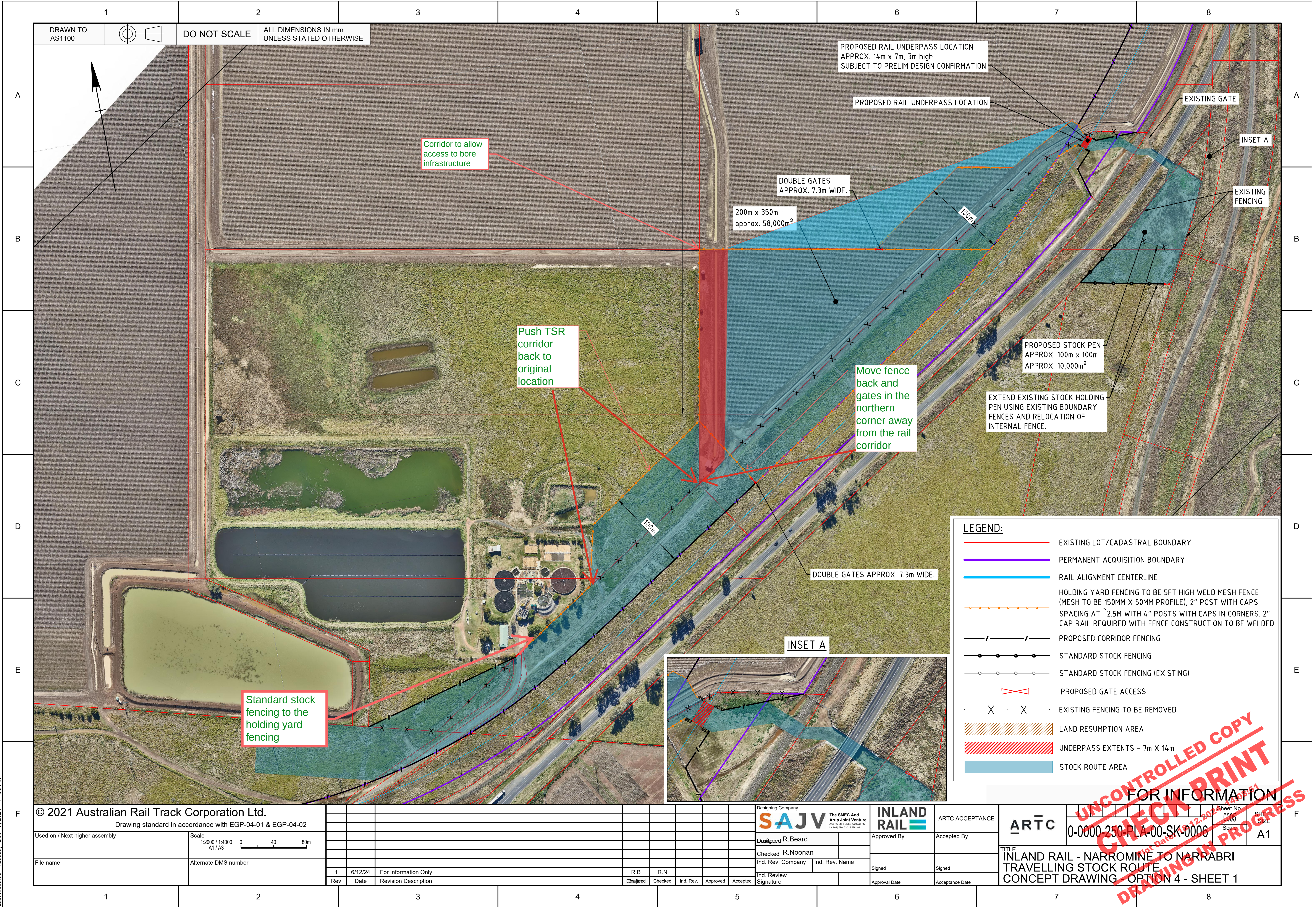




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Inland Rail TSR Report

The following is a report of the Inland Rail TSR (Travelling Stock Route) options for the Arrow Site at Narrabri, NSW. In conjunction with the LLS during a site visit on the 26th March 2025 multiple options for the amendment of the TSR along, and under, the Newell Highway at the Arrow site were proposed and discussed. I will provide my assessment on the suitability and recommendations of each option discussed on the day with the aim of encouraging a suitable and safe outcome for both Inland Rail and LSS, as well as the stock and stockmen who utilise the TSR.

For me, the main considerations are the nature of cattle and their behaviours associated with both human and non-human stimuli; startle and panic in cattle is dangerous to not only the stockmen handling the cattle, but also to the animals themselves, and to the vehicles on the nearby highway should stock panic enough to break containment. Panic behaviours can mix social groups, increase agonistic behaviours and stress in cattle. Furthermore, and perhaps most importantly, as the proposed rail line does not have any anticipated schedule or predictability, and lies in very close proximity to the TSR for approximately one kilometer, the onus is on Inland Rail to ensure the TSR is safe for cattle to be moving along the corridor at any given time.

Cattle, being prey animals, feel safer when surrounded by conspecifics. It is expected that mobs of cattle will be moving along the TSR when it is used which allows us to utilise herd behaviours to keep animals moving, keep them together, and lead them in the direction we desire as a group. Conversely, herds are prone to group behaviours which can include stampede as a panic or flight reaction in response to a perceived threat. Not all animals are required to perceive the threat to a level where a behavioural response is initiated, as herd animals will respond as a collective group if the response in individuals is strong, repeated or sustained to a level that incites a fear or flight behaviour in other individuals.

Cattle are largely sight-oriented when faced with a threat, though they will startle and/or alert at auditory stimuli. This is the premise behind rubber mats being used on yards to facilitate smooth movement by reducing visual stimuli of people moving on the outside of the yard environment. Their eyes (like all herd animals) are designed for less visual acuity and more for horizon scanning for movement, as would be appreciated when grazing the open grasslands with stalking predators. Cattle will also baulk at sudden changes in light/dark and sudden changes in substrate - often seen as them lowering their heads close to the ground to investigate areas of change, and will baulk at blind corners preferring a direct line of sight, or a curving pathway.

The trains on the proposed line are double-stacked and expected to be approx 2.5m high, and travelling through on a continuous track at approximately 80km/hr. In areas where the cattle are expected to move in close proximity (within 50 metres) to the trains it would be recommended that the trains are shielded from the view of cattle with no less than 8ft, and preferably 10ft fencing with blackout matting. I am not an engineer so cannot comment on the footing requirements for fencing of that height.

Research into cattle behaviour shows that while human voices are the most aversive to cattle, mechanical noise was also aversive. This is the premise behind the gentle stock handling movement initiated by Temple Grandin in the 1990s, and adopted within the farming community. Cattle will not move towards aversive auditory stimuli, and noise stimuli will increase heart rate and movement patterns in restrained cattle. However unless the noise aversion is above a threshold level, which is suggestive to be above 85dB to initiate a behavioural response (and is likely dependent on the individual beast), they are less likely to initiate panic behaviours unless they can identify a threat visually. And utilising herd behaviours, if most animals are stimulated to a level that does not incite a behavioural response, the herd should not break into disruption.

I do not have the dB level of the trains, so I cannot comment on the noise impact on the cattle at present without this information. It is my opinion that the aforementioned shielding should provide a degree of sound barrier as well which will be beneficial.

It should be noted that the cattle will also be able to feel the train approach and pass, though I expect given it will be a continuous track that this stimulus will be tolerated as long as no visual threat is identified by the cattle. *I cannot comment fully on this as I have no data on the level of tactile stimulus a passing train would create.*

Some mobs moving along the TSR may have a level of habituation towards rail noise if they have had prior exposure, and some individuals may be of a more complacent attitude and I cannot definitively say that every beast will respond the same way. However my recommendations are based on the available options discussed at the Arrow Site meeting with the aim of minimising startle and flight responses in cattle to ensure the safety of all parties.

Any stimulus is measured in three ways: Frequency, Intensity and Duration. The Frequency being the number of times an individual is likely to be exposed to a stimulus over a given period

of time. The Intensity is the amount of emotional stress the stimulus invokes at each exposure and is usually related to distance, or proximity. The Duration is the length of time each exposure to the stimulus lasts. Obviously minimising all these factors would be ideal, but what we currently have is:

Frequency: Unknown. Anticipated to be 8 or more trains per day. No predictable schedule.

Intensity: Unknown. I have requested the dB level of the trains. Ideally the noise level would be under 70dB which is the level cattle begin to show stress signs.

Duration: Expected duration of each stimulus to be approximately 3.5 minutes, which is quite a long time for exposure.

Noting this information, I will discuss each option and my recommendations for each.

Option 1: TSR is left as is, with the proposed Inland Rail track to consume a portion of the TSR as it approaches the underpass.

Overview: Not recommended. Intensity of stimulus too high without ability of cattle to behaviourally adjust the intensity. Width will reduce flow and potentially increase frequency of exposure. More likely to result in flight behavioural responses.

My opinion is that this option is not feasible as the proposed rail line impacts the TSR to an unacceptable level close to the underpass creating not only an undesirable junction of the TSR as it veers under the Newell Highway, but also narrows the existing TSR to an unacceptable width, increasing the intensity of every exposure to the stimulus without a chance of escape. This narrowing would create a bottleneck of sorts as stock turn to pass over the existing railway, but also increase the amount of time stock are in close proximity to the rail line by limiting stock movement simply based on flow. This, in my opinion, is more likely to induce a flight or panic response in the cattle in a confined space, increasing the chances of injury or breaking containment.

Option 2: East-West Corridor crossing the Newell Highway at the Arrow Site

Overview: Feasible. Reduced intensity and duration of potential stimulus exposure. Higher public safety risk owing to more artificial substrate changes which may increase baulking behaviours.

This is a feasible option given the width of the proposed passage which will facilitate faster stock movement (up to 30 minutes for 1000 head). The stock would move under the proposed new Rail Line through an underpass of approximately 7m wide x 3m high. Holding areas for cattle would be available both on the Eastern, and Western sides of the highway. Control of the traffic on the Newell Highway for passage would be required for each crossing.

Behavioural concerns for this option include multiple changes in substrate which can be minimised by creating a somewhat continuous substrate (asphalt for example) that will reduce baulking by maintaining colour and light/dark continuity for the cattle from the holding pen on the Western side to the holding pen on the Eastern side of the crossing. Baulking increases the chances of cattle pushing at peripheries of the crossing and breaking containment, escaping up the existing rail line, or onto the Newell Highway where they can pose a risk to the public.

Conversely, utilising cattle's aversion to sudden substrate changes, should this option be selected it would be recommended that the Newell Highway crossing perimeter be demarcated with a grid pattern to encourage animals to stay within the confines of the crossing.

However overall the cattle are likely to be exposed to a reduced frequency, intensity and duration of stimulus owing to the fact they interact with the proposed Rail Line for a very short time (as they approach and pass under it). Management of other stimuli (e.g. highway vehicles) should be feasible as they can be kept at a safe distance, and will not be moving as the cattle cross.

Option 3: Discarded

Option 4: Utilising the current TSI with land acquisition additions to facilitate increasing width and holding capacity of the current TSI.

Overview: Most Feasible. Ability to utilise existing TSR. Reduced intensity of exposure, retained duration and frequency of exposure. Ability to behaviourally withdraw from stimulus.

My opinion is that this option is also feasible, and poses a lesser public safety risk than Option 2. By widening the corridor for the majority of the increased proximity area (approximately 1km TSR directly adjacent to the Proposed Rail Line) we can reduce the intensity of the stimulus and allow the cattle room to behaviourally respond (move away). In addition, a wider corridor also increases flow and reduces the time for mobs to travel the corridor, potentially reducing the frequency of exposures. It is my recommendation that this corridor be fenced with 8-10ft fencing with blackout matting to reduce visual stimuli for any area within 50m of cattle flow. There is one area of narrowing of the corridor, adjacent to the Water Treatment Works which is approximately 150m in length. While this is unfortunate, I feel that it is manageable as long as the visual perceived threat is reduced.

One area of land acquisition on the northern boundary of the Water Treatment Works is deemed contaminated due to the possibility of a zoonotic parasite. LLS has been tasked with assessing the requirements of decontamination to ensure this land is utilisable and safe for the cattle.

Holding areas on both the Northern and Southern aspects of the corridor will allow cattle to be safely contained away from the Rail Line, reducing the intensity of any exposure. Yard design has been delegated to LLS, to be based on the expected mob size and to facilitate easy movement of mobs into, and out of the yards from either direction. Recommendations would be

that at the very least yard fencing facing the Rail Line be shielded with black rubber matting to create a more insular area. It is expected that watering points will be available to cattle at these holding areas. If holding times are expected to be greater than 6 hours during the peak of the day then shade should also be provided in the form of vegetation or shade matting.

The Proposed Rail line will include an underpass at the northern end of the corridor. As cattle do not willingly turn blind corners, it is my recommendation that the underpass be matched in size and position to the existing underpass (Newell Highway) to facilitate a continuous line of sight for the cattle to encourage cattle movement. Light and shadow from the underpass(es) cannot be amended, but should be noted that cattle will have many changes of substrate and pattern for this crossing (underpass-grass-existing rail line-grass-underpass-grass) which may reduce flow and create congestion, increasing the chances of encountering a train as they move from the western side of the Newell Highway to the eastern side of the Newell Highway.

Additionally, as cattle will not willingly move towards an aversive stimulus (visual or auditory), and in line with my recommendations that any rail within 50m of cattle movement be visually shielded up to 10ft, I also recommend the overpass be visually shielded. This should also reduce the auditory stimulus intensity. The risk of baulk, or flight behaviours in cattle should a train suddenly appear on the rail above them may result in the mob splitting to avoid the train stimulus, which as discussed can result in mixing of mobs, mismothering, increased agonistic behaviours and stress. This is not a major concern for the Newell Highway underpass as the road is set further back from the edge of the underpass, and the height also means that cattle cannot easily view the road traffic as they approach. As the Rail Line will be narrower, the trains will be easily visible to the cattle as they approach if they are not shielded (as a function of line of sight).

In conclusion, Option 4 is the most feasible from the standpoint of modifying existing routes to facilitate behavioural safety. Option 2 would potentially result in the least stimulus exposure but poses an increased public safety risk which may, or may not mitigate this.

I have provided my recommendations for both options to increase the emotional safety of the cattle, which directly impacts the safety for the stockmen and the surrounding public lands. By implementing measures to reduce the frequency, intensity and duration of any aversive stimulus, individuals are less likely to exhibit stress, flight or panic behaviours that can result in injury or damage.

If you have any questions regarding my recommendations, please feel free to contact me at em@newenglandvetservices.com.au.

Kind Regards, Emma Billing BVSc MANZCVS (Veterinary Behaviour)

