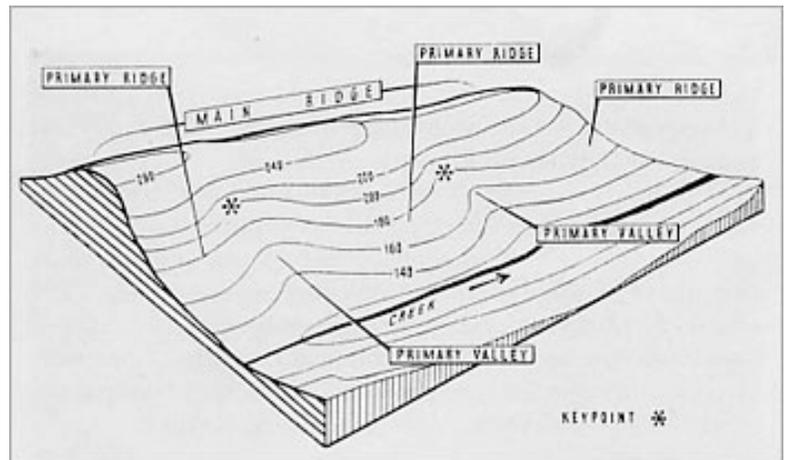


# Principles of Keyline Design - Mark Krawczyk [www.keylinevermont.com](http://www.keylinevermont.com)

'Keyline' Design describes a holistic design system developed by Australian mining engineer and farmer PA Yeomans in the 1940s and 50s. Developed as a direct response to the conservation movement in the 30s and 40s, Yeomans believed it was not nearly enough to 'conserve' the remaining topsoil resource that had since eroded from abused Australian farmland - they needed to develop a 'regenerative' agriculture and land use system that helped restore health to landscapes.

Keyline Design looks to the topographic character of the landscape to inform the layout of farm, home and community infrastructure. To help guide this process, Yeomans developed the *Scale of Permanence*, a spectrum of ecological characteristics that influence a site, organized based on those things that are 'most permanent' (we have the least ability to modify) and those that are most easily changed. The Scale of Permanence (as modified by Jacke and Toensmeier) includes:

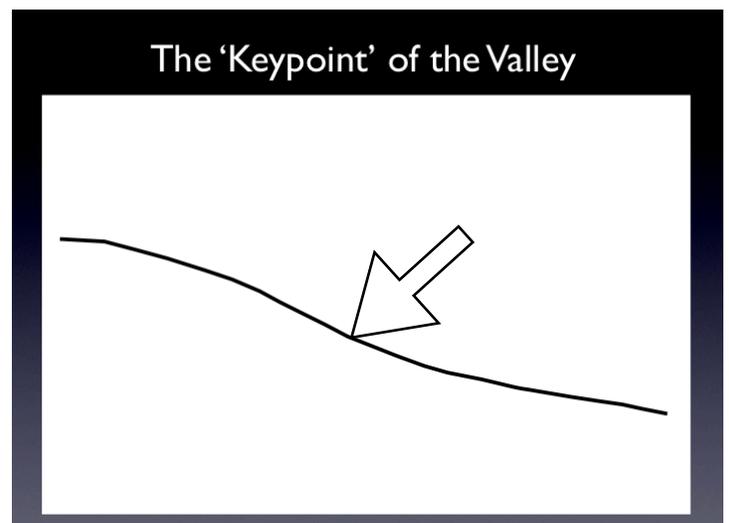
- Climate
- Landform
- Water
- Legal Issues
- Access and Circulation
- Vegetation and Wildlife
- Microclimate
- Buildings and Infrastructure
- Zones of Use
- Soil Fertility and Management
- Aesthetics and Experience of Place



Together these characteristics help guide our analysis of a site and our understanding as to how best to lay out these qualities in response to the physical realities on the ground.

The name 'Keyline' actually describes a physical feature in the landscape. Yeomans identified the basic geography of keyline (see illustration above) to include the 'main ridge' (the watershed divide at the horizon), 'primary ridges' (convex slopes radiating off of the main ridge) and 'primary valleys' (concave basins receiving runoff between primary ridges). Essentially, landforms take either one of 2 shapes - convex or concave. Convex shapes shed water while concave shapes receive it.

The 'keypoint' of the landscape exists in valleys and is the point where the slope changes from being convex to concave in shape. This is often the point where springs and seeps emerge from the landscape. It marks the highest point in the landscape where it's often cost-effective to hold water as the concave shape below allows for the development of farm ponds that require minimal excavation in order to create storage. The contour line passing through the keypoint is known as the 'Keyline'.

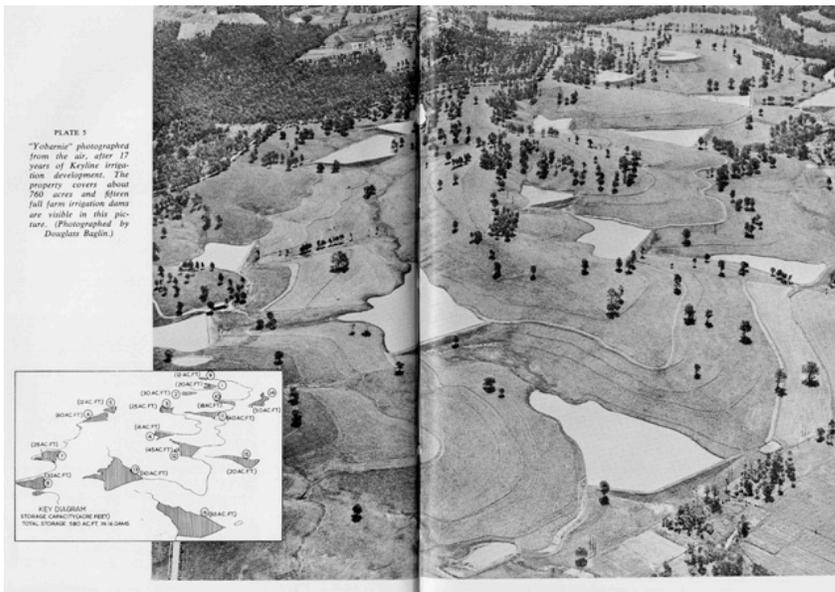
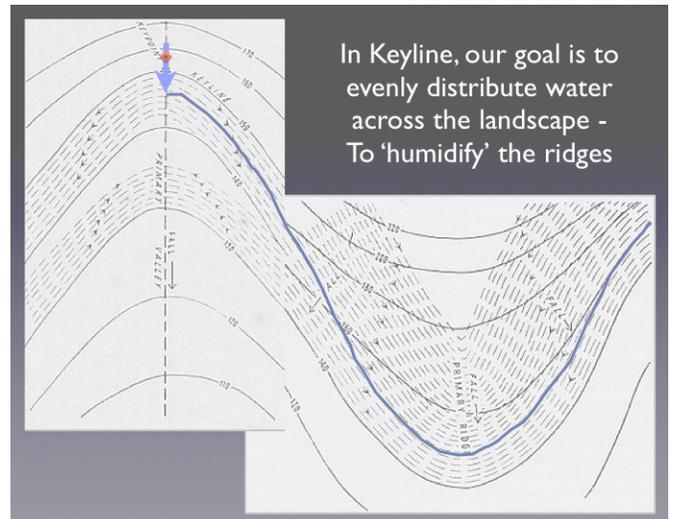
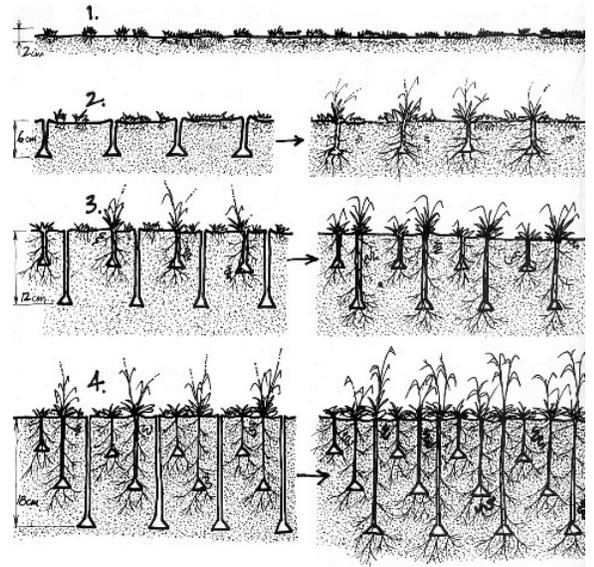


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Keyline management focuses primarily on soil building and the development of on-site water security as two means towards building resilience into farm operations. Subsoil plowing that follows the keyline presents one way to help decompact degraded soils, improve water infiltration, and spread and distribute water more evenly. The image at right depicts a subsoil plow regime that helps restore a soil's structure and water holding capacity.

Following the keyline pattern can help distribute water more evenly across the landscape. Water naturally flows downhill (more specifically 'perpendicular to contour'). This means it runs off ridges and concentrates in valleys. By following the keyline with a subsoil plow, one can actually create mini drainage channels in the subsoil rips that serve to divert water from a place of concentration (the valleys) gently downhill and back out onto the ridges. This elegantly embodies our water harvesting principle 'Slow it, Spread it, Sink it'.

This unique pattern creates a symmetrical layout for farm operations like pasture paddocks, agroforestry systems, road, and farm fields. Whereas with contour layouts, the spacing between rows is always changing because contour lines constantly change in their relationship to one another, any given slope only has one keyline - once it's established, everything else follows parallel. It can be a confusing concept to grasp, but it's extremely powerful once understood.



Little has been written in recent times to describe keyline design in greater detail. Most folks explore Yeomans *Water for Every Farm* as the most comprehensive primer. Several of Yeomans now out-of-print books are available as free downloads at [www.soilandhealth.org](http://www.soilandhealth.org)

Yeomans experimental farm Yobarnie in New South Wales, AU (depicted left) elegantly demonstrates what good, conscious, land use planning can look like when one considers how best to utilize the natural patterns of the landscape to catch and store water resources and layout farm operations so that a large preliminary investment in energy results in a powerful, gravity fed system that is capable of supporting sustainable ag systems for centuries into the future.