

Joanne Kerr

From: Anna Bui Xuan Hy
Sent: Wednesday, 24 February 2021 4:34 PM
To: sch4p4(6) Personal information
Cc: Gerhard Schoning
Subject: OGIA - Subsidence modelling
Attachments: Context_SLB.pdf

Hi,

Following-up Monday's meeting, please find in attachment some **slides to provide more context to the project.**

- To help us in writing a better suited scope, could you please provide couple of **dotted points of the modelling steps.**
- And to start conversation with companies, with regards to the data (in particular calibrated data), could you please provide a **list of data that will be required for this project.**

Don't hesitate if you have any question,

Cheers



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OGIA Subsidence project

22/02/2021

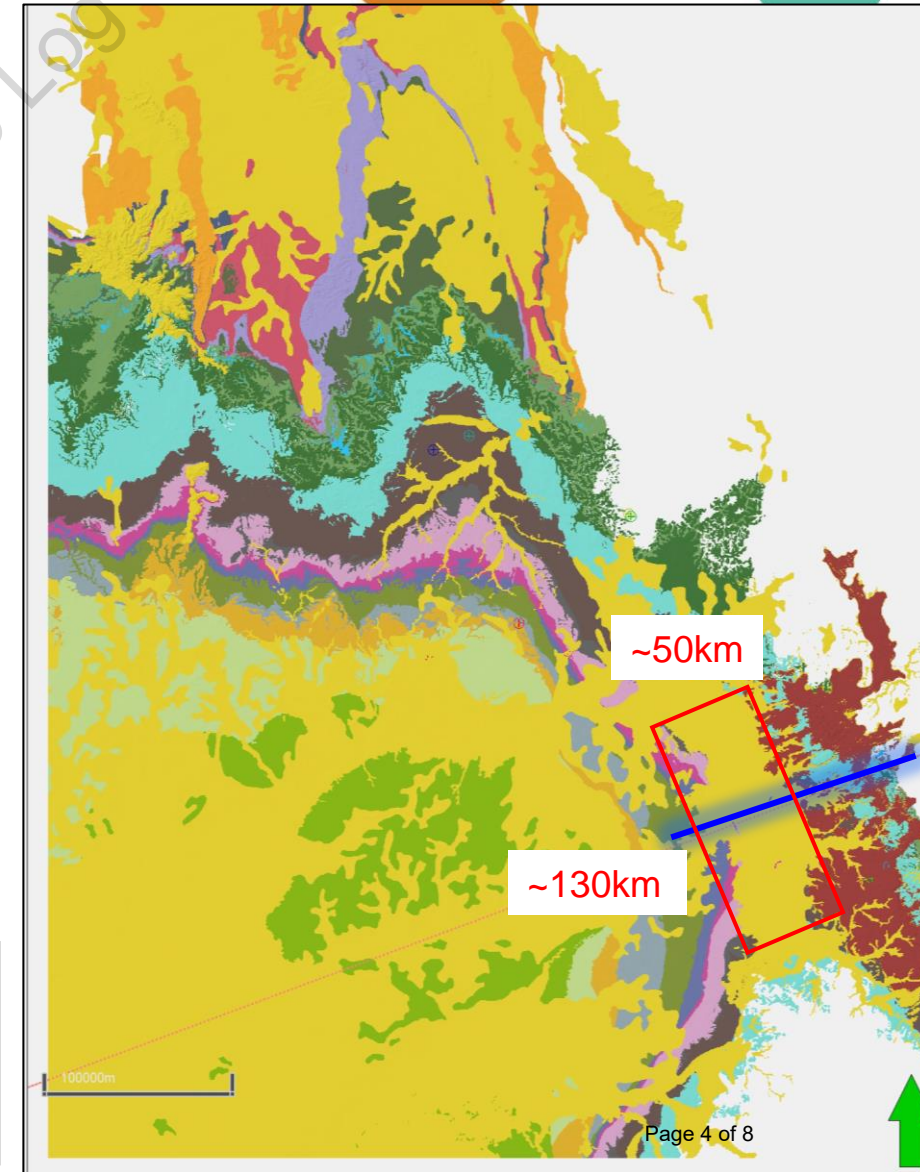
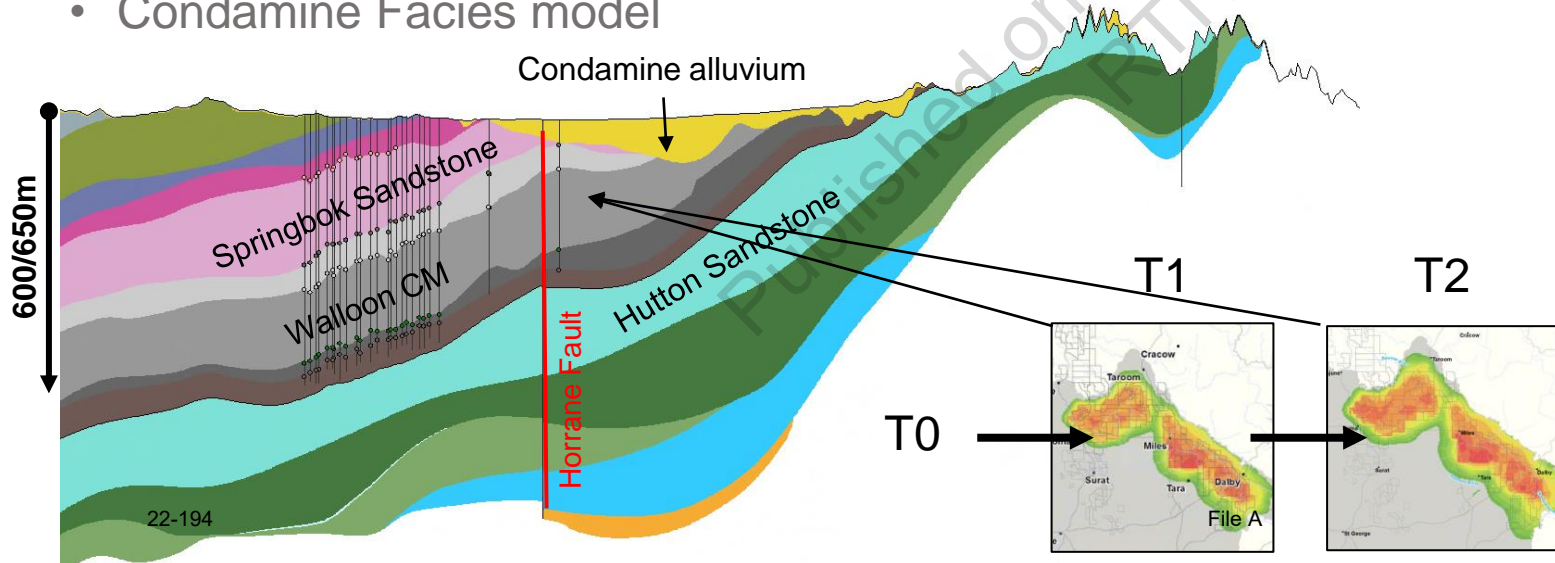
Gerhard Schoning
Anna Bui Xuan Hy

Objectives

- For the UWIR 2021, OGIA needs to assess the risk of subsidence to Environmental Value from Coal Seam Gas and Mining extraction only.
- In 2019, OGIA assess the subsidence using two risk factors: estimate of compaction within Walloon Coal Measures, using the predictions of water level change; and the presence or absence of overlying consolidated sandstone formations.
- Model resolution:
 - 130km by 50km
 - Ideal cell resolution 30m
 - 4-6 units: Condamine Alluvium (unsaturated) | Springbok Sandstone | Walloon Coal Measures (subdivided into 3 at least) | Durabilla Formation)
- Time Frame of modelling completion by end of May 2021

Context

- What do we have:
 - Borehole images with stress direction
 - About 60 wells with log Density / C / Sv (Regionally)
 - Lithology logs
 - Geomodel
 - Model depressurisation from GW model
 - DEM (surface) resolution of 30m
- What we don't have:
 - Calibrated data
 - Condamine Facies model



Context – previous work undertaken for UWIR 2019

Reservoir compaction

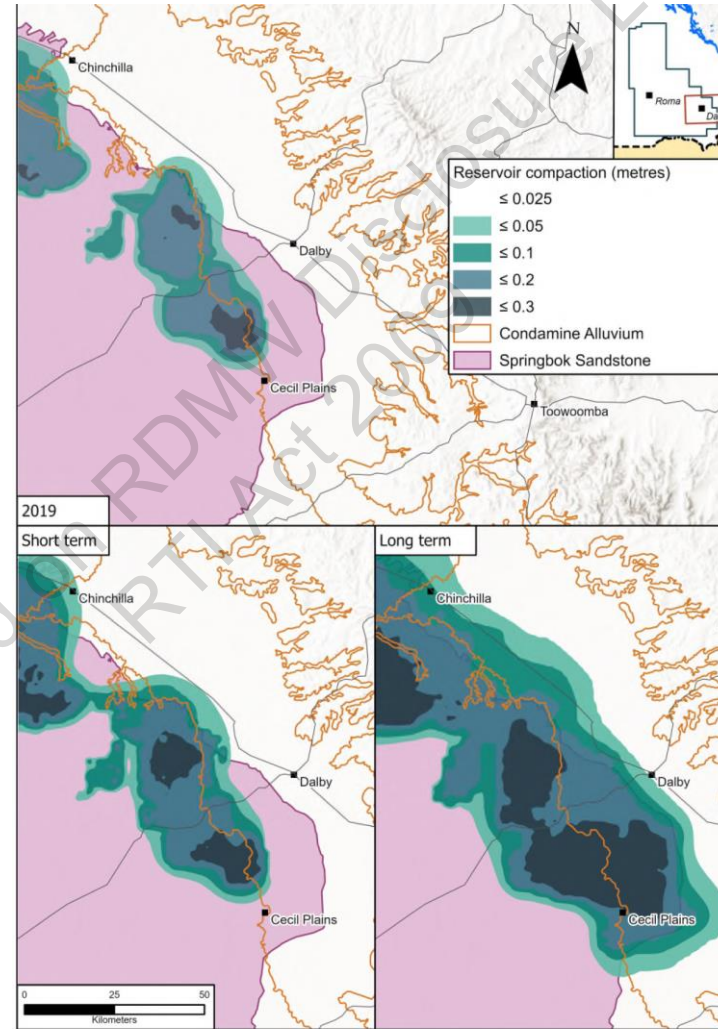
Reservoir compaction was calculated utilising geomechanical rock properties and modelled drawdown for those formations which are depressurised for Coal Seam Gas production. For this calculation, the following information is integrated to provide an estimate of compaction:

- Lithological proportion of the Walloon Coal Measures were derived from downhole geophysical logs
- Rock elastic properties (Young's modulus) were calculated per lithology and applied to the Walloon Coal Measures layer thicknesses at each location to obtain a bulk Young's modulus
- Drawdown in the Walloon Coal Measures was extracted from the UWIR2019 groundwater model at each of the three statutory timeframes – prior to 2019, the short and long term.

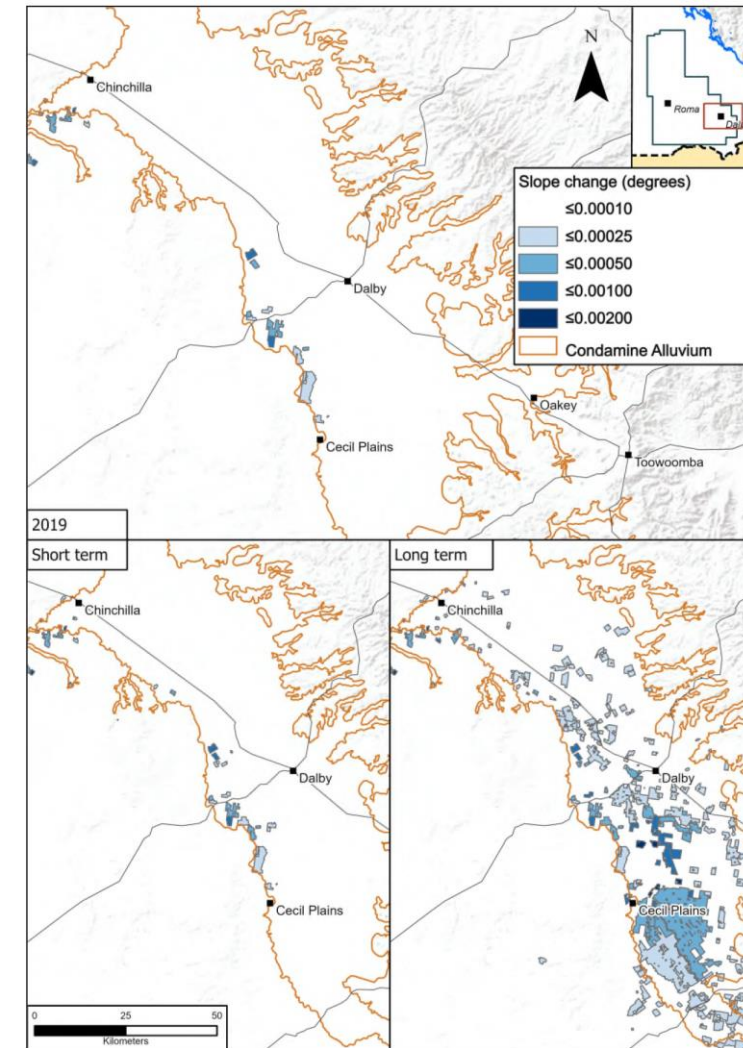
Slope and aspect

Change to slope and aspect were calculated as follows:

- Compaction within the reservoir was calculated accounting for the elasticity of the coal measures and the pressure reduction within those layers
- A recalculated ground surface for each year is estimated by subtracting the compaction estimated for that year from a reference elevation (1-second digital elevation model (DEM) captured in the year 2000 at ~30 x 30 m resolution)
- For each year, a change in slope and aspect is calculated with reference to the baseline period.

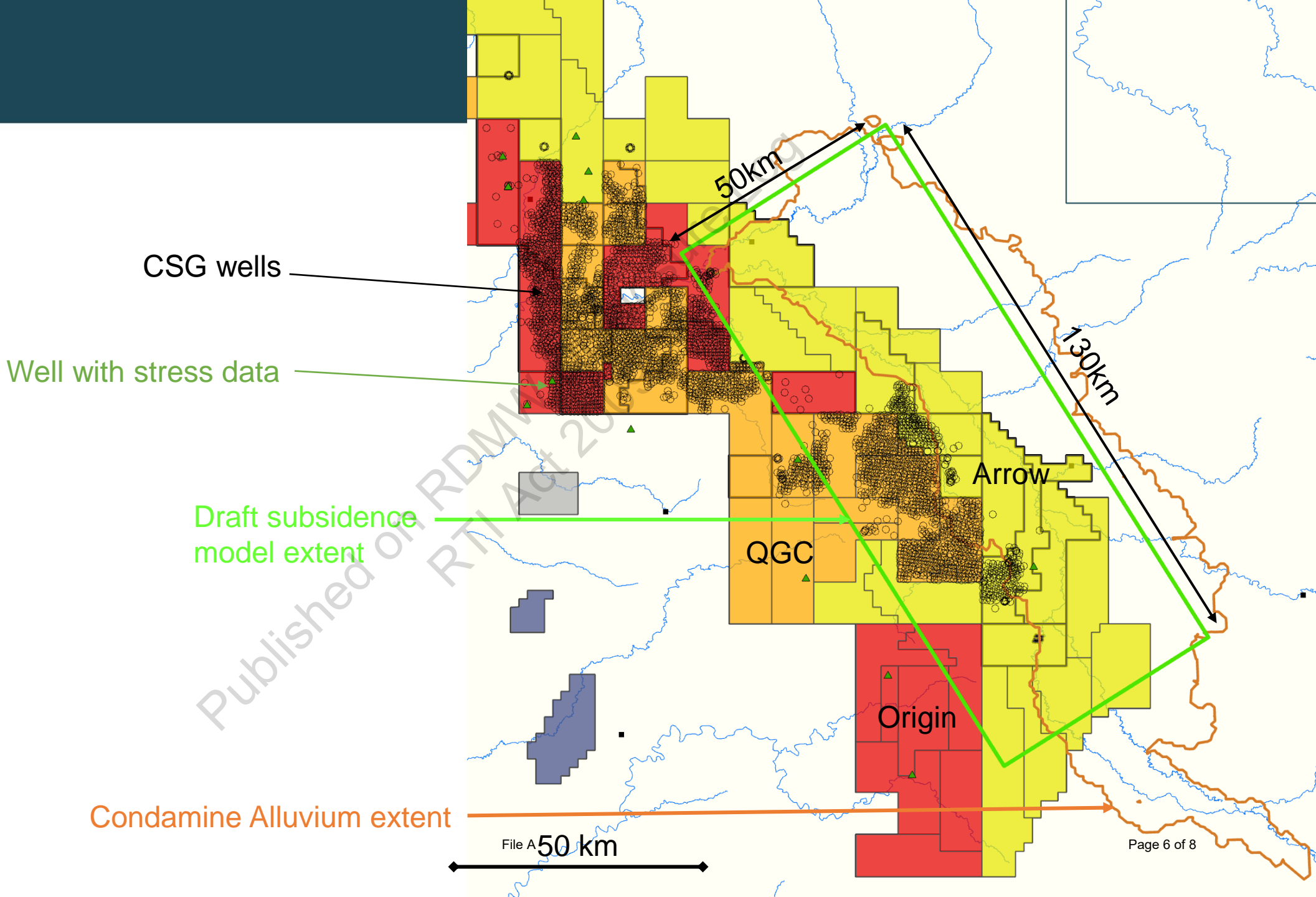


File A
Figure 3-1 Predictions of reservoir compaction prior to the UWIR 2019, in the short term and in the long term



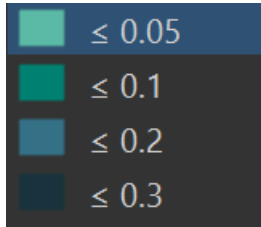
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Figure 3-2 Estimates of mean change in slope prior to the UWIR 2019, in the short and in the long term

Context



Context

Walloon Coal Measures Max
Compaction (m) – long term



Tenures

Well with stress data

CSG wells

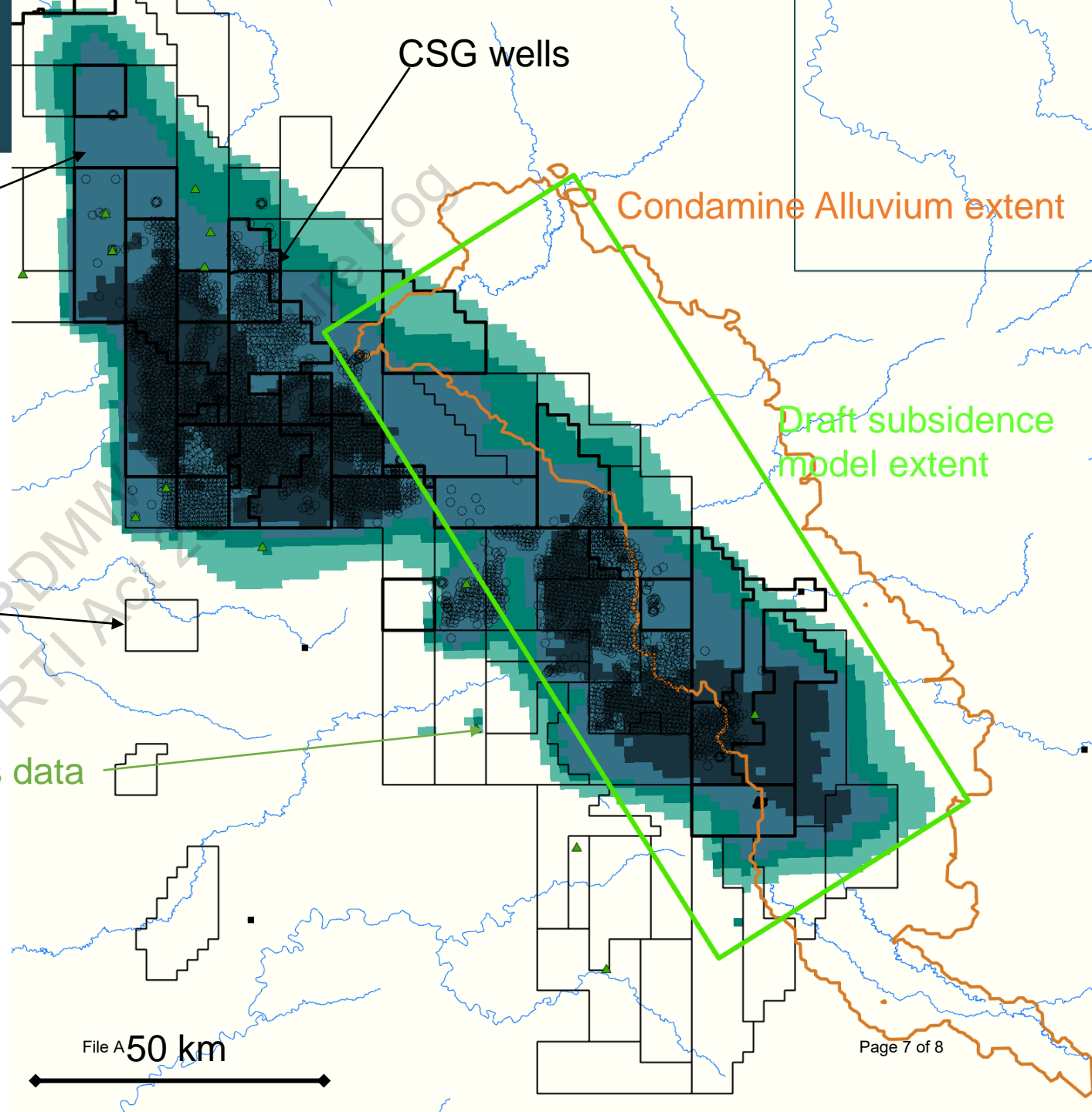
Condamine Alluvium extent

Draft subsidence
model extent

File A 50 km

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RTI Act 2013





- List of wells with stress data

Durham Ranch 164
CONDABRI SOUTH 6
CONDABRI SOUTH 2
ABERDEEN 10
ALDERLEY 1
ALDERLEY 2
ALDERLEY 3
ALDINGA EAST 1A
BROANDAH 1
BROANDAH 2
BROANDAH 3
Bottle Tree 2
Carinya south 2
Celeste 116
Commissioner Creek 1
Dalwogan 14
Dalwogan 16
Dalwogan 9
Dalwogan 12
Duke 22
EMU PARK 1
WYGI CREEK 1
Ramyard 7
Horse Creek 8
Horse Creek 16
Southleigh 1
Scotia 45
Gilbert Gully 18
Lucky Gully 11
Lucky Gully 9
Scrubber Gully 2
FAIRVIEW 299_OB1
Noonga Creek 6
Plainview 34
Waar Waar 16T

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