Valentine Alexander Troup Cormack

27 JULY 2014

State Development, Infrastructure and Industry Committee Parliament House George Street BRISBANE QLD 4000

Dear Sir

Thankyou for your letter dated 8th July 2014 seeking written submissions.

Please find enclosed my submission and attachments.

I am very concerned regarding an industrial site going through Beef Production properties. The two railway easements must be listed on The Queensland Contaminated Land Register once the final routes are set. Will the committee look to have this put in place?

The fact is there will be an industrial site 8.1 km long by 50 metres wide put through our clean, green noise free Beef Producing business which will be just the opposite to what it is today.

From railway easement come industrial chemicals which are not used or allowed in agriculture. Metals, oils, grease and coal dust all of which can get into our Beef Chain.

Disturbance from train noise and horn blowing day and night. This disturbance will cause cattle to feed away from the impact, overstocking and over grazing, feeding for maintenance and not putting on weight.

For fair compensation to be paid to Beef Producers regarding loss of income from disturbance there needs to be scientific monitoring research done into impact on livestock coming from industrial sites, railway line easements and coal seam gas fields. There are a number of research groups who can do this. Will the committee look to have this put in place?

The Beef Industry today and in the future has very high standards set and demanded by consumers on Beef Production worldwide. An Industrial site put through my Beef producing property would not be acceptable in the future by these consumers. The customers of Organic Beef would be just one.

The loss of income from this railway easement will be very high on our Beef producing enterprise.

Yours faithfully

Val Comack

VAL CORMACK



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27<sup>th</sup> July, 2014

State Development, Infrastructure And Industry Committee Parliament House George Street BRISBANE QLD 4000

Dear Sir,

Thank your for your invitation and the opportunity to express my views and concerns in relation to the proposed Galilee Basin State Development Area (GBSDA).

As a landholder, along with many others, whose properties will be substantially affected by this development it is important that all aspects of the proposed GBSDA are properly assessed and considered.

Clearly there is a need to develop the State's resources if Queensland is to prosper and grow as a state but, such development should not be solely be at the expense of the individual landholders affected.

Having owned and operated Wavering Downs as a cattle-producing property for more than 40 years and having been in discussions with both the GVK and Adani proponents over the past 4 - 5 years, I have a variety of concerns with the GBSDA proposal. Specifically these concerns are:

1. The apparent reluctance of the Galilee Basin development proponents (Adani, GVK, Carmichael, etc) to adopt a cooperative attitude to the development of a common rail corridor.

The development of a rail corridor through a cattle property or any other agricultural venture is highly disruptive not only to the lifestyle of the families involved but also to daily operations of the properties affected.

In the proposed GBSDA, the Cormack family is only one family amongst many families who lifestyle and properties will be impacted by the "East-West" and "North-South" railway corridors from Galilee Basin to the port of Abbott Point.

The fact that that there will be large numbers of families and properties in the proposed GBSDA severely impacted by the development of these two rail corridor are understandable as all such developments must have an impact.

corridor are understandable as all such developments must have an impact.

I am not opposed to the development of the State's resources nor am I opposed to the concepts of developing a rail infrastructure in common rail corridors.

I am however concerned by the multitude of corridors being proposed and the roughshod and bullying manner in which the proponents use both the current legislation and the projects of state significance status to disadvantage landholders.

In most instances the proponents have unlimited resources, both legal and personnel, and having the regulatory framework biases in their favour are largely able to ignore the concerns of landholders whose properties they are seeking to build infrastructure on.

Why Adani, GVK, Waratah Coal and others continue to look to build their own corridors when the State Government has asked for one corridor North/South and one corridor East/West is beyond me. I can only surmise that their interests are self-serving and merely reflect the cheapest bottom line development costs at the time.

In the case of my property, the proposed rail corridor development will not only pass through some of my best cattle carrying capacity land but it will also split my property into two, effectively creating two properties either side of a rail line to manage. The only reason the rail corridor isn't being situated in the road reserve or on my property boundary adjacent to the road reserve is one of cost.

In its current position, the proposed rail corridor not only cuts my property in two but also passes at right angles through all my paddocks. This configuration will not only destroy the paddock fattening and cattle movement cycles I have developed over 40 years on Wavering Downs but it is also the most **financially disruptive** option to my business possible that could have been proposed.

Where I once could move cattle from one paddock to the next by myself with the aid of a dozen dogs, I will now have to move cattle several kilometers to holding pens whilst waiting approval to cross the rail corridor.

Although the holding pens and other infrastructure recovery items (such as water troughs etc) have formed part of my discussions with the various proponents, none are willing to discuss the ongoing and indirect cost of their proposal to me the landholder.

By way of example, not only will my cattle loose weight during the "new" movement process (in my case a "round" trip of 8km) which had been previously unnecessary but, I now will need to hire additional staff to assist with moving the cattle across the rail lines in the corridor as well as providing food (hay bales, etc) and water. All are new cost components to my business that were not previously there.

Having raised these issues with the proponents, it is simply cheaper to put the rail through the middle of my property and use the regulatory framework to pretend these concerns don't exist.

Most landowners along the rail corridor will be experiencing similar issues and as yet these issues have not and are not being effectively addressed in any resumption process.

This is something that perhaps could be addressed by the Coordinator General as part of the resumption process as it is clear the proponents have no desire to tackle this issue.

## 2. Loss of Beef Production from Disturbance

Having operated my property, Wavering Downs, as a cattle producing property for over 40 years now, I am extremely concerned about the impact that the rail corridor proposed in the GBSDA will have on my beef production capacity.

By way of explanation, over the past 8 years, Wavering Downs has undergone changes in operational and management practices and has been restructured and reconfigured from a cattle breeding property to a background and fattening property targeting the EU market.

To achieve these changes, it has been necessary to destock our breeders on Wavering Downs over the past 8 years and replaced them with EU accredited calves for fattening from our other two properties Johnny Cake and Glen Bowen.

To ensure our cattle meet the requirements of EU accreditation, as well as those of the EU export market, we have had to seamlessly integrate the cattle production activities of Wavering Downs, Johnny Cake and Glen Bowen.

It has taken us a considerable amount of time to achieve this and our cattle are now able to meet the very specific requirements of the EU, not only in relation to their origin but also in relation to their weights and age.

In order for our operation to meet EU requirements, all cattle we supply to the EU export market must be born on our properties (Johnny Cake and Glen Bowen) and must fatten up at a certain rate.

Our fattening cattle come from Johnny Cake and Glen Bowen, two isolated properties that have no exposure to industrial activities or noise, and go to Wavering Downs also isolated property that has no exposure to industrial activities or noise.

The proposed location of the GBSDA rail corridor is right through the middle of the paddocks where we first introduce our cattle from Johnny Cake and Glen Bowen onto Wavering Downs. Given that the current GVK proposal is to have 4km trains traversing Wavering Downs approximately every 40 minutes, 24 hours a day, 7 days a week, the potential for feeding disturbance to our cattle from the proposed rail corridor is enormous. A further complication is that noise emanating from the rail corridor will travel significant distances from this corridor.

As I have previously mentioned, our cattle have had no exposure or experience in relation to industrial noise throughout their lives and the introduction of industrial noise such as rail traffic or other industrial activities (such as rail line construction and maintenance )will have the effect of disturbing their feeding patterns that in turn will cause loss of weight gain.

If we are unable to meet the weight and age requirements of the EU export market as a result of feeding disturbance, we will be forced to sell unsuitable cattle into cheaper markets. If this was to occur, I estimate the impact on our income stream will be in the order of \$600K per annum.

In 2010, as part of the community consultation session held by GVK-Hancock, I raised my concerns about the disruption to my cattle feeding patterns along with the financial impact the of proposed corridor through Wavering Downs with GVK-Hancock's representatives.

At that time, I asked Hancock to set up a monitoring program to determine cattle weight gains and establish a baseline against which cattle feeding disturbance and weight loss as a result of rail activities could be benchmarked. My request was ignored.

While there is no question that cattle born and bred on properties that experience significant industrial noise and other activities for the most part seem not to be affected by these activities and gain weight, the case for the reverse is not as clear.

There is a real need for an investigation and determination by properly qualified scientists using verifiable techniques to establish the exact financial impact that rail related noise and other rail related activities emanating from the rail corridor have on cattle grazing and their feeding patterns and how these affect weight gains.

Again, most landowners along the proposed rail corridor easement will be experiencing similar issues and as yet these issues are not being effectively addressed in any resumption process by the various proponents.

In the absence of factual scientific evidence, proponents and as well as Land Court judges simply dismiss the experience and concerns of "uneducated" graziers in relation to these impacts on their livilihood.

Again, this is something that should be addressed by the Coordinator General as part of the resumption process as it is clear the proponents have no desire to tackle this issue.

## 3. Rail Corridor Fires

One of the greatest concerns I have associated with the GBSDA proposal is the manner in which the rail operators have, and continue to manage fires originating in their rain corridor.

Most rail corridor operators are well aware of the regular occurrence of fires in their corridor and yet they take little if any action to prevent their recurrence despite their public position.

Rail fires are not new occurrences but in the past were relatively rare given the lesser volumes and speed of traffic using a rail corridor. Today it is a different situation, as a result of the resources developments taking place.

From a grazier's perspective, many of the rail corridor fires seem to occur in the middle of summer and it would appear that most of these could easily have been prevented with appropriate management and inspection strategies given the advent of new monitoring technologies.

Despite the technologies available, the realities are that rail corridor operators have nothing in place to manage fires that originate on their premises as a result of their activities in rural regions. Instead, they rely on the goodwill of their landholder neighbours to mobilise the resources necessary to contain the fire and minimize damage.

There seems to be a general unwillingness from the railway operators to put in place a series of appropriate response strategies and service agreements such a contracting local fire brigades or water helicopters, etc to manage known problem areas.

When a fire originating in a corridor leaves the rail corridor and enters an adjoining grazing property, not only does it cause a very big financial impact to that grazier and potentially his neighbours, but it also costs the landholder and other considerable time, cost, inconvenience and stress.

This situation can often made worse for graziers by the fact that most fires occur in the middle of summer or during drought conditions when fodder stocks are low, the grass is dry and rain is sparse or non-existent.

The impact of such fires and the recovery efforts required in such situations, such as hand feeding stock for weeks/months, while paddock recover, creates huge burdens for graziers. Not only do they have to manage the extra workloads these incidents create but also they have to carrying the financial burden of the "incident" while their "cost recovery" discussions with the rail corridor operators and their insurers will often drag on for many months.

Generally there will always be more grass next to a rail corridor that has high rail traffic as cattle will tend to graze away from the noise and vibration of moving trains and their horns sounding at crossings. Without a doubt, many of the fires that occur in rail corridors occur as a result of the high fuels loads could have been prevented with appropriate vegetation management inspection and control strategies.

Rather than incur the time, cost, inconvenience and stress of rail corridor fires, most graziers would have preferred rail corridor operators to be more diligent in their management of their responsibilities and have better strategies in place to manage corridor fires.

If this were a rail safety issue, it would be a top priority to prevent fires from occurring in the rail corridor let alone recurring in know hot spots, something for immediate, not future consideration

Unfortunately, there is a general consensus amongst graziers that rail corridor operators have little or no interest in addressing these issues or developing a long-term solution to an on-going problem.

As mentioned previously, despite the technologies available, the realities are that rail operators have nothing in place to manage fires in rural regions that originate on their premises.

There seems to be a general unwillingness from the railway corridor operators to put in place a series of appropriate response strategies and commercial service agreements such a contracting local fire brigades or water helicopters, etc or even the landholders themselves to manage known problem areas.

It is simply **cheaper** for rail corridor operators to rely on the goodwill of their grazier neighbours to mobilise any resources necessary to contain the fire and minimize any damages and then reimburse the grazier for his "out of pocket" expenses if, at their discretion, they appear reasonable.

Should there be any disagreements in the quantum involved, the attitude of the rail corridor operator towards the grazier is "take my offer or take me to court and substantiate every cent you are claiming". Is it any wonder graziers take what is offered rather than fight a costly court battle?

In my dealings with GVK-Hancock in relation to the rail corridor fire issues, their approach to fire management has been somewhat different but always with the lowest risk and cheapest cost option in mind.

GVK-Hancock have generously offered me a lump sum cash payment that irrevocably binds me as the landholder to providing and maintaining a rail corridor fire break along the proposed rail corridor that adjoins my property.

Whilst on the surface this appears to be a generous offer, it is a clever risk management strategy that removes the need for the rail corridor operator to be diligent in managing fire generating potentials and simply passes the financial responsibility and liability for any damages causes by a fire originating in the rail corridor to the land holder. Given the extra impost and potential fire risk to my business that the GBSDA proposed rail corridor will create perhaps rail corridor operators should consider establishing some sort of "Fire Management Service" agreements based on standard commercial rates with adjoining landholders for the use of their machinery and personnel just as many landholders have with mining and exploration companies.

Again, most landowners along the proposed rail corridor easement will experience similar issues and as such, this issue needs to be addressed by the Coordinator General as part of the resumption and rail corridor establishment process.

## 4. Railway Lines as industrial/Contaminated Sites

Rail corridors are significant sources of diffuse pollution and during their operational life and beyond they release significant amounts of metals, hydrocarbons, herbicides and other inorganic and organic environmental hazards each year.

Depending on the size on the rail network, its usage patterns and the frequency of maintenance programs, the quantity of diffuse emissions per annum can be in the order of several kilograms per kilometre of track.

Most of the pollutants released in rail corridors are metal particles emitted by friction processes from the wheel rail interface, brake linings and in the case of electric trains the commutator and power supply. Of these emissions, the largest by far is iron, followed by copper, zinc, manganese, chromium, nickel, vanadium and lead plus a large range of trace metals.

Under normal circumstances, only small amounts of these metals are leached into the dissolved phase, however, in soils where the environmental conditions are acidic and anaerobic, such metal are quickly mobilised and bio accumulated throughout the ecosystem.

In addition to these metal, significant quantities of hydrocarbons from the trains themselves (eg wheel flanges) and other lubricants from fixed point sources (track switches, transformers, etc) and the trains themselves are also lost from the rail corridor to the environment each year.

In most cases, the lubricating oils are a mixture of different inorganic and synthetic oils with an unknown part of additives and solid particles, and are not biodegradable. As such, it can be expected that significant amounts of these compounds will also leach into the track profile and surrounding area.

In typical rail formation, hydrocarbons and other contaminants are found in the embankment and leach to the bottom of the track profile. Over the years, hydrocarbon and metal concentrations in corridor soil surrounding the rail line are usually elevated some 5–10m distance from the tracks

Along railway tracks plants and weeds are eliminated for security and track stability reasons by the application of the non-selective herbicide such as roundup and more toxic residuals herbicides for problem areas.

Clearly the level of herbicide application is designed to give 100% mortality and obviously, these herbicides are leached, dissolved and adsorbed to particulate matter through the track profile and in many instances beyond the spray zone through wind drift.

Other examples of diffuse rail corridor pollution include the use of corrosionresistant poles which are hot zinc dipped with the galvanizing coat consists of more than 99% of zinc and traces of cadmium. Over time, the annual amount of zinc and cadmium dissolved into the soil around poles can be as high as 140g zinc and 14g of cadmium per pole. Both are highly toxic chemicals in the environment.

There are many instances throughout Australia where such pollutants eventually reach the ecosystem during storm and other high rainfall events which exceed 1 in 100 year stormwater and sediment basin retention capacities

Unfortunately, the knowledge about the fate and long-term effects of diffuse pollutant emissions from railway corridors in Australia is limited and there is little available about the cumulative environmental behaviour of substances in the track profile and formation.

Nonetheless throughout Australia the Contaminated Land Legislation and Registers of most Commonwealth, State and Local Governments now acknowledge and list railway lines and their associated infrastructure as industries that create highly polluted sites as a result of the operations.

The cattle industry today has very **strict** rules regarding chemicals that are used on cattle properties and on cattle and it has to be anticipated that substances entering railway ballast and soil may leach to groundwater or surface waters.

Our business is about producing food for human consumption and it is **important** to understand that the chemicals and herbicides used on a rail corridor and during their construction and maintenance are registered for use in an industrial setting and context and are not registered or suitable for use in food producing agricultural areas.

In most States, it is a breach of environmental legislation to use a pesticide registered for industrial use in an agricultural application.

As a EU accredited beef producer, any chemical that has a potential to come off the railway corridor and gets into the beef food chain is of great concern to me. Not only would such an event cause massive financial damage to the Queensland Beef Industry and but it would potentially make those properties along any rail corridor in Queensland unsalable as cattle producing enterprises.

Again, most landowners along the proposed rail corridor easements will have similar concerns. As such, it is important these concerns and the mechanism to monitor the development and the potential listing of the rail corridor as an industrial/contaminated site needs to be addressed by the Coordinator General at the start of the resumption and GBSDA rail corridor establishment process rather than at a later date.

## 5. Coal Dust

In relation to the issue of coal dust from trains I, along with many others, have a number of concerns about the potential health issues that the presence of the GBSDA rail corridor is likely to bring not only to myself and but also to my family and the environment in which we live.

It is well established that transport corridors bring significantly increased levels of air borne pollution to the surrounding areas and it is interesting to see that the health effects of coal dust are now starting to increasingly becoming more apparent not only in the Hunter Valley in NSW but also in regional towns in close proximity and downwind of coal mines and coal transport corridors.

Over the past few years, there has been increasing public awareness of the dangers of coal dust inhalation. More recently, public concern in places such as Brisbane, has forced the regulatory agencies to require the coal carrying rail corridors to monitor coal dust emissions from their transport wagons and the rates of coal dust deposition into the surrounding neighborhoods.

ABC's Science Program, Catalyst, recently ran a very informative program on coal dust emissions in the Hunter Valley and their links to health issues being experienced by residents in the region. So clearly the establishment of these monitoring programs in capital cities such as Brisbane would have not been considered if there was no risk to the general public.

Furthermore, the fact that these monitoring programs are being undertaken in highly populated areas does not diminish the risk to those individuals living in remote rural locations adjacent to coal carrying rail corridors where there is a high frequency and volume of rail traffic carrying coal.

At present, one of the proposed solutions to reduce the escape of coal dust from coal wagons is to spray the surface of loaded coal wagon with a liquid polymer that dries and binds the surface particles.

Whether the use of dust suppression technologies developed for the construction industry are able to provide sufficient and durable coal dust suppression trip without failing during the coal transport trip from the mine site to the port remain to be seen.

Nonetheless, I am concerned that when this sticky polymer reaches the ports along the coast it is not going to vanish into thin air. Almost certainly, some of the fine polymer coated coal dust will find its way to the bottom of coal stockpiles and eventually during heavy rainfall events it will be carried to sea and the mangroves where the ocean fish breed before moving out to The Coral Reefs.

I have heard that for every 100 tons of coal loaded onto a ship some 10 tons of water are also added to prevent fires. Presumably this water need to emptied somewhere at the end of the unloading process and the polymer that has been used to suppress the dust will mix with water and coal dust and will be dumped in the ocean causing an impact somewhere.

One only has to look at the transformation of the area around Hay Point in North Queensland to see the impact of coal dust on the surrounding ecosystem to see that this scenario has already been played out.

The journey from the mine to the Port is only half of the coal dust story. Once the coal wagons have been emptied, and are being prepared for the return journey to be refilled, there will still small amounts of fine coal dust left inside the wagon. Unless a second polymer coating is applied, this coal dust will be blown out of the uncovered wagons on the return trip back to the mine.

It is not uncommon to see "cloud" of coal dust drifting off trains travelling at high speed on rail corridor and I am happy to provide photographs that show this in no a rare occurrence. For the protection of The Great Barrier Reef Tourism and The Beef Industry, as well as the individual living in close proximity or downwind of a rail corridor, coal wagons must be physically covered by a lid and not by polymer veneering.

Hopefully the Coordinator General can address this issue as part of the resumption and rail corridor establishment process.

## 6. Representation issues.

Last but not least, are what I would classify as financial expenditure and representation issues.

As I previously mentioned over the past 4 - 5 years, I have been in discussion with both the GVK and Adani proponents in relation to their various proposal. As part of this process we have been given the opportunity to comment on a wide variety of documents ranging from preliminary design layouts to EIS, Terms of Reference and the list goes on.

Throughout this whole process, the never ending paperwork to read and respond to, the constant revising and changing of the corridor configurations (sitings, line duplications, etc) as well as the never ending requirement to attend meeting after meeting including the preparation of submissions such as this all take their toll. We are a small cattle producing family business that doesn't have access to levels of professional services that the proponents do and yet we are expected to not only run our business but also be able to interpret, analyze and respond to complex scientific documents and issues.

In preparing submissions and other documents, I along with many other cattle producers call on a variety of practitioners and other environmental and agricultural services to assist them in understanding and responding to these requests and "information" packages while I run my business.

Like many of the landowners along the proposed rail corridor, I have discovered the current system of expense reimbursement only extends to "nominated professional services" notably lawyers and accounts.

Under the present regulatory framework, there are no provisions in either the land acquisition acts or mining regulations for affected landholders to engage the services of other professionals such as agronomists, environmentalists and mediators to assist them throughout the process and claim these expenses.

Unfortunately most of the "nominated professional services" such as accountants and lawyers are not qualified to write submissions and with no mechanism to reimburse landholders for their time and that of their consultants in preparing submissions and responses the playing field is somewhat uneven.

Further complicating the matter is that many of the "nominated professional services" working for affected landholders also have close links with the proponents at the same time. Such a situation creates a perceived conflict of interest that only serves to create larger divides between the parties.

Perhaps the Coordinator General as part of the resumption and rail corridor establishment process could look into providing some mechanisms that extends the range of service providers available to landholders and reduces such perceptions.

## 7. Conclusion.

As I have clearly indicated previously, I am not opposed to the development of the State's resources nor am I opposed to the concepts of developing a rail infrastructure in common rail corridors.

The resources of Queensland need to be developed if we are to prosper and grow as a state but, such development should not be solely be at the expense of the individual landholders affected or at the expense of our natural treasures such The Great Barrier Reef.

I am a firm believer that negotiation around the table is best way forward and I have included additional information in the attachments on issues that will

impact on both landholders and The Great Barrier Reef.

I hope this information will help assist you in convincing the various rail corridor proponents of the need for only one rail corridor with spurs connecting to it from the Galilee Basin to Abbot Point.

Yours sincerely,

Val Cormach

Val Cormack Wavering Downs

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Diane has ta Charleville, ti

to us. Kyle, Christian and Kate did up to Year 7 at home and Daniel stayed on until Year 10. All went onto boarding school. The boys continued on through Dalby Agricultural College leaving with Honours in Ag Studies for Kyle, Associate Diploma in Ag for Christian and Certificates 1, 2 and 3 in Ag Studies and Agricultural Awards for Daniel. Kate has just graduated on 24th April with a Bachelor of Education in Early Childhood through South East Queensland University. Kate has the same love for Wavering Downs (Home) as the three boys. Kate decided to get an off farm career in case through life she needed a fall back. While in Toowoomba for Kate's graduation last Sunday we visited the local markets at Cabarlah. When we were walking into the grounds I noticed Kate go out of her way to pat a pony that was there for kid's rides and again on the way out she did the same and here I thought Kate has not lost her love for the land and animals.

Seven years ago Diane and I formed a business partnership with our four kids which you will see in our email address **age of the last part** Mackland is made up of the last part of Cormack and the last part of Harland which is Diane's maiden name. The 6 of course represents the six of us, Dad, Mum and the four kids.

The only thing our three boys have wanted to do in life was to own their own property. This is why we formed the partnership so as the kids could use Dad and Mums assets to borrow against. If they waited until they died for their heritage they would be too old.

In 2005 we borrowed against our assets to buy and stock Johnnycake Station at Collinsville. We also purchased Glenbowen a small irrigation block near Johnnycake to grow hay. Johnnycake is just a breeding block where we run our breeding cows. We are unable to fatten on this property. Diane and I own Wavering Downs and lease it to Mackland (or the kids). We then bring the weaners down from Johnnycake to Wavering Downs to grow out and fatten for the EU market.

In 1982 during the drought Daniel was born on 12 September '82. I was feeding hay out to the breeders at the 18 mile dam. Diane came home from hospital, wrapped Daniel in a bunny rug and put him on the front seat of the truck and drove the truck while Kyle 4 and Christian 2½ helped Dad throw hay from the back of the truck to feed the cows. No wonder they love the challenge of the land. In 1993 during the big drought I only went to town once in 12 months. I stayed at home to look after my cattle. This time Daniel was 10 and Kate 7 and they took on the job of feeding out hay themselves barely able to see out of the windscreen of the Toyota ute to drive themselves around to feed out. Kyle and Christian returned to boarding school exhausted after spending the school holidays feeding stock. It is in their blood and they just love the life on the land.

## CORMACK FAMILY

My wife Diane and myself (Val) were married on 26<sup>th</sup> January 1975. Diane was 21 and myself 26. I came to Wavering Downs in September 1973 and Diane in 1975. We have both lived here ever since. We have four children all of whom were born from here in the Moranbah hospital. Kyle is 31, Christian 30, Daniel 27 and Kate 24.

Diane has taught all four here at home through Distance Education. We started off through Charleville, then Charters Towers and finally through Emerald as a centre opened up closer to us. Kyle, Christian and Kate did up to Year 7 at home and Daniel stayed on until Year 10. All went onto boarding school. The boys continued on through Dalby Agricultural College leaving with Honours in Ag Studies for Kyle, Associate Diploma in Ag for Christian and Certificates 1, 2 and 3 in Ag Studies and Agricultural Awards for Daniel. Kate has just graduated on 24<sup>th</sup> April with a Bachelor of Education in Early Childhood through South East Queensland University. Kate has the same love for Wavering Downs (Home) as the three boys. Kate decided to get an off farm career in case through life she needed a fall back. While in Toowoomba for Kate's graduation last Sunday we visited the local markets at Cabarlah. When we were walking into the grounds I noticed Kate go out of her way to pat a pony that was there for kid's rides and again on the way out she did the same and here I thought Kate has not lost her love for the land animals.

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## WAVERING DOWNS (Property No.1)

Wavering Downs was a brigalow block which I selected in September 1973. There was no house or buildings, 1 dam and very few fences plus the property was all scrub. The terms were that we had to live on the block for 7 years and do an amount of development which included pulling scrub and seeding with improved pasture, putting down dams for stockwater and fencing which included boundary fences.

There was no power or telephone. The power came in 1982 and the telephone in 1983. We lived in a shed for 6 years and then built our home in 1980.

We have worked very hard to make "Wavering Downs" what it is today.

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## GLENBOWEN

Glenbowen is a 2300 acre property with a 800ML Irrigation licence.

We bought Glenbowen in 2005 to work in conjunction with Johnnycake to grow hay for droughts and weaning. The proposed railway line will go over a black soil area which is a potential area for irrigation ruling it out forever.

When I was looking to buy Glenbowen the owner Peter Ramage pointed out this black soil for me for irrigation. Of course there was no word of a railway line then.

This will potentially take away an earning of approx \$100,000 per year from hay sales.

With the loss of land this it will make Glenbowen smaller and devalue it.

At the moment we run some 190 breeders on Glenbowen and bring the weaners down to Wavering Downs to grow out and fatten

## COAL DUST IMPACT

If allowed to happen the impact from coal dust on our grass would be very high. The cattle will not eat the grass. Wind in our country could blow coal dust 1-2 km across an open paddock. Sometimes we get dust from cars going along our front road which is 1½ km away.

## WORKING CATTLE IMPACT

Our main cattle working yards are situated near to where the proposed railway line will go. From these yards we can let cattle out into six different paddocks or continue on down the lane towards the front of the property. We like to get cattle in and out of the yards on the same day if possible especially the older cattle as they get sour being in the yards overnight. The next time you bring them to the yards they do not want to go through the gate especially Brahman cattle. We have to breed Brahman cattle because they are best suited to the hills on our breeding property at Collinsville. We had very good crossbreed cattle at Wavering Downs and have tried these type of breeders at Collinsville but are finding they cannot handle the ticks and more humid climate.

These yards have become our main trucking yards. There is an old set of yards at the front which are falling down. We will have to replace these yards. As a result of the railway line we will have to walk the cattle some 3-4km to work them through the yards, to dip or spray for buffalo fly and just drafting for whatever reason and also for trucking to market. We will not be able to get them in and out of the yards on the same day.

When we bring our weaners down to Wavering Downs from Johnnycake and Glenbowen at Collinsville we tail them out during the day and then lock them up at night for approx 7 days. We then let them out into the paddock next to the yards. There are two paddocks that we use for introducing weaners to Wavering Downs. The railway line will go straight through the middle of both these paddocks. We will not be able to use these two paddocks for weaners. The first train that comes through in the dark will cause us to be looking for the weaners in the neighbours or another paddock. After one fright like that they will never settle down to feeding. They will continue to graze away from the noise of the train and you will find them at the furthest water point from the railway line.

## IMPACT ON CREEPFEEDING

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We are set up to creep feed calves while on their mothers. We have 32 feed bins covering every water point on the property. We did this for 3 years in 1995, 1996 and 1997. We ran 1000 cows with approx 800 calves. This was the most I have enjoyed my cattle. We sold the vealers through the saleyards at Moreton near Ipswich. The butchers on the Gold Coast said it was the best meat in Queensland. We do not have cows and calves here now only cull cows which may have calved while here. We have never ruled out creep feeding here again. It will all depend on where the best market is. Maybe in two years time we may have looked at it again. But now with the impact from the noise of the trains we will never have the opportunity to do this again. Cows with calves are very sensitive to anything that may harm their calves. If a cow with a baby calf was at a water point near a railway line and a train came along the cow would move away from the threat and her calf would follow. A cow would take her calf to the water point furthest from the railway line if there was one

## **IMPACT FROM FIRE**

I have heard that if a fire is started by a train and gets into our property outside of the railway line fence the fire becomes our responsibility. If that is the case then that **started by a train burns any of my grass then that will affect my income. I will be seeking financial compensation for this impact.** 

Queensland Railway will have to make sure that their locomotives are equipped with the correct spark arresters. There were fires almost every day at the end of last year in the Collinsville area from trains. We were told that the locomotives came from Western Australia and the problem of the spark arresters was to be fixed and was not. You will find that there will always be more grass close to a railway line especially in a bigger paddock as the cattle will feed away from the noise of the trains.

# IMPACT FROM PARTHENIUM WEED

There will be be impact from parthenium weed in some paddocks where there is black soil and natural grasses near fences away from the railway line. Brahman cattle will flog these areas out. We may have to destock these paddocks during the wet season from October to May. We have two ways of fattening beef on Wavering Downs:

Option 1 is fattening on improved pasture with the ability and position to the grain growing area where we have purchased grain for our fattening programme. In our plans for the future we have considered growing our own grain for our finishing programme.

Option 2 which we are set up to use is the use of creep feeders where we have grain available to the calves or vealers to approx 300-400 kg live weight while still on the cows.

First and most importantly we are grass producers and stock watering experts. As can be seen from a visual inspection of Wavering Downs you will see the improved pasture and also a very stock friendly watering system which I put in 24 years ago which saves any animal from a lengthy walk for a drink which is very important in the fattening of an animal. This also saves the cattle from drinking from dams or creeks. An animal will do etter drinking from troughs rather than muddy sources.

We then receive our income from turning this grass and water through cattle into red meat or protein that contributes to the Queensland economy through jobs and in a small but very important way helps to feed the worlds' human population.

There are several ways that the railway line construction and operation will impact on Wavering Downs:

1. The noise from the trains passing through.

2. The coal dust from the wagons blowing across our grass.

3 The way we will have to change working our cattle compared to the way we work now eg: how we check our stock watering points.

4. Fires started by the trains passing through.

5. Grazing pressure on some paddocks with regards to parthenium weed.

I will now address these issues:

The impact from the noise of trains, vehicles and lighting plants.

Introduced cattle on Wavering Downs. My first experience started in 1974 when I purchased 527 cows and calves and put them into our River Paddock of 3500 acres. The River Paddock joins Eaglefield at one end and runs along the Suttor River to the other end where Chesterfield homestead is situated just across the river. In those days there was no rural 240 volt power only lighting plants and lanterns. When I regularly went out to check the cattle I would find 75% or more down Eaglefield end with only a few back Chesterfield homestead end. From 1973-74 wet season to 1977 the wet seasons were very good which resulted in there being water in the melon holes Eaglefield end as well as water in the river. In November 1975 John and Peter Heelen helped me put 300 weaners in the River Paddock. Diane and I went back to Wallumbilla. When returning to Wavering Downs I rode out on horseback and was unable to find many weaners. I wrote in my diary at the time that they must have gotten out of the paddock. I later found them on Eaglefield boundary. At the time I just thought that the country up that end must have sweeter grass. Even in the drier years it did not change and also after pulling the timber in the paddock it did not change the feeding pattern of any cattle we put in that paddock.

It was not until we all, Chesterfield included got the rural 240 volt power connected in 1982 that in the years after that the feeding pattern of the cattle changed. I then realised that it had been the noise caused by the Chesterfield lighting plant that had been causing the cattle to feed at the opposite end of the paddock, some 3-4 km in distance.

In 1979 after clearing 320 acres on the front of Wavering Downs I planted it with forage sorghum to fatten cattle. These were 2-3 year old cattle from the middle of the property. Every time a car went along the front main road the cattle would run approx 1km into a patch of standing scrub so I then had to fence them into the forage sorghum paddock. I then cleared more country for forage cattle feed and the cattle still did the same so I pulled the patch of scrub so the cattle could not hide in it.

In November 2007 we trucked 94 weaners from Johnnycake to Wavering Downs. I put them into the Eaglehawk Nest paddock. Diane and I had to go away so our son Christian came from Johnnycake to Wavering Downs to settle the weaners in. To settle weaners in we tail them out in the day and put them into the yards at night. The Airforce must have had their training path right over the top of the paddock. They turned the jet right on top of the paddock, once during the day and once at night. On both occasions the weaners rushed into the neighbouring property, Sondela. Christian then had to go into Sondela and muster them back. I point out the fact that it is 2 years last November 'hat this happened and these cattle have not completely settled down. If they are

watering at the Jumbo cup and saucer they will come into water just on dark and if I drive up the lane towards them ½ km away they will all rush out the gate before I get there.

2 weeks ago (end of March) is the first time I have been able to get out to the River paddock on a motor bike. At the moment there are 500 plus 12-16 month old weaners running in the River Paddock. In Chesterfield end of the River Paddock there are 5 stock watering points: The Suttor River, 1 cup & saucer out from Chesterfield mailbox, 1 at the blackbutt tree, 1 trough out from the steel yards and 1 at the steel yards. When I got to the cup and saucer out form Chesterfield mailbox there was a large number of cattle, I then went on to the next watering point approx 1 km away. I was very surprised to find no cattle there, as last year most of the cattle were there when checking the waters. The reason being there is now quite a lot of vehicle traffic through the top of our property to Chesterfield which is now owned by the Angus family who are based at another property along the Moranbah road. There is always staff going back and forth between properties early and late in the day but due to the wet season there has been no traffic until recently. Before Angus bought Chesterfield the only cars along that road was the mailman twice a week.

When we wean at Johnnycake we lock the weaners in the yards for four weeks fed on hay. We also have a stereo with two large speakers going on top of a concrete tank at the yards. This is to get the weaners use to different sounds at night. We put a lot of work into our cattle to make them quiet.

Our 3 properties are EU accredited which to meet the market requirements requires a 4 teeth or less beast with no Hormonal Growth Proponent.

The impact from the noise of construction and operation will completely take away our ability to turn off an animal under 4 teeth of age.

The EU market is a premium beef market for us having paid up to 50 cents more a kg dressed that the nearest price for a Jap Ox or \$75- \$300 better per head.

Overviev Wavering Do n developed fin d fattening op Since it was development / well mainta Throughout seeding, sti for raising high numbers of cattle.

In 2005, the family enterprise Mackland Grazing ) to meet the purposes of breeding, fattening and selling cattle was created with the purchase of Johnny Cake a 30,000 acre breeder property, along with Glen Bowen a 2300 acre breeder and irrigation property with the capacity to provide fodder during times of drought.

With these changes, over the past 7 years, Wavering Downs has undergone changes in operational and management practices and has been restructured from a cattle breeding and fattening property to a background and fattening property targeting the EU market.

To achieve these changes, Wavering Downs has for the past 7 years been destocking its breeders and replacing these with EU accredited calves from their Johnny Cake and Glen Bowen properties.

Cattle carrying capacities at Wavering Downs have consistently risen and Mackland Grazing is now beginning to reap the benefits of its strategy as it reaches peak production in 2012.

Johnny Cake and Glen Bowen have now reached peak breeding capacity and cattle numbers on wavering Downs over the past 3 years, ground have increased from 1865 in the financial 2009/2010 to more than 2990 in the financial 20011/2012.

In addition to the infrastructure and pasture improvements, Wavering Downs also holds a European Union Accreditation for the access of beef into Europe. By strategically managing the commercial breeding herds, Wavering Downs is able to produce cattle within the very specific requirements of the export market.

In targeting this market, Wavering Downs is able to gain a further 11% in commercial returns on its cattle sales compared to other properties in the district which cater for the domestic and export cattle market. Such a strategy serves to raise the "effective" carrying capacity of Wavering Downs by 17% compared to other properties in the district which cater for the domestic and export cattle market.

In adopting their current business model, Mackland Grazing has been able to seamlessly integrate the cattle production of Wavering Downs, Johnny Cake and Glen Bowen into a cattle producing business that releases some 1,200 cattle into the market place generating revenue in excess of \$1.15M.,

With cattle production at Wavering Downs, Johnny Cake and Glen Bowen now stable and at peak production, Mackland Grazing looking to expand its operations in the cattle production market.

Commercial- in Confidence

## Overview

Wavering Downs is a freehold tenure property of 7,614 ha (18,814 acres) which has been developed from Brigalow-Gidgee scrub over the past 39 years into a cattle breeding and fattening operation.

Since it was purchased in 1973, it has undergone significant infrastructure and paddock development. Water and fencing improvements are extensive, well constructed and well maintained and the property is now drought proof for water.

Throughout the property, the pastures have been significantly improved through seeding, stick racking, blade ploughing and carry good quality buffel grass suitable for raising high numbers of cattle.

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Commercial- in Confidence

The current rail line proposal and alignment has the potential to significantly disrupt not only the progress made to date but also the revenue streams that have been developed.

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Commercial- in Confidence

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Wavering Downs



The Coordinator General c/- Project Manager, Hancock Coal Rail Corridor Infrastructure and Economic Development Department of Infrastructure and Planning PO Box 15009 City East Qld 4002

Dear Sir,

## Re: Hancock Coal Rail Corridor

We have two properties which will be affected by the proposed railway line. The railway line will go through the heart of our cattle fattening and weaning property and our inigation country on property and line in concerns:

- The affect the noise of the trains will have on our cattle feeding. This will have to be addressed in the compensation package.
- The affect the coal dust would have on our grass country within one to two kilometres of the rail line. This may need to be addressed with wet down points along the line.
- The railway line will go over the top of a lot of our stock watering pipelines. This can be addressed during the construction of the line.
- Any money received by us from the sale of our land and impact compensation is income tax and capital gains tax free. Also any GST is to be paid by Hancock Coal on top of the compensation package.
- 5. If, because of the impact the railway line has on our ability to fatten our cattle, we decide to purchase land elsewhere then all costs incurred eg: stamp duty and other costs incurred will be free of charge.

Our first reaction to the Railway Line was total shock because of the impact financially and working of our cattle business

We realise the enormous benefit to our economy through jobs and the running of our hospitals and schools this project will have.

As long as we receive fair compensation for the impact on our business, we are prepared to work with Hancock Coal to achieve their outcome through our two properties.

Yours sincerely

VAL CORMACK

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## **Diane Cormack**

From: Sent: To: Cc: Subject:

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Attention: Val and Di

Valentine Alexander Wavering Downs (th Hancock Coal Pty Lto ALIV 100 240 010, Hancock Frospecting . by han Acid ove of a set provident . Dspecting) and Hancock Energy Pty Ltd ACN 130 249 624 (Hancock Energy) (together "Hancock") Hancock Alpha Coal Project - Proposed Rail Corridor

We refer to recent communications in connection with this matter.

## **Correspondence to Hancock**

Would you please see below correspondence delivered to Hancock on even date, in accordance with your instructions.

## **Future Action**

We will advise immediately upon receipt of Hancock's further advices.

Should you have any questions in relation to the foregoing, please do not hesitate to contact Barry Taylor or Fiona Pinfold at your convenience.

Regards,

## fiona pinfold



Llability limited by a scheme approved under professional aton dards legislation.

From: Fiona Pinfold Sent: Tuesday, November 29, 2011 8:10 AM To: 'Sten Fraser' Cc: Barry Taylor; Greg Boytar; David McIlwraith; Nicholas Taylor; Belinda Keogh Subject: [100649] Cormack v Hancock (Wavering Downs)

Stuart Wade;

Sten,

Valentine Alexander Troup Cormack and Diane Cormack (Cormack) Wavering Downs (the Land) Hancock Coal Pty Ltd ACN 130 249 973, Hancock Prospecting Pty Ltd ACN 008 676 417 (Hancock Prospecting) and Hancock Energy Pty Ltd ACN 130 249 624 (Hancock Energy) (together "Hancock")

## **Diane Cormack**

From: Sent: To: Cc: Subject:

Tuesday, 29 November 2011 10:12 AM

Barry Taylor; David McIlwraith; Belinda Keogh; Nicholas Taylor [100649] Cormack v Hancock (Wavering Downs)

Attention: Val and Diane Cormack

Valentine Alexander Troup Cormack and Diane Cormack (Cormack) Wavering Downs (the Land) Hancock Coal Pty Ltd ACN 130 249 973, Hancock Prospecting Pty Ltd ACN 008 676 417 (Hancock Prospecting) and Hancock Energy Pty Ltd ACN 130 249 624 (Hancock Energy) (together "Hancock") Hancock Alpha Coal Project – Proposed Rail Corridor

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## Hancock Alpha Coal Project - Proposed Rail Corridor

We refer to recent communications in connection with this matter.

## Hydrology Inspection

Cormack has:

- Advised that it is in order for Hancock to visit on Thursday, 8 December 2011 by helicopter.
- Requested that Hancock make contact with Cormack the night prior to attendance on Cormack is half way through mustering to sell cattle).

as

 Advised that Cormack wishes to entertain discussions with C & R Consulting: Geoff Kavanagh (Kavanagh) at the inspection regarding the flow of water researched from Kavanagh's most recent visit.

Would you please confirm Hancock's acknowledgement of same by return.

## **Cattle Monitoring**

Following various previous discussions between Cormack and Hancock representatives, Emanate delivered a request on behalf of Cormack with respect to cattle monitoring.

Hancock responded by advising that it:

- Does not intend to provide cattle monitoring as it does not consider this to be necessary to arrive at an appropriate value for the purposes of achieving a voluntary agreement with Cormack.
- Is unaware of previous discussions with former contractor Roger Cox (Cox) on this point.
- Considers that any suggestion by Cox that Hancock had committed to monitoring was not correct.
- Reassures Cormack that cattle monitoring has not been agreed on other properties.

We are instructed that:

- The above position is incorrect:
  - Rachel Gibson (Gibson) initiated contact with Cormack and advised "Val I have good news, Hancock have agreed to do a monitoring program."
  - Cox subsequently phoned Cormack and said "Hancock has agreed to do a monitoring program and has asked that Cormack be the first on the program."
  - The foregoing is able to be verified by Gibson and Cox.
- Whether or not cattle monitoring has been agreed on other properties is of no relevance in Cormack's situation.

Hancock unilaterally withdrawing such agreement is unfair to Cormack, who has proceeded in good faith communications with Hancock regarding a claim for compensation to finalise this matter, on the basis that cattle monitoring (a significant concern for Cormack) will be a consideration in such agreement.

Cormack has honoured Cormack's obligations to date, and simply requests that Hancock do the same.

**Future Action** 

We await Hancock's acknowledgement and further advices by return.

Should you have any questions in relation to the foregoing, please do not hesitate to contact Barry Taylor or Fiona Pinfold at your convenience.

Regards,

fiona pinfold

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Email is confidential/privileg ed, directed to the addressee. Enconaous receipt to be deleted. Liability limited by a schemo-approved under professional stan dards legislation.

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## HANCOCK PROSPECTING PTY LTD

Alpha Coal Project Environmental Impact Statement | VOL3 2010

Potential Impact Monitoring Tool Target and Outcomes, Responsibility Timing

Disturbance to cattle and other animals	Monitor cattle	Limit the disturbance to cattle	HPPL and landholders	As required	Cattle movements and growth
	Communication with landholders about the Project (landholder survey)		HPPL and landholders	As required	Cattle movements and growth
Loss of viable land	Monitor cattle reaction and habits (e.g. areas where they graze, camping locations etc)	Limit the loss of viable land	'HPPL and landholders	As required	Pasture quality, cattle movements and growth
Decrease in property values (landholders)	Track property values in the region and other trends that may impact on property values.	For the individual compensation packages to cover the loss in property value.	HPPL	Quarterly	Property values
Increase in property values (regional communities)	Track property values in the region and other trends that may impact on property values.	For the individual compensation packages to cover the loss in property value.	HPPL	Quarteriy	Property values
Increase in local employment and contracting opportunities	Review of Human Resources and procurement data	Maximise local	HPPL	Quarterly	Number of positions offered and advertised locally and the number of local people employed.
Increase in skills shortage	Communication with landholders about the Project (landholder survey)	Reduce impacts on existing skills shortage	HPPL and landholders	Quarterly	Staff retention Recruitment rates
	Business and service providers survey	Reduce impacts on existing skills shortage	HPPL and business and service providers	Quarterly	Staff retention Recruitment rates
Diversification of regional economy	Refer to Economic Impact Management Plan	-	¥	÷	÷

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Indicators to be monitored

o is fact UBLISHING Animal Production Scienc u/journals/an Global nav system dev M. G. Trotter <sup>A</sup>Cooperative Res al Cormo <sup>B</sup>Precision Agricu <sup>C</sup>School of Enviro DCorresponding a

Abstract. The use of global satellite navigation system tracking as a research tool for monitoring livestock activity is increasing. Commercial systems are being developed for the livestock industry. This paper reports on the development of a low-cost, store-on-board Global Positioning System collar suitable for large-scale deployment in livestock herds. A robust collar design that avoids the necessity of external cables has been designed and was tested on beef cattle in western New South Wales. Configured for alternating wake and sleep modes to conserve battery life, the collars obtained a positional fix on 99.9% of attempts. Numerous alternatives for presenting extracted data, based on average diurnal activity, mean daily velocity, Livestock Residence Index and dry sheep equivalent maps are introduced and discussed.

### Introduction

Recent developments in Global Navigation Satellite System (GNSS) technology have resulted in an increased availability and decreased cost of portable GNSS devices. Although the cost of the electronic components of GNSS receiver devices has fallen, even the most basic commercially available animal tracking units remain expensive (>A\$1500). Yet despite the cost, the application of GNSS devices in livestock research is increasing dramatically as researchers examine a variety of animal behaviour and animal resource interactions (Bailey and Jensen 2008; Bertiller and Ares 2008; Putfarken et al. 2008; Swain et al. 2008; Ganskopp and Bohnert 2009; Guo et al. 2009; Tomkins et al. 2009; Trotter et al. 2009; Hampson et al. 2010). Several systems aimed at commercial deployment are being developed (Stassen 2009; Schleppe et al. 2010); however, widespread market penetration is not expected for several years, These real-time tracking systems will provide producers with a range of benefits including the ability to remotely locate the position of livestock, monitor animal welfare and provide an increased understanding of grazing pressure (Turner et al. 2000; Thomas et al. 2008; Petherick and Edge 2009). Until real-time tracking becomes more widely available, researchers and commercial end-users of this technology require simple store-on-board (SOB) systems to generate data suitable for livestock-landscape (for example pasture understanding utilisation) and livestock-livestock interactions (for example behaviour modelling). The data generated from these simple systems is also invaluable to inform the development of more complex, commercial systems. Given the diverse range of potential end-users, research is required to determine how best to analyse spatial data that ensures maximum value, be it for a scientist seeking to understand animal behaviour or a farmer planning the rotation of livestock to optimise pasture utilisation.

As part of an ongoing spatial livestock research program, the University of New England's Precision Agriculture Research Group have been developing low-cost, reliable, SOB GNSS tracking collars and deploying them in commercial environments. The development of an initial prototype (UNEtracker I - Fig. 1) is described by Trotter and Lamb (2008) and was based on a design proposed by Clark et al. (2006). The UNEtracker I collar housed a Global Positioning System (GPS) chipset along with supporting hardware in a polycarbonate enclosure at the base of the collar. The antenna was mounted at the top of the collar and connected to the chipset by coaxial cable which ran down one side of the collar into the polycarbonate box. The collar itself was made from synthetic belting, doubled and stitched down both sides to enable the coaxial cable to pass down the centre. A commercially available Fastrax IT03-02 (Fastrax, Finland) GPS chipset was used as it has an integrated flash memory of 16 MB which can store up to 45 000 positional records and a programmable sleep mode, essential for conserving energy (Trotter and Lamb 2008). Despite several successful deployments (Trotter and Lamb 2008; Berney et al. 2009; Taylor et al. 2009) a design flaw was indentified with the coaxial cable which was prone to damage particularly at the point where it entered the polycarbonate housing connecting the antenna to the polycarbonate box.

For processing and rendering the recorded data for further analysis, Trotter and Lamb (2008) proposed the Livestock Hours Index (LHI). The LHI, measured in hours is an assessment of the total time spent by the animals in a certain area. While proving useful to map the incidence of livestock on the landscape, the LHI is not as readily understood by livestock managers as, for example, the enterprise-relevant dry sheep equivalent (DSE) value (Walcot and Zuo 2003).

This paper has several objectives; first a modified SOB collar, based on the original design of Trotter and Lamb

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# Global navigation satellite system livestock tracking: system development and data interpretation

M. G. Trotter<sup>A,B,D</sup>, D. W. Lamb<sup>A,B,D</sup>, G. N. Hinch<sup>B,C</sup> and C. N. Guppy<sup>A,B,C</sup>

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<sup>C</sup>School of Environmental and Rural Science, University of New England, Armidale, NSW 2351, Australia.

<sup>D</sup>Corresponding author. Email: parg@une.edu.au

Abstract. The use of global satellite navigation system tracking as a research tool for monitoring livestock activity is increasing. Commercial systems are being developed for the livestock industry. This paper reports on the development of a low-cost, store-on-board Global Positioning System collar suitable for large-scale deployment in livestock herds. A robust collar design that avoids the necessity of external cables has been designed and was tested on beef cattle in western New South Wales. Configured for alternating wake and sleep modes to conserve battery life, the collars obtained a positional fix on 99.9% of attempts. Numerous alternatives for presenting extracted data, based on average diurnal activity, mean daily velocity, Livestock Residence Index and dry sheep equivalent maps are introduced and discussed.

### Introduction

Recent developments in Global Navigation Satellite System (GNSS) technology have resulted in an increased availability and decreased cost of portable GNSS devices. Although the cost of the electronic components of GNSS receiver devices has fallen, even the most basic commercially available animal tracking units remain expensive (>A\$1500). Yet despite the cost, the application of GNSS devices in livestock research is increasing dramatically as researchers examine a variety of animal behaviour and animal resource interactions (Bailey and Jensen 2008; Bertiller and Ares 2008; Putfarken et al. 2008; Swain et al. 2008; Ganskopp and Bohnert 2009; Guo et al. 2009; Tomkins et al. 2009; Trotter et al. 2009; Hampson et al. 2010). Several systems aimed at commercial deployment are being developed (Stassen 2009; Schleppe et al. 2010); however, widespread market penetration is not expected for several years. These real-time tracking systems will provide producers with a range of benefits including the ability to remotely locate the position of livestock, monitor animal welfare and provide an increased understanding of grazing pressure (Turner et al. 2000; Thomas et al. 2008; Petherick and Edge 2009). Until real-time tracking becomes more widely available, researchers and commercial end-users of this technology require simple store-on-board (SOB) systems to generate data suitable for understanding livestock-landscape (for example pasture utilisation) and livestock-livestock interactions (for example behaviour modelling). The data generated from these simple systems is also invaluable to inform the development of more complex, commercial systems. Given the diverse range of potential end-users, research is required to determine how best to analyse spatial data that ensures maximum value, be it for a scientist seeking to understand animal behaviour or a farmer planning the rotation of livestock to optimise pasture utilisation.

As part of an ongoing spatial livestock research program, the University of New England's Precision Agriculture Research Group have been developing low-cost, reliable, SOB GNSS tracking collars and deploying them in commercial environments. The development of an initial prototype (UNEtracker I - Fig. 1) is described by Trotter and Lamb (2008) and was based on a design proposed by Clark et al. (2006). The UNEtracker I collar housed a Global Positioning System (GPS) chipset along with supporting hardware in a polycarbonate enclosure at the base of the collar. The antenna was mounted at the top of the collar and connected to the chipset by coaxial cable which ran down one side of the collar into the polycarbonate box. The collar itself was made from synthetic belting, doubled and stitched down both sides to enable the coaxial cable to pass down the centre. A commercially available Fastrax IT03-02 (Fastrax, Finland) GPS chipset was used as it has an integrated flash memory of 16 MB which can store up to 45 000 positional records and a programmable sleep mode, essential for conserving energy (Trotter and Lamb 2008). Despite several successful deployments (Trotter and Lamb 2008; Berney et al. 2009; Taylor et al. 2009) a design flaw was indentified with the coaxial cable which was prone to damage particularly at the point where it entered the polycarbonate housing connecting the antenna to the polycarbonate box.

For processing and rendering the recorded data for further analysis, Trotter and Lamb (2008) proposed the Livestock Hours Index (LHI). The LHI, measured in hours is an assessment of the total time spent by the animals in a certain area. While proving useful to map the incidence of livestock on the landscape, the LHI is not as readily understood by livestock managers as, for example, the enterprise-relevant dry sheep equivalent (DSE) value (Walcot and Zuo 2003).

This paper has several objectives; first a modified SOB collar, based on the original design of Trotter and Lamb

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#### Development of GPS to track livestock herds



Fig. 1. UNEtracker I collar (Trotter and Lamb 2008).

(2008) is described and second the results of a trial deployment of three UNEtracker II collars on a commercial property are presented. Examples of processing and rendering the derived information for use by livestock managers are also presented. This includes representation of the spatial variability in resource utilisation by livestock as a DSE map.

#### Materials and methods

#### UNEtracker II collar development

The UNEtracker II collar (Fig. 2) is an SOB system designed to integrate all components of the commercial GPS chipset used (Fastrax IT03-02), a lithium-thionyl chloride battery and data recording components into a single enclosure, thus avoiding the need for external cables. The collar was designed to contain two independent GPS systems in order to increase system reliability but also the utility to record multiple types of data, or importantly to record information at several different sampling configurations.

The primary GPS device is located in a polycarbonate enclosure (dimensions: length 65 mm, width 65 mm and height 40 mm) at the top of the collar. The optional secondary GPS is housed in a larger polycarbonate enclosure (dimensions: length 120 mm, width 65 mm and height 40 mm) on the bottom of the collar and acts as a counterweight to keep the smaller, top enclosure in place.

The same Fastrax IT03-02 chipset is used in the UNEtracker II collar as the UNEtracker I (Trotter and Lamb 2008); however,



Fig. 2. UNEtracker II collar based on improvements to the Trotter and Lamb (2008) design.

rather than potting the chipset directly into the polycarbonate box it is encased in epoxy along with an integrated antenna (leaving the battery wires and serial port free) to enable installation and removal from the polycarbonate box. When commencing a deployment the chipset and attached battery are simply placed in the polycarbonate box, ensuring a good sky view, and held in place by packing foam.

Depending on the size of the bottom enclosure a larger capacity battery can be used for longer deployment or a longer wake interval allowing the GPS to determine a more accurate position solution from available satellites. When only a single GPS is required, the bottom box can be filled with an appropriate mass to counterbalance the top box.

The accuracy of the UNEtracker chipset has been previously reported (Trotter and Lamb 2008) with a mean error from actual receiver position of 4.14 m and a standard deviation of 3.04 m when subject to a static accuracy test. Results demonstrated 99.9% of points fell within 20 m and 97.3% within 10 m of the known point.

# UNEtracker II test deployment in a commercial environment

The UNEtracker II collar was deployed on three steers located on a commercial property 'Buttabone' in western New South Wales (147°31'E, 31°17'S datum WGS84). Three collars were deployed in a group of 360 steers for a period of 11 days. The collared steers were put out into the paddock at 1500 hours on 15 July 2009 and removed at 1200 hours on 25 July 2009.

The UNEtracker II collars were deployed with only a single GPS system housed in the primary top polycarbonate box. The duty cycle (wake-sleep-wake) for this chipset was set to 600 s. The raw GPS log data were analysed using ArcGIS (ESRI 2006) and Microsoft Excel. Displacement records were derived using 'Hawth's Tools', an add-in for ArcGIS designed to facilitate analysis of ecological and animal movement data (Beyer 2004). This information was exported to Excel and velocities calculated by dividing step length by the time interval recorded between each point. Vertical distances were not taken into account as the paddock was 'flat'. Microsoft Excel was used to graph mean daily velocities, distribution of velocities and instantaneous velocity (based on consecutive GPS records) as functions of hour of day to provide a diurnal activity chart. Based on other studies (Ungar et al. 2005; Trotter and Lamb 2008) an average hourly velocity cut-off of 0.075 m/s was used to categorise the GPS locations into discrete activity sessions of 'night-time low', 'morning high', 'midday low' or 'afternoon high'.

The processed GPS locations were mapped as a LRI on 1-ha cells. This cell size was based on previous research which suggests that smaller grid sizes could have in excess of 30% spatial error in relation to the chosen sample interval of 600 s (Swain *et al.* 2008). A 1-ha grid was overlayed on the point data and the number of points within each grid cell counted for each of the four activity categories described above. The LRI for any given grid cell x (LRI<sub>x</sub>) was calculated using:

$$LRI_{x} = \frac{\sum_{x} Raw \text{ point count}}{\sum_{n} \sum_{x} Raw \text{ point count}}$$
(1)

where n is the number of cells in the entire trial field. As a GPS fix was collected in 99.9% of attempts and standard deviation (10.21 s) of the fixes was low, each point was accepted as representing equal time portions. The proportion of points within each grid cell for each activity category was then calculated and expressed as LRI maps.

'DSE' is a commonly understood measure of stocking rate among graziers and equates to an intake of ~7 MJ of metabolisable energy per day (Walcot and Zuo 2003). In this trial, the DSE rating was based on the herd size of 360 steers of an approximate average weight of 320 kg, equivalent to 8 DSE each (McLaren 1997). As the DSE systems relates to energy intake, only morning high and afternoon high activity categories were analysed given they most likely reflect the majority of grazing activity of the livestock (Hinch *et al.* 1982; Roath and Krueger 1982). A separate LRI was calculated by combining these two category datasets and these were then converted to DSE maps. The DSE value for each grid cell ( $DSE_x$ ) was calculated using:

$$DSE_x = LRI_x \times Total DSE$$
 (2)

where Total DSE is the herd value (360 steers  $\times$  8 DSE/steer). Where the paddock boundaries crossed a 1-ha cell, thereby constraining cattle to only part cells, the  $DSE_x$  for these partial cells was adjusted, proportionally, to accommodate the true cell size in hectares.

#### **Results and discussion**

The integration of all components of the GPS system into a single polycarbonate enclosure significantly increased the robustness and reliability of the UNEtracker II collars. The dual-buckle system of UNEtracker II collars (Fig. 2) avoided the need for the 'bolt and nut' adjustment system of the UNEtracker I design (Fig. 1) and proved better suited to quickly fitting the collars while livestock were restrained in a 'crush'.

During the sleep-wake-sleep cycle, the UNEtracker II GPS devices obtained a fix for an average of 99.9% of all attempts (1418 out of 1420 attempts) with two of the three collars succeeding every time (Table 1). This was attributed to the unimpeded sky view offered to the primary GPS, the flat terrain in which the trial was undertaken and the lack of a dense tree canopy which often impede GPS signals. Although of no consequence to the results of this study, there is some variation between individual collars (Table 1), which has been observed elsewhere (Agouridis et al. 2004). The issue of the number of collars necessary to represent whole-of-herd dynamics is pertinent at this point. Although only a small proportion of the herd was monitored (3 out of 360), this study demonstrates the potential of GPS tracking data for use by producers. Clearly, studying whole-of-herd dynamics requires collars be deployed on each and every animal. However, 'mob monitoring' may only require a small number of collars deployed on strategic animals. Although this consideration is beyond the scope of this present work, it is worth acknowledging the need for further work in this area

The mean daily velocities of the tracked steers reveal some variation between individuals over the 11-day period (Fig. 3). The high rates of travel shown on the first day and the low rates on the last day were not representative of the actual mean daily velocities on these days. This was an artefact of part-day logging on Day 1 when the animals were introduced into the paddock and Day 11 when they were removed. Even among this small sample there is obvious diversity in the mean daily velocities with collar 3

Table 1. Performance statistics of UNEtracker II collars from test deployment

Collar	Samples logged	Samples attempted	Attempted samples completed (%)	Mean sampling interval (s)	Standard deviation of sampling interval (s)
1	1420	1420	100.0	600.33	10.41
2	1414	1420	99.6	600.31 <sup>A</sup>	10.66 <sup>A</sup>
3	1420	1420	100.0	600.25	9.57
Mean	1418	1420	99.9	600.29	10.21

<sup>A</sup>Excludes extended sampling intervals from collar 2 produced as a result of incomplete sample attempts.



Fig. 3. Mean daily velocity travelled by tracked steers over the 11-day period showing the variation between each animal.

showing a generally stable mean daily velocity whereas collar 1 shows a more erratic pattern. The diversity apparent in the results indicate that there may be potential to increase overall production through selection of individual animals that most efficiently utilise the available resources as suggested by Bailey *et al.* (2006).

The distribution of mean velocities of all tracked steers is shown in Fig. 4. In a similar study Swain *et al.* (2008) reported a mean velocity of  $0.10 \text{ ms}^{-1}$ , much higher than the  $0.06 \text{ ms}^{-1}$  found in this study. This is not surprising as Swain *et al.* (2008) used a high fix-rate GPS device with a 0.25-s sample interval. A shorter sample interval is expected to provide a more accurate measure of the absolute movement of the animal and hence absolute velocity. This compares with the velocity records generated by longer sample intervals as in this study, which are inevitably lower as they are calculated from the minimum possible distance travelled by the animal (Johnson and Ganskopp 2008). However, the reduction in average velocity observed in this work is likely to



Fig. 4. Distribution of minimum velocities of all tracked steers over the 9 consecutive days (dashed line represents mean = 0.06).

be partially real as the steers may have moved less due to increased pasture availability. Further research is required to develop systems that provide a better measure of absolute animal movement rather than the minimum estimates commonly generated through point-to-point analysis from duty-cycled GPS.

The distribution of velocities depicted in Fig. 4 shows a similar pattern to that reported by Swain *et al.* (2008), although the velocities observed here are more than 1 m/s higher. This difference may be the result of either the larger paddock size (Hart *et al.* 1993) or younger age of the animals engendering more rapid movement in exploration or regular daily movements (e.g. watering events). One potential application of this type of data in a commercial context would be the use of a combination of velocity records and digital elevation maps for energy expenditure-behaviour analysis, and in particular to ascertain the energy expended during grazing events (Brosh *et al.* 2006).

The diumal activity of the tracked steers (Fig. 5) reveals a similar pattern to that observed in several other studies (Tomkins and O'Reagain 2007; Trotter and Lamb 2008; Tomkins *et al.* 2009). There is a peak of activity in the morning (morning high), followed by a reduced activity during the middle of the day (midday low) before activity gradually increases in the afternoon (afternoon high). Observational studies have shown similar diumal activity with the peaks strongly associated with grazing (Hinch *et al.* 1982; Roath and Krueger 1982; Gibb *et al.* 1998).

One obvious limitation in associating specific time windows to each of the activity categories based on average diurnal activity records alone is the confounding effect of small variations in start and finish times of these activities throughout the recording period. The error bars indicated in Fig. 5 indicate the activity categories based on movement rates are different from one another. Other researchers have sought to directly measure activity levels either in combination with activity sensors or by positional data alone (Putfarken et al. 2008; Guo et al. 2009) and these direct methods are likely to be more accurate. Despite this, there is considerable scope for further research into inferring animal behaviour from position records. The ability to accurately predict grazing behaviour will have profound benefits to the industry, particularly when real-time tracking systems become available. These systems will allow producers to monitor the change in grazing behaviour of their stock in response to the available pasture and more accurately implement paddock rotations to better meet the nutritional needs of livestock while meeting minimum biomass targets. The use of positional records to ascertain behaviour is particularly relevant as some of the commercial tracking systems being planned are ear tag-based (Stassen 2009; Schleppe et al. 2010) and owing to possible weight and size restrictions and the fact that the ear moves independently of the animals' body, the inclusion of activity sensors may not be possible.

Both the raw point records and the subsequently derived LRI map of the trial field (Fig. 6) reveal a clear spatial variation in residence time. The LRI map for all the logged data (Fig. 6b) shows the steers' preference for the northern and eastern areas of the paddock while they appear to avoid the central and southern areas. The same data, partitioned into each of the four activity


Fig. 5. Diurnal activity of tracked steers (mean hourly velocity) in relation to activity defined as high or low (error bars indicate 1 standard deviation). Dashed line shows activity zone cut-off of 0.075 m/s.



Fig. 6. (a) Raw Global Positioning System logged point data and (b) Livestock residence index (LRI  $\times$  100) map for three tracked steers over the 11-day deployment period.

categories and rendered into LRI maps (Fig. 7) indicates the nighttime low activity is mostly isolated to the northern areas of the paddock with some use of the central and south-eastern areas. Morning high activity, most commonly associated with grazing, is isolated to the north-eastern and north-western corners of the paddock while the afternoon high activity reveals a broader use of the entire paddock. In contrast the tracked steers avoided the central and south-eastern areas during their midday low activity periods spending most of this time in the northern area of the paddock probably seeking shade under the few available trees in this location. This shade seeking and its relationship to temperature are well known driving factors in resource utilisation by livestock (Thomas *et al.* 2008). Apart from providing a measure of the variability in spatial utilisation of pastures this data can also be used to inform other management operations. For example; mustering and movement of the livestock might well be better undertaken in the morning when stock is less dispersed than in the afternoon. Providing objective data will become increasingly important as producers strive to increase the productivity and efficiency of extensive heterogeneous pastures through matching animal requirements with seasonal pasture availability.

The DSE map (Fig. 8) and the frequency distribution of DSE ratings for each cell (Fig. 9) provide producers with a familiar



Midday low activity (1000-1300 hours)





Afternoon high activity (1400-1800 hours)

Morning high activity (0600-0900 hours)



Fig. 7. Livestock residence index (LRI  $\times$  100) for steers fitted with UNEtracker II collars during each of the defined activity periods.



Fig. 8. Dry sheep equivalent map for the deployment period.



Fig. 9. Frequency distributions of cell dry sheep equivalent/ha ratings (dashed line shows mean).

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# Conclusions

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### Acknowledgements

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### References

- Agouridis CT, Stombaugh TS, Workman SR, Koosta BK, Edwards DR, Vanzant ES (2004) Suitability of a GPS collar for grazing studies. Transactions of the American Society of Agricultural Engineers 47, 1321-1329.
- Bailey DW (2005) Identification and creation of optimum habitat conditions for livestock. Rangeland Ecology and Management 58, 109–118. doi:10.2111/03-147.1
- Bailey DW, Jensen D (2008) Method of supplementation may affect cattle grazing patterns. Rangeland Ecology and Management 61, 131–135. doi:10.2111/06-167.1
- Bailey DW, VanWagoner HC, Weinmeister R (2006) Individual animal selection has the potential to improve uniformity of grazing foothill rangeland. *Rangeland Ecology and Management* 59, 351–358. doi:10.2111/04.165R2.1
- Berney P, Wilson G, Ryder D, Whalley W (2009) GPS livestock tracking in wetlands. In '13th annual symposium on precision agriculture in Australasia'. Armidale, Australia. (Eds MG Trotter, EB Garraway, DW Lamb) p. 77. (Precision Agriculture Research Group, The University of New England: Armidale)
- Bertiller MB, Ares JO (2008) Sheep spatial grazing strategies at the Arid Patagonian Monte, Argentina. Rangeland Ecology and Management 61, 38–47. doi:10.2111/07-130.1

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behaviour by lactating dairy cows. Grass and Forage Science 53, 41-46. doi:10.1046/j.1365-2494.1998.00102.x

- Guo Y, Poulton G, Corke P, Bishop-Hurley GJ, Wark T, Swain DL (2009) Using accelerometer, high sample rate GPS and magnetometer data to develop a cattle movement and behaviour model. *Ecological Modelling* 220, 2068–2075. doi:10.1016/j.ecolmodel.2009.04.047
- Hampson BA, Morton JM, Mills PC, Trotter MG, Lamb DW, Pollitt CC (2010) Monitoring distances travelled by horses using GPS tracking collars. Australian Veterinary Journal 88, 176–181. doi:10.1111/ j.1751-0813.2010.00564
- Hatt RH, Bissio J, Samuel MJ, Waggoner JW (1993) Grazing systems, pasture size, and cattle grazing behavior, distribution and gains. *Journal of Range Management* 46, 81-87. doi:10.2307/4002452
- Hinch GN, Lynch JJ, Thwaites CJ (1982) A note on the grazing behaviour of young bulls and steers. Animal Production 35, 289–291.
- Johnson DD, Ganskopp DC (2008) GPS collar sampling frequency: effects on measures of resource use. Rangeland Ecology and Management 61, 226-231. doi:10.2111/07-044.1
- McLaren C (1997) 'Dry sheep equivalents for comparing different classes of livestock.' (Department of Primary Industries Victoria: Attwood)
- Petherick J, Edge M (2009) 'Measuring the welfare of livestock in extensive production systems: can we, should we?' (Department of Primary Industries and Fisheries: Rockhampton, Qld)
- Putfarken D, Dengler J, Lehmann S, Hardtle W (2008) Site use of grazing cattle and sheep in a large-scale pasture landscape: a GPS/GIS assessment. *Applied Animal Behaviour Science* 111, 54–67. doi:10.1016/j.applanim. 2007.05.012
- Roath LR, Krueger WC (1982) Cattle grazing and behaviour on a forested range. Journal of Range Management 35, 332–338. doi:10.2307/3898312
- Schleppe JB, Lachapelle G, Booker CW, Pittman T (2010) Challenges in the design of a GNSS ear tag for feedlot cattle. *Computers and Electronics* in Agriculture 70, 84–95. doi:10.1016/j.compag.2009.09.001
- Stassen G (2009) Sirion, the new generation in global satellite communications: livestock GPS tracking and traceback. In '13th symposium on precision agriculture in Australasia: GPS livestock tracking workshop'. Armidale, Australia. (Eds MG Trotter, EB Garraway, DW Lamb) pp. 68–70. (Precision Agriculture Research Group, The University of New England: Armidale)
- Swain DL, Wark T, Bishop-Hurley GJ (2008) Using high fix rate GPS data to determine the relationships between fix rate, prediction errors and patch selection. *Ecological Modelling* 212, 273–279. doi:10.1016/ j.ecolmodel.2007.10.027
- Taylor DB, Hinch GN, Trotter MG, Brown WY, Price IR, Doyle EK, Lamb DW (2009) What can sheep teach us about shelter use? In '13th symposium on precision agriculture in Australasia'. Armidale, Australia. (Eds MG Trotter, EB Garraway, DW Lamb) p. 99. (Precision Agriculture Research Group, The University of New England: Armidale)

means of quantifying spatial variability in paddock utilisation. Three-quarters of the paddock has a stocking rate below the mean of 13 DSE/ha while some areas experience in excess of 50 DSE/ha. Such data may prove useful for producers considering manipulating the spatial resource utilisation patterns of their livestock through strategic location of water points and supplementary feed (Bailey and Jensen 2008), sitespecific management of forage nutritional characteristics (Ganskopp and Bohnert 2009) or through the provision or manipulation of shelter, trails and fencing (Bailey 2005).

### Conclusions

A low-cost, SOB GPS livestock collar has proven to be a sufficiently robust and reliable tracking system for livestock under commercial conditions. Raw GPS point data, and a subsequently derived LRI provided graphic record of the spatial variability in livestock residency across the trial field. A diurnal activity chart enabled partitioned of positional records into activity categories which provides further opportunities for analysing the derived data in relation to understanding livestock energy expenditure and biomass and nutrient removal in fields. A producer relevant means of displaying spatial livestock data is proposed through DSE mapping. In this case the DSE map indicated spatial variability in grazing pressure to a range between less than one-tenth and more than 10 times the average paddock stocking rate.

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### References

- Agouridis CT, Stombaugh TS, Workman SR, Koosta BK, Edwards DR, Vanzant ES (2004) Suitability of a GPS collar for grazing studies. *Transactions of the American Society of Agricultural Engineers* 47, 1321–1329.
- Bailey DW (2005) Identification and creation of optimum habitat conditions for livestock. Rangeland Ecology and Management 58, 109–118. doi:10.2111/03-147.1
- Bailey DW, Jensen D (2008) Method of supplementation may affect cattle grazing patterns. Rangeland Ecology and Management 61, 131–135. doi:10.2111/06-167.1
- Bailey DW, VanWagoner HC, Weinmeister R (2006) Individual animal selection has the potential to improve uniformity of grazing foothill rangeland. Rangeland Ecology and Management 59, 351-358, doi:10.2111/04-165R2.1
- Berney P, Wilson G, Ryder D, Whalley W (2009) GPS livestock tracking in wetlands. In '13th annual symposium on precision agriculture in Australasia'. Armidale, Australia. (Eds MG Trotter, EB Garraway, DW Lamb) p. 77. (Precision Agriculture Research Group, The University of New England: Armidale)
- Bertiller MB, Ares JO (2008) Sheep spatial grazing strategies at the Arid Patagonian Monte, Argentina. Rangeland Ecology and Management 61, 38-47. doi:10.2111/07-130.1

- Beyer HL (2004) Hawth's Analysis Tools for ArcGIS. Available at http:// www.spatialecology.com [Accessed 18 February 2010]
- Brosh A, Henkin Z, Ungar ED, Dolev A, Orlov A, Yehuda Y, Aharoni Y (2006) Energy cost of cows' grazing activity: use of heart rate method and the global positioning system for direct field estimation. *Journal of Animal Science* 84, 1951–1967. doi:10.2527/jas.2005-315
- Clark PE, Johnson DE, Kniep MA, Jermann P, Huttash B, Wood A, Johnson M, McGillivan C, Titus K (2006) An advanced, low-cost, GPS-based animal tracking system. *Rangeland Ecology and Management* 59, 334–340. doi:10.2111/05-162R.1

ESRI (2006) 'ArcGIS 9.3.' (ESRI: Redlands, CA)

- Ganskopp DC, Bohnert DW (2009) Landscape nutritional patterns and cattle distribution in rangeland pastures. *Applied Animal Behaviour Science* 116, 110–119. doi:10.1016/j.applanim.2008.10.006
- Gibb MJ, Huckle CA, Nuthall R (1998) Effect of time of day on grazing behaviour by lactating dairy cows. Grass and Forage Science 53, 41–46. doi:10.1046/j.1365-2494.1998.00102.x
- Guo Y, Poulton G, Corke P, Bishop-Hurley GJ, Wark T, Swain DL (2009) Using accelerometer, high sample rate GPS and magnetometer data to develop a cattle movement and behaviour model. *Ecological Modelling* 220, 2068–2075. doi:10.1016/j.ecolmodel.2009.04.047
- Hampson BA, Morton JM, Mills PC, Trotter MG, Lamb DW, Pollitt CC (2010) Monitoring distances travelled by horses using GPS tracking collars. Australian Veterinary Journal 88, 176–181. doi:10.1111/ j.1751-0813.2010.00564
- Hart RH, Bissio J, Samuel MJ, Waggoner JW (1993) Grazing systems, pasture size, and cattle grazing behavior, distribution and gains. *Journal of Range Management* 46, 81–87. doi:10.2307/4002452
- Hinch GN, Lynch JJ, Thwaites CJ (1982) A note on the grazing behaviour of young bulls and steers. Animal Production 35, 289–291.
- Johnson DD, Ganskopp DC (2008) GPS collar sampling frequency: effects on measures of resource use. Rangeland Ecology and Management 61, 226–231. doi:10.2111/07-044.1
- McLaren C (1997) 'Dry sheep equivalents for comparing different classes of livestock.' (Department of Primary Industries Victoria: Attwood)
- Petherick J, Edge M (2009) 'Measuring the welfare of livestock in extensive production systems: can we, should we?' (Department of Primary Industries and Fisheries: Rockhampton, Qld)
- Putfarken D, Dengler J, Lehmann S, Hardtle W (2008) Site use of grazing cattle and sheep in a large-scale pasture landscape: a GPS/GIS assessment. *Applied Animal Behaviour Science* 111, 54–67. doi:10.1016/j.applanim. 2007.05.012
- Roath LR, Krueger WC (1982) Cattle grazing and behaviour on a forested range. Journal of Range Management 35, 332–338. doi:10.2307/3898312
- Schleppe JB, Lachapelle G, Booker CW, Pittman T (2010) Challenges in the design of a GNSS ear tag for feedlot cattle. *Computers and Electronics* in Agriculture 70, 84–95. doi:10.1016/j.compag.2009.09.001
- Stassen G (2009) Sirion, the new generation in global satellite communications: livestock GPS tracking and traceback. In '13th symposium on precision agriculture in Australasia: GPS livestock tracking workshop'. Armidale, Australia. (Eds MG Trotter, EB Garraway, DW Lamb) pp. 68–70. (Precision Agriculture Research Group, The University of New England: Armidale)
- Swain DL, Wark T, Bishop-Hurley GJ (2008) Using high fix rate GPS data to determine the relationships between fix rate, prediction errors and patch selection. *Ecological Modelling* 212, 273-279. doi:10.1016/ j.ecolmodel.2007.10.027
- Taylor DB, Hinch GN, Trotter MG, Brown WY, Price IR, Doyle EK, Lamb DW (2009) What can sheep teach us about shelter use? In '13th symposium on precision agriculture in Australasia'. Armidale, Australia. (Eds MG Trotter, EB Garraway, DW Lamb) p. 99. (Precision Agriculture Research Group, The University of New England: Armidale)

Development of GPS to track livestock herds

- Thomas DT, Wilmot MG, Alchin M, Master DG (2008) Preliminary indications that Merino sheep graze different areas on cooler days in the Southern Rangelands of Western Australia. Australian Journal of Experimental Agriculture 48, 889–892. doi:10.1071/EA08061
- Tomkins NW, O'Reagain PO (2007) Global positioning systems indicate landscape preferences of cattle in the subtropical savannas. *The Rangeland Journal* 29, 217–222. doi:10.1071/RJ07024
- Tomkins NW, O'Reagain PJ, Swain D, Bishop-Hurley G, Charmley E (2009) Determining the effect of stocking rate on the spatial distribution of cattle for the subtropical savannas. *The Rangeland Journal* 31, 267–276. doi:10.1071/RJ07070
- Trotter MG, Lamb DW (2008) GPS tracking for monitoring animal, plant and soil interactions in livestock systems. In '9th international conference on precision agriculture'. Denver, Colorado. (Ed. R Khosla) (Colorado State University: Fort Collins, USA)
- Trotter MG, Lamb DW, Hinch GN (2009) GPS livestock tracking: a pasture utilisation monitor for the grazing industry. In 'New South Wales Grasslands Society conference'. Taree, Australia. (Eds D Brouwer, N Griffiths, I Blackwood) pp. 124–125. (New South Wales Department of Primary Industries: Orange, NSW)

- Turner LW, Udal MC, Larson BT, Shearer SA (2000) Monitoring cattle behavior and pasture use with GPS and GIS. Canadian Journal of Animal Science 80, 405–413. doi:10.4141/A99-093
- Ungar ED, Henkin Z, Gutman M, Dolev A, Genizi A, Ganskopp D (2005) Inference of animal activity from GPS collar data on free-ranging cattle. *Rangeland Ecology and Management* 58, 256–266. doi:10.2111/1551-5028(2005)58[256:10AAFG]2.0.CO;2
- Walcot J, Zuo H (2003) Spatial patterns and temporal trends in productivity of Australian agriculture. In 'Proceedings of 11th Australian agronomy conference'. Geelong, Victoria. (Ed. M Unkovich) (The Regional Institute Ltd: Gosford, NSW)

Manuscript received 15 December 2009, accepted 14 April 2010

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Val and Diar

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Dear Val and Diane

### Alpha Coal Project (Rail) **Original Information and Consent Form**

Thank you very much for your time and hospitality while participating in the SIA case study for the Alpha Coal Project (Rail).

O Com

Please find attached your original signed Information and Consent Form and your copy of the Queensland Country Life.

Yours faithfully GHD Pty Ltd

.. **Rachel Gibson** 

Social Impact Assessment Consultant



# 21 May 2010

Val and Diane Cormack

Our ref: 41/22090/10/405189 Your ref:

Dear Val and Diane

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Please find attached your original signed Information and Consent Form and your copy of the Queensland Country Life.

Yours faithfully GHD Pty Ltd

11 **Rachel Gibson** Social Impact Assessment Consultant



# **Construction Stage**

Impact	Negative/Positive	Mitigation/Enhancement	Monitoring
The cattle business will go broke because of the disturbance to cattle.	Negative	Work with Hancock Coal to prevent the business from going broke. Compensation package to be finalised and relevant payments made prior to construction beginning.	n/a
Change the grazing and feeding pattern of the cattle,	Negative	Reconfigure fencing and infrastructure (e.g. roads, watering points, stockyards) when the alignment is being fenced. Hancock Coal to pay and organise the fencing to take place.	n/a
		Provide access across the corridor during construction – do not cut the access during the construction.	
		Need to leave some high ground for the cattle to stand on during the wet season and winter (colder temperatures).	ш.
Change in the way mustering is undertaken due to the reconfiguration of fences and construction noise (large impact).	Negative	This is something landholders will have to work through.	n/a
Decrease in property value.	Negative	To be negotiated between Hancock Coal and the landholders prior to the project starting.	n/a
Noise disturbing cattle, introduced cattle feed away and stay away from noise even if there is good pasture and water sources and cattle (especially weaners) rushing at night with the noise. Cattle already rush with natural noises such as a plain turkey being spooked or wild pigs (sow and piglets) travelling walking through the paddock.	Negative	Monitoring of cattle prior to construction, during construction and during operation – monitoring to be undertaken by an objective third party (e.g. university). Monitoring program to be designed in consultation with landholders. Hancock Coal and landholders	Monitoring the cattle together with a third party, must be started as soon as possible.



# DRAFT ONLY - FOR LANDHOLDER REVIEW

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Impact	Negative/Positive	Mitigation/Enhancement	Monitoring
		agree to use the evidence. It would be up to Hancock Coal to prove that cattle were not being impacted, rather than landholders having to prove that the cattle is being impacted. It is important to listen to the landholders	
Fear for the safety of women and children living on the property.	Negative	About now it is impacting their business.      Construction camps should:     have a no drug and no alcohol policy     (dry camp)	n/a
		<ul> <li>have random testing of construction workforce</li> </ul>	· · · · ·
		rosters that allow construction workers to see their families on a regular basis	
×		<ul> <li>only allow construction workers out of the camps to work or to go home</li> </ul>	
		no hunting when not on roster (e.g. if workers live locally)	
		Fence the construction camp within the construction corridor so workers do not access properties. If working on the project – stay on the Hancock Coal land.	
Impacts on working dogs	Negative	Have to get the working dogs used to the new noises and people.	n/a
Pig and kangaroo hunting – increased access to landholders properties because of the construction corridor.	Negative	The alignment and camps need to have appropriate security to ensure the workers do not go hunting or tell their mates about good hunting spots along the alignment.	n/a

# DRAFT ONLY - FOR LANDHOLDER REVIEW

Impact	Negative/Positive	Mitigation/Enhancement	Monitoring
Impact from fire (large impact if there is a fire)	Negative	Landholders will have to work with Hancock Coal.	n/a ,
Impacts from parthenium weed.	Negative	Landholders may have to destock some paddocks during the wet season.	n/a
Changes to the environment.	Negative	Design the railway to take into consideration the geographically isolated storms which can flood small dry creeks and gullies.(	

# **Operational Stage**

Impact	Negative/Positive	Mitigation/Enhancement	Monitoring
Noise disturbing cattle, introduced cattle feed away and stay away from noise even if there is good pasture and water sources and cattle (especially weaners) rushing at night with the noise. Cattle already rush with natural noises such as a plain turkey being spooked or wild pigs (sow and piglets) travelling walking through the paddock.	Negative	Loss of production will have to be addressed in the compensation package. Build more secure fencing to keep the cattle in the paddocks (e.g. cattle rail on the corners of the paddocks)	Monitoring the cattle together with a third party, must be started as soon as possible.
Impacts of coal dust - cattle will not eat the pasture with coal dust on it.	Negative	Design and use covers for the wagons so there isn't any coal dust.	n/a
Impacts of coal dust on people living and working near the alignment.	Negative	<ul> <li>Design and use covers for the wagons so there isn't any coal dust.</li> </ul>	n/a
Decreased safety for landholders and their employees because of the high frequency of working near or going over the railway (e.g. to check watering points, mustering, maintenance etc)	Negative	Inform the landhoiders of how many trains per day and when. Provide access across the railway for landholders, either overpasses or underpasses.	n/a
Decreased safety of animals such as working dogs and horses. It can take up to seven years to train a lead working dog. Working dogs are critical to running the property, particularly mustering. Loosing a working dog is the equivalent of loosing an employee.	Negative	Train the working dogs and allow them to get used to the train. However this will take more time and distract from running the business as it used to be prior to the railway, so it will increase the workload.	n/a
Pig and kangaroo hunting – increased access to landholders properties because of the construction corridor. This will be a very sensitive issue for Hancock Coal and the landholders. There is an existing history of pig hunters causing problems for landholders. If not handled sensitively, the pig shooters could "drop a match" (which they have threatened some landholders with) and burn out	Negative	Security. Train drivers to report any vehicles/people in the corridor (pig hunters may have their lights turned off to access the corridor and when a train is corning). Fly the alignment on a random basis (dawn	n/a

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# DRAFT ONLY - FOR LANDHOLDER REVIEW

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Impact	Negative/Positive	Mitigation/Enhancement	Monitoring
property and their neighbours as well.		and dust - when pig hunters are moving).	
Impact from fire.	Negative	Spark arresters are to be installed and maintained.	n/a
Impacts from parthenium weed where there is black soil and natural grasses near and away from the corridor.	Negative	Landholders will have to destock a paddock during the wet season.	n/a

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ate Legal Idancock. Liability limited by a se From: Sent To: Cc: **Subject**:

Attention: Val a

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Valentine Alexa Wavering Down

Hancock Coal Pty Ltd ACN 130 249 973, namer in supering in the second state of the second sec

ck Prospecting) and

We refer to our correspondence to Maloney Field Services (MFS) dated 26 October 2011 (copy below).

**Current Status** 

We have received advice that MFS has referred the same to Hancock for a response.

**Future Action** 

Subsequent to receipt of further advice from MFS and/or Hancock we will revert to you,

Should you wish to discuss the foregoing please do not hesitate to contact Barry Taylor.

Regards

# marie barnsley

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## From: Marie Barnsley

Sent: Wednesday, 26 October 2011 11:00 AM To: Ian David Cc: Barry Taylor; Nicholas Taylor; Belinda Keogh; Fiona Pinfold Subject: [100649] Cormack v Hancock (Wavering Downs)

Attention: Ian David

Valentine Alexander Troup Cormack and Diane Cormack Wavering Downs

Hancock Coal Pty Ltd ACN 130 249 973, Hancock Prospecting Pty Ltd ACN 008 676 417 (Hancock Prospecting) and Hancock Energy Pty Ltd ACN 130 249 624 (Hancock Energy) (together "Hancock") Hancock Alpha Coal Project – Proposed Rail Corridor

We refer to previous correspondence and discussions.

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From:	Marie Barnsley	
Sent	Monday, 31 October 2011 12:11 PM	
To:	'Val and Diane Cormack'; 'Grant Roberts'	
Cc	Barry Taylor; Belinda Keogh; Nicholas Taylor; Fiona Pinfold	
Subject:	[100649] Cormack v Hancock (Wavering Downs)	

Attention: Val and Diane Cormack / Grant Roberts

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We refer to previous correspondence and discussions.

### **Request for Information**

We have been requested by Cormack to obtain clarification from Hancock with respect to the following issues:

### Monitoring

 In Cormack's case study with GHD Cormack quoted "Monitoring the cattle together with a third party must be started as soon as possible".

GHD: Rachel Gibson (Gibson) was the staff member involved with Cormack for the case study along with Hancock: Roger Cox (Cox).

Gibson has spoken to Hancock regarding the importance of the monitoring before construction commenced.

More than twelve (12) months ago Cox informed Cormack that Hancock had approved the monitoring program and that Cox had requested Cormack be put on the first list.

 A monitoring program on cattle on Wavering Downs must be over twelve (12) months to cover when Cormack's weaners arrive from Johnnycake Station to when Cormack sells its fats to the following year. Several paddocks that Cormack have quoted covering some 15000 acres (not 15 metres each side of the railway easement).

Would you please advise whether or not Hancock:

- Is going to complete a monitoring program; or
- Accept that there is going to be financial impact on livestock and are going to pay compensation for the same.
- .

3. Cormack is not interested in the result of a before and after (railway).

Cormack are fully aware of impact on introduced Brahman cross cattle on Wavering Downs and accordingly Cormack will be claiming for compensation before construction commences.

### Disturbance to Cattle

Cormack have been advised by Hancock staff that Hancock have accepted and cannot argue against the issue of disturbance of cattle.

Would you please confirm Hancock's acceptance with respect to the same.

**Future Action** 

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Cormack request a concise response from Hancock in relation to the matters raised herein.

We await your response.

Should you wish to discuss the foregoing please do not hesitate to contact Barry Taylor.

Regards

# marie barnsley

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voise of trains. U sort this out . 5.2 actual boidance. 5.2.1 野 Comment -I cannot fin h my Val Cormarc property ear d the ability to fail > hoan Response -As detailed in Volume 3 Section 2. 5. 2 of the EIS, for the nominated transportation of 60 Mipa of coal,

seven (7) trains per day (14 train movements) will be required on average per day. Poiss g every: There is going to be only 1 easement with a train

### Comment-RC4

Hancock Prospecting are predicting up to 120 Mtpa on the proposed railway line with third party users. Quoting 14 trains per day is not acceptable.

Response - RC4

As detailed in Volume 3 Section 1. 3 of the EIS, the Project will enable export of 60 Mipa of quality thermal coal for a lifespan of approximately 30 years, not 120 Mipa as mentioned in this submission. Augmentation of the rail infrastructure to accommodate a capacity greater than 60 Mipa to meet future demands generated via third party access agreements will require further impact assessment and approvals subsequent to this EIS.

This is not correct regarding the final number

5.2.2 Noise and Vibration

Comment-RC5

It is expected that livestock will adapt to the noise and will not suffer stress from noise. This is not accepted. As such no miligation measures are proposed. This is not accepted.

Response - RC5

The criteria adopted by the US Department of Transportation Federal Railroad Administration (FRA) for potential noise impacts on wildlife is 100 dB(A)SEL. This criteria is much higher than the criteria used in the assessment for sensitive receivers. Noise measurement data from the Hunter Valley coal trains indicates the 100 dB(A) SEL criteria for animals would only be exceeded within approximately

10 metres of the rall corridor (Australian Rall Track Corporation, 2009). On this basis, noise impacts

on Import on Cost Clo. on wildlife are not expected to be an issue. & will prove (his lan A correra Nega Conourd

5.2.3 Land Use and Tenure

Comment-RC6

Compensation payment must be agreed to by myself and paid in full by Hancock Prospecting Pty Ltd before any construction of any form begins on Wavering Downs. The compensation must cover the full life time of the railway line. Not just capitalised out for 18 years. The impact from train noise will be the same in 100 years.

Section 05 | Comments and Responses - Railway Conidor | Page 5-6 | HC-URS-86100-RPT-0002

### 5.2 Cormack, Val

### 5.2.1 Executive Summary

Comment - RC3

I cannot finalise my compensation claim until I know how many trains will be passing through my property each day. This is because the noise of each train will impact highly on my cattle and the ability to fatten our beef cattle for the EU market which has no ge limit and been

Response - RC3

left of my sulemissions.

HANCOCK PROSPECTIVE FITLE

As detailed in Volume 3 Section 2. 5. 2 of the EIS, for the nominated transportation of 60 Mtpa of coal, seven (7) trains per day (14 train movements) will be required on average per day.

There is going to be only 1 easement with a train passing every 20m

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Section 05 | Comments and Responses - Railway Corridor | Page 5-6 | HC-URS-88100-RPT-0002

# HANCOCK PROSPECTING FLY LTD why designed and the second states of the second states of the second states of the second states of the second

### Response - RC6

Negotiations with individual landowners are continuing. These comments are noted and will be taken into consideration during further discussions with the Proponent.

### Comment-RC7

If, because of the impact to our operational beef producing business we have to purchase more land then, If this land is not already Freehold it is to be made Freehold by Hancock Prospecting as Wavering Downs is Freehold country and also all costs, stamp duty etc be paid by Hancock Prospecting Pty Ltd.

### Response - RC7

HPPL must follow the 1999 Guidelines on acquisition of land by a third party (under the State Development and Public Works Organisation Act 1971 (SDPWO Act)), and is also subject to the Acquisition of Land Act 1967 (AL Act). Impacts of the railway line are required to be mitigated and/or compensated in accordance with the compensation provisions of the AL Act.

### Comment - RC8

No small water reservoirs to be left on 'Wavering Downs'. Cattle do not drink or do well from muddy waters.

### **Response - RC8**

Volume 3 Section 2. 7 Decommissioning and Rehabilitation of the EIS identifies that at the completion of the construction activities for civil and track work, all temporary construction facilities and areas will be rehabilitated. This includes the rehabilitation of any temporary turkey nest dams that may be required.

### 5.2.4 Air Quality

### **Comment - RC9**

With the potential for coal dust to escape form the wagons with the very strong winds we experience in our area. The risk to our health and the health of our livestock and the effect to meat quality may be very high.

### **Response - RC9**

The strength of the winds in any area is a minor influence on coal disperment as the emission estimate is based on the 80 km/hr train speed causing the coal dust lift-off. The modelling undertaken has accounted for the prevailing speed and direction of ambient winds (much lower than the train forward speed) when calculating the likely coal dispersion.

Although the majority of the coal on and around existing rall networks comes from spillage from the wagons during loading and unloading, coal dust lift off from the exposed coal surface is considered a serious environmental issue. HPPL fully appreciates this issue and is currently undertaking a study to investigate the best approach to address and minimise coal dust emissions. The study will investigate how wagon shape and design, wagon covers and spray treatments (water sprays or polymer) can reduce coal dust emissions. This study is also seeking to understand other sources of dust and coal contamination.

Section 05 | Comercints and Responses - Railway Corridor | Page 5-7 | HC-URS-88100-RPT-0002

It is also noted that in addition to environmental drivers, there are economic ones related to coal loss, possible fuel savings and reduced maintenance which will support the recommendations and outcomes from these investigations.

HANCOCK PROSPECTING FTY LTD Anthropological and an anthropological website

Cover the wagono

### Comment - RC10

The trains will be sounding their homs at level crossings, three times each way on Wavering Downs, approx. 42 times in daylight hours. The impact on introduced cattle (Brahman Cross) will be very big. Cattle are animals of prey and need to be treated the same way as Fauna in many ways. There will also be lights from the trains and signal equipment operating at night.

**Response** - RC10

For the safety of road users and the wider community, trains will be required to intermitantly sound horns at level crossings. Your concerns are noted. However, it is expected that livestock will adapt to the noise and will not suffer stress from such noise sources. Noise measurement data from a Hunter Valley coal rail project indicates the 100 dB(A) SEL (the criteria adopted by the US Department of Transportation Federal Railroad Administration (FRA) for potential noise impacts on wildlife) criteria for animals would only be exceeded within approximately ten m of the rail condor. On this basis, noise impacts on wildlife are not expected to be an issue (Australian Rail Track Corporation, 2009).

e layound any doubt that Response-RC10 & will Pro 5.3 Heelan, John

5.3.1 Description of the Project

Comment -RC11 'f.

This section has been completely glossed over, as the availability of water will provide a massive challenge to the success of this project. The average requirements of 22. 2 mega litres per km of line is a huge volume of water and when it is intended to be drawn from underground aquifers it has the potential to cause serious and permanent damage to certain underground systems.

### Response - RC11

The proponent intends to draw construction water from a number of available sources as addressed in Volume 3 Sections 11 and 12 of the EIS. In addition, the Proponent is currently undertaking a study to investigate potential water supplies, including:

- existing major pipelines;
- existing bores and new bores;
- natural watercourses;
- sinking dams;
- damming creeks or guilles;
- reuse of water from the Alpha Mine site; and
- town water supply systems.

Initial investigations from this study indicate that there may be an opportunity to utilise groundwater for rail construction purposes in the northern section of the alignment (north of the Bogle River). However further investigations will need to occur before this can be confirmed. Should water be





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The LPA program is integral to upholding the reputation of Australia's livestock industry and in particular our beef, sheep and goat meat products.

At the time of obtaining LPA Accreditation, a representative of each accredited PIC agreed to the requirements and conditions of being in the LPA program. This original commitment coincided with PIC representative first seeking to order LPA NVDs.

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To proceed, follow the steps below.

Step 1: Tell us who you are

What is your role:	- Please Select -
Please confirm your name: (Given Name)	
(Surname)	

Before I can order your NVDs, you need to complete and agree to the LPA Commitment Declaration

# **Background:**

1 - 1 -

The Livestock Production Assurance (LPA) program is the Australian livestock industry's on-farm food safety program. It meets the stringent requirements of our export markets, providing an assurance of the safety of red meat grown on Australian farms.

The LPA program is integral to upholding the reputation of Australia's livestock industry and in particular our beef, sheep and goat meat products.

At the time of obtaining LPA Accreditation, a representative of each accredited PIC agreed to the requirements and conditions of being in the LPA program. This original commitment coincided with PIC representative first seeking to order LPA NVDs.

# **Confirming your Commitment:**

To ensure that LPA accredited producers continue to maintain their awareness of the on-farm practices required under LPA, the LPA Advisory Committee (LPAAC) has introduced a requirement for all accredited producers to confirm their ongoing commitment to the program.

It is important to note that this commitment confirmation must be completed by either the property (PIC) owner, manager or person responsible for the husbandry of the livestock.

To proceed, follow the steps below.

Step 1: Tell us who you are	(1	
What is your role:	- Please Select -	<b>v</b>
Please confirm your name: (Given Name)		
(Surname)	]	

Next >

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To proceed, follow the steps below.

# Step 1: Tell us who you are

• What is your role: | Please confirm your name: (Given Name)

1e) Val

Ow ner

V

(Surname) Cormack

# **Location Address:**

We would like to confirm your location address.

Address: \*

Town: \*

State: \*

Postcode: \*

# Email Address:

Please advise your email address. (Leave blank if they do not have one)

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Email:

1. I understand th is restricted to

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Val Comack

VDs)

Accept | Decline

Accept | Decline

2. I have read and understood the requirements of the LPA Program as described in the LPA Rules and Standards (as amended from time to time);

3. I will seek to ensure all persons with access to LPA NVDs for this PIC will comply with the requirements of the LPA Rules and Standards at all times;

Accept | Decline

4. I will ensure that all records required by LPA Administration and the LPA Rules and Standards are maintained, including auditable evidence to demonstrate compliance with the five (5) elements of the LPA Standards: Property Risk Assessment, Animal Treatment records, <u>Agricultural Chemical Usage and Stockfeeds</u>, Preparation of Livestock and Livestock Movements and Transactions;

Accept | Decline

 I will provide access to LPA Administration to conduct random audits as required under the LPA program (irrespective of whether the business is a hobby farm, small/large operation, or is currently destocked); Email:

14

dbrucesmil Next >

1. I understand that eligibility to use LPA National Vendor Declarations (LPA NVDs) is restricted to PICs that are accredited under the LPA Program;

2. I have read and understood the requirements of the LPA Program as described in the LPA Rules and Standards (as amended from time to time);

Accept | C Decline

Accept | Decline

Accept | Decline

Accept | Decline

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5. I will provide access to LPA Administration to conduct random audits as required under the LPA program (irrespective of whether the business is a hobby farm, small/large operation, or is currently destocked);

bety as the owner It is my reapon under the livestock apour - L.P.L regard regramto inf Y.X.K ba ept | Decline uption will be putting a molustrial Centan and 8. 6. I wied Nai e LPA Rules and no satte Star most ( Cormack Accept Decline

7. I will cease using NVDs displaying the LPA logo if accreditation is withdrawn;

Accept | Decline

8. All information provided to LPA applicable to this PIC is correct to the best of my knowledge;

Accept | Decline

9. <u>I will inform LPA Administration of all changes applicable to the LPA</u> Accreditation of PIC TESTMODE;

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Accept | Decline

10.You, **Deb Pinard** as the authorised representative of Property Identification Code (PIC) **TESTMODE**, located at **Constitution of the end of** 

# IVESTOCK

# Producers asked to commit to LPA

# Governor to open breed headquarters

GOVERNOR of Queensland, Penelope Wensley AC, will officially open the new beadquarters for Droughtmaster Australia during the Royal Queensland Show next week.

After almost 20 years of being based at the University of Queensland Vet School Farm at Pinjarra Hills, the Society recently moved its headquarters to Ipswich.

The society needed more office space and after a lengthy search purchased a federation-style residence on the edge of the Ipswich CBD, which was converted into professional offices.

This move has additional significance, given that the society is celebrating its Golden Jubilee this year.

The Governor will be hosted by society president, Rob Atkin-son, who is also grandson of one of the breed's founding fathers, Monty Atkinson.

The official opening is at 9.30am on Friday, August 10, at 40 Thorn Street, Ipswich.

Some 50 guests, members and associates are expected to attend. AS consumer scrutiny of the production of food grows, Australia's livestock producers are being asked to once again commit to the Livestock Production Assurance (LPA) program.

LPA is the Australian livestock industry's on-farm food safety program introduced seven years ago.

It underpins the LPA national vendor declaration (NVD), which all LPAaccredited producers are required to sign when selling livestock.

From August 1, 2012, accredited producers will be required to confirm their commitment to the LPA program when ordering new NVD booklets. If they do not, they will be unable to purchase the booklets.

"In signing the declaration, producers are pledging that they have carried out all the farm management practices that underpin the LPA standards." said Kevin Roberts, LPA advisory committee chairman. These practices ensure that the red meat produced is safe to eat, and meets the stringent conditions of our export markets.

"The success of our livestock industry is underpinned by Australia's enviable reputation as a producer of safe red meat.

"We export red meat to over 100 countries with varying food safety and market requirements.

"LPA provides a food safety assurance to these customers.

"It's about every individual producer fulfilling their responsibility in the safe production of red meat.

"Signing the LPA NVD demonstrates that producers stand by what they sell."

Mr Roberts said the Australian red meat industry, its reputation in both domestic and international markets, and the livelihoods of individual livestock producers were dependent upon all participants fulfilling the obligations of



Kevin Roberts, LPA advisory committee chairman, said signing the LPA NVD "demonstrates that producers stand by what they sell".

LPA accreditation. It also helped to ensure that livestock sold for the highest possible price and was not discounted.

To renew their commitment to the program, producers are required to complete a declaration with nine questions.

This can be done online via www.mla.com.au/lpa or by calling the LPA helpline on 1800 683 111. "Accredited producers have previously agreed to the requirements of the program, and the recommitment process is a way to ensure awareness of the onfarm practices required under LPA is maintained," Mr Roberts said.

"The LPA advisory committee has agreed to this way forward because all LPA-accredited producers need to be aware of and understand their responsibilities under the program."

FOOD SAFET

LPA is overseen by the industry's LPA advisory committee (LPAAC) which is made up of representatives of peak bodies in the red meat production business and aims to provide an assurance of the safety of red meat grown on Australian farms.

FACT SHEET #3

# LPA Requirements: #3

# Fodder crop, grain and pasture treatments and stock foods



FACISTICS

What?

The Livestock Production Assurance (LPA) program is the Australian livestock industry's on-farm food safety program. It meets the stringent requirements of our export markets, providing an assurance of the safety of red meat grown on Australian farms.

When farmers become LPA-accredited, they are promising to meet LPA's requirements and fulfil their responsibility in the safe production of red meat. The management of **fodder crop, grain and pasture treatments and stock foods** is just one of five elements that farmers need to satisfy to become LPAaccredited.

Every LPA-accredited producer must undertake to minimise exposure of livestock to foods containing unacceptable chemical contamination and guarantee livestock are not fed animal products. As a livestock producer, you must guarantee that animals are not exposed to foods containing chemical contamination or fed animal products.

Exposure to contaminated food or animal product may result in unacceptably high chemical residues in the animal at the time of slaughter, posing a risk to human health.

Producers must, therefore, do all they can to ensure agricultural chemicals are applied and stored correctly and that animals are not exposed to chemical residues. Records must be kept to enable the traceability of stock feeds provided to animals, including details on relevant Withholding Periods (WHP) and Export Slaughter Intervals (ESI).

### To demonstrate this you must:

- Keep records of your agricultural chemical treatments
- Introduce management systems to identify livestock that may have become contaminated and to map or list treated or contaminated areas
- File Commodity Vendor Declaration (CVDs) that accompany all introduced stock feeds

### How?

The fodder crop, grain and pasture treatments and stock foods checklist includes nine questions to ensure a livestock producer is doing all they can to minimise animal exposure to foods containing chemicals or animal products.

It is recommended producers document and file answers to the checklist questions and make them available when the property is subject to an LPA audit. A template to assist you with your record keeping is available on the LPA website at www.mla.com.au/lpa



### Checklist:

1 Do you only allow people who are trained and/or competent to use chemicals?

Anyone applying or handling chemicals must be able to demonstrate competency in the storage, handling, preparation, use and disposal of chemicals. Ideally livestock producers will hold or be under the supervision of someone that has a current recognised chemical user's certificate. Certificates should be stored and presented during the LPA audit.

2 When applying chemicals, do you abide by the legal directions (e.g. as written on the label) and only use approved agricultural chemicals?

The intended use, application method and dose rates of agricultural chemicals must be understood prior to use. This means reading the chemical labels and applying them in accordance with the manufacturer's instructions. To ensure that the appropriate chemicals are applied, only agricultural chemicals approved by the Australia Pesticides and Veterinary Medicines Authority (APVMA) should be used. 3 Do you ensure that any equipment used to apply or measure chemicals is working correctly before use and clean it before and after you use it?

So that the correct amount of chemical is applied and is not contaminated, it is essential to calibrate equipment and check it for operational efficiency before using. Equipment to apply or measure chemicals must also be thoroughly cleaned before and after each use.

4 Are agricultural chemicals stored according to instructions on the label and kept in a place safe from animals?

Agricultural chemicals can lose their effectiveness if not stored appropriately and should always be kept according to the manufacturer's instructions. They should also be kept away from animals to minimise the risk of unnecessary contamination of livestock.

5 Are management systems in place to identify livestock that may have accessed treated paddocks or contaminated feed?

Being able to trace livestock that may have come in contact with chemicals is essential. Producers should implement a system that allows them to identify these animals, such as the use of a coloured ear tag or segregation. 6 Do you record agricultural treatments, including spray drift and introduced stock feed, and pass this on when selling stock?

Agricultural treatments should be recorded and passed on when selling stock, by completing an LPA NVD/Waybill.

Where relevant, the producer should also record on the LPA NVD/Waybill details of the Withholding Period (WHP) and Export Slaughter Interval (ESI) to ensure that contaminated livestock are not processed for human consumption before these have expired.

### Records should include:

- Treatment date
- Location/size/quantity of treatment
- Chemical/drug used, including batch number and expiry date
- Application rate and method
- Relevant Withholding Period and/or Export Slaughter Interval (and date of expiry)
- Relevant withholding from grazing period

Records of any evident spray drift from , neighbouring properties should also be maintained. 7 Do you record introduced stock feeds and ensure these come with a Commodity Vendor Declaration (CVD) that shows there is a minimal risk of contamination?

To minimise the risk of contaminating our meat supply, it is important to keep records of feeds that are introduced, including the date they were received, a description of the feed, the supplier and a residue analysis. It is also important to ensure that a CVD is provided every time you buy/introduce stock feed. CVDs can be downloaded from the LPA website at www.mla.com.au/lpa. In the absence of a CVD it is important that the residue status of the stockfeed be determined and/or that the stockfeed is not fed to livestock that are to be sold for slaughter within 60 days from date of last exposure. Records of stockfeed activities should be maintained, including date, description of stockfeed, mob and/or paddock identification, etc.

If you are not sure of the chemical residue status of stockfeeds, do not provide it to livestock until you can prove it is clear, possibly through a National Association of Testing Authorities (NATA) approved laboratory test.



8 Do you meet the ruminant feed ban legislation of the state in which you raise stock?

### This means you:

- Are not permitted to feed Restricted Animal Material (RAM) to ruminants (cattle, sheep, goats)
- Must ensure that livestock do not have access to feed, the feed mixing area or discarded feed containing RAM
- Should ensure all containers, machinery, augers, etc that come in touch with stock feeds containing RAM are thoroughly cleaned prior to using or holding ruminant stockfeed

RAM includes meat, meat and bone meal, blood meal, blood and bone meal, dog biscuits, poultry offal meal, feather meal, fishmeal or any other animal meals or manures. [It does not include tallow, treated recycled cooking oils, gelatine, milk or milk products]

To minimise the risk of contaminating our meat supply, it is important to keep and store products that may contain RAM separately and securely from feed that will be fed to ruminant livestock.

### Careful consideration should be given to:

- Dog biscuits where dog kennels are in holding yards or paddocks
- Poultry and pig feeds storage and mixing equipment.
- If spreading poultry and pig manures, stock are not allowed to graze until such time that the pasture has grown up and through the manure so that the stock doesn't consume the manure.

If used cooking oils are in feed mixes (tallow and oil) you must ensure they meet relevant Australian Standards. If feeding old/waste bread/bakery/pastry waste to livestock ensure that any bread or waste product containing meat is not fed to ruminant animals (cattle, sheep, goats). 9 Is there a management system in place to map or list treated and contaminated areas and signpost them on-farm?

Keeping a map or list of treated paddocks and any contaminated sites or facilities, enables producers to minimise the risk of livestock accessing these areas, where they may become contaminated. Signposting treated paddocks on-farm is not essential, but can also help to minimise the risk of contamination.

Where livestock are contaminated, producers must ensure that they meet the relevant Withholding Period or Export Slaughter Interval before they are slaughtered or sold.

### When?

Records should be updated every time chemicals are applied and feed is introduced to the property.

### Why?

Australia's food safety record is essential to consumers of red meat, both locally and in the 100 plus countries we export to. This means it's fundamental to the future of our red meat industry.

If animals consume foods that have unacceptably high chemical residues or which contain animal product, the meat they produce may be unsafe for human consumption. This will put the entire industry at risk.

At a producer level, repercussions may include failure to be paid for the livestock, and possible legal liability for the resulting costs faced by processors and the rest of the supply chain.



# European Union Vendor Declaration (Cattle) and Waybill

# Edition: April 2011



LIVESTOCK PRODUCTION ASSURANCE The signatory to an LPA National Vendor Declaration (NVD) acknowledges that the use of the NVD is subject to the LPA Program rules and standards and confirms that the use of the NVD and the livestock described there-in meet all requirements of those rules and standards. The rules and standards are contained in the LPA Program Manual. The information in the Manual, as updated from time to time, can be viewed at www.mla.com.au/Ipa

Different parts of this document have legal standing under the following legislation: The Export Control Act 1982 (Cwth); Queensland Stock Act 1915, Section 22; WA Stock (Identification and Movement) Act 1970, Section 46; transported stock statement as approved under NSW Rural Lands Protection Act 1998, Section 140J; and permit to travel stock under ACT Stock Act 1991, Section 33.

### ALL PARTS OF THE EUVD WAYBILL MUST BE COMPLETED

If you make a mistake keep the copy and use a new EUVD form.

The top sheet (white) goes with the livestock to the purchaser. The middle sheet (green) goes with the carrier. Keep the bottom sheet (pink) for auditing purposes.

For consignments that require more lines to describe the stock, use the Attachment to National Vendor Declaration and Waybill form - available from www.mla.com.au/lpa and select the link: Attachment to the NVD/Wa

## **XPLANATORY NOTES – EUROPEAN UNION**

### ackground

le European Union Cattle Accreditation Scheme (EUCAS) lerates under the Export Control Act 1982. The LPA ropean Union Vendor Declaration (Cattle) and Waybill places the third edition of the European Union Vendor eclaration. Wavbills are required when Cattle (and other ock) are moved in the Australian Capital Territory (ACT), orthern Territory (NT), New South Wales (NSW), Oueensland LD). Western Australia (WA) and Tasmania (TAS), Only this mbined LPA NVD/waybill need be completed in these ates/Territories when Cattle are being moved. The mpletion of Part 8 of this combined LPA NVD/wavbill is tional in those States where waybills are not required. The orthern Territory (NT) only accepts an NT waybill as its indatory movement document; it does not accept the LPA D/Waybill.

copy of this form must be used for all cattle consigned m one EU accredited facility to another EU accredited sility. EU accredited facility means farms, feedlots, leyards and abattoirs that are accredited or licensed der the Export Control Act 1982 to handle EU eligible ttle. Where cattle are sent from an EU accredited facility a destination that is not EU accredited the LPA National ndor Declaration (cattle) should be used. Cattle must be lividually identified with an AOIS approved NLIS endorsed teder or Post-breeder device (ear tag with a microchip, or nen bolus with a microchip and linked ear tag). This form as not list all the rules of the European Union Cattle reditation Scheme. The rules are on www.agis.gov.au neral

### swer all items accurately. Any false, misleading or rerified statements may result in prosecution and/or civil ion. If you rely on the document to verify future claims but purchased stock, then the stock should be identifiable linst their accompanying document.

+ cost of any residue testing required or undertaken in ponse to information given on the document is a nmercial matter between the vendor and buyer (except ere industry funds such testing).

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NLIS devices

Where cattle carry National Livestock Identification System (NLIS) approved Breeder or Post-breeder devices, record the number of identified animals and device type(s) in the spaces provided.

Under State/Territory law, NLIS Breeder and Post-brooker devices must not be removed until cattle are processed in an abattoir or knackery. Cattle only need one NLIS device. Nover attach a second NLIS device if a NLIS device is already present. Attach NLIS devices in the right (off-side) ear.

#### Details of other statutory documents

Other documents relating to this movement e.g. permit. animal health certificate, animal health statement, including additional sheets of descriptions of cattle. The words "Attachment to NVD/Waybill serial number..." must be en every additional document with the serial number recorded. Additional document (s) must be attached to the original and both copies.

#### Animal Fats (Question 1) (If you don't know you must tick YESI

Whitst State law prohibits feeding of most onimal materials to ruminants, products such as animal fats (examples include tallow) are not prohibited. However, some oversering customers for various reasons also require that bear and offal they receive be sourced from cattle that have never in their lives been fed animal fat such as fallow, which mine he included in supplementary fend materials. If you answer NO to this question, ensure that you have all LPA NVDs fix introduced cattle to substantiate this claim.

Ownership (Question 2) (If you DON'T KNOW, you must lick NO) When sending in stock in one lot that are both vendor bred and non-vendor bred, you must either tick "No" und answer the subsequent question on how long they have been owned for or use a separate document for the verider bred stock and the non-vendor bred stock.

#### By-product stockleed (Question 3) (If you DON'T KNOW, you must tick YES).

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- (b) It is not acceptable to fax LPA EU NVD to the recipient of the scheme cattle. The copy of the LPA EU NVD must thruch with the consignment: and
- he agends may attach a post-sale summary or stock agent's involce and a list of the RFID/NLIS number of the cattle

# KPLANATORY NOTES - EUROPEAN UNION VENDOR DECLARATION (PATTLE) AND WAYELL

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of this journey, do not record the PIC of the property on which the cattle were loaded.

A new LPA EU NVD/waybill must be completed if the cattle have been purchased and/or moved to a new property, and then despatched to a saleyard, abattuir or other destination.

### **Description of Cattle**

For consignments that regulre more lines to describe the stock, go to the website www.mia.com.au/ion and exisct the link: Attachment to the NVD/Waybill

Ensure that the total number of EU Cattle being sold is put in the "Total" box.

### Consigned to / Destination (If different)

Include in "Consigned to" the name of the person and/or company the cattle are being consigned to including full location address of person and/or company e.g. Mr Smith ABC Stock Agents, Town, and State.

Include in "Destination (if different)" the full location address of the destination of the cattle if they are not being sent to the location address of who the cattle are being consigned to e.g. ABC Saleyards, Town, State.

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traditional animal Material includes any tissue, blood or and any meals derived train advante, I kanadeo and meat and bone meals, blood received which ment to other mond etc. It does not include tallow, Water or with matheds. Contact your State Agriculture or Manage presenters lagrantment for more details on these finishing protocolligio.

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the transfer development applicable) must complete this wall and open it. When more than one truck is carrying the settle all early is reproteation numbers are to be recorded. If meta in insufficient space to record all the vehicle tendendos numbers an additional document must be intertant to the original and all copies. Some state the land and and will require a copy of the LPA NVD/ washill in word with each individual vehicle. If any information is incorrect regulatory authorities may take the action than pletton of this part is optional within South Automatic and Victoria. This LPA NVD/Waybill is valid for one allering univ. and from vendor's property to salevard. A infidente without must be completed for any subsequent fouriers and them sateyard to buyer's property.

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- (b) it is not incorptable to fax LPA EU NVD to the recipient of the Scheme cattle. The copy of the LPA EU NVD must
- travel with the consignment; and
- the agents may attach a post-sale summary or stock agent's Invelice and a list of the RFID/NLIS number of the cattle

17	ho	te.
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The form multiple used for all cattle consigned from one EU accredited facility	Think about	120 / 120 / 120 / 120 PPLIED GRAZING WHP DATE FIRST FED/GRAZED DATE FEEDING/GRAZING C
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Menor of cattle	producer has to	$Commute To . \qquad : \qquad 1/20 \\ MONTH YEAR$
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manufactor of cattle		ss andry of the animals in this consignment that
Printiker Description (BREED, SEX, E.G. MEREFORD CHOSS STEERS)		d correct. I also declare that none of the animals L P have ever been treated with HGPs; I have records available to demonstrate that the animals were either a) born on the property the PIC of which is shown, or b) for purchased cattle, accompanied by an EU vendor declaration attesting to their HGP freedom. I also declare that all cattle in this consignment have be properly identified by the use of the approved NLIS device. This declaration is made under the Export Contr Act 1982. I will retain a copy of this declaration for two (2) years, three (3) years in WA (Giving false or misleadi
Use the Attachment Forms for consignments th	at require more lines to describe the stock. (See Explanatory Notes)	information is a serious offence under the Criminal Code Act 1995, the punishment for which is a period of imprisonment not exceed 12 months).
Lighter to (NAME OF PERSON )	IR BUSINESS)	I also declare that I have read and understood all the questions that I have answered, that I have read and
1 State State	(TOWN/SLIBURB) (STATE)	material (including meat and bone meal) in breach of State or Territory legislation.
Westination (if different) of cattle	(LOCATION ADDRESS)	Signature* / /20
HLIS devices used on these cattle Number of ear tags	Number of rumen devices	*Only the person whose name appears above may sign this declaration, or make amendments which must be initialled.
Details of other statutory documents relating to this moven	ent e.g. animal health certificate	
Landblan fylt NUMBER	OFFICE OF ISSUE EXPIRY DATE	Movement commenced: / /20 : (am/pm)
Have the cattle in this consignment ever in their lives be           Yin         No         (See Explanatory Notes)	een fed feed containing animal fats?	Vehicle registration number(s)*:
Were all of the cattle born and raised on the vendor's p	property?	I am the person in charge of the cattle during the
Yers No If No, how long ago were the cattl	e obtained or purchased?	FULL NAME movement and declare all the information in Part B is true and correct.
A Less than 2 months B. 2-6 months C. C. 6-12 months D. more than 12 months		Signature Date / /20 Tel no.
In the past 60 days, have any of these cattle been fed	by-product stockfeeds?	*When more than one truck is carrying the cattle, other vehicle registration numbers are to be recorded.
Yets No If Yes, attach a list of the by-product stockfeeds, date when last fed and a copy of an analyst's report if available.		
In the past 6 months, have any of these cattle been on distubase or placed under grazing restrictions because	a property listed on the ERP of chemical residue?	Agents completing Part C should retain the original or a scanned copy of the original declaration or a summary for a minimum of two (2) years, or three (3) years in WA and supply a copy or summary to any buyer on request.
Yes No I If Yes, give details:		Vendor code
Are any of the cattle in this consignment still within a	Nithholding Period (WHP) or Export	Stock agent company
nughter Interval (ESI) following treatment with any ve	terinary drug or chemical?	Buyer's name Destination PIC
TOS LI INO LI II YES, give Getalls: (Record additional o	/ /20	No. of cattle purchased Saleyard arrival time (am/pm)
INTEMICAL PRODUCT	TREATMENT DATE WHP ESI (IF SET)	Agent's signature Date / /20

		an a subscription and a subscription of the su	In the nact 60 days, have any of the cattle in this considement consumed any material	
AND MARKEN AND MARKEN AND A	E0411 D18	38945	that was still within a withholding period when harvested, collected or first grazed?	
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The form duct by used for all pattle populated from any EU approxim	d Sality to another EU according facility. When		CHEMICAL PRODUCT DATE APPLIED GRAZING WHP DATE FIRST FED/GRAZED DATE FEEDING/GRAZING C	
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			a) grazed in a spray risk area; or	
diener of cattlo	<ul> <li>Coll Statement and the provide international sectors.</li> </ul>	CTUL TRADING MANY	b) red rodders cut from a spray drift risk area? (See Explanatory Notes for definition of spray drift risk area.)	
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Total Use the Attachment Forms for consign	ments that require more lines to describe the stock.	(See Explanatory Notes)	information is a serious offence under the Criminal Code Act 1995, the punishment for which is a period of imprisonment not exceed 12 months). <b>I also declare</b> that I have read and understood all the questions that I have answered, that I have read and understood all the questions that I have not fed restricted animum of the cattle were not fed restricted animum.	
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Were all of the cattle born and raised on the very	tor's property?			
Yes No If No, how long ago were th	e cattle obtained or purchased?	1	FULL NAME	
If purchased at different times, tick the box corresponding to the tim	e of the most recent purchase.)		movement and declare all the information in Part B is true and correct.	
A Less than 2 months L B. 2–6 months L C. 6–12 months L D. more than 12 months L		*When more than one truck is carrying the cattle, other vehicle registration numbers are to be recorded.		
If Yes, attach a list of the by-product stockfeeds, date when last fed				
In the past 6 months, have any of these cattle been on a property listed on the ERP database or placed under grazing restrictions because of chemical residue? Yes No I If Yes, give details:		Agents completing Part C should retain the original or a scanned copy of the original declaration or a summary for a		
		minimum of two (2) years, or three (3) years in WA and supply a copy or summary to any buyer on request.		
		Vendor code		
Are any of the cattle in this consignment still with	hin a Withholding Period (WHP) o	or Export	Stock agent company	
Was No If Vas rive details:	any veterinary drug or chemical?		Buyer's name Destination PIC	
TES LI INO LI IT YES, give GETAIIS: (Record additional details in question 8)			No. of cattle purchased Saleyard arrival time (am/pm)	
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# 4 Roles and responsibilities

Managing contaminated land involves all levels of government, industry, landowners and the wider community. This section of the draft *Guidelines* sets out the responsibilities of government, landowners, industry and developers in the prevention, identification, and remediation of contaminated land.

## 4.1 Administering authority

While some of the powers of the EP Act are devolved to local government, the contaminated land provisions remain with DoE. Local governments play a major role in the Identification of contaminated land and as development assessment managers under the IP Act.

While DoE is the administering authority for Part 9B of the EP Act, the Department enters into agreements with other State Government agencies with specific expertise. Under a Memorandum of Understanding between DoE and the Queensland Department of Health, the Radiation Health Section within the latter department is responsible for the assessment of land contamination caused by radioactive substances.

Similarly the Department of Mines and Energy (DME) is responsible for the management of all environmental issues associated with exploration and mining activities under the Environmental Management Overview System and the Plan of Operation for mine sites.

In the case of UXO contamination, DoE works closely with the Department of Defence (Defence). Defence's role is to identify land affected by UXO and make preliminary assessment of the extent and nature of contamination. Under Commonwealth Government policy, Defence is responsible for disposal of discovered UXO.

#### 4.1.1 Prevention of contamination

The EP Act requires the licensing or approval of industrial activities which are able to cause environmental harm including land contamination. Licence conditions are established which ensure that industrial raw materials and liquid and solid chemical wastes are not discharged onto land or managed in a way that could contaminate land. These processes ensure that future land contamination from industrial activity is minimised.

## 4.1.2 The Environmental Management Register and Contaminated Land Register

DoE maintains the EMR and the CLR in accordance with the requirements of the EP Act. The EMR and CLR are public access registers and members of the public can search and obtain extracts from the Registers. (See section 5.3 for Information on performing a search.)

## 4.1.3 Assessment of site investigation and remediation reports

DoE is responsible for the assessment of site investigation reports, validation reports and draft site management plans submitted under the EP Act. In considering reports, DoE ensures the work has been carried out in accordance with the technical requirements of section 6 of these *Guidelines*. DoE also assesses submissions in regard to the contamination status of land that is being considered for inclusion on the EMR or is within an area which is covered by an Area Management Advice (AMA).

Site investigations about land contamination caused by radioactive substances are assessed by Radiation Health, Queensland Department of Health.

Under the Mineral Resources Act 1989, the Department of Mines and Energy (DME) is the administering authority for current mining leases. Under the proposed Environmental Protection (Mining and Extractive Industries) Policy, DME will confer with DoE on contaminated land matters on mining leases during the end-of-lease agreement.

## 4.1.4 Approval of site management plans

À site management plan is used to manage land recorded on the EMR when there has been a site investigation and some contamination remains on the land. A site management plan is used to manage environmental harm that may be caused by the contamination by applying conditions to the use of the land. Sites with a site management plan are recorded on the EMR.

After the submission of a site investigation report, a draft site management plan may be submitted to DoE for approval, with the consent of the owner of the land. The procedures for preparing a draft site management plan are outlined in Appendix 10. When a site management plan is approved, a copy is provided to the landowner, applicant and local government for the area.

Draft Guidelines for the Assessment and Management of Conteminated Land in Queensland 11

## 4.2.2 Development assessment managers

The IP Act integrates the decision-making processes for landuse planning in Queensland. Under the IP Act, the development assessment manager refers development that is prescribed under the Integrated Planning Regulation 1998 on land to DoE for assessment where a development application is made for a material change of use or a reconfiguration of a lot. It is essential that all local governments seek advice from all parties seeking development approval on the contemination status of the subject property. This information requirement is usually sought on development application forms. Local governments are also responsible for ensuring that the conditions of any site management plan for land are included in a development approval.

The Integrated Planning Regulation prescribes DoE as a concurrence agency for development on land where there is a likelihood of contamination.

43 Landowner and occupier

Landowners and occupiers have specific responsibilities relating to contaminated land under the EP Act.

#### 4.3.1. Notification

If the owner or occupier of land becomes aware a notifiable activity is being carried out on the land or if the land has been, or is being, contaminated by a hazardous contaminant, the owner or occupier must notify DoE within 30 days. (s118E). The notification must be in the approved form (see Appendix 12).

Under the EP Act a penalty applies for failure to notify DoE of contaminated land or land that has been used for a notifiable activity.

4.3.2 Owner must provide notice about land

If the landowner has entered into, or proposes to enter into, an agreement with another person about occupancy of the land, the owner is required to provide written notice to the person in an occupancy agreement (i.e. the tenant) if the land is recorded on the CLR. The owner is also required to inform any occupier of the property, such as persons who are renting, managing or leasing the land, that it is listed on the CLR. If the owner does not give notice as required under the EP Act, the other person who has entered into the occupancy agreement may terminiate the agreement by written notice given to the owner within ten days after the person becomes aware of the listing.

Anyone selling or otherwise disposing of land that is listed on either the EMR or the CLR is required to give written notice of the land's listing to any potential buyer. This ensures that potential buyers of land are aware of relevant past or present landuse and any site management plan before purchasing the property.

Under the EP Act a penalty applies for failure to provide notice to a prospective purchaser.

## 4.3.3 Dealing with site investigation and remediation

Land that has been used for a notifiable activity or is recorded on the EMR or CLR will require an investigation and, possibly, remediation when a development application is made for a change of material use or reconfiguring a lot.

Landowners are usually responsible for the investigation of their land for contamination and remediation. They would, unless appropriately qualified and experienced, be required to contract an environmental consultant to conduct a contaminated site investigation and undertake remediation work. Information for landowners on choosing an environmental consultant is provided in Appendix 4.

## 4.3.4 Compliance with site management plan

In approving a site management plan to manage land contamination, the administering authority may decide the owner or occupier of the land is responsible for ensuring that the conditions of the plan are complied with.

Under the EP Act a penalty applies for noncompliance with a site management plan.

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## Michael Burkhardt<sup>a</sup>\*, Luca Rossi<sup>a,b</sup>, Markus Boller<sup>a</sup>

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## Abstract

There is increasing concern about environmental pollution by diffuse emissions of various environmental hazards emitted by transportation activities. For the first time substances released by railways to the environment were investigated. We considered the significant sources and the amounts emitted by regular operation within the Swiss Federal Railways (SBB) network (7200 km tracks). The main substances are about 2270 t  $y^{-1}$  metals, 1357 t  $y^{-1}$  hydrocarbons and 3.9 t  $y^{-1}$  herbicides. Most of the released metals are particles emitted by friction processes with iron, followed by copper, zinc, manganese, chromium, nickel, vanadium and lead. Only a small amount of metals is expected to be leached in dissolved phase. The emission of hydrocarbons may be diffusive (e.g. operational losses) or at point-sources (e.g. track-switch). The wooden sleepers seem to be the most important sources of hydrocarbons, followed by lubricants from track-switches and wheel flanges. The emissions reflect a spatial and temporal exposure pattern. The assessment is valuable for regulatory authorities working on soil and water protection as well as for railway companies determining their necessity of water and soil protection measures. Based on the results, selected studies may establish an understanding on relevant processes and environmental risk of railway imissions to soil, drainage water and groundwater.

Keywords: Railways; Environmental hazards; Diffuse emission; Water protection; Technical measures

#### **1. Introduction**

In the context of the European Water Framework Directive (WFD; 2000/60/EC), member

\*Corresponding author.

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# Diffuse release of environmental hazards by railways

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#### 1. Introduction

In the context of the European Water Framework Directive (WFD; 2000/60/EC), member states are expected to establish pollution reduction programs including the control of diffuse emissions, discharge and measures. Several substances are mentioned in the directive as priority and specific pollutants (List I, II), e.g. copper, zinc, chromium, and polycyclic aromatic hydrocarbons

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(PAH). Protection of soil, surface water and groundwater requires knowledge on the impact of pollutants emitted, for example by the transport sector in a diffuse pattern. In fact, transport sector can be considered as an important source of diffuse pollution to the environment. Until now, numerous studies focus on road traffic pollution, but little is known about railways. However, regular railway operation is also associated with the diffuse release of inorganic and organic substances into the environment (Fig. 1) [1,2]. Some substances emitted by railway operation are listed in the WFD and there are strong indications that the environmental exposure has to be evaluated for several relevant pollutants. It has to be anticipated that substances entering railway ballast and soil may leach to groundwater or surface waters (Fig. 1) [3,4].

Knowing sources and pathways of the emissions, mass flow balances can be analyzed and technical and operational measures established. However, knowledge on emissions of regular railway operation and the fate and behavior of the substances in the track profile and environment are scarce compared to road traffic [5]. Thus, railway companies are not able to estimate the environmental fate of these emissions or to assess if quality standards for water and soil protection are met (Fig. 2). Moreover, railway companies have problems to evaluate the efficiency of common drainage systems for substances mobilized from track profiles. Up to now, reduction measures like drainage systems along the tracks or infiltration of runoff are uncertain in terms of hazard retention efficiency (Fig. 2). With the lack of essential data on emission and fate, it becomes clear that an environmental impact assessment can presently not be fully established.

The aim of the study is an assessment of diffuse losses relevant for the environment. We investigated emission patterns from different sources released in the entire railway network of Swiss Federal Railways (SBB) (Fig. 2). The presented emissions focusing on the most relevant sources and substances were extracted (Fig. 2, gray box) from Burkhardt et al. [6]. To our knowledge it is the first assessment in which all substances emitted by railways are quantified.



Fig. 1. Spatial distribution of substances emitted by regular railway operation and their pathways to groundwater and surface water.



Fig. 2. Overview of the entire study "water protection along railway tracks" evaluating the environmental risk of construction materials and railway operation and maintenance. The part emission (gray box) is already complete and presented in this publication.

## 2. Material and methods

The relevant substances, sources, amounts and pattern were investigated (Fig. 2, gray box). We evaluated several surveys, reports, and scientific literature (about 200) describing the situation of past, present, and future developments. Most of the information came from internal SBB reports that have not been published (about 40 references). In the scientific domain, 90 references are related to railway pollutant emissions. Other railway companies also conducted some studies in this field, but for different reasons reports are not available for public. Detailed information about literature review can be found in Burkhardt et al. [6].

The source specific emissions were calculated taking into account the composition of construction materials and products used. The amounts released implicate the material consumption, recycling quota and emission factors for the year 2003. In addition, the amounts were normalized to the entire railway network (7200 km) and expressed in gram per kilometer of railway track. A few substances linked to railways are judged as harmless in the environment (e.g. calcium, carbon, magnesium, phosphorus, sulfur; Table 1: harmless substances) and therefore not displayed in detail. Accidents and technical disturbances are not taken into account as we focused on regular operation and maintenance of railways. The deposition rate, exposure of soil and tracks and leaching rate of the emitted substances were not assessed yet (Fig. 2).

#### 3. Results and discussion

The results can be divided into (a) operation emissions depending mainly on the train frequency and type, and (b) substance release almost independent from railway traffic.

#### 3.1. Operation emissions

The main sources of operation emissions and particulate matter are generated by braking. The brakes used by SBB are made of gray iron

(G-brakes), composite (C-brakes), and iron sinter material (S-brakes) [7,8]. The total consumption of friction brake pads in 2003 reached about 2390 t. Based on the returned amount of 20% reported by SBB, in total 1912 t of brake material were emitted (Table 1). Most of the brakes release is attributed to freight trains (67%) due to the predominant use of G-brakes in freight stock. Iron is the outstanding metal, followed by manganese, copper and chromium (Table 1). The ingredients of binder in C-brakes could not be clarified as well as secondary transformation products (e.g. PAH) [7]. Since 2005, SBB has started to substitute G-brakes by C-brakes in passenger rolling stock. Therefore, a significant decline of the mass emitted by G-brakes is expected simultaneous with an increase of substances from C-brakes (Table 1: Tendency). Due to the increasing kilometric performance the release by friction processes increase at the same time.

The contact between wheels and rails generates in average 124 t of abrasion material at wheels and 460 t at rails (Table 1). The composition of wheels and rails are >96% iron, followed by manganese and chromium. Additionally, during abrasion of wheels emission of copper, nickel, molybdenum, and vanadium occurs. The significant increase in kilometric train performance favors the current losses (Table 1) [9]. Contact lines consist to 99.8% of copper and 0.2% of silver [8]. The average train frequency in 2003 lead to abrasion losses of 38 t copper and 80 kg silver emitted as particulate matter. As for the other friction processes, increasing performance leads to additional emissions.

The release of metals to the environment by regular railway operation correlates mainly with particulate matter from the abrasion processes (Table 2). The size distribution and the fate of the emitted particles are still unknown. However, pollutants may adsorb on particles and thus immobilized or leached via particle-facilitated transport, and particulate matter itself might be toxic due to the particle size (PM 2.5 and PM 10). Table 1

Composition of abrasion emitted by different brake types, rails, and wheels used by SBB in 2003 and future trend of emitted amounts

Source (material)	Abrasion (t/a)	Substance	Proportion (%)	Emission (t/a)	Tendency
Brakes (total)	1912				
Gray iron brakes	1670 (87%)	Iron	93.3	1558.1	$\downarrow$
		Manganese	0.6	10.0	
		Chromium	0.15	2.5	
		Copper	0.1	1.7	
Composite	209 (11%)	Iron	44.9	94.0	<b>↑</b>
		Binder	23.1	48.0	
Iron sinter	33 (2%)	Iron	67.9	22.4	1
		Copper	20.0	6.6	
		Boron	0.05	0.02	
		Tin	0.09	0.03	
		Antimony	0.01	0.003	
		Lead	0.01	0.003	
		Molybdenum	0.01	0.003	
Rails	475	Iron	97.0	460	Ŷ
		Chromium	1.0	4.8	
		Manganese	1.0	4.8	
Wheels	124	Iron	96.0	120	1
		Manganese	1.2	1.5	
		Chromium	0.3	0.4	
		Copper	0.3	0.4	
		Nickel	0.3	0.4	
		Molybdenum	0.08	0.1	
		Vanadium	0.05	0.06	

Harmless substances, e.g. calcium, carbon, magnesium, phosphorus, and sulfur, representing the difference to the total amount (100%) are not presented.

#### Table 2

Sources of abrasion by SBB railway operation on a mass quantity basis calculated (2003)

Source of abrasion	Emission (t/a)	Proportion (%)
Brakes	1912	73
Rails	550	21
Wheels	124	5
Contact lines	38	1
Total	2624	100

Most of the oils and grease used were applied for mechanisms of e.g. engines, gearing, buffer, and bearing, and on winding tracks and tracks with significant slope. Information on emission factors from loss lubrication was not available thus the acquired consumption data were analyzed. It is expected that significant amounts leach into the track profile. For mechanisms about 197t and 69t of oil and grease, respectively, and 39 t oils for wheel flanges of trains were applied. Due to the increasing train performance in the SBB network the used amounts of grease and oil was nearly constant in recent years [10]. The consumption in 2005 calculated in a different way amounts to about 580,000 L of grease and oil. The lubricating oils are a mixture of different inorganic synthetic oils with an unknown part of additives and solid particles, but without any undesired heavy metals, PAH and halogen compounds. There was no information available on emission factors. However, it is not expected that the total mass was released to the environment.

## 3.2. Substance release almost independent from railway frequency

We considered 144,000 corrosion-resistant poles which are hot zinc dipped for 20 years. The galvanizing consists to more than 99% of zinc and traces of cadmium [11]. The annual amount of zinc and cadmium dissolved at poles reached 20 t zinc and 2 kg cadmium, resulting in a significant amount of 140 g zinc per pole. The losses of zinc and cadmium leached at poles depend on the exposition and the age of the object. Leaching in the luff seems to be significantly smaller than in the lee and aged hot galvanized poles are protected by a layer of dust particles. An unknown number of bridges and platform roofs are still coated with lead. For example, in the area of Zurich about 90% of both objects consisted of lead coated steel [11]. However, the losses of lead are not quantifiable.

Within the railway network 40% out of 14,000 track-switches are completely lubricated [9]. At these track-switches all flexible parts were maintained. Although the proportion of lubricant free track-switches increased continuously, the used amount did not decline. There are some indications that the quantity required for lubrication-free railway switches is significant as well. Thus, the lubrication requirement for all track-switches reached about 68 t  $y^{-1}$  grease and oil. Based on a volatilization rate of 40% in average, 41 t  $y^{-1}$  hydrocarbons or 6.8 kg  $y^{-1}$  at each track-switch, respectively, emitted to the environment. The periodical cleaning of track switches with hot

water steam, sometimes combined with surfactants, may foster the leaching significantly. The introduced lubricants are free of heavy metals, PAH, and halogens.

The proportion of wooden sleepers in the SBB network reached up to 43% corresponding to about 5.1 million single sleepers [12]. Wooden sleepers are impregnated with creosote. Creosote contains 200-10,000 different substances [13,14]. About 80-85% belongs to PAHs, 5-15% to heterocyclic hydrocarbons, 1-12% to phenolic compounds, and about 5% to a variety of heterocyclic compounds. Overall, 65,000 t creosote is used for the wooden sleepers. Components of creosote may enter the environment by volatilization, exudation (Fig. 3), leaching, and abraded particles. Within the lifetime of a wooden sleeper (25 years), about 5 kg creosote may be released at each wooden sleeper [12] or in average 990 t y-1 creosote containing about 800 t y-1 PAHs and 2.2 t y-1 phenolic compounds. In particular, creosote release is strongly non-linear decreasing with time [14]. First, the volatile PAHs naphthalene, acenaphthene, fluorene und anthracene are dominant, displaced after one year by low volatile PAHs exuded or released via particulate matter. At Swiss level, a rough estimation of 94,000



Fig. 3. Exudation losses of creosote from impregnated wooden sleepers in hot weather (railways station Lugano, Switzerland).

Table 3

Cumulated emission of the most important substances and relevant sources on the entire railway network of the Swiss railways SBB

Substance	Emissio	n	Source
	(t/a)	(g/km)	
Iron	2176	302,000	Brakes >>> rails > wheels
Copper	46.6	6480	Contact lines >> brakes
Zinc	19.8	2750	Galvanization
Manganese	15.5	2170	GG-brakes > rails > wheels
Chromium	6.9	960	Rails > GG-brakes
Nickel	0.4	50	Wheels
Vanadium	0.06	8.5	Wheels
Lead	0.003	0.5	S-brakes
Antimony	0.003	0.5	S-brakes
Cadmium	0.002	0.3	Galvanization
Binder	21	2900	C-brakes
Hydrocarbons	1357	176,800	Wooden sleepers >>> loss lubrication >> track-switches > wheel flange
Glyphosate	3.9	540	Vegetation control

wooden sleepers used in 2003 lead to a release of 525 kg y<sup>-1</sup> PAH within the first year and 230 kg y<sup>-1</sup> in the second. The uncertainty of the calculated PAH emission is particularly high. An increasing use of concrete sleepers may reduce the emission of these substances.

Along railway tracks plants and weeds are eliminated for security and track stability reasons by the application of the non-selective herbicide glyphosate. In 2003 about 3.9 t/a of the active ingredient was applied [9]. The application rate of 2.2–2.9 kg ha<sup>-1</sup> is corresponding to an area of 1345–1770 ha, equivalent to 50% of the total railway network. The yearly application amount seems to be nearly constant [10]. Jarvis et al. [4] investigated the transport behavior of glyphosate in tracks. Obviously, glyphosate leached dissolved and adsorbed to particulate matter through the track profile.

#### 3.3. Emissions per track kilometer

During regular railway operation and maintenance, various substances are emitted from several sources. In terms of quantity the ten most important metals (Table 3) with an emitted amount of 2270 t y<sup>-1</sup> made up for about 99% of all emitted metals. The weight of the hydrocarbons reached more than half of the metals weight whereas the amounts of binder and glyphosate seem to be negligible on a quantitative basis. However, the varying boundary conditions (e.g. exposition, products used and emission rates) cause a broad spatial and temporal variability of the average emission per track kilometer (Table 3). For instance, braking and acceleration (e.g. railway stations, signals) increase the average emission values estimated from flat tracks.

#### 4. Conclusions and outlook

The essential substances released by railways to the environment in a diffuse way are metals, hydrocarbons, binder, and one herbicide. Particulate matter is the dominant species fraction. Due to the unknown behavior of particles a risk assessment of the heavy metals including the transport behavior as well as the corrosion and dissolution of particles, respectively, is crucial. The emission of hydrocarbons is related to wooden sleepers and lubrication of track-switches, wheel flanges and mechanisms. It is anticipated that the total amount of used hydrocarbons reached the environment by different processes such as leaching, exudation, drip losses, and volatilization area-wide and at point-sources. Compared to metals, the mass balance of released hydrocarbons is more arguable. Characteristic operation losses are diffuse area-wide as well as at pointsources. Wooden sleepers seem to be the most important source of hydrocarbons and of PAHs and track-switches are well known point-sources.

The main sink of all released substances seems to be the railroad embankment, and a smaller proportion deposit in soil nearby the track. Although most of the hydrocarbons and PAHs are potentially degradable, track profiles are highly polluted after lifetime. For instance, hydrocarbons occurred in the embankment to the bottom of the track profile in 1 m depth after regular operation period, and metal contents in soil are elevated mainly within 5-10 m distance from the tracks [6]. In the context of the significant exposure of embankment material and soil as well as the EU Water Framework Directive, leaching risk via drainage systems to surface water and groundwater has to be evaluated. However, neither the pattern of imission nor the fate and behavior of the released substances are well known.

Because it is still impossible to assess the fate of the emitted substances, it is essential to investigate the leaching risk of the most crucial pollutants at real tracks. The information summarized in this paper and the corresponding report [6] might be used as a reliable basis to select a worstcase site for a detailed leaching study including an environmental risk assessment.

Finally, the mass flow analysis of the emitted substances might be used to evaluate present technical measures with respect to their potential for environmental impact reduction and to develop new innovative and sustainable measures. The already proposed technical measures should be verified by especially designed laboratory or field studies. Although hazard emissions from railways are considerably smaller than from motorized traffic, intensified studies such as this one may still lead to a progress towards increased environmental sustainability in construction and operation of railways.

## Acknowledgements

We thank Fernande Gächter and Helmut Kuppelwieser, both from SBB, for assisting the study and all persons of SBB delivered essential information. Initiation and funding of the project by Swiss Federal Railways (SBB), Swiss Federal Office for the Environment (FOEN), and Swiss Federal Office of Transport (FOT) is highly acknowledged.

#### References

- SBB, Gleisabwässer und Gewässerschutz (Runoff from railway tracks and water protection), Report of Swiss Federal Railways SBB, Bern, Switzerland, 1993.
- [2] M. Osborne and M. Montague, The potential for water pollution from railways, Report CIRIA C643, CIRIA, London, UK, 2005.
- [3] R. Lorenzo, R. Kaegi, R. Gehrig and B. Grobety, Particle emissions of a railway line determined by detailed single particle analysis, Atmos. Environ., 40 (2006) 7831–7841.
- [4] N.J. Jarvis, S. Almqvist, J. Stenström, E. Börjesson, E. Jonsson and L. Torstensson, Modelling the leaching of imazapyr in a railway embankment, Pest Manage. Sci., 62 (2006) 940–946.
- [5] A. Zysset, C. Hugi and R. Pfammatter, Wegleitung Gewässerschutz bei der Entwässerung von Verkehrswegen (Technical guidance document – water protection by drainage systems at transportation routes), Swiss Agency for the Environment, Forests and Landscape (SAEFL), Bern, Switzerland, 2002.

- [6] M. Burkhardt, L. Rossi, N. Chèvre, M. Boller, L. Steidle, J. Abrecht, F. Gächter, S. Knabl and H. Kuppelwieser, Gewässerschutz an Bahnanlagen – Emittierte Stoffe im Normalbetrieb der SBB sowie Grundlagen zu deren Umweltverhalten (Water protection at railroads – emitted substances from regular operation of SBB and fundamentals of their environmental behavior), Report of the Eawag, Duebendorf, Switzerland, 2005.
- [7] P. Bregy, Emissionen von Verbundstoff-Bremsklotzsohlen (Emissions of composite-brakes), Report for the Swiss Federal Railways SBB, BahnUmwelt-Center, Bern, Switzerland, 2004.
- [8] SBB, Unterlagen zur Untersuchung über PM10 (Documents on PM10 investigations), Report of Swiss Federal Railways SBB AG, BahnUmwelt-Center, Bern, Switzerland, 2001.
- [9] SBB, Environmental Report 2002/2003, Report of Swiss Federal Railways SBB, BahnUmwelt-Center, Bern, Switzerland, 1999 (http://mct.sbb. ch/mct/en/umweltbericht\_02-03.pdf).
- [10] SBB, Facts & Figures SBB statistics for 2005, Swiss Federal Railways SBB, Bern, Switzerland,

2006 (http://sbb-gb.mxm.ch/geschaeftsbericht/ pdf2005/SBB\_Vadem\_e\_gesamt.pdf).

- [11] Carbotech, Schwermetallbelastung der Böden in der Umgebung korrosionsgeschützter Stahlobjekte (Contamination of soils with heavy metals around corrosion-resistant steel objects), Report, Basel, Switzerland, 1994.
- [12] M. Kohler, T. Künniger, P. Schmid, E. Gujer, R. Crockett and M. Wolfensberger, Inventory and emission factors of creosote, polycyclic aromatic hydrocarbons (PAH), and phenols from railroad ties treated with creosote, Environ. Sci. Technol., 34 (2000) 4766–4772.
- [13] K.M. Brooks, Polycyclic aromatic hydrocarbon migration from creosote-treated railway ties into Ballast and adjacent Wetlands, Report FPL-RP-617, U.S. Department of Agriculture, Forest Service, Madison/WI, 2004.
- [14] OSPARCOM, PAH Emission Factors with Procedural Guidance for the Submission of PAH Emission Data, Report DIFF 97/7/3-E(L), Norwegian Pollution Control Authority, Oslo, Norway, 1996.

Question 12-6 Ca d D. as the trains increase we will not Agreein be able to cross cattle. This is part of the agreement that If the par GV. K are asking me to sign. 11.2 if the dispute; and ments, record or also that the railway corridor will i expert requests. party may ( Queensla int is final and bloding whose de e uncontaminate absence of manifest on the pa 11.3 Director Oal Comach in determ y responsible for the intent paying are capert a vosio or menning the determination or this Deed and the purposes of this Deed. apportion the costs between the parties if considered 11.4 Expert's role reasonable by the expert. The expert must: 12. **RISK AND INDEMNITY** (a) act as an expert and not as an arbitrator; 12.1 Owner's risk (b) proceed in the way the expert thinks fit without The Owner and the Owner's Associates use the Crossing being bound to observe the rules of natural and access the Rall Corridor at the Owner's sole risk at justice or the rules of evidence; all times. not accept oral submissions unless both parties (c) **Camer's** Indemnity 12.2 are present; The Owner Indemnifies Hancock at all times against all on receipt of a written submission from one (d) Loss or Claims that Hancock pays, sustains, suffers or party, ensure that a copy of that submission is incurs arising from the installation of the Crossing or the given to the other party promptly; use or attempted use of the Crossing by the Owner and (e) take into consideration all documents, the Owner's Associates or any breach of this Deed by the information and other material given by either Owner or the Owner's Associates. party that the expert, in its absolute discretion, 123 Hancock's Indomnity considers relevant to the determination of the dispute; Hancock indemnifies the Owner at all times against all Loss or Claims that the Owner pays, sustains, suffers or (1) not be expected or required to obtain or refer to incurs arising from the installation of the Crossing or the any other documents, information or material use of the Crossing by Hancock or any breach of this (but may do so if the expert wishes); Deed by Hancock. issue a draft certificate stating the expert's (g) 12.4 Release intended determination within 21 days after appointment, giving each party 21 days to The Owner releases and discharges Hancock from any make further submissions; and all Claims and legal actions arising from the use or attempted use of the Crossing by the Owner or the issue a final certificate within 14 days after the (h) Owner's Associates except to the extent that a Claim end of the pariod of 21 days the parties have to arises from the neoligence of Hancock. make submissions on the draft certificate, stating the expert's determination; and 12.5 Payment of costs (i) act expeditiously with a view to issuing the final Hancock may recover a payment under an indemnity in certificate as soon as practicable. this Deed before it makes the payment in respect of which the indemnity is given. 11.5 Complying with expert's directions 12.6 No wanenty) Hancock and the Owner must: The Owner acknowledges that Hancock makes no (a) comply with the expert's directions in excress or implied warranty: connection with the dispute, and within the time period specified by the expert; and (a) as to the state, condition or quality of the Rail Corridor or that it is suitable for use for (b) give the expert: Crossings; (i) a short statement of facts; Roch over 12 B6897434 9

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14.2	Agreeing on	the	relevant field	1
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If the parties cannot agree on the relevant field, either party may refer the matter to the President of the Queensland Law Society or the President's nominee whose decision as to the relevant field is final and binding on the parties.

11.3 Directions to expert

In determining the dispute, the expert must give effect to the intentions of Hancock and the Owner in entering into this Deed and the purposes of this Deed.

11.4 Expert's role

The expert must:

- (a) act as an expert and not as an arbitrator;
- (b) proceed in the way the expert thinks fit without being bound to observe the rules of natural justice or the rules of evidence;
- (c) not accept oral submissions unless both parties are present;
- (d) on receipt of a written submission from one party, ensure that a copy of that submission is given to the other party promptly;
- (e) take into consideration all documents, information and other material given by either party that the expert, in its absolute discretion, considers relevant to the determination of the dispute;
- (f) not be expected or required to obtain or refer to any other documents, information or material (but may do so if the expert wishes);
- (g) issue a draft certificate stating the expert's intended determination within 21 days after appointment, giving each party 21 days to make further submissions;
- (h) issue a final certificate within 14 days after the end of the period of 21 days the parties have to make submissions on the draft certificate, stating the expert's determination; and
- act expeditiously with a view to issuing the final certificate as soon as practicable.

11.5 Complying with expert's directiona

Hancock and the Owner must:

- (a) comply with the expert's directions in connection with the dispute, and within the time period specified by the expert; and
- (b) give the expert:
  - a short statement of facts;

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	(ii)	a description of the dispute; and
	(iii)	any other documents, record or information the expert requests.
11.6	Expert's final d	etermination
	The final determ on Hancock and error.	ination by the expert is final and binding the Owner, in the absence of manifest
11.7	Expert's costs	
	The expert must paying the exper apportion the cos reasonable by th	determine the party responsible for t's costs of making the determination or sis between the parties if considered e expert.
12.	<b>RISK AND INDE</b>	MNITY
12.1	Owner's risk	
	The Owner and t and access the F all times.	he Owner's Associates use the Crossing tail Corridor at the Owner's sole risk at
12.2	Owner's Indemn	nity
	The Owner Inden Loss or Claims th incurs arising fror use or attempted the Owner's Asso Owner or the Own	nniñes Hancock at all times against all at Hancock pays, sustains, suffers or in the installation of the Crossing or the use of the Crossing by the Owner and ociates or any breach of this Deed by the ner's Associates.
12.3	Hancock's Inden	nnity
	Hancock indemni Loss or Claims th incurs arising from use of the Crossir Deed by Hancock	fies the Owner at all times against all at the Owner pays, sustains, suffers or n the installation of the Crossing or the 1g by Hancock or any breach of this
12.4	Release	λ.
	The Owner release and all Claims and attempted use of t Owner's Associate arises from the ne	es and discharges Hancock from any I legal actions arising from the use or the Crossing by the Owner or the as except to the extent that a Claim gligence of Hancock.
12.5	Payment of costs	5
	Hancock may reco this Deed before it which the indemni	over a payment under an indemnity in t makes the payment in respect of ty is given.
12.6	No warranty	
	The Owner acknow	wedges that Hancock makes no warranty:
	(a) as to the	state, condition or quality of the Rail

as to the state, condition or quality of the Rat Corridor or that it is suitable for use for Crossings;

Rook over

	(b)	that there will be any or adequate services available on the Rail contidor to meet the needs of the Owner at any time;	14.4
	((c)	that Hancock has or will continue to have rights to grant access to the Owner under this Deed;	
	1	Of	
(	(d)	that the Rall comidor will be uncontaminated.	
	INSU	TANCE	14.5
1	Discio	sure of Deed	
	Despit	e clause 17, the Owner music	
	(a)	disclose a copy of this Deed to its Insurer immediately after the Commencement Date;	
	(b)	direct its Insurer to include the Owner's and Owner's Associates activities detailed in this Deed as an insured Activity under its current	
		policy of insurance; and	15.
	(C)	give Hancock a copy of the Owner's insurance policy which shows that the activities of the Owner and the Owner's Activities have been included as an Insured Activity	15.1
	6	Alexandre Baller	
	policy v time to TRANS	vithin 7 days of any request from Hencock from time but not more than once per year. IFER OF LAND	
	Transfe	er sublect to consent	
	The Ow with the unrease conditio discretion	mer may only transfer its rights under this Deed written consent of Hancock which must not be onably withheld but may or may not be subject to one imposed by Hancock in its reasonable on.	15.2
	Deed o	f Consent	
	Hancoc transfer Hancoc Deed of each pe executio	k may require that the Owner and the proposed as of the Land enter into a Deed of Consent with k on terms wholly satisfactory to Hancock. The Consent will be prepared at Hancock's cost but inty will bear their own costs of negotiation and on of the Deed of Consent.	
	Transfe	r by Hancock	
	Hancock any pen person a bound b informat	c may assign its interests in the Rail Corridor to son accredited under the Rail Safety Act if that enters into a deed covenanting to agree to be y this Deed. Hancock may disclose any ion relating to this Deed or any party to it.	15.3

Subdivision of the Land

If the Owner subdivides the Land, the Owner or the person acquiring one of the newly created lots must : a document on similar terms and conditions to this document in respect of the newly created lots. Hance may determine that the creation of a new lot by the Owner constitutes a change to the use of the Crossin under 7.9.

Owner's indemnity

The Owner must indemnify Hancock against, and mus pay to Hancock on demand all costs and expenses incurred by Hancock:

- (a) In assessing a request by the Owner for consent under clause 14.1; and
- (b) any transfer of the Owner's right to use the Crossings.
- DEFAULT AND TERMINATION

#### 1 Default

Hencock may by written notice terminate or suspend the Owner's right to use the Crossings immediately if the Owner:

- breaches a term of this Deed and the breach i not capable of remedy;
- (b) breaches a term of this Deed and the breach is capable of remedy but the Owner fails to remedy the breach within seven days of being given formal notice from Hancock to do so; or
- c) breaches any terms of this Deed on three or more occasions in any six month period regardless of whether each breach is remedied by the Owner.
- 5.2 Termination by Hancock

In addition to Hancock's rights under clause 15.1, Hancock may terminate this Deed by notice in writing to the Owner If:

(a) the operational condition on or near the Rall Conidor are such that the continued use of the Crossings would adversely affect the safety or integrity of the Rall Corridor; or

> the nature or volume of traffic on the Crossings is such that the continued use of the Crossing would adversely affect the safety or integrity of operations on the Rail Corridor.

5.3 Termination by the Owner

The Owner may terminate this Deed if it no longer requires the use of the Crossings by written notice to Hancock.



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Coal dust coming of a g. R national train lecturen nebe creek and Copperbella

in november 2012.

Dal Cormock

**Diane** Corma

From: Sent: To: Cc: Subject:

Dear Val, I'm Luciano Gon I recently receiv about the of rail

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rl Mckellar (DEEDI) group is very

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- Monitoring collars able to measure cattle location using GPS as well as behaviours such grazing and ruminating time. We use high frequency data collection of up to 10 measures per second with 50 collars we currently have on use.
- Automated control collars (virtual fencing) to control cattle movement in the landscape. These could be used to deter cattle from grazing in the railroad tracks and avoid accidents.
- Measures to assess the spatial and temporal distribution of vegetation quantity and quality within a paddock. We use satellite images and Mike Nicholas told me they have images from your area. We also use ground cameras.
- 4) Wireless networks that allow us to observe the location and activities performed by cattle in real time (from a homestead computer without internet or anywhere using an internet connection). We have currently set up a research and demonstration network at Lansdown research station near Townsville. If you are interested, I could show the data and send you a link perhaps.

These technologies would allow us to respond many of the questions and concerns you, other producers and researchers interested in this field have. We have lately received other concerns and questions from producers in other parts of the country. Our group has been contacted by producers in WA and QLD with concerns similar to the ones you raised, which indicates the need to carry out research and look for solutions in this area. I'm also in good contact with Mark Trotter from UNE. He and I have organised the symposium about livestock tracking last week in the Gold Coast. I don't know if you were there but if so it was unfortunate we have

had not a chance to meet each other. It could become a good opportunity to team up with Mark to search for some research dollars.

I hope this can become an initial contact for further discussions, collaboration and joint research. Having people like you on board of a project would give us the critical practical viewpoint about different factors affecting cattle behaviour and productivity.

I look forward to hearing from you. Best regards,

Luciano Adrián González Research Scientist CSIRO Livestock Industries

Mailing address: CSIRO PMB Post Office Aitkenvale, Queensland 4814 AUSTRALIA

Geographic address: Australian Tropical Sciences and Innovation Precinct Building 145, James Cook Drive, James Cook University Douglas, Townsville QLD 4811 AUSTRALIA

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## **Diane Cormack**

From:	ć.		i k	
Sent:		Friday, 7 October 2011 11:10 PM		ł
To:				~
Cc:	-24		÷	
Subject:		cattle and trains	· .	

## Dear Val,

I'm Luciano Gonzalez from CSIRO Livestock Industries at Townsville.

I recently received an email coming from you through Mike Nicholas, Nick Webb (CSIRO) and Karl Mckellar (DEEDI) about the of railroad tracks passing by your property on cattle behaviour and productivity. Our group is very interested in this topic since we are currently working with behaviour monitoring and control of movement in cattle. At CSIRO, we have developed:

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Mailing address: CSIRO PMB Post Office Aitkenvale, Queensland 4814 AUSTRALIA

Geographic address: Australian Tropical Sciences and Innovation Precinct Building 145, James Cook Drive, James Cook University Douglas, Townsville QLD 4811 AUSTRALIA

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hoto These mumbers may change depending on the length of the trains and Passing land lane.

60 MI Numk Numb Numb Numb Numb<mark>s. or cremo per year</mark> A train will pass approx. every 102 minutes

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Number of wagons per train 227 Number of times the train horn will sound 42 each 24 hours

number of wagons for 360 stays 1,179,360

**120 MILLION TONNES PER ANNUM** Number of tonnes per train 24000 tonnes Number of trains per 24 hours 28 Number of locomotives per 24 hours 84

A train will pass approx. every 51 minutes normalies if wayons for 360 dayst Number of times the train horn will sound 84 each 24 hours If it takes 4 minutes for a train to

With the passing lane (2.5km on Barellan end of Wavering Downs) the train will need to start slowing down maybe Eaglefield boundary.

As a train stops on the passing lane 227 wagons will screech and also as the train starts off there will be a noise from the wagons as well as from one or two locomotives (empty trains). A train going onto the passing lane may take 8-10 minutes to pass our stock crossing on the railway line.

60 MILLION TONNES PER ANNUM Standard Gauge Line Number of tonnes per train 24000 tonnes Number of trains per 24 hours 14 Number of locomotives per 24 hours 42 Number of wagons per 24 hours 3276 Number of trains per year 2500 A train will pass approx, every 102 minutes Number of wagons per train 227 Number of times the train horn will sound 42 each 24 hours number of wagons for 360 days 1,179,360

**120 MILLION TONNES PER ANNUM** Number of tonnes per train 24000 tonnes Number of trains per 24 hours 28 Number of locomotives per 24 hours 84 A train will pass approx. every 51 minutes normleer of wagens for 360 days Number of times the train horn will sound 84 each 24 hours If it takes 4 minutes for a train to

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May 2010	3/05/10 3/05/10 1				
Johnny Cake & Glen Bowen Weaners	2/11/09 3/05/10 131			UII	
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Move 650 Weaners from Paddock 2 into Paddock 3	2/11/10 2/05/11 130				IN THE REAL PROPERTY OF
Split Steers and Heiffers	3/05/11 3/05/11 1			and the state of the	
Move 320 Steers to Paddock 4	4/05/11 4/11/11 133				
Move 320 Steers to Paddocks 7,8, 9 & 10	3/11/11 3/04/12 109	a state of the second sec			
Move 320 steers into Paddocks 11 & 12	3/04/12 2/08/12 88				
Move 320 Steers into Sale Paddock 13 and Sell	2/08/12 31/08/12 22				
Move 330 Heilfers to Paddock 5	4/05/11 4/11/11 133	20			
Add Bulls to Paddock 5	4/11/11 4/11/11 1				
330 Heilfers with Bulls	4/11/11 4/04/12 109				
Preg Test Heilfers	4/04/12 4/04/12 1				
Move 250 Pregnant Heitlers to Sale Paddock 13 to Sel	4/04/12 3/05/12 22				
Move 80 Sterile Heiffers into Sale Paddock 13 and Sell	3/05/12 1/06/12 22				
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Move 80 Sterile Heiffers to Sale Paddock 13 to Sell	30/10/13 28/11/13 22				

Doft	Nomo	Hectares	Acres	Usage Sequence	Time of Year	Animal Type	Animal	Avg. Value/	Total Value	Total Value
aler #	And the second s		and the strengther a	(and the Wayness of the			Numbers	Animal		less Transpor
1	Number 1 Paddock	317 28 ha	783	J.C & GB to W.D. (1)	May - Nov	Weaners	650	\$350	-\$227,500	-\$227,500
2	Number 2 Paddock	481.13 ha	1188	1-2	Aug - Nov	Weaners	650			
3	Chesterfield End of River Paddock	823.36 ha	2033	3	Nov - May	Weaners	650			
4	Eaglefield End of River Paddock	683.49 ha	1688	4	May - Nov	Steers	320			
5	Gooberoo Paddock	1217.95 ha	3008	5	May - Nov - April	Heiffers	330		1.	
6	Eagle Hawk Nest Paddock	521.64 ha	1288	6	April	Heiffers - Sterile	80	\$790	\$63,200	\$63,200
7	Eaglefield Creek Paddock	629.21 ha	1554	7.8.9 & 10	Nov - April	Steers				
8	Eences Camp Number 2 Paddock	416.23 ha	1028	7.8.9 & 10	Nov - April	Steers				
9	Fences Camp Number 1 Paddock	177.27 ha	437	7,8,9 & 10	Nov - April	Steers				15.
10	Paddock Behind big Dam	339.01 ha	837	7.8.9 & 10	Nov - April	Steers	1	1		1
11	Jumbo Paddock	855.58 ha	2111	11 & 12	April - Aug	Steers				
12	18 mile Paddock	1114.63 ha	2751	11 & 12	April - Aug	Steers				
13	Fences Camp Holding Paddock	88.96 ha	219	13	April	Heiffers - PTIC	250	\$860	\$215,000	\$215,000
	i eners demp hereing recest			13	Aug-Sept	Steers	320	\$1.078	\$344,960	\$344,960
									1	
	Weaper Transport						650	\$12		-\$7,770
	Steer/Sterile Heiffer Transport				-		400	\$95		-\$38,000
	Heiffer PTIC Transport						225	50	1	50
	nemer the transport								\$395 660	\$349,890
	-	-								
1	Number 1 Paddock	317.28 ha	783	J.C & GB to W.D. (1)	May - Nov	Weaners	650	\$350	-\$227,500	-\$227,500
2	Number 2 Paddock	481.13 ha	1188	1-2	Aug - Nov	Weaners	650			
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				13	Aug-Sept	Steers	320	\$1,078	\$344,960	\$344,960
	Weaner Transport						650	\$12		-\$7,770
	Steer/Sterile Heiffer Transport				1		400	\$95		-\$38,000
	Heiffer PTIC Transport						225	\$0		\$0
-								1	\$395,66	\$349.890
							1			13.0000
	Annual Return			1					\$791.32	\$699,780

Source	Турс	Avg. Purch. Cost	Transport/	No. of	Total Cost	No. of	Type	Avg. Sell	Transport/	Sales	Sales	Revenue/	Revenue/	JK & GB \$	External \$	Difference
			Animal	Animal		Animal		Price	Animal		6 Months	6 Months	12 Months	12 Months	12 Months	
JK & GB	Heiffer	\$300	\$12	330	\$102,960	250	Heiffer PTIC	\$260	\$0	\$215,000	\$270,600	\$167,640	\$334,780	\$334,780		
EU						80	Heiffer - Empty	\$790	\$95	\$55,600						
External (300-400kg)	Heiffer	\$572	\$16	330	\$194,040	250	Heiffer PTIC	\$860	\$0	\$215,000	\$270,600	\$76,560	\$152,620		\$152,620	
Non EU						80	Heiffer - Empty	\$790	\$95	\$55,600						
						1. 1. A. A.										\$182,160
JK & GB	Steer	\$400	\$12	320	\$131,840	320	Steer	\$1,078	\$95	\$314,560	\$314,560	\$132,720	\$364,800	\$364,800		
EU																
External (300-400kg)	Steer	\$758	\$16	320	\$247,680	320	Steer	\$1,078	\$95	\$314,560	\$314,560	\$66,880	\$133,120		\$133,120	
Non EU																
																\$231,680
														\$699,580	\$285,740	
																\$413,840
																Loss



Peaks for itself



Val Cormack

Dear Mr & Mrs Connack,

Thank you for your email of 10 August 2012 requesting information about the types of chemicals QR National uses for weed management in easements.

Firstly, I wish to apologise for the delay in responding to your email.

As you mention, your property is part of the study corridor defined for the Central Queensland Integrated Rail Project (CQIRP).

QR National has engaged AECOM to undertake necessary environmental studies within this corridor, the study information obtained will then form the Environmental Impact Statement(EIS).

In terms of undertaking these environmental studies, typically no chemicals are taken onto private properties, with the exception of diluted mentholated spirits which is required to preserve aquatic ecology samples. Some studies also require calibration fluids to calibrate different equipment used for specific testing, however these are in small quantities (usually less than one litre).

If a private landowner requests for a specific method of weed wash down to be undertaken prior to entering a property, the team may need to transport the associated herbicide requested by the landowner. In this event, a specific agreement would be made directly with the landowner, and the team would develop a specific Safety Work Method Statement (SWMS) to ensure the safe transportation and use of the herbicide.

Further to this, please be aware that our team has a number of different weed management options open for discussion with landowners, and these methods can be tailored to suit. These arrangements will be documented as part of the land access agreement negotiations, and will be done so in agreement with the landowner.

As part of its rail corridor weed management program, QR National typically uses the following pesticides:

wately!	
Number	Product
20002637	HERBICIDE ACCESS WEED KILLER 10L
20000192	HERBICIDE ACIDIFER L 1 700 10L
10015668	HERBICIDE GRAZON EXTRA 20L DR
10028133	HERBICIDE MACSPRED CLOMAC FORESTRY 2KG
10003000	HERBICIDE MACSPRED GLYMAC DRI 700 10KG
20001616	HERBICIDE METSULFURON/METMAC 200G
10028952	HERBICIDE ROUND UP 15 L DRUM
10026454	HREBICIDE SULFOMAC 1KG BOT #0012



Aurizon Operations Limited ACN 124 649 967

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Central Queensland Integrated Rall Project Tel: 1800 204 580

Fortitude Valley QLD 4006



6 December 2012

Mr Valentine Cormack

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Aurizon Operations Limited ACN 124 649 967

BBadanial

I hope this information addresses your enquiry. If you do have any further questions, please feel do not hesitate to contact the CQIRP project team on 1800 204 580 or by emailing cqirp@qmational.com.au.

Kind regards

Robert Stuart Infrastructure Project Director Aurizon

141

esate resistance may include weed. The not sements (north- South) from the to about point is loooled with partle ium weed. This is just another ason for the beef industry and the great Barrier need to have control of chemicals are used on the easement. What chanica used us y Parthenium

grasses and damaging environmental weeds like fireweed and parthenium weed.

Andrew Storrie, Australian Glyphosate Sustainability Working Group executive officer, says most of the weeds tested are found across Australia and one in 10 weed species have a high risk of glyphosate resistance.

"While resistance to glyphosate in cropping has been making headlines around the world, this study suggests it could become a problem in any Australian weed management situation," he said.

Two-hundred weed species were analysed to determine their innate likelihood to evolve and change in response to continued selection by herbicides in projects funded under the recently completed Department of Agriculture, Fisheries and Forestry (DAFF) National Weeds and Productivity Research Program managed by Rural Industries Research & Development Corporation (RIRDC), involving Department of Agriculture, Fisheries & Forestry Queensland and other organisations.

The project was also supported by the Cotton Catchment Communities Cooperative Research Corporation. The program aims and outcomes complement Grains Research and Development Corporation (GRDC) investments in managing herbicide resistance.

Project member David Thornby, Queensland Department of Agriculture, Fisheries and Forestry (DAFF), says weed managers have a range of weed management tactics available to them for each species.

www.queensiandcountrylife.com.au

Flaxleaf flexbase after the wheat harvest.

"Where a species is at high risk of developing glyphosate resistance, it is vital not to rely on a single herbicide," Dr Thornby said. "Most weed managers have multiple problems competing for scarce resources – labour, time, money and attention – and risk assessments can be used by managers to help them decide how to organise their resources.

"From a resistance management perspective, it makes sense to devote more time to planning and monitoring, and increasing the range of management options, to species that appear to be at the highest risk of evolving herbicide resistance."

Dr Thornby says it is important to remember there is no relationship between resistance risk and weediness, invasiveness, or ease of control.

"What this study shows is that we need to be thinking about how we use herbicides in every situation, both agricultural and nonagricultural weed control."

The top five highest risk weeds were needle burr, sweet summer grass, Vulpia species, flaxleaf fleabane and liverseed

grass. The latter two species have already evolved resistance to glyphosate in Australia.

fleabane

"Luckily almost half of all species assessed are at low risk of resistance, and the remainder at moderate risk," Dr Thornby said.

"Despite being at low risk of resistance, some low-scoring species are nevertheless important and highly prevalent weeds, both to cropping (e.g. nutgrass, bladder ketmia) and non-cropping areas (e.g. salvinia, alligator weed)."

Mr Storrie said market research as part of the project has found many land managers are ill-prepared to deal with the loss of herbicides through resistance."

The Australian Glyphosate Sustainability Working Group is supported by the GRDC and key R&D based crop protection companies with an interest in the sustainability of glyphosate.

The AGSWG website has a range of information about glyphosate resistance including a register of glyphosate resistant weed populations.

 Visit glyphosateresistance.org.au and grdc.com.au

18 QUEENSLAND COUNTRY LIFE 20 December 2012

# **One in 10 weeds 'high risk** for glyphosate resistance'

**RESEARCHERS** say 23 weed species are now at high risk of developing glyphosate resistance, including several important grasses and damaging environmental weeds like fireweed and parthenium weed.

Andrew Storrie, Australian Glyphosate Sustainability Working Group executive officer, says most of the weeds tested are found across Australia and one in 10 weed species have a high risk of glyphosate resistance.

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www.queensiandcountrylife.com.au

T& QUEENSLAND COUNTRY LIFE 20 December 2012



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Australian Government

Great Barrier Reef Marine Park Authority

Mr Val Cormack

2008/4647

#### Dear Mr Cormack

Thank you for your letter dated 26 September 2012 requesting that the Great Barrier Reef Marine Park Authority work with Agforce Queensland to have the Hancock – GVK rail corridor listed as a potentially contaminated site on the Queensland Contaminated Land Register.

The Great Barrier Reef Marine Park Authority shares your concerns that additional pressures imposed by development of the Great Barrier Reef catchment may further reduce the resilience of Great Barrier Reef ecosystems.

The Great Barrier Reef Marine Park Authority will liaise with Agforce Queensland through its Reef Guardian Farmer program to investigate your concerns.

I thank you once again for raising this matter with me and I look forward to working cooperatively with Agforce Queensland in seeking to find a satisfactory resolution.

Should you wish to discuss this matter further, please contact Mr Nathan Walker, Manager Reef Guardian and Fishing

Yours sincerely

Bruce Elliot General Manager Environment and Sustainability

2 November 2012

2 - 68 Flinders St PO Box 1379 Townsville Qld 4810 Australia Phone + 61 7 4750 0700 Fax + 61 7 4772 6093 info@gbrmpa.gov.au www.gbrmpa.gov.au