# The Leeuwin Group

**Submission to: Independent Scientific Panel Inquiry into Hydraulic Fracture Stimulation in Western Australia 2017**

The Leeuwin Group (TLG) is an independent group of concerned scientists who are committed to the conservation and protection of Western Australia's biodiversity and natural environment. The TLG's purpose is to: *Provide high-level independent scientific commentary and advice on environmental matters to Government, industry, environmental organisations and managers.*

In making this submission TLG refers the Panel to the Australian Council of Environmental Deans and Directors (ACEDD) report on the coal seam gas industry (ACEDD, 2012) for a comprehensive and still relevant review of associated issues

TLG will otherwise touch on one aspect of the environmental impact of fracking that is not covered in existing materials, namely the impacts of linear infrastructure.

Fracking, similar to other types of resource extraction, is often considered to have a relatively small development footprint. This is because the actual extraction pads cover a relatively small area. However, the assessment of the footprint and its impact also needs to take into account the linear infrastructure associated with the actual extraction infrastructure.

Where fracking has occurred elsewhere, it has been accompanied by the development of a relatively dense network of roads, tracks and other infrastructure. To date, the impact of linear infrastructure has been poorly incorporated into environmental impact assessments (Alamgir *et al*., 2018). And yet, studies from a range of locations in Australia and elsewhere clearly indicate that linear infrastructure can have significant impacts in terms of landscape fragmentation, reduced habitat suitability for key fauna species, altered surface hydrology and other effects (see Raiter *et al*., 2014 for a review and examples).

Recent research in relation to mining infrastructure in the Great Western Woodlands (GWW), has clearly demonstrated both the extent and impact of roads and tracks associated with mining development (Raiter *et al*., 2017, Raiter *et al*., 2018). These findings would also apply to the infrastructure impact of fracking.

This research indicated that most of the direct development footprint in the GWW is unmapped linear infrastructure, only detectable through manual digitisation. Across the 160,000 $km^2$ of the GWW, the estimated development footprint is 690 $km^2$, of which 67% consists of linear infrastructure with the remainder being 'hub' infrastructure. An estimated 150,000 km of linear infrastructure exists in the study area, equating to an average of ~1 km per $km^2$. Beyond the direct footprint, a further 4,000–55,000 $km^2$ (3–35% of the region) lies within offsite risk zones (Raiter *et al*., 2017).

There is a high level of association between linear infrastructure and altered surface hydrology, with erosion and pooling 5 and 6 times, respectively, as likely to occur on-road than off-road on average (1.06 erosional and 0.69 pooling features $km^{-1}$ on vehicle tracks, compared with 0.22 and 0.12 $km^{-1}$, off-road, respectively). Erosion severity was greater in the presence of tracks, and 98% of crossings of ephemeral streamlines showed some evidence of impact on water movement (flow impedance (62%); diversion of flows (73%); flow concentration (76%); and/or channel initiation (31%)). Infrastructure type, pastoral land use, culvert presence, soil clay content and erodibility, mean annual rainfall, rainfall erosivity, topography and bare soil cover influenced the frequency and severity of these impacts.

Linear infrastructure frequently affects ephemeral stream flows and intercepts natural overland and near-surface flows, artificially changing site-scale moisture regimes, with some parts of the landscape becoming abnormally wet and other parts becoming water-starved. In addition, linear infrastructure frequently triggers or exacerbates erosion, leading to soil degradation and loss. Where linear infrastructure densities are high, their impacts on ecological processes are likely to be considerable (Raiter *et al*., 2018).

Studies elsewhere have indicated that high densities of linear infrastructure affect habitat suitability and significantly fragment the landscape (studies cited in Raiter *et al.*, 2014, for instance, relating to caribou in Canada).

Resource extraction activities such as fracking that involve multiple extraction points are inevitably going to involve extensive networks of linear infrastructure. Although seldom accounted for in standard environmental impact assessments, it is increasingly clear that the footprint of such linear infrastructure can be large compared to the actual extraction points, and is likely to have substantial environmental impacts.

Additional impacts associated with both hub and linear infrastructure include facilitating the introduction of weeds, feral animals and pathogens (especially various Phytophthora species) (Coates *et al*., 2014).

Fracking may provide short-term benefits, but put long-term benefits at risk. Tourism is an important industry to rural and regional WA in particular, with tourists seeking a nature-based experience. If activities associated with fracking diminish the value of our natural area then income from tourism will decline.

In addition, WA does not need to extract fossil fuels through fracking, because we have alternatives in terms of solar and wind energy.

The environmental costs of fracking are significant, and if we allow it to proceed, it will mean that Australia will find it that much harder to meet its targets in the Paris climate change agreement.

**References**


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