OBJECTION TO PROPOSED BYLONG COAL MINE ON THE FOLLOWING GROUNDS

RETROGRADE STEP AGAINST HALTING CLIMATE CHANGE

The report "Bylong Coal Project EIS - Main Text states:

> In 2014, approximately 5% of KEPCO Korea's generation capacity was from renewable energy sources (KEPCO Korea, 2014). While KEPCO Korea is committed to further developing renewable energy technologies, high quality thermal coal is anticipated to remain a dominant source of energy over the next several decades whilst these alternative technologies are developed. KEPCO Korea's commitment to best practice environmental management is demonstrated by its Environmental Management System certified to ISO 14001.

"several decades whilst these alternative technologies are developed" is a very leisurely timetable that does not acknowledge the urgency of action to halt climate change. Why should our farming communities have to bear the devastation that will enable this inaction to continue?

The Climate Council's publication, "THE AUSTRALIAN RENEWABLE ENERGY RACE: WHICH STATES ARE WINNING OR LOSING? states:

> "Australia's states and territories have an important leadership role to play in tackling climate change and growing Australia's renewable energy industry."

Comment – Approval of this coal mine will show the exact opposite. Climate change is a global problem and just because the CO_2 will be generated in the northern hemisphere will not change the outcome of increased global warming.

The publication states further:

> "Victoria and NSW have moved from leaders to laggards in Australia's renewable energy race. in the past NSW had been a leader introducing the first emissions trading scheme, ... Neither state now has targets to reduce emissions or increase renewable energy.
>
> NSW is last among the states for new per capita investment in renewable energy.
>
> The recent NSW government renewable energy Action Plan includes 24 actions and 3 goals designed to encourage renewable energy in NSW. This may indicate a welcome shift in NSW's approach."

The Progressing the NSW Renewable Energy Action Plan Annual Report 2014 states:

> "The NSW Government's support for the industry is also demonstrated through the Plan and *NSW 2021*, which states that NSW "will contribute to the national renewable energy target by promoting energy security through a more diverse energy mix, reducing coal dependence, increasing energy efficiency and moving to lower emission energy sources."

Comment - Approval of the Bylong or any other new coal mine would be in total opposition to this claimed demonstration of support for the renewable energy industry via "reducing coal dependence", both ideologically and potentially practically in terms of possible future exports of Australian renewable energy technology to Korea

DESTRUCTION OF LANDSCAPE AND DISRUPTION OF COMMUNITY

The report "Appendix AC Social" indicates a number of impacts described by residents .

- Stress and anxiety as a result of uncertainty in relation to coal exploration and the potential for mining into the future in the Bylong Valley and potential impacts;
- Population decline and resulting changes in social networks and sense of community;
- Changes in community structure and social networks with the gradual departure of long-term residents;
- Declining social capital due to community fragmentation;
- Perceived increasing prevalence of property acquisition and corresponding changes in landownership;
- Potential loss of Bylong Upper PS due to lack of enrolments, attributed to historical population decline in the Bylong Valley*;* and
- Maintaining the economic viability of agricultural holdings and retaining property values.

If this were a strategic project of national importance then there might have been an argument that "the benefits outweigh the disadvantages". However this is purely a commercial project with a flexible timetable to suit the company's commercial needs but nevertheless implying pressure for prompt approval. The market driver for the project is demonstrated throughout the EIS, by such as:

> It should be noted that the indicative Project schedules are subject to continual revision based on changing mining and marketing conditions and as such the forecast timing may vary. The indicative Project schedule presented in this EIS is also subject to the necessary regulatory approvals being obtained by 2016.

> However, primarily due to Project viability considerations, two open cut mining areas are proposed for the efficient recovery of identified marketable seams within the coal resources as part of the Project.

> The product coal generated will be largely dependent upon the ROM coal processed and the market conditions and demands at the time.

> Alternatively, a stand-alone longwall operation was considered, but presented limited economic potential. A financial analysis confirmed that an underground only option is not economically feasible under current market conditions or for longer term forecasts for the return to normalised market conditions.

> ARTC manages the rail network that will be used to deliver coal from the Project to market.

There appears to be the expectation that a disproportionate degree of environmental and social impact together with fostering inaction on reversing climate change are justifiable. The claimed benefit of economic boost and jobs is only for a generation then it's all gone with the legacy of a degraded rural environment and the forfeiture of 25 years of action to halt climate change.

IMPACT ON GROUNDWATER THAT THE EIS APPEARS TO UNDERESTIMATE

The liklihood of surface cracking is mentioned in a number of reports.

The EIS document (main text) states:

> ### Subsidence Impacts
>
> Subsidence has the potential to result in cracking or deformation of the ground surface. Transient tensile cracking may occur during extraction of a longwall panel. These cracks occur behind and parallel to the moving extraction face (i.e. after the longwall miner has passed beneath a point). These tensile cracks generally close once the land has fully settled following longwall extraction.
>
> Permanent surface cracking will generally occur in the tensile zone, which generally extends a horizontal distance of up to 0.4 times the depth of cover from the longwall panels. Most surface cracks will occur within a distance of 0.1 times the depth of cover from the longwall panels. Cracking may also occur in compressive zones if compressive strains result in buckling of the surface strata. Unlike transient tensile cracks, these cracks will remain open unless remediated.
>
> Surface cracks in the flatter areas are generally expected to vary in width from 25 mm to 50 mm, although isolated cracks of up to 100 mm width may occur. In steeper areas, surface crack widths are generally expected to be in the order of 50 mm to 100 mm, with possible isolated examples of cracking wider than 200 mm.

The Subsidence report further describes the extent of surface cracking that could occur.

> **4.5. Surface Cracking and Deformations**
>
> Longwall mining can result in surface cracking, heaving, buckling, humping and stepping at the surface. The extent and severity of these mining induced ground deformations are dependent on a number of factors, including the mine geometry, depth of cover, overburden geology, locations of natural joints in the bedrock, the presence of near surface geological structures and mining conditions.
>
> Fractures and joints in bedrock occur naturally during the formation of the strata and from subsequent erosion and weathering processes. Longwall mining can result in additional fracturing in the bedrock, which tends to occur in the tensile zones, but fractures can also occur due to buckling of the surface beds in the compressive zones. The incidence of visible cracking at the surface is dependent on the pre-existing jointing patterns in the bedrock as well as the thickness and inherent plasticity of the soils that overlie the bedrock.

Without intending to labour the obvious, surface cracking is evidence of the cracking of the strata between the underground workings and the ground surface.

Section 7.11 of Appendix H Subsidence Ground Movement Predictions on page 66 further confirms major cracking:

> It is likely that the groundwater bores will experience impacts as the result of mining of the longwalls, particularly as they are located directly above the longwalls. Impacts may include lowering of the piezometric surface, blockage of the bore due to differential horizontal displacements at different horizons within the strata, changes to groundwater quality, and horizontal shearing of the bores.
>
> It is recommended that management of potential impacts during the mining of the proposed longwalls be included as part of the Water Management Plan.

Even if the bores were to be redrilled there would be no water to pump out because the total disruption of the rock strata in the cracked zone would have drained all the water into the mine.

The report 21. Bylong Coal Project EIS - Appendix L Surface Water Part 1 states:

> There is the potential for connective cracking to occur between the mined coal seam and the surface in areas where the depth of cover is shallower. There is the potential for cracking to occur in the reaches of Dry Creek (and its tributaries) that overlie the Underground Extraction Area. Stream bed surface cracking that occurs as a result of mining will be remediated by infilling and regrading (where accessible) as soon as practical after being identified. In the period after the occurrence of cracking but before remediation can be undertaken, there is the potential for some surface flows (following extensive rainfall) to drain from the sections of Dry Creek (and its tributaries) into the underlying mine workings. **Section 7.4** provides an assessment of the potential impacts to the surface water.
>
> The uppermost bedrock lies directly beneath the surface soils hosting Dry Creek and its tributaries. Any fractures that form in this bedrock material as a result of subsidence are expected to gradually infill with surface soils during flow events. To mitigate the losses of stream flow into the mine workings, remediation of the fractured bedrock material within the stream alignments can be proactively undertaken in the circumstance where the infilling of these fractures does not occur naturally.

Therefore it must be inferred that the so-called cracked zone reaches the surface where the depth of cover is shallower such as in Dry Creek and its tributaries .

The report Appendix N Groundwater Peer Review lists a reference to a paper "Tammetta P 2015 Estimation of the Change in Hydraulic Conductivity above Longwall Panels Groundwater Vol 53 No 1 Jan-Feb 2015 122-129" that quotes an average value of 40 for the hydraulic conductivity in the cracked zone.

However Appendix M Groundwater Part 1 shows much lesser modelling values:

The model represented the fractured zone above the longwall panels by increasing the vertical hydraulic conductivity of the overlying layers. The vertical hydraulic conductivity was calculated for each layer by increasing the base value to a value between the free-draining vertical hydraulic conductivity value provided by SCT (2015), and the undisturbed host rock values. Table 10.2 and Figure 10-3 show the values used to represent the subsided and fractured overburden material.

Table 10.2 Vertical hydraulic conductivity of fractured zone

Layer	Unit	Undisturbed Kz (m/day)	Saturated Goafed Kz (m/day)	Unsaturated fracture network Kz (m/day)	Elevation mRL	Height (m)
8	Coggan coal seam	2.2×10^{-4}	1.1×10^{-1}	864	187	6
7	Interburden	1.5×10^{-4}	7.5×10^{-2}	864	191	10
6	Ulan coal seam	5.0×10^{-4}	5.0×10^{-2}	864	196	15
5	Interburden	4.3×10^{-7}	2.58×10^{-2}	864	218	37
4	Interburden	1.5×10^{-4}	3.75×10^{-3}	34.6	343	180
3	Weathered Permian	1.0×10^{-1}	1.0×10^{-1}	0.17	381	200
2	Basalt	1.9×10^{-2}	1.0×10^{-1}	0.17	381	260

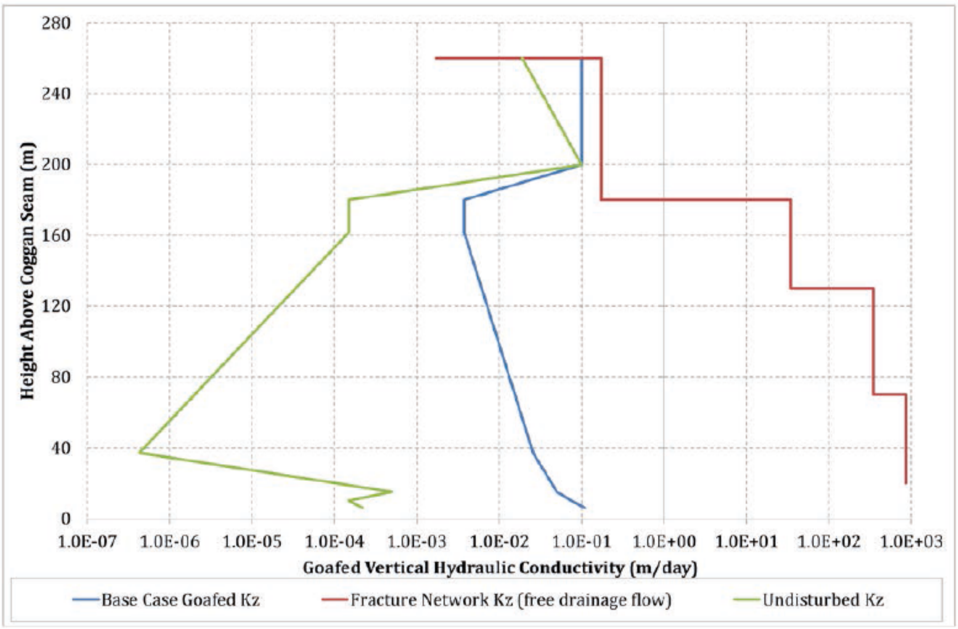

Figure 10-3 Vertical hydraulic conductivity of fracture zone

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The maximum modelled goafed K_Z value of 0.1" (blue line) is an extreme underestimation below 40 that the Tammetta paper quotes for the cracked zone and still compares badly to the "10 or less " recommended for the so-called disturbed zone. The modelled K_Z value of 0.01 at say 100 m above the longwall gallery is one four thousandth of the Tammetta recommended value of 40 for the cracked zone. The resulting claim that there will be only a 2 m fall in the water table is therefore dubious.

The adoption of the modelled K values is vaguely justified as "adjusted to a value between the free draining vertical hydraulic conductivity value provided by SCT (2015) and the undisturbed host rock values" but with no definition of how exactly in between the chosen values are.

The diagram suggests a midway point but the chart is misleading because it is based on a logarithmic scale and insight comes from the peer review which refers to taking the geometric mean. Any reduction of K values below that recommended by Mr Tammetta must be viewed with suspicion, but to arbitrarily take a geometric mean over a range of up to a billion-fold is absurd.

That the peer review supports taking the geometric mean indicates a systemic underestimation of impacts on groundwater supplies.

Divergence between modelling and real life was ironically reported on thus:

> The pseudo-soil function was attempted in the Bylong model sensitivity analysis, however, the model failed to converge. This is not an uncommon experience, and was likely due to the large number of unsaturated cells in the upper layers of the groundwater model in the elevated plateau overlying the underground mining areas, coupled with the relatively low recharge rates.

Because this brush with reality didn't give the desired answer is no a valid reason to go on to pick and choose modelling methods just to get any answer that "ticks the boxes", with accuracy a secondary consideration.