GISERA
Gas Industry Social and Environmental Research Alliance

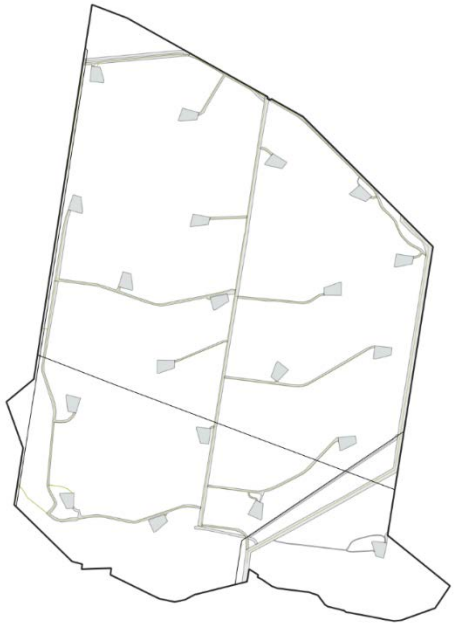
Cattle, pastures and coal seam gas – a case study

SEPTEMBER 2018

Grazing is the most common agricultural land use in areas developed for coal seam gas (CSG) in Queensland. CSIRO scientists investigated graziers' concerns about the impacts of CSG traffic and infrastructure on soils, pastures and livestock.

Victoria Park – the case study property

Located on the outskirts of Miles in the western Darling Downs region of Queensland, Victoria Park is a 955-hectare grazing property with an established network of 20 coal seam gas (CSG) wells and related infrastructure. The property's soils, climate and gas infrastructure design are representative of grazing properties found across gas developments in south-west Queensland.



Map of the case study property showing the location of well lease areas and Right-of-Ways (grey) and power transmission lines (black).

KEY FINDINGS

- The soils on grazing properties are often fragile. CSG infrastructure needs to be carefully installed and rehabilitation needs to be tailored to the soils.
- Roads and access paths should be located to minimise interception of water flow.
- The most common CSG vehicle is the 4WD but the much bigger vehicles may provide a disproportionate contribution to compaction, road damage and dust.
- Dust emissions will be highly variable as they are dependent on the road surface, traffic levels and rainfall.
- Livestock can be attracted to CSG right-of-ways for ease of passage, and to rehabilitation areas planted with palatable grass. This can increase grazing pressure, soil compaction and pugging in these areas. Management of rehabilitated soils during active livestock grazing should be carefully considered.

Cow with GPS collar in a paddock

Livestock behaviour

GPS monitoring collars were installed on 16 cattle for approximately 10 weeks. There was little evidence of cattle avoiding CSG infrastructure or spending less time on pastures along right-of-ways. In fact, cattle spent 18% more time grazing or walking on CSG right-of-ways than on similar neighbouring open pasture. This is most likely because CSG right-of-ways provide ease of thoroughfare across the property. However, it may also be because of rehabilitation of pipeline areas with palatable grass species during a period when pasture biomass across the

property was low because of dry seasonal conditions. This extra pressure on areas undergoing rehabilitation may add risk for soils and re-establishing pastures.

The data also showed that grazing pressure varied across the property. Much of the CSG infrastructure was installed into open grazing areas used extensively by the livestock. Variations in productive capacity across a property should be considered when planning CSG infrastructure so that compensation accurately represents the impacts of CSG on production.

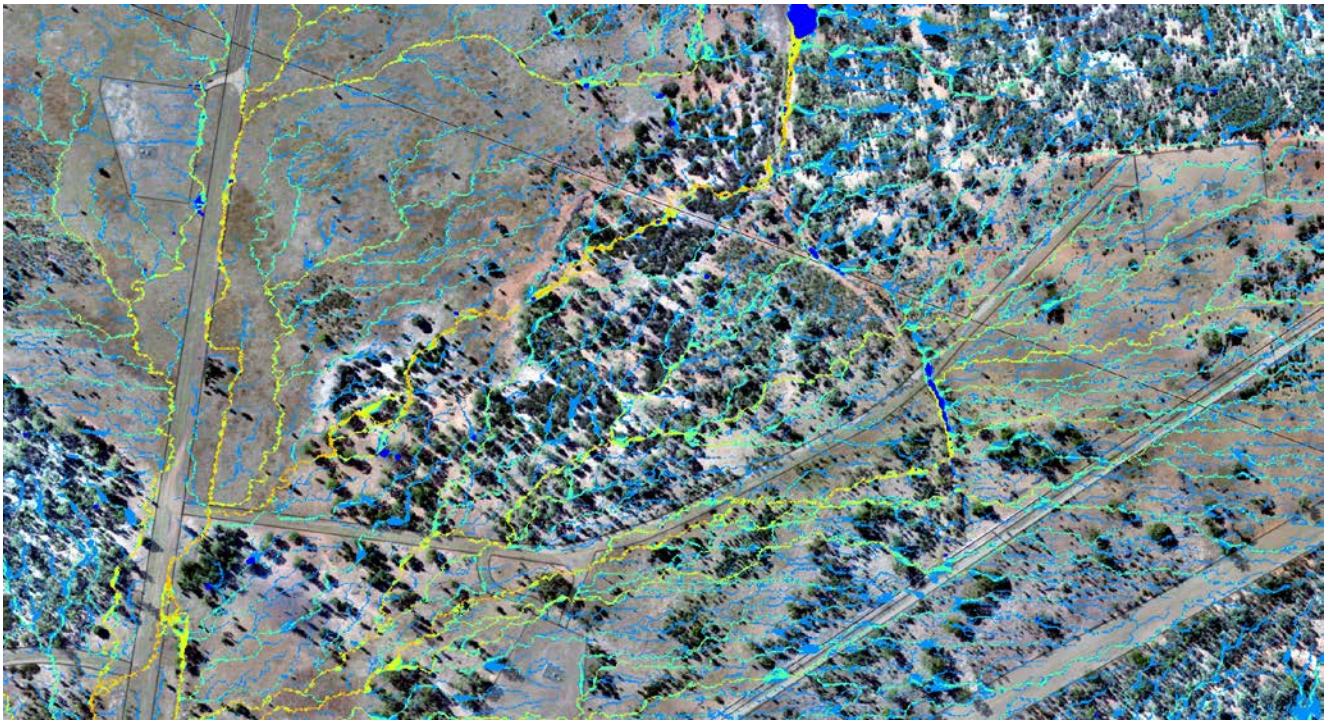
Soils

Victoria Park has a range of soil types typical of the region. Four typical soils from across the property were analysed and found to have a fragile nature that makes them prone to erosion and hard to manage. Soils can be disturbed, compacted, blended or inverted during the installation of CSG infrastructure and this can change their characteristics. A system of perpetual erosion could develop if soil is not properly rehabilitated, particularly after excavation and mixing causing loss of topsoil.

Best practice guidelines exist for pipeline installation, soil management, and re-compaction during backfilling. However, it is not uncommon for pipeline subsidence, surface and tunnel erosion to occur on these soils if they are not compacted correctly, or if natural processes of sodic soils leave voids for water to enter.

Water flow

Ongoing damage to access tracks from surface water flows was evident across the property. Maps of soil surface relief and predicted surface water flows identified sections of unsealed road that were at risk of being eroded by water flowing from large catchment areas. Such intersections of water flows and unsealed CSG access tracks need to be managed or these problems will continue to occur.



Water flow paths from water accumulation model demonstrating possible erosion risks within the highlighted CSG footprint.

Vehicles

A total of 341 vehicles entered the property over the three-month study period, and the traffic volume varied greatly from day to day. While four-wheeled vehicles (4WDs, buses, cars) accounted for 64 per cent of all traffic, much larger vehicles (>22 wheels) provided a major contribution to traffic levels. These larger vehicles may present a disproportionate contribution to issues of compaction, road damage and dust generation.

Dust

Dust emissions are likely to be highly variable for several reasons. Dust emissions from traffic on unsealed roads vary directly with the amount of silt in the road surface material. Samples were taken from six locations on the property's CSG access track network. Each varied in particle size and condition. Four had native soil surfaces and two were imported gravel. Estimates using US Environmental Protection Agency's model for dust emissions suggest that dust emissions from roads formed from native soil are likely to be up to 4.8 times greater than those from imported gravel roads on the property. Dust emissions also correlate with vehicle weight. Modelling indicates that a vehicle with 40 wheels will cause four times more dust than a 3-tonne utility vehicle. Dust emissions are highly dependent upon road surface water content and, therefore, seasonal rainfall. Large rainfall events not only suppress the dust, but can result in less traffic for several days after the event.

Find out more

Download the full report: Inside the Herd: Final Project Report [PDF 6 MB]

FREQUENTLY ASKED QUESTIONS

Where did the study take place?

Victoria Park is an operating grazing property with an established network of 20 coal seam gas (CSG) wells, near Miles, Queensland.

When did the study take place?

From October 2017 to April 2018.

How did you monitor the effects of CSG on cattle?

GPS collars were installed onto cattle and that continually monitored their movements. These data were then overlayed with various spatial data to quantify the amount of time spent by livestock on or nearby areas developed for CSG.