

Bill Feast | Managing Director : Natural Resources

FEBRUARY 2018

To Grid, or not to Grid

Why implement a Cadastral Grid?

- World Bank Book : Mineral Rights Cadastre; Jun 2009
 - One of the most innovative and efficient concepts introduced in the management of mineral rights is the cadastral unit (CU).
 - Before the CU concept was developed, many countries had no restrictions on the shape, geometry, and position of mineral rights, leading to a number of problems, including frequent overlaps between adjacent concessions and the presence of areas that were geometrically blocked for applications.

Why implement a Cadastral Grid?

- Enrique Ortega : Design and Supervision of Installation of Mining Cadastre System Malawi Phase 1 Report; July 2014
 - The best practice solution for the optimization of land-use for mining activities, and for facilitating the management of a Mineral Rights Cadastre, is the establishment of a cadastral and the Cadastral Unit (CU).
 - It is obvious that if the CU has small dimensions, its adaptation to the geometry of the pre-existing licenses (and consequently the transformation of the current titles to the new system during the transition period), is easier.

Why implement a Cadastral Grid? *My view!*

- World Bank Book : Mineral Rights Cadastre. Jun 2009
 - One of the most innovative and efficient concepts introduced in the management of mineral rights is the cadastral unit (CU).
 - ***The real advance is the in implementation of modern mining cadastre systems together with updated survey techniques using GPS technologies***
 - Before the CU concept was developed, many countries had no restrictions on the shape, geometry, and position of mineral rights, leading to a number of problems, including frequent overlaps between adjacent concessions and the presence of areas that were geometrically blocked for applications.
 - ***Modern mining cadastre systems will prevent overlaps no matter what shape a licence is. So why then force a simple polygon to fit a complex cadastral grid?***

Why implement a Cadastral Grid? *My view!*

- Enrique Ortega : Design and Supervision of Installation of Mining Cadastre System Phase I Report. July 2014
 - The best practice solution for the optimization of land-use for mining activities, and for facilitating the management of a Mineral Rights Cadastre, is the establishment of a cadastral and the Cadastral Unit (CU).
 - ***Best practice or subjective opinion?***
 - It is obvious that if the CU has small dimensions, its adaptation to the geometry of the pre-existing licenses (and consequently the transformation of the current titles to the new system during the transition period), is easier.
 - ***The smaller the CU, the more complex the transition and later management of existing and new applications especially for adjacent titles***

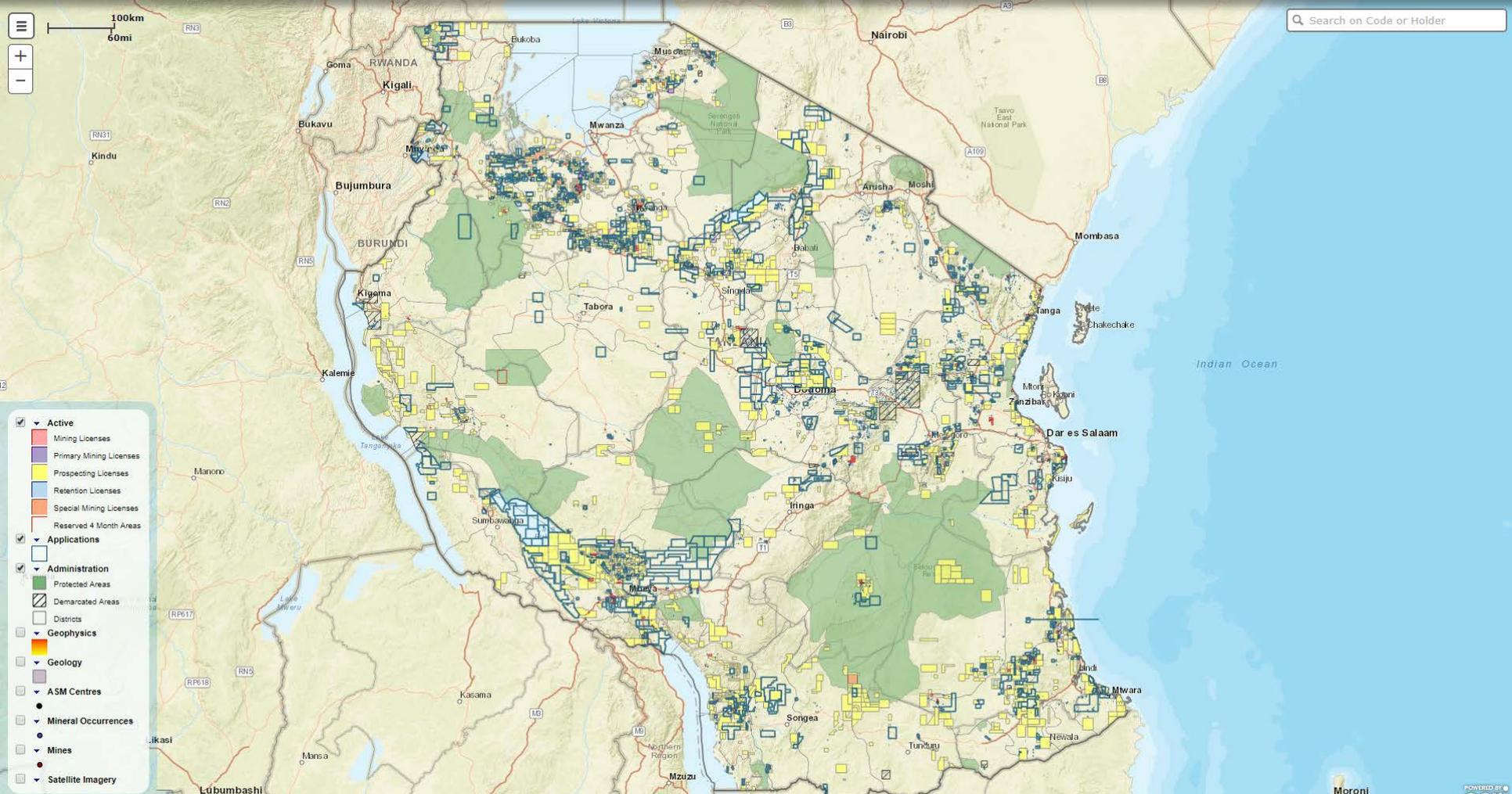
What am I going on about this?

- We have been involved in numerous projects where Governments have wasted an inordinate amount of time, resources and goodwill in trying to implement a cadastral grid for no good reason and simple blind faith in someone's opinion of best practice.
- Governments should focus on streamlining the sector not undertaking superfluous activities that jeopardise security of tenure and create disputes that end up in the judicial system.
- Let's review some examples....



Search on Code or Holder

- Active
 - Mining Licenses
 - Primary Mining Licenses
 - Prospecting Licenses
 - Retention Licenses
 - Special Mining Licenses
 - Reserved 4 Month Areas
- Applications
 -
- Administration
 - Protected Areas
 - Demarcated Areas
 - Districts
- Geophysics
 -
- Geology
 -
- ASM Centres
 -
- Mineral Occurrences
 -
- Mines
 -
- Satellite Imagery



6°19'12" S, 35°14'42" E

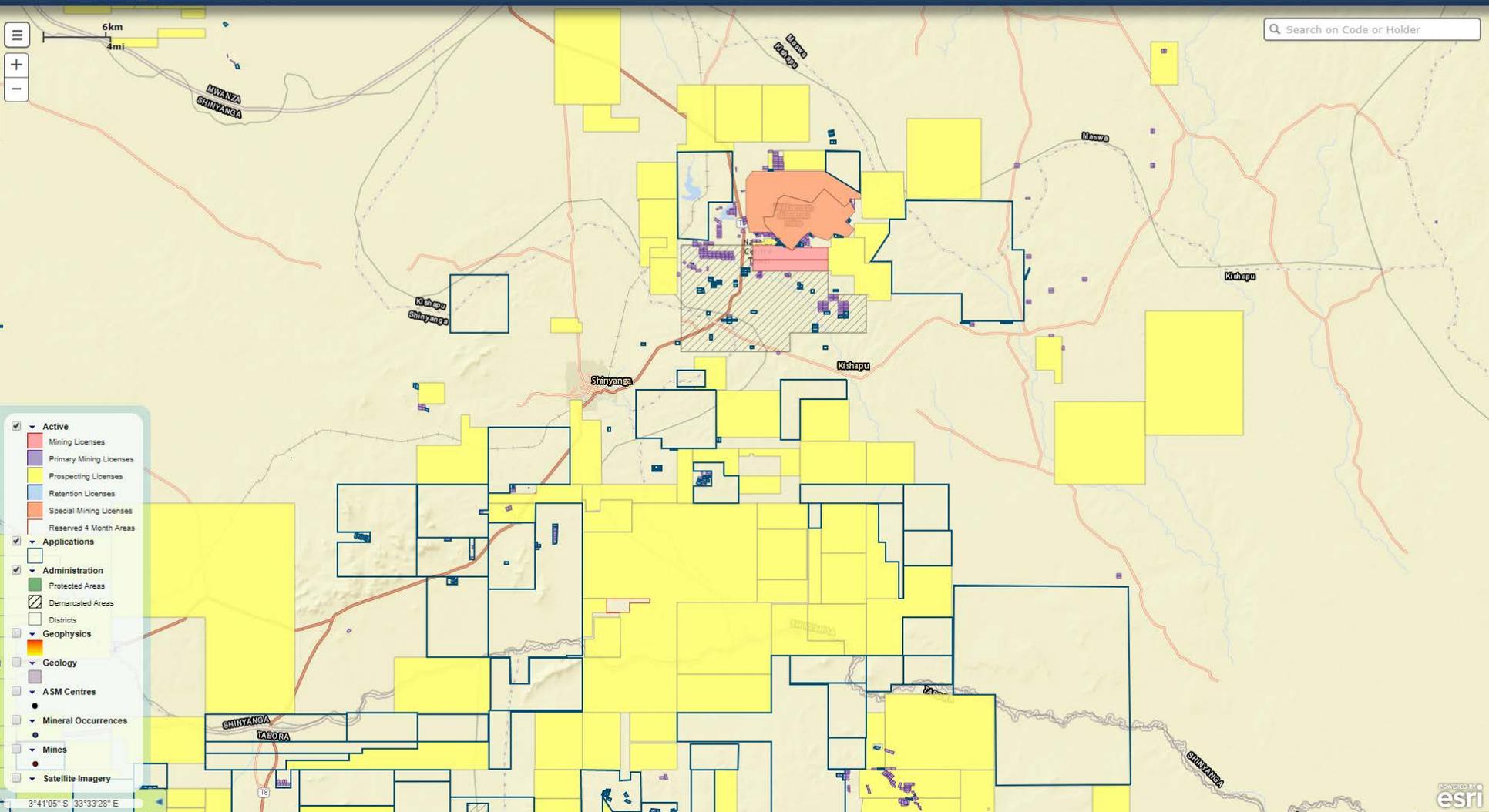


6km
4mi

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 - Retention Licenses
 - Special Mining Licenses
 - Reserved 4 Month Areas
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- ASM Centres
- Mineral Occurrences
- Mines
- Satellite Imagery

3°41'05" S 33°33'28" E



200km / 200mi

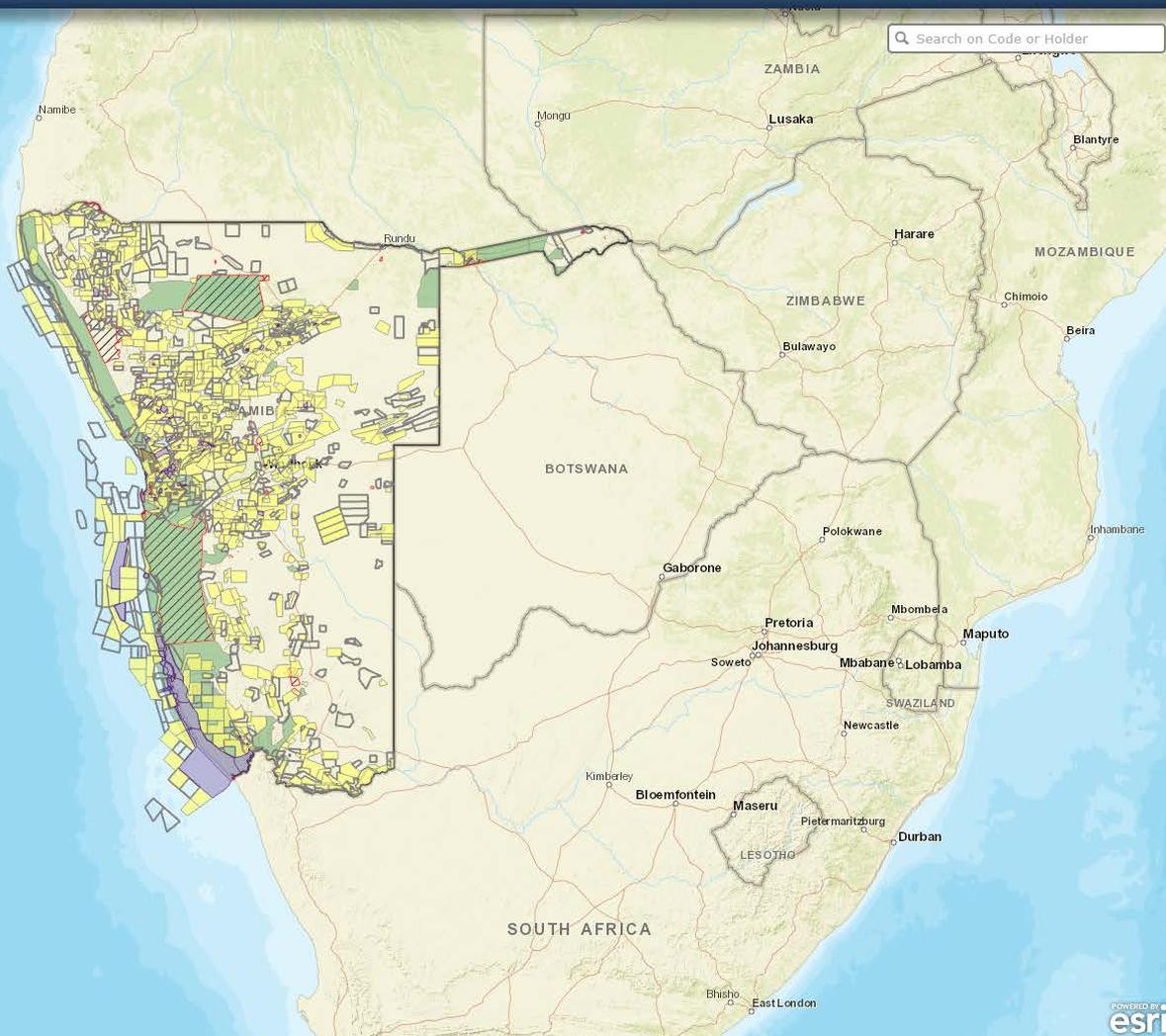
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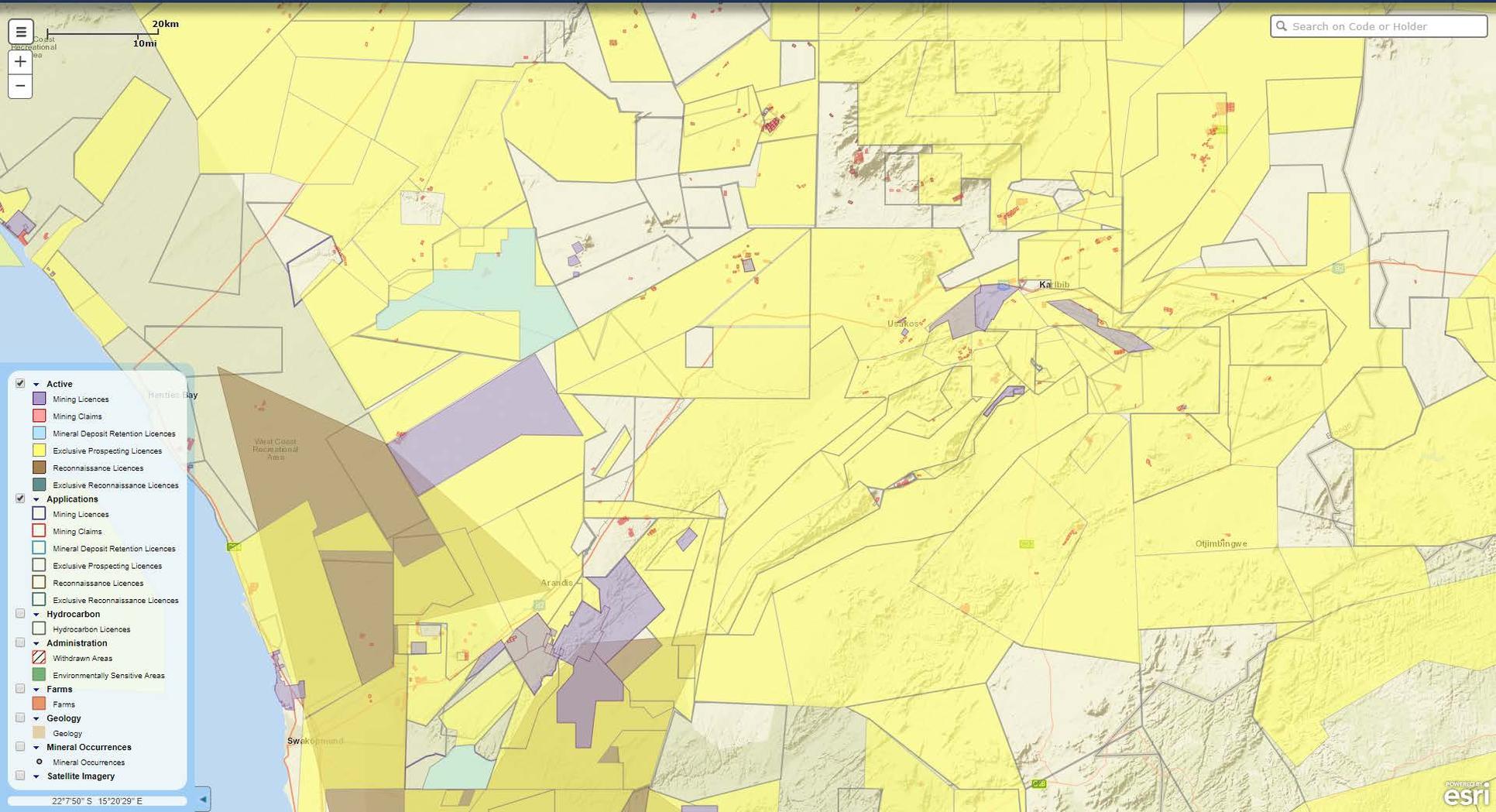
-

Search on Code or Holder

- Active
 - Mining Licences
 - Mining Claims
 - Mineral Deposit Retention Licences
 - Exclusive Prospecting Licences
 - Reconnaissance Licences
 - Exclusive Reconnaissance Licences
- Applications
 - Mining Licences
 - Mining Claims
 - Mineral Deposit Retention Licences
 - Exclusive Prospecting Licences
 - Reconnaissance Licences
 - Exclusive Reconnaissance Licences
- Hydrocarbon
 - Hydrocarbon Licences
- Administration
 - Withdrawn Areas
 - Environmentally Sensitive Areas
- Farms
 - Farms
- Geology
 - Geology
- Mineral Occurrences
 - Mineral Occurrences
- Satellite Imagery



23°38'33" S 16°11'14" E

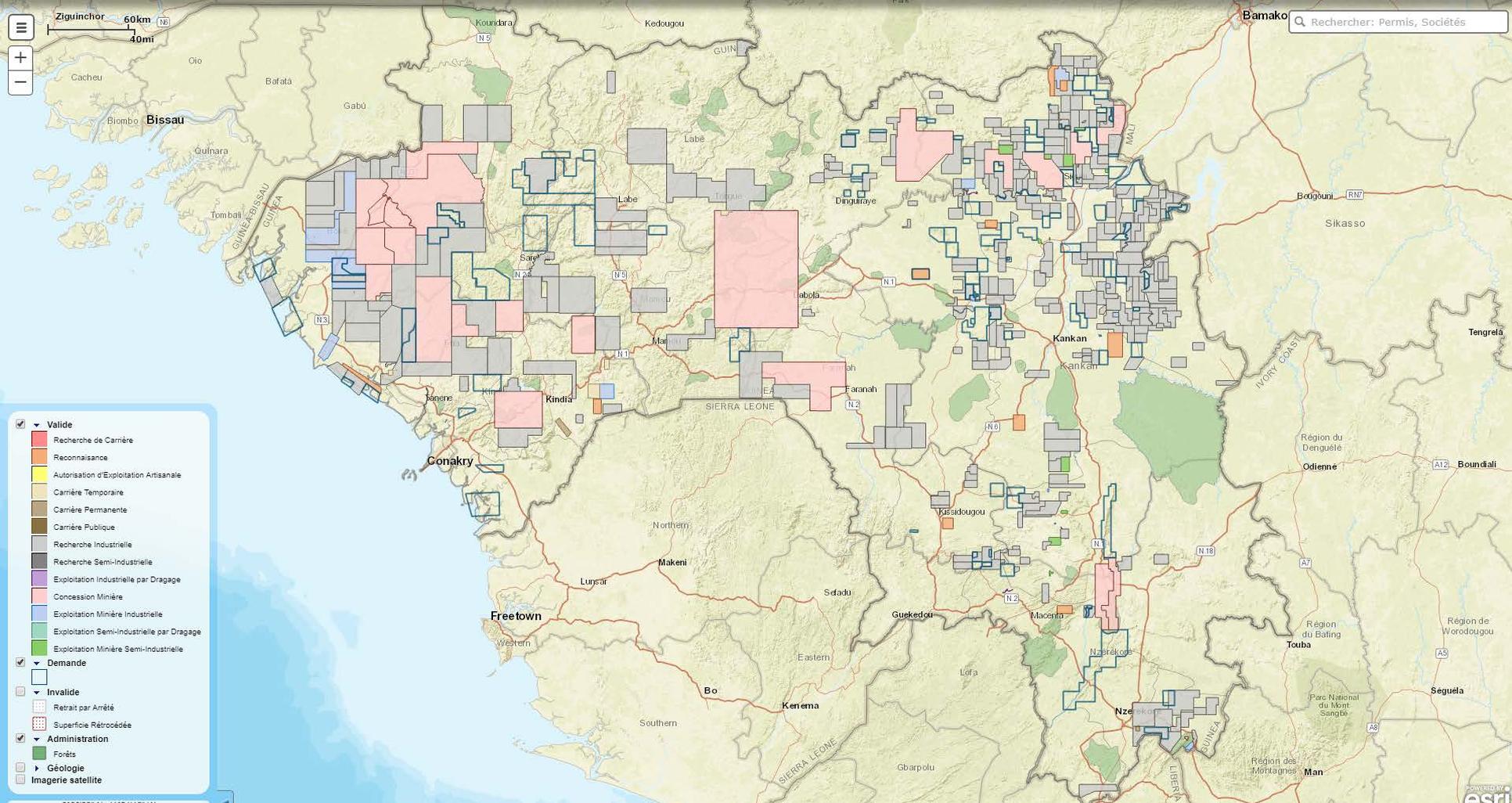


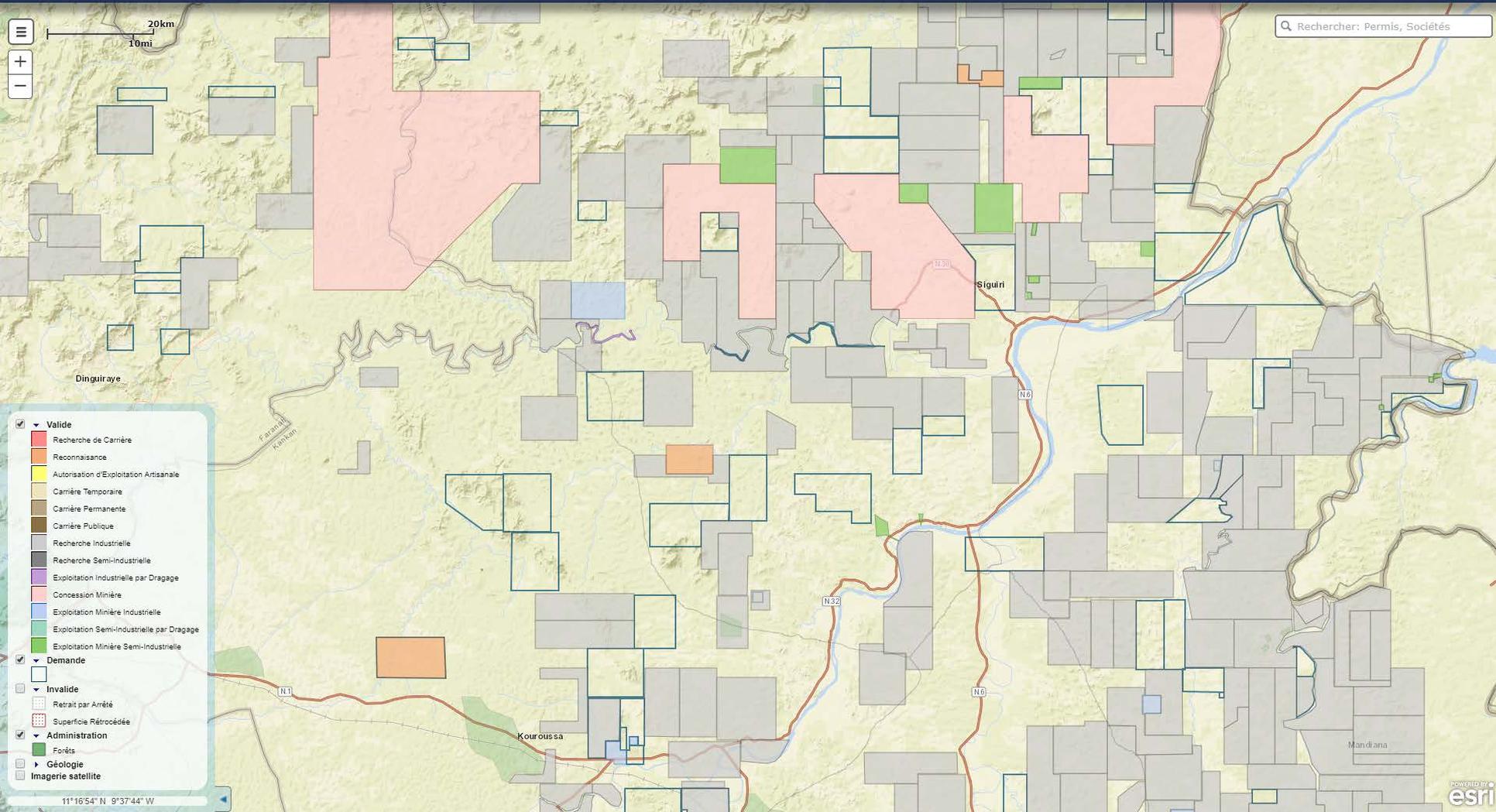
Search on Code or Holder



- Active
 - Mining Licences
 - Mining Claims
 - Mineral Deposit Retention Licences
 - Exclusive Prospecting Licences
 - Reconnaissance Licences
 - Exclusive Reconnaissance Licences
- Applications
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 - Mining Claims
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 - Exclusive Prospecting Licences
 - Reconnaissance Licences
 - Exclusive Reconnaissance Licences
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 - Hydrocarbon Licences
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 - Environmentally Sensitive Areas
- Farms
 - Farms
- Geology
 - Geology
- Mineral Occurrences
 - Mineral Occurrences
- Satellite Imagery

22°7'50" S 15°20'29" E





Valide

- Recherche de Carrière
- Reconnaissance
- Autorisation d'Exploitation Artisanale
- Carrière Temporaire
- Carrière Permanente
- Carrière Publique
- Recherche Industrielle
- Recherche Semi-Industrielle
- Exploitation Industrielle par Dragage
- Concession Minière
- Exploitation Minière Industrielle
- Exploitation Semi-Industrielle par Dragage
- Exploitation Minière Semi-Industrielle

Demande

-

Invalide

- Retrait par Arrêté
- Superficie Rétrocédée

Administration

- Forêts

Géologie

Imagerie satellite

11°16'54" N 9°37'44" W

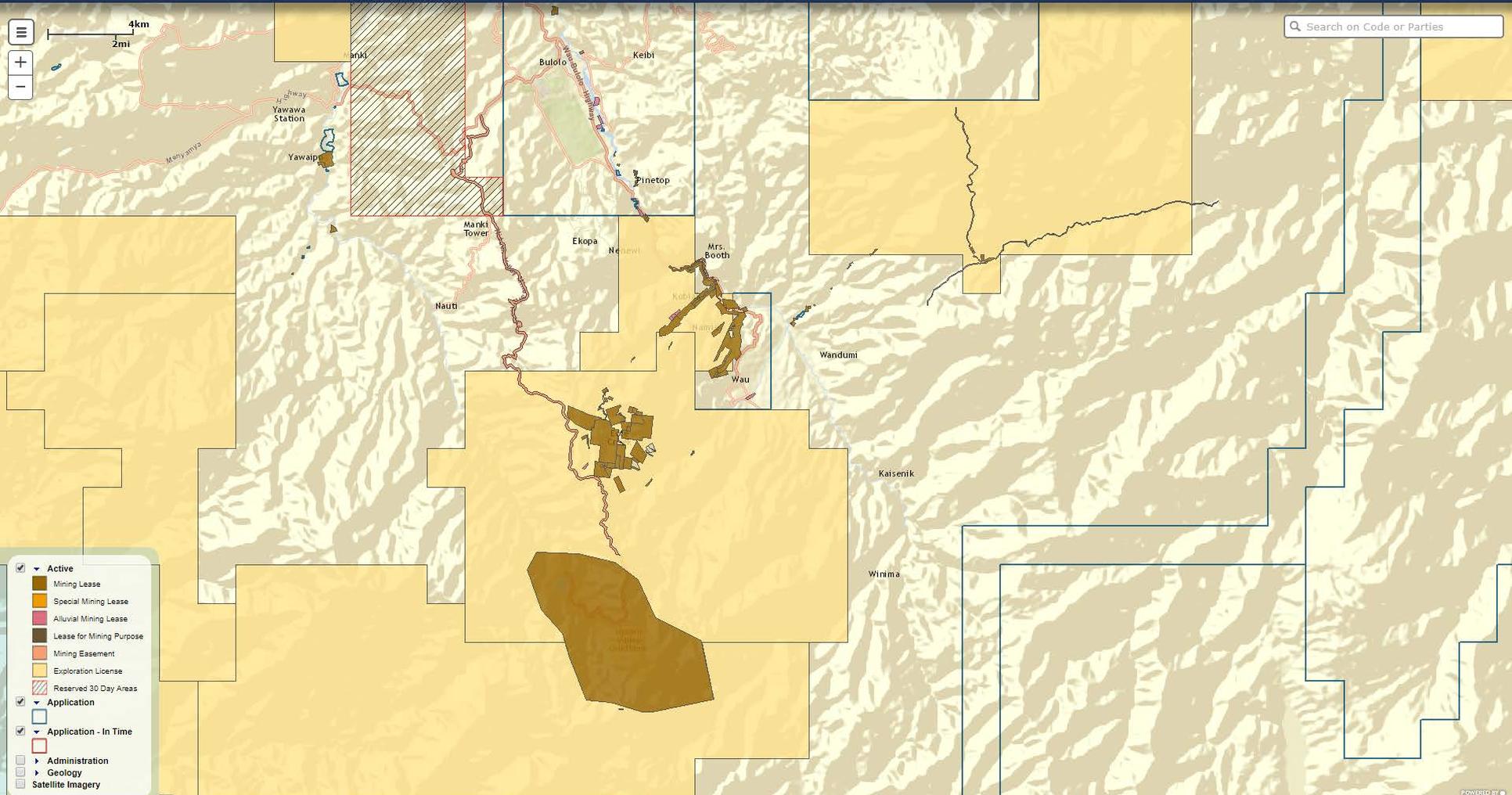


Search on Code or Parties



- Active
 - Mining Lease
 - Special Mining Lease
 - Alluvial Mining Lease
 - Lease for Mining Purpose
 - Mining Easement
 - Exploration License
- Application
 - Application - In Time
- Administration
- Geology
- Satellite Imagery

7°11'14" S 149°19'54" E

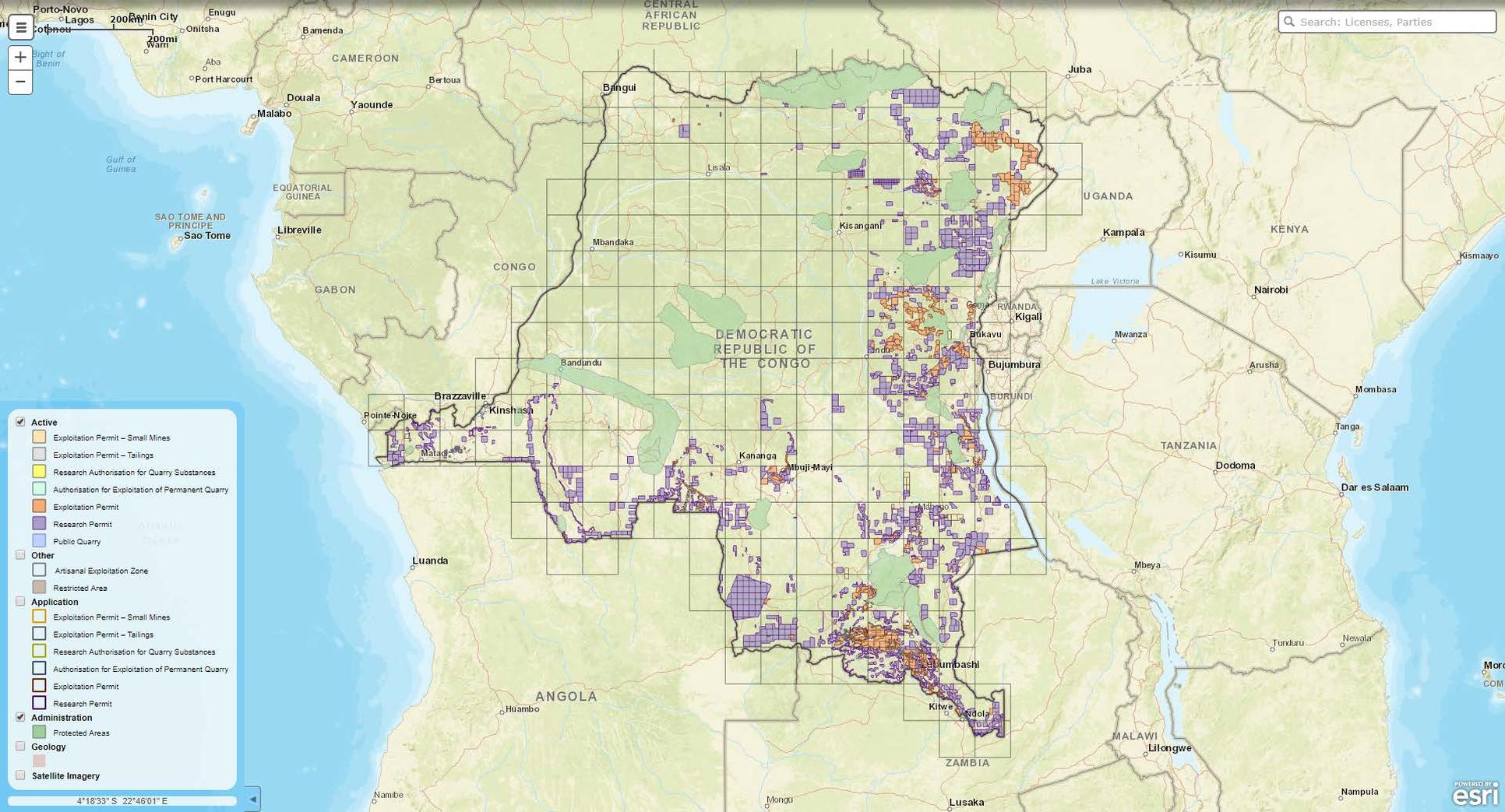


Search on Code or Parties

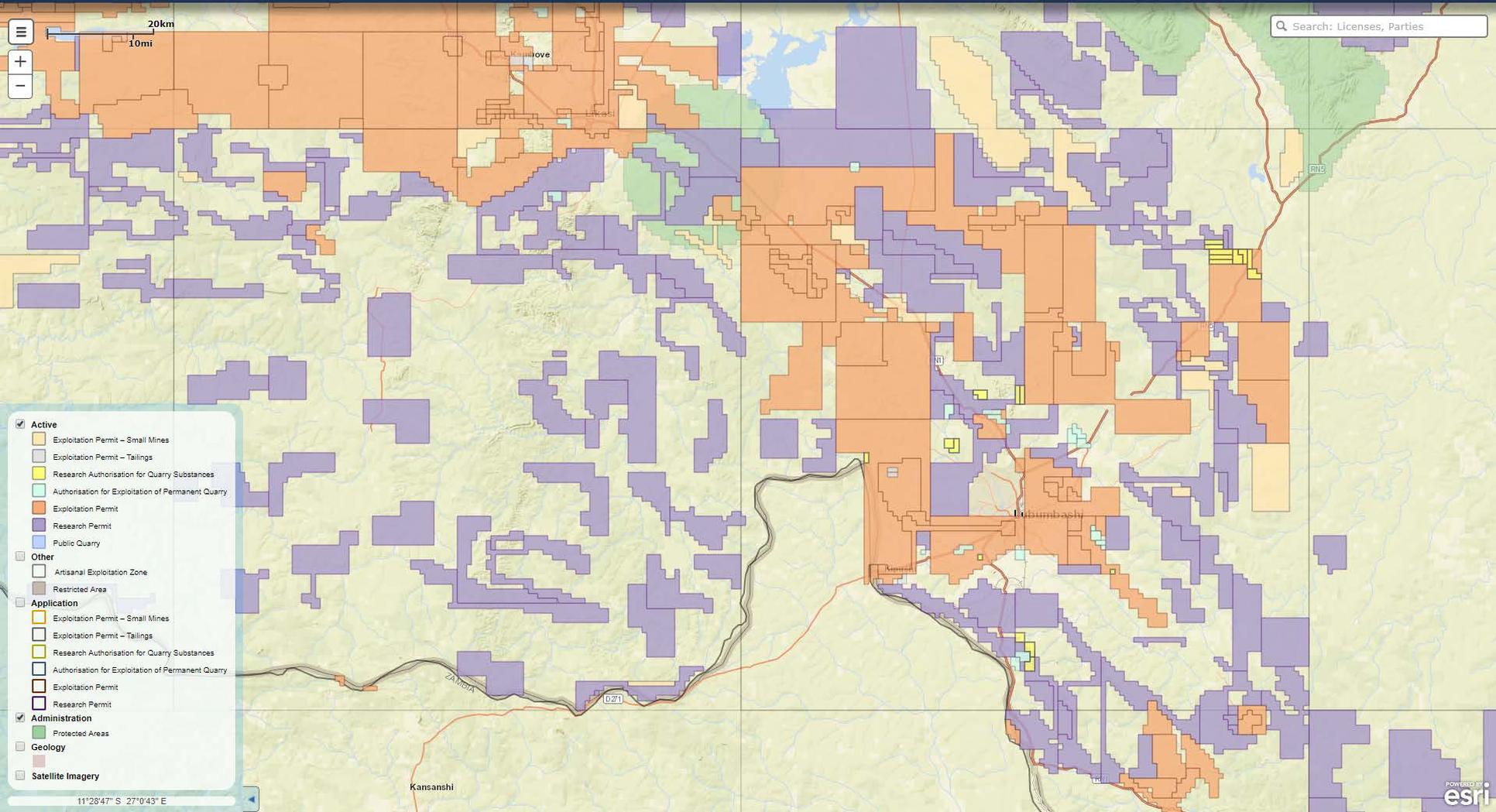


- Active
 - Mining Lease
 - Special Mining Lease
 - Alluvial Mining Lease
 - Lease for Mining Purpose
 - Mining Easement
 - Exploration License
 - Reserved 30 Day Areas
- Application
 -
- Application - In Time
 -
- Administration
- Geology
- Satellite Imagery

7°21'04" S 146°43'37" E



- Active**
 - Exploitation Permit – Small Mines
 - Exploitation Permit – Tailings
 - Research Authorisation for Quarry Substances
 - Authorisation for Exploitation of Permanent Quarry
 - Exploitation Permit
 - Research Permit
 - Public Quarry
- Other**
 - Artisanal Exploitation Zone
 - Restricted Area
- Application**
 - Exploitation Permit – Small Mines
 - Exploitation Permit – Tailings
 - Research Authorisation for Quarry Substances
 - Authorisation for Exploitation of Permanent Quarry
 - Exploitation Permit
 - Research Permit
- Administration**
 - Protected Areas
- Geology**
 -
- Satellite Imagery**



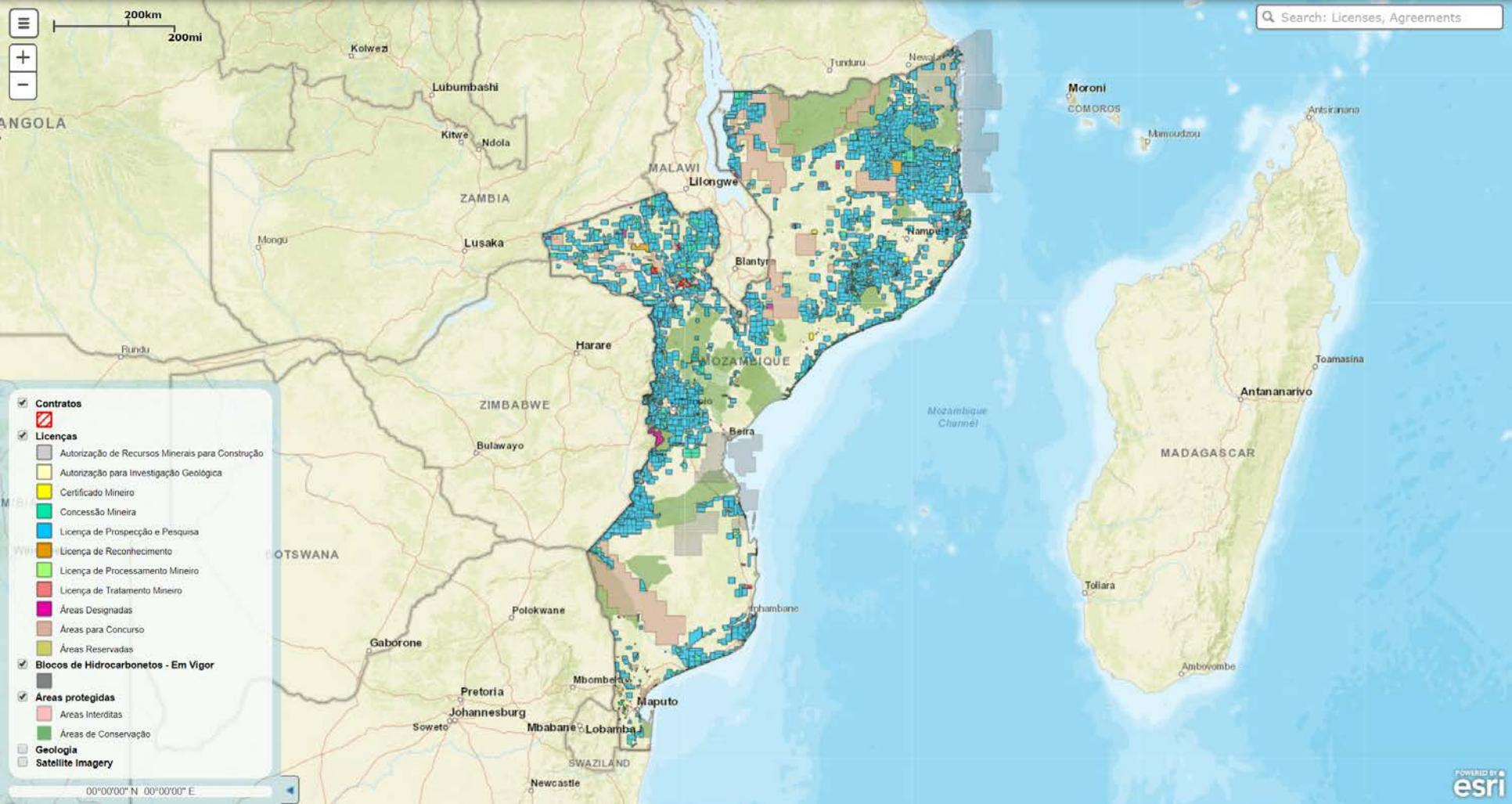
Search: Licenses, Parties

20km
10mi

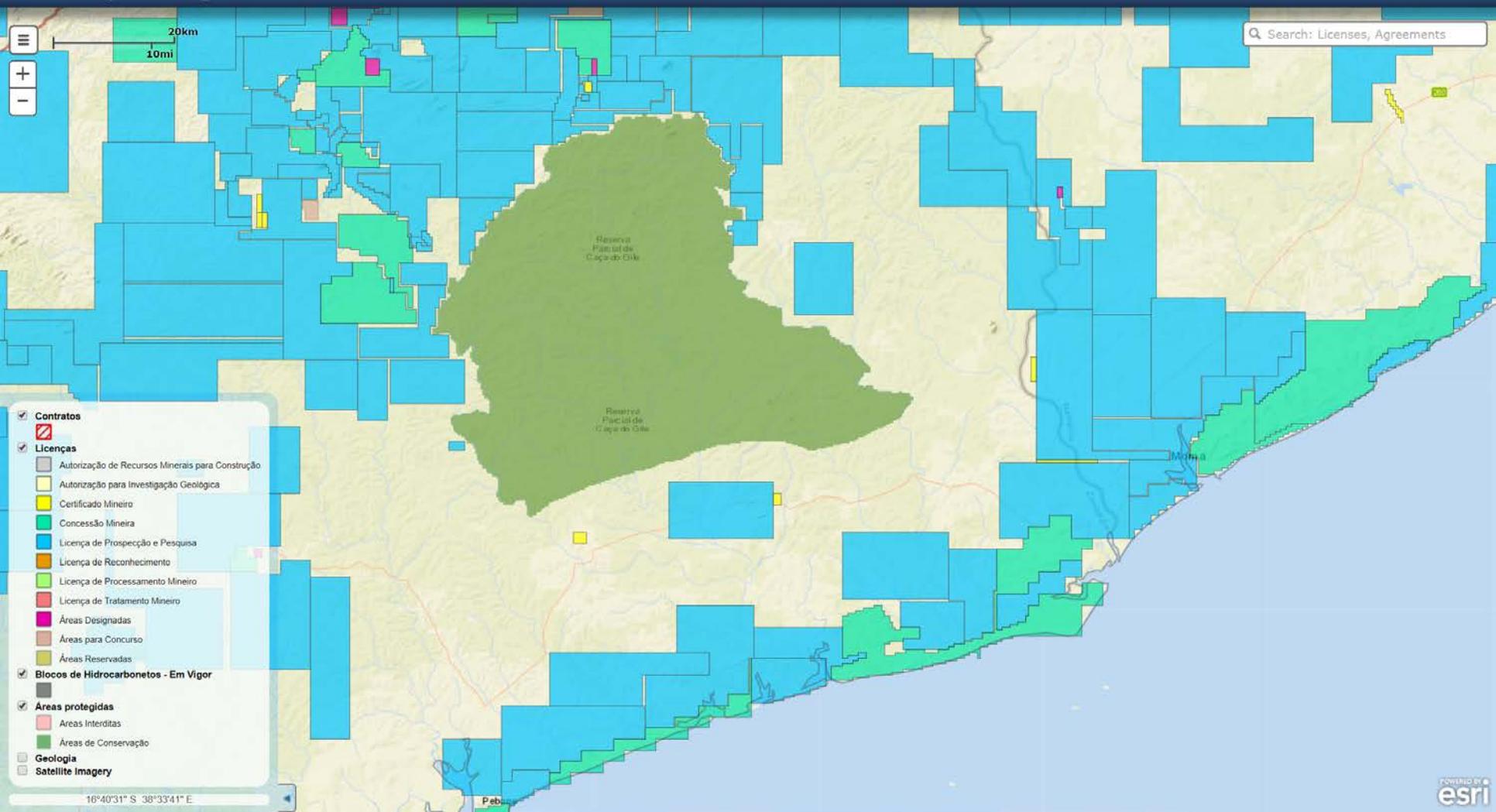
Map navigation controls: Home, Zoom In (+), Zoom Out (-)

- Active**
 - Exploitation Permit – Small Mines
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 - Authorisation for Exploitation of Permanent Quarry
 - Exploitation Permit
 - Research Permit
- Administration**
 - Protected Areas
- Geology**
- Satellite Imagery**

11°28'47" S 27°04'3" E

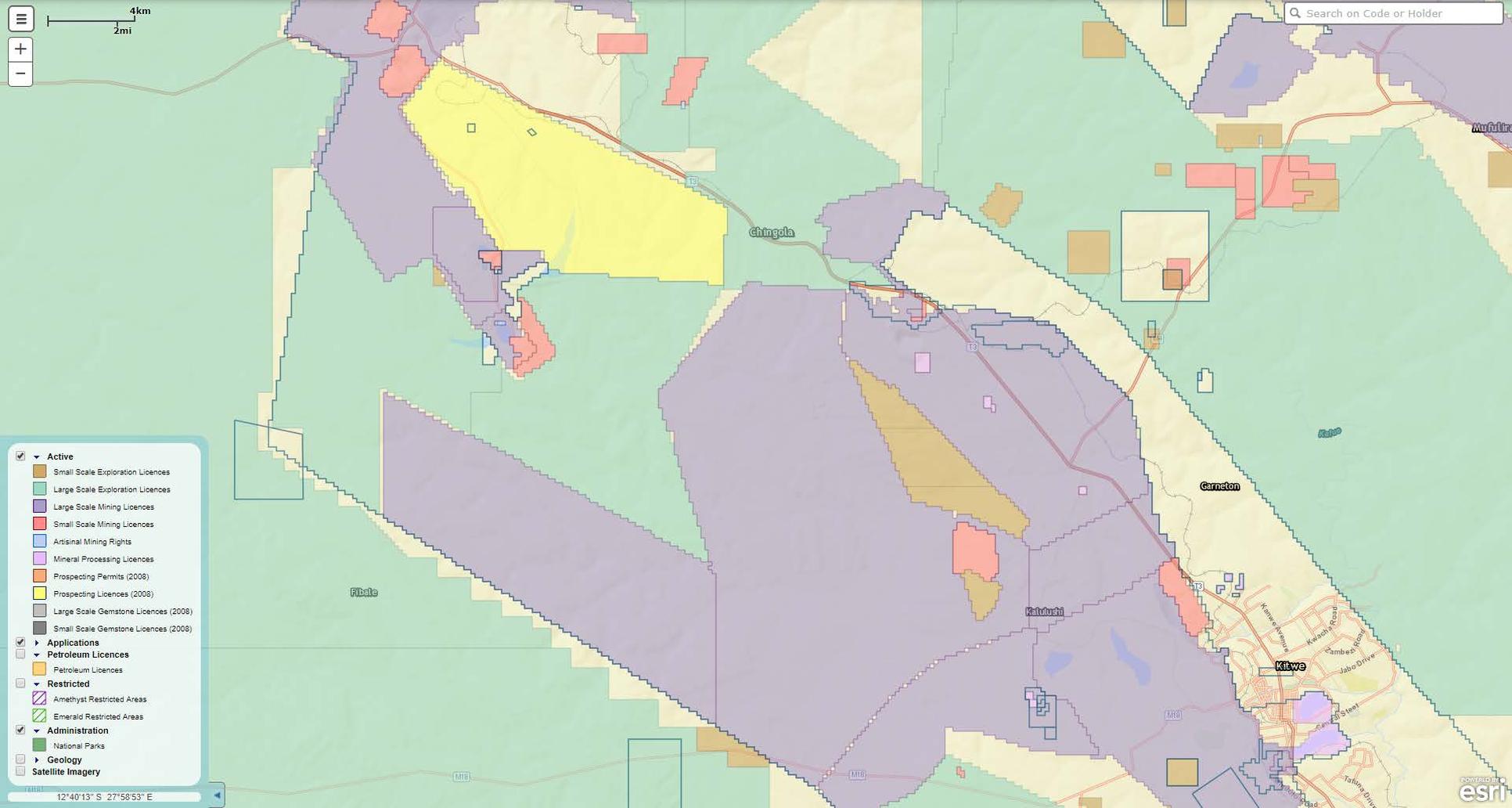


Search: Licenses, Agreements



- Contratos**
- Licenças**
- Autorização de Recursos Minerais para Construção
- Autorização para Investigação Geológica
- Certificado Mineiro
- Concessão Mineira
- Licença de Prospecção e Pesquisa
- Licença de Reconhecimento
- Licença de Processamento Mineiro
- Licença de Tratamento Mineiro
- Áreas Designadas
- Áreas para Concurso
- Áreas Reservadas
- Bloques de Hidrocarbonetos - Em Vigor**
- Áreas protegidas**
- Áreas Interditas
- Áreas de Conservação
- Geologia**
- Satellite Imagery**

16°40'31" S 38°33'41" E



Search on Code or Holder

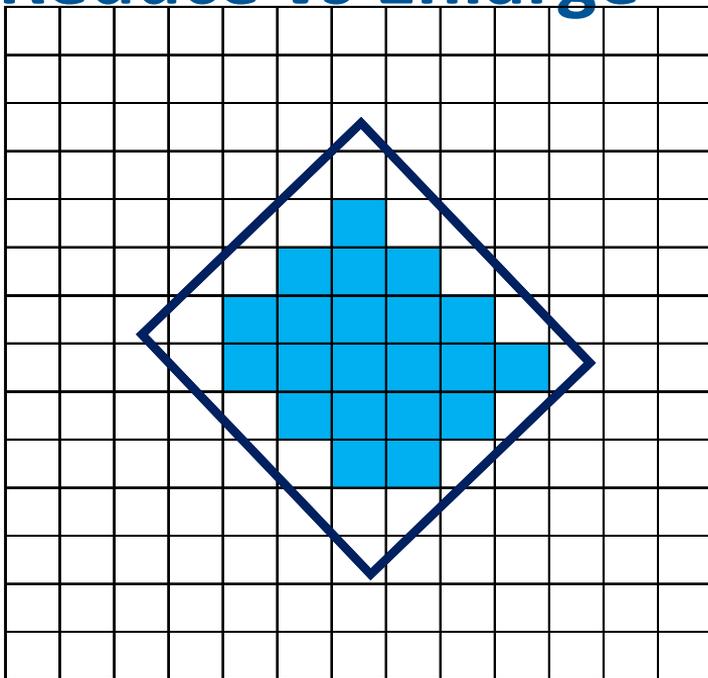
4km
2mi

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+
-

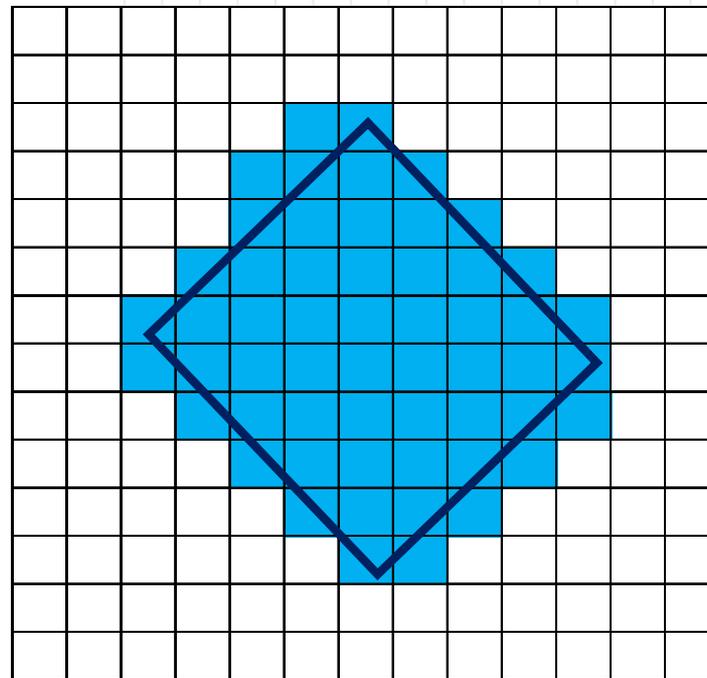
- Active
 - Small Scale Exploration Licences
 - Large Scale Exploration Licences
 - Large Scale Mining Licences
 - Small Scale Mining Licences
 - Artisanal Mining Rights
 - Mineral Processing Licences
 - Prospecting Permits (2008)
 - Prospecting Licences (2006)
 - Large Scale Gemstone Licences (2008)
 - Small Scale Gemstone Licences (2008)
- Applications
 - Petroleum Licences
- Restricted
 - Amethyst Restricted Areas
 - Emerald Restricted Areas
- Administration
 - National Parks
- Geology
- Satellite Imagery

The mechanics of implementing a grid

Reduce vs Enlarge



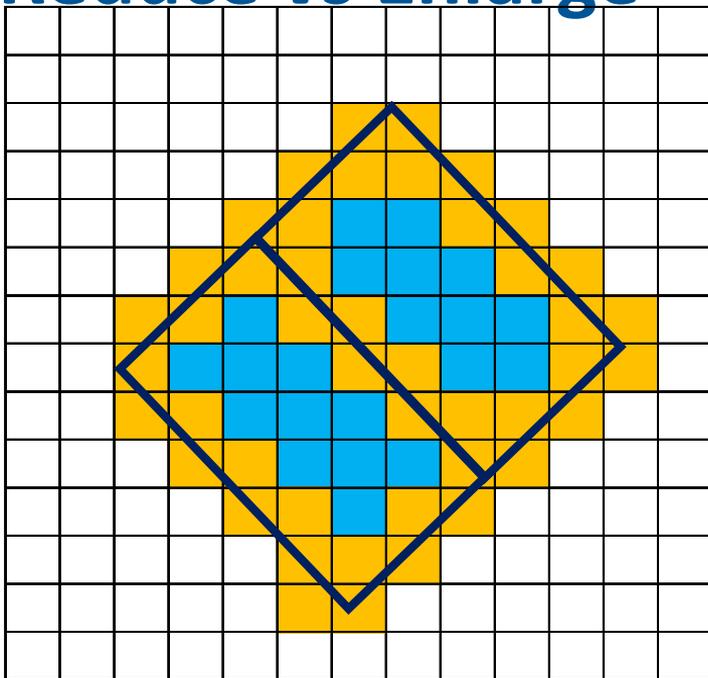
□ Old right
■ New right



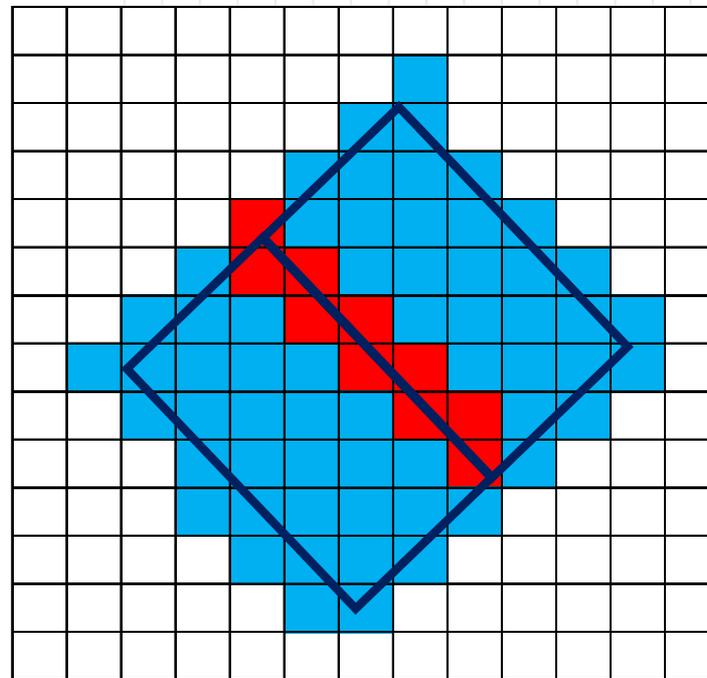
□ Old right
■ New right

The mechanics of implementing a grid

Reduce vs Enlarge

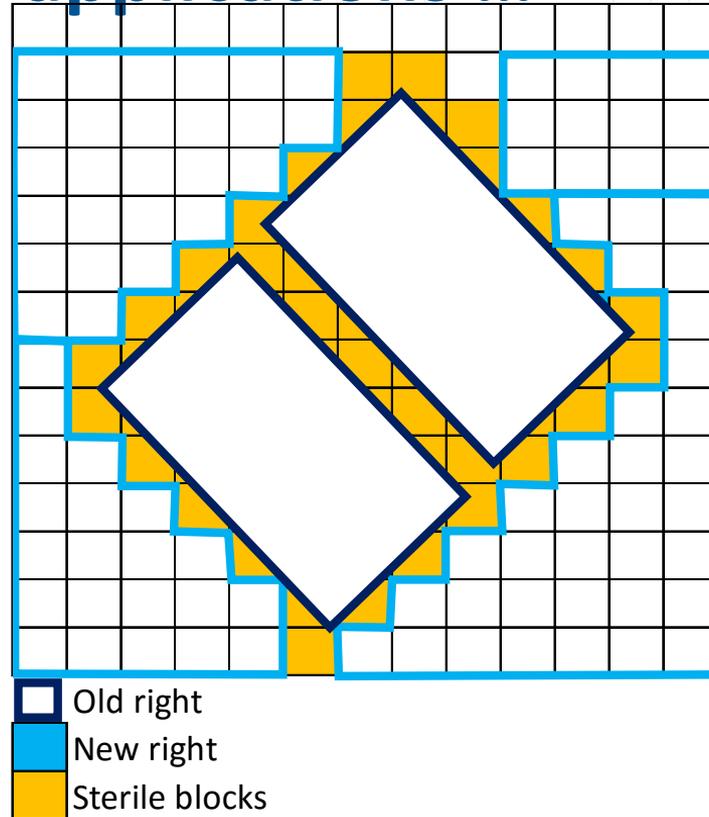


- Old right
- New right
- Sterile blocks



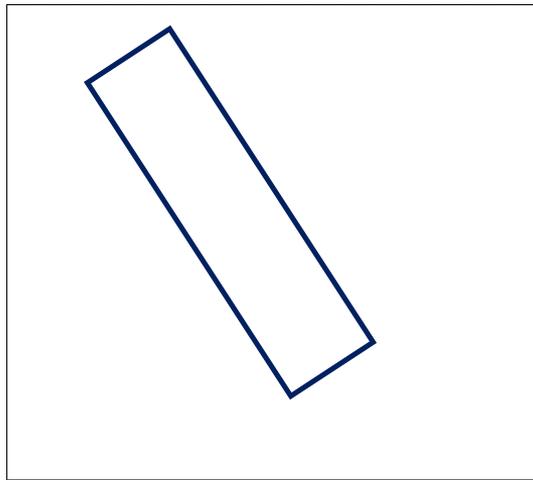
- Old right
- New right
- Conflict

The mechanics of implementing a grid Only for new applications ...



Grid Size impact on number of vertices...

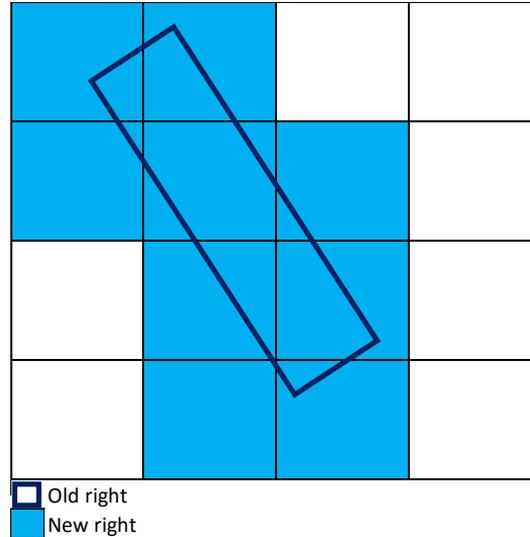
- 4 vertices



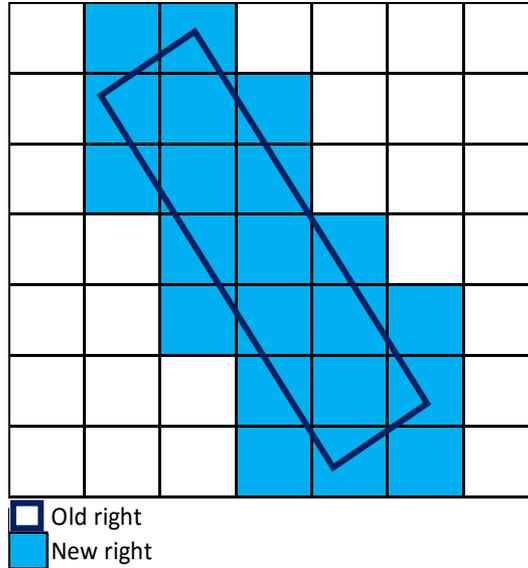
Old right

Grid Size impact on number of vertices...

- 4 vertices
- 8 vertices

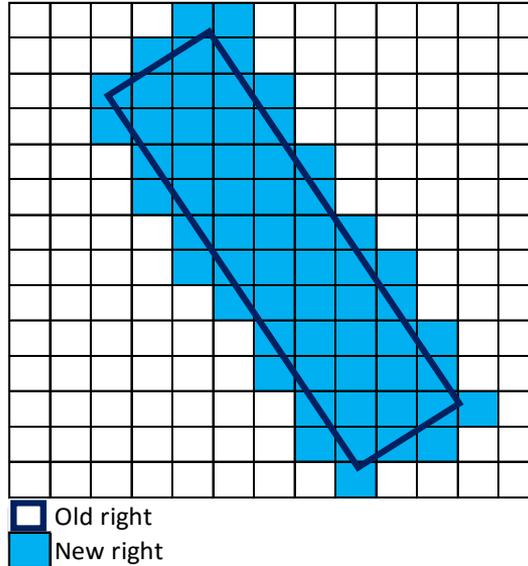


Grid Size impact on number of vertices...

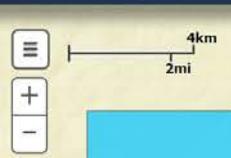


- 4 vertices
- 8 vertices
- 14 vertices

Grid Size impact on number of vertices...



- 4 vertices
- 8 vertices
- 14 vertices
- 37 vertices

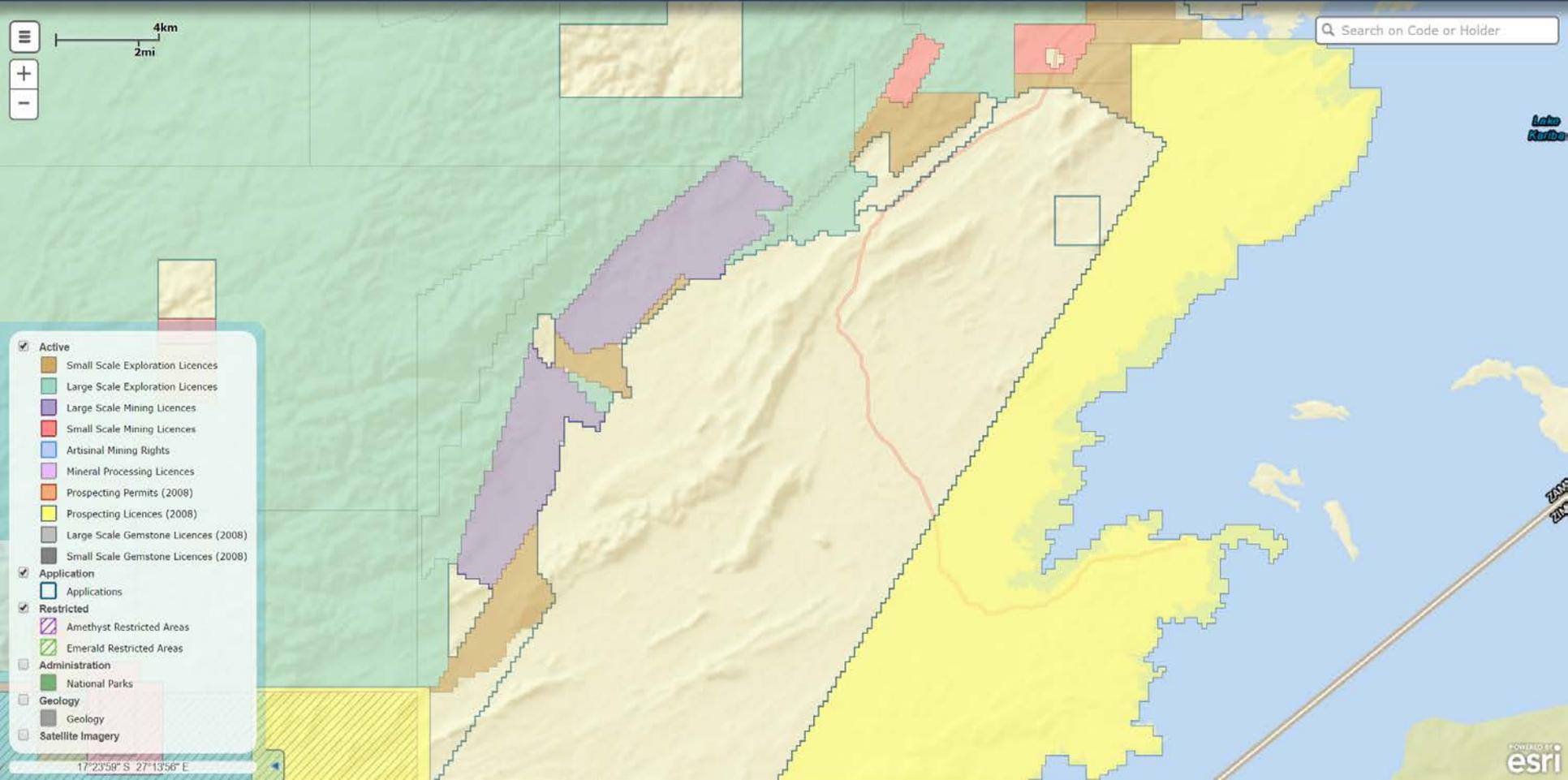


Search: Licenses, Agreements



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- Blocos de Hidrocarbonetos - Em Vigor**
- Áreas protegidas**
 - Áreas Interditas
 - Áreas de Conservação
- Geologia**
- Satellite Imagery**

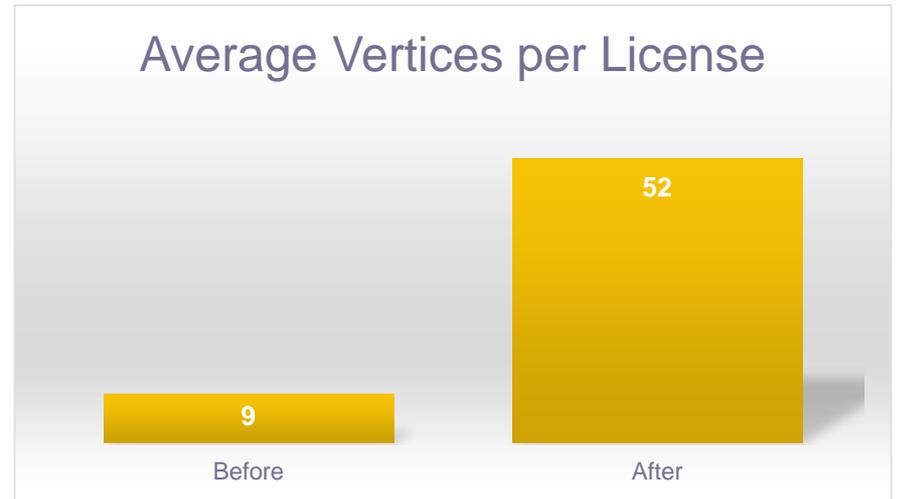
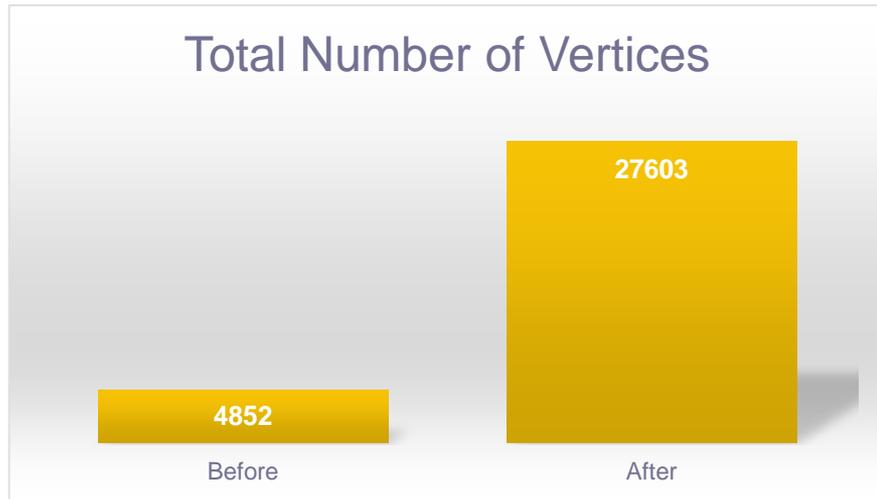
Zambia Mining Cadastre Portal



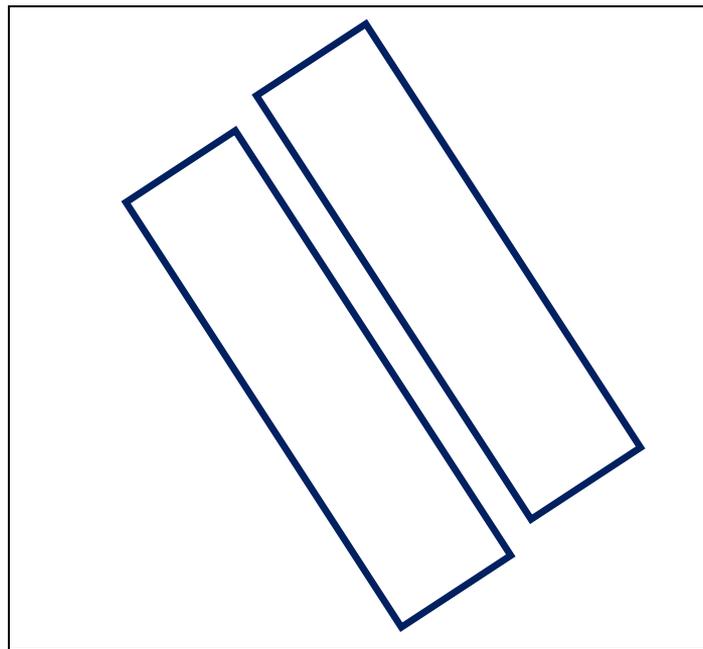
17°23'58" S 27°13'56" E

Case Study : Guinea

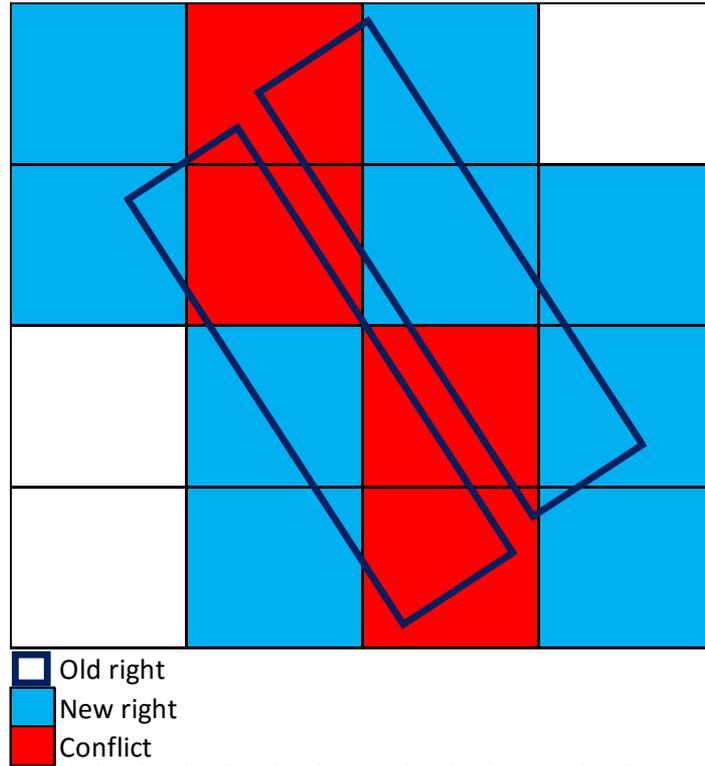
- Proposal to implement a 100mx100m cadastral unit
- Would have resulted in
 - 370 overlaps with a total area of 196 square kilometres



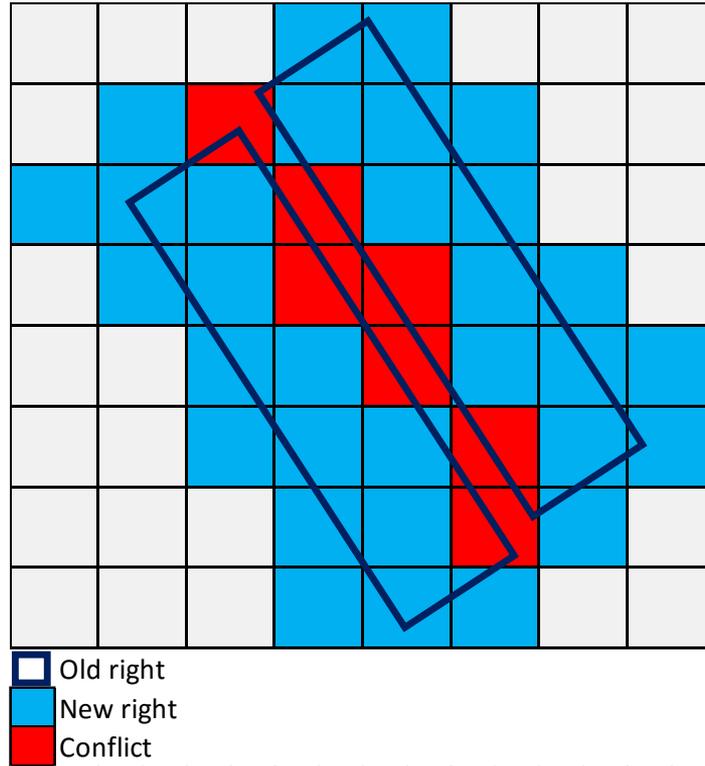
Grid Size impact on number of conflicts...



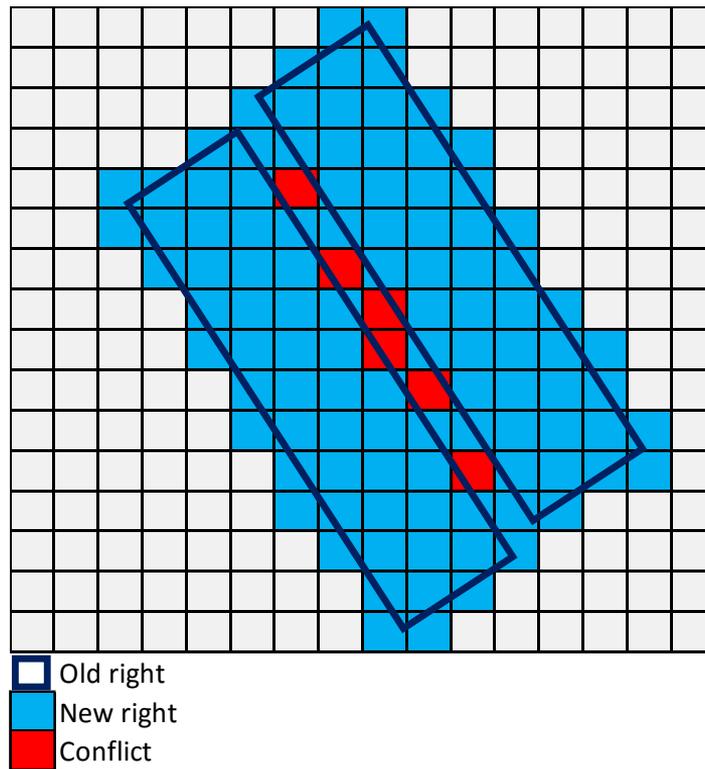
Grid Size impact on number of conflicts...



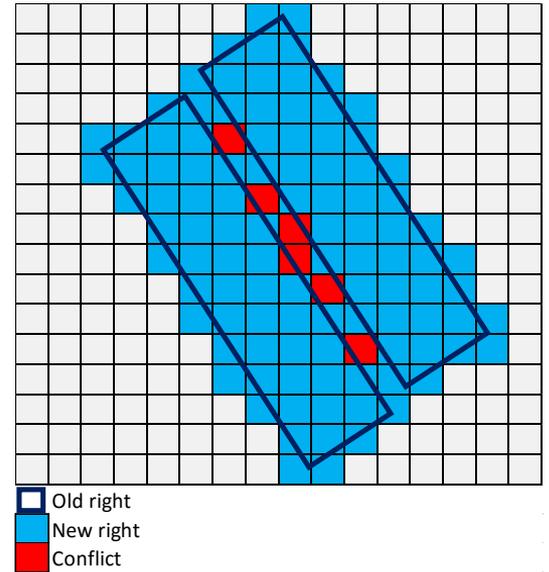
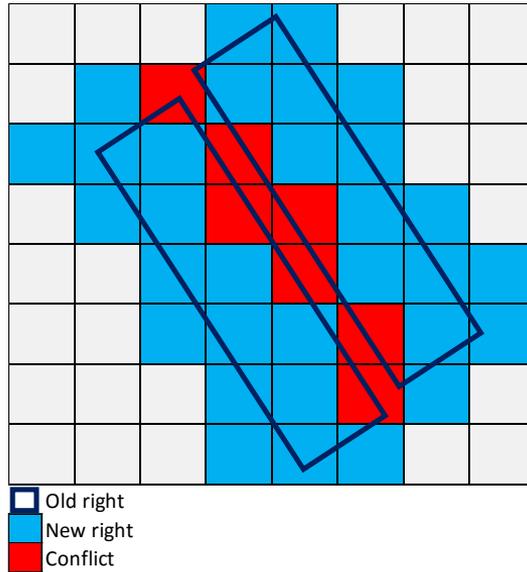
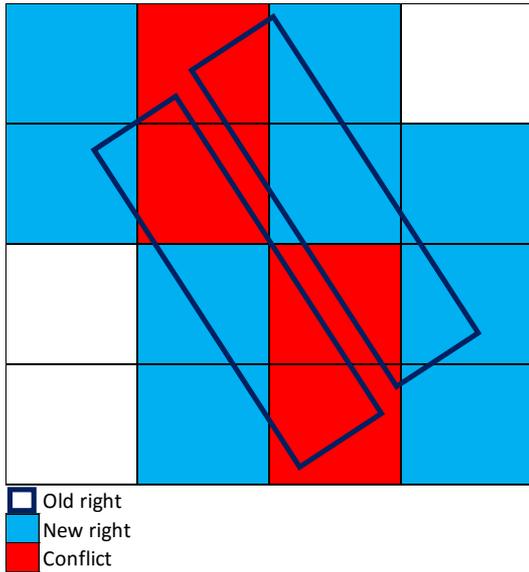
Grid Size impact on number of conflicts...



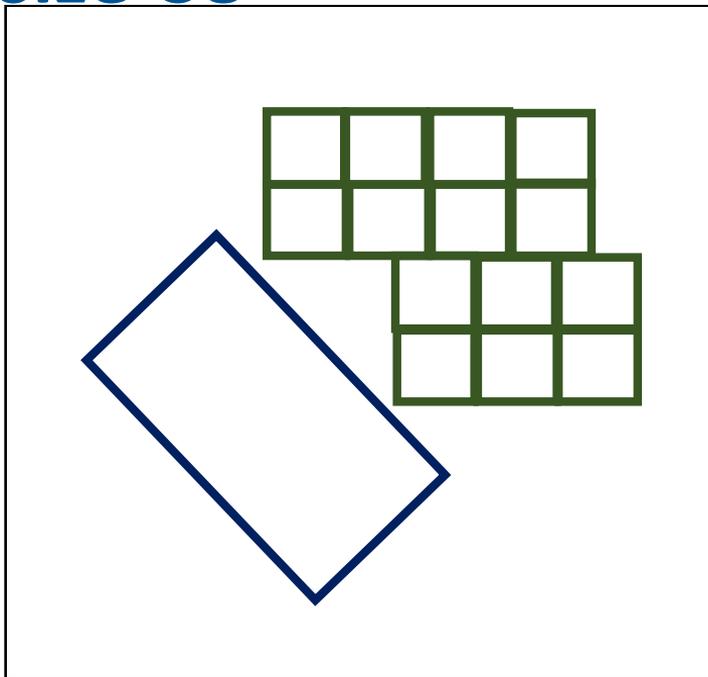
Grid Size impact on number of conflicts...



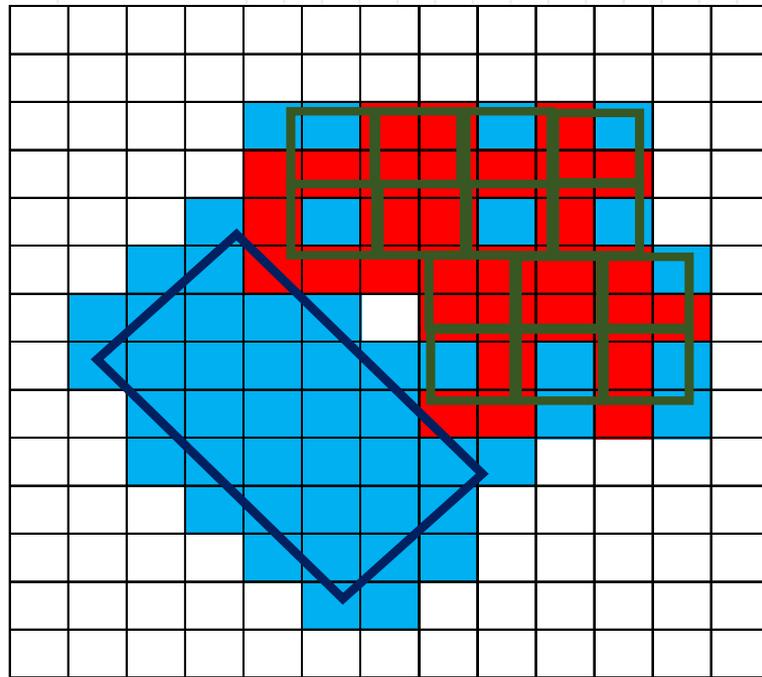
But why implement a policy that creates conflicts ?!?



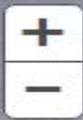
Managing different type of licenses with same size CU



- Old right (Large Scale)
- Old right (Small Scale)

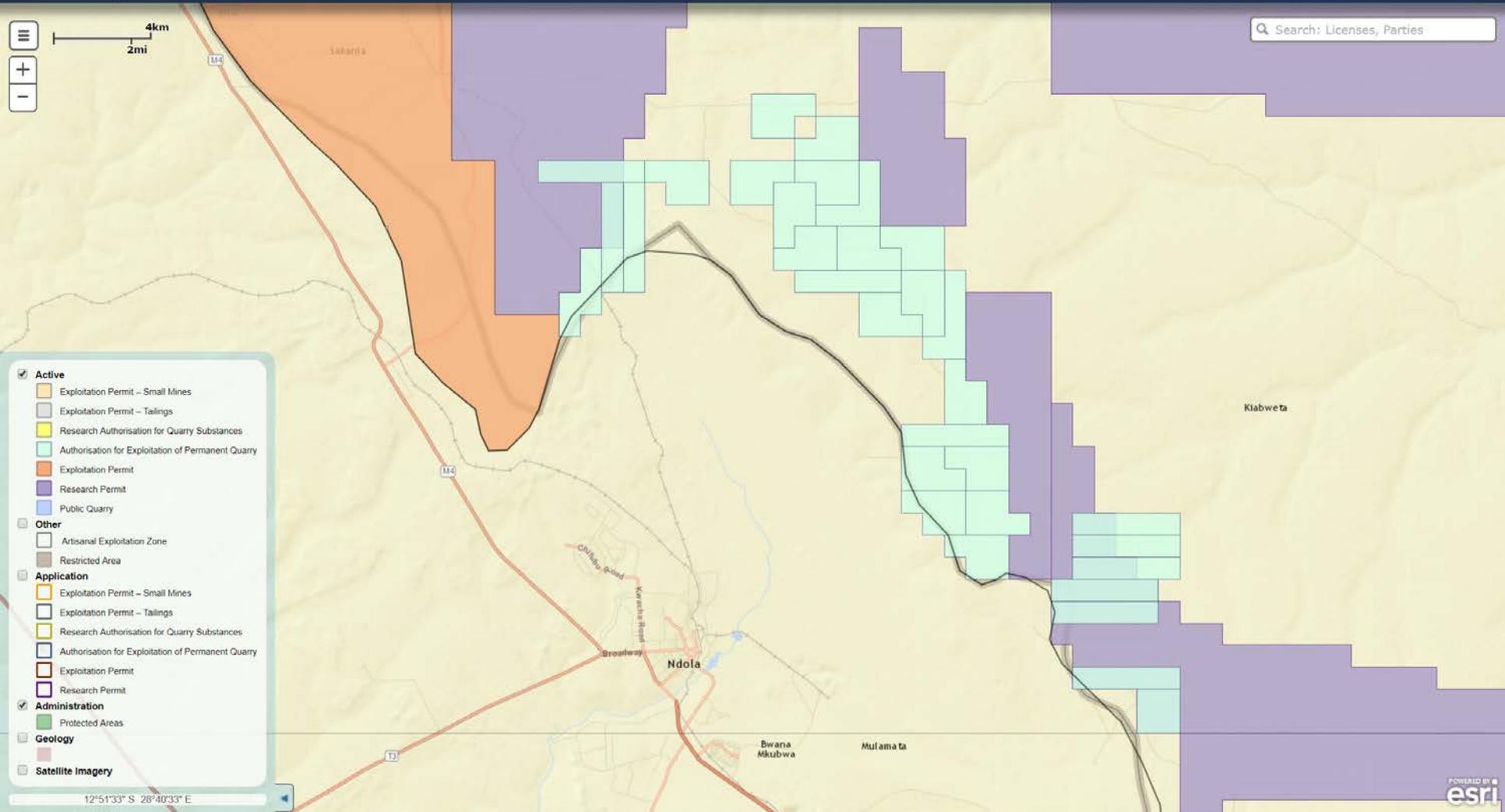


- Old right (Large Scale)
- Old right (Small Scale)
- New right
- Conflict



308





Search: Licenses, Parties

- Active**
 - Exploitation Permit – Small Mines
 - Exploitation Permit – Tailings
 - Research Authorisation for Quarry Substances
 - Authorisation for Exploitation of Permanent Quarry
 - Exploitation Permit
 - Research Permit
 - Public Quarry
- Other**
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 - Restricted Area
- Application**
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 - Research Permit
- Administration**
 - Protected Areas
- Geology**
- Satellite Imagery**

12°51'33" S, 28°40'33" E

The truths about cadastral units

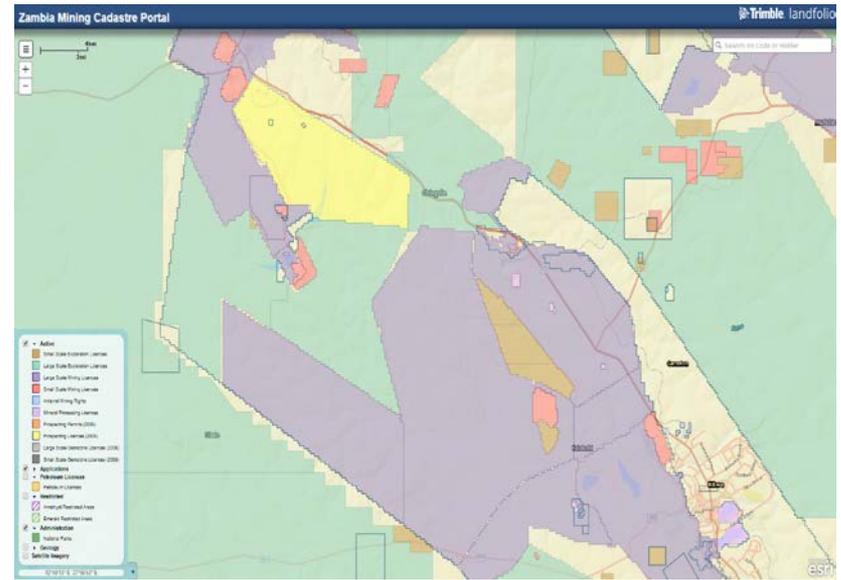
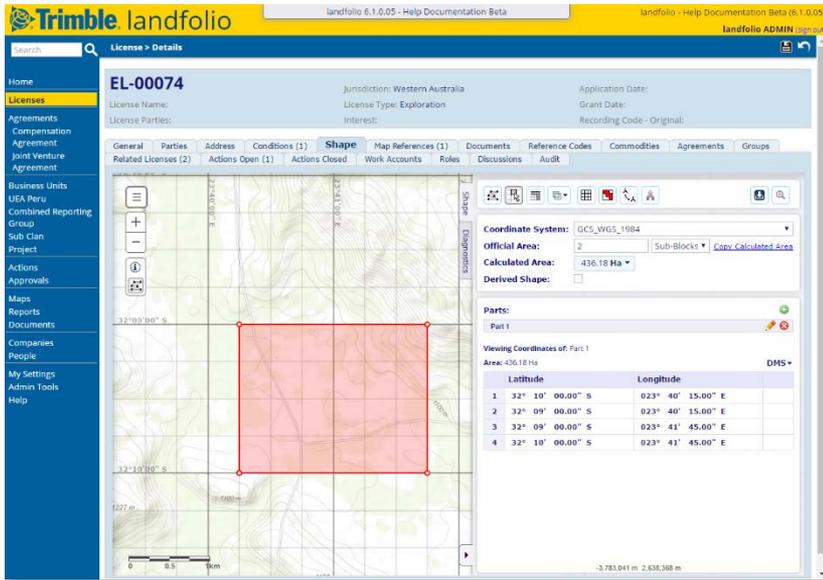
- You can not convert adjacent licenses without violating security of tenure
- Small grids do not make it easier for applicants
- Grids do not make it easier for mining cadastre systems
- Grids do not make it easier to identify boundaries in the field
- A justification for large grids for exploration / reconnaissance licenses can be made, but trying to accommodate large scale and small scale mining within a cadastral grid is a pointless exercise
- Grids do not provide any real return on investment

So would I ever recommend implementing a grid?

- ***Absolutely***, but only on the following conditions
 - I was President of a new country, or a country with almost no existing rights
 - I would have a large cadastral units for reconnaissance and exploration rights
 - I would allow mining right shapes to be dictated to by geological / infrastructure / logistical constraints, and these shapes would be excised out of the surrounding reconnaissance or explorations rights
- In all other cases, I consider it is a solution looking for a problem
- As President of a country, or as the Head of a Mining Cadastre I would have far more important matters for my staff to worry about than the shape of rights in the country!

Disclaimer

- Landfolio has advanced tools to support the design and implementation of cadastral grids should you still be keen ...



We have (unfortunately) done it many times...

Country	Client	Operational Since	Backoffice	Public Portal	e-Gov Portal	Small Scale (ASM)	Cadastral Blocks	Licenses Managed	Connected Offices	Users of the System	Stakeholders Managed	Graticular Block Size	Notes
Cameroon	Ministry of Industry, Mines & Technological Development	2016	✓	✓		✓	✓	1 000	1	10	500	15"x15"	
Democratic Republic of Congo	Cadastre Minier	2007	✓	✓		✓	✓	15 000	1	120	3 000	30"x30"	
Kenya	Ministry of Environment and Mineral Resources	2011	✓	✓	✓	✓	✓	1 500	5	30	1 000	15"x15" 7.5"x7.5"	
Mozambique	Ministry of Mineral Resources	2003	✓	✓		✓	✓	7 000	12	110	4 000	15"x15"	
Papua New Guinea	Mineral Resource Authority	2013	✓	✓	✓		✓	3 500	1	50	1 000	5"x5"	
South Sudan	Ministry of Petroleum & Mining	2014	✓	✓			✓	100	1	10	100	15"x15"	
Zambia	Ministry of Mines, Energy and Water Development	2006	✓	✓	✓	✓	✓	11 000	6	70	6 500	6"x6"	