Geological Setting

Geological setting = Sydney Basin

Sydney basin part of the drainage basin that is within

Lachlan fold belt would have played a role in the basin formation – precedes Sydney basin formation

Provide geological context

* Lachlan fold Belt
  + Blue Mountains
  + Uplift and Erosion
    - Allowed for more deposition
* Lapstone Complex
* “Lapstone complex believed to be controlled by re-activation of faults in the basement rocks beneath the Sydney Basin – evidence for movement on these old structures can be seen close to the western margin of the basin”
* Stability of the area – predominantly stable, with uplift and subsidence and volcanics still occurring, given this is a passive margin
* Glaciations
* Sediment input/source
  + Currently predominantly sedimentary with occasional volcanics
* “Broadly, the history of the complex is in three parts: (1) tectonism prior to formation of the Sydney Basin (i.e. pre-Permian); (2) movements during Sydney Basin sedimentation (Permian and Tri- assic); and (3) movements well after sedimentation ceased”

Sydney Basin itself

Tectonic events that led to the formation of the Sydney Basin

Geological Setting

The Sydney Basin is a part of the greater Sydney-Gunnedah-Bowen Basin, dominating much of New South Wales, extending southerly into Victoria and Tasmania, as well as extending northerly into the state of Queensland. For the purposes of this section, the basin shall be referred to as Sydney-Gunnedah Basin as this is predominantly restricting to the state of New South Wales, in which our local geological region is set.

In the region of New South Wales, there are three particular geological provinces that are in close relation to the geological history of the Sydney-Gunnedah basin. The three such provinces are the Lachlan Fold Belt to the south and west of Sydney Basin, the New England Fold Belt to the north east of the basin, and the Lapstone Structural Complex which is contained within the Sydney Basin to the west of our site in question.

The overall structure of the Sydney-Gunnedah-Bowen Basin is noted to be the result of deformational events that occurred Middle Devonian () to Late Carboniferous, this being largely responsible for the present formation of the Lachlan Fold Belt (bioregional assessment webpage, find proper ref on page list).

**Lachlan Fold Belt**

* **Relevancy**
  + Basement rocks
* **Location**
  + Basement rocks of Sydney basin but also to the west/south of the basin itself
* **History**
  + Show evidence of rifting and extension

Bounding Sydney- Gunnedah Basin to the south and to the west, the Lachlan Fold Belt covers much of the southern region of the eastern margin of Australia, in particularly, New South Wales and Victoria. The Lachlan Fold Belt contains predominantly lower and middle Paleozoic rocks, which have been folded and metamorphosed, as well as intruded by volcanics (Branagan et al., 2000). Branagan and Packham (2000) note that the deformation (i.e. folding) of the Lachlan Fold Belt increases in intensity towards the east. The deformation

**New England Fold Belt**

The New England Fold Belt (within New South Wales) is situtated to the north-east of Sydney Basin

**Lapstone Structural Complex**

The Lapstone Structural Complex refers to a number of north-south trending folds and faults and monoclinal flexures (\*step-like fold in rock strata) (Branagan and Pedram, 2000; McPherson et al., 2014). The timing of deformation is contentious, varying views of the completion of fold deformation by Early Jurassic, Late Jurassic, Early Tertiary, Late Tertiary (consult McPherson et al., 2014 for referencing of these views). Additionally, the significance of the role of basement structures in the deformation of the complex is also contentious (McPherson et al., 2014 again for a list of those who think that it is highly important). The Lapstone Structural Complex is primarily composed of deformed sedimentary Triassic rocks, Tertiary gravel, Quarternary sediments and minimal igneous occurrences, predominantly basalt, in the form of dykes and neck features (Branagan and Pedram, 1990)\* POTENTIAL REPHRASE. The origins of this complex are marked by the initially deposition of sediments of Permian and Triassic age over an already-developed north-trending structure that was intersected by easterly trending structures (Branagan and Pedram, 1990). These pre-existing structures indicate a previous extensional event \*verify (also above ref). Following this, there was compression that originated from the northeast as well as uplift of basement rocks and the aforementioned sediments that were deposited on top, forming a ‘broad warp’. Early Tertiary adjustments were instigated by compressional strike-slip which warped near-surface rocks (Branagan and Pedram, 1990). The continuing erosional events that occur are largely responsible for the relief of the Lapstone Structural Complex (McPherson et al., 2014).

**Sydney Basin**

* **Definition**
* **Location**
* **Geology**
* **History?**