Land Resource Assessment and Management Pty. Ltd.
ABN 65 446 117 882
ACN 059 780 602

About this Paper

This paper has been prepared by Bill Thompson of LRAM Pty Ltd. LRAM has been and is still retained by DERM to provide advice on matters relating to SCL. That said, the views expressed in this paper are my own and are based on my experience in land resource assessment, review of public domain SCL documents as well the my experience in applying the SCL and GQAL frameworks to the soils of Qld.

The SCL framework is now legislated. As a result, this paper does not canvas policy issues. The paper also does not canvas how the policy might best be implemented.

The paper does attempt to put the development of SCL into a perspective that demystifies the arcane and sometimes obtuse science of soil assessment. Hopefully, the paper will help both soils and non soils people accept the simple reality that SCL is really a straightforward pragmatic concept – albeit a long overdue one.

Historical Background to Soil Assessment

Queensland has a long history in using natural resource values as a basis for planning. SCL as a concept did not appear overnight – it has been debated, discussed and floated by many soils people for almost 40 years. Politically, it was deemed an impossibility as recently as 2006 when a recently retired Minister told farmers at Haystack Plains that there was no accurate way of identifying what became known as SCL. The Minister was wrong then and his successors have proven him wrong.

Paul Lucas

In the late 1970's Queensland led Australia in not only the numbers of experienced resource assessment staff but also in setting in place inventories of land qualities. By the mid 1980's Queensland employed two thirds of the Australian soils expertise capable of independently undertaking and completing regional scale soil surveys or supervising others doing such surveys. We were so active as a state that we attracted a significant number of southern trained experts as well. We had in my view three of the most experienced and knowledgeable soil surveyors Australia ever produced - Ray Isbell, Graham Murtha and Ron Macdonald - who had quality practical and scientific national and international reputations and set the standards for the next generation that followed them.

Much of this coincided with the period of agricultural and pastoral intensification in Queensland. In the 1970's other states were starting to wind back over 100 years of land development; much of it based on an inadequate land resources understanding. In Queensland we were at the peak of our land development phase and this was increasingly fuelled and informed by more and better science than that which applied in the much earlier southern Australian development period. As a young soil scientist then with left wing political views, I was critical of what we were doing in Queensland – until wiser counsel pointed out that relative to the rest of Australia, we were scientifically well ahead. I subsequently worked on national reviews of Resource Assessment, Soil Conservation and Salinity R&D which confirmed this.

In effect the need 30 years ago for better information coincided with capacity and funding sources in Queensland as well as a desire by many young scientists to better understand Queensland landscapes.

This stage of state run land assessment programs started to decline in the 1990's. Despite the earlier enthusiasm and investment of our technical soils staff, coverage of our main dryland farming areas of the Darling Downs and Central Queensland was still patchy and incomplete. Although coverage of our sugar cane and irrigation areas was largely complete, many of our regional towns and cities experiencing peri urban pressures had, and some still have, poor coverage.

Head Office

Peter Shields
46 Hancock Rd,
Coulson, QLD 4310,
Australia
Ph. (07) 5463 5461
Fax. (07) 3103 4093

Bill Thompson
1569 Tarome Road
Kalbar, QLD 4309,
Australia.
Ph. (07) 5463 8450
Fax. (07) 3103 4093

In 2012, it is the private sector working mainly in the mining and energy sectors in this state that now dominates land and soils assessment. As of 2012, there are a number of experienced private sector soil surveyors in this state running assessment teams with budget lines running well into the multiple of millions of dollars. In effect the state run programs up to the 1990's focused on the agricultural uses of soils – from that point on the effort in the private sector has become more focused on how soils can be sustainable managed in the mining and energy sectors.

Using Land Resource Information to Inform Development Planning

Deleted: d

Deleted: p

When the idea of SCL first surfaced there were three schools of thought. The first school of thought was it could not be done – that was wrong and if true would have been an indictment of many years of soil science investigations in Qld.

The second school of thought was the direct opposite and suggested that all of the existing work could be essentially massaged to produce a definition of SCL. The premise behind this was that many of the existing studies had a land suitability classification associated with them and that these could be 'massaged' into an unified SCL framework[1].

The best way I can summarize the difficulty in assembling these data sets of different scales, ages, accuracy and complexities into a single state wide data set for the purposes of state wide land resource planning is that it is similar to putting around 20 different jigsaw puzzles into one coherent jigsaw puzzle when all the pieces have been randomly mixed. With persistence and sufficient time it can be done – the real question is how accurately the end result would reflect the intent of the original concept.

The third school of thought and the one used in building the SCL used the long history of land resource assessment to answer the very basic simple question of what soil features are most important in what regions to identifying the best of the cropping land.

In the past, this ostensibly simple question has been given qualified answers by technical 'experts'. For too long in Queensland the question has been phrased as what types of soils are suited to cropping which itself implies a further question of how many crops need to be suited before a soil is considered the best soil and whether crops with a potential to be grown in a region should be considered as well. Is it little wonder that initially our policy leaders at one time might have thought it was impossible to answer such a simple question in a simple concise way.

The answer is of course really quite simple. Most farmers, mine rehabilitation staff and planners who have only a passing interest in soils would find the following concept of a cropping soil fairly obvious – a soil should be over 600 mm deep, not be excessively acid or have excessive amounts of rock or surface relief, not contain levels of salinity or wetness or waterlogging problems that limit growth and be able to store sufficient soil water over a maximum depth of 1m to sustain crop growth. That, in short, is SCL.

Whilst this may be viewed as a simplified reductionist approach to the question of what identifies SCL, the question in my view needs a simple transparent and robust answer on which to base the SCL framework and policy. The resultant SCL framework has the following features:

- Of the eight criteria, first 4 can be assessed by simple field measurements and of these 3 do not change their SCL threshold value across the state.
- The next 4 criteria require some knowledge of subsoil conditions, one of these has the same threshold value across the state, one has a different threshold value in the western areas to elsewhere, one has a different threshold value in only the Granite Belt area and 1 (soil water store) varies in four out of the five zones.
- A knowledge of soils is only needed for assessing the latter 4 criteria.
- An ability to map different terrain (and soils if applying the latter 4 criteria) is required.
- However, a knowledge and understanding of land/crop and soil suitability is not necessary.

diffrce AQAL vs SCL

[1] These systems ranged from those based on an old USDA framework (hence the 7 and 8 class land capability frameworks attached to the older -1960/70's - data sets). More recently five class individual crop suitability frameworks have been used - based on up to 40 criteria with each criteria potentially having varying thresholds depending on which crop was being tested. Because the dominant crops varyi from one regional area to another, these capability/suitability approaches are region and even sub regionally specific.

GQAL

In the early 1990's, the state government set the technical basis for what became GQAL. A semi reductionist approach was used where 4 classes (Agricultural Land Classes) were defined that summarized the extensive and sometimes internally inconsistent land suitability systems in place at that time. In some shires, land which could be cropped was identified as GQAL (and this includes land marginally suited for cropping), whilst in other parts of the state land which could be cropped and land which was suited for pasture improvement were classed as GQAL.

By the end of the 1990's what we had in place was literally many dozens of soil maps, with many tens of land assessment frameworks and a GQAL policy that attempted to summarize this jigsaw for planning purposes. The weaknesses in that system are widely recognised. The main ones in my view were and remain:

- Cropping practices have changed substantially since the 1990's and the assignment of Agricultural Land Classes to soil map units based on out-of-date land suitability assessments is readily challenged
- To be of use at a strategic planning level, you need better and more accurate data than many of the source data sets are able to supply. For example, if planners have to use an overriding needs test for assessment, the GQAL system is simply far too coarse for such finely judged decisions. This is exaggerated by the fact that most local authority planning schemes have essentially "dummed down" the already reductionist GQAL system to an even more simplified spatial overlay of 'agricultural land'.
- The link between land and crop suitability and GQAL class is not transparent even to seasoned practitioners let alone planners.
- Included as GQAL are lands which are at best suited to a very limited range of crops. An example of a perverse result of this system is that GQAL still protects the lowland areas of the Moreton sugar mill long after sugar has been lost from the area. What useful agricultural function GQAL serves in this situation eludes me.

SCL Trigger Map

Given all of the above, a reasonable question is how can we spatially indicate where SCL might be found.

Obviously SCL should be a subset of the arable GQAL. Unfortunately, over 70% of our cropping lands are not covered by mapping which has had land suitability or agricultural land classes (GQAL) assigned to it. In these cases the only way to infer whether an area might contain some SCL quality land is to determine whether it has ever been cropped. The trigger map uses remote sensed imagery for land use mapping and existing GQAL mapping to indicate where SCL might occur.

My belief is that if the trigger map shows an area as not likely to be SCL, then one can have some confidence in that assessment. Conversely, developers would be well advised to confirm in the field the SCL status of any area shown on the trigger map as potential SCL if they are planning an alienating use.

The other cautionary point I would make is that planners should not use the trigger map as a de facto better quality overlay for GQAL. It will not show all areas that are GQAL and may show some areas that are neither SCL nor GQAL.

SCL Validation

The Act states that validation of SCL status shown on the trigger map must be performed " in the way provided for under any criteria guidelines." This a major difference with GQAL assessment, where the guidelines need not be followed.

The current guidelines prescribe that SCL assessment must be based on ground observations - that is, undertaken at a field level.

SCL vs GQAL

The fundamental differences between GQAL and SCL when applied at the field level are:

- None of those areas identified as GQAL because they are good quality pastoral land will be SCL and 99.9% of these areas will fail SCL on the simplest of criteria; namely, soil depth, slope,rockiness or gilgai. This difference will be most noticeable in the western cropping zone where good quality pastoral land is often considered GQAL.
- None of the areas classified as GQAL because it is marginal cropping land should be SCL. They will and should fail on one or more of the criteria. There may be a greater need to establish subsoil properties such as pH, salinity and SWS, however many will fail on the simplest of criteria.
- Within the arable GQAL (Agricultural land Class A), those areas which are considered arable because they have a high level of suitability to a small range of crops will not necessarily meet SCL requirements. Areas of our pineapple and cane lands and the more steeply sloping horticulture lands will not meet SCL criteria.

Accommodating SCL within the Development Process

Whilst I appreciate the concerns of the development industry, I do not share the view that SCL will quarantine large areas from development around our regional centers. It is correct that in the inland areas, regional towns like Dalby, Pittsworth and Allora are constrained by GQAL and flooding. SCL will add to this constraint – however the overriding community disbenefit that results for expanding towns like these onto flood prone lands remains irrespective of SCL.

Elsewhere on the Downs, the majority of the lands which are consistently cropped between Toowoomba and Chinchilla will be SCL; however, Toowoomba city and Oakey will have large areas on the city boundaries which will fail SCL as will all other towns in the Darling Downs and Western Downs area.

In the coastal zone, regional towns in the Scenic Rim, Lockyer, Somerset and Moreton Bay council areas as well as the Gympie and Burnett and South and North Coast regions will have large tracts of land in the peri urban area that will fail SCL – even where they are surrounded by GQAL. The same will apply to every sugar cane town in the state with the possible exception of Ayr and Home Hill which sit in the middle of some of the best soils in Australia.

In Western and Central Queensland, it is unlikely that major regional centres will be completely surrounded by SCL.

Rather than limit or inordinately constrain development, SCL ultimately will produce the following effects:

- It will identify the best of the GQAL resource and planners and developers can then focus alienating DA applications based on overriding community benefit/need onto the lesser quality GQAL.
- In the inland areas it will tend to direct development away from the so called black soil plains and into lands which are less prone to flooding, and less prone to geotechnical problems.
- By directing development away from SCL, design, implementation, approvals and appeals processes as well as mitigation costs for projects will be significantly lessened.

SCL will however be a serious and costly irritant if the development sector treats it in the same way they have recently started to treat GQAL. When SPP1/92 first came out, GQAL assessments were commonly done as part of the DA process. Today, it is increasingly common for these to be left until the council has made a decision and the issue of GQAL then gets resolved through the appeals process.

One final point on the impact of SCL on development. Under SCL arrangements, there is a far greater clarity about what constitutes permanent as opposed to temporary alienation and what the requirements are for mitigating temporary impacts. SCL also has size and dimension components to its. These features are noticeably lacking under GQAL and this has not assisted in the consistent implementation of SPP1/92.

In essence, identifying SCL, validating its presence will be technically far simpler and more transparent than it has been with GQAL. There is also no real reason why it cannot be done up front in the application process and thus provide a much greater level of certainty to the process.