **Impact Case:** Groundwater impacts of existing mine site facilities plus proposed facilities.

Comparison of the modelling results from these scenarios provides an indication of the incremental impacts resulting from the proposed WRLs.

The term “seepage” herein relates to impacted waters which migrate from the facilities into the underlying strata, and which seep in the direction of groundwater flow. The impacted seepage waters may contain elevated CoPCs, primarily metals, which are derived from leaching from the facilities (waste rock or tailings), and/or from slurry waters used during tailings deposition. For this model, arsenic and lithium were modelled as being representative of strongly and weakly attenuated CoPCs, the adsorption characteristics of which can be used to reliably infer the distribution of other CoPCs.

The groundwater modelling achieves the objectives via the following:

– Modelling the seepage inputs into the underlying strata.
– Attenuation of CoPCs within the underlying strata.
– Migration of the seepage with groundwater flow (rates and volumes).
– Discharge locations of any residual seepage impacts (e.g., creeks, dams, rivers).
– Predictive estimates of CoPCs concentrations and loads to the receiving environments.

This modelling has been based on a modification of previous site groundwater models by GHD (2019), GHD (2020), and GHD (2023h). No additional calibration or assessment of model sensitivity or uncertainty has been carried out since the baseline parameters were not changed and there are no monitoring data from within the model extension area. Calibration statistics were checked, however, to confirm they were consistent with previous values.

2.2 Scope of Modelling Works

The scope of the modelling work reported on herein comprised:

– Reviewing changes to TSF designs, inclusion of the proposed WRLs, and any new aquifer hydraulic or geochemical properties obtained since previous modelling stages.
– Modification of model materials and internal boundary conditions (flow and transport) to reflect changes in TSF designs, WRL landforms, and pit progressions.
– Adjustment of surface drainage to broad catchment-wide seepage faces, with additional drainage to simulate the proposed drain through the former dredge ponds to the east of TSF1, to better reflect site conditions.
– Updating the open pit dewatering simulation to use progressively deepening Drain (DRN) cells based on historical Central Lode and Cornwall Pit shells and proposed pit design, including expansion to the east to Kapanga Pit (combined as Northern Pit) and the Southern Pit. Model.
– Renewing the recharge flux and concentrations to reflect the progressive expansion of historical and proposed WRLs, including that to be established over TSF1.

- Modelling the post closure pit lake using the Lake (LAK) package and then using the predicted pit lake level data to re-run the model with the pits simulated as drain cells to allow for transport modelling.
- Running the groundwater flow and solute transport modelling for historical (1980-2023) conditions, ongoing mining operations (2023-2052), and post-closure conditions (2052 to 2099) to determine the extent of contaminant plumes and predict inflows to the various drainage systems over time.
- Extracting surface water discharge flux and solute mass from drain cells and preparing flux, solute mass and discharge concentration time series for use in surface water modelling.

2.3 Model Development History

The history of modelling at the site is detailed in the *TSF4 Seepage Assessment: Groundwater Model Update and Site Assessment* (GHD, 2023b) which should be read in conjunction with this report. A summary of the evolution of the groundwater model development is as follows:

- **Stage 1:** An initial single layer MODFLOW NWT and MT3D-USGS model was constructed and calibrated by GHD (2019) and used to assess pit inflows.
- **Stage 2:** This model was then expanded by GHD (2020) into a 3-layer model to assess post-closure pit lake levels.
- **Stage 3:** The model was further modified by GHD (2023b) to laterally refine the model grid around the mine pit and TSFs and vertically refine the model into 11 layers, to allow inclusion of the various weathering zones (saprolites, saprock and alluvial sands), TSF features (liners and tailings) and WRLs.
- **Stage 4:** The model domain was extended to include the receiving environment for the Eastern Catchment Study (GHD, 2023i), namely Cascades Gully and the lower Hester Brook catchments, and to simulate Salt Water Gully Dam, Floyds and S1 WRL extensions, and S8 WRL.
- **Stage 5 (current stage):** This model has been further modified, as noted in **Section 2.2** and **Section 3**.

3. Model Construction

3.1 Model Grid

The model grid frame, cells and activation areas are shown in **Figure 3.1**. Lateral cell dimensions range from 20 m x 30 m in the TSF area to 10 m x 100 m in the model fringes. Cells were refined to restrict adjacent dimension changes to less than a factor of 1.5 and maintain aspect ratios lower than 10:1.

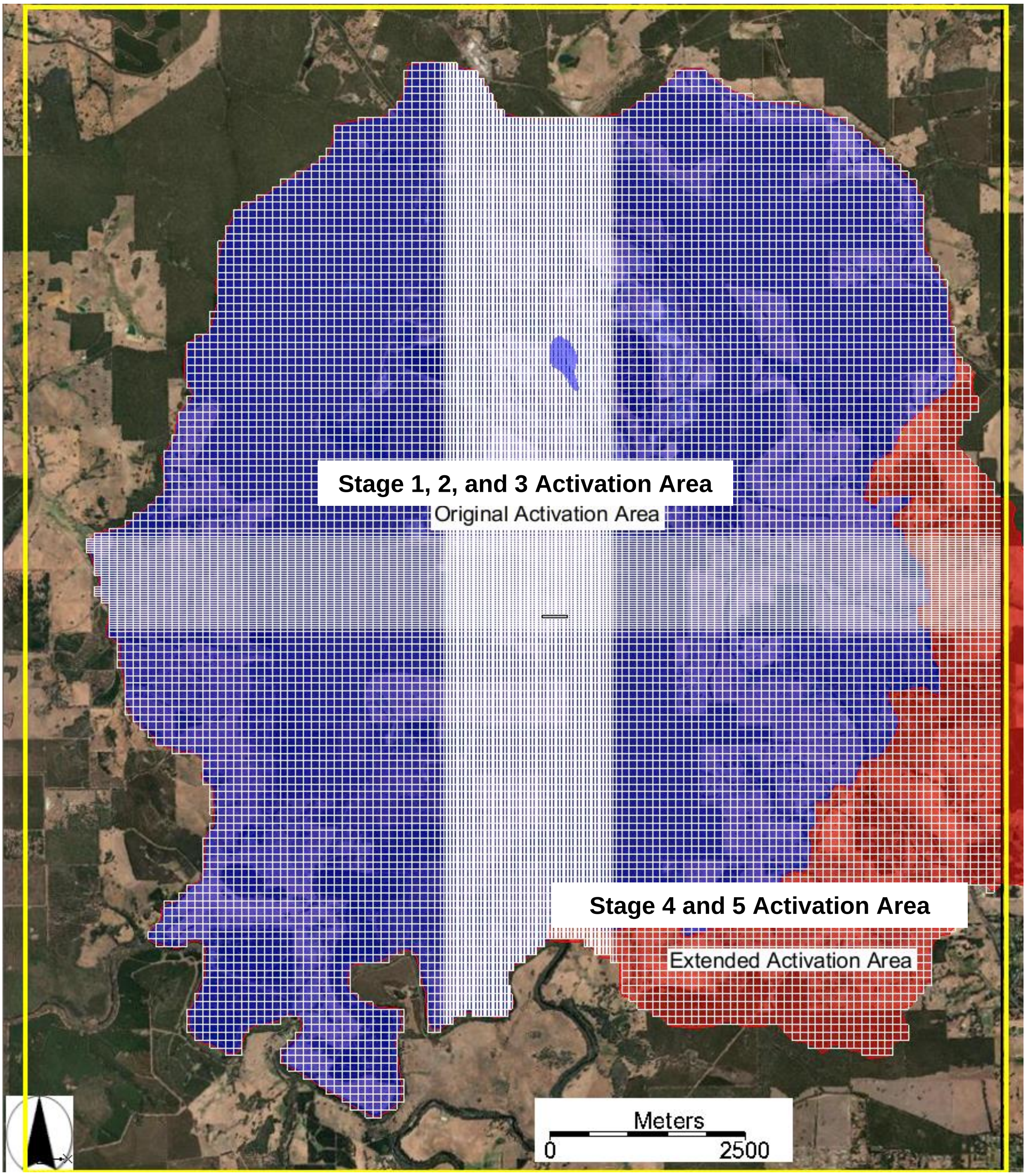

Figure 3.1: Model Activation Areas[1]

[1] Blue - Original activated cells
Red – New activated cells
Yellow – Model extent
White Lines - Grid cells

3.2 Model Layers

The model comprises 11 layers with variable thicknesses, elevations, and properties to reflect the infrastructure and underlying geology. The layers represent the features and lithologies detailed in **Table 3.1**, which have a constant thickness with their base configured relative to the pre-mine surface elevation. Further details of the model construction and calibration are provided by GHD (2023b) and GHD (2023i). The TSF4 liner was updated to reflect the constructed mix of a Bituminous Membrane (BGM) liner and compacted clay. Material properties were consistent with the previous models, other than longitudinal dispersivity, which reduced from 10 m to 1 m to improve model stability and better reflect likely conditions.

Table 3.1: Layer Tops and Bottoms Relative to pre-TSF4 Surface[2]

Layer	Depth From (m)	Depth to (m)	Thickness (m)	Dominant lithologies
1[3]	0	1	1	Tailings beach, tailings interior, waste rock, TSF embankments, embankment clay core, and palaeochannel sands
2	1	1.6	0.6	TSF liner, pallid saprolite, palaeochannel sands.
3[4]	1.6	10	8.4	Pallid saprolite, palaeochannel sands
4	10	18	8	Non-pallid saprolite
5	18	20	2	Saprock
6	20	40	20	“U” Upper fractured bedrock”
7	40	60	20	“M” Middle fractured bedrock
8	60	100	40	As above
9	100	180	80	As above
10	180	-100 mAHD	>1 Variable	As above
11	-100 mAHD	-200 mAHD	100	“L” Lower fractured bedrock

3.3 Model Boundary Conditions

The boundary conditions remained the same as those documented in the *Eastern Catchments Study: Groundwater Modelling Report* (GHD, 2023i), with the following exceptions:

- Surface drainage was simulated using the MODFLOW seepage face option, with seepage polygons set to match final surface water catchments, which was undertaken to simplify post-model extraction of discharge flux and mass data.
- Additional pit shells were configured to add more steps to the historical and proposed pit drain elevations defined by a transient Triangulated Irregular Networks (TINs) of the northern and southern pits.
- The Lake package was used to simulate post-closure northern pit lake levels (southern pits are proposed to be backfilled).
- Recharge concentrations and rates from the historical and proposed WRLs (see proposed footprints in **Figure 3.2**), were modelled as follows:
  - Recharge concentrations were initially set to be the same as the regional recharge of 0.0056 mg/L of arsenic and 0.0246 mg/L of lithium, which were based on the average background concentrations in groundwater from wells outside likely impacted areas, same as for the *Eastern Catchments Study: Groundwater Modelling Report* (GHD, 2023i).
  - Concentrations were increased after commencement of deposition in the WRLs to 0.056 mg/L of arsenic and 0.166 mg/L of lithium based on the results of waste rock leachate testing (GHD, 2023m) and historical WRL seepage (see progressive footprints of the WRLs in **Figure 3.2**).
  - Transient recharge rates simulated prior to 2023 were based on calibrated rates from previous pit lake and inflow models as a percentage of rainfall. Post 2023 transient recharge rates were based on seepage rates modelled for the WRL design covers using climate data for the 50th percentile of

[2] Data provided for post pit conditions. Key layers were removed within the opencut.
[3] Layer 1 has a base 1 m below pre-mine surface and a top that varies over time as tailings and waste rock are deposited. Pallid saprolite makes up the rest of Layer 1 outside the various tailings and embankment areas.
[4] Sand paleochannel in Layer 3 is assumed to be removed from beneath TSF4.

predicted rainfall climate change scenarios, which are documented in the *Conceptual Site Model* (GHD, 2024b) and the average percentage of rainfall for the period 1980 to 2022 for undeveloped areas.

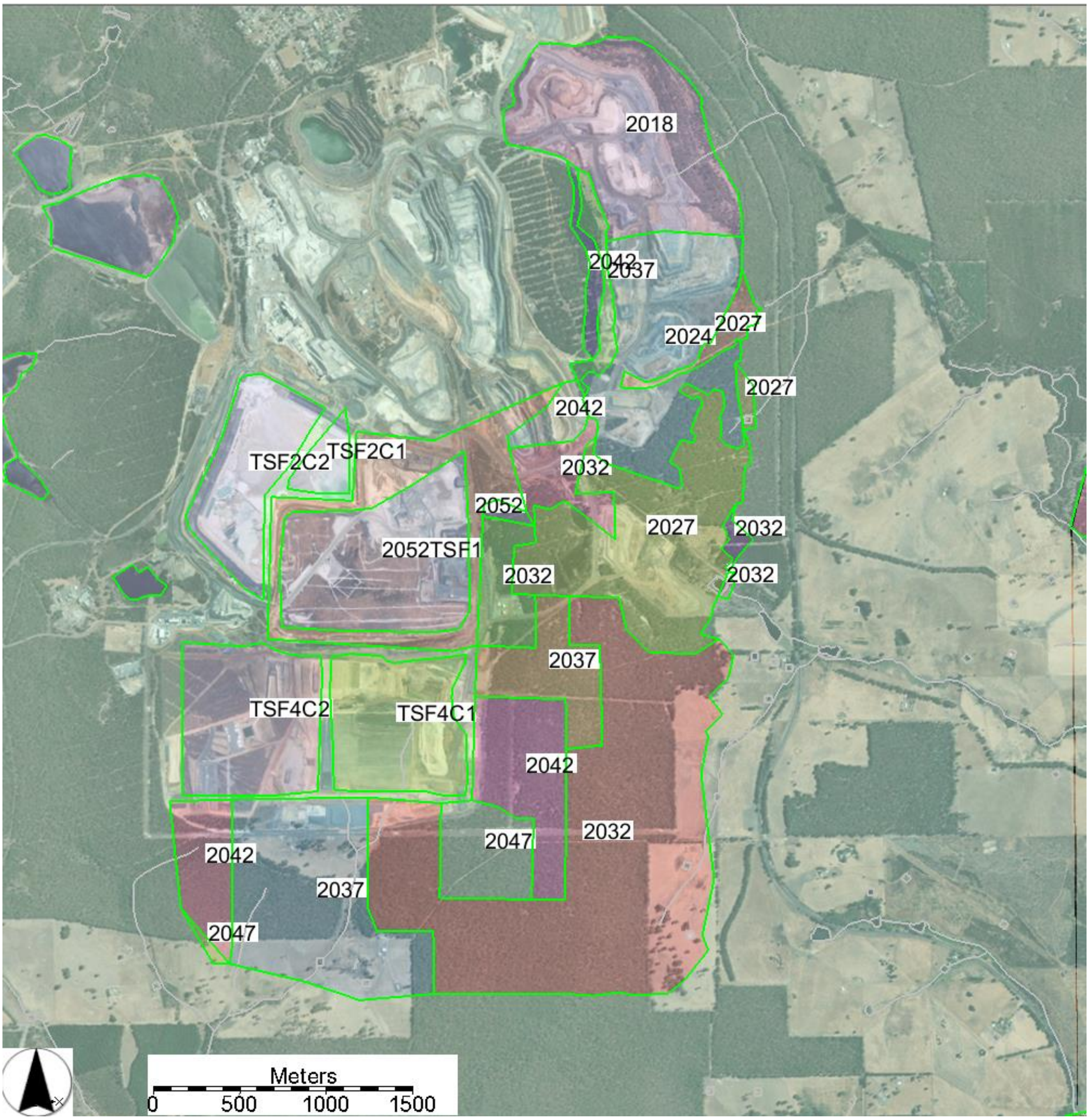

Figure 3.2: WRL Footprint Progression[5]

5 Numbers are years completed, when recharge changes.

4. Predictive Modelling

4.1 Modelling Approach

4.1.1 Historical Model (1980 to 2023)

The historical model (*Talison_2024NWT_009*) was configured to include the flow and transport sources of the progressive development of the opencut, existing TSFs and water storage dams, the existing Floyds WRL, and the MSA embankment.

4.1.2 Future Mining Model (2023 to 2053)

The future mining model (*Talison_2024NWT_017*) was the same as the historical model, but included the construction and operation of TSF4, construction of SWG Dam and progressive expansion of the opencut pits and WRLs. The model was simulated from 2023 to 2053, which represents the active period of pit development and waste rock placement. The model surface (top of Layer 1) was modified to reflect the progressive pit, WRL, and TSF topographies. The area within the pit drain zone, simulated with either drain or lake packages, was left as a flat surface at around 290 m.

4.1.3 Post-Closure Model (2053 to 2100)

The post-closure model was based on the final stress period of the 2023-2053 model, with the formation of the pit lakes initially modelled using the MODFLOW NWT Lake package. As solute transport for the NWT LAKE package is not supported in GMS, the area of Lake cells was replaced with Drain cells and the modelled lake gauge data used to define the rising drain elevation over time. It should be noted that the post-closure modelling was terminated at 2100 due to non-convergence at some late stress periods as agreed with Talison. Accordingly, modelling results for 2123 and 2913 are not presented as they were for the *Eastern Catchments Study: Groundwater Modelling Report* (GHD, 2023i).

4.2 Water Quality Guidelines

Water Quality Guidelines (WQGs) were derived for the downstream beneficial uses for the *TSF4 Seepage Assessment* (GHD, 2023n) and have been adopted to assess the fate and transport modelling of the key CoPCs. A summary of the WQGs for arsenic and lithium (the key CoPCs modelled) is provided in **Table 4.1**.

Table 4.1: Water Quality Guidelines (GHD, 2023n)

Contaminant	Water quality guideline (mg/L)				
	Agricultural use - Livestock	Agricultural use - Irrigation	Aquatic Environment	Potable use	Non-potable use
Sample type	Unfiltered	Unfiltered	Filtered	Unfiltered	Unfiltered
Arsenic	0.5	0.1	0.013 (as AsV) 0.024 (as AsIII)	0.01	0.2
Lithium	0.82	2.5	2.0	0.007	0.14

4.3 Plume Extents

4.3.1 Arsenic

The modelled arsenic plumes (contours of concentrations reflecting the various WQGs) in layers 2, 3, and 5 are provided as follows:

– Plume extents in 2023 in **Appendix A**.
– Plume extents in 2030 in **Appendix B**.
– Plume extent in 2040 in **Appendix C**.

– Plume extent in 2070 in **Appendix D**.
– Plume extents in 2100 in **Appendix E**.

The modelling results indicate that:

– The current impact (2023) is confined to Layer 3 and above, within the footprints of TSF1, TSF2, and Floyds WRL (see **Appendix A**). A small zone is associated with seepage from the existing Salt Water Gully Dams. The concentration contours of 0.010 mg/L and 0.013 mg/L within the plume indicate that the drinking water and aquatic environment WQGs, the most stringent of these guidelines, are exceeded immediately below the TSFs, WRLs and dam. These results are qualitatively consistent with observed values, although formal numerical calibration was not appropriate given the steep concentration gradients in the monitored areas.
– There is no noticeable migration of the plumes from TSF1 and TSF2 in Layer 2 by 2030, either horizontally or vertically (see **Appendix B**). Any increase in extent of arsenic impact corresponds with the expansion of the WRLs and is confined to their immediate footprint. Arsenic impact from TSF4 is evident beyond a zone within the Layer 2 clay lining in Cell 1.
– The impact of the expanding WRLs generally breaks through into in Layer 2 around 1 to 10 years after commencement.
– The plume within layer 2, emanating from the WRLS, extends to cover most of the footprint of these facilities by 2100 (see **Appendix D**). The drinking water and aquatic environment WQGs remain the only guidelines exceeded.
– There is no noticeable lateral migration of the plumes emanating from the WRLs by 2100 (see **Appendix E**). By this date, the plume from Floyds WRL and MSA has emerged in Layer 3. There is a small plume from Floyds WRL and the WRL areas immediately to the west has migrated Layers 4 to and 9 within the opencut pit.

The impact case modelling results indicate the following:

– The first indications of arsenic impact from Floyds appeared in groundwater in the Layer 2 saprolite in 1990. As the S2 and S7 WRLs expand, the area of groundwater with arsenic above the 0.01 mg/L (drinking water guideline) and 0.013 mg/L (aquatic environmental guideline) expand but are retained within the footprint of the WRLs.

4.3.2 Lithium

The modelled lithium plumes (contours of concentrations reflecting the various WQGs) in layers 2, 3, and 5 are provided as follows:

– Plume extents in 2023 in **Appendix F**.
– Plume extents in 2030 in **Appendix G**.
– Plume extent in 2040 in **Appendix H**.
– Plume extent in 2070 in **Appendix I**.
– Plume extents in 2100 in **Appendix J**.

It should be noted that the background lithium concentrations exceed the drinking water guidelines (0.007 mg/L) across much of the mine site and the upper reaches of the receiving catchments, so it was not possible to depict these concentration contours.

The base case modelling results indicate that:

– The current impact (2023) of the TSFs and WRLs is mostly confined within the landform footprints except for the eastern side of TSF1, where the plume extends ~400 m in Layer 2 into the area of historical dredge mining (concentration of 0.14 mg/L contour only representing the non-potable water guideline), and approximately 100 m to the east of the Floyds WRL (see **Appendix F**). The maximum concentration simulated is around 6 mg/L below TSF2, which exceeds all guidelines.
– By 2030, groundwater above 0.14 mg/L is present below the Floyds WRL and the WRL segment immediately south. The plume below Floyds has reached Layer 9, drawn in by pit dewatering. The 0.14 mg/L contour from TSF1 has migrated to extend around 1.2 km eastwards, beneath the WRL (see **Appendix G**).
– By 2040 the impact from the WRLs remain within the WRL footprint, mostly confined to layer two, except beneath Floyds, where it reaches Layer 7 over around half or the footprint. The plume from TSF1, defined

by the 0.14 mg/L contour now extends to the eastern edge of the WRL, and some areas beneath the WRL exceed 0.82 mg/L (see **Appendix H**).

– By 2070 more of Layer 2 is showing impact but below 0.82 mg/L. The are of the TSF1 plume exceeding 0.82 mg/L has almost disappeared and the 0.14 mg/L contour has not extended any further east. Impact above 0.14 mg/L does not extend beyond Layer 3, other than the Floyds area and the TSF1 plume (see **Appendix I**).

– By 2100 the 0.14 mg/L contour encompass almost all of the areas of Layer 2 below the WRLS and much of Layer 3 and 5 and extending in part down to Layer 9 The 0.14 mg/L contour extends east of the WRLS some areas, with the maximum extent of around 200-300 m in Layer 5 saprock. At the water table (Layers 1 and 2), the plume remains within the WRL footprint (see **Appendix J**).

5. Conclusions from Modelling

The previous groundwater flow and solute transport model was modified to reflect proposed expansion of waste rock landforms WRL S2 to S7. The modelling indicates that the arsenic and lithium plumes from the existing and proposed WRLs and TSFs are generally constrained close to or within the TSF or WRL footprints. Modelling predicts a lithium plume extending east along the palaeochannel sand from TSF1, but it remains almost entirely beneath the proposed WRLs, primarily due to capture by the main pit (active and post closure lake). Isolated plumes of elevated lithium extend within the saprock up to around 300 m east of the WRLs but do not extend in the uppermost layers likely to discharge to surface.

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GHD. (2023g). *Eastern Catchments Study: Conceptual Site Model Report. Repoprt for Talison Lithium Pty Ltd. October 2023. Ref 12604929.*

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GHD. (2023i). *Eastern Catchments Study: Groundwater Modelling Report. Repoprt for Talison Lithium Pty Ltd. December 2023. Ref 12604929.*

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GHD. (2024b). *S2 and S7 WRLs Hydrological Study: Conceptual Site Model. Draft Report prepared for Talison Lithium Pty Ltd. April 2023. Ref 12604929. .*

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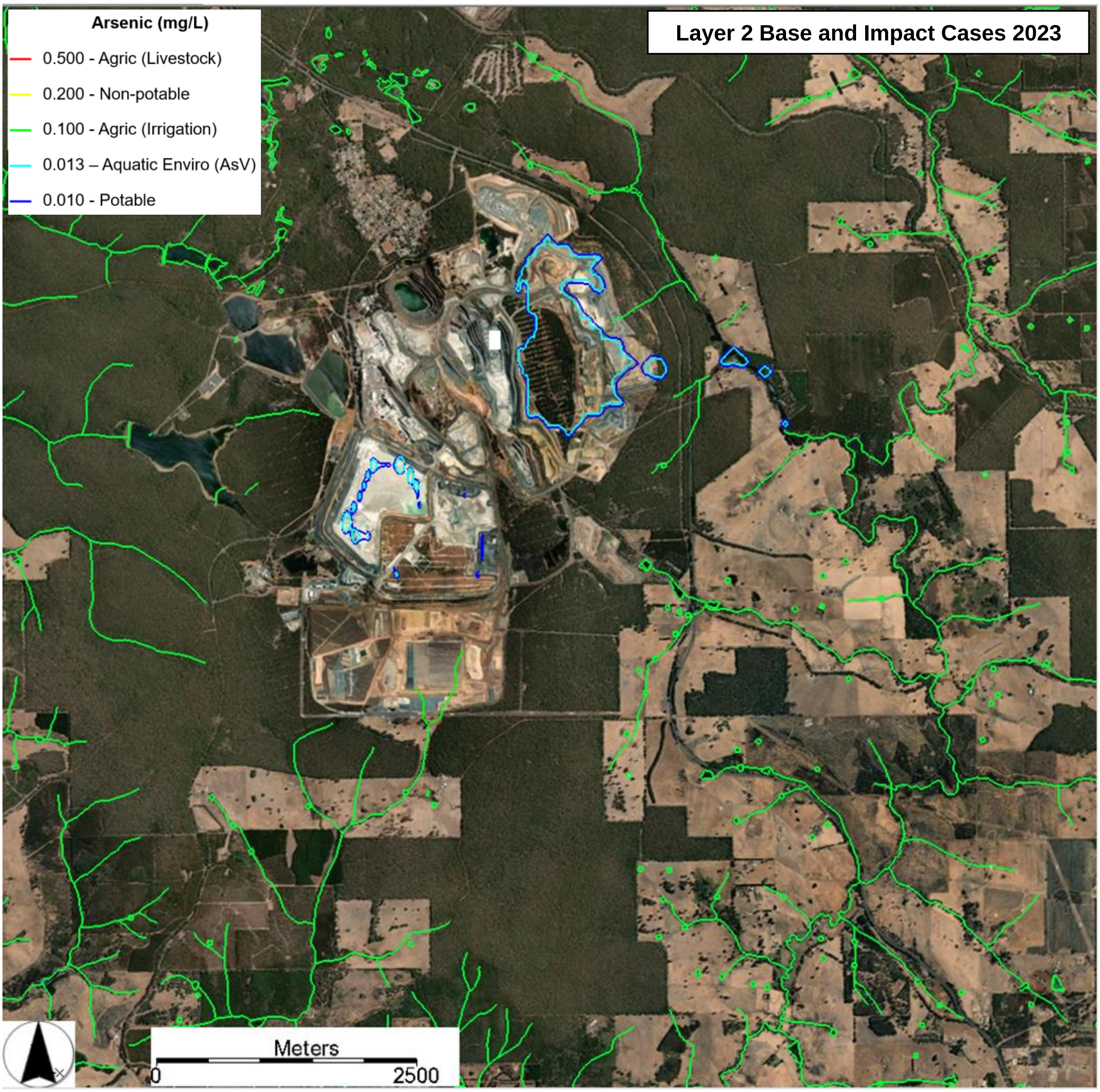
GHD. (2024d). *S2 and S7 WRLs Hydrological Study: Preliminary Risk Assessment. Report to be prepared for Talison Lithium Pty Ltd. Undated. Ref 12604929.*

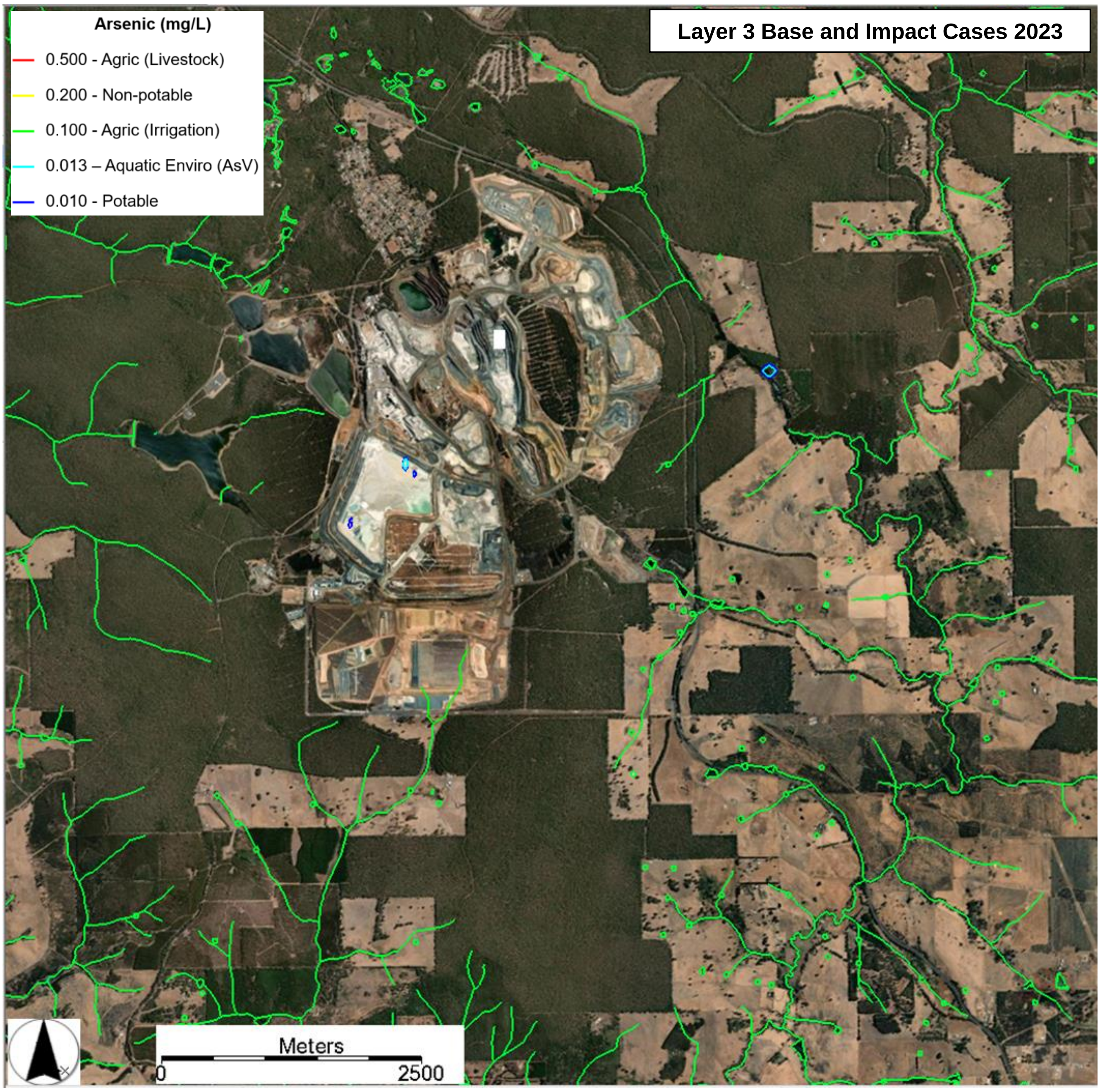
GHD. (2024e). *S2 and S7 WRLs Hydrological Study: Monitoring Plan. Report to be prepared for Talison Lithium Pty Ltd. Undated. Ref 12604929.*

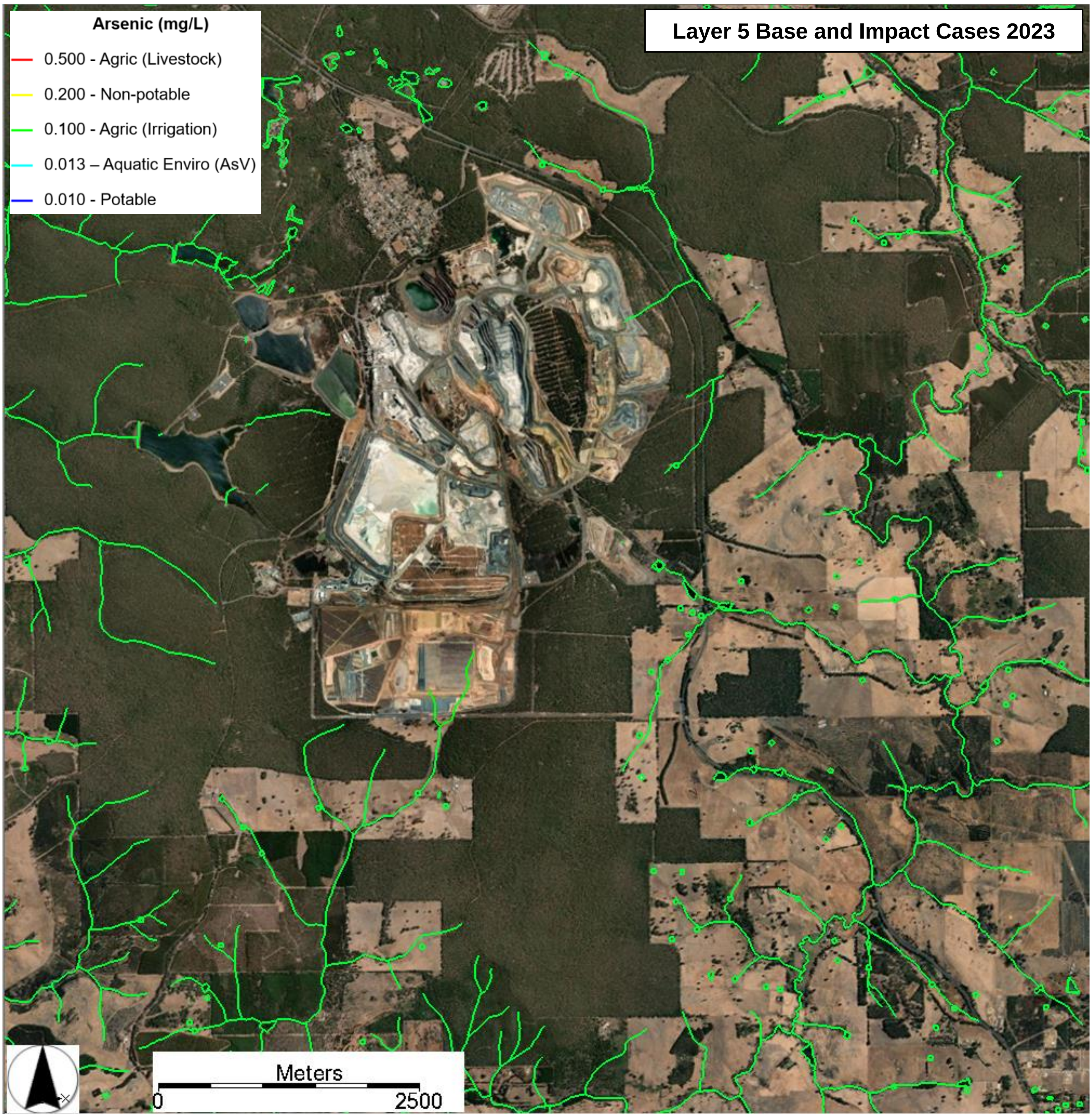
Appendices

Appendix A

Modelled Arsenic Plumes in 2023

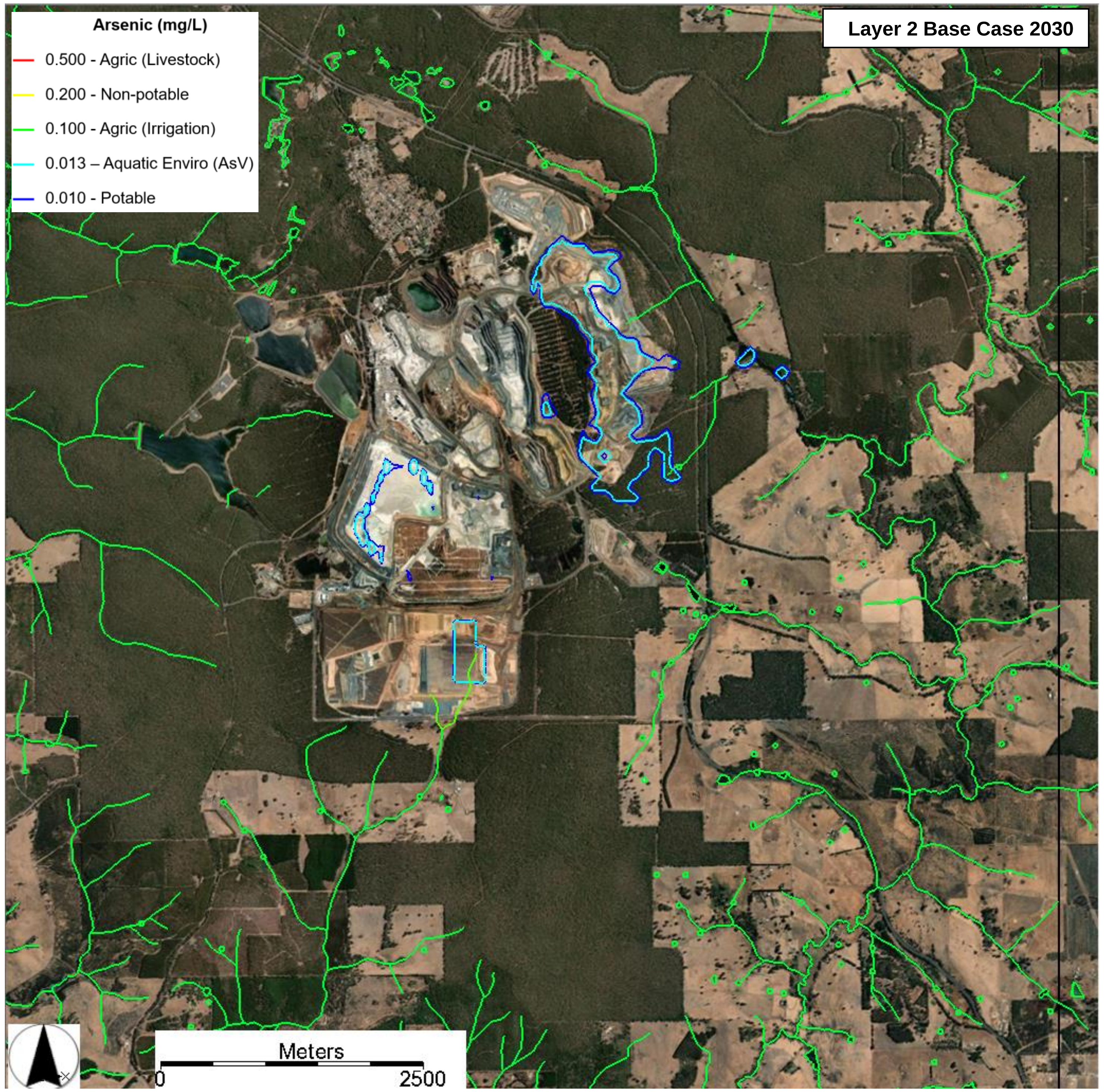

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 2 Base and Impact Cases 2023
Meters
0
2500

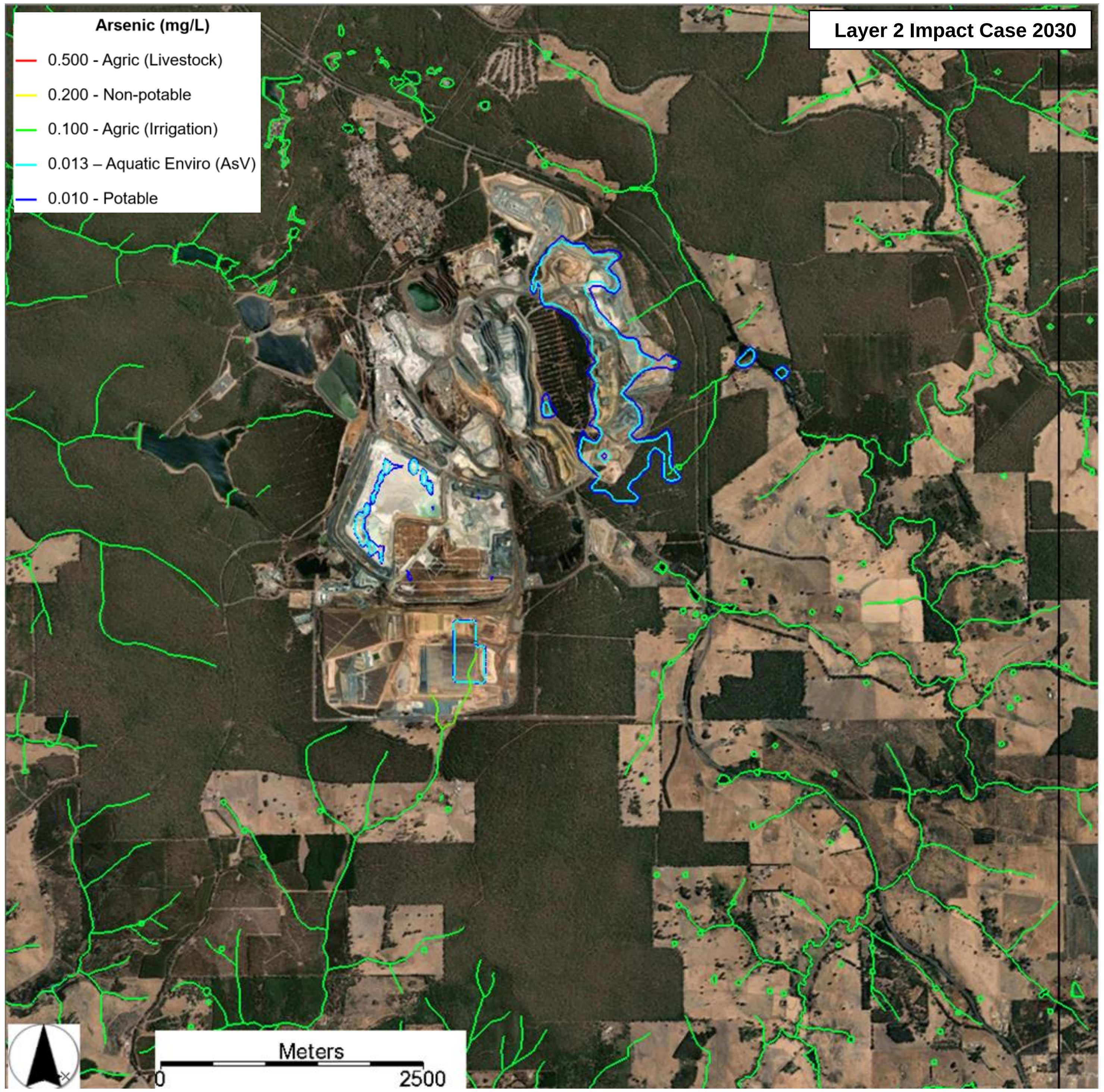

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 3 Base and Impact Cases 2023
Meters
0
2500

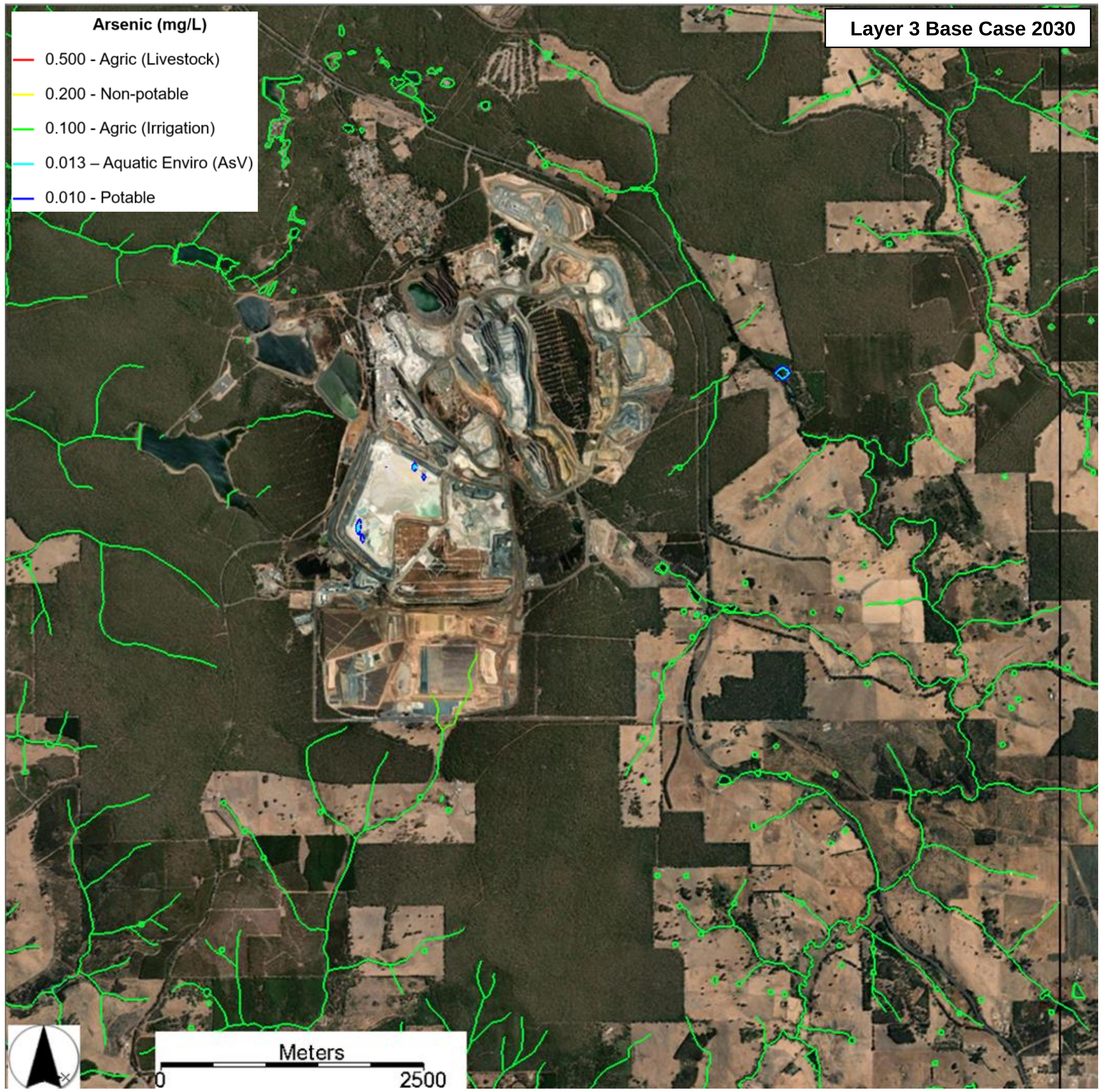

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 5 Base and Impact Cases 2023
Meters
0
2500

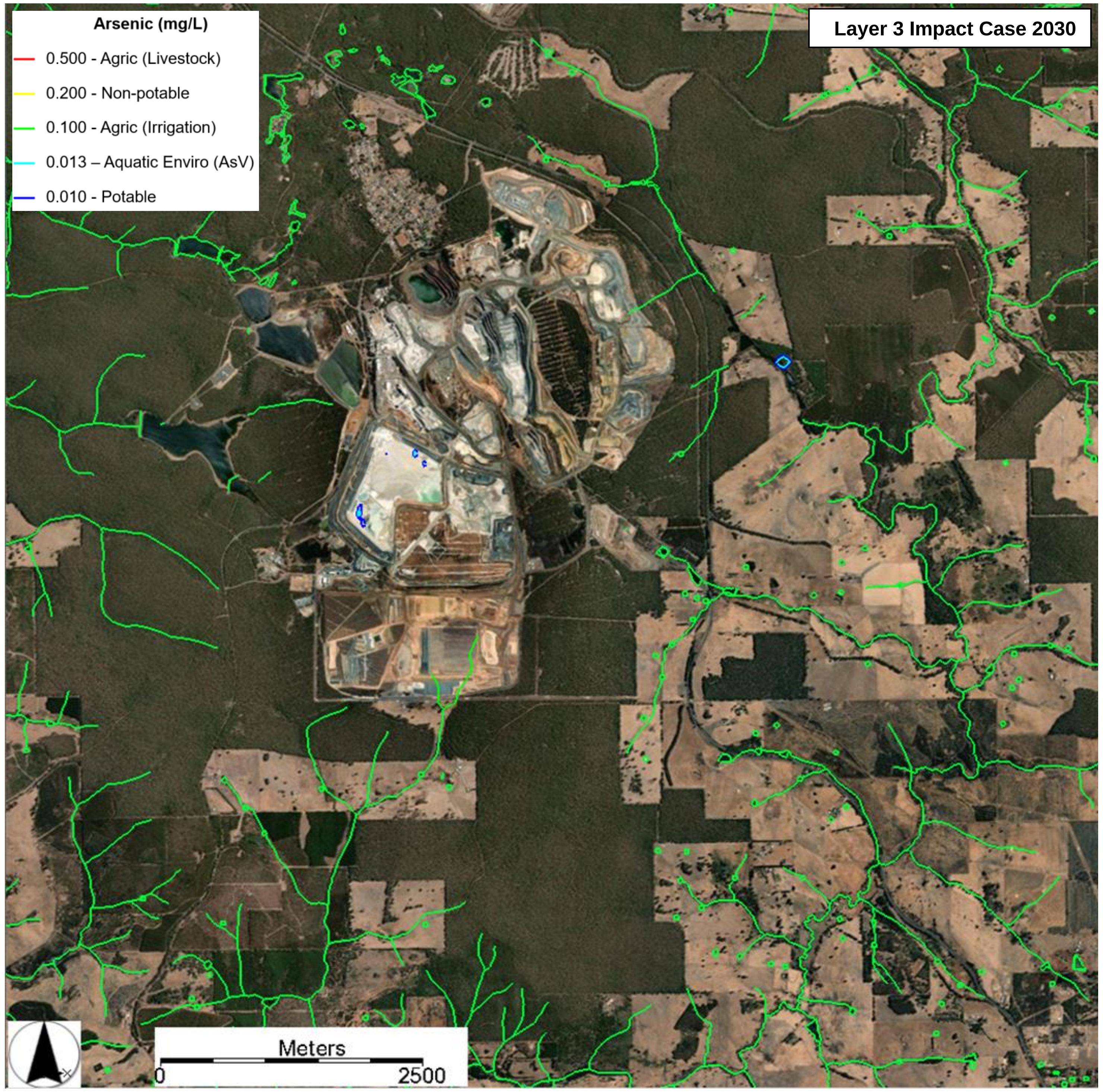
Appendix B

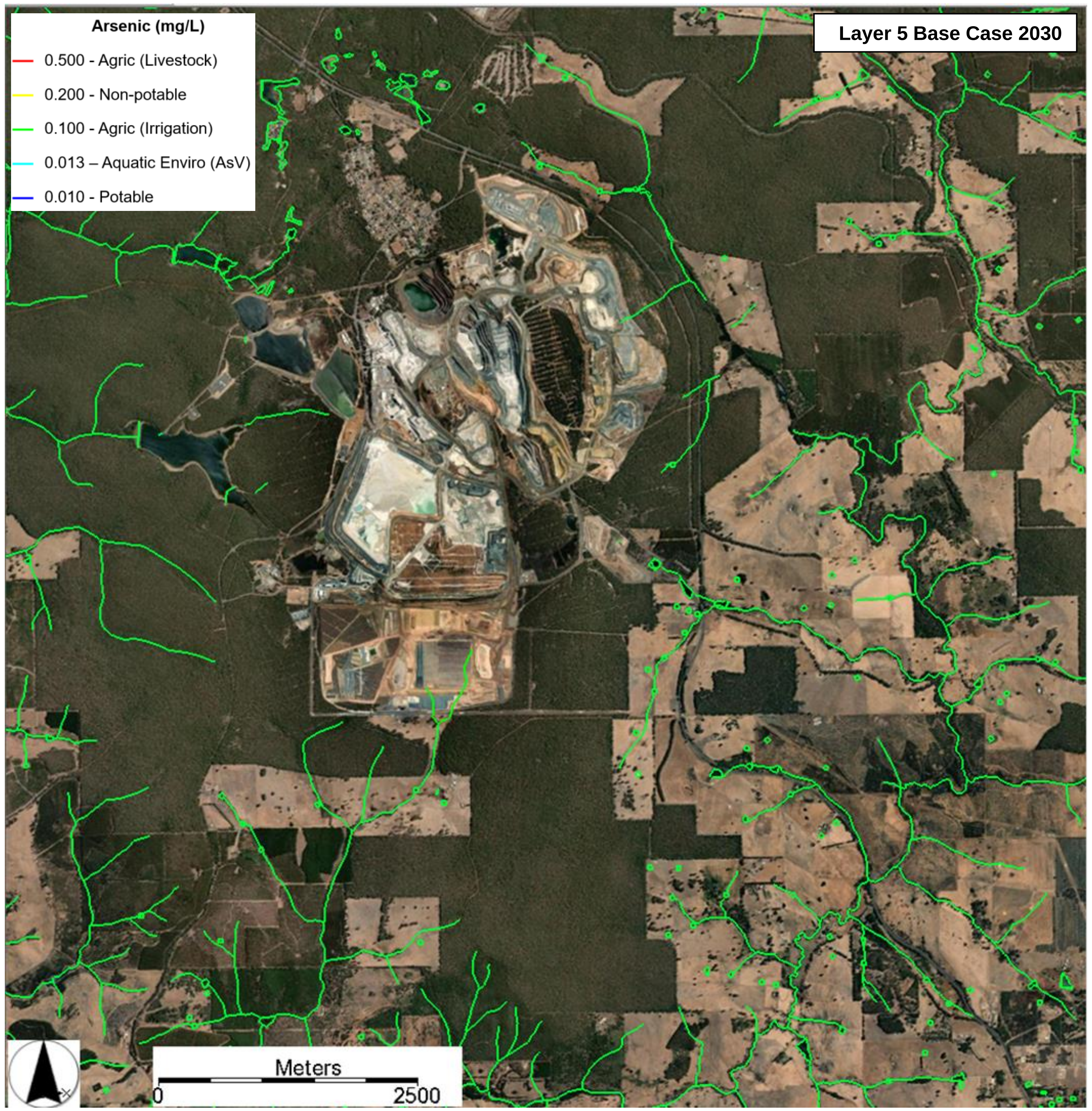
Modelled Arsenic Plumes in 2030

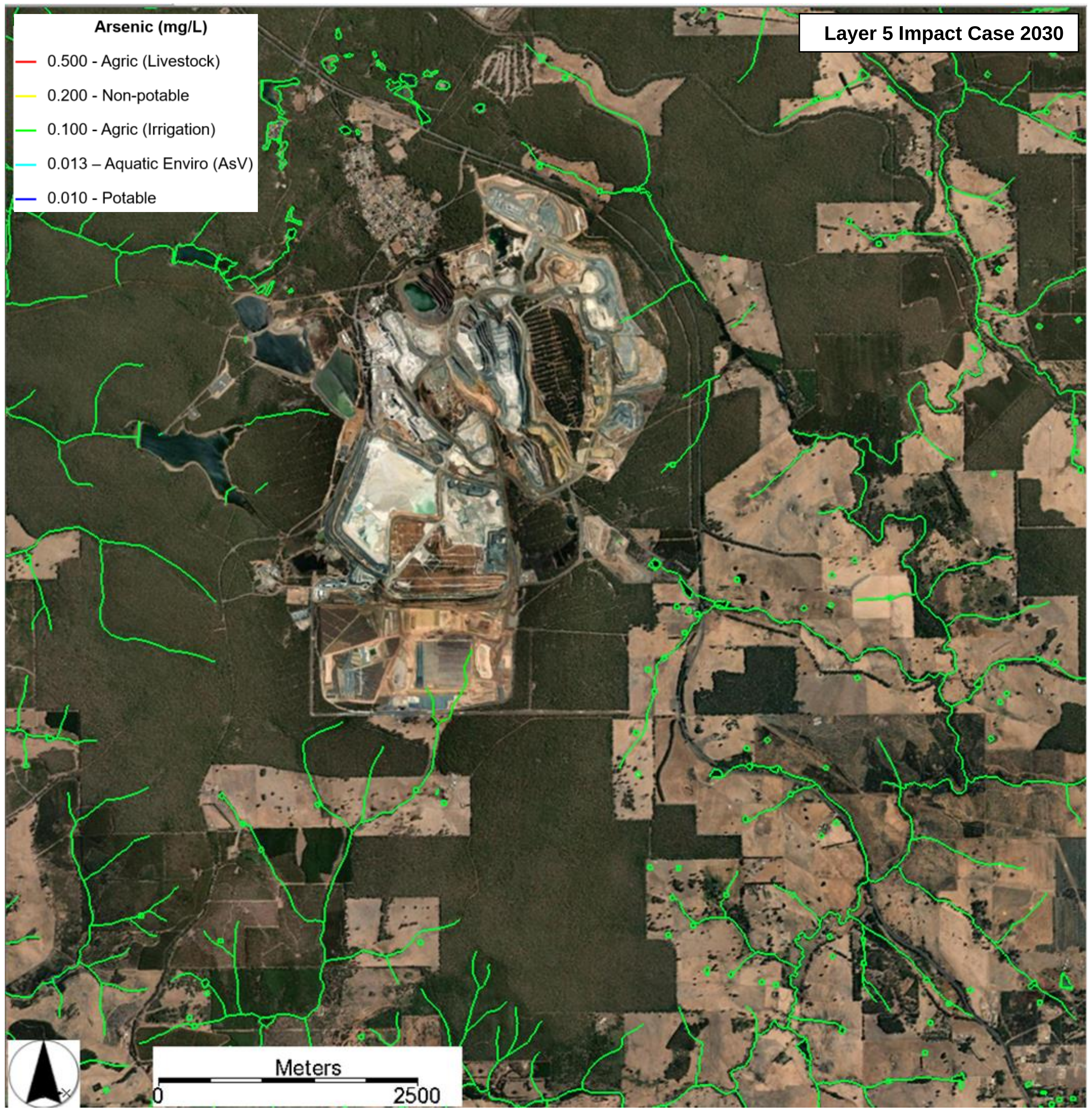

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 2 Base Case 2030
Meters
0
2500


Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 2 Impact Case 2030
Meters
0
2500


Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 3 Base Case 2030
Meters
0
2500

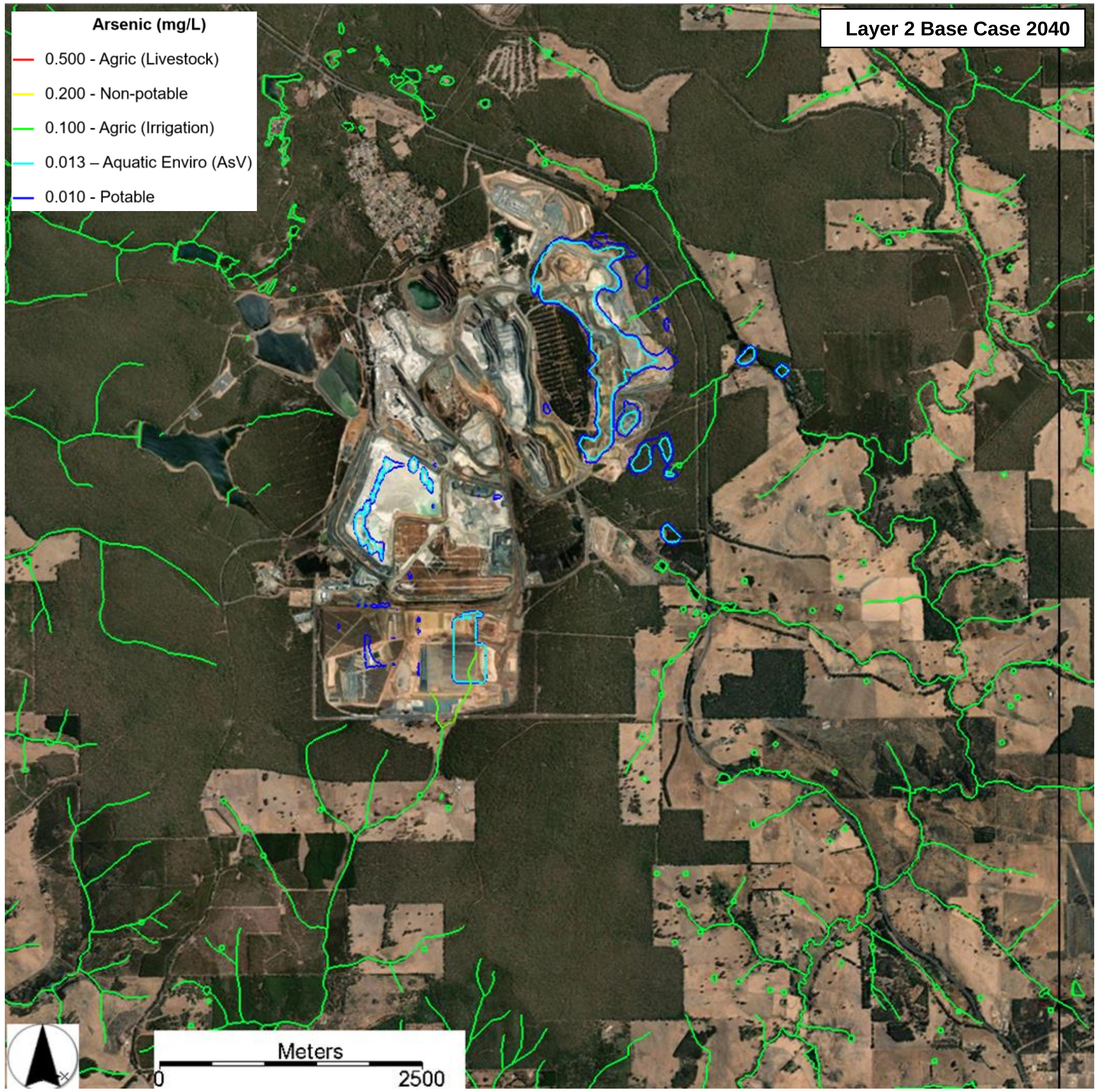

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 3 Impact Case 2030
Meters
0
2500

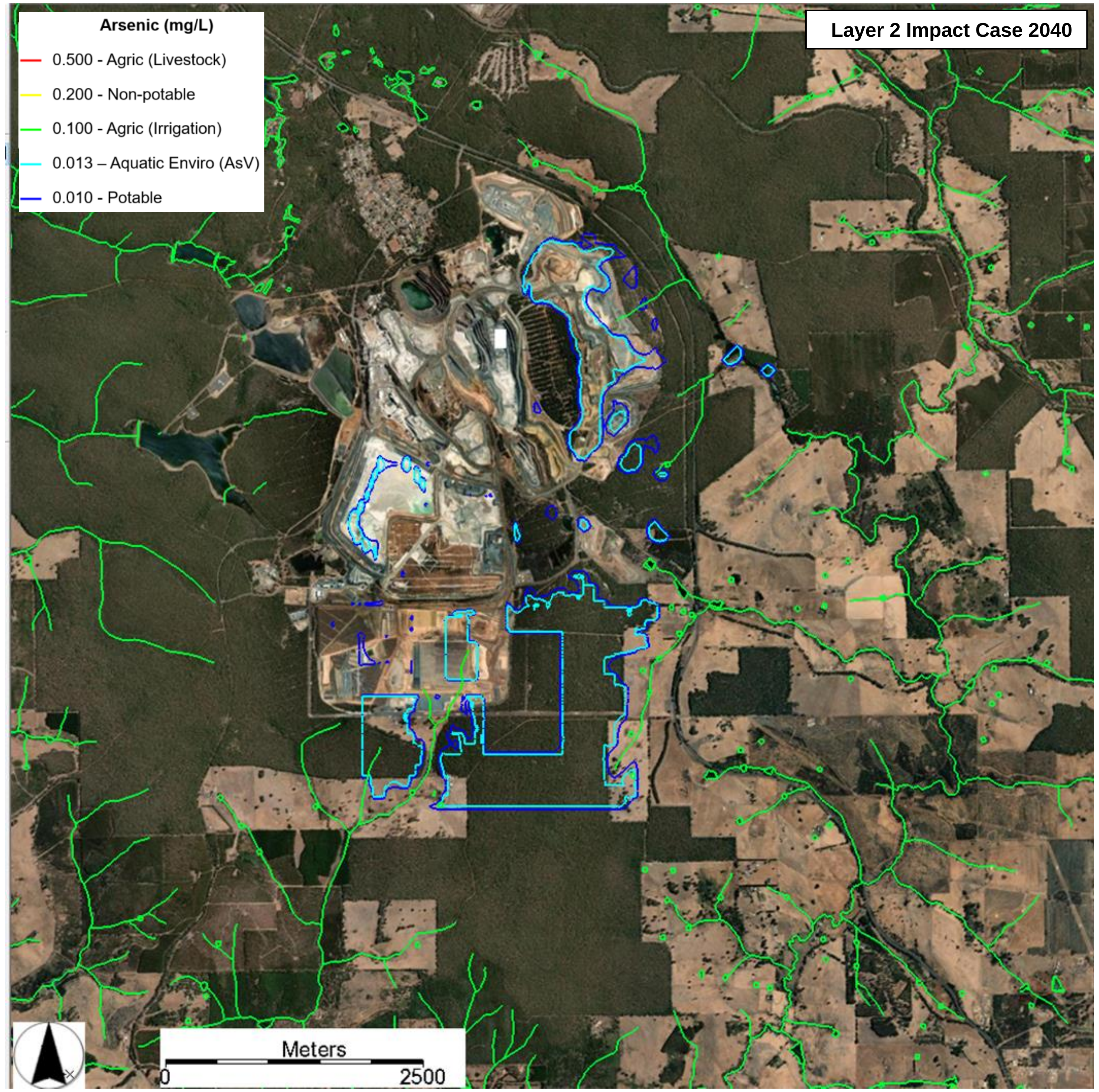

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 5 Base Case 2030
Meters
0
2500

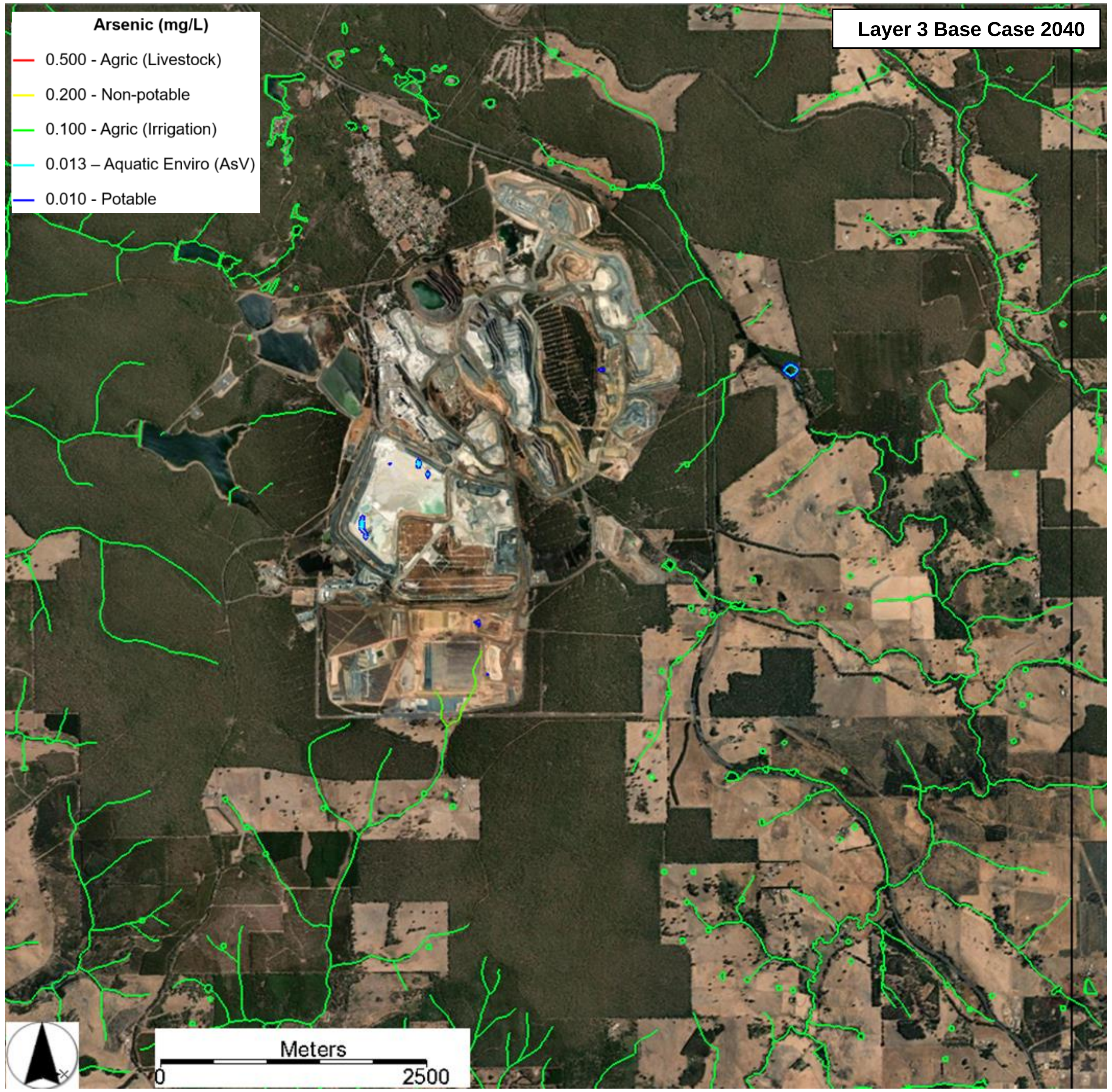

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 5 Impact Case 2030
Meters
0
2500

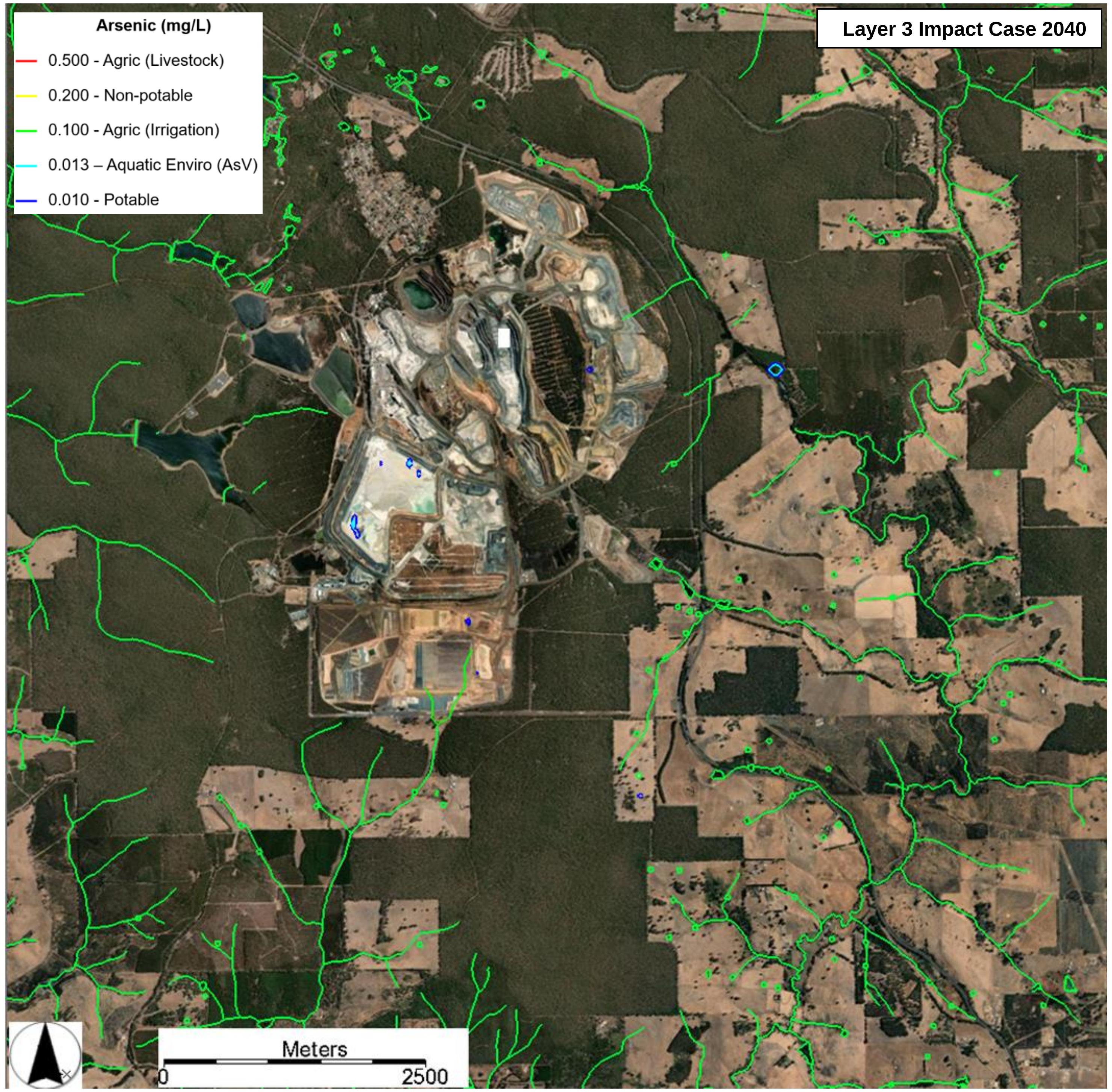
Appendix C

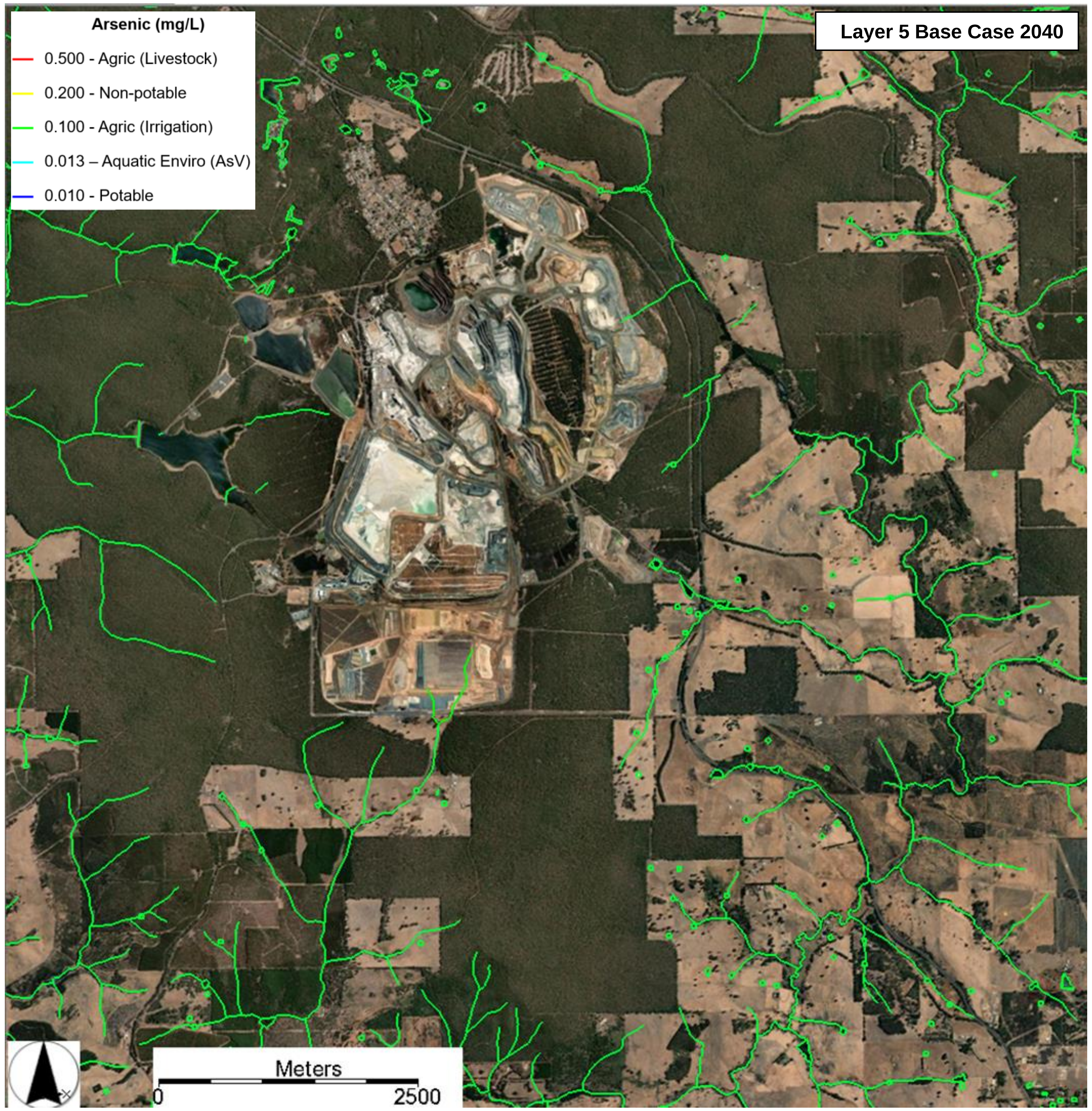
Modelled Arsenic Plumes in 2040

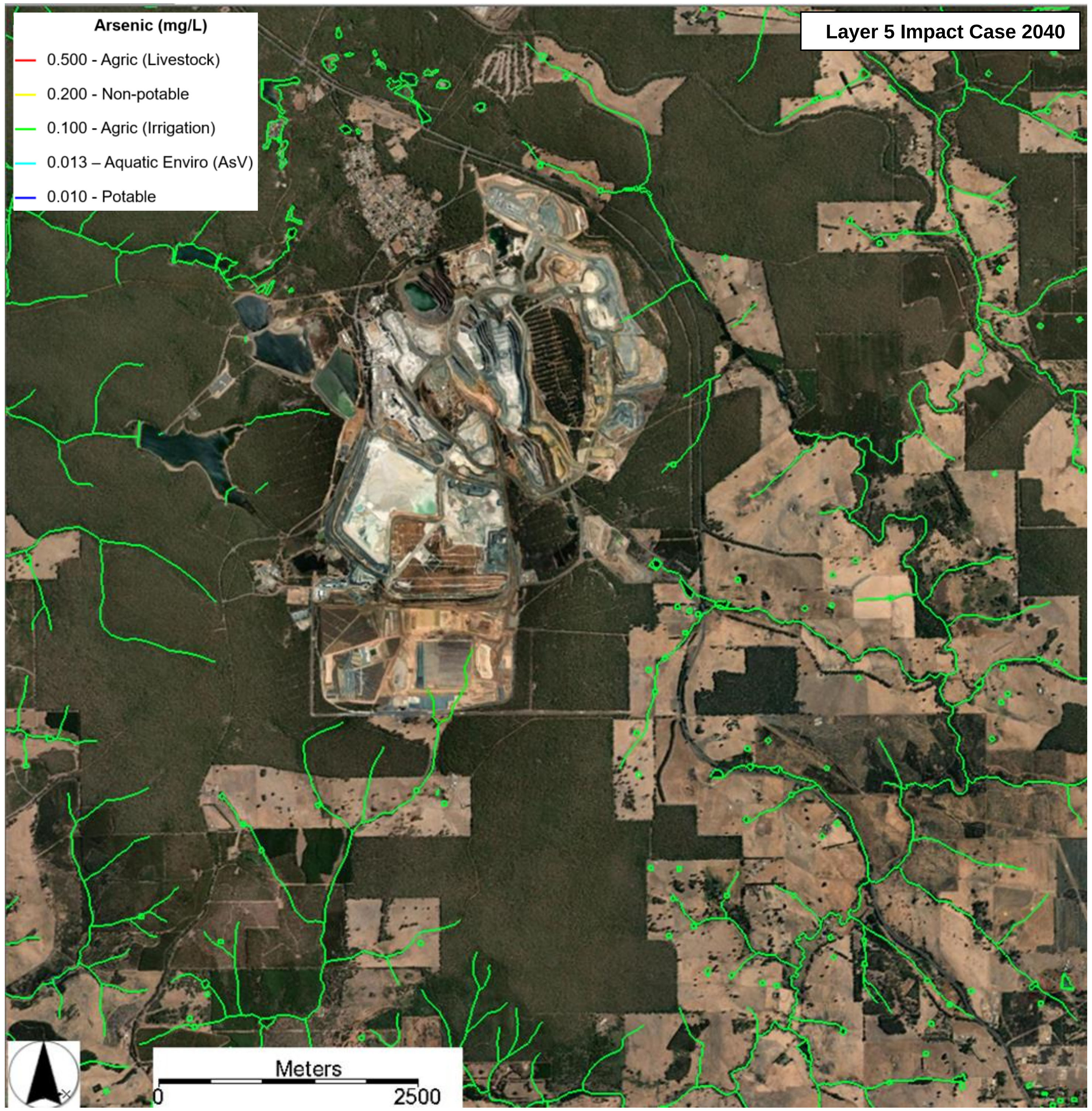

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 2 Base Case 2040
Meters
0
2500


Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 2 Impact Case 2040
Meters
0
2500


Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 3 Base Case 2040
Meters
0
2500

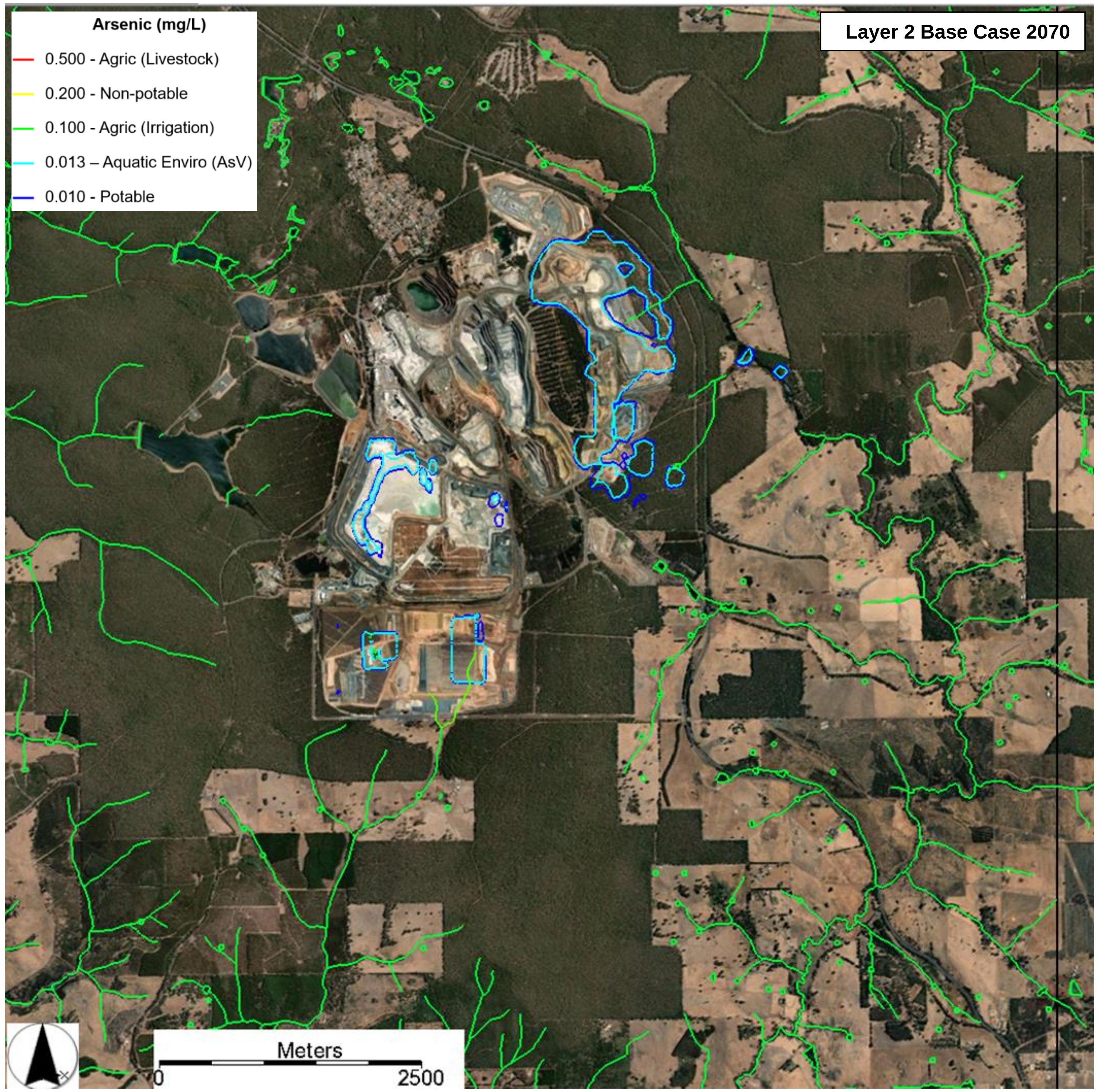

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 3 Impact Case 2040
Meters
0
2500

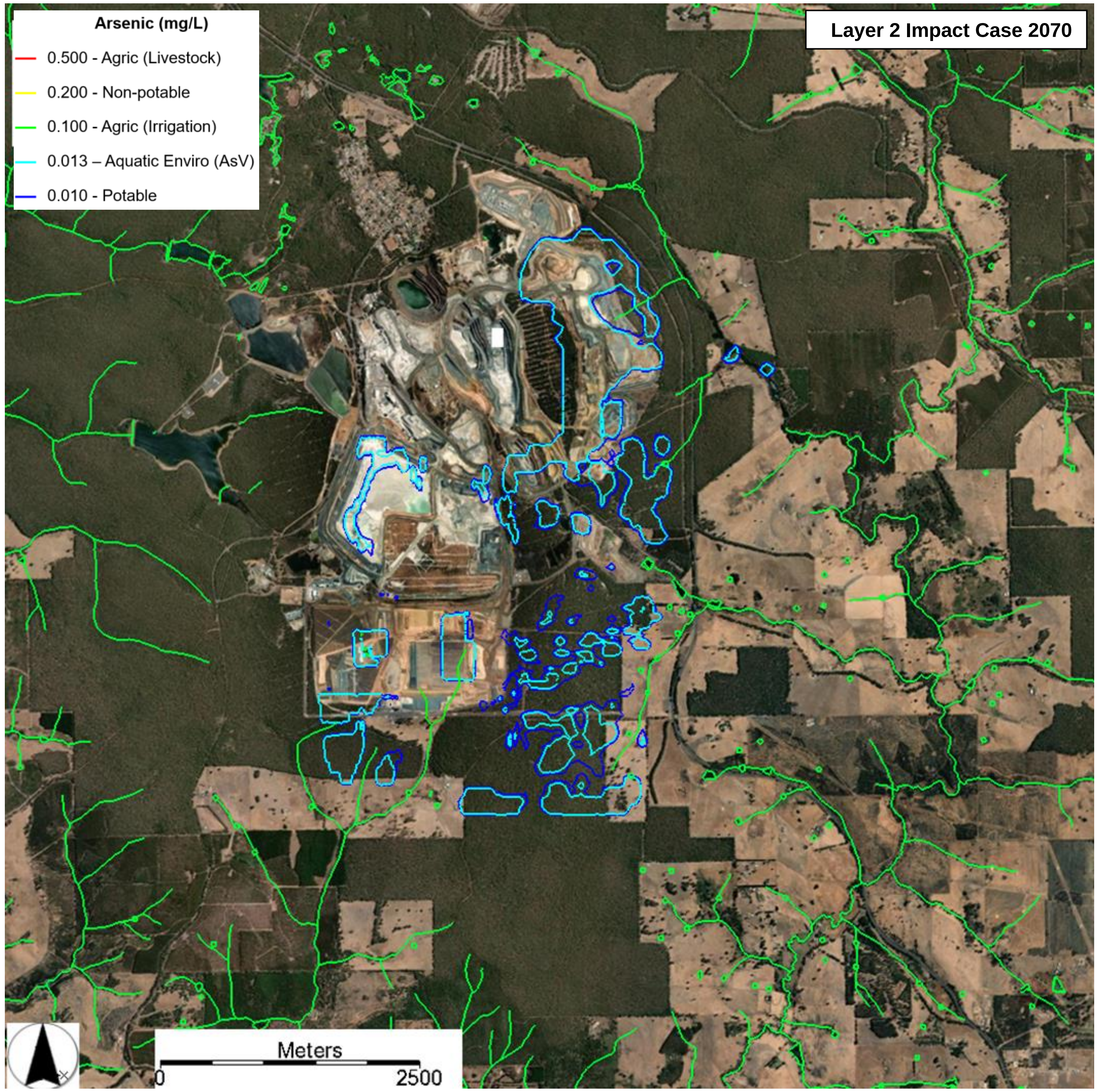

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 5 Base Case 2040
Meters
0
2500

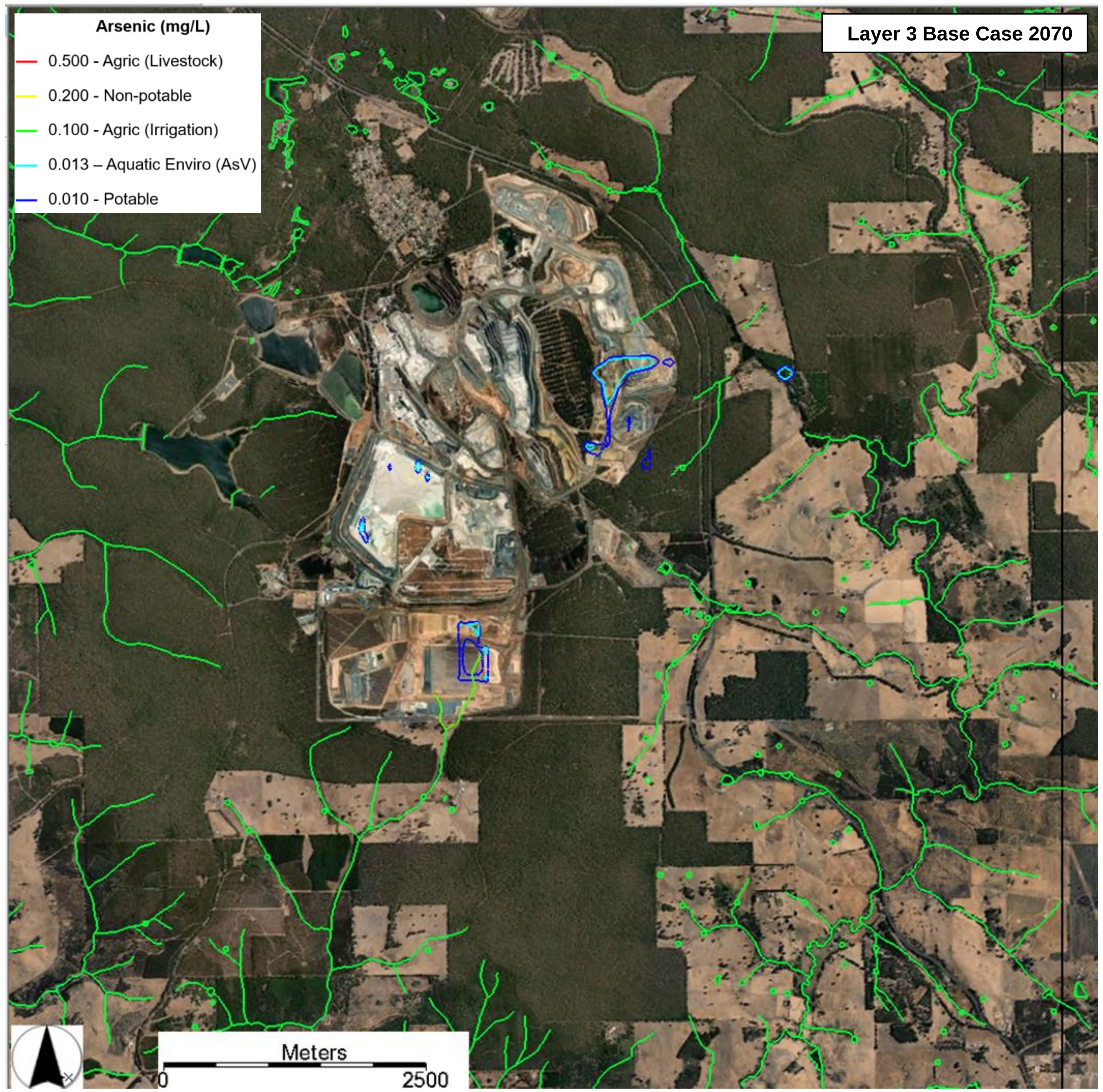

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 5 Impact Case 2040
Meters
0
2500

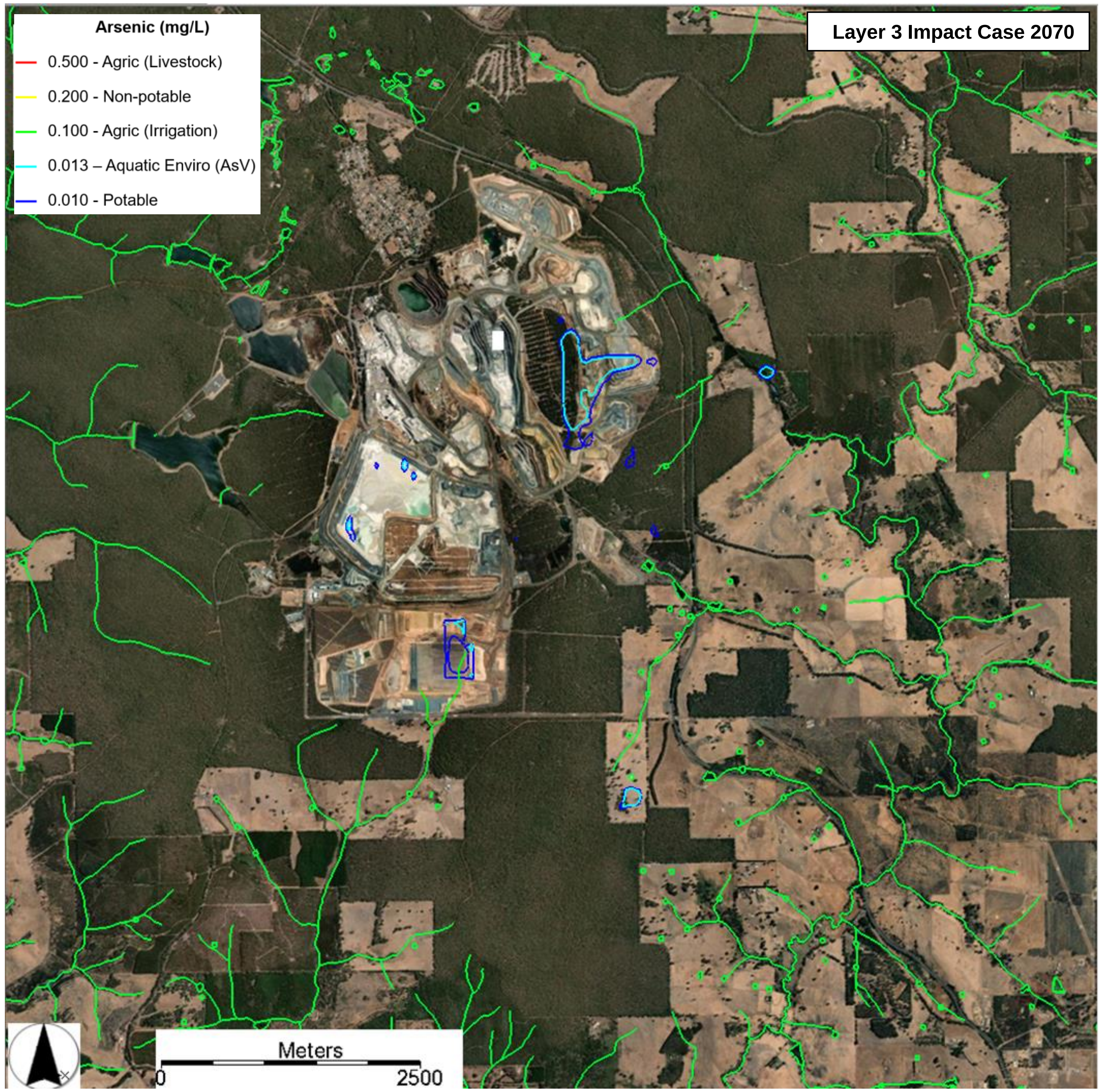
Appendix D

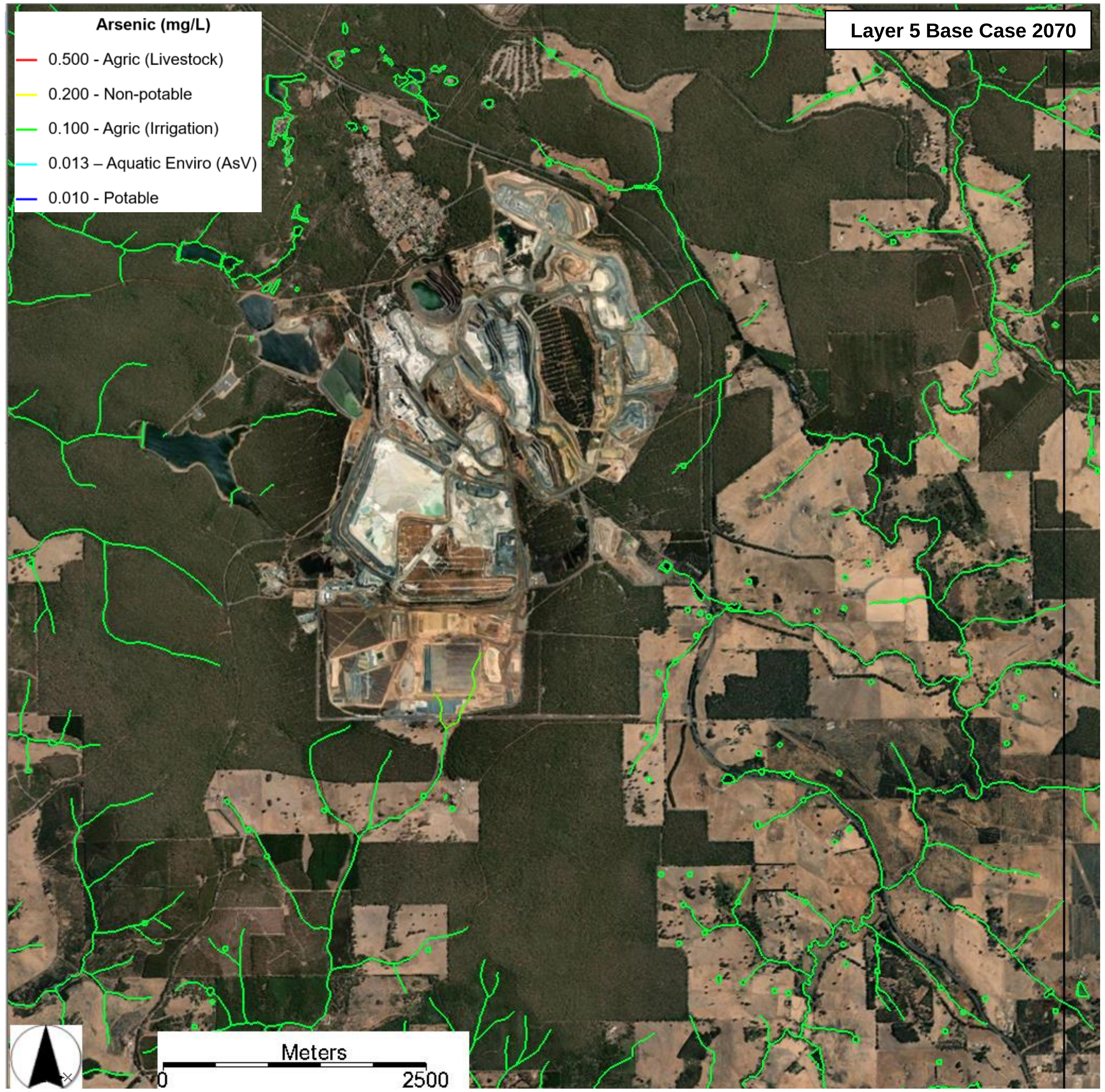
Modelled Arsenic Plumes in 2070


Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 2 Base Case 2070
Meters
0
2500

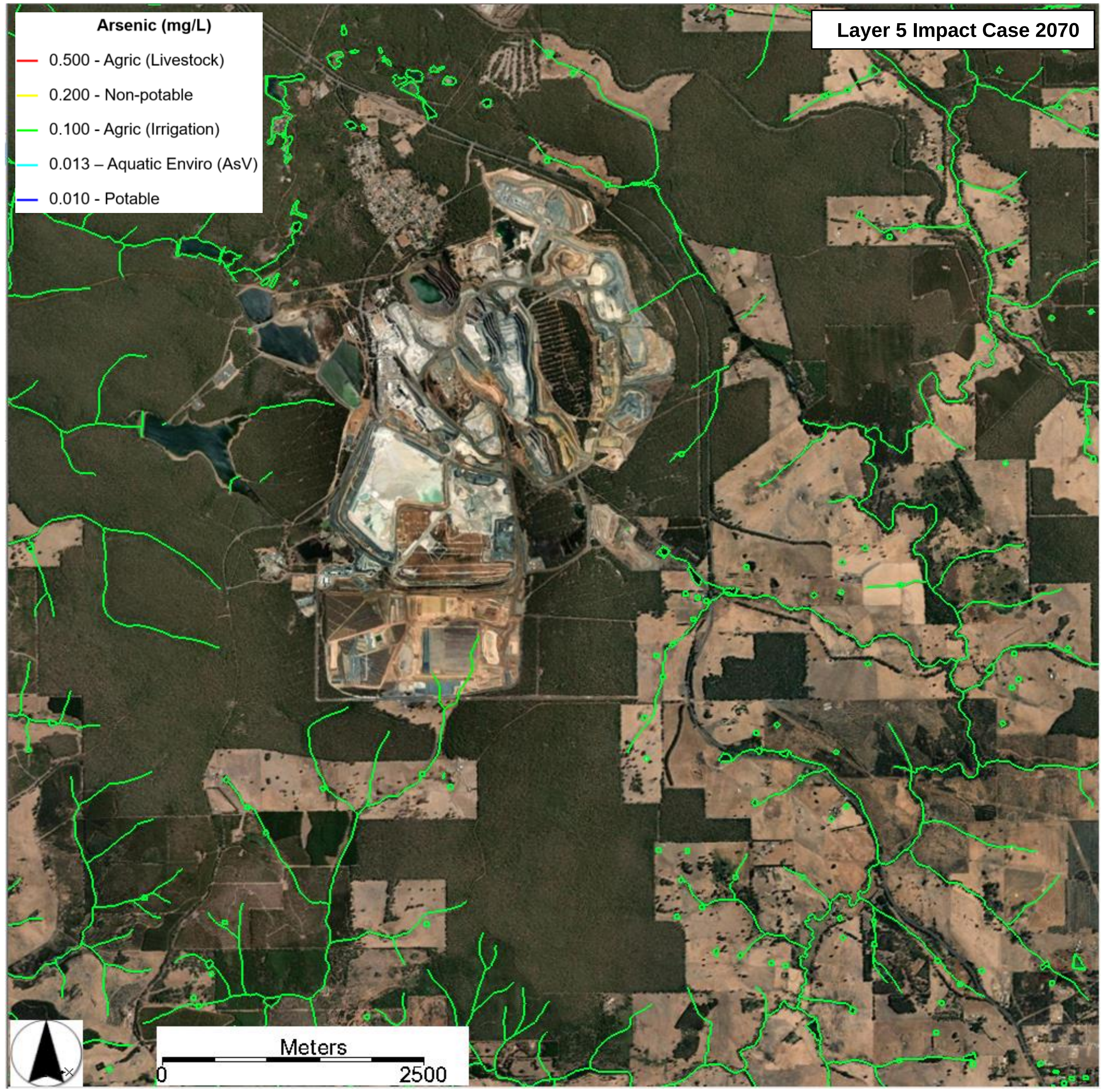

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 2 Impact Case 2070
Meters
0
2500


Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 3 Base Case 2070
Meters
0
2500


Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 3 Impact Case 2070
Meters
0
2500



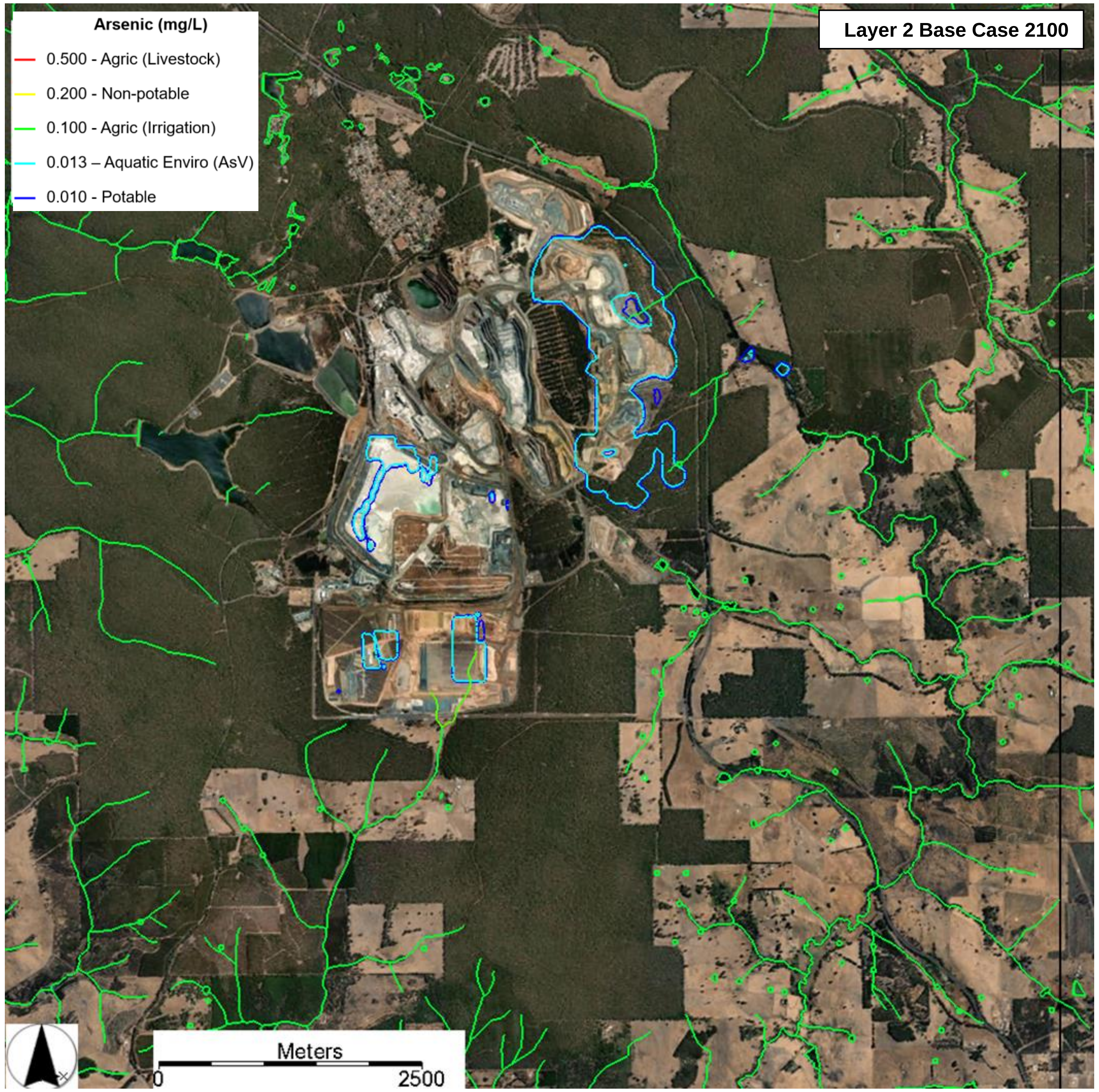
Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 5 Base Case 2070
Meters
0
2500

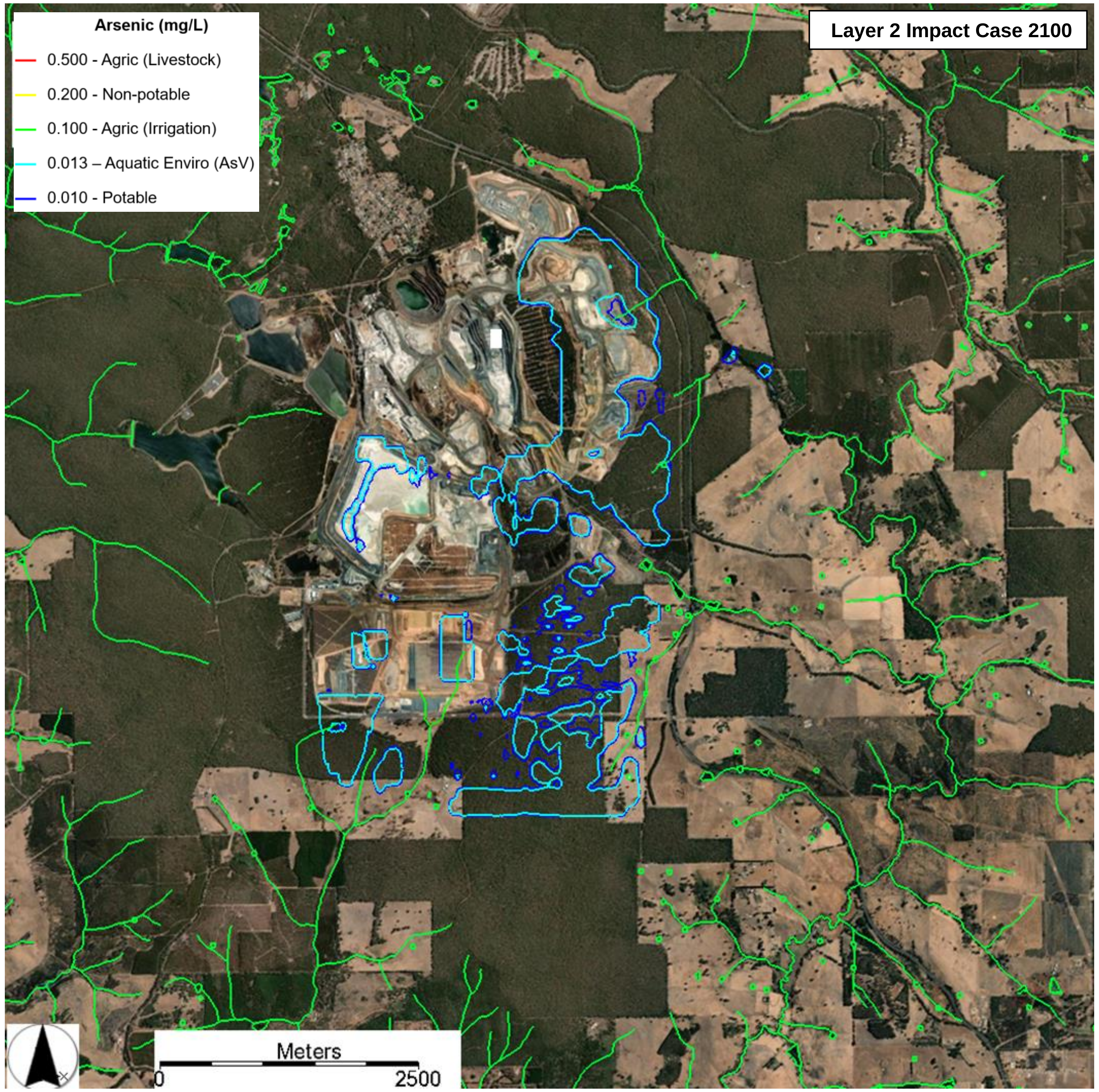


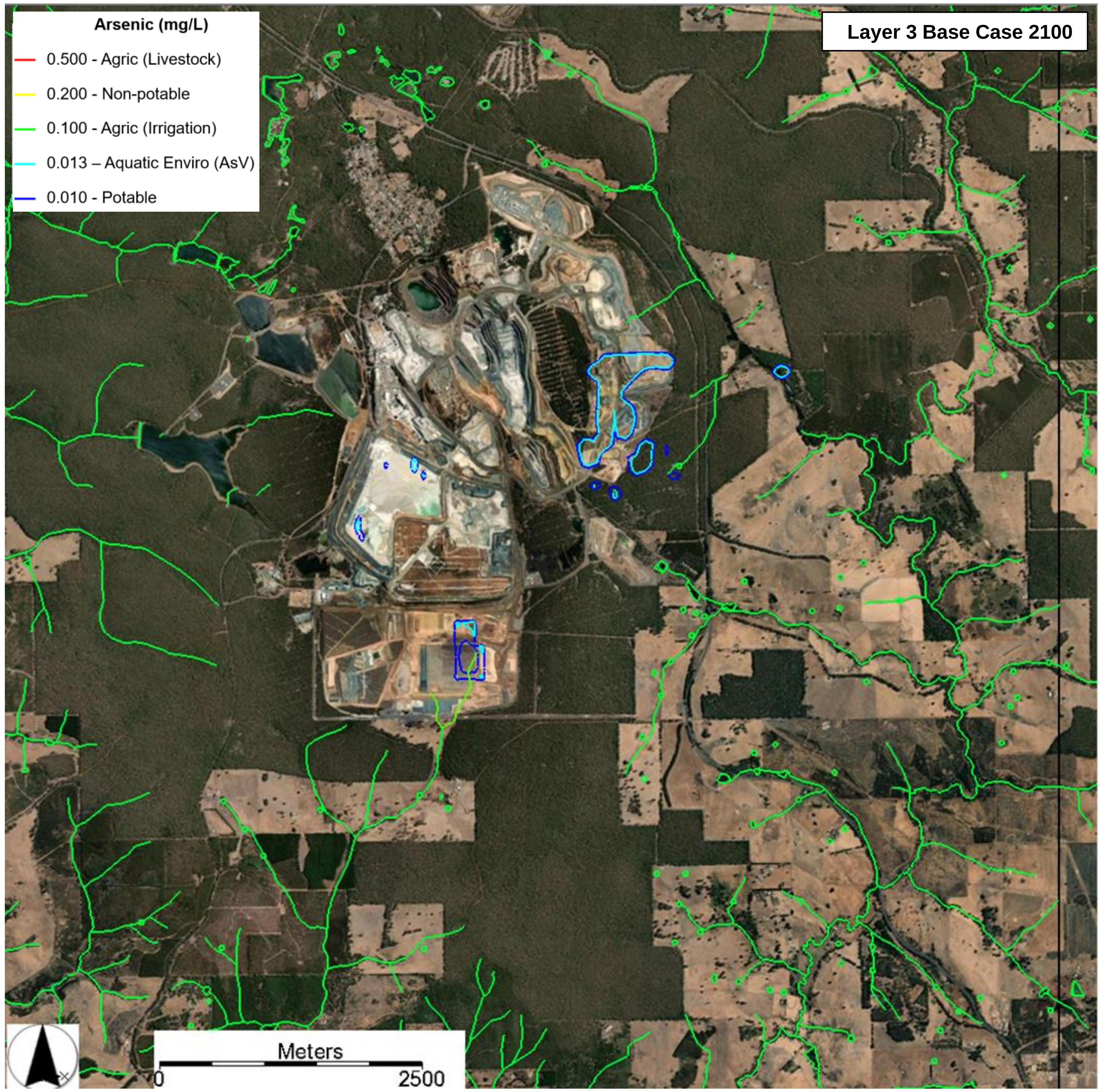
Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 5 Impact Case 2070
Meters
0
2500

Appendix E

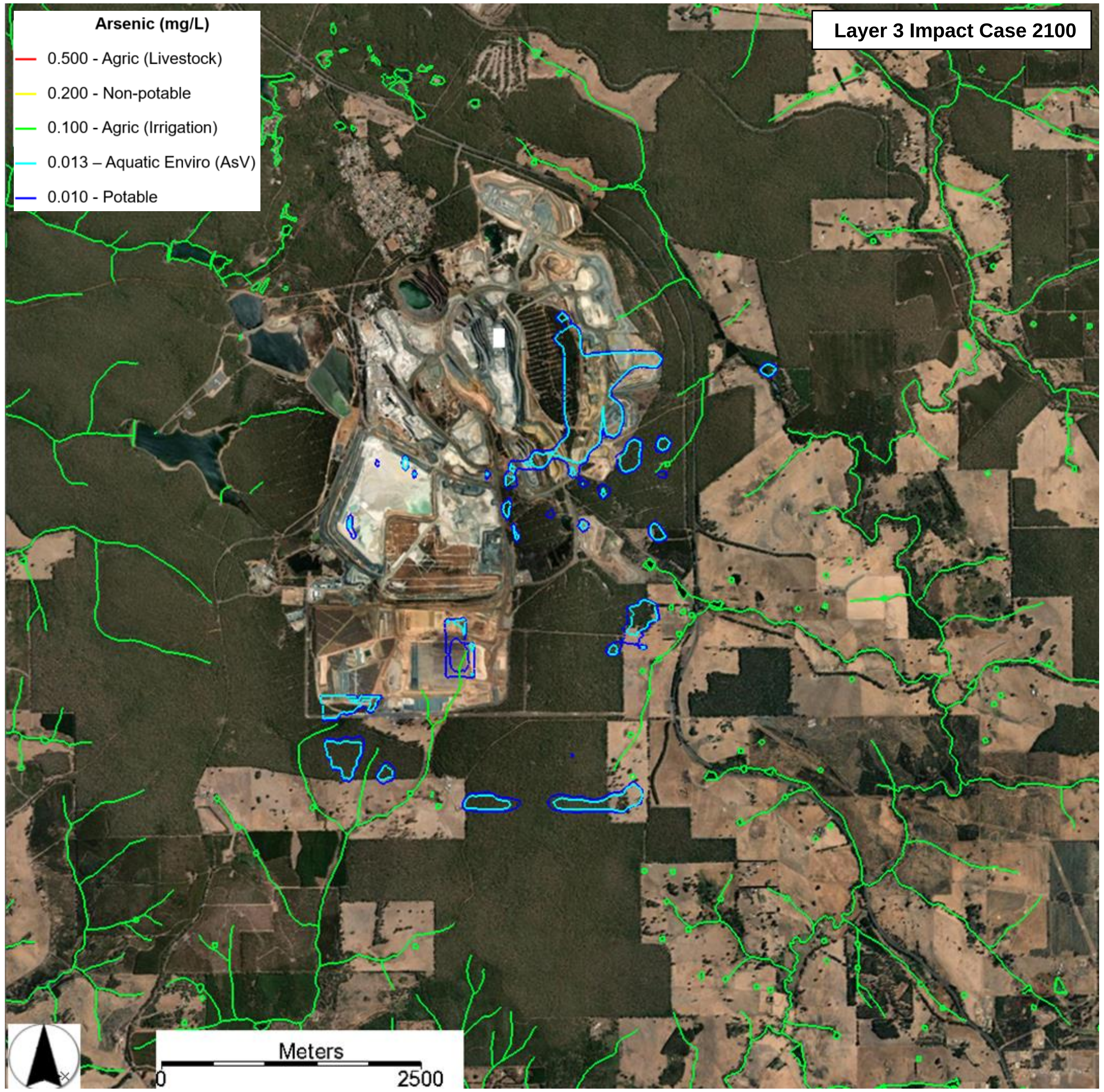
Modelled Arsenic Plumes in 2100


Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 2 Base Case 2100
Meters
0
2500


Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 2 Impact Case 2100
Meters
0
2500

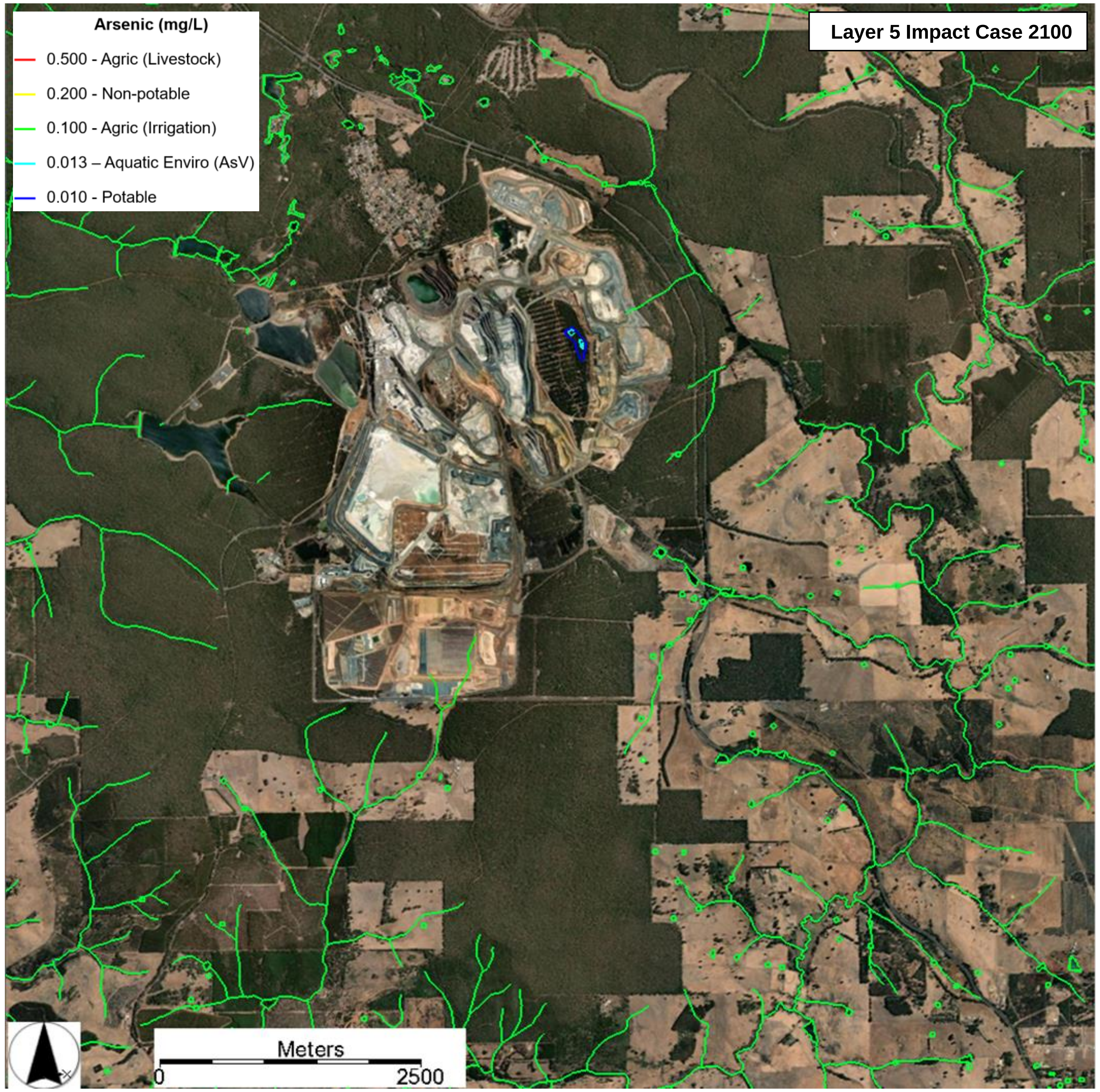


Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 3 Base Case 2100
Meters
0
2500



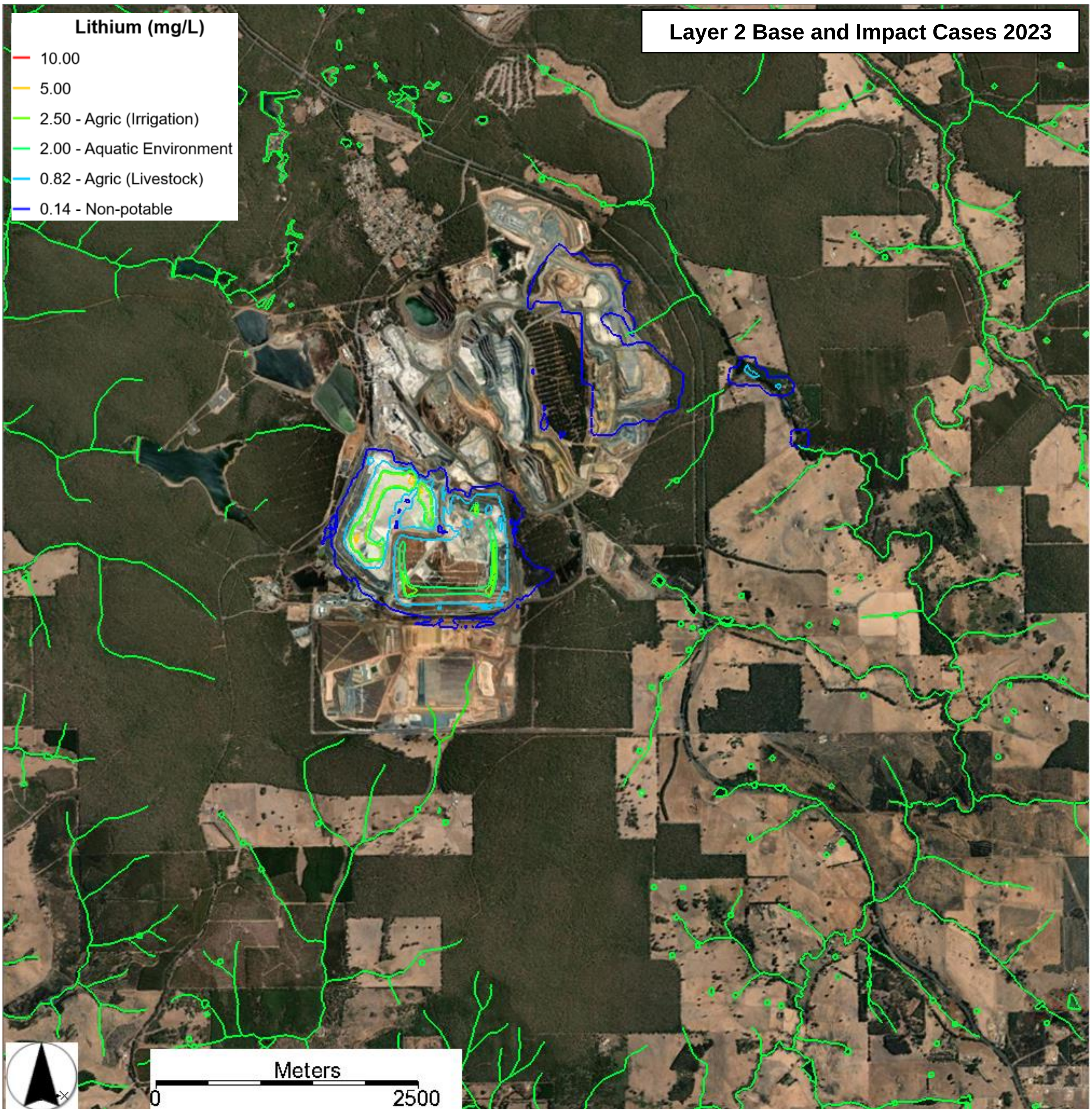
Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 3 Impact Case 2100
Meters
0
2500


Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 5 Base Case 2100
Meters
0
2500

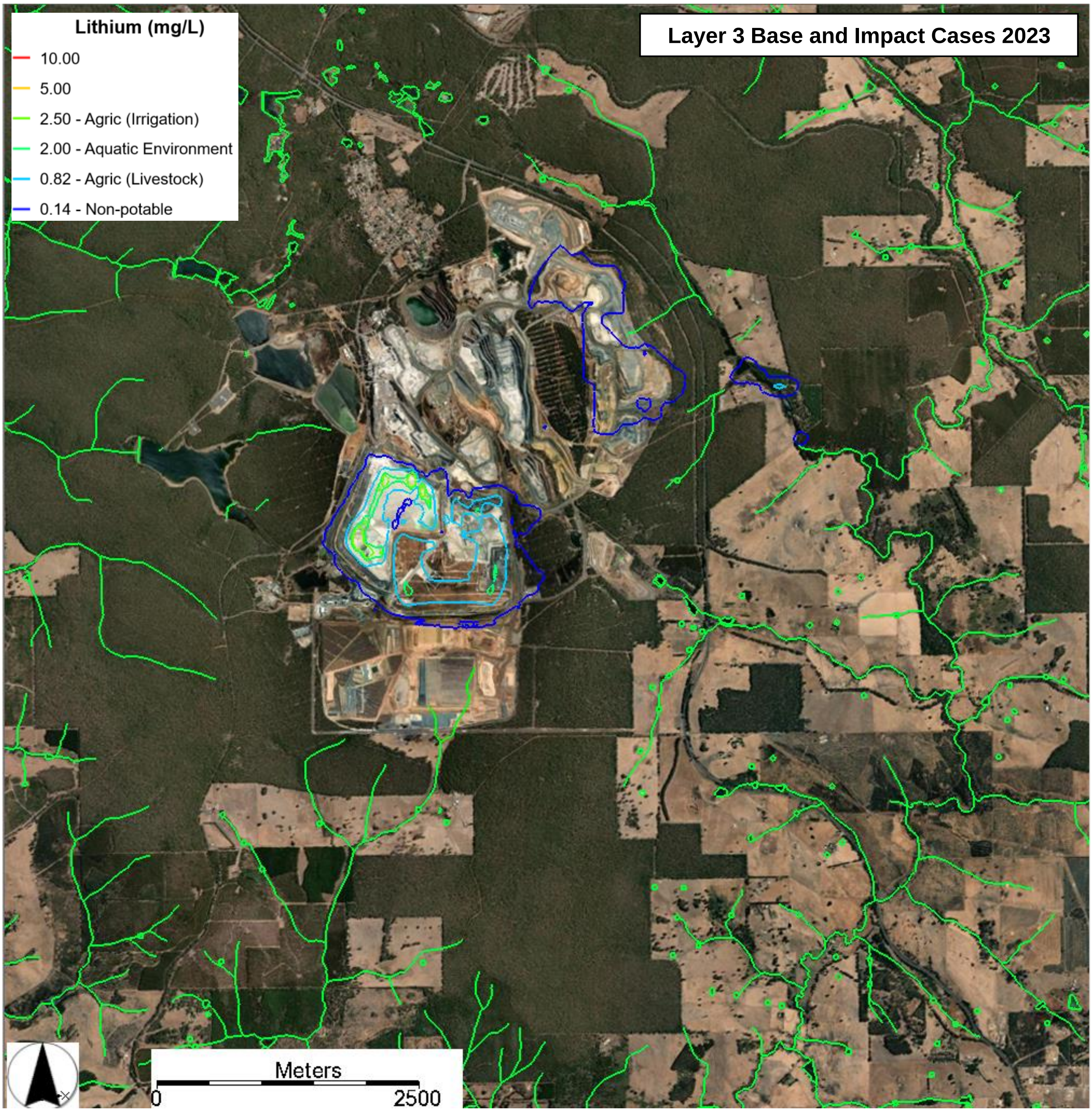

Arsenic (mg/L)
0.500 - Agric (Livestock)
0.200 - Non-potable
0.100 - Agric (Irrigation)
0.013 – Aquatic Enviro (AsV)
0.010 - Potable
Layer 5 Impact Case 2100
Meters
0
2500

Appendix F

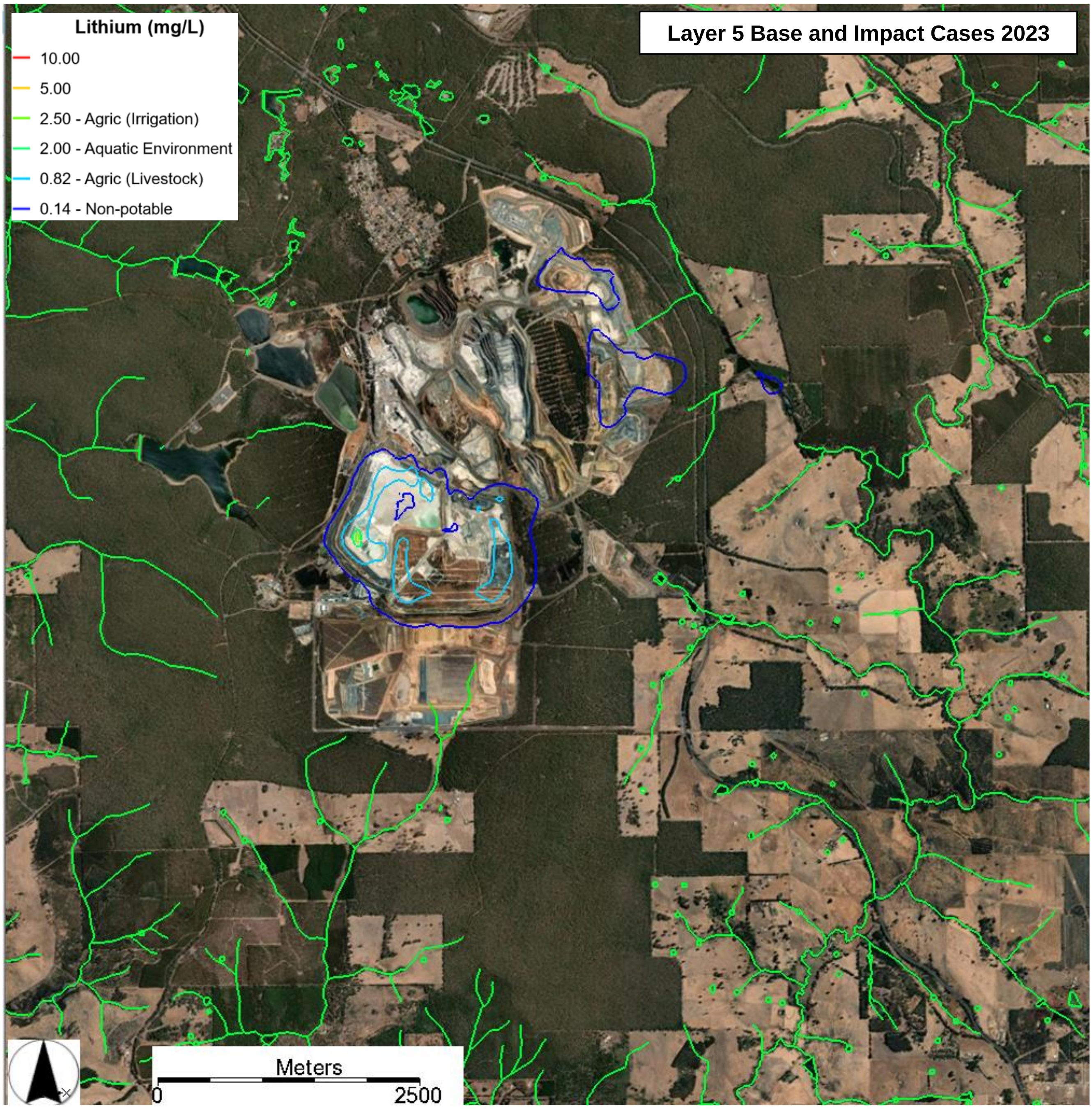
Modelled Lithium Plumes in 2023



Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 2 Base and Impact Cases 2023
Meters
0
2500

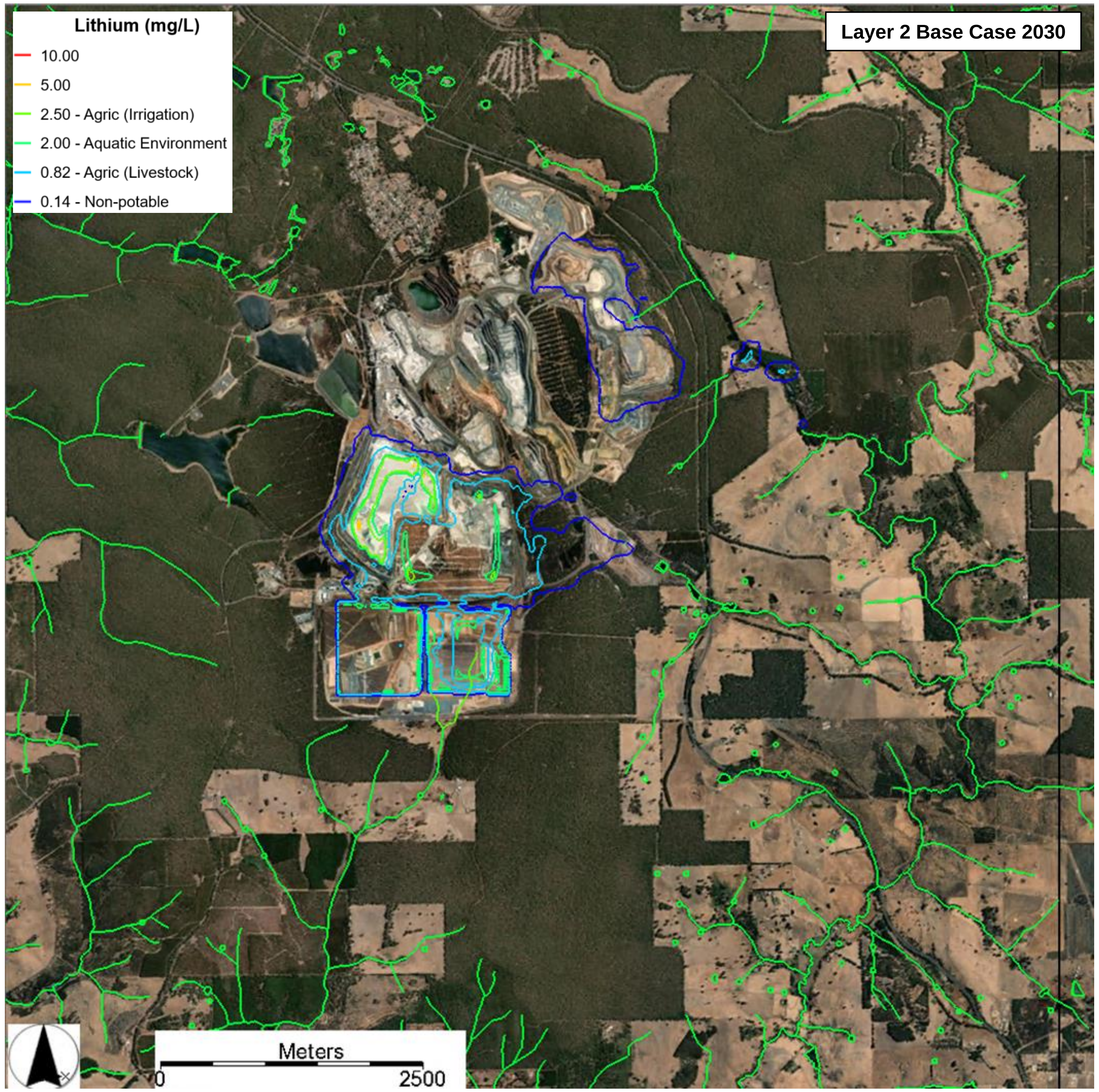


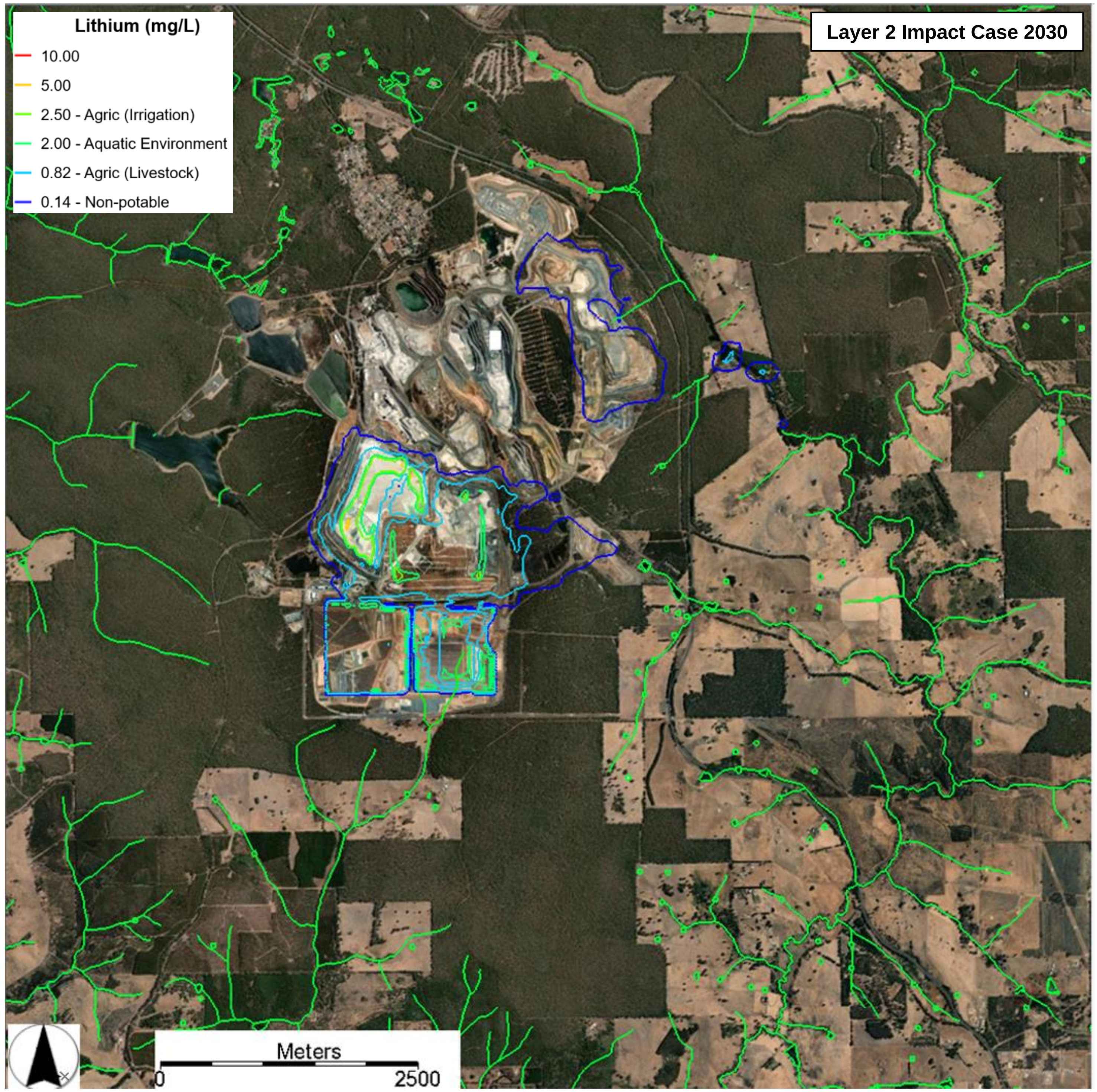
Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 3 Base and Impact Cases 2023
Meters
0
2500

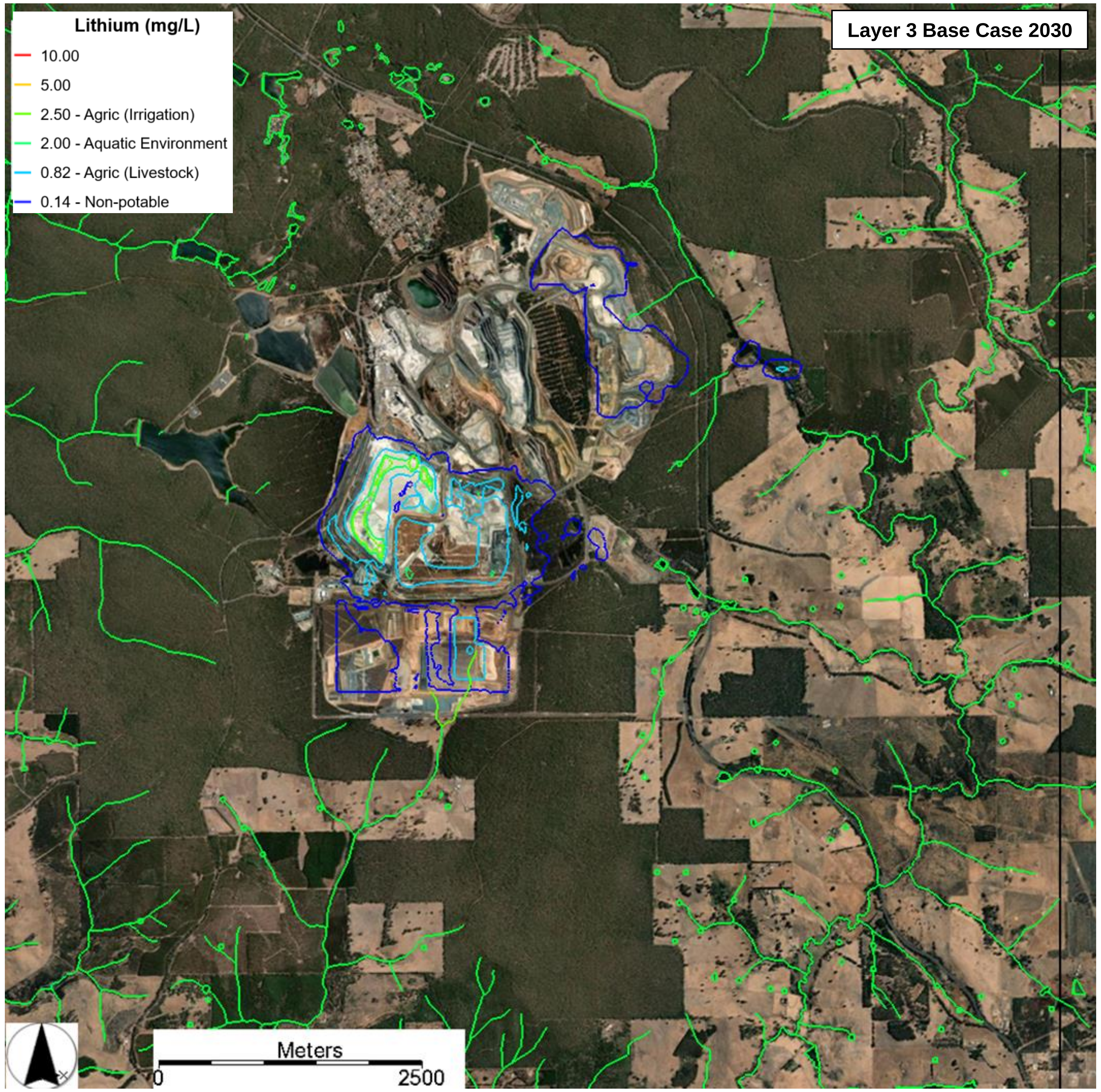

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 5 Base and Impact Cases 2023
Meters
0
2500

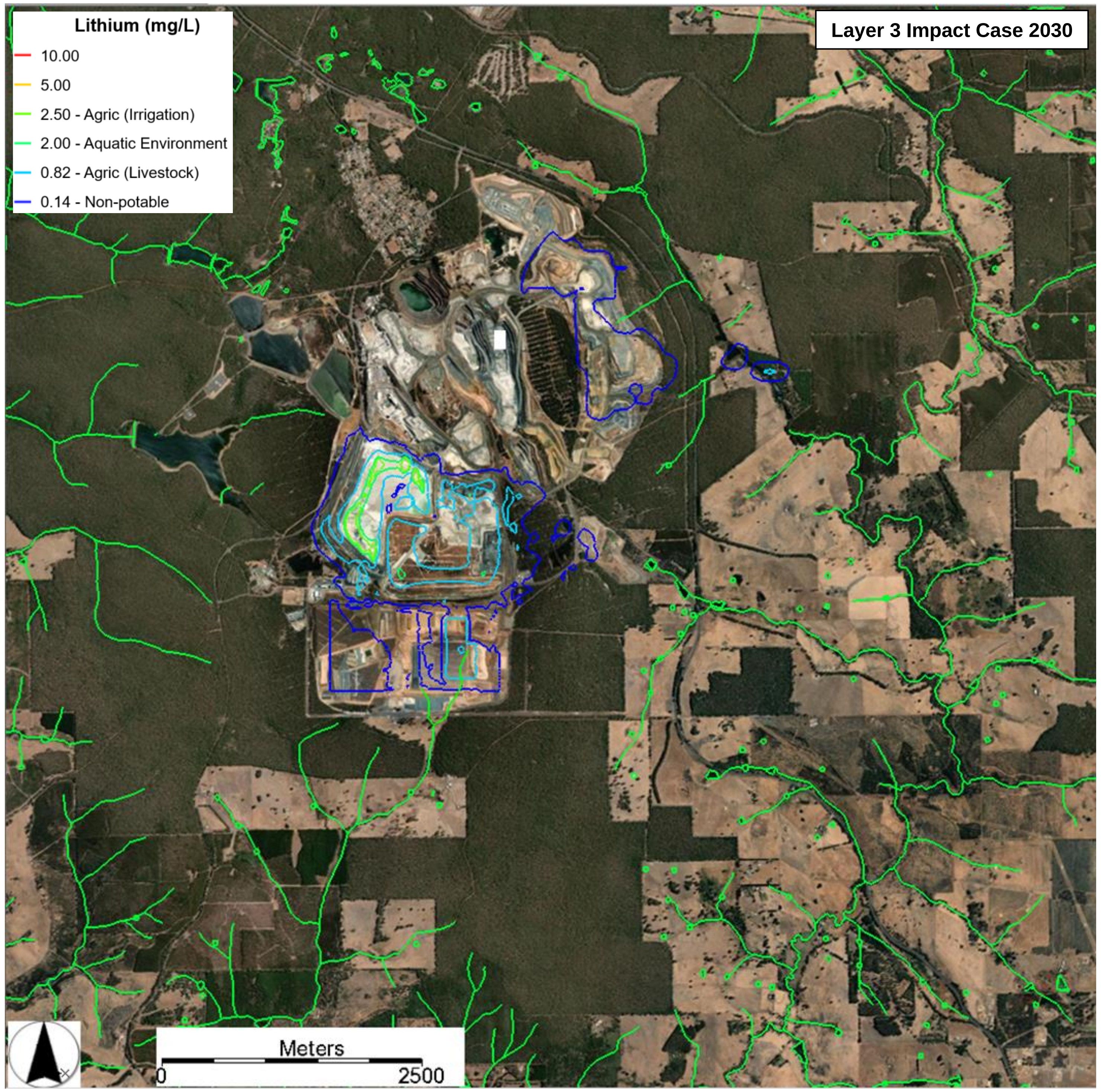
Appendix G

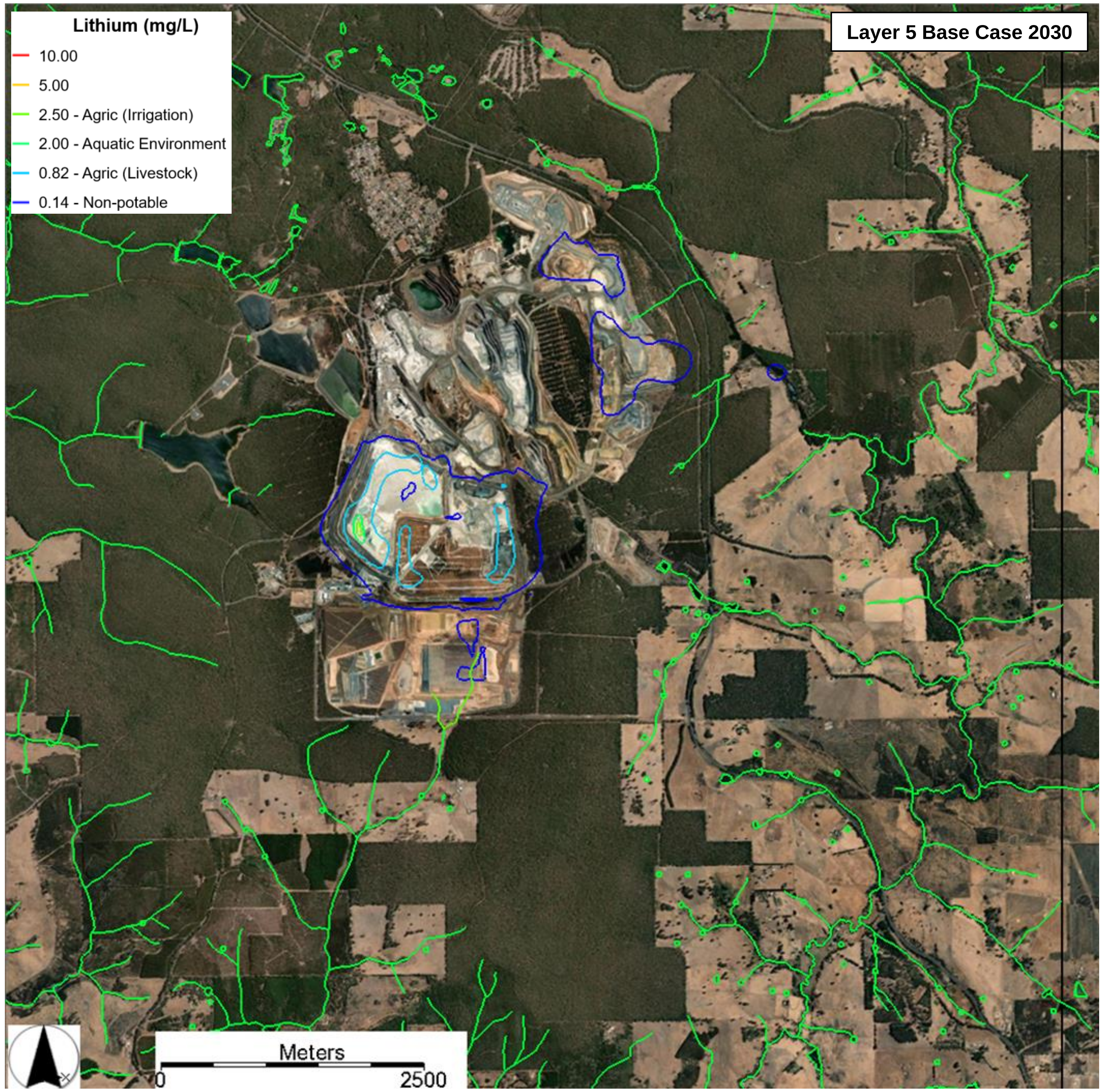
Modelled Lithium Plumes in 2030

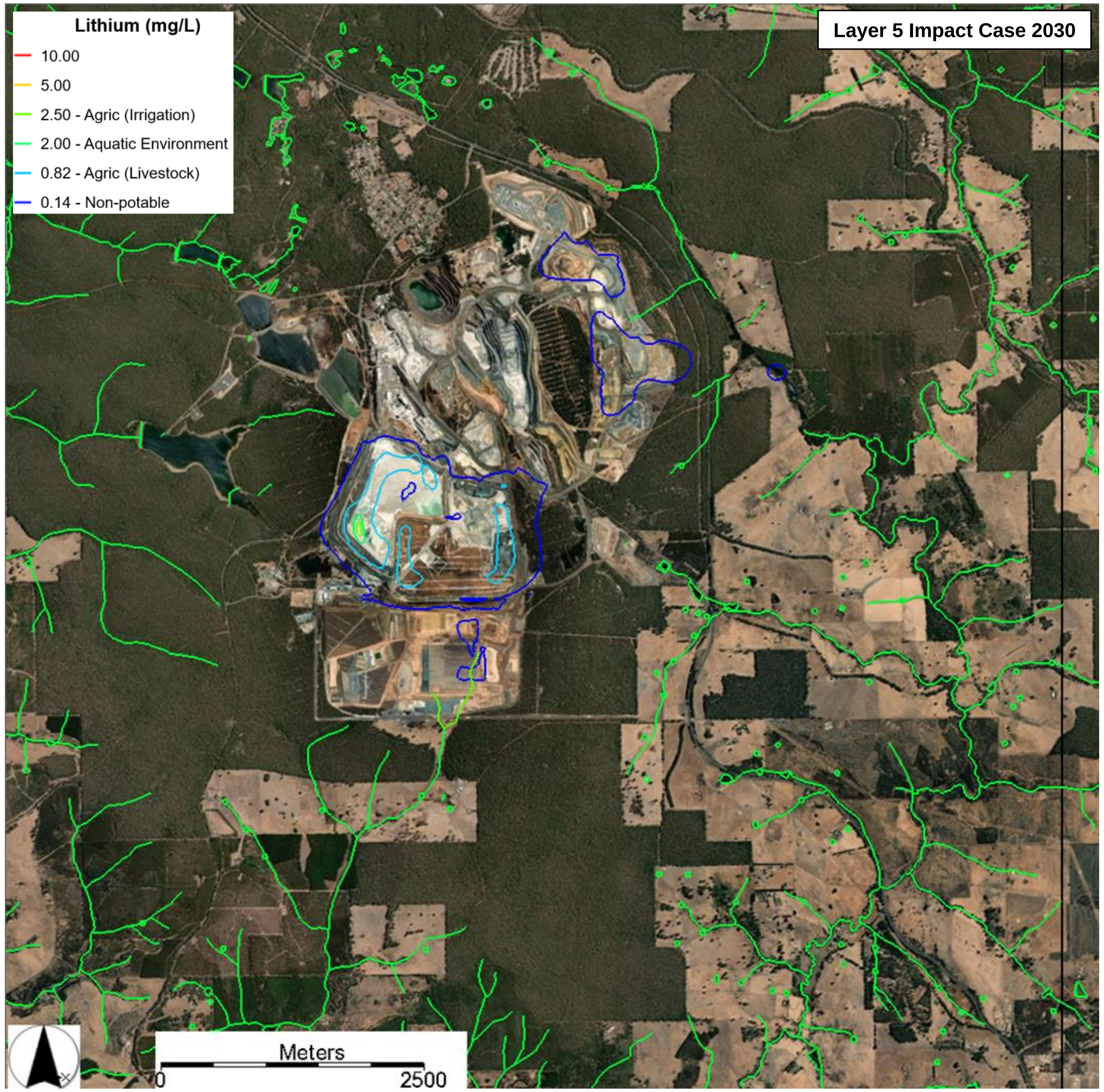

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 2 Base Case 2030
Meters
0
2500


Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 2 Impact Case 2030
Meters
0
2500


Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 3 Base Case 2030
Meters
0
2500

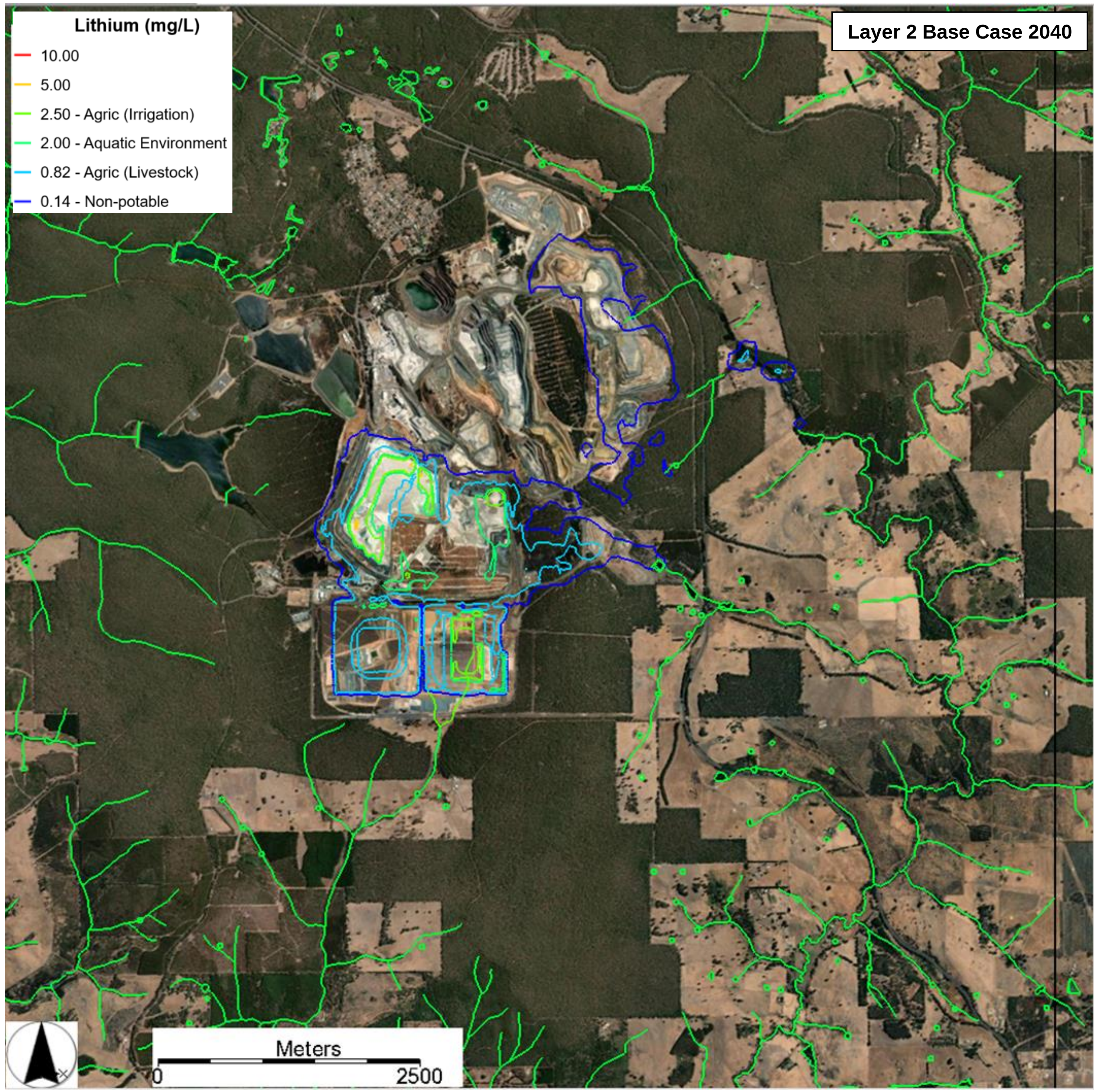

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 3 Impact Case 2030
Meters
0
2500

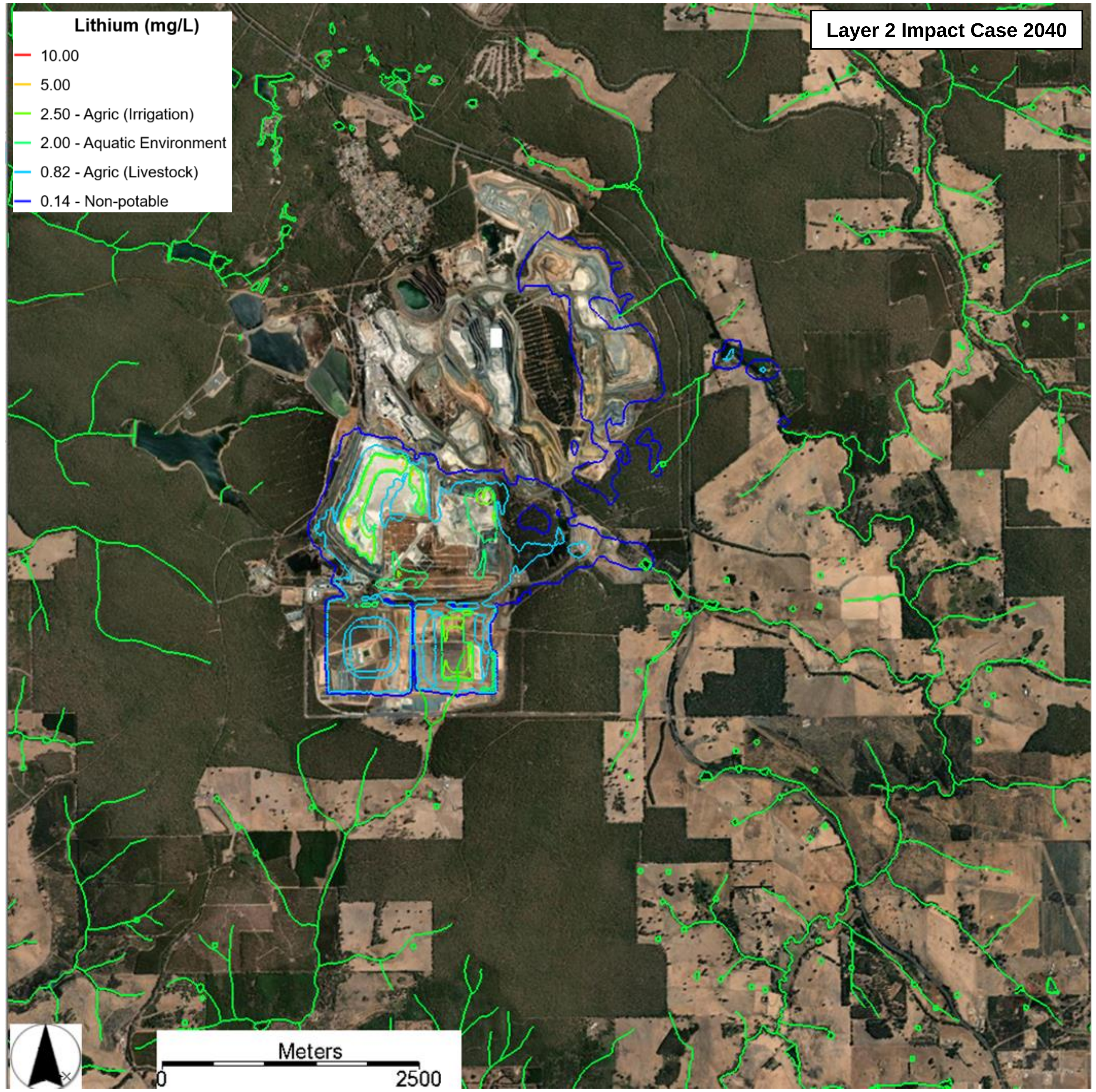

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 5 Base Case 2030
Meters
0
2500

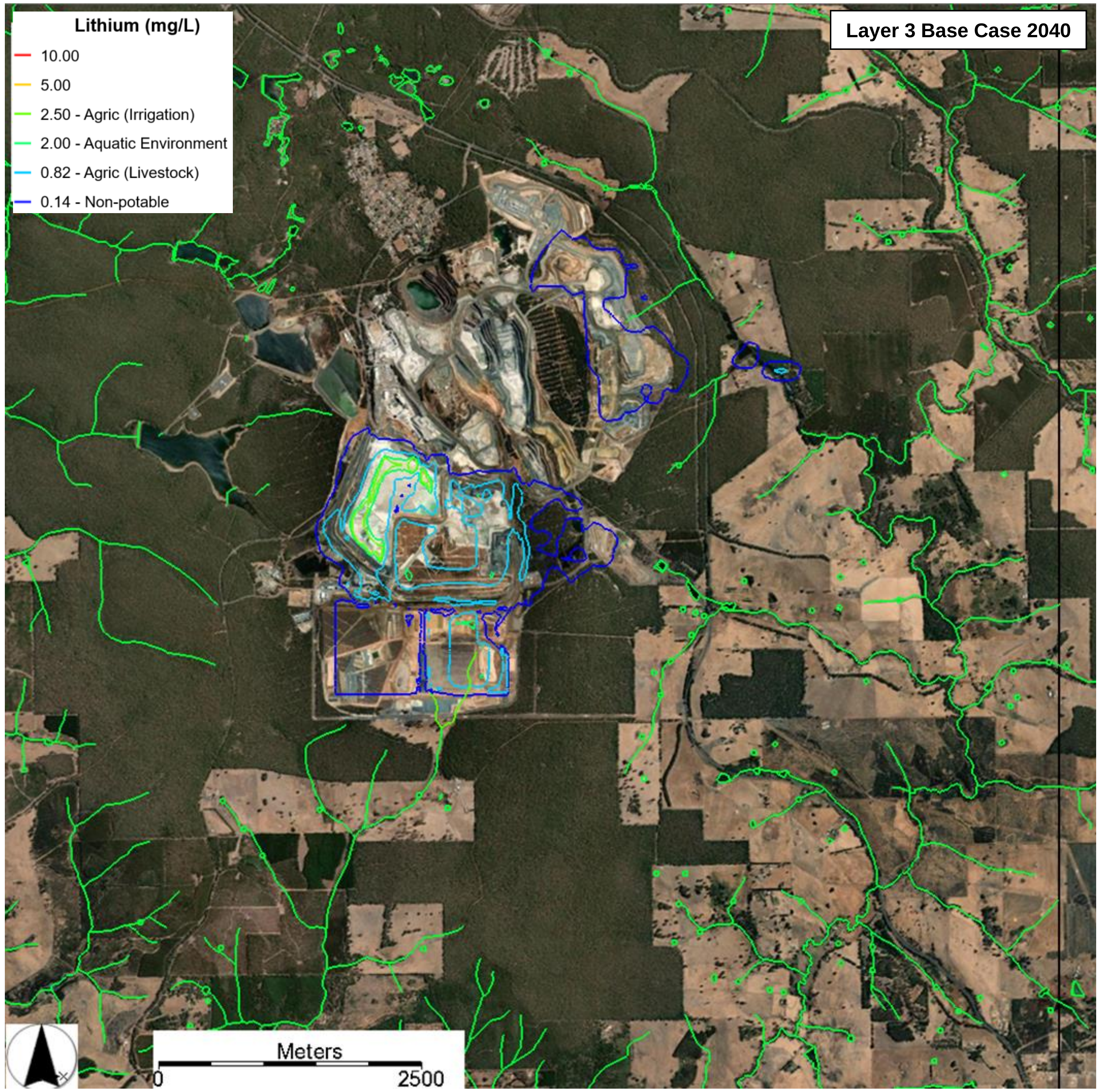

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 5 Impact Case 2030
Meters
0
2500

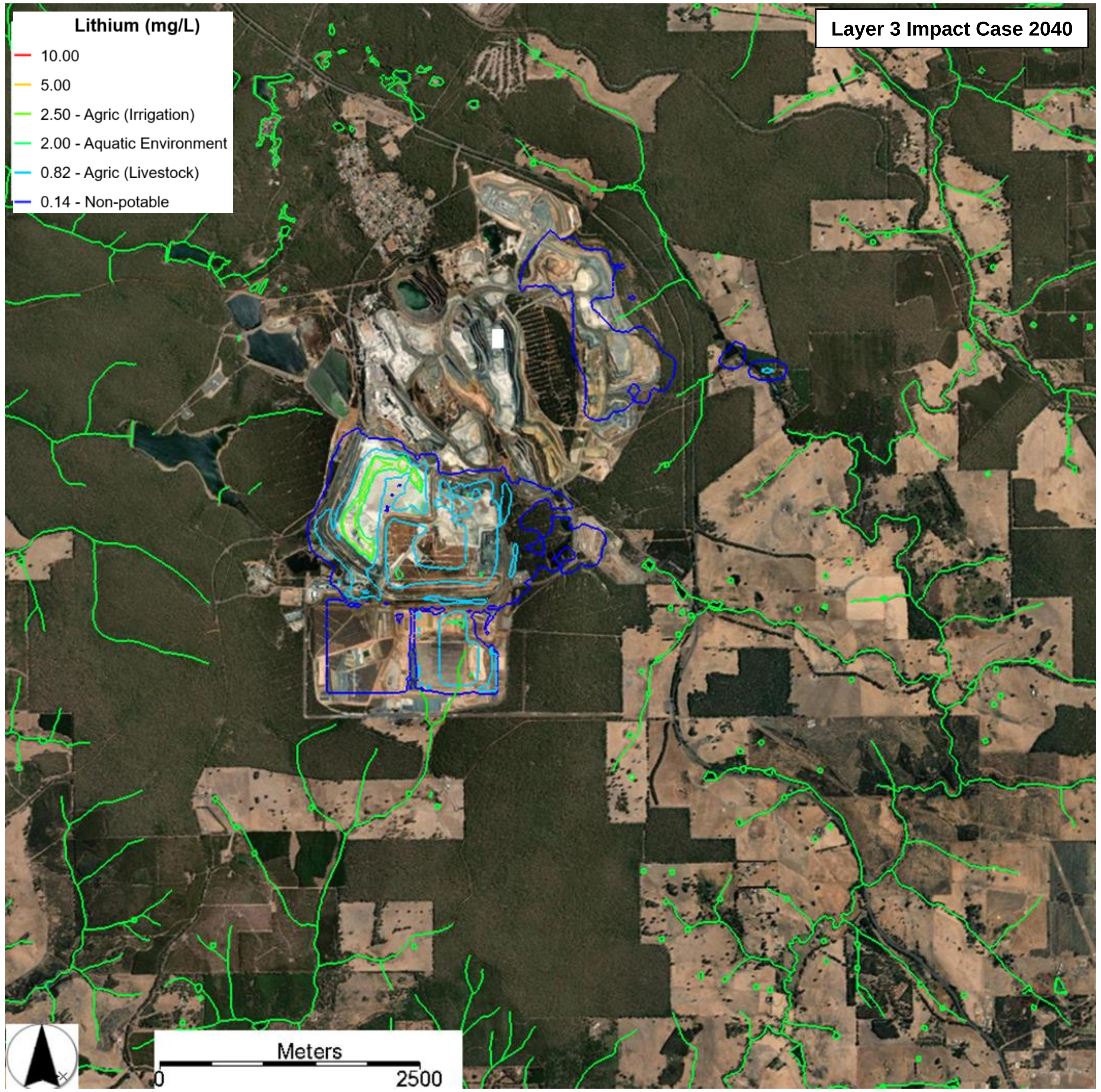
Appendix H

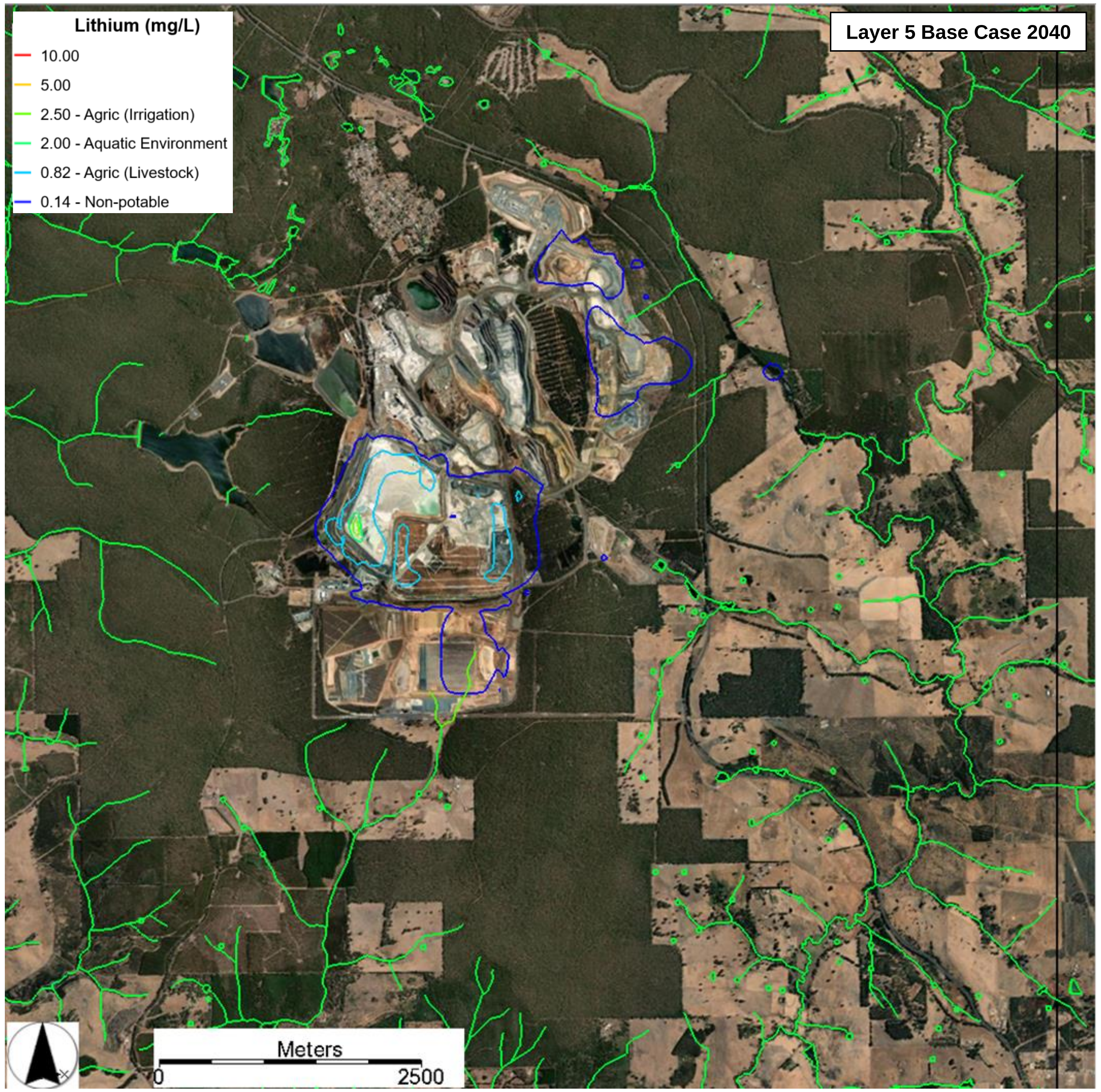
Modelled Lithium Plumes in 2040

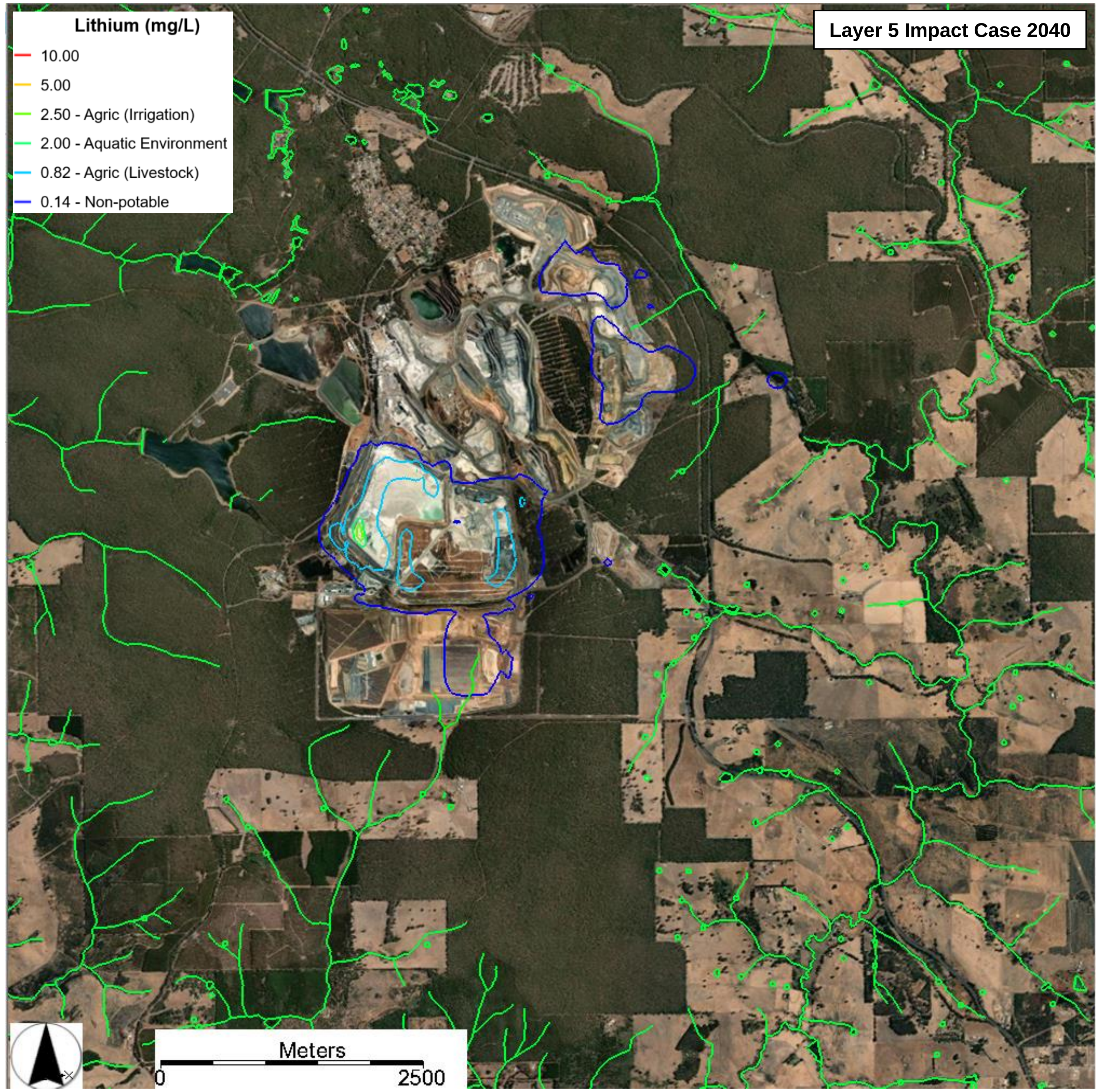

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 2 Base Case 2040
Meters
0
2500


Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 2 Impact Case 2040
Meters
0
2500


Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 3 Base Case 2040
Meters
0
2500

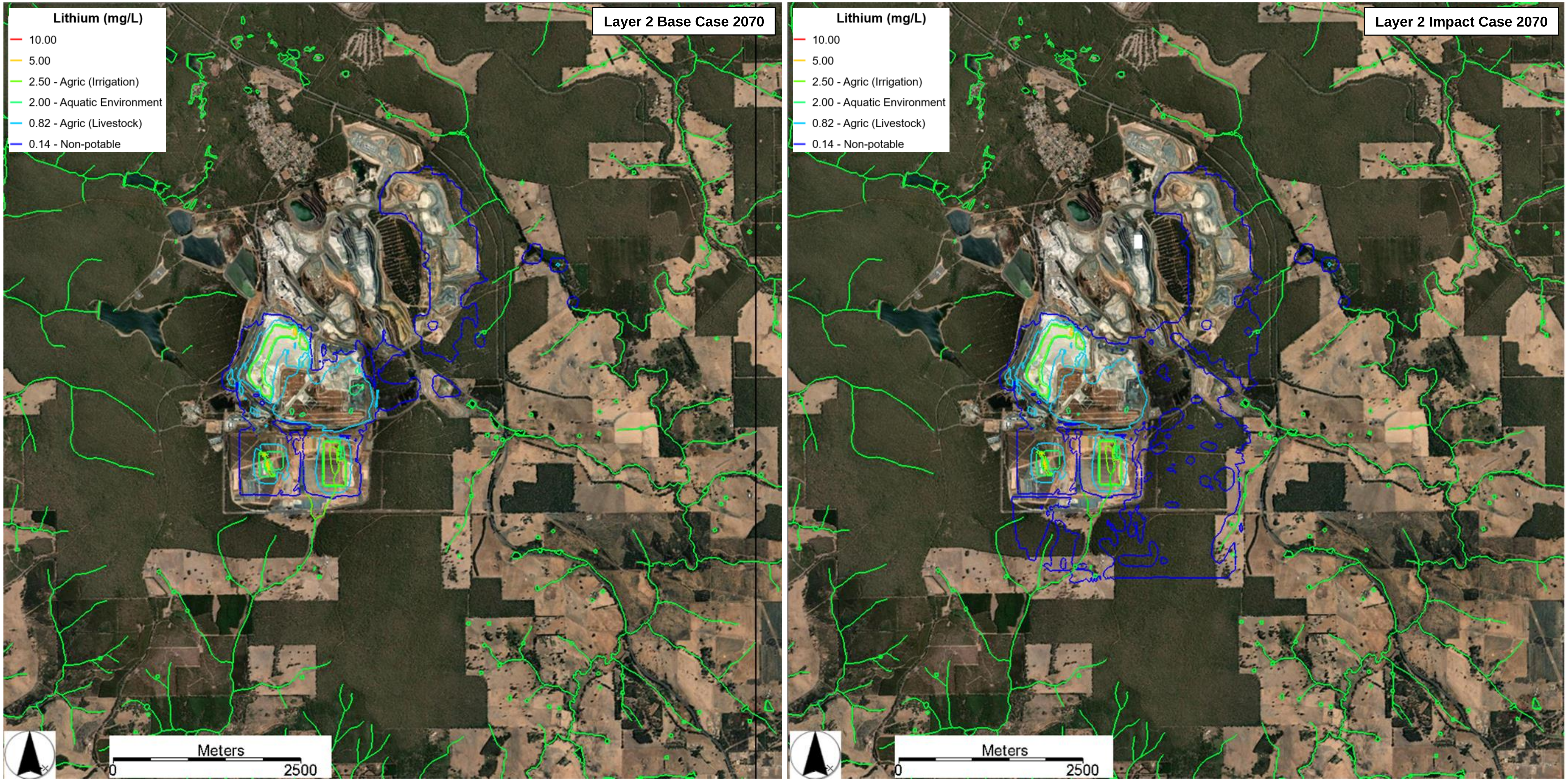

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 3 Impact Case 2040
Meters
0
2500

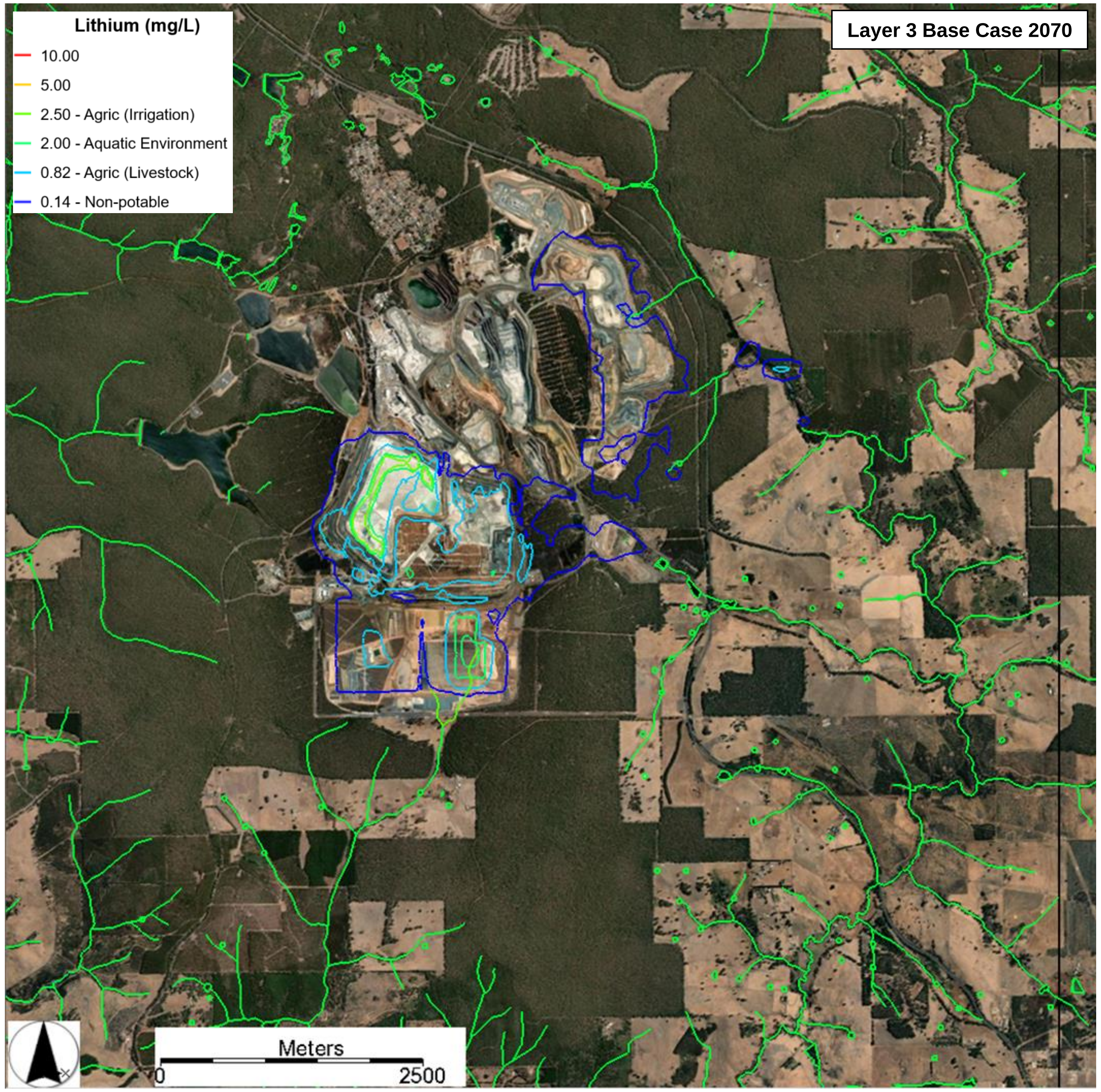

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 5 Base Case 2040
Meters
0
2500

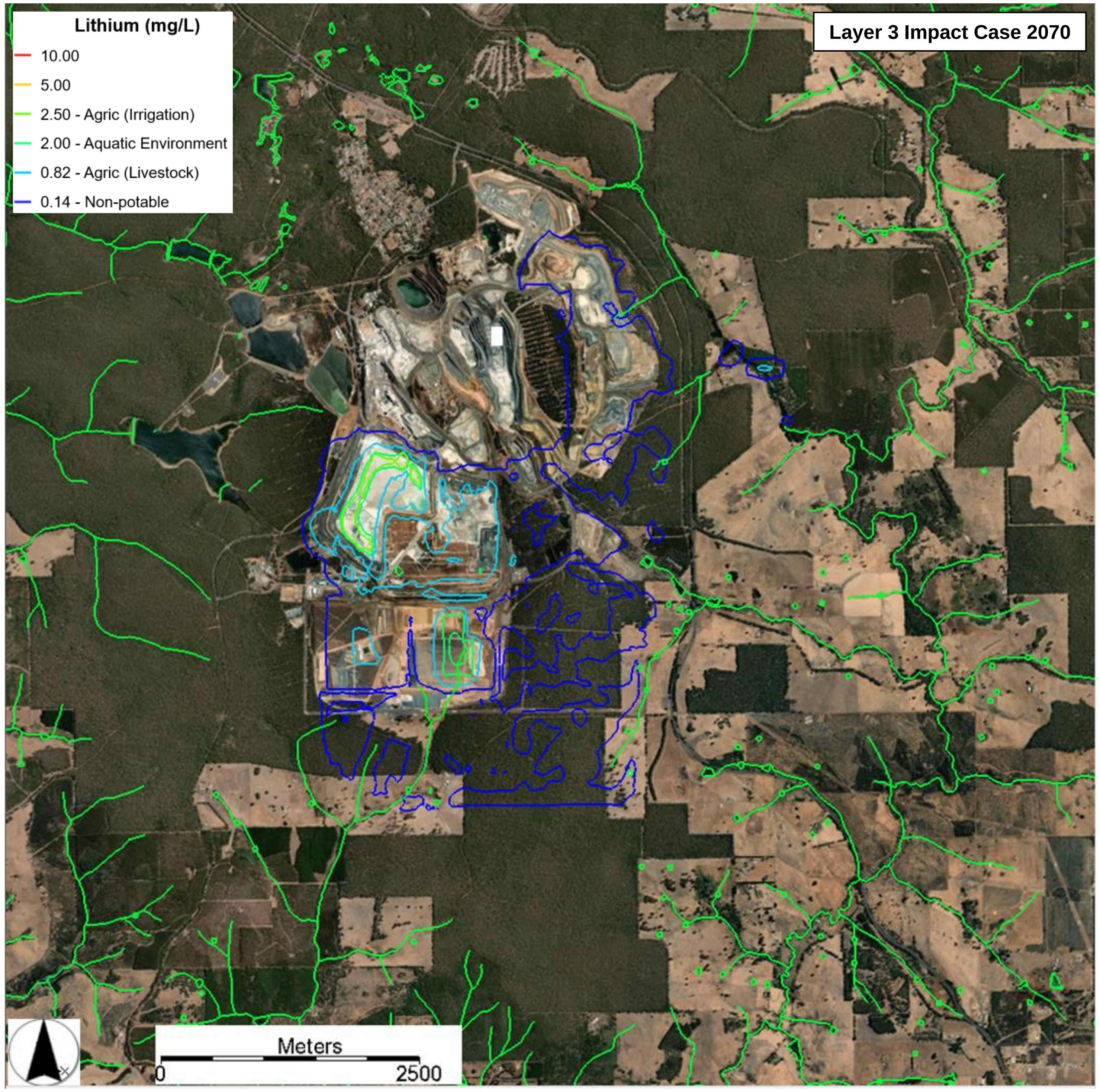

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 5 Impact Case 2040
Meters
0
2500

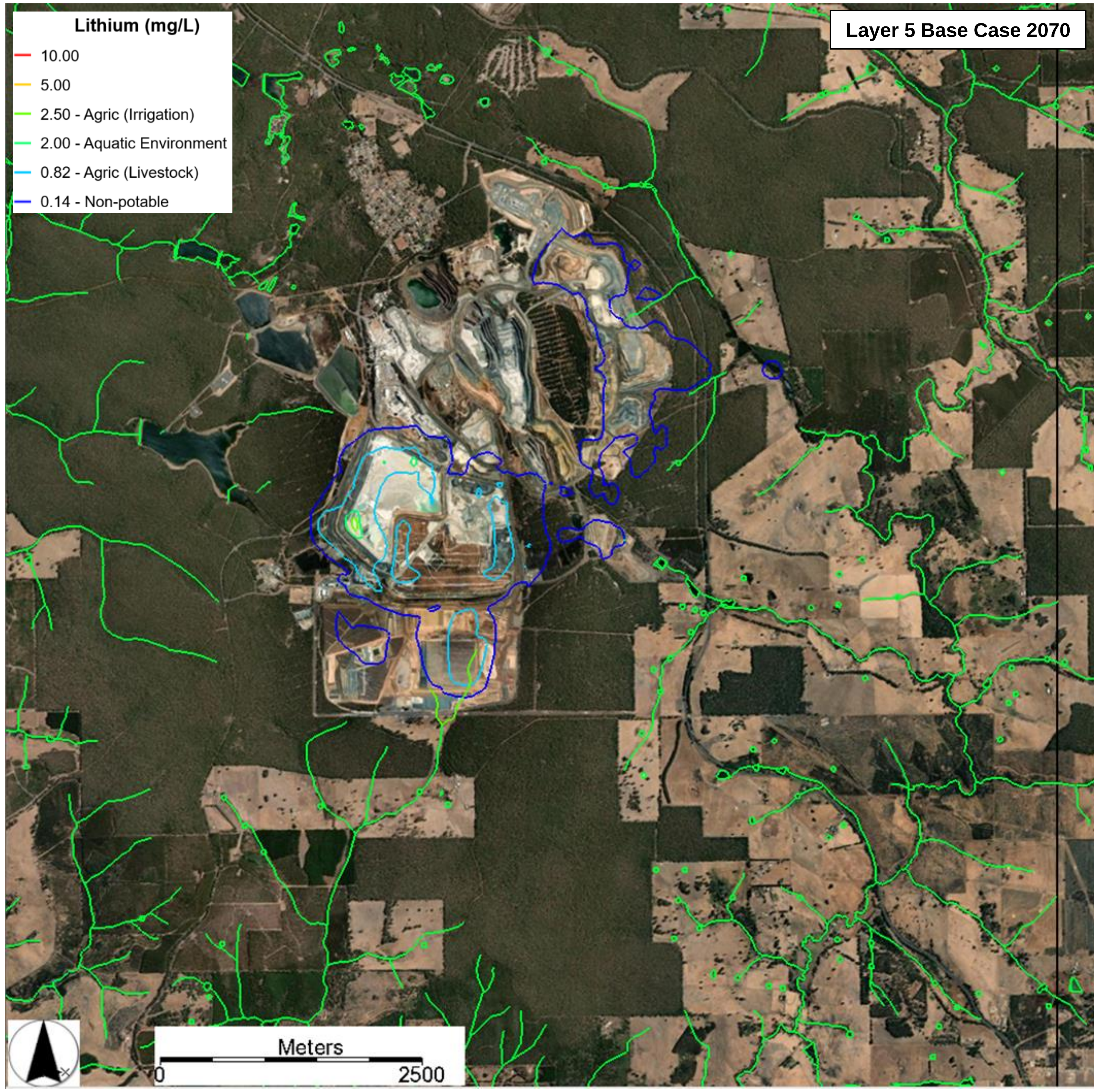
Appendix I

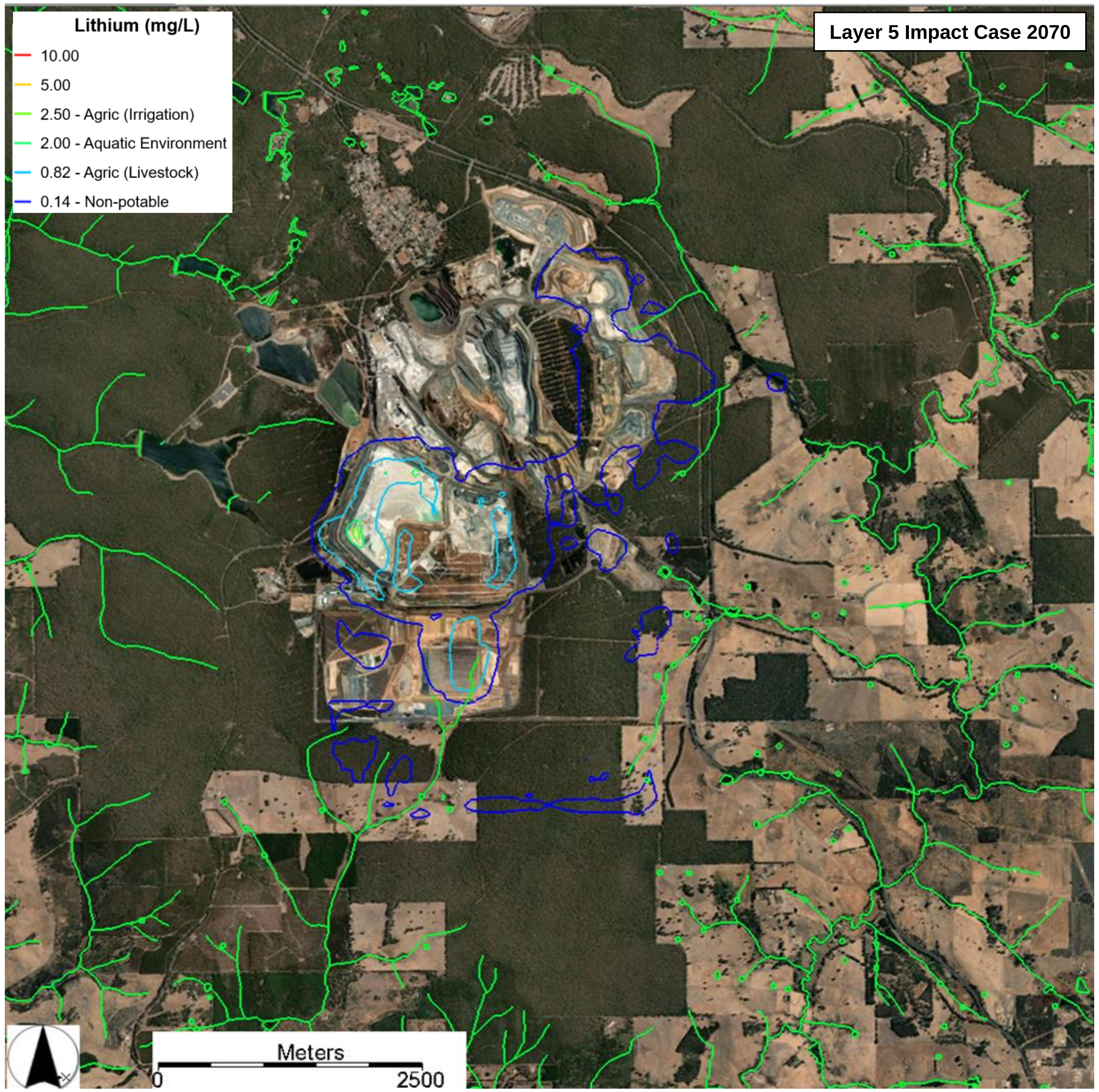
Modelled Lithium Plumes in 2070


Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 2 Base Case 2070
Meters
0
2500
Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 2 Impact Case 2070
Meters
0
2500


Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 3 Base Case 2070
Meters
0
2500

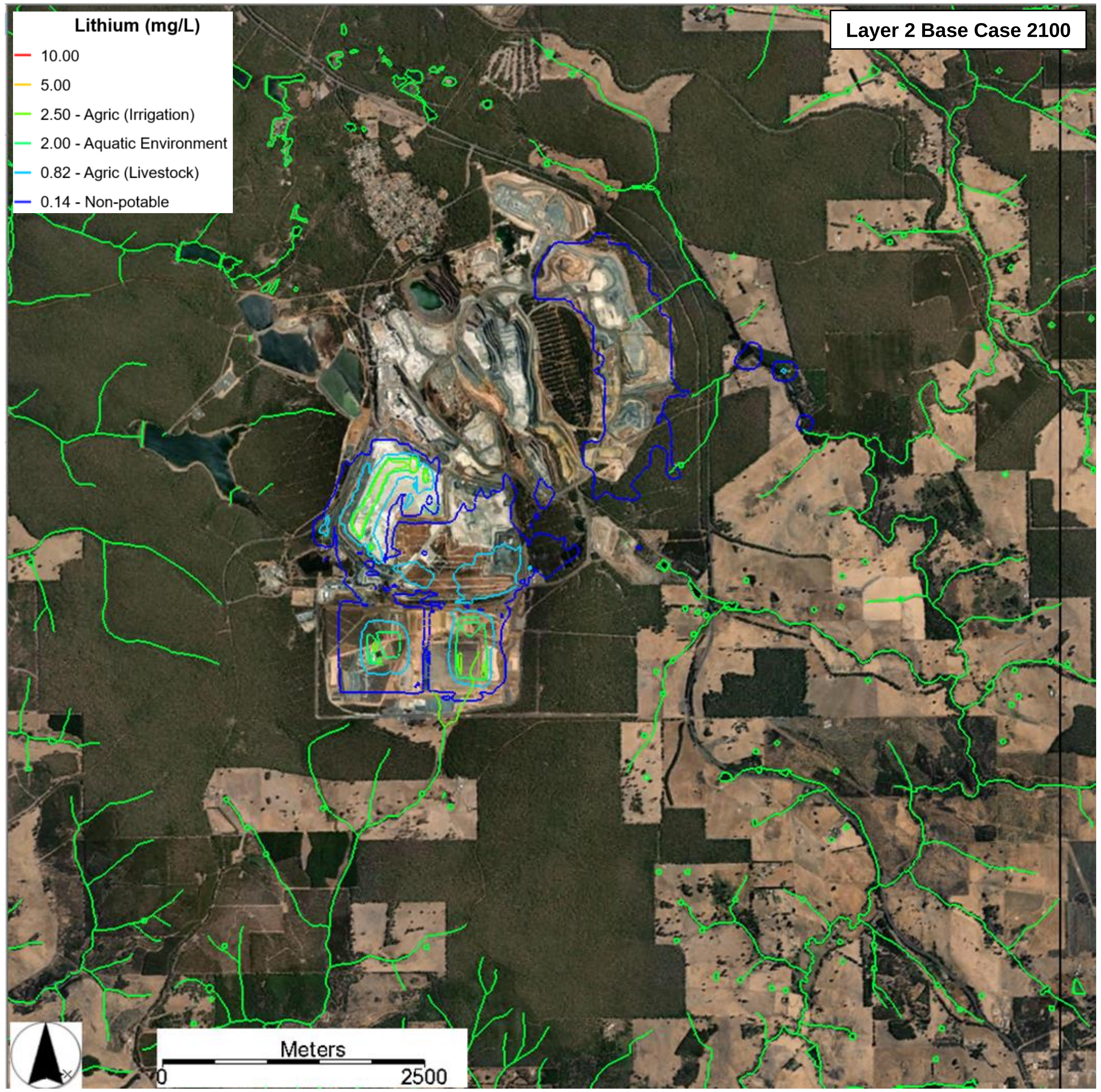

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 3 Impact Case 2070
Meters
0
2500

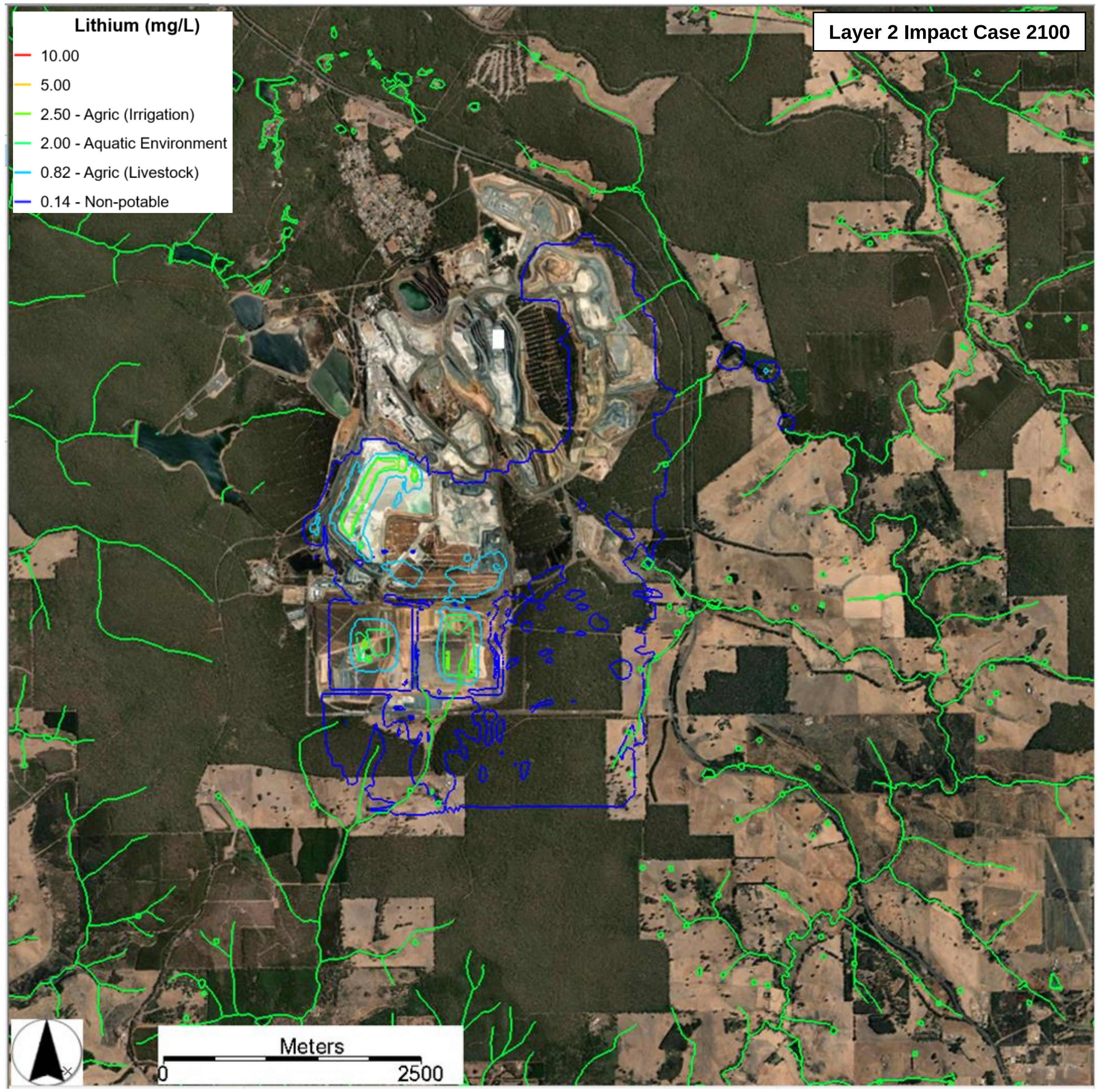

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 5 Base Case 2070
Meters
0
2500

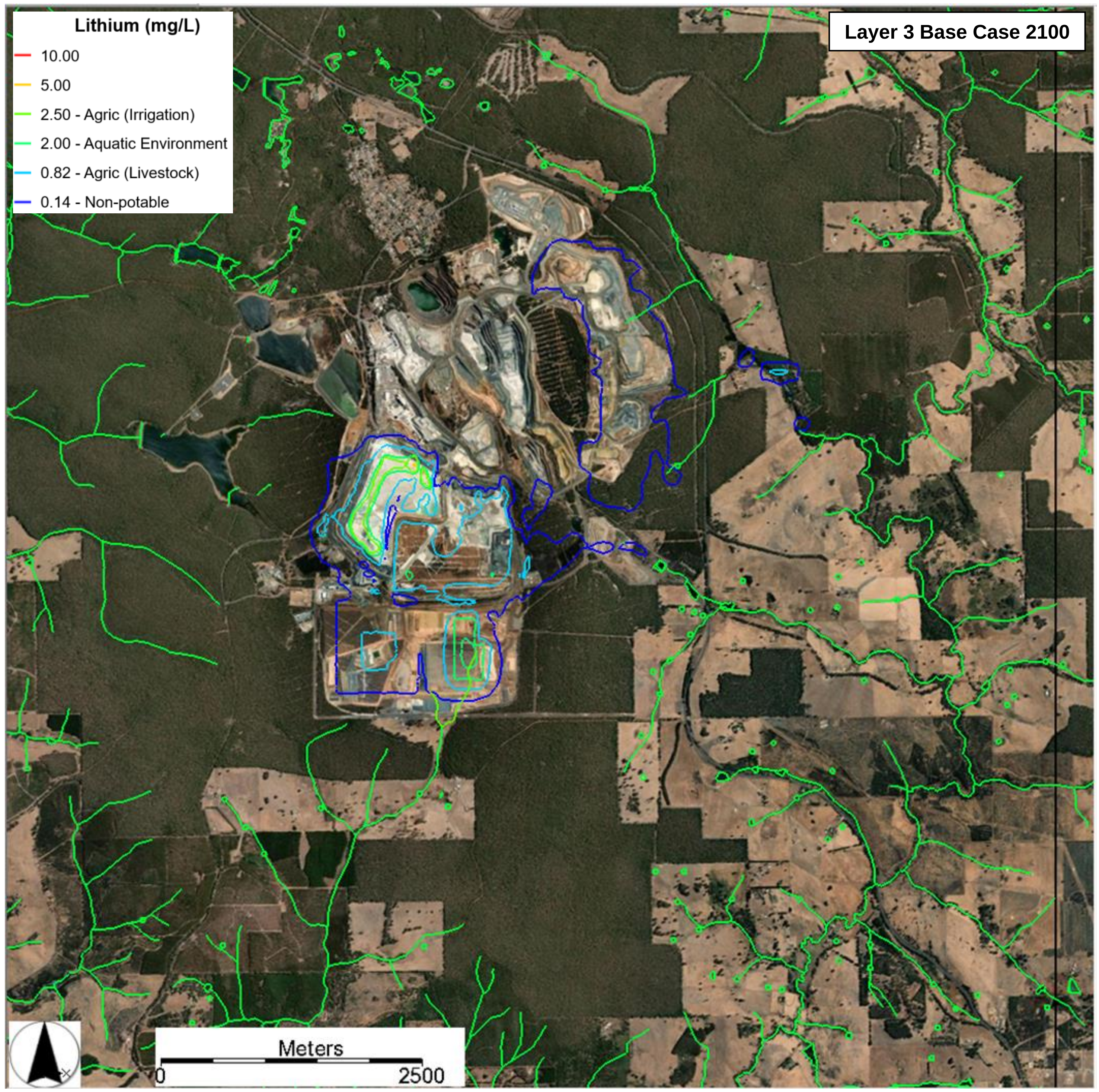

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 5 Impact Case 2070
Meters
0
2500

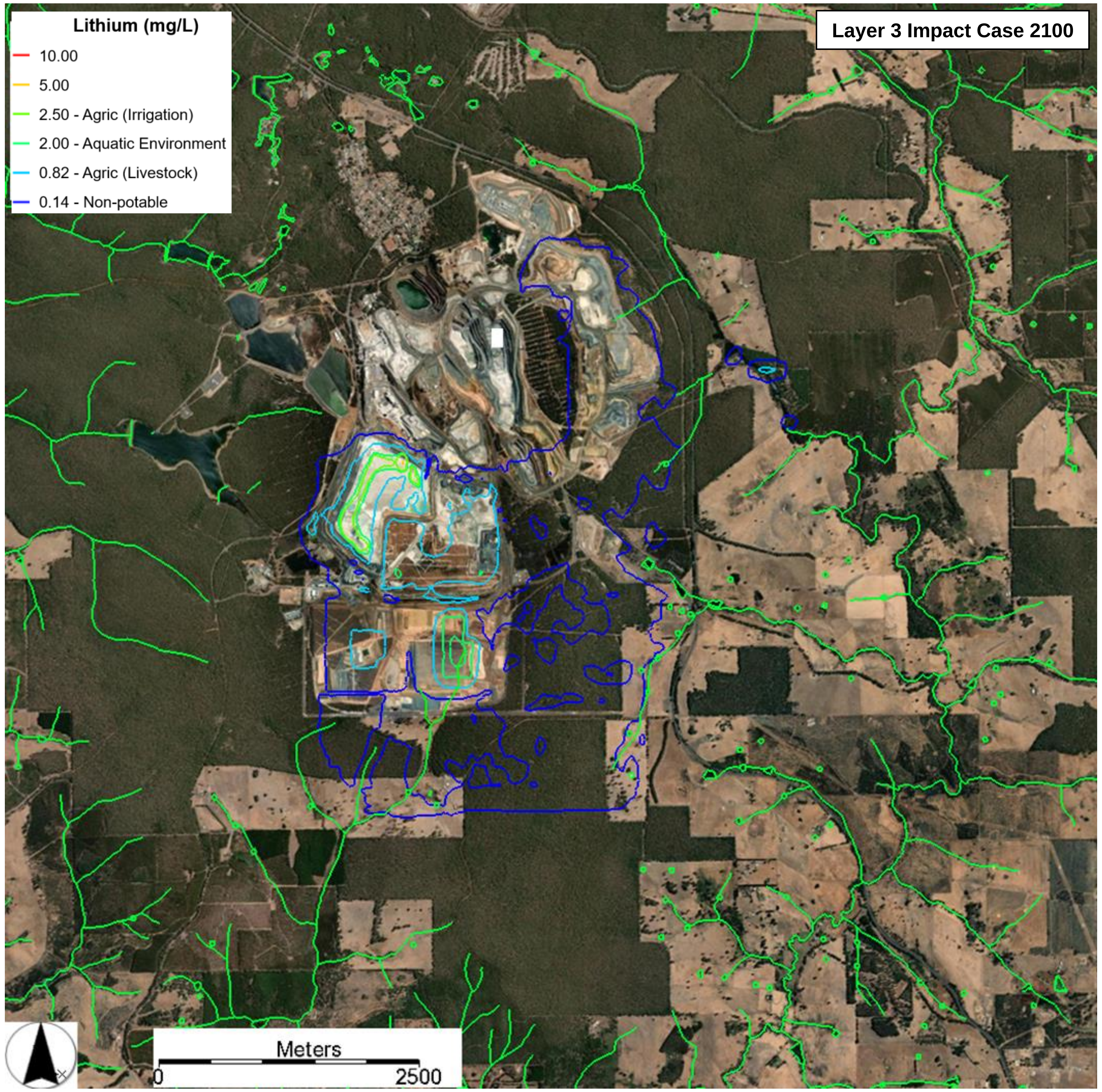
Appendix J

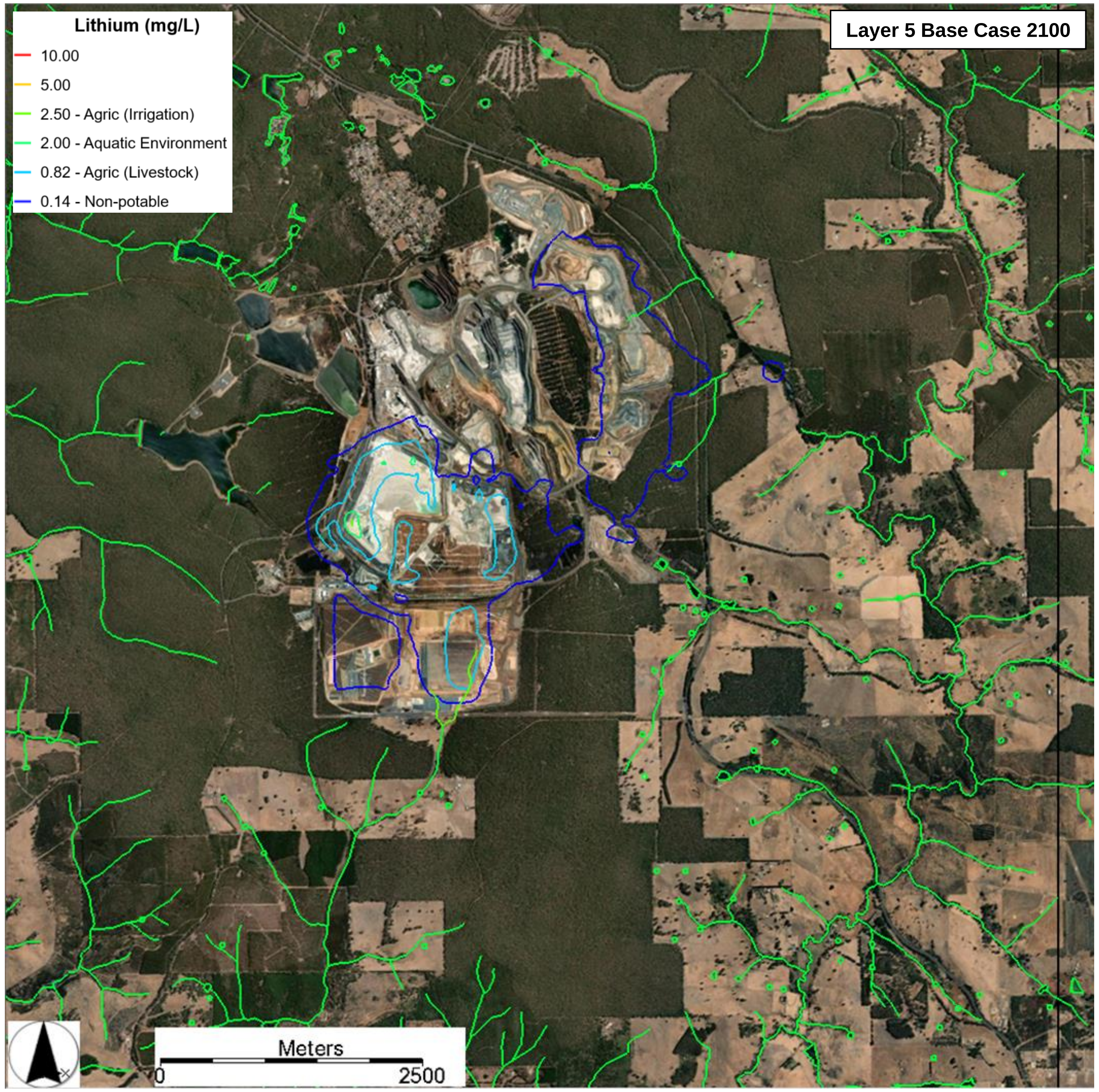
Modelled Lithium Plumes in 2100

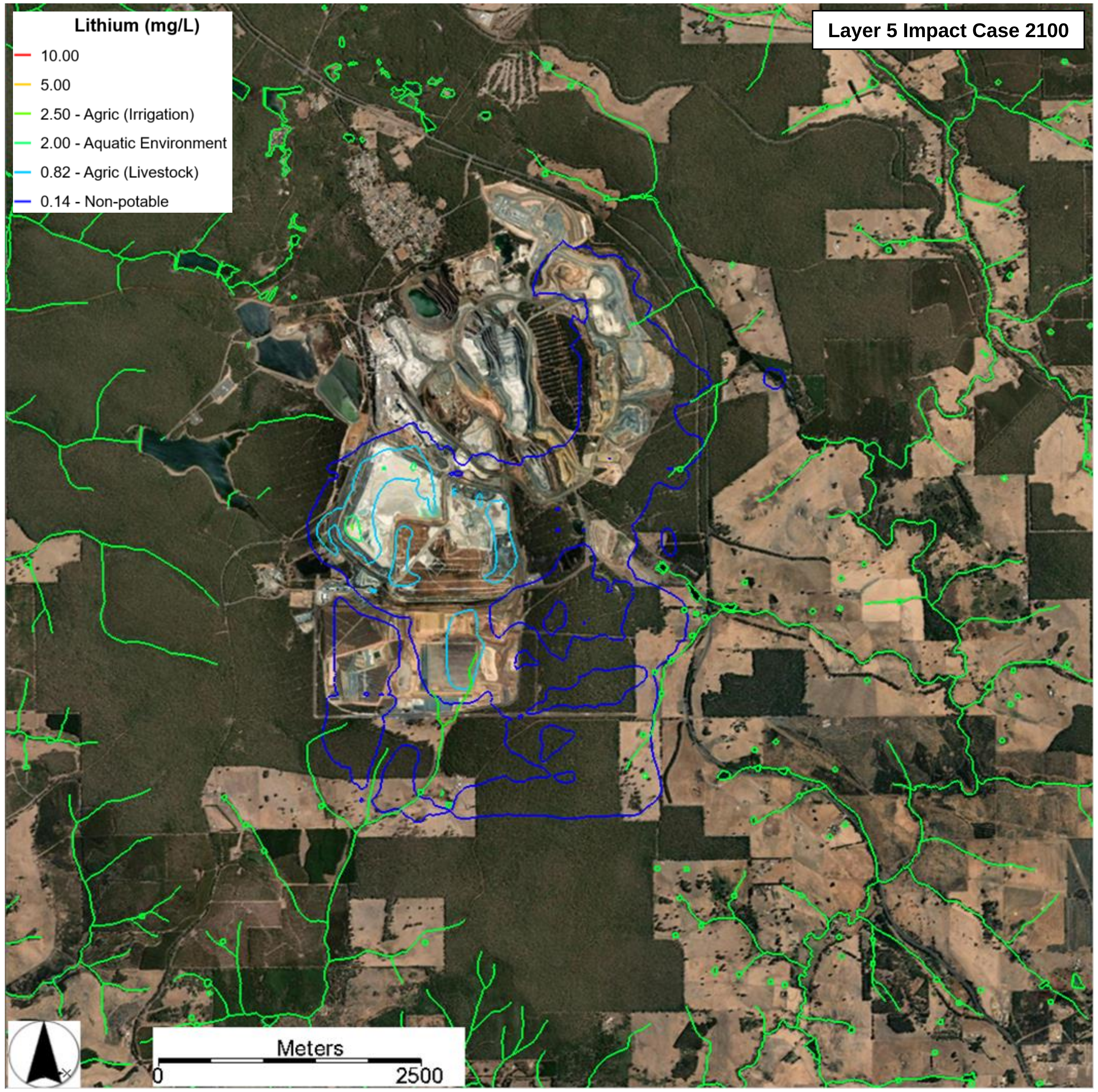

Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 2 Base Case 2100
Meters
0
2500


Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 2 Impact Case 2100
Meters
0
2500


Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 3 Base Case 2100
Meters
0
2500


Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 3 Impact Case 2100
Meters
0
2500


Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 5 Base Case 2100
Meters
0
2500


Lithium (mg/L)
10.00
5.00
2.50 - Agric (Irrigation)
2.00 - Aquatic Environment
0.82 - Agric (Livestock)
0.14 - Non-potable
Layer 5 Impact Case 2100
Meters
0
2500

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