

Springsure Creek Coal Mine MLA 70486

SCL Protection Decision Application



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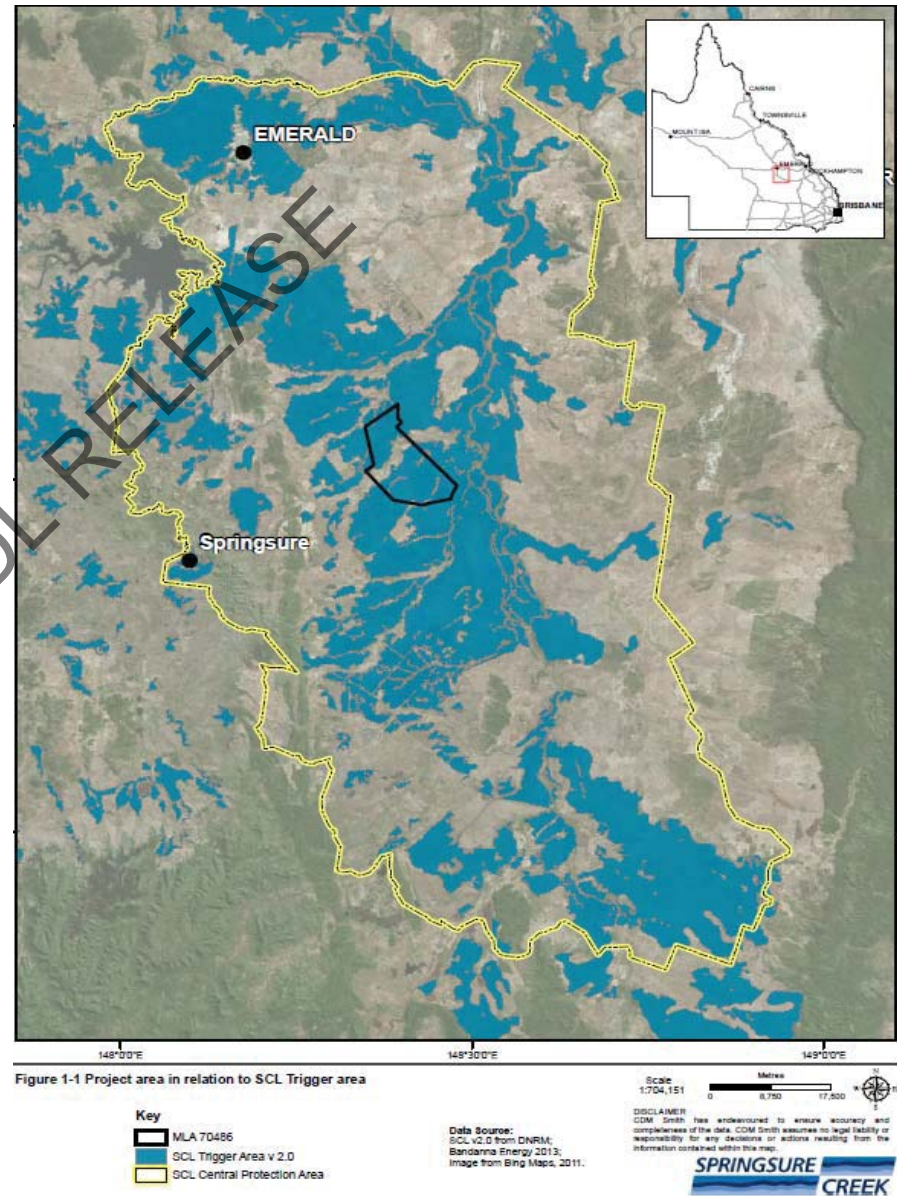
SCL Protection Decision App.



Application

- > Protection Decision Application for MLA 70486

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Context

- > Approvals:
 - > EIS for MLA 70486 at supplementary stage
 - > If approved, Project proceed to preparation of environmental authority
 - > SCL Protection Decision required before issue of environmental authority or resource authority

- > Legislation:
 - > SCC has exemption under s. 289 of SCL Act – *no need to demonstrate exceptional circumstances for permanent impacts*

 - > s.290 sets out SCL protection conditions on SCC:
 - > *No open cut mining or storage of hazardous materials*
 - > *SCC to use all reasonable endeavours to rehab. impacts on land from mining*

SCL Protection Decision App.



Contents of Development Impact Report:

- > Project description and justification for layout, including environmental management system and coexistence definition
- > Agricultural context
- > SCL site assessment
- > Impact assessment
- > SCL restoration objectives
- > Conclusions of assessment
- > Proposed SCL protection conditions

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**APPLICATION
FOR A STRATEGIC
CROPPING LAND
PROTECTION
DECISION**

**DEVELOPMENT
IMPACT REPORT**

**SPRINGSURE CREEK
COAL MINE PROJECT
MLA 70486**

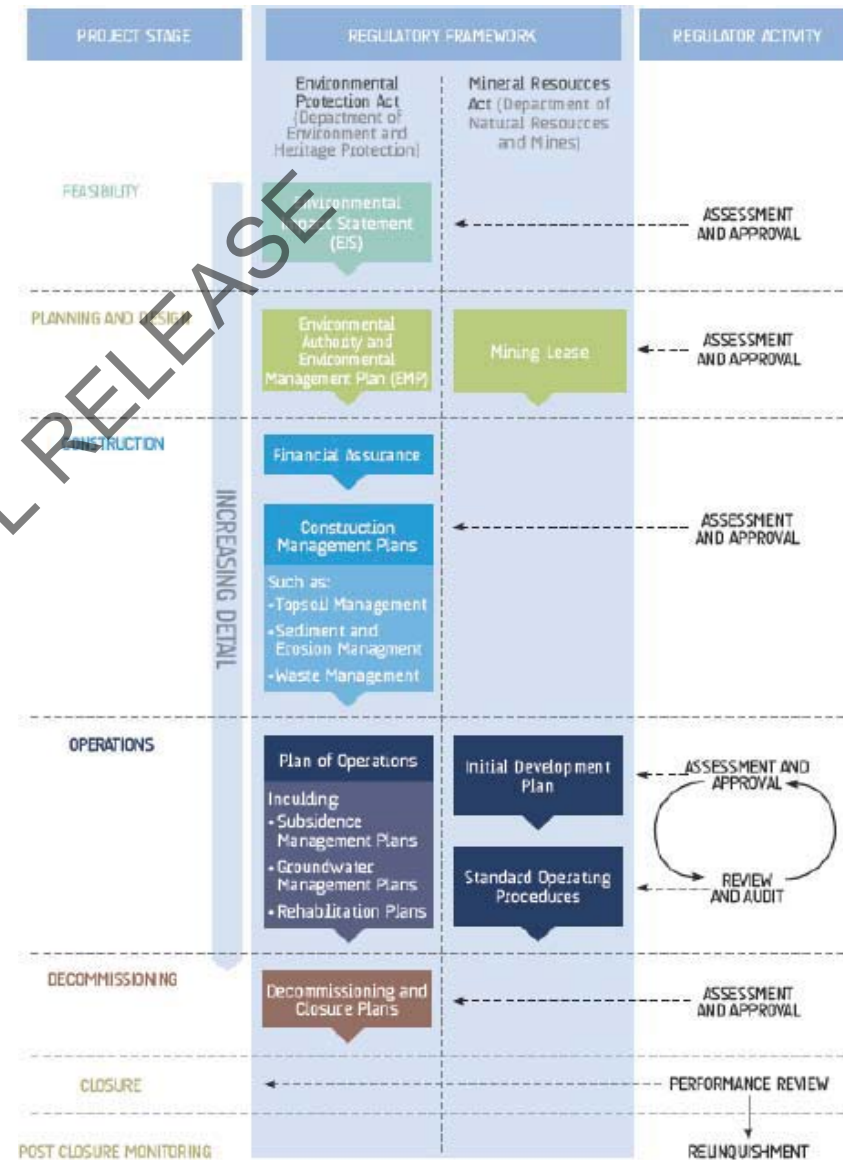


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EMS

Management Plan	Environmental Value	Subsidiary Management Plan	
	Land	Agricultural Management Plan Subsidence Management Plan Topsoil Management Plan	
	Waste	Waste Management Plan	
	Surface water	Erosion and Sediment Control Plan Water Management Plan Subsidence Management Plan	
	Groundwater	Groundwater Management Plan Waste Management Plan Subsidence Management Plan	
	Air quality	Air Quality Management Plan Greenhouse Gas Abatement Strategy	
	Noise and vibration	Noise and Vibration Management Plan	
	Ecology	Significant Species Management Plan Pest and Weed Management Plan Offsets Strategy	
	Health and safety	Emergency Response Plan Fire Management Plan	
	Hazard and risk	Integrated Risk Management Plan	
	Health and safety	Health and Safety Management System	
	Climate	Water Management Plan	
	Cultural Heritage Management Plan	Cultural Heritage	Indigenous Cultural Heritage Management Plan
	Social Impact Management Plan	Social Values and economy	Workforce Management Plan Community Development Plan Housing and Accommodation Strategy Local Industry Participation Plan
Health and Safety and Hazard and Risk			Community Health and Safety Plan Workforce Management Plan
Commitments not in Environmental Management Plan	Ecology	Significant Species Management Plan	
	Cultural Heritage	Historical Heritage Management Plan	
	Transport	Road-use Management Plan Traffic Management Plan	



Coexistence

- > Defined 'coexistence'
- > Established ACRC in October 2012
- > Draft Research Plan released June 2013
 - > Landholders, DNRM, EHP, DAFF, Ag. NGOs
- > Bandanna MD and CDO sit on ACRC

Draft Bandanna Energy Coexistence Policy

Vision

The integration of mining and agriculture in a mutually beneficial and sustainable partnership.

Objectives

To mine natural resources in a way that provides an economic return for Bandanna shareholders

To maintain or improve agricultural productivity on properties that are directly impacted by Bandanna Energy projects.

How we define coexistence

Coexistence is defined as:

Working together with the agricultural community to ensure agriculture and mining can occur concurrently in an economically sustainable manner while maintaining productivity at the field/paddock, property and regional level.

Commitments

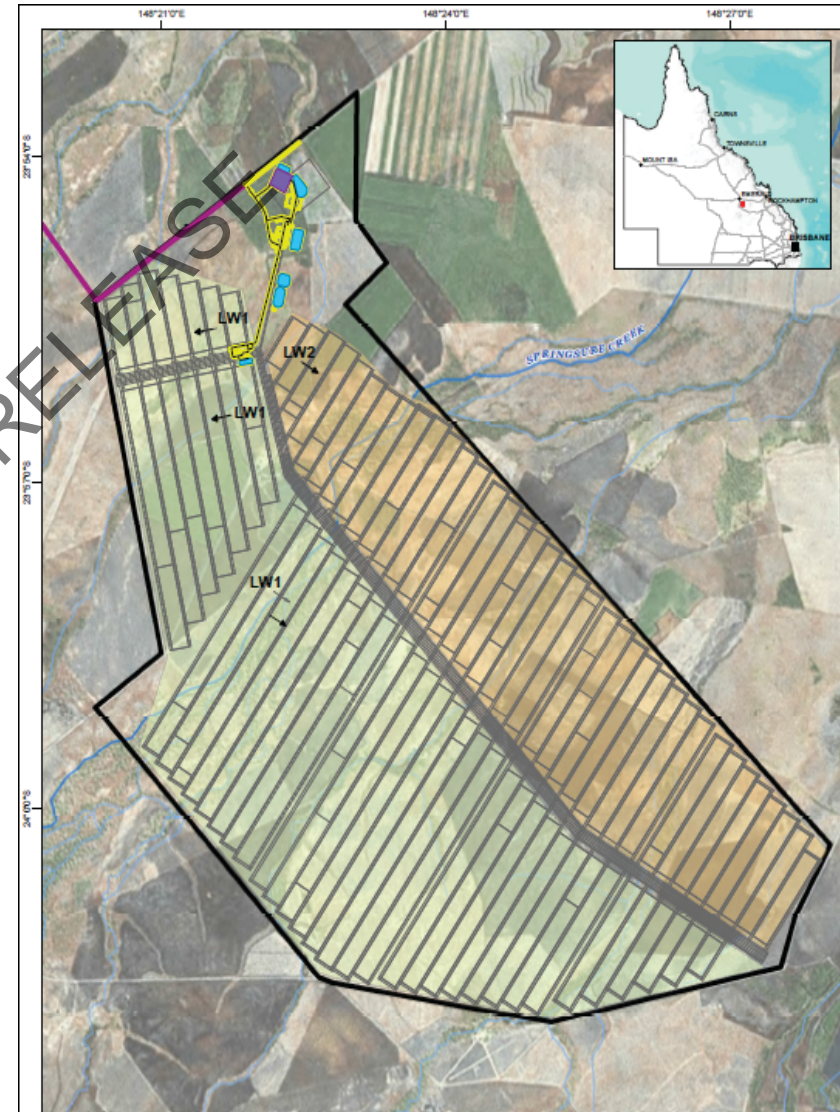
- To establish and fund the Springsure Creek Agricultural Project which includes development of the Springsure Creek Agricultural Plan;
- To invest in an Agricultural Coexistence Research Committee;
- To fund an agricultural research program in the area specifically aimed at developing methods that ensure coexistence between mining and agriculture can occur;
- To support the Agricultural Coexistence Research Committee as the stewards of the Springsure Creek Agricultural Plan allowing the committee to govern the implementation of the plan including:
 - defining, monitoring (including collecting a baseline) and reporting on agricultural productivity in a way that respects the confidential information of landholders;
 - undertaking coexistence research on Den-Lo Park prior to subsidizing other properties to be impacted by subsidence

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Protection during design

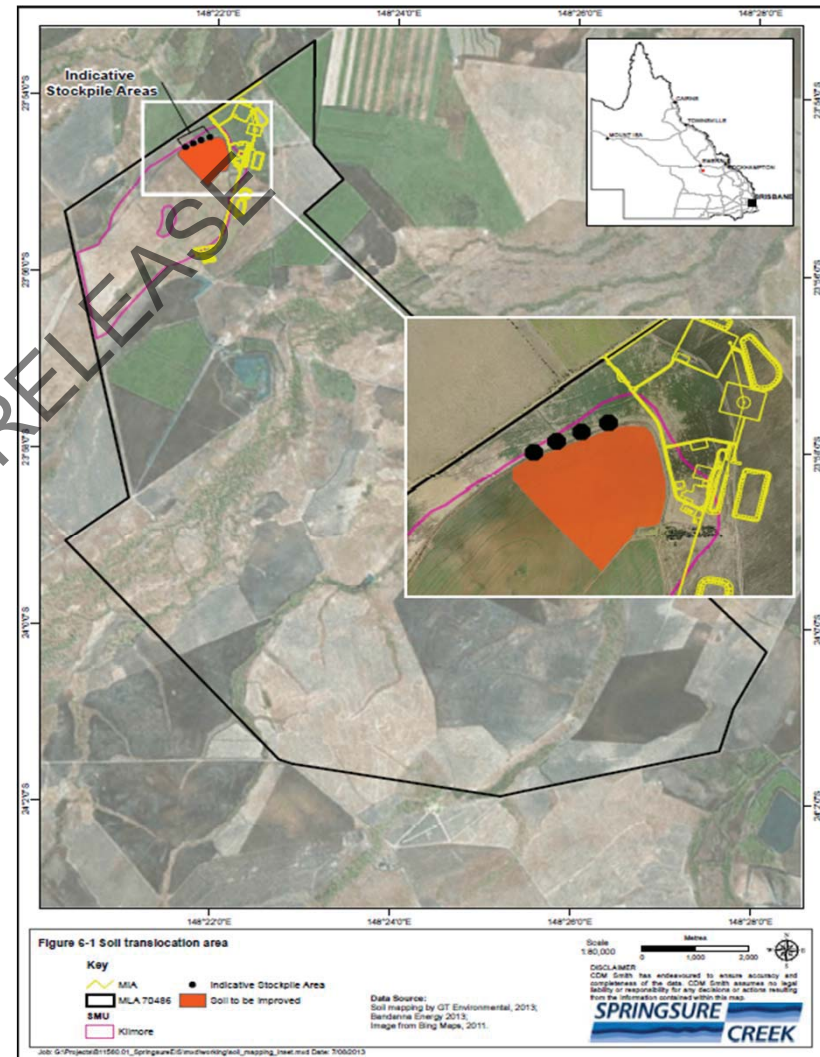
- > No open cut
- > Alignment of longwall panels broadly in parallel with watercourses
- > Location of MIA on least efficient paddock on Den-Lo Park and reduction of loss of any one soil type
- > No waste rock
- > Recycling of rock won during construction
- > Recycling of mine affected water and water pipeline



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Protection during construction

- > Map each paddock and give clear field reference
- > Record existing and historical cultivations (dates of planting, harvesting, crop variety, mix, watering rates, machinery, etc)
- > Permit to Disturb SCL
- > Soil stripping
- > Translocation of topsoil for life of mine to adjacent area
- > Stockpiling of subsoil
- > Stockpile care and maintenance



Agricultural Context:

- > Zero/minimum till farming
- > Flood irrigation (only these laser levelled and not all are laser levelled)
- > Dryland cropping
- > Crop storage mainly on farms

- > April / May planting winter crops w harvest Sept / Oct
- > Early summer crops (sorghum & corn) planted late Aug / Sept and harvested in Jan.

- > Many crops are double cropped if sufficient moisture in the soil (with some effect on yields compared to planting after fallow period) but often forced to plant due to weather uncertainty

- > Grazing also occurs (but not considered in great detail)

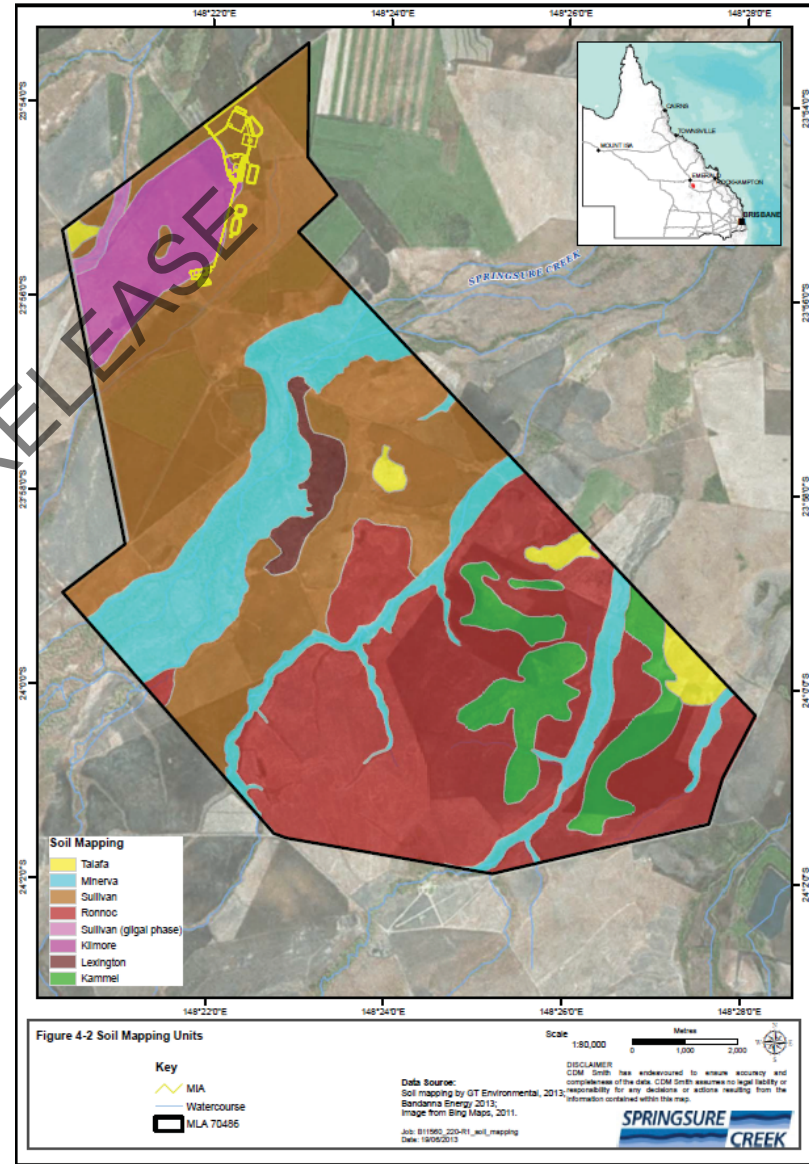
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SCL Site Assessment

- > Desk top study
- > Field work
 - > 176 observation sites
 - > 76 detailed sites
 - > 8 SMUs identified

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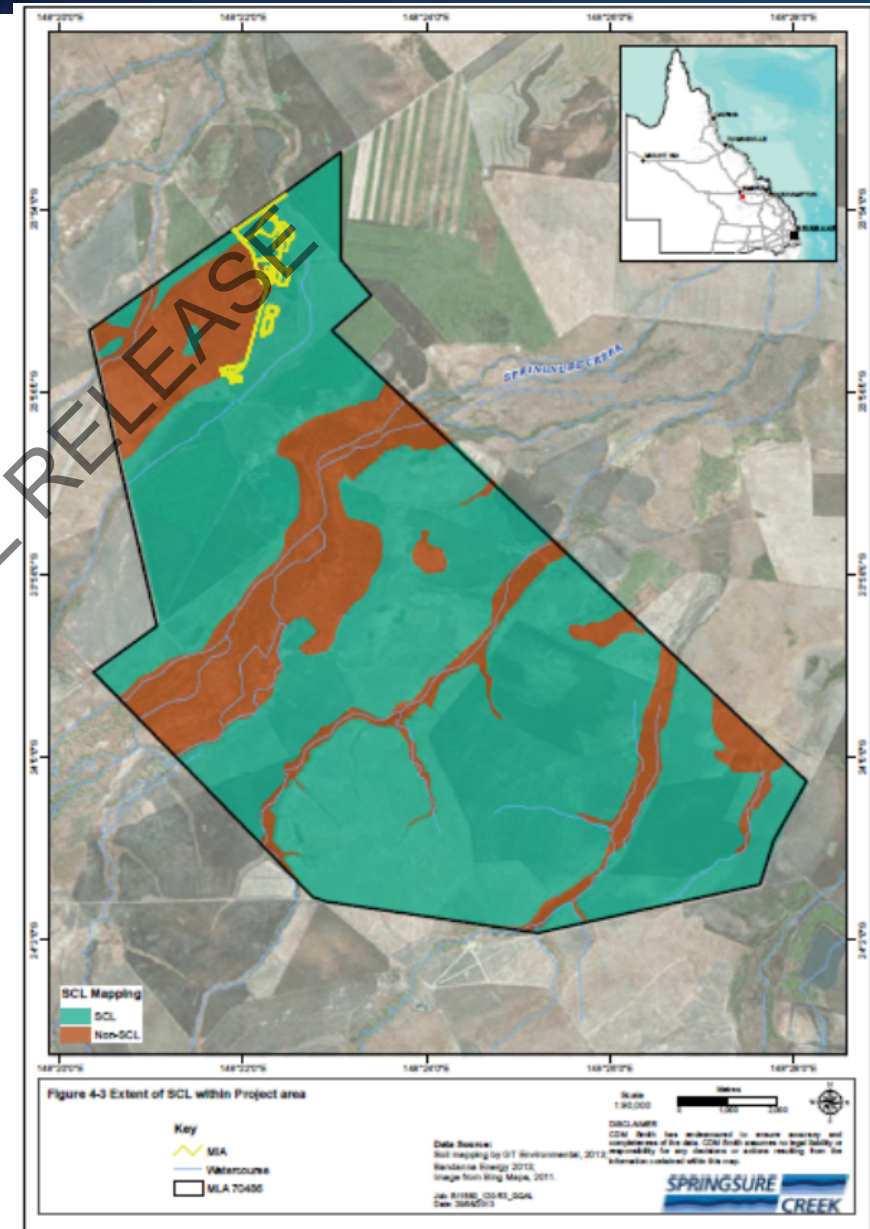
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SCL Evaluation

- > Based on SCL criteria for WCZ.
- > SCL must meet all 8 criteria
 1. Determined exclusion areas:
 - > Slope, rockiness and microrelief
 - > Min. size requirements
 - > Existing land use & disturbance
 2. Assessment against remaining 4 criteria

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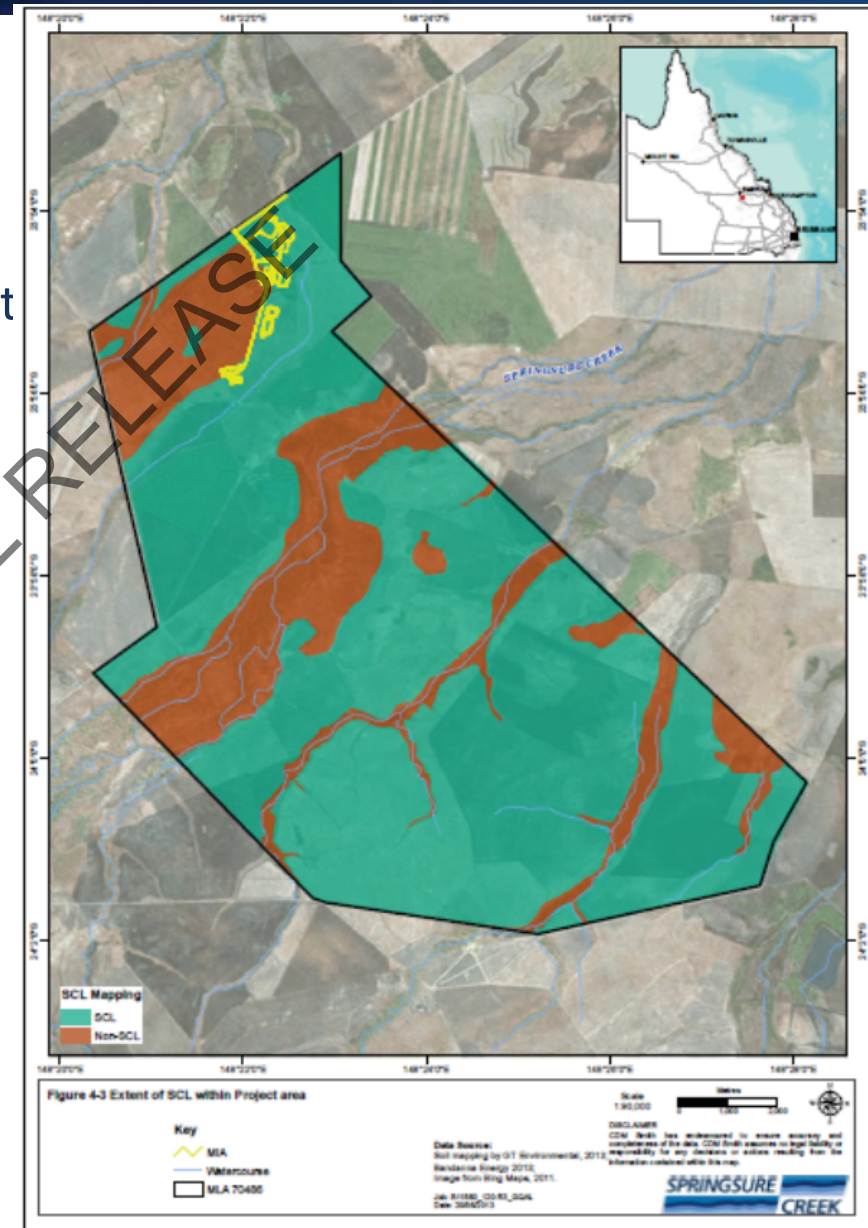
SCL Validation

- > MLA 10, 736 ha
- > 8,368 ha (94%) passes all SCL criteria
- > 500 ha (6%) of potential SCL fails to meet all criteria

- > Limited difference between trigger map and site survey

- > **SCC not seeking SCL validation decision**

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Impact Assessment

- > Applies permanent or temporary impact definitions under the Act s.14 (permanent impact = 50 yrs or more)
- > Relates to predevelopment condition:
 - a) *Condition prior to development; or*
 - b) *A condition consistent with contiguous SCL for the land (sch. 2 Act)*
- > Scope:
 - > Physical impacts (changes to topo, landform, soils)
 - > Chemical impacts (emissions and deposits within or on soil)
 - > Biological impacts (weeds and pests)
 - > Land use impacts (tenure, access, water resources, land suitability)
 - > Construction and mining activities

Restoration #1

> **Statutory process:**

- > Review and audit of rehab work requirement of EA
- > Plan of Operations to set out actions to comply with EA conditions including rehab programme
- > POO to be approved by EHP prior and EHP can suspend or cancel EA if non-compliance
- > Annual return submitted on status of rehab work
- > SCC will provide financial assurance as security bond in unlikely event conditions not met

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Restoration #2

> Objectives:

- > A landform with the same or similar land use suitability to that pre-development, unless other beneficial land uses are pre-determined and agreed with key stakeholders;
- > Land use that will not require any maintenance associated with the mine's legacy in terms of safety, pollution and stability; and
- > Water coming into contact with the Project area, either at the surface or underground, to not be degraded in terms of quality or quantity and will be acceptable to existing users.

> Set objectives for each domain of the project

- > Cropping land
- > MIA, access roads, drifts, quarry
- > Translocated soils

SCL Protection Decisions

- > SCC propose 20 SCL protection conditions
- > Relate to impact avoidance, minimisation, restoration and aftercare.
- > Conditions in addition to those sought for rehab under EA

- > Next Steps:
 - > Follow up meeting in 2 weeks
 - > Agency meeting to discuss conditioning

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THANK YOU & ANY QUESTIONS

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Strategic Cropping Land Assessment Springsure Creek Coal Mine Project



Great state. Great opportunity.



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Aim

- Outline the assessment requirements in the SCL Act for:
 - Discerning between Permanent and Temporary impacts
 - Characterising the Pre-development condition of land
 - Ensuring restoration of SCL (in the case of temporary impacts)
- Provide an overview of the Springsure Creek SCL Protection Decision Application, particularly in relation to the above points.
- Provide an overview of the assessment pathways for the Springsure Creek SCL applications.

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DNRM interpretation & application in respect to provisions in the SCL Act

14 When development has a *permanent impact* or *temporary impact*

(1) Carrying out development on SCL or potential SCL has a *permanent impact* on the land if—

- (a) the carrying out impedes the land from being cropped for at least 50 years; or

Example—

drilling or wells under a resource Act carried out on the land at a level or density which, or the cumulative effects of which, impede it from being cropped for at least 50 years

- (b) because of the carrying out, the land can not be restored to its pre-development condition; or

(c) the activity is or involves—

- (i) open-cut mining; or
(ii) storing hazardous mine wastes, including, for example, tailings dams, overburden or waste rock dumps.

(2) For subsection (1)(a), it does not matter whether the impediment is legal or physical.

Example of a legal impediment—

a restrictive covenant impeding cropping

(4) Carrying out development on SCL or potential SCL has a *temporary impact* on the land if—

- (a) the carrying out does not have a permanent impact on the land under subsections (1) to (3); or

- (b) it is development of a type prescribed under a regulation.

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- The development **introduces an impediment to cropping for any period of time**, irrespective of whether the land is currently being cropped. Land may be impeded from being cropped due to its occupation by mining activities or due to safety or legal restrictions on access to areas of land during the mine lease period. Impediments to cropping may be partial (as in an additional restriction, complication or cost on cropping) or absolute (as in the complete exclusion of cropping). Introduced impediments to cropping may be short-lived or long term. If the impediments endure for 50 years or more, the affected land is regarded under the SCL Act as being permanently impacted by the development.
- The development **results in land disturbance that alters the condition of the land**. This could entail an alteration to the soil profile or soil properties, altering the land cover, changing the topography or altering the surface or subsurface drainage characteristics and conditions of the land. The land's condition at the point in time prior to the development commencing, is taken to be the benchmark against which impacts that are attributable to the development are recognised. If any alteration to the pre-development condition of the land is unable to be restored, the land is regarded under the SCL Act as being permanently impacted by the development.
- Restoration to pre-development condition – not rehabilitation and not in a literal sense.
- Consequences of temporary and permanent
 - Temporary – restoration ±FA – no difference in protection or management area
 - Permanent – mitigation in management area, and require EC in protection area else refused (unless transitionals apply)

Pre-development condition

pre-development condition, for a provision about the carrying out of development on land, means that the land is restored to—

- (a) its condition before the development started; or
- (b) if the condition can not be worked out—a condition consistent with contiguous SCL for the land.

Establishing the “Condition” of the land requires consideration of:

1. Soil profile characteristics
2. Soil properties (chemical, physical, biological)
3. Natural landform, topography and surface drainage
4. Land improvements (e.g. levelling, drainage modification, erosion control).
5. Productive capacity (not just yield). Productive capacity may be used as an indicator of land condition (for cropping) but it does not describe the inherent condition as it is input-sensitive and easily manipulated.

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Pre-development is what the land is now, not what the land was before initial development. Therefore could be in a modified state ie, cleared of vegetation, contoured, laser levelled etc.

An assessment against the SCL criteria may measure part of the “condition” of the land.

1. the number and depth of horizons, soil depth, drainage, structure, texture - more qualitative
2. Lab assessment pH, EC, cation exchange capacity, dispersibility – quantitative
3. Slope, relief, landform pattern etc
4. X
5. Eg might be able to maintain yield, but you might be required to increase inputs (fertiliser and water) to achieve that.

An important point is that the relevant “measure” of pre-development condition is influenced by the nature of the impact – restricted access with no physical impact, effluent disposal – more chemical measures, compaction – more bulk density or penetrometer

What must be decided for each application

101 Criteria for decision

- (1) In making an SCL protection decision, the chief executive must consider—
 - (a) the extent of the impact of the carrying out of the resource activity on SCL; and
 - (b) whether the carrying out of the resource activity will have a permanent impact or a temporary impact on the land; and
 - (c) whether the applicant has demonstrated that the impact has been avoided or minimised to the greatest extent practicable.

DNRM delegate must make decision about:

- The extent (location, area, severity and duration) of impact
- Whether the impacts are permanent or temporary
- Whether impacts have been avoided or minimised to the greatest extent.

High level of confidence about the development/restoration outcome is required.

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- Avoid is the first consideration, minimise second – point that minimise doesn't necessarily drop off for permanent impacts.
- Require a high level of confidence in the restoration that is proposed is actually achievable
- Decision can't be deferred until a point in the future. Ie after they've tried to restore (particularly in the protection area)

We are yet to be confronted by an SCL application that is likely to be refused due to a lack of an approval pathway. However, hypothetically such scenarios exist and are potentially on the horizon with potential for future 'greenfield' underground coal projects in protection areas.

SCL misconceptions sometimes encountered

1. SCL framework seeks to protect the land use as opposed the land resource (SCL) .
2. A permanent impact is one that results in complete alienation of the land from cropping
3. If we return the land to a stable landform and it's pre-existing land use (as required by our EA) - it will be regarded as a temporary impact under the SCL Act
4. We can impact the land in any way as long as at the end it still meets the thresholds of the SCL zonal criteria for validation (e.g. 0-3% slope) - it will be regarded as a temporary impact under the SCL Act.
5. Returning the land to its pre-development condition just means we have to demonstrate that you can grow productive crops (or maintain yield) after we leave - it will be regarded as a temporary impact under the SCL Act.
6. If DNRM just conditions my development to say that I have to shut it down within 50 years - it will be regarded as a temporary impact under the SCL Act.
7. I can accept the trigger map when making my application (protection decision or MCU/RaL), and then propose part of it is non-SCL

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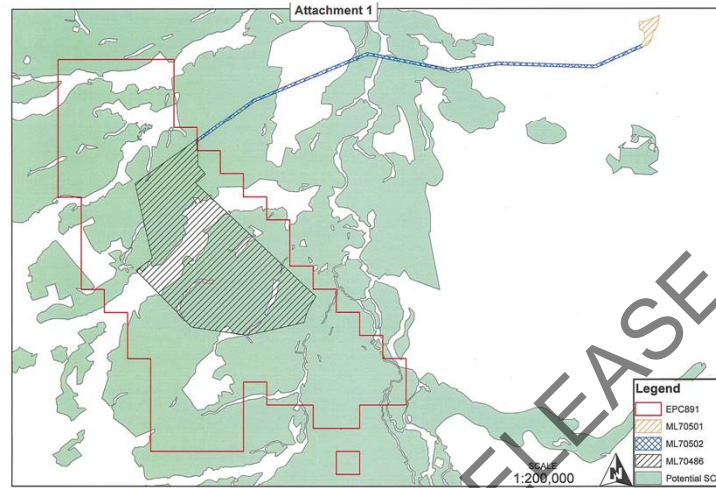
Important to appreciate that these concepts are only misunderstood by a minority (<20%) of first-time applicants and that after appropriate explanation and guidance most are able to identify the most efficient application and approval pathway. Some applicants unfortunately are habitually intractable (QGC).

1. As a side effect of the SCL principles of avoid, minimise (restore), and mitigate, but not the purposes of the act.
2. Example of open cut vs longwall
3. For a long time this has been the goal and what everyone is used to... SCL set the bar higher eg Gordonstone (now Kestrel). "has been signed off by DERM as being fully rehabilitated"
4. As long as it could still be validated as SCL then that's a temporary impact
5. Regardless of what physical and management inputs would be required to support those crops or whether they can be sustained long-term
6. People really focus on the 50 year timeframe as opposed to the restoration requirement.

Overall impact of these misconceptions is that applicants, even in the management area, push the temporary impact cart – often perversely.

Bandanna proposal

1. Mining project area, Haul road, and rail load out facility.
2. Transitional provisions under SCL Act.
3. DNRM SCL involvement / application lodged not properly made, some application requirements not provided. Reapplication sent.



1. Essential 3 MLs – EIS for mining project, no EIS for either haul road or rail load out facility. pSCL on mining and haul road leases
2. Mining area has transitional provisions excluding the permanent impact restriction – Haul road doesn't
3. Commented on EIS and SupEIS for Mining area, received protection decision application for mining area – impending haul road application ± validation application
 - Application lodged is technically incomplete (unable to be accepted) and does not follow the application guideline provided during pre-lodgement. Reapplication to make good and reinforce the most efficient approval path has been provided.

Mining Project Area

1. Mining area impacts (longwall subsidence - deformation of land, disruption of drainage systems. Industrial infrastructure, holding dams, basalt quarrying, soil stripping and stockpiling).
2. Application is proposing all impacts are temporary based <50 years, their co-existence research policy, and focusing on re-establishing an undetermined level of future productivity over the site despite failing to restore pre-development condition and loss of some land from cropping (ponding and landform alteration).
3. Proposes to use conditions requiring development of plans and methods of soil handling and restoration sometime in the future. No proof of restoration capability or temporary impact.
4. Application is lodged but incomplete. Requisition issued.
 - All mining activities and impacts not identified.
 - Incorrect acknowledgement of extent of SCL impacted.
 - Assertions of temporary impact are unsupported by evidence.
 - Proposed reliance on 'productivity' as a measure of restoration success is not valid given altered management inputs required to achieve pre-mining productivity.

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1. Proposed 40 year mine with up to 11 Mtpa Coal. Approx 7000 hectares SCL subsided and 60 ha MIA (based on current application)
2. Haven't proposed "restoration" for subsidence, application is focused on "mitigating (not SCL mitigation)" or managing the impacts (ie re-contouring, changing irrigation methods etc). Even within their application they make reference to "impacts would be permanent unless mitigation is implemented"
3. We would need to make a permanent/temporary decision without the detail or level of confidence/certainty required to ensure impact is only temporary.
4. Only general/high level pre-lodgement.

Mining Project Area – assessment pathways

Based on the current application:

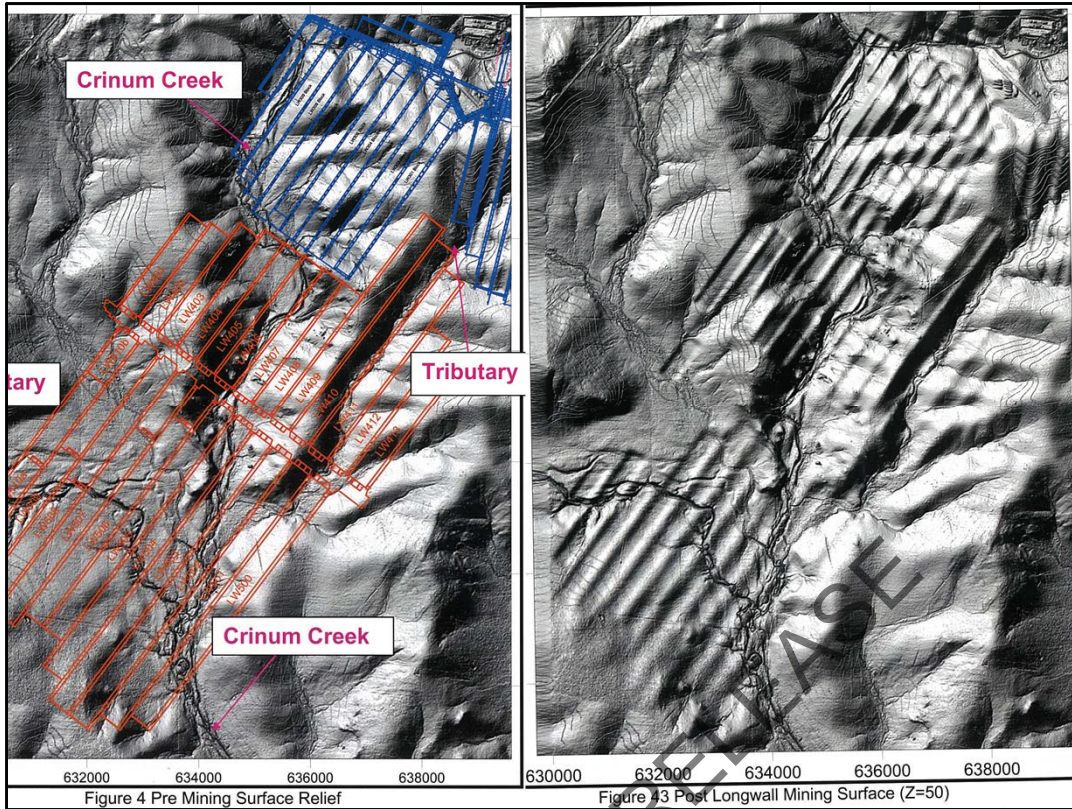
- Land will not be returned to pre-development condition (particularly landform) and substantial areas will no longer be available for cropping due to ponding and the need to restructure landscape drainage patterns and install erosion control structures
- Presence of activities with defined permanent impact (overburden dumps, hazardous mine waste).
- No commitment to remove all mine infrastructure from SCL (dams, roads, buildings).
- Impacted soils will not be returned to predevelopment condition due to mixing of soil horizons, potential mixing of different soil types and redistribution of stockpiled topsoils around the project site.
- The absence of plans that reliably demonstrate how the soils and landscape will be attempted to be remediated to support ongoing cropping provides no certainty as to what the outcome will be in terms of achieving the SCL Act purposes and principles
- The 40 year projected life of the mine and the certainty regarding the 50 year consideration

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Mining Project Area – assessment pathways

- Considerations regarding a decided temporary vs permanent impact
 - Decided Permanent Impact - mitigation would be $\approx 7060\text{ha}$ (? $8,868\text{ ha}$ of the MLA is SCL) $\times \$4750/\text{ha} \approx \33.5mil . In addition to the costs of minimising the impacts to the greatest extent practicable – as yet unknown.
 - Decided Temporary Impact – significant additional work and evidence required, that Bandanna are unprepared for. Would significantly delay the decision timeframe – months/years with no guarantee of approval at the end.
 - Would expect the costs of attempting to legitimately restore impacts to far exceed any mitigation amount and these would need to be reflected in the project's FA liability paid to DNRM.
 - DNRM point of view – assessment, conditioning, FA, compliance/enforcement, risk

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Kestrel expansion project. Z=50 means a bit more pronounced
 Slightly different in that the land is not currently cropped – Land use vs soil resource.

Springsure creek modelled subsidence predictions
superimposed onto topography as presented in
EIS

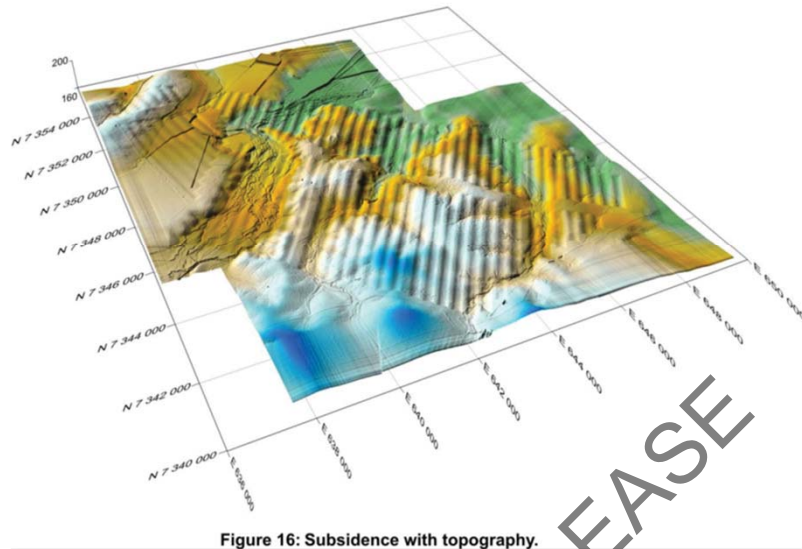


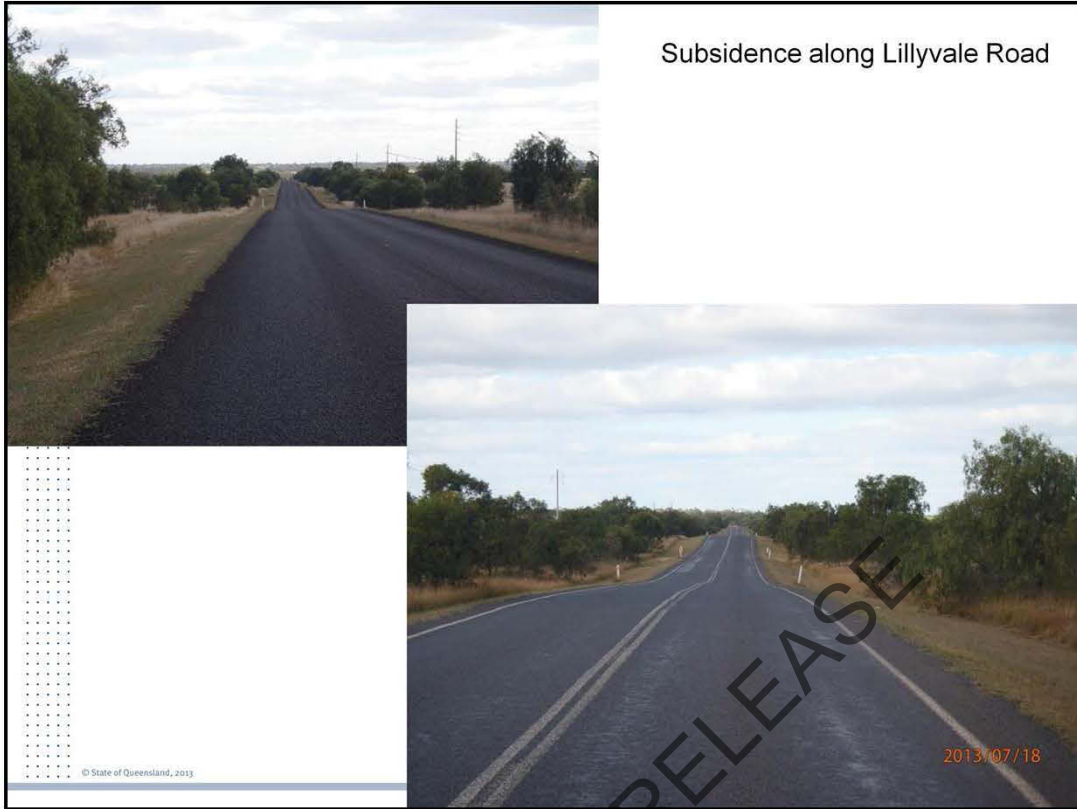
Figure 16: Subsidence with topography.

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Colours are just elevation.

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Perched culvert on lillyvale road



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Due to subsidence, the culvert is no longer the lowest point – surface drainage has been disrupted

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Haul Road

1. Application lodgement imminent – No pre-lodgement
2. Unlikely to validate SCL
3. 200 metre wide 40 km long corridor.
 - Privately owned haul road
 - Potential overland conveyor
 - Services
 - Dams to collect runoff
4. (EIS) Nominal 350t side tipper road trains
5. Impacts
6. Restoration
7. Assessment pathways

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1 - update from meeting

2,3 Based on only discussions to date and some background info in EIS – proposing temporary –

4 Up to 11 mill tonnes of product per year + trucks 24/7 for 40 years,

5 Physical & non-physical impediments and impact to pre-development condition

6 likelihood of only being 40 years, will stockpile soil for 40+ years and then restore – concerns – actual practicality & likelihood of success,

7 Temp – protection decision & FA, Perm – will require EC. Council Road at end?

Examples of haul roads / Side tippers



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- These are just some images of other haul roads – note that these haven't gone through a SCL assessment
- Side tippers are just sourced from the web and from my experience – indication only based on EIS info
- Little information has been provided to date regarding the proposed haul road

Framework review – streamlining and flexibility

1. Expand permanent impacts into two categories
2. Additions to prescribed permanent impacts
3. Adjust mitigation and EC to accommodate two categories
4. 50 years timeframe
5. Better define “pre-development condition” or change benchmark
6. Cropping history – alignment with purposes of act, better defined/clarify

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1. Permanent - complete alienation & permanent – land use maintained... SCL status maintained
2. Provides clarity and certainty for all, reduces contention and overly aspirational proposals, speeds up process – eg Sonoma Creek protection decision (open cut and stream realignment)
3. Provide recognition of remediating the land to the land use as well as recognising that the land has been permanently impacted. EC to be more flexible.
4. From a decision making point of view, that length of time increase level of uncertainty. Issues with Practicality and reasonableness
5. Is predevelopment condition a practical benchmark for long term projects? Are there other options?
6. Cropping history is a land use test, not a land resource test. Could help with a few additions/clarification of what is considered a crop

Exceptional Circumstances - overview

- Minister would be decision maker
- Criteria prescribed in SCL Act
 - No alternative site
 - Significant community benefit
- Public notice and submission stage
- Appeals to P&E court – applicant only
- Application Fee of \$49 546

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If it was a co-ordinated project under SDPWOA, decider would be co-ordinator general.

Submissions must address the EC criteria

134 Sole criterion for deciding no alternative site

- (1) In deciding whether there is no alternative site for the development to be carried out, the required decider can only consider whether there is an alternative site in the State—
 - (a) if the proposed authority is a resource authority—from which the resource the subject of the authority (the *relevant resource*) can lawfully be obtained; or
 - (b) if the proposed authority is a development approval—at which the development can lawfully be carried out.
- (2) All of the following must be disregarded in considering any possible alternative site—
 - (a) who owns the land on which the site is located;
 - (b) the existence or non-existence of a resource authority or development approval for the site;
 - (c) the profitability of carrying out the development on the site;
 - (d) the classification, grade or quality of the relevant resource;
Example—

If the relevant resource is coal, it does not matter whether coal on the possible alternative site is thermal or coking.
 - (e) if the proposed authority is a resource authority—its proximity to existing infrastructure relevant to carrying out the development.
- (3) If the proposed authority is a development approval, the only possible alternative sites that may be considered are those within, or a reasonable distance from, the region or locality to which the development relates.

For info in case the discussion goes down this track.

125 What is a *significant community benefit*

A *significant community benefit*, in carrying out the development on the land, means that—

- (a) the carrying out is an overwhelmingly significant opportunity of benefit to the State; and
- (b) the benefit outweighs the State's interest in protecting the land as SCL.

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 - (c) whether there would be significant adverse, economic, environmental or social impacts if the development is not carried out.
- (2) Also, a significant community benefit can not be decided solely on the profitability of the carrying out of the development or its economic benefit to the State.

Example—

A significant community benefit can not be decided solely on the basis of potential royalties under a resource Act or land tax under the *Land Tax Act 2010* that the State may receive if the development is carried out.

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Strategic Cropping Land Act Provisions



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DNRM interpretation & application of provisions in the SCL Act

14 When development has a *permanent impact* or *temporary impact*

(1) Carrying out development on SCL or potential SCL has a *permanent impact* on the land if—

- (a) the carrying out impedes the land from being cropped for at least 50 years; or

Example—

drilling or wells under a resource Act carried out on the land at a level or density which, or the cumulative effects of which, impede it from being cropped for at least 50 years

- (b) because of the carrying out, the land can not be restored to its pre-development condition; or

- (c) the activity is or involves—

- (i) open-cut mining; or
(ii) storing hazardous mine wastes, including, for example, tailings dams, overburden or waste rock dumps.

(2) For subsection (1)(a), it does not matter whether the impediment is legal or physical.

Example of a legal impediment—

a restrictive covenant impeding cropping

(4) Carrying out development on SCL or potential SCL has a *temporary impact* on the land if—

- (a) the carrying out does not have a permanent impact on the land under subsections (1) to (3); or

- (b) it is development of a type prescribed under a regulation.

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- The development **introduces an impediment to cropping for any period of time**, irrespective of whether the land is currently being cropped. Land may be impeded from being cropped due to its occupation by mining activities or due to safety or legal restrictions on access to areas of land during the mine lease period. Impediments to cropping may be partial (as in an additional restriction, complication or cost on cropping) or absolute (as in the complete exclusion of cropping). Introduced impediments to cropping may be short-lived or long term. If the impediments endure for 50 years or more, the affected land is regarded under the SCL Act as being permanently impacted by the development.
- The development **results in land disturbance that alters the condition of the land**. This could entail an alteration to the soil profile or soil properties, altering the land cover, changing the topography or altering the surface or subsurface drainage characteristics and conditions of the land. The land's condition at the point in time prior to the development commencing, is taken to be the benchmark against which impacts that are attributable to the development are recognised. If any alteration to the pre-development condition of the land is unable to be restored, the land is regarded under the SCL Act as being permanently impacted by the development.
- Restoration to pre-development condition – not rehabilitation and not in a literal sense.
- Consequences of temporary and permanent
 - Temporary – restoration ±FA – no difference in protection or management area
 - Permanent – mitigation in management area, and require EC in protection area else refused (unless transitionals apply)

Pre-development condition

pre-development condition, for a provision about the carrying out of development on land, means that the land is restored to—

- (a) its condition before the development started; or
- (b) if the condition can not be worked out—a condition consistent with contiguous SCL for the land.

Establishing the “Condition” of the land requires consideration of:

1. Soil profile characteristics
2. Soil properties (chemical, physical, biological)
3. Natural landform, topography and surface drainage
4. Land improvements (e.g. levelling, drainage modification, erosion control).
5. Productive capacity (not just yield). Productive capacity may be used partly as an indicator of land condition (for cropping), but it does not describe the inherent condition as it is input-sensitive and easily manipulated.

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Pre-development is what the land is now, not what the land was before initial development. Therefore could be in a modified state ie, cleared of vegetation, contoured, laser levelled etc.

An assessment against the SCL criteria may measure part of the “condition” of the land.

1. the number and depth of horizons, soil depth, drainage, structure, texture - more qualitative
2. Lab assessment pH, EC, cation exchange capacity, dispersibility – quantitative
3. Slope, relief, landform pattern etc
4. X
5. Eg might be able to maintain yield, but you might be required to increase inputs (fertiliser and water) to achieve that.

An important point is that the relevant “measure” of pre-development condition is influenced by the nature of the impact – restricted access with no physical impact, effluent disposal – more chemical measures, compaction – more bulk density or penetrometer

What must be decided for each application

101 Criteria for decision

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 - (b) whether the carrying out of the resource activity will have a permanent impact or a temporary impact on the land; and
 - (c) whether the applicant has demonstrated that the impact has been avoided or minimised to the greatest extent practicable.

DNRM Delegate must make decision about:

- The extent (location, area, severity and duration) of impact
- Avoid is the first consideration, minimise second – point that minimise doesn't necessarily drop off for permanent impacts.
- Require a high level of confidence in the restoration that is proposed is actually achievable
- Decision can't be deferred until a point in the future. I.e. after they've tried to restore (particularly in the protection area)

We are yet to be confronted by an SCL application that is likely to be refused due to a lack of an approval pathway. However, hypothetically such scenarios exist and are potentially on the horizon with potential for future 'greenfield' underground coal projects in protection areas.

Transitional provisions

289 Future mining lease relating to EPC 891

- (1) Any environmental authority application and any related resource application for a mining lease relating to EPC 891 is excluded.
- (2) However, the exclusion only applies for resource activities under an EIS resulting from the finalised EIS TOR relating to EPC 891, published on 2 June 2011.

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- (1) This section applies for any environmental authority or mining lease granted because of an application mentioned in section 289(1).
- (2) It is a condition of the lease that no open cut mining can be carried out under the lease.
- (3) It is a condition of the environmental authority that its holder must use all reasonable endeavours to rehabilitate all impacts on the land from underground coal mining carried out under the lease.

Example—

if the mining causes subsidence, contouring and laser levelling

- (4) The conditions are SCL protection conditions.
- (5) This section does not limit or otherwise affect the power, under chapter 3, part 4, to impose other SCL protection conditions for the authorities that are not inconsistent with the conditions.

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- 289 – mining lease area meets transitional provisions and transport corridor doesn't as it's is not included in the EIS. Rail load out facility does not trigger SCL.
- 290
 - No open cut
 - All reasonable endeavours
 - Can impose other protection decisions conditions as long as they are not inconsistent

Transport corridor therefore subject to full provisions of the act, including the permanent impact restriction.

Misconceptions about SCL sometimes encountered

1. SCL framework seeks to protect the land use as opposed the land resource (SCL) .
2. A permanent impact is one that results in complete alienation of the land from cropping
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4. We can impact the land in any way as long as at the end it still meets the thresholds of the SCL zonal criteria for validation (e.g. 0-3% slope) - it will be regarded as a temporary impact under the SCL Act.

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Exceptional Circumstances - overview

- Minister would be decision maker
- Criteria prescribed in SCL Act
 - No alternative site
 - Significant community benefit
- Public notice and submission stage
- Appeals to P&E court – applicant only
- Application Fee of \$49 546

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If it was a co-ordinated project under SDPWOA, decider would be co-ordinator general.

Submissions must address the EC criteria

134 Sole criterion for deciding no alternative site

- (1) In deciding whether there is no alternative site for the development to be carried out, the required decider can only consider whether there is an alternative site in the State—
 - (a) if the proposed authority is a resource authority—from which the resource the subject of the authority (the *relevant resource*) can lawfully be obtained; or
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- (2) All of the following must be disregarded in considering any possible alternative site—
 - (a) who owns the land on which the site is located;
 - (b) the existence or non-existence of a resource authority or development approval for the site;
 - (c) the profitability of carrying out the development on the site;
 - (d) the classification, grade or quality of the relevant resource;
Example—

If the relevant resource is coal, it does not matter whether coal on the possible alternative site is thermal or coking.
 - (e) if the proposed authority is a resource authority—its proximity to existing infrastructure relevant to carrying out the development.
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For info in case the discussion goes down this track.

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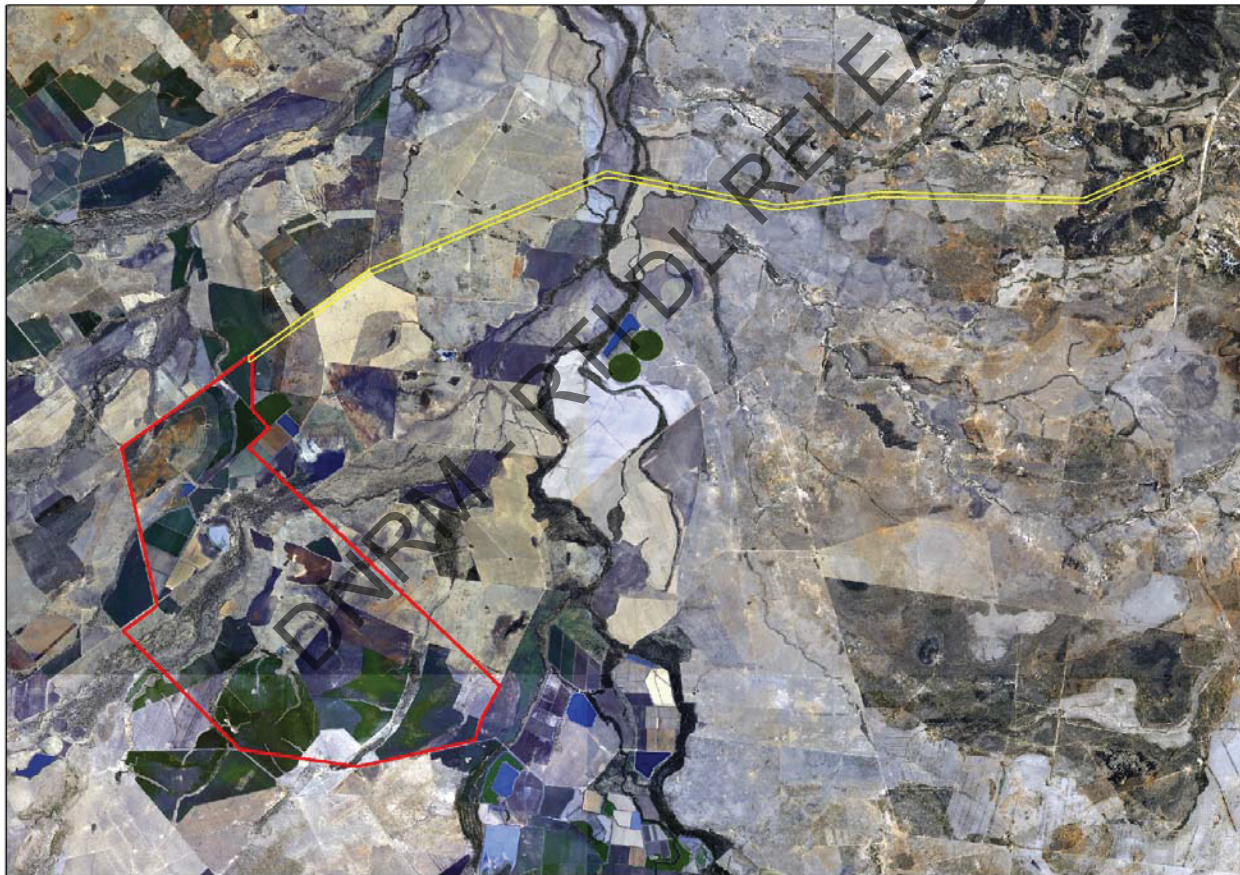
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Strategic Cropping Land Act Provisions



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DNRM - NOT FOR RELEASE

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Strategic Cropping Land Assessment Springsure Creek Coal Mine Project



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Outline

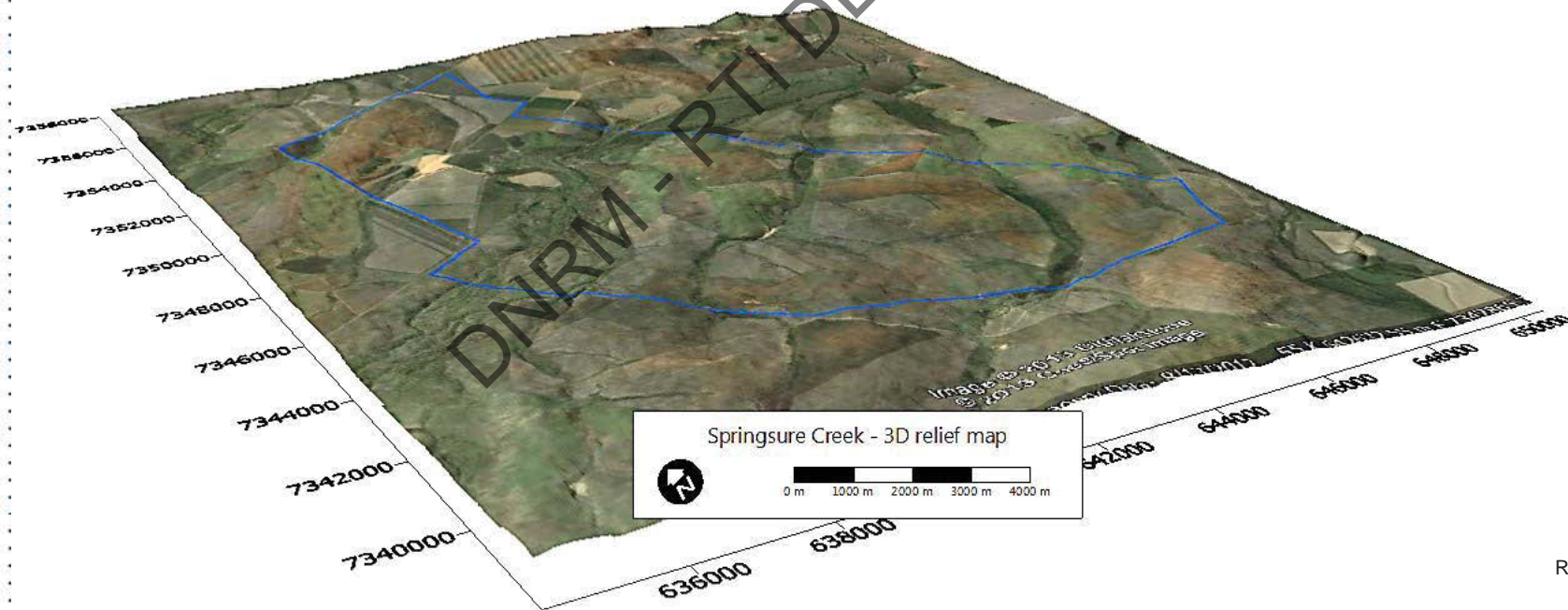
Assessment of the SCL Protection Decision Application

- Role and function of the SCL Protection Decision
- Overview of the development proposed:
 - What we know
 - What we don't know
- Findings about impacts on SCL:
 - Surface infrastructure
 - Longwall mining
- Challenges for constructing reasonable and appropriate conditions

R

ML70486 – Springsure Creek

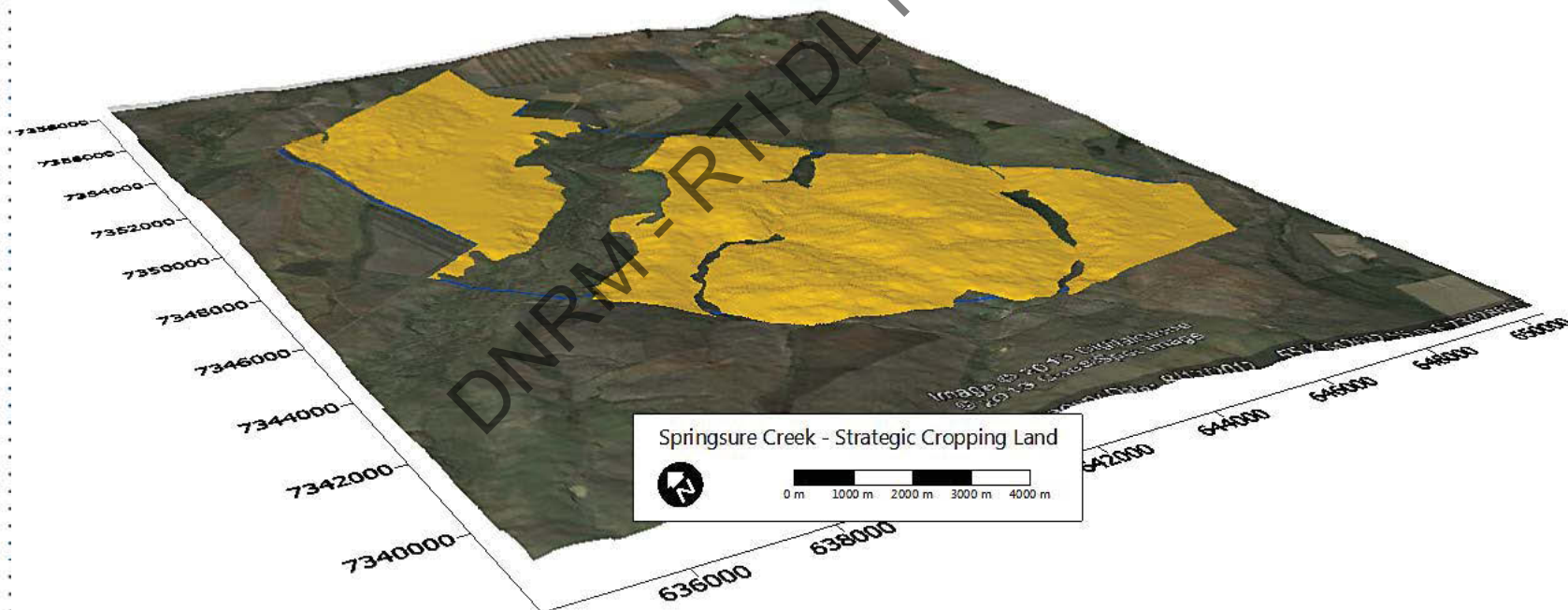
- ML70486 covers ~10 600 ha in southern part of Central Highlands
- Straddles lower reaches of Springsure Creek above junction with Comet River
- Surface geology - basalt or alluvia derived predominantly from basalt
- Gently undulating plains (slopes <3%)
- Other than riparian areas along major watercourses, majority (>85%) of land cultivated



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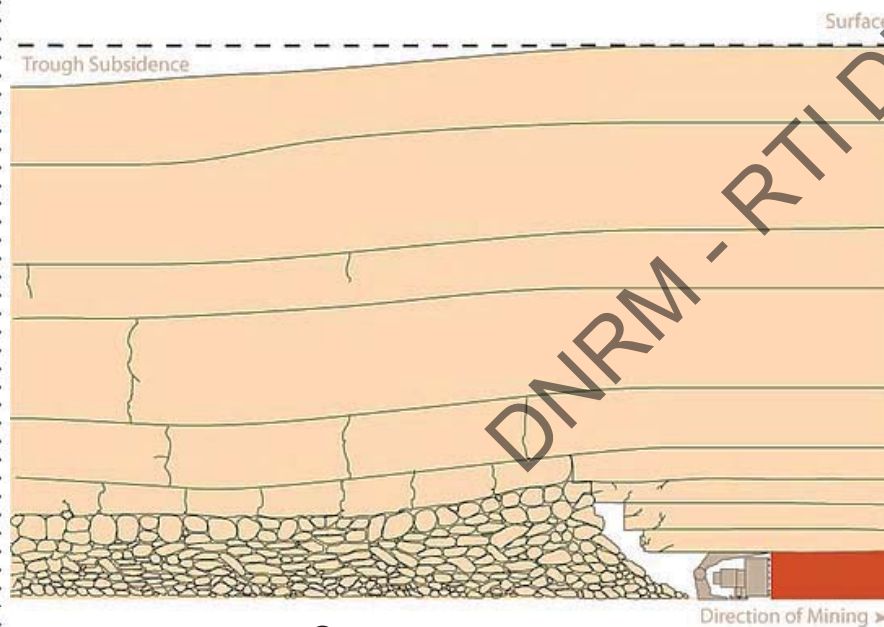
Strategic Cropping Land

- Area of pSCL within ML70486 of ~8 750 ha
- Effectively all ML70486 is pSCL with the exception of remnant riparian vegetation along watercourses (i.e. 18% of land area)
- About 7 500 ha of pSCL is currently being cropped (dryland & irrigated cropping)



Longwall mining & subsidence

- Subsidence is reasonably predictable
- Magnitude chiefly dependent on:
 - Depth of cover; and
 - Coal seam thickness.
- Ballpark value \approx 65% of seam thickness



Source:

<http://www.notchcode.com>

Parameter	Symbol	Value	Unit
<i>Seam & panel characteristics</i>			
Depth of cover	H	250 m	
Seam thickness	t_c	3.7 m	
Panel width	W	300 m	
Width: cover ratio	W/H	1.20	
Pillar width	P_w	40 m	
k_s		0.65	
k_1		0.4	
k_2		1	
k_3		3.3	
<i>Predicted results</i>			
Maximum subsidence	S_{max}	2.4 m	
Tensile strain	$+E_{max}$	4 mm/m	
Compressive strain	E_{max}	10 mm/m	
Tilt	G_{max}	3.2%	

R

Role and function of the SCL Protection Decision

- Consider the impacts* of carrying out the mining activity on SCL
- Decide whether those impacts are temporary or permanent
- Impose conditions on the Environment Authority to ensure that impacts are:
 - Avoided
 - Minimised
 - Restored to predevelopment condition (if Temporary)
 - Mitigated (if Permanent)

*Impacts on SCL are recognised as:

- ✓ *any alteration to the pre-development condition of the land or*
- ✓ *any impediment to cropping the land that did not exist pre-development.*

R

Overview of the development proposed

What we know



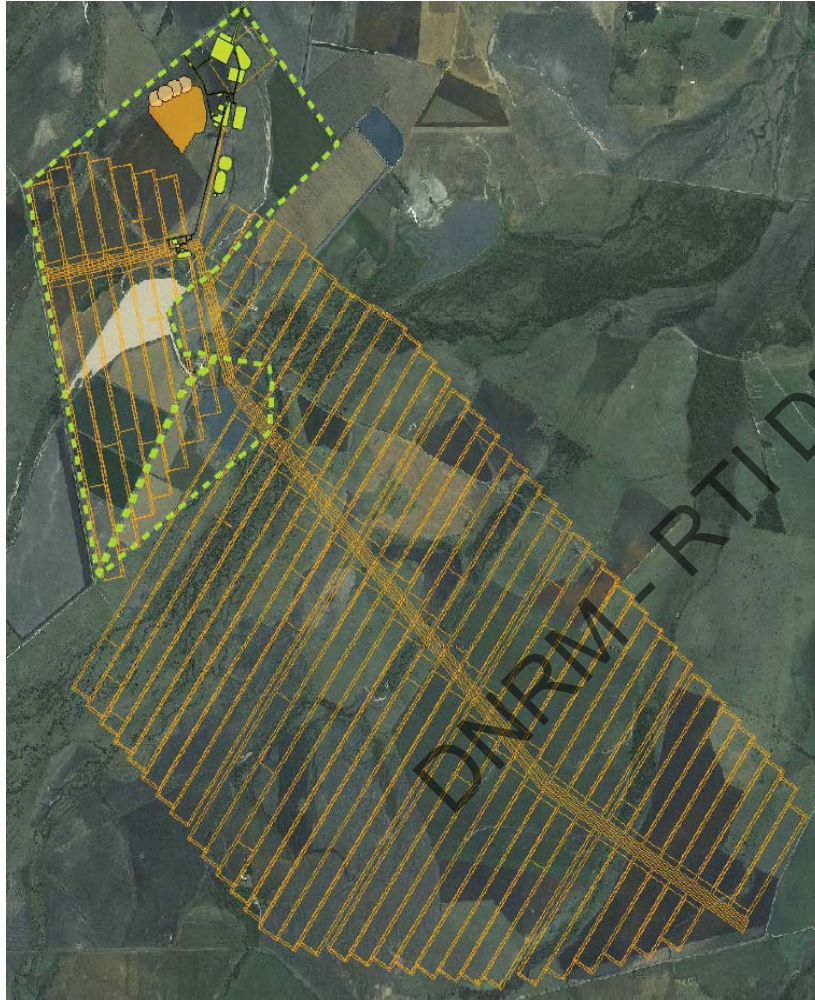
What we don't know

- “Conceptual” layout
- Disturbance Footprint (150ha +?)
- Earthworks plan
- Controlled drainage
- Erosion & Sediment controls
- Topsoil salvage and preservation
- Basalt quarrying (20k m³)
- Waste rock dumps (526k m³)
- Exclusion perimeter for cropping
- Pre-development benchmarks
- Post mining rehab plans
- Impact duration (< or > 50 years)

R

Overview of the development proposed

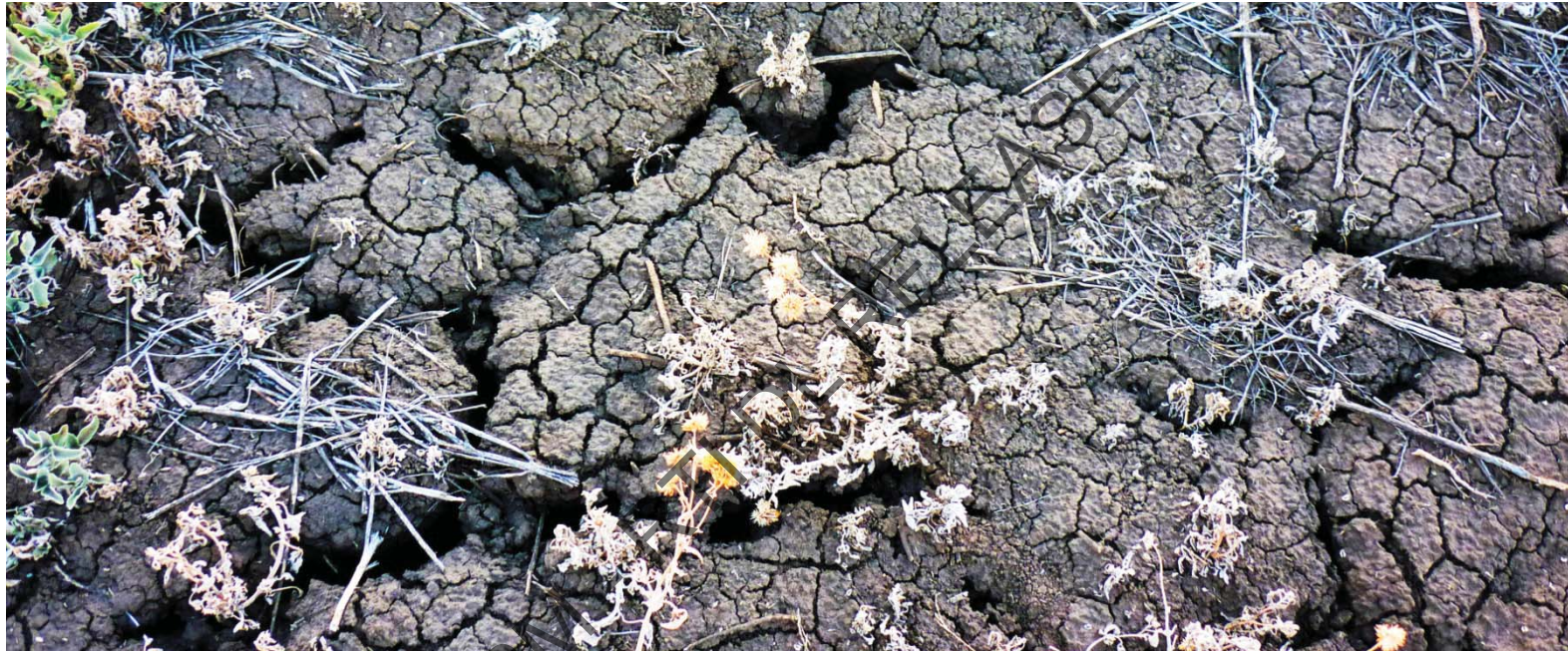
What we know



What we don't know

- Pre-development benchmarks
 - Soils
 - Erosion rates
 - Crop suitability
 - Agricultural inputs*
 - Productivity*
- Continuing land use during subsidence
- Subsidence remediation measures
- Transferability across MLA
- Impact duration (< or > 50 years)

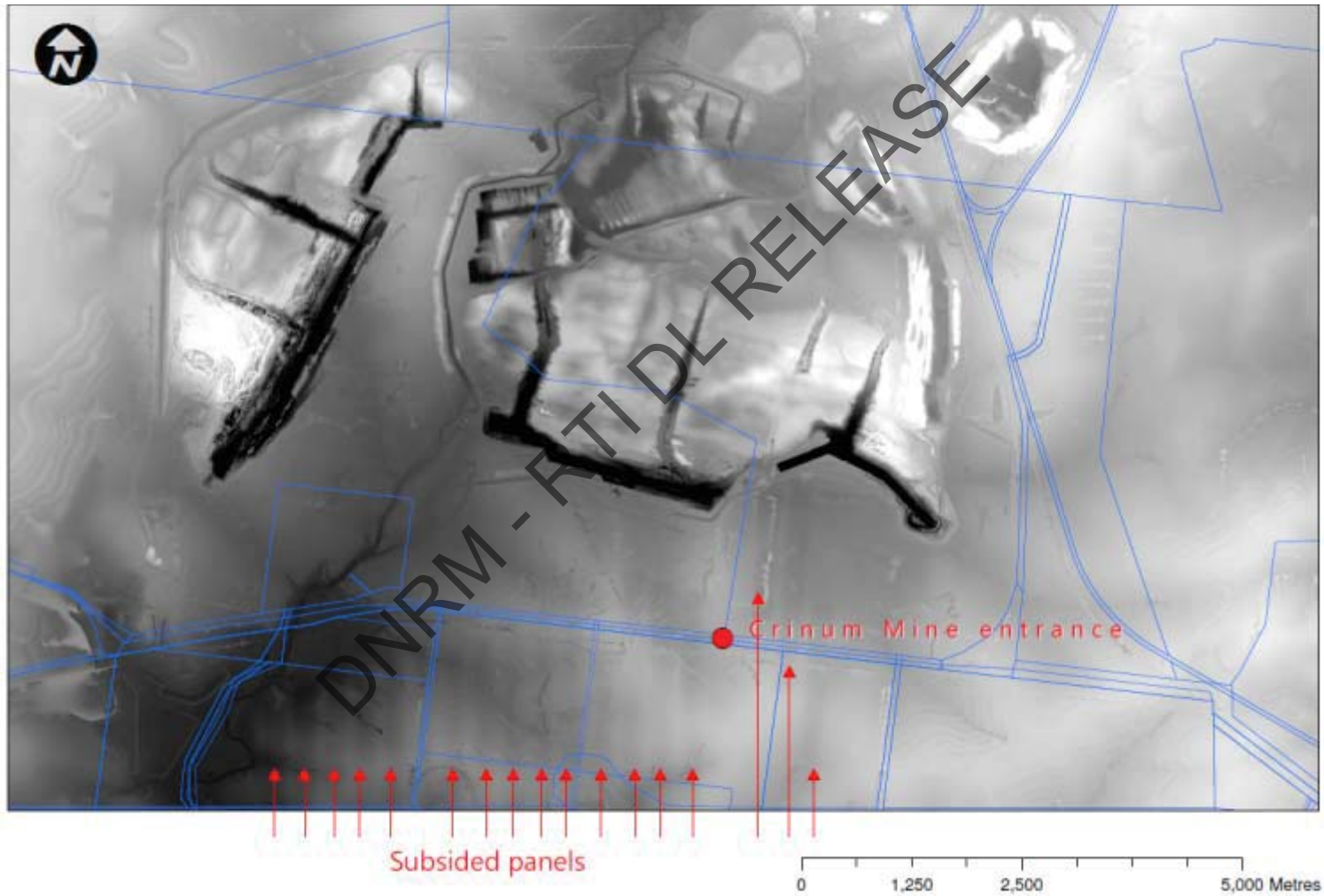
Vertosol soils



- Soils predominantly Black, Brown or Grey Vertosols – some red soils (e.g. on 'Denlo Park')
- Non-rigid (shrink-swell), cracking clay soils, with self mulching surfaces
- High plant available water capacity (generally >> SCL soil water storage threshold)
- Susceptible to physical degradation and erosion

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Crinum Mine – LiDAR digital elevation model



Crinum Mine subsidence – Lilyvale Road



Source: *'Rich Land, Wasteland'*, Munro (2012)

Subsidence induced undulations in Lilyvale Road

Crinum has similar depth of cover and mined seam thickness to Springsure Creek

R

Surficial effects – Kestrel Mine

- ▶ Subsidence troughs above mined panels
- ▶ Soil tension cracking at margin of troughs

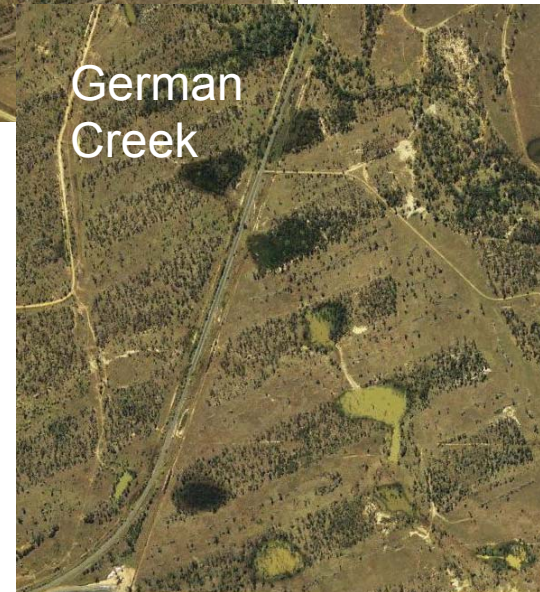


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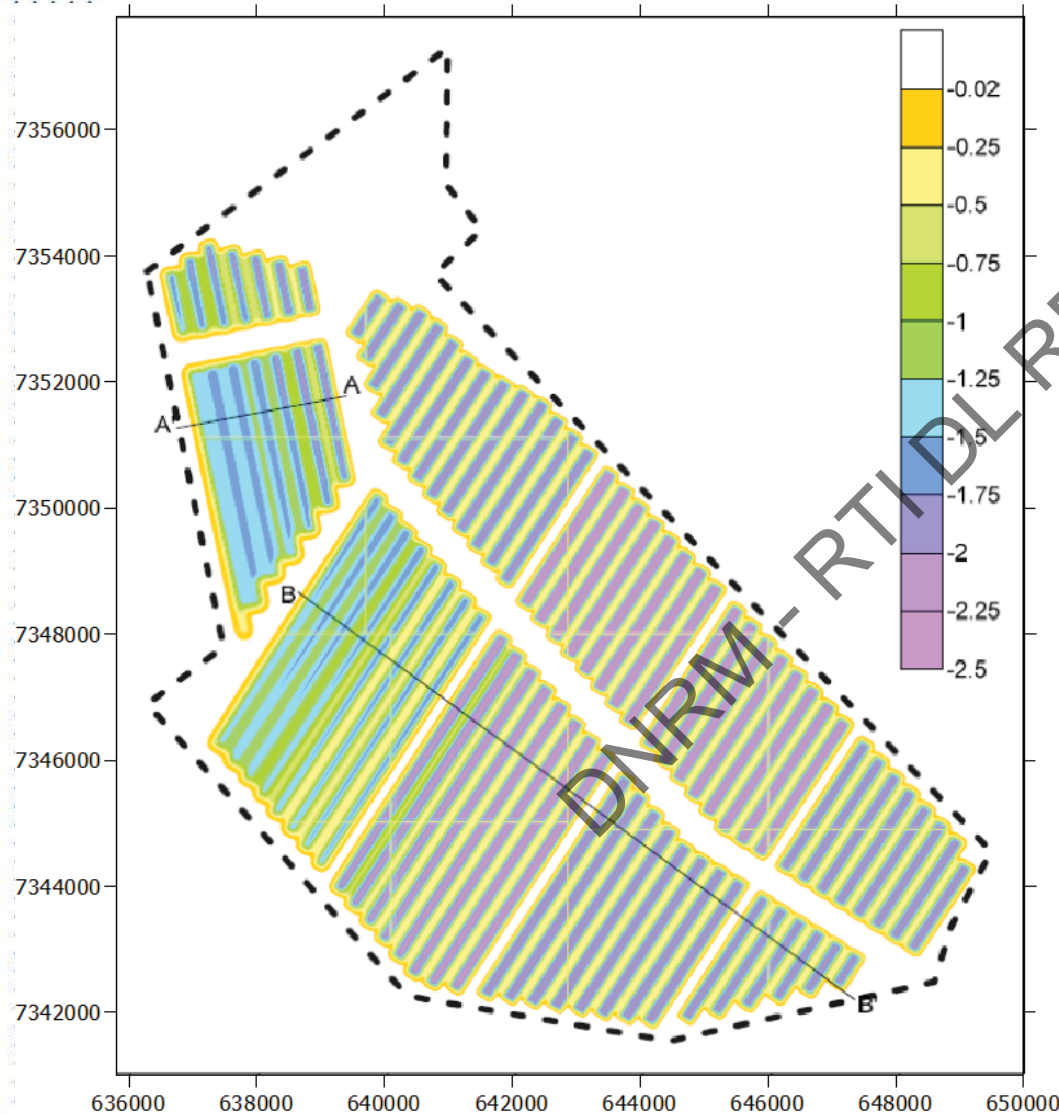
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Ponding in subsidence troughs



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Springsure Creek – predicted subsidence



Likely to affect ~7060 ha of pSCL
 Subsidence predicted to be <2.5 metres

Varies over the ML –

- Least in western part (e.g. 'Denlo Park') where coal seam deepest; and
- Greatest in central and eastern parts of ML (e.g. 'Arcturus') where coal seam shallowest

Averaged over subsided pSCL, subsidence-related tilting increases slope gradients by ~1.0% and locally (along trough margins) by ~3%

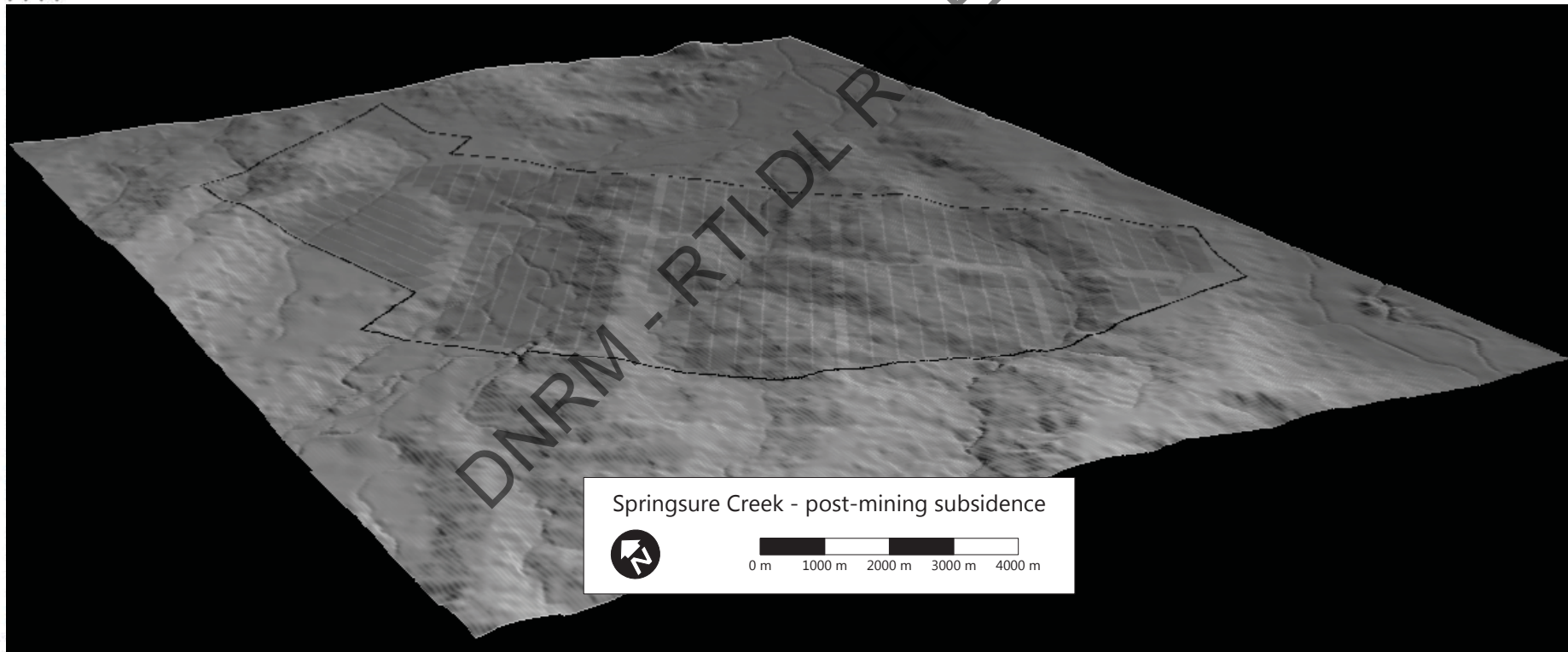
SCL slope threshold 3%

Some ponding likely (inevitable)

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Post-subsidence landform

- Most subsidence troughs orientated NE/SW roughly parallel to the fall of the land (but still crossing waterways and drainage lines)
- Subsidence troughs on Denlo Park run NNW/SSE and more directly up and down slope



R

Soil erosion

Factors affecting soil erosion rates:

- Slope gradient & length
- Rainfall erosivity (intensity, frequency & duration of storm events)
- Soil erodibility
- Crop type & management practices

Soil erosion > soil formation rates on most agricultural land → any increase highly undesirable (particularly on SCL)

Erosivity of summer rainfall events in CQ is high

Even in low gradient terrain (0.5%) Vertosol soils on long slopes in CQ are very susceptible to erosion

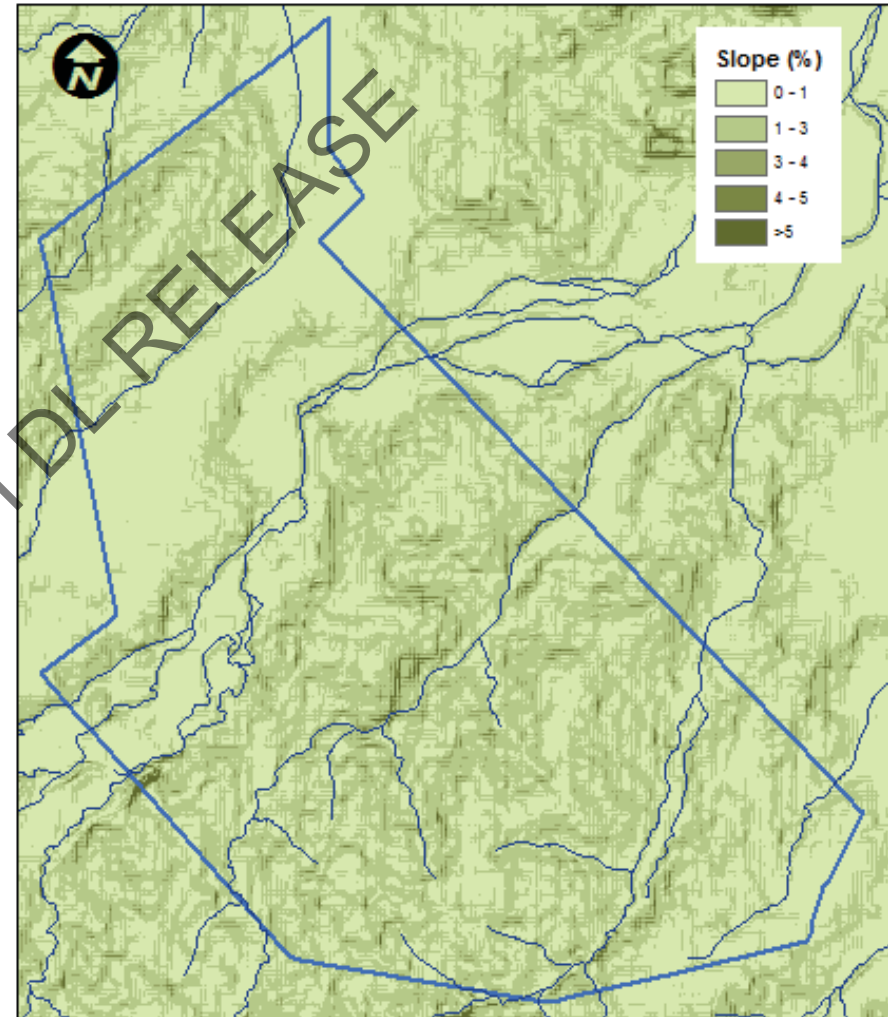
Erosion can be catastrophic when control structures fail in major storm events



R

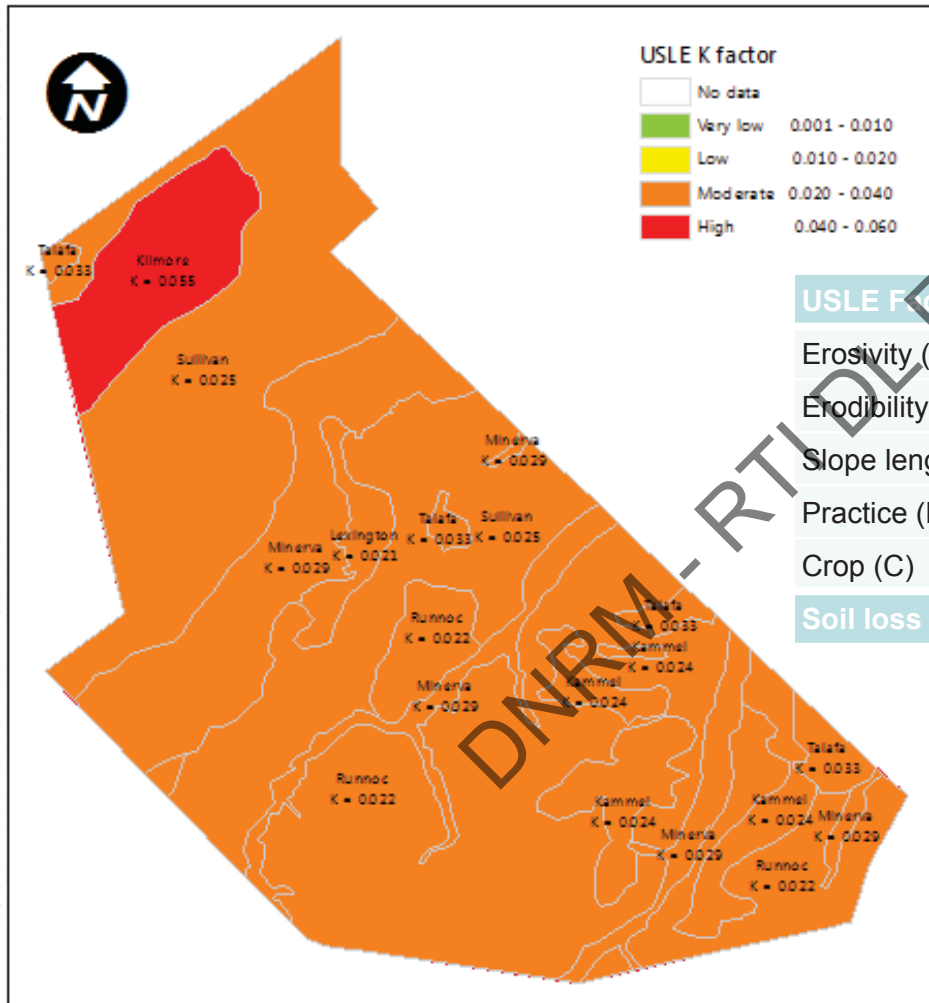
Slope gradients & lengths

- Slope gradients on pSCL are generally all <3% (the Western Cropping Zone threshold)
- Mean slope gradient across ML70486 is 1.19%
- Typical slope length (i.e. contour bank spacing) across pSCL on the ML is presently ~125 m (80 – 150 m range)



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Subsidence-related increase in soil erosion



Vertosol soils on ML have an average K value of 0.026 (moderate erodibility)
 Red 'Kilmore' soil on 'Denlo Park' is highly erodible (K value of 0.055)

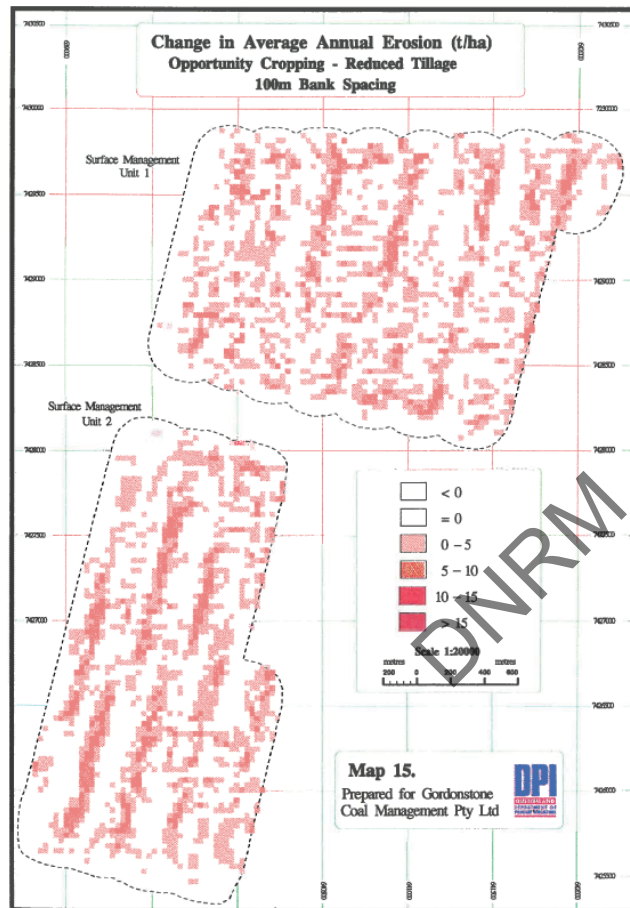
USLE Factor	Current	Subsided	Re-contoured
Erosivity (R)	2544	2544	2544
Erodibility (K)	0.023	0.023	0.023
Slope length (LS)	0.21	0.42	0.35
Practice (P)	0.34	0.34	0.34
Crop (C)	0.2	0.2	0.2
Soil loss (A) t/ha/yr	0.8	1.6	1.4

erosion rates on most of ML (e.g. a 'Sullivan' soil with K = 0.023)
 Halving the contour bank interval (i.e. to 60 m) on these areas reduces soil loss to 1.4 t/ha/yr (but 75% > current)

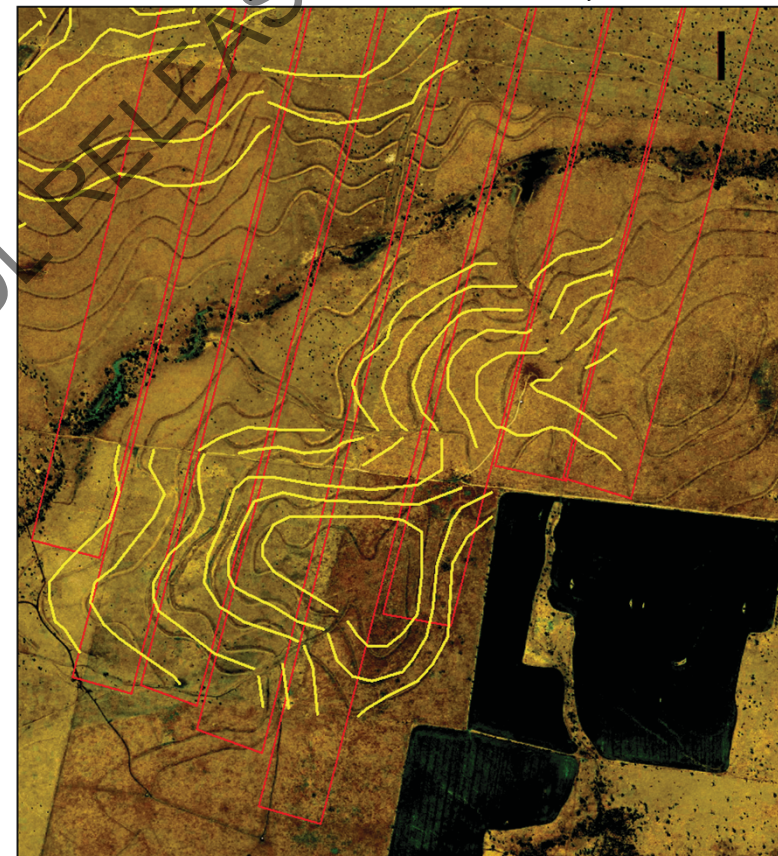
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The Kestrel (aka Gordonstone) experience

- Littleboy et al (1993) Gordonstone modelling



- Result → intensification of erosion control structures (i.e. contour banks)



0 0.25 0.5 1 Kilometres

— Pre-subsidence contour
□ 100 & 200 series panels

R

Soil compaction

- Applying mechanical force to a moist clay soil
→ mechanical dispersion of clay colloids
(i.e. structural degradation)
- Dispersion → reduced soil pore space →
increased soil bulk density → decreased
rooting depth & decreased plant available
water capacity (SWS in SCL context) →
reduced crop reliability (more crop
failures) and lower yields
- Effect greatest when soil moisture levels >
plastic limit (a common condition)
- Reason production systems in CQ moving to
minimum or zero tillage
- Mechanical force applied as result of traffic
(e.g. earthmoving equipment) and
compression during subsidence
- Surface soil in Vertosols have some capacity to
'self repair', but subsoils have limited
capacity



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Impediment to farming operations

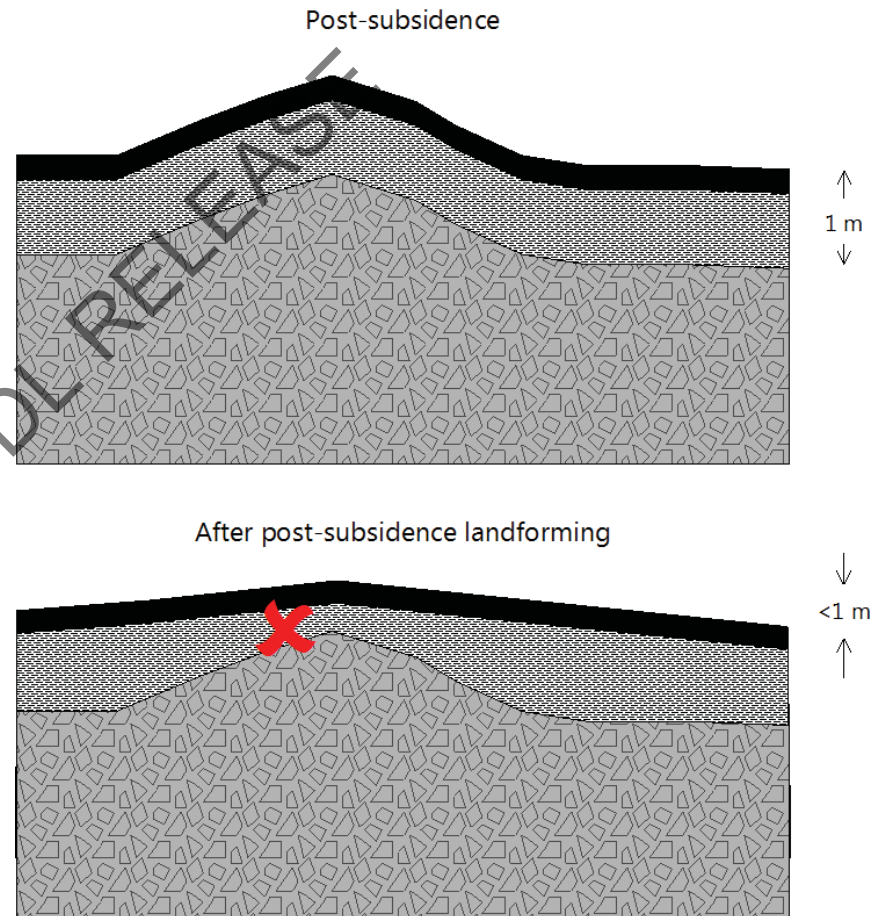


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Wheat yields – winter 2000

Landform	Crinum	Kestrel
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Cropped subsidence area at Kestrel – Source: Rio Tinto (2006)

Springsure Creek MIA & CHIA development

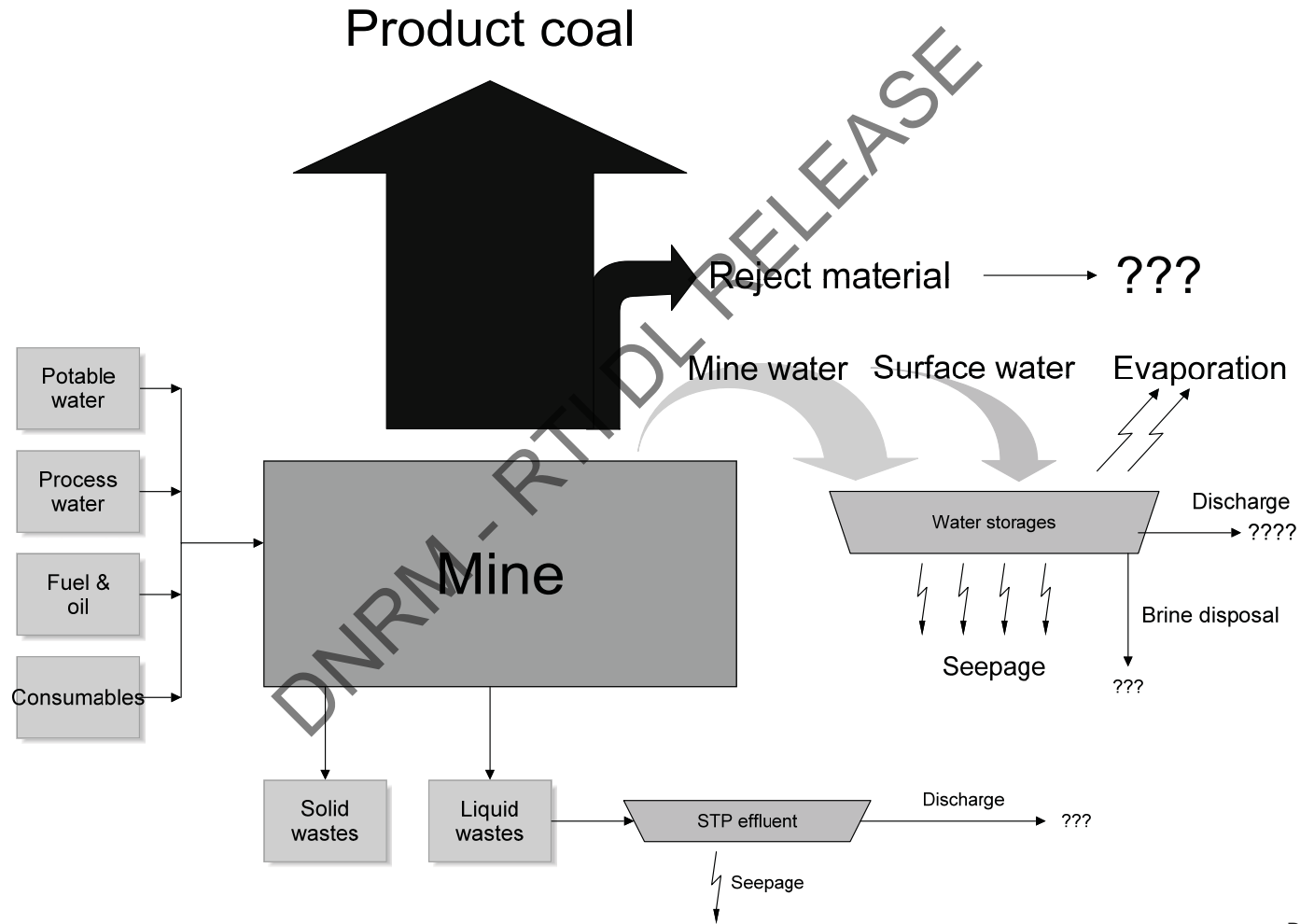
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Kestrel South mine portal – Source: <http://www.reco.com.au/mining-and-energy/projectcase-studies/item/78-kestrel-mine-portals.html>

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Material flows – production phase



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Other potential threats to SCL

Flood events

- Increased streambank erosion in floods

Salinity

- Seepages from water storages
- Ponding & detention in troughs → increased deep drainage
- Disposal of water & brine from water storages
- Disposal of STP effluent

Contamination

- Fuel & oil (addressed by EP Act)
- Solid waste (in part addressed by EP Act)
- Reject coal & fugitive losses → adsorption of nutrients and potential for TPH, PAH & BTEX in leachate
- Ash from any stockpile fires (spontaneous combustion)

Eutrophication

- Disposal of STP effluent

Productivity

- Reduced versatility in regard to crops able to be grown (e.g. problems with centre pivot irrigation & cotton)
- Losses due to ponding



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Findings about impacts on SCL Surface Infrastructure

- Site prep – topsoil stripping, cut and fill, grading
- Sediment and erosion control works - construction
- Controlled drainage - MIA and Coal Handling Area
- Building and hardstand pad construction
- Road construction and drainage
- Dam construction
- Bulk excavations – access to mine drift and quarrying
- Waste rock and subsoil dumps
- Soil contamination
- Soil losses, compaction, contamination, structure decline – 80ha stockpiling
- Exclusion estimate of 150ha cropping on Den-Lo Park (indeterminate period)



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Findings about impacts on SCL Longwall mining

- Permanently altered landform over 7064ha SCL
- Max. 2.5m subsidence, 2.5% slope increase
- Disable flood irrigated cropping systems
- Cost and viability of persisting with alt. irrigation
- Water harvesting & irrigation system dysfunction
- Existing soil con structures rendered dysfunctional
- Redirection and disruption of overland flow
- Tension cracking and faulting – subsoil moisture
- Scouring in drainage lines, ponding in depressions
- Increased soil erosion hazard on cropped slopes
- Increased requirement contour banks and soil conservation works
- Reduced efficiency for broad-width cultivation and harvesting and trafficability
- Proposed landscape remodelling to infill depressions and reduce slopes over 3%?
- 5-10 yr cropping deferment while paddocks are subsided and contours redesigned?

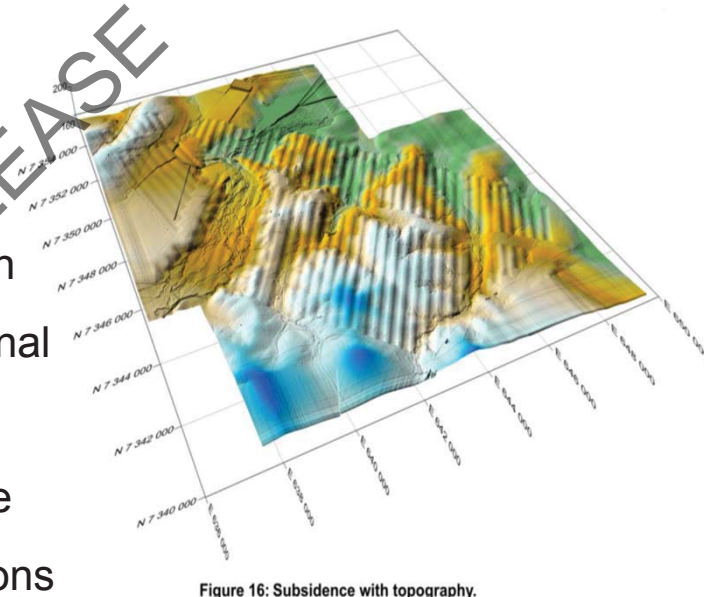


Figure 16: Subsidence with topography.

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Findings about impacts on SCL (Cont'd)

- Majority of impacts are considered to be permanent.
 - Permanent alteration to soils and landform are expected.
 - No reliable methodology or strategy put forward for restoring land (surface infrastructure or subsidence affected) to its pre-development condition.
 - Alterations to soil and landform will introduce enduring complications and difficulties for cropping that are directly attributable to the mining activity.
 - Methodologies to address these impediments for cropping the land are yet to be formulated by SCC
- Permanent impacts must be avoided and minimised to the greatest extent practicable and
- Mitigated in accordance with the SCL Act requirements (~\$33.8M).^R

Challenges for constructing reasonable and appropriate conditions to avoid and minimise identified impacts on SCL

- Lack of detail and certainty on what, where and how of mining activity and approaches to impact remediation.
- Reliance on Ag Committee work and findings to develop approaches to subsidence management.
- Transferability of SCC agricultural program to 'real world' farms. Productivity ≠ Viability.
- SCL Mitigation plus remediation costs.
- Functionality within the emerging Regional Planning Framework and "Co-existence" objectives in a PAA.

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DNR/MPRTI DL RELEASE

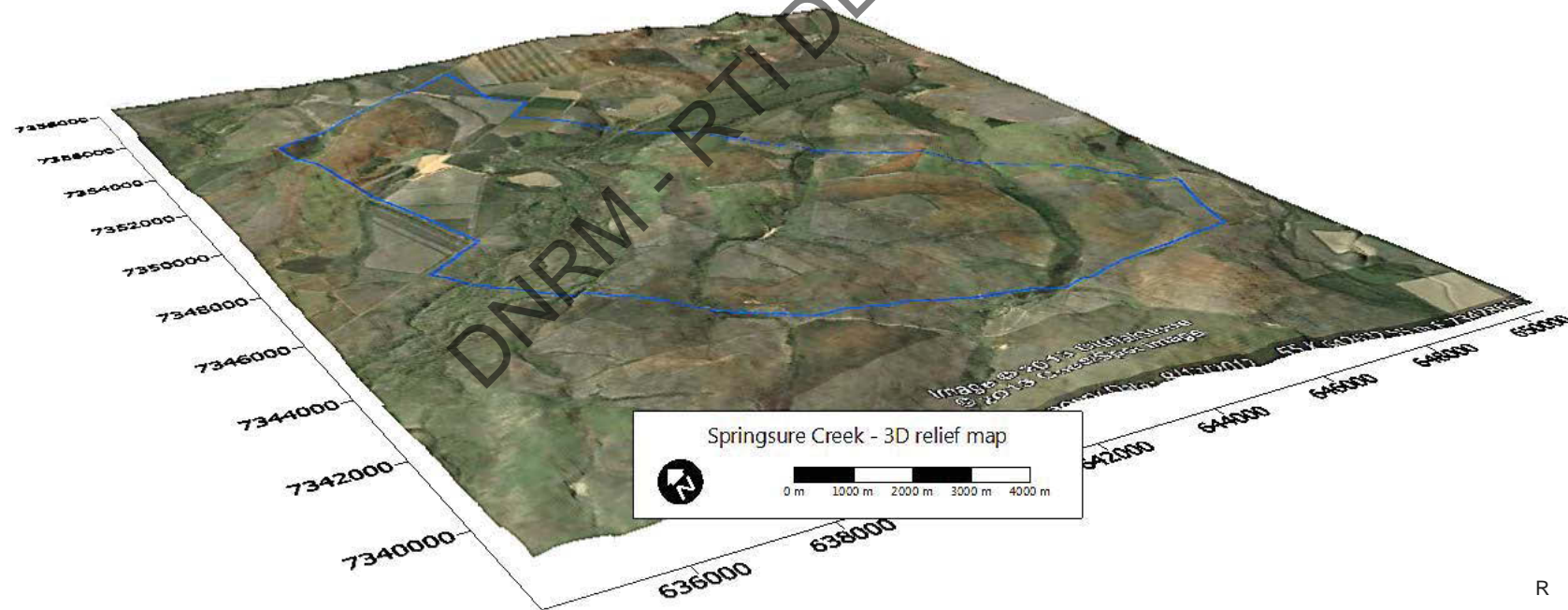
Springsure Creek Mine

Management of impacts on Strategic Cropping Land

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ML70486 – Springsure Creek

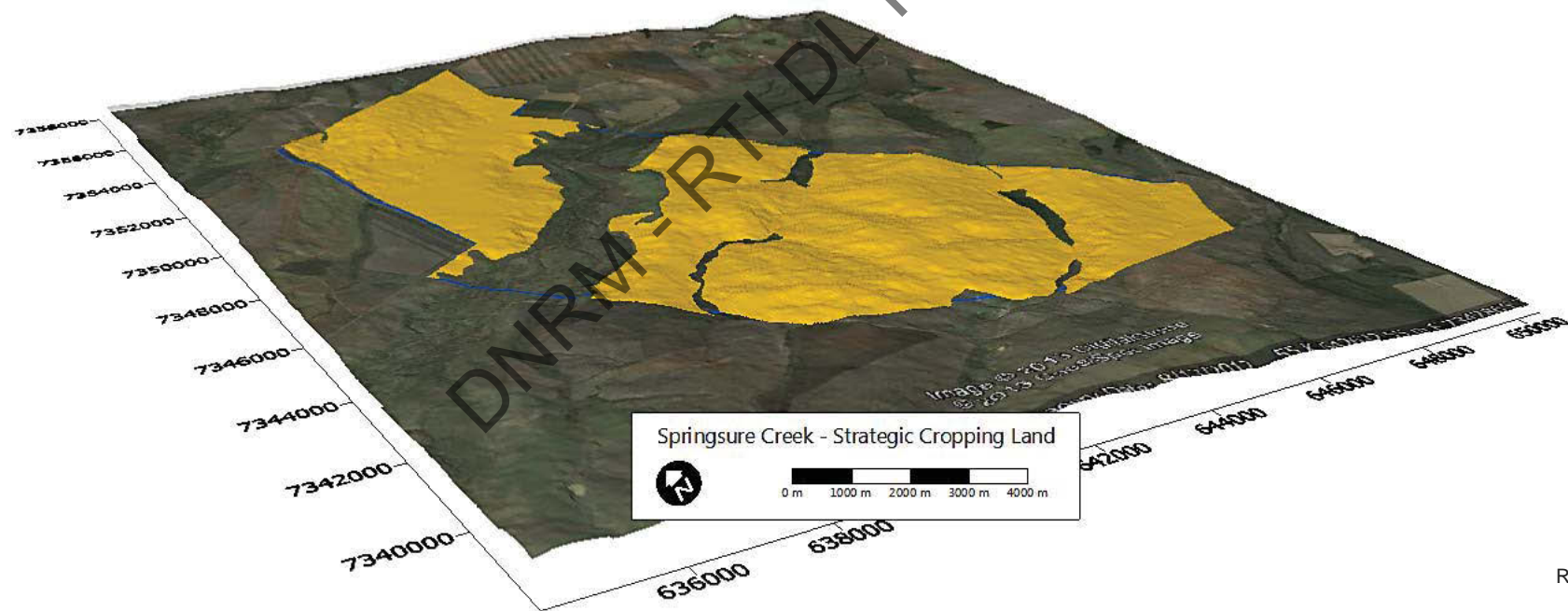
- ▶ ML70486 covers ~10 600 ha in southern part of Central Highlands
- ▶ Straddles lower reaches of Springsure Creek above junction with Comet River
- ▶ Surface geology - basalt or alluvia derived predominantly from basalt
- ▶ Gently undulating plains (slopes <3%)
- ▶ Other than riparian areas along major watercourses, majority (>85%) of land cultivated



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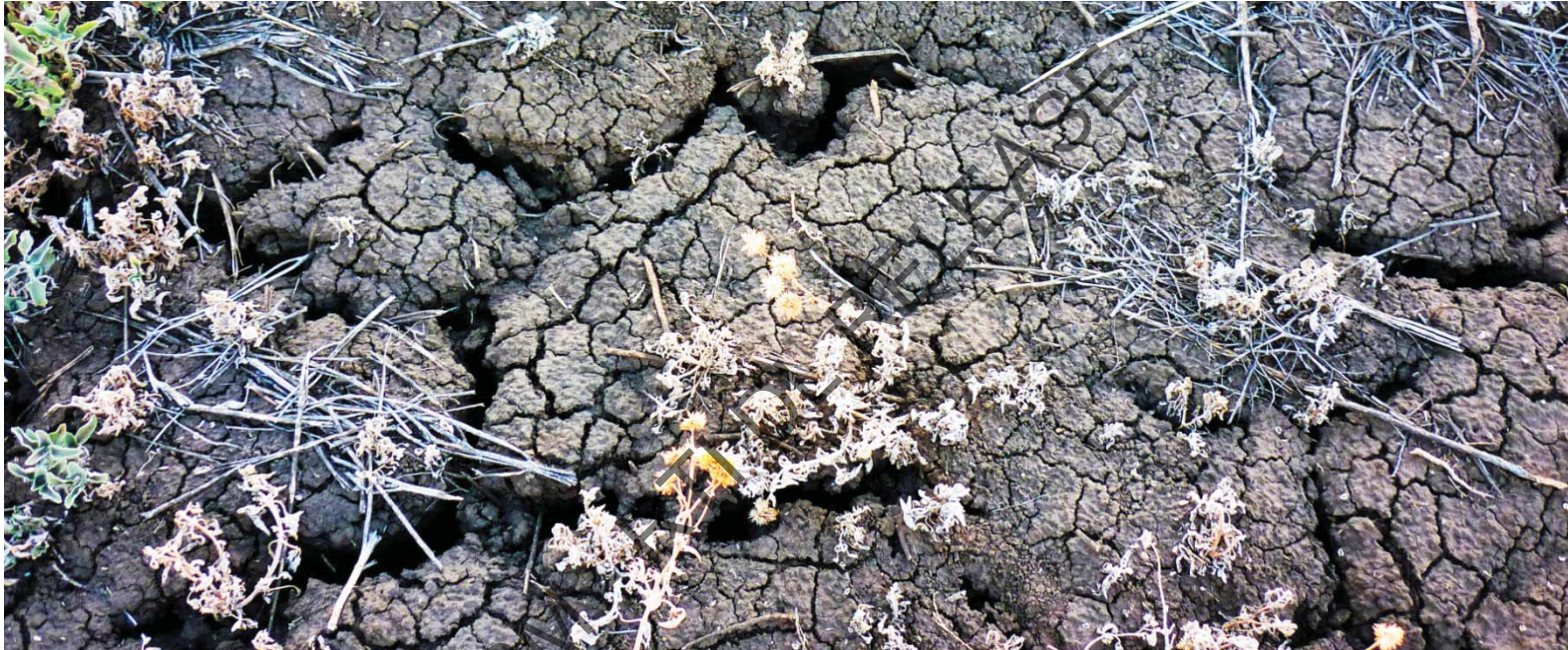
Strategic Cropping Land

- ▶ Area of pSCL within ML70486 of ~8 750 ha
- ▶ Effectively all ML70486 is pSCL with the exception of remnant riparian vegetation along watercourses (i.e. 18% of land area)
- ▶ About 7 500 ha of pSCL is currently being cropped (dryland & irrigated cropping)



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Vertosol soils

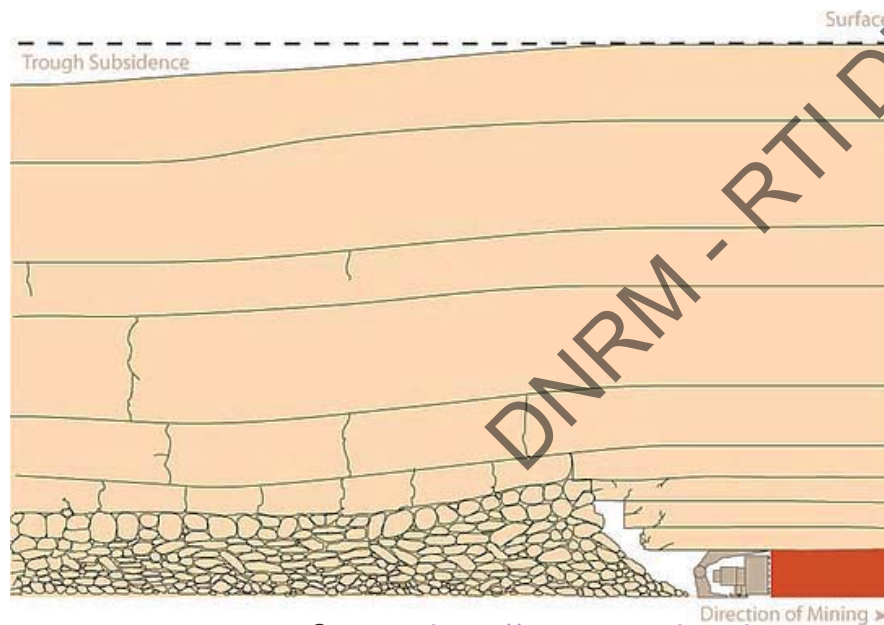


- ▶ Soils predominantly Black, Brown or Grey Vertosols – some red soils (e.g. on 'Denlo Park')
- ▶ Non-rigid (shrink-swell), cracking clay soils, with self mulching surfaces
- ▶ High plant available water capacity (generally >> SCL soil water storage threshold)
- ▶ Susceptible to physical degradation and erosion

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Longwall mining & subsidence

- Subsidence is reasonably predictable
- Magnitude chiefly dependent on:
 - Depth of cover; and
 - Coal seam thickness.
- Ballpark value $\approx 65\%$ of seam thickness

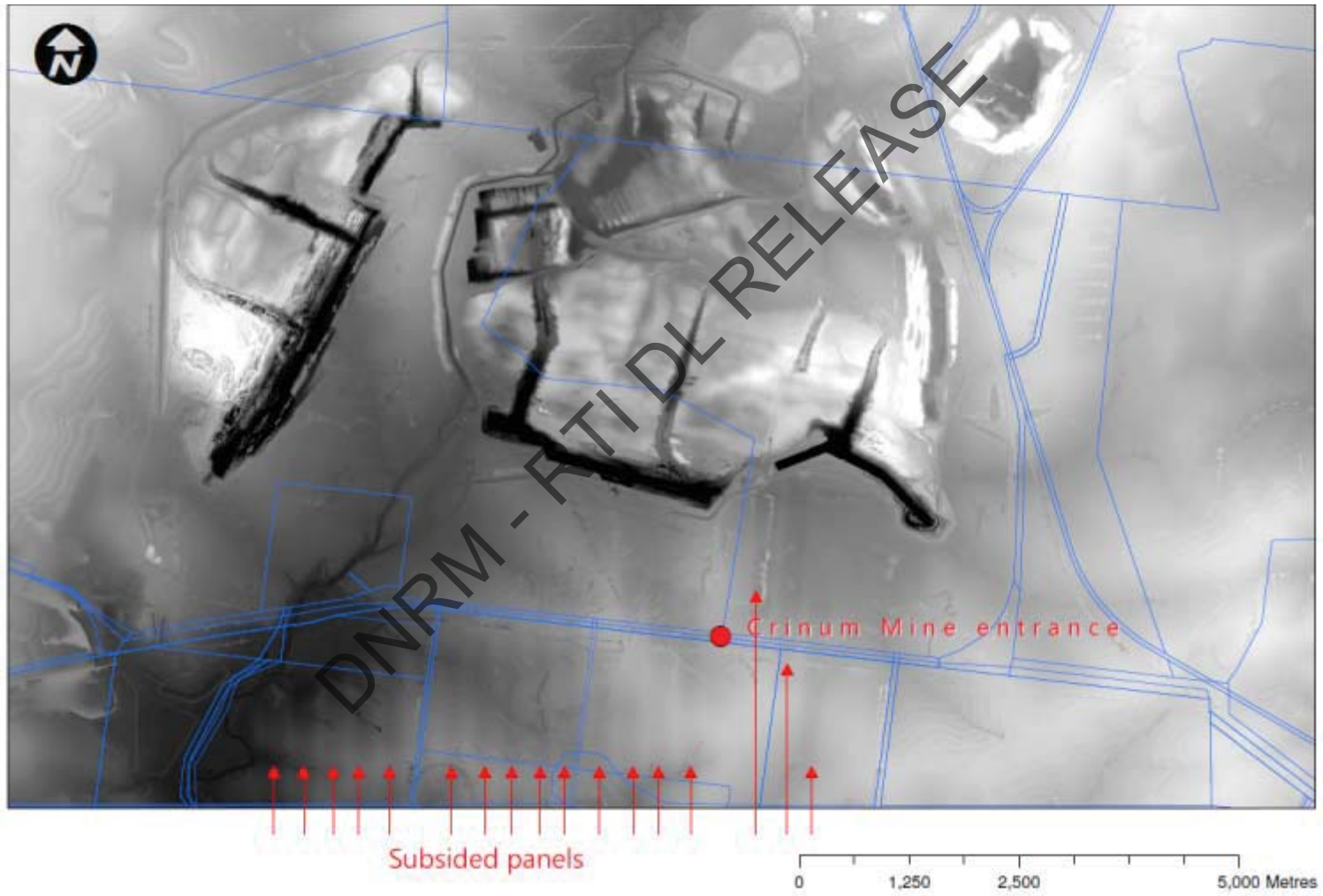


Source: <http://www.notchcode.com>

Parameter	Symbol	Value	Unit
Seam & panel characteristics			
Depth of cover	H	250 m	
Seam thickness	t_c	3.7 m	
Panel width	W	300 m	
Width: cover ratio	W/H	1.20	
Pillar width	P_w	40 m	
k_s		0.65	
k_1		0.4	
k_2		1	
k_3		3.3	
Predicted results			
Maximum subsidence	S_{max}	2.4 m	
Tensile strain	$+E_{max}$	4 mm/m	
Compressive strain	E_{max}	10 mm/m	
Tilt	G_{max}	3.2%	

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Crinum Mine – LiDAR digital elevation model



Crinum Mine subsidence – Lilyvale Road



Source: 'Rich Land, Wasteland', Munro (2012)

- ▶ Subsidence induced undulations in Lilyvale Road
- ▶ Crinum has similar depth of cover and mined seam thickness to Springsure Creek

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Surficial effects – Kestrel Mine

- ▶ Subsidence troughs above mined panels

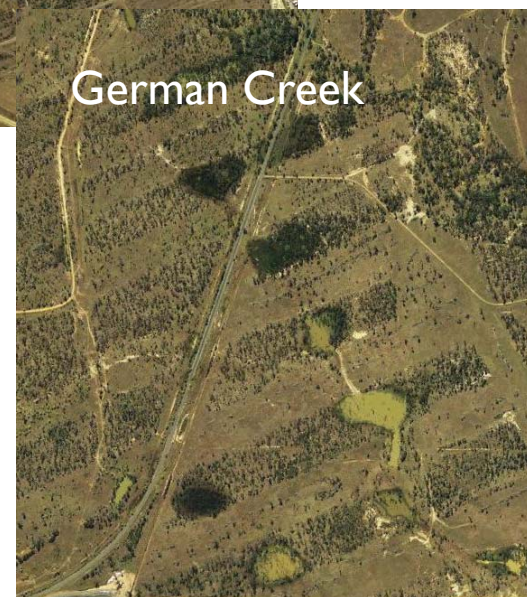
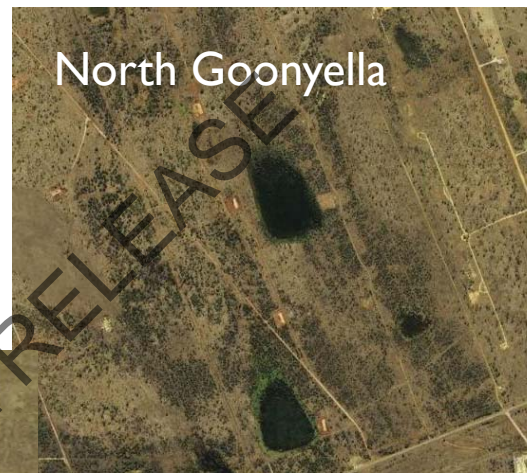


- ▶ Soil tension cracking at margin of troughs

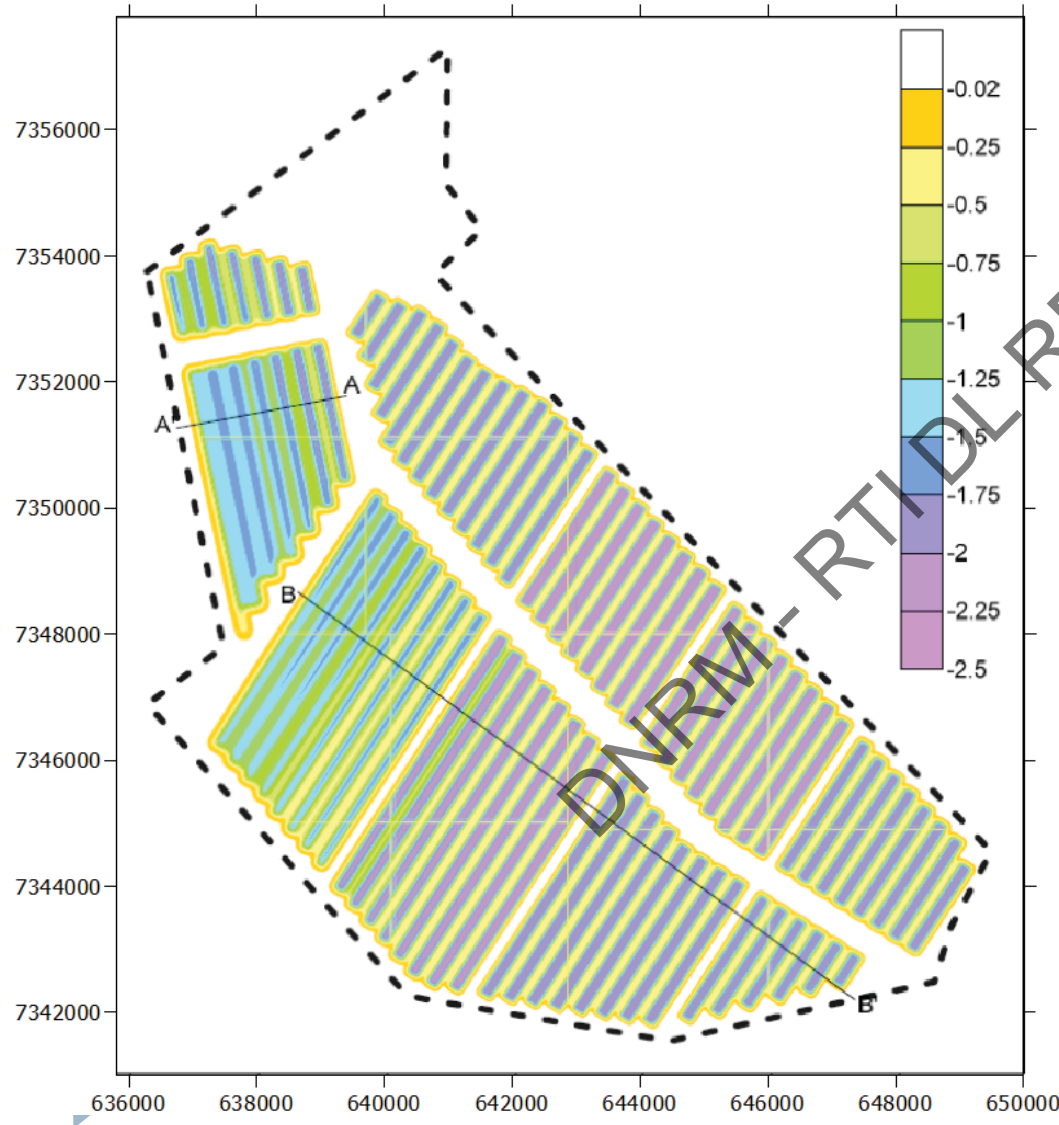


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Ponding in subsidence troughs



Springsure Creek – predicted subsidence

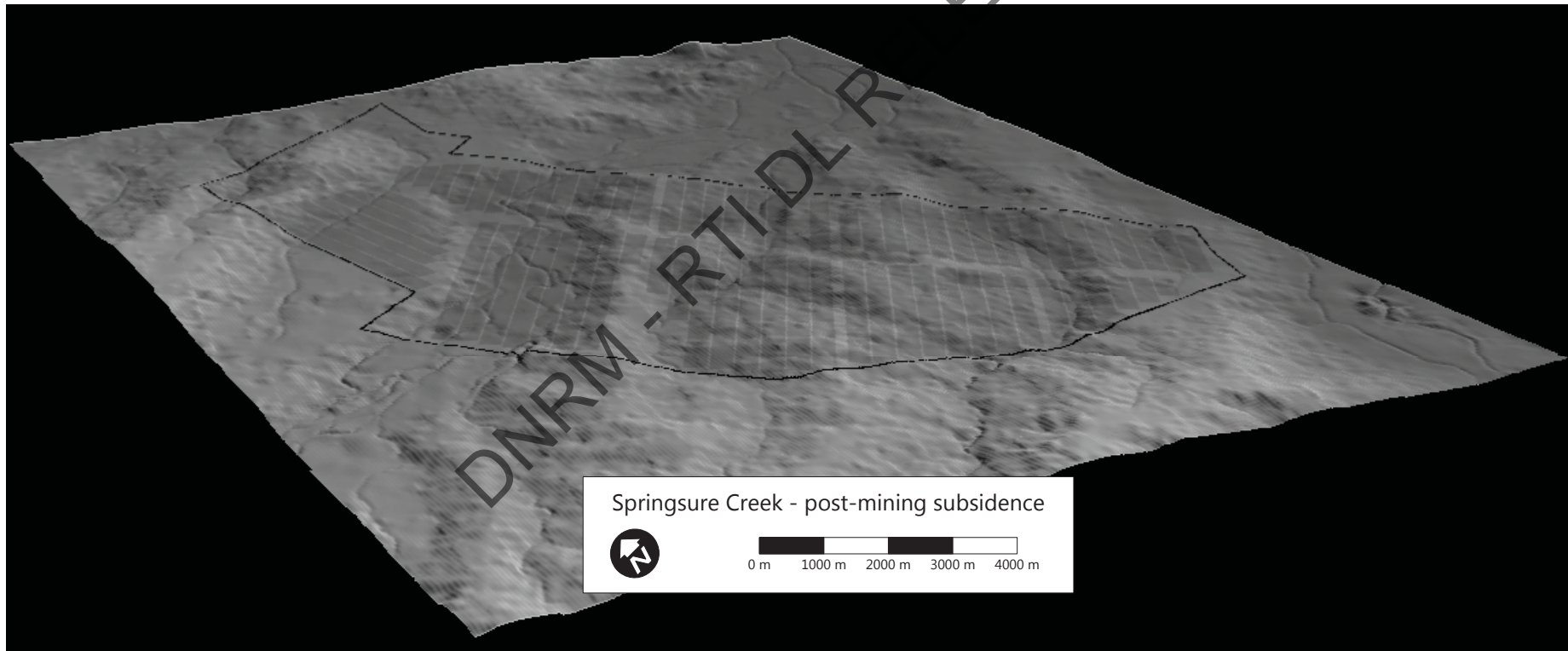


- ▶ Likely to affect ~7060 ha of pSCL
- ▶ Subsidence predicted to be <2.5 metres
- ▶ Varies over the ML –
 - ▶ Least in western part (e.g. 'Denlo Park') where coal seam deepest; and
 - ▶ Greatest in central and eastern parts of ML (e.g. 'Arcturus') where coal seam shallowest
- ▶ Averaged over subsided pSCL, subsidence-related tilting increases slope gradients by ~1.0% and locally (along trough margins) by ~3%
- ▶ SCL slope threshold 3%
- ▶ Some ponding likely (inevitable)

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Post-subsidence landform

- ▶ Most subsidence troughs orientated NE/SW roughly parallel to the fall of the land (but still crossing waterways and drainage lines)
- ▶ Subsidence troughs on Denlo Park run NNW/SSE and more directly up and down slope



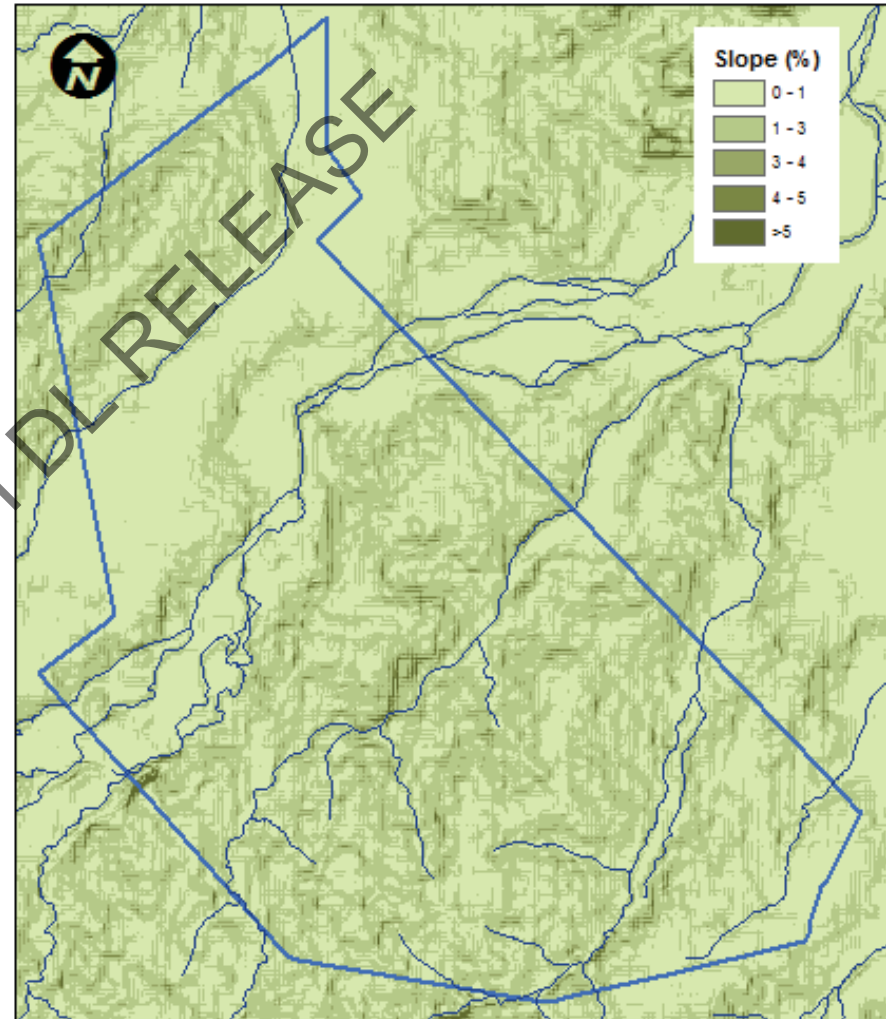
Soil erosion

- ▶ Factors affecting soil erosion rates:
 - ▶ Slope gradient & length
 - ▶ Rainfall erosivity (intensity, frequency & duration of storm events)
 - ▶ Soil erodibility
 - ▶ Crop type & management practices
- ▶ Soil erosion > soil formation rates on most agricultural land → any increase highly undesirable (particularly on SCL)
- ▶ Erosivity of summer rainfall events in CQ is high
- ▶ Even in low gradient terrain (0.5%) Vertosol soils on long slopes in CQ are very susceptible to erosion
- ▶ Erosion can be catastrophic when control structures fail in major storm events

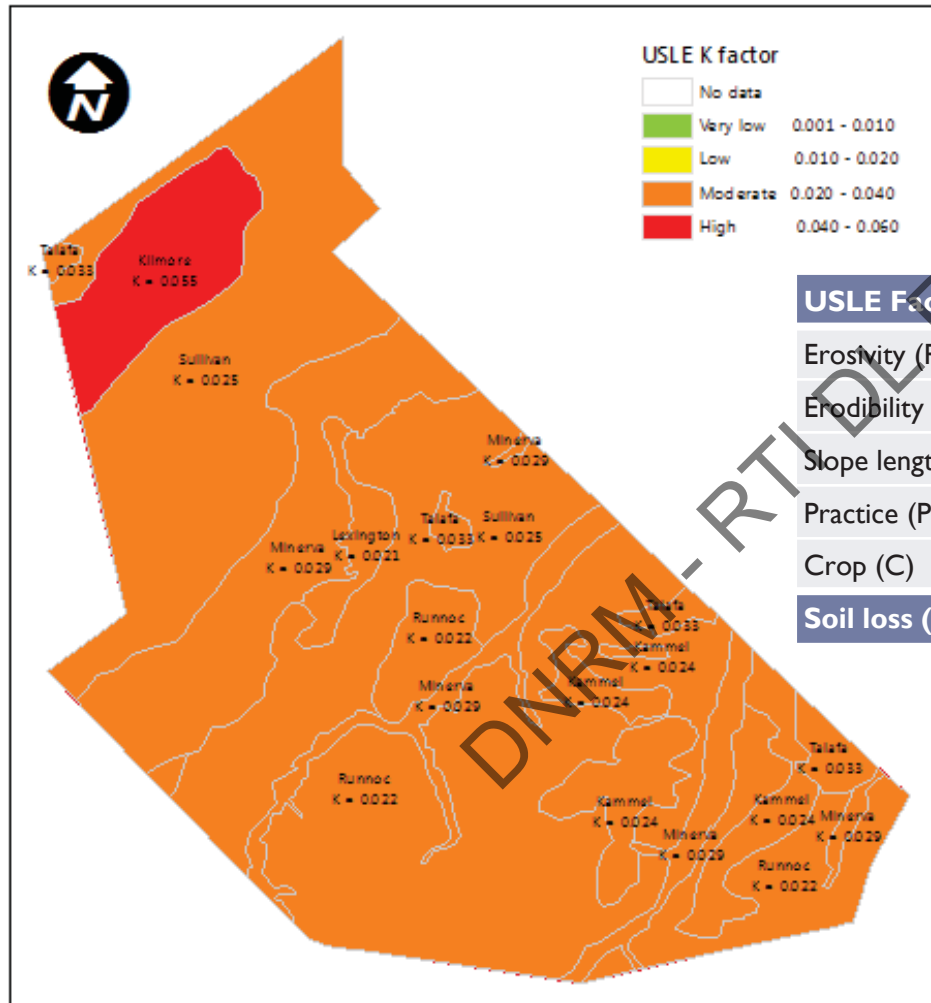


Slope gradients & lengths

- ▶ Slope gradients on pSCL are generally all <3% (the Western Cropping Zone threshold)
- ▶ Mean slope gradient across ML70486 is 1.19%
- ▶ Typical slope length (i.e. contour bank spacing) across pSCL on the ML is presently ~125 m (80 – 150 m range)



Subsidence-related increase in soil erosion



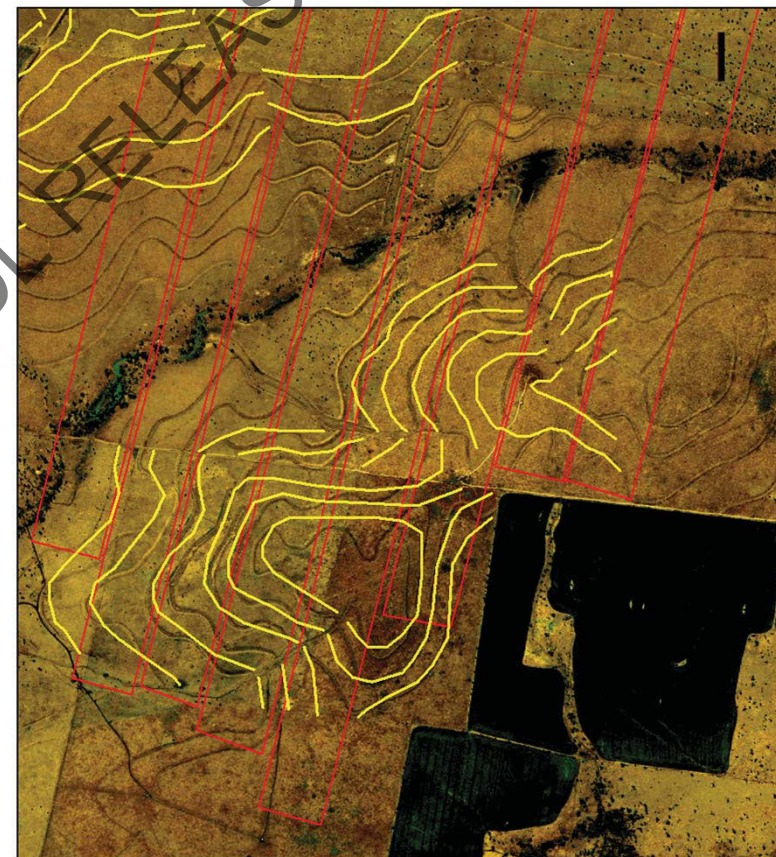
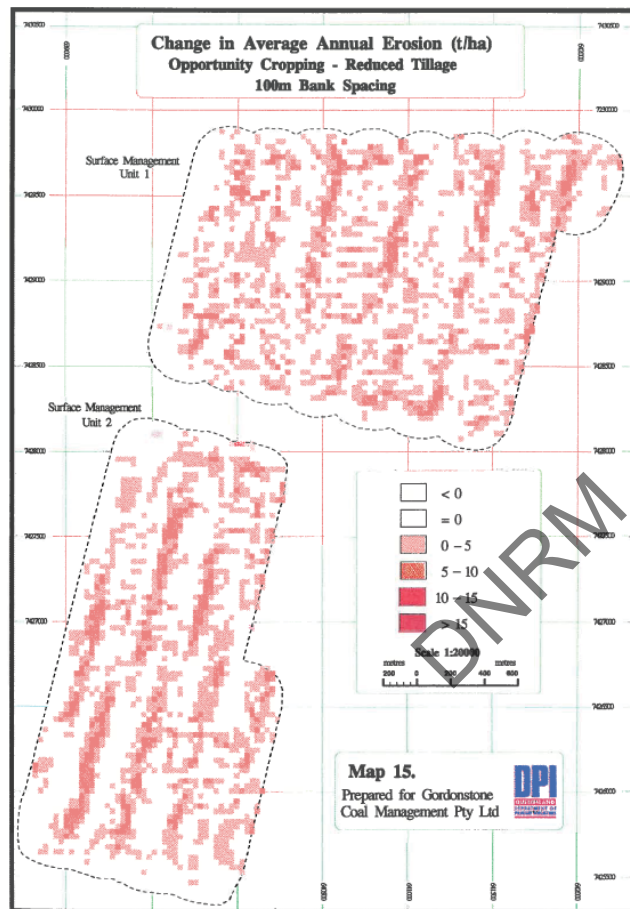
- ▶ Vertisol soils on ML have an average K value of 0.026 (moderate erodibility)
- ▶ Red 'Kilmore' soil on 'Denlo Park' is highly erodible (K value of 0.055)

USLE Factor	Current	Subsided	Re-contoured
Erosivity (R)	2544	2544	2544
Erodibility (K)	0.023	0.023	0.023
Slope length (LS)	0.21	0.42	0.35
Practice (P)	0.34	0.34	0.34
Crop (C)	0.2	0.2	0.2
Soil loss (A) t/ha/yr	0.8	1.6	1.4

- ▶ A slope increase of 1% doubles annual erosion rates on most of ML (e.g. a 'Sullivan' soil with K = 0.023)
- ▶ Halving the contour bank interval (i.e. to 60 m) on these areas reduces soil loss to 1.4 t/ha/yr (but 75% > current)

The Kestrel (aka Gordonstone) experience

- Littleboy et al (1993) Gordonstone modelling
- Result → intensification of erosion control structures (i.e. contour banks)



0 0.25 0.5 1 Kilometres

— Pre-subsidence contour
□ 100 & 200 series panels

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Soil compaction

- ▶ Applying mechanical force to a moist clay soil → mechanical dispersion of clay colloids (i.e. structural degradation)
- ▶ Dispersion → reduced soil pore space → increased soil bulk density → decreased rooting depth & decreased plant available water capacity (SWS in SCL context) → reduced crop reliability (more crop failures) and lower yields
- ▶ Effect greatest when soil moisture levels > plastic limit (a common condition)
- ▶ Reason production systems in CQ moving to minimum or zero tillage
- ▶ Mechanical force applied as result of traffic (e.g. earthmoving equipment) and compression during subsidence
- ▶ Surface soil in Vertosols have some capacity to 'self repair', but subsoils have limited capacity



Impediment to farming operations

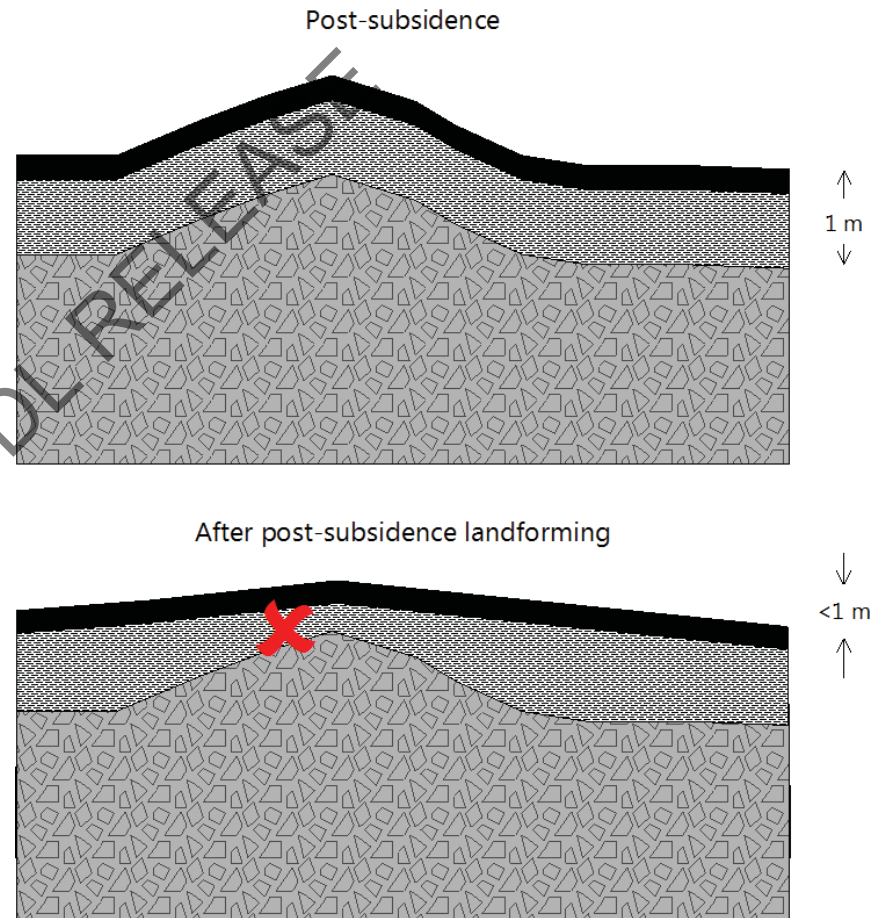


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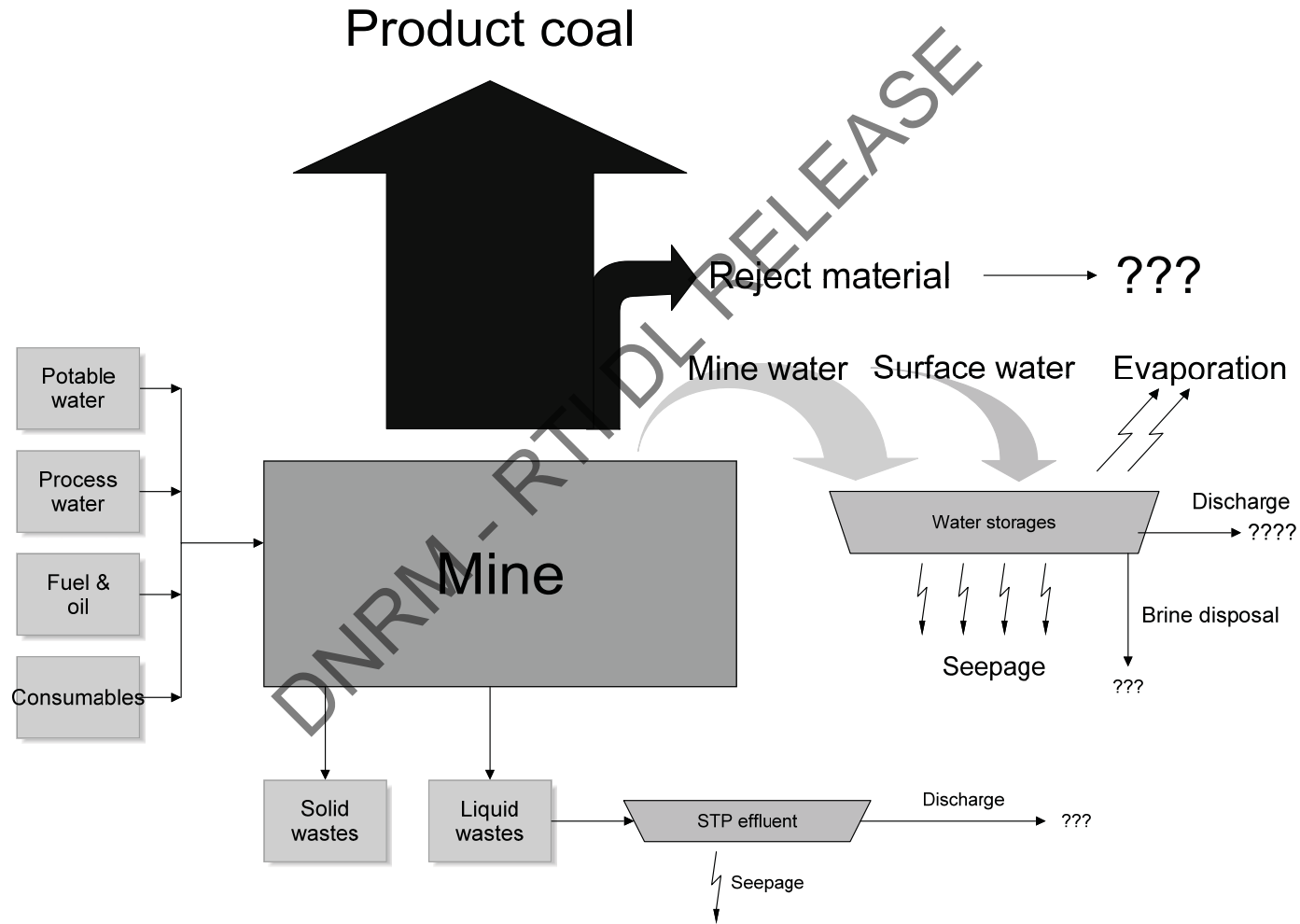
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Material flows – production phase



Other potential threats to SCL

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 - ▶ Increased streambank erosion in floods
- ▶ *Salinity*
 - ▶ Seepages from water storages
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Springsure Creek Mine – remaining tasks

- ▶ Decide what are the permanent & temporary impacts
- ▶ Draft development approval conditions to manage impacts

