A Comprehensive and Detailed Explanation for the Intention of Land Clearing, Construction and Operations for the Purpose of Pyrolysis or Endothermic Process in the aim of the Reduction of Waste Tyres and Medical Waste.

Notice of Intent

Compiled by the Proponent: Anthony Gurr
06/04/2017

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2. Project details

2.1 Project title

- Daly River Road Pyrolysis Plant Project.

2.2 Proponents contact details:

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- Consultants will be contracted upon pending possible future licensing approvals.

2.4 Joint-venture Partners

- At this present time, only the landowners/applicants have shown interest in the establishment of a Pyrolysis Plant in the Northern Territory.

2.5 Location

- 135 Daly River Road Robin Falls NT 0822. N.T. Portion Lot# 05216 Plan(s) S 98/240C. (Staged sub-division of N.T. Portion Lot# 04724) Current title: CUFT 715 246 (order one). Current status: Freehold The area of the land is: 2 square kilometres + 25 hectares + 4000 square metres/224.6 hectares/555 acres.
  Longitude and latitude
- S/E corner 13 29' 20, 25" S
  131 11' 15, 26" E
- N/E corner 13 28' 50, 18" S
  131 11' 09, 37" E
- N/W corner 13 28' 51, 57" S
  131 09, 45, 20" E
- S/W corner 13 29, 20, 01" S
  131 09, 44, 12" E
- The nearest residents or more affectionately known as "Blockies", reside over 5 kilometres in distance from the proposed site. The intended freehold land to be cleared for the proposed site is 7.9 Hectares which will contain buffer zones of no less than 25 Metres, in accordance with the Department Of Environment and Natural Resources regulations.

135 Daly River Road Robin Falls NT 0822 Portion Lot# 05216 Intersection

2.6 Proximity to Essential Services

- The nearest Fire, Police and Ambulance services are Adelaide River town ship, approximately 32 kilometres to the north/east, Daly River community approximately 100 kilometres due west and Katherine town ship, approximately 160 kilometres to the south/east and Darwin due north 142 kilometres.

2.7 Location within a regional context

- As previously stated, the said parcel of land is located in the Robin Falls district on the southern corner of Daly River Road and Dorat Road "T" intersection, the area is also known as the Escarpment Ranges. Ideally, the location lends itself the privilege of being in the more remote areas of the Top End, in order to conduct everyday activities without disruption to nearby businesses or residents. The physical co-ordinates for the proposed 7.9 hectare pyrolysis plant venture, within the boundaries of 135 Daly River Road (Lot# 5216) are:
- North/east corner E736691/N8508311,
- North/west corner E736494/N8508282,
- South/west corner E736552/N8507891,
- South/east corner E736750/N8507921.

A 25 metre wide offset natural flora buffer zone located on the eastern side boundary of the proposed site and running parallel with Dorat Road, will be remaining after the clearing, as per Department of Environment Natural Resources compliance. The north and south boundaries will retain a natural flora buffer zone of 261 metres in width, respectively. The entire Daly River

Road frontage boundary 2.5 kilometres in distance will remain undisturbed of any clearing.

2.8 Planning Context

- The said property is located within the boundaries of the Silkwood Estate properties, which over time have been sub-divided into multiple sized parcels of land, running parallel with the Dorat and Daly River Roads, respectively. These varied size parcels of land, have over the years been purchased by people to use for "weekenders" or permanent living arrangements. The Tipperary Station boundary is located to the most southern aspect boundary of the said land and approximately 30 kilometres due West in distance is the rear, "4 wheel-drive only" entrance, to the world renowned Litchfield National Park. Robin Falls is situated in the northern direction of the proposed pyrolysis plant site, approximately 15 kilometres in distance. To the south of the proposed site approximately 80 kilometres in distance is the Douglas-Daly region. Escarpment Ranges create flowing contours of hills, dotted with Native Ironbark trees and Eucalypts, just to name a few.

2.9 Typical vegetation of Lot# 05216

3.0 Regulation

3.1 Current Northern Territory and Commonwealth Legislation

- As the proposed Pyrolysis Plant site falls outside of the jurisdiction of the Planning and Infrastructure Act due to the indicated location, a development permit is not required.
- Environment Protection Licenses will need to be applied for by the Applicant, due to the Listed Waste activities that will be transported, stored and treated on-site.
- No activities under the Mining Act or the Petroleum Act will be taking place on the Proposed site or any part of the project.

4.0 Detailed description of project proposal

4.1 Project overview

- The Proposed Pyrolysis project will include activities of the destructive distillation of "end-of-life" automotive tyres, ranging from small to very large in size. Plastic medical waste will also be treated by the Pyrolysis method. The process will initialise with the mulching of tyres, to an appropriate size to suit the negative pressure rotating heating chamber. Once the shredded tyre has entered the airless, negative pressure chamber, temperatures of up to 500 degrees Celsius are applied by using the hydrocarbon gases/liquids, captured from the previous pyrolysis process.
- Once the waste tyre/medical waste reaches combustible temperatures, the gases are captured by using air-scrubbers, wet scrubbers, condensers and heat exchangers then convert the gases to liquid (crude oil) which is pumped to the designated receiver storage tanks or channelled to another process. Only four main hydrocarbon components remain after the pyrolysis process, crude oil, liquid propane gas, steel and carbon char.
- The liquid (crude oil) can then be either, on-sold, separated or reused in the next pyrolysis distillation process.
- Liquid propane gases also created during the pyrolysis process, can be pumped to a receiver tank (under pressure) to be on-sold, purified or used for the next pyrolysis cycle. Scrap steel collected after the waste tyre pyrolysis process has been completed, will be on-sold to local scrap steel merchants.
- Carbon char will be on-sold to markets in the primary production, paint, fertiliser industries etc.
- Each ten tonne batch of rubber or plastics takes approximately 24 hours for Completion. Two x ten tonne Pyrolysis Plants are intended to be purchased by the Applicant. The proposed pyrolysis plants will not be operating simultaneously nor will they be operating on a daily basis.

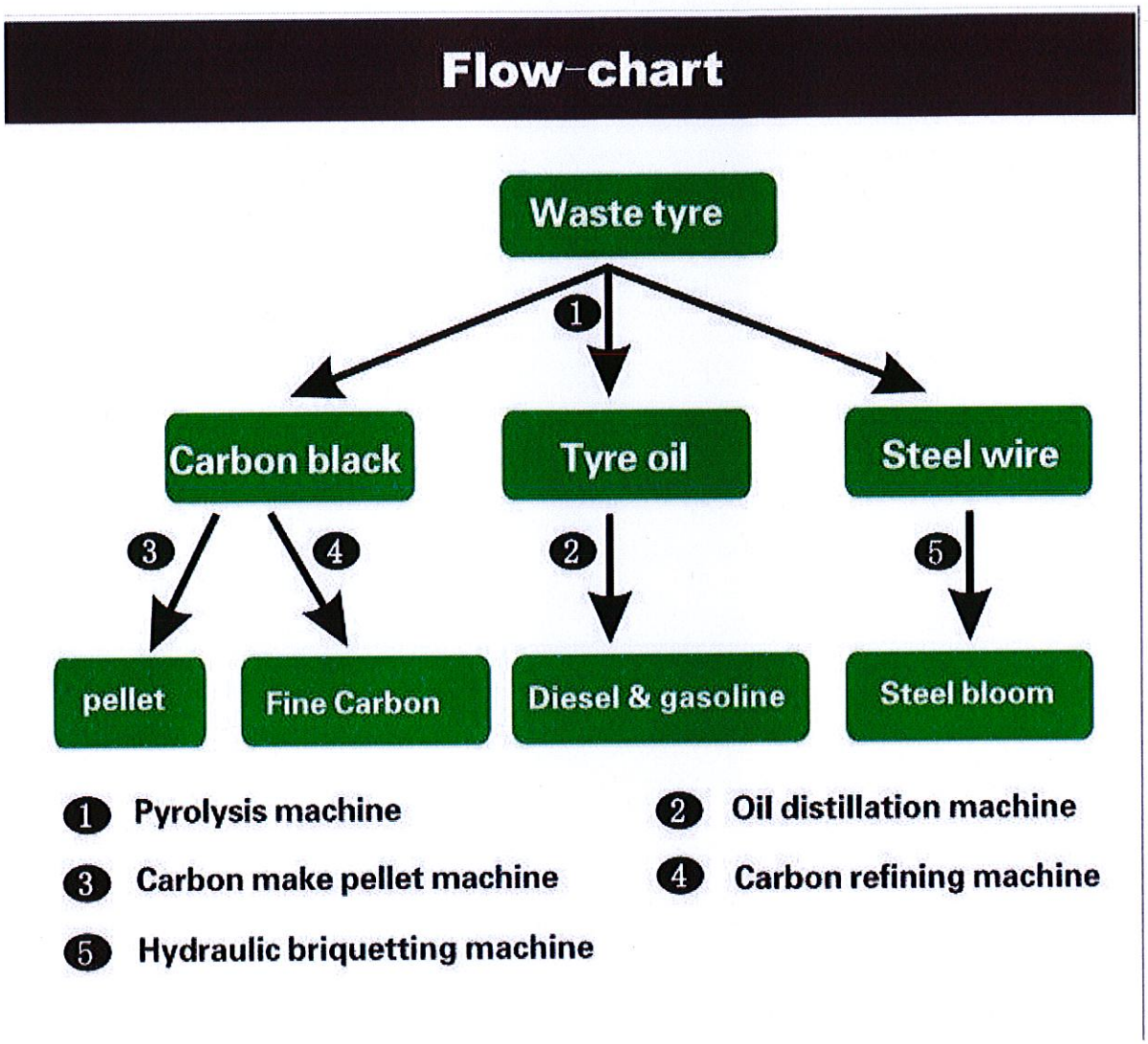


Chart 4.2

4.3 Emissions

Community consternation

Possible concerns raised by the local community and Quality of Life purveyors. Water/Traffic/Odours/Noise.

It needs to be pointed out, none of the intermediate binary products and final products obtained from the pyrolysis plant are highly toxic and hazardous. The pyrolysis reactor will not contribute to Green House Gas emissions as it does not require oxygen, thus does not produce CO2.

4.4 Water

4.5 State the source of potable water supply.

- Initially and perpetually, the facility will require water for the condensers and heat exchangers, to be stored in closed holding tanks for when required during the pyrolysis process. The size of the water storage holding tanks will be indicative of the amount and size of the water cooling towers and heat exchangers.
- The amount of water required for two pyrolysis plants will be approximately 3.2 m3/week and the wet scrubber will have a makeup water requirement of 1.50 m3/week (17%-50% of water consumed).
- 2.0 m3/week of make-up water will also be required by the condenser to compensate for the water lost through evaporation during cooling process in the cooling tower.
- All pyrolysis plant water will be recycled through a cooling tower and tested regularly for impurities and at no time will any pyrolysis plant water/liquids be discharged onto open ground, storm water drains, around trees or into the open environment.
- Upon start-up of the pyrolysis plant, water from a commercial source will be transported-in for initial operations. Water collected from the rooves of buildings will also be utilised for retention in further use for the cooling condensers and heat exchangers, during the wet season. As the pyrolysis plants are contained, at no stage is there any possibility of cooling water to mix with liquids or gases derived from the pyrolysis process.
- At no point will bore water or artesian water be drawn from the allocated land, be used on the pyrolysis plant site.
- No water management areas, control districts or plan allocations are located near the proposed land.

4.6 Traffic

4.7 Levels

- Expected increase of traffic levels are to be marginal, on the basis that bulk deliveries, both entering and exiting the site will be on a weekly basis and not daily.

4.8 Odours

- **Identify all sources of odour for the proposed pyrolysis plant and associated amenities such as the storage of scrap tyre/rubber and plastic and to state the proposed mitigation measures.**
- The emissions shall be in line with the Emission Standards as per the Environment Protection (Standards for Air) Regulations.
- The emission test results of the exhaust gas of an existing pyrolysis plant similar to that proposed by the Proponent located in the country of The Peoples Republic of China, whereby standard emissions were compared with that of the exhaust gas presented in against the Emissions Standards for Air, it was shown that gaseous emission from the plant will conform to the maximum permissible limits as per the Environment Protection (Standards for Air) Regulations.
- All recycled water will be piped back to the wet scrubber.
- All equipment, hoses, taps etc to be used will be in air tight conditions, hence, there will be no odour emission from the equipment.
- Storage area of scrap tyre/rubber will have a capacity of 20 to 30
- MT of tyre/rubber and the smell will be like that of a tyre selling
- shop and will not disperse outside site boundaries.
- The emissions from the pyrolysis process will comply with the Emission Standards of the NTEPA requirements.
- The quantity of particulate solids obtained from filtration will be relatively low and odourless.
- The particulate solids will be collected by filtration and will be allowed to dry in the open air.
- After drying, the solids will be collected, on-sold, recycled and/or sent to the landfill by a licensed waste carrier after approval from the relevant authority.
- The disposal of the solids, calcium sulphate and sodium sulphate is not expected to have any significant impact to the landfill.

4.9 NOISE

- **To list the major equipment which are likely to cause noise, to Predict their noise levels both on site and at the sites Boundaries and to elaborate on the mitigating measures such as soundproofing (if any) being proposed.**
- The plant will operate between 07:00 – 21:00 hrs. Monday-Saturday.
- The major equipment expected to have noise emissions are the pyrolysis chambers, suction blowers and the cooling tower. Noise emissions at the source will be due to the operation of the motors and will not exceed 60 dB (A) Leq during operation.
- The diesel generator to be used for internal power generation will be equipped with a sound-proof system and will also not exceed the limit of 60 dB(A) Leq during operation as indicated in the industrial noise exposure limit of the Environmental Protection (Environmental Standards for Noise) Regulations.
- The nearest residents to the proposed site are approximately 5 kilometres in distance from the pyrolysis plant activity.

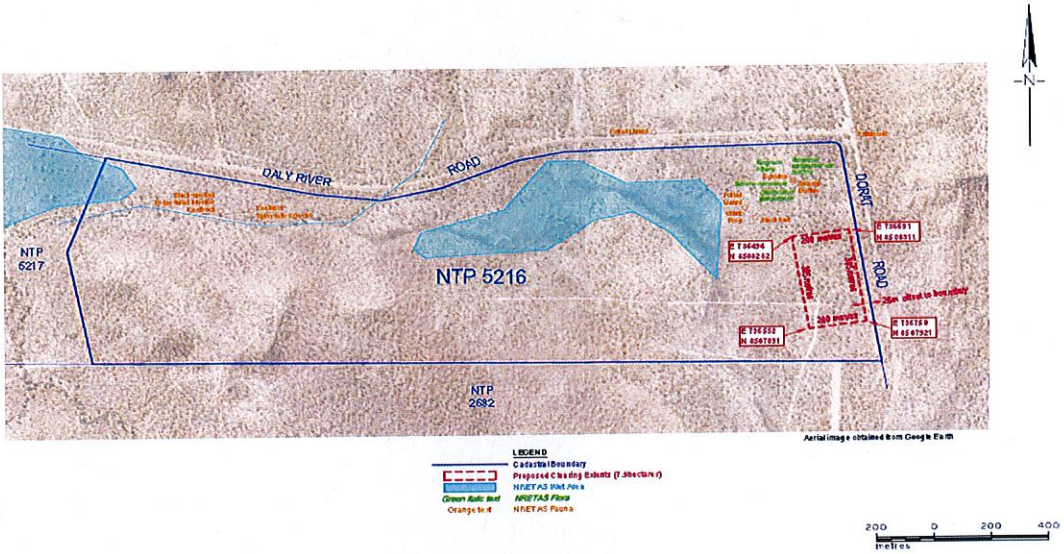
Activity	Aspect	Impact	Mitigation Measure
1. Construction	Noise and dust generation	Noise and dust generation from use of heavy machinery	• Civil works will not be carried out during undue hours and night time. • Noise will be within prescribed limits for neighbourhood noise exposure limits: 07:00–18:00hrs 60 dB(A)L_{eq} 18:00–21:00hrs 55 dB(A)L_{eq} 21:0 –07:00hrs 50 dB(A)L_{eq} • Site will be fenced to reduce dust propagation. • Site will be sprinkled with water.
	Solid waste production	• 14 kg/day domestic waste • Around 1,000 kg/day construction waste	• Construction waste will be used as backfill. • Waste will be segregated for recycling and composting. • Remaining waste will be sent to landfill. • Toxic wastes will be transported by a licensed carrier for recycling.
2. Operation	Electricity consumption from CEB	Around 200 kWh of electricity will be consumed daily	-
	Water consumption	3.2 m3 of water per week 2.0 m3 of make-up water per week	- Water will be sourced externally and stored for when required.
	Creation of employment	10 jobs will be created	-
	Risks associated with storage of scrap tyres and waste plastics	• Risk of tyre fires • Risk of tyre leachate contaminating groundwater, surface water and soil • Risk of transmission of diseases	• Around 50 MT of tyres will be stored on level site (EPA, 2010). • Concrete flooring for storage facility. • Combustible or flammable liquid will not be stored near storage area. • Plastic storage area should be enclosed and protected against rain and wind.

Table 4.10

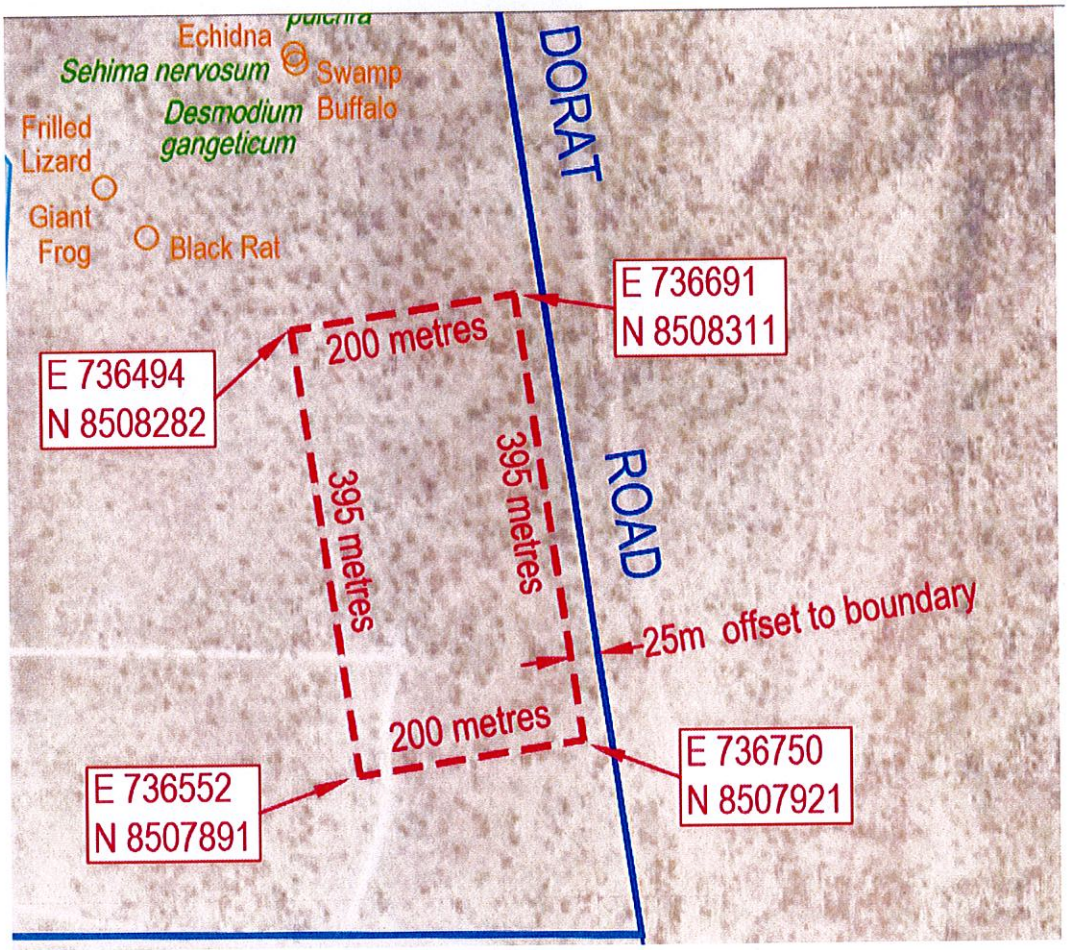
4.11 Layout of the proposed site

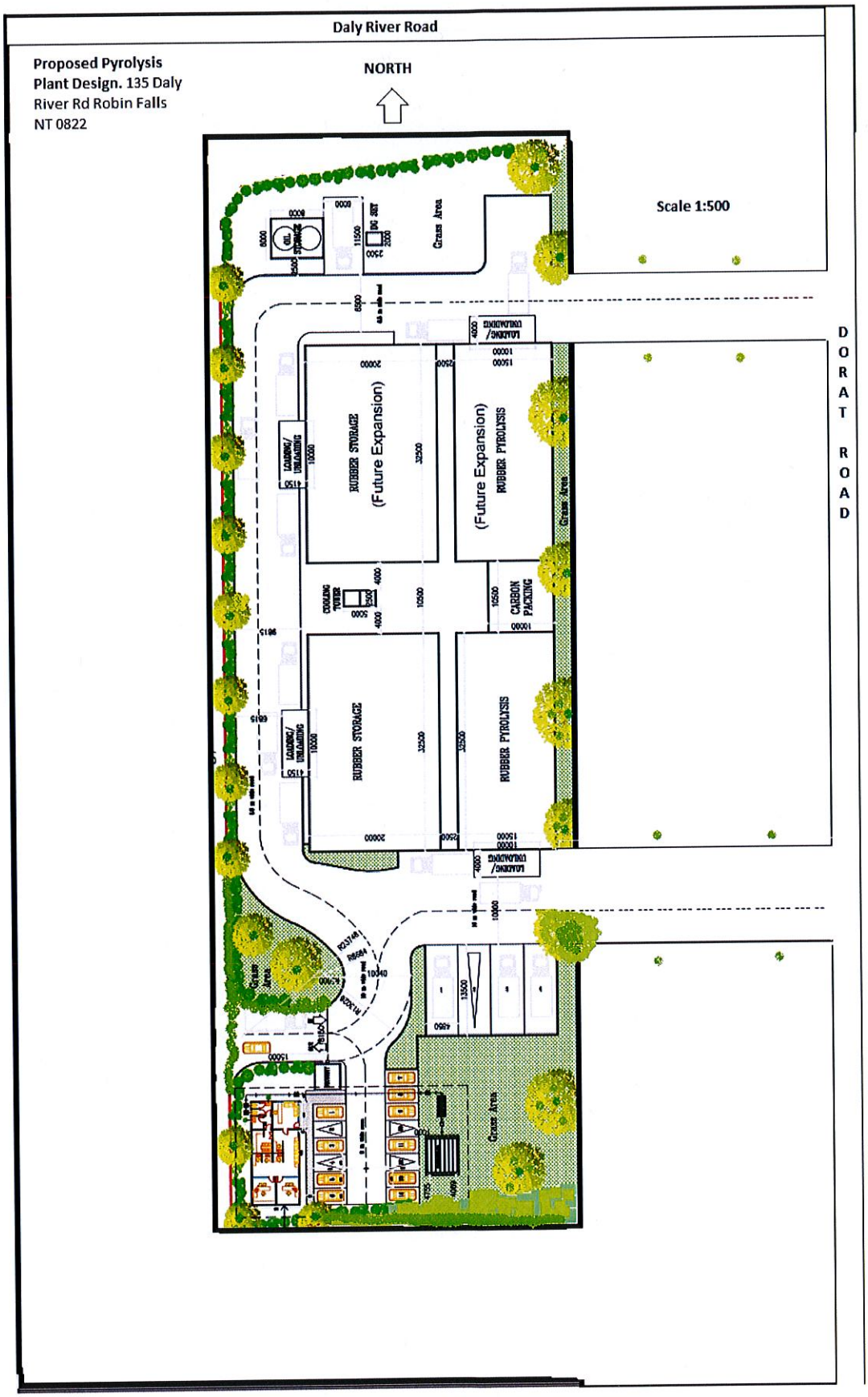
- The make-up of the site will include two pyrolysis plants, each having a footprint area of approximately 300 square metres, a tyre mulching yard an area of approximately 50 square metres, a tyre holding yard an area to hold up to 30 tonnes of tyres per week (approx. 50 square metres), a holding area for medical waste plastic bags for up to 50 tonnes per week (approx. 100 square metres) and numerous receiving and liquid storage/holding tanks, amenities/first aid block, office block and caretakers cottage.
- Total area required for the infrastructure is approximately 5000+ square metres. No part of the proposed pyrolysis plant infrastructure is expected to be seen from either the Dorat Road or Daly River Roads, respectively.
- The two pyrolysis plants will be positioned side-by-side and located near the condenser and heat exchange water tanks for the convenience in the unlikely event of a fire.
- Only Australian Standards Back-Fire suppressors units will be fitted to all pyrolysis plants.
- Entrance and exit points will be in and out of Dorat Road only, due to the ease of driver visibility.
- The proposed project will be aligned in three stages, the clearing of the 7.9 hectares of land required, the erection and assembly of the infrastructure and finally, the instalment of the pyrolysis plants and associated equipment. A fair timeline for the completion of the proposed pyrolysis plant and infrastructure, is approximately 4-5 months pending weather conditions, unexpected hold-ups, staff shortages, NT time, delayed components, just to name a few.

4.12 Map Proposed Land Lot# 05216



4.13 Map Proposed Parcel of Land (magnified)





4.14 Plant Design

Project overview continued…

4.15 A description of the key physical components of the proposed project and their purpose/function, including infrastructure and major equipment as follows:

- Pyrolysis heating chambers to initiate endothermic processes which are large steel cylinders heated by fuel procured by pyrolysis
- Air scrubbers for cleaning solid particles from vapours
- Heat exchangers to vary required temperatures of liquids
- Condensers for converting crude oil vapours to liquid
- Cooling towers to reduce the water temperature from condensers
- Liquid/gas receiving and holding tanks to store final products
- Tyre mulching equipment for preparing waste tyres for pyrolysis
- Conveyors will deliver the processed rubber material to the chambers
- Forklifts to transport heavy items around the plant and works
- Prime mover and trailer for future mobile waste tyre collection operations
- Generators to supply electricity for lighting, motors and other circuitry
- Numerous industrial size sheds with concrete floors, for all of the above
- Office block, staff amenities and first aid centre, maintenance/tool shed
- Caretakers residence
- Designated safety assembly areas
- Roads, fencing and car parking
- Permanently connected and on stand-by fire-fighting equipment
- Signage

4.16 Transport requirements, modes, routes and frequency of public roads:

- Large transport vehicles will be required to carry tyre waste/medical waste to the proposed site, due to the geographical location of Darwin, via Dorat Road, from the northern end (using Daly River Road as the midway point reference) which currently has length restrictions for vehicles over 19 metres in length. Heavy vehicles approaching the proposed facility from the southern end have unlimited length restrictions. Expected increase of traffic levels are to be marginal, on the basis that bulk deliveries, both entering and exiting the site will be on a weekly basis and not daily.

4.17 Social and economic details relating to the project:

- The proposed project stands to employ a number of local people from the start of the land clearing (earthmovers) to the assembly and placement of the infrastructure (consultants, plumbers, electricians, gas fitters, welders, fencers, labourers etc) and then onto the actual start-up of the pyrolysis operations alone, for which will initially require up to 6-10 staff. Regular servicing and maintenance of plant, machinery and vehicles will also be required, which will also assist local commerce and industry.
- A myriad of future business opportunities and enterprises exist within the scope of this proposed project, which will include primary production, commerce, petro-chemical production, training, energy generation and carbon trading, just to name a few.

Environmental, Socio Economic and Safety Aspects and Impacts

Stage	Aspect/Activity	Impact	Type (E, SE, H&S)	N/P	Severity	Likelihood	Significance	Level of Significance
1	**Construction Phase:** Construction of the scrap tyre/rubber and plastic pyrolysis plant	Greenhouse Gas Emissions	E	N	2	1	2	Relatively Harmless
		Energy Consumption	E	N	1	1	1	Relatively Harmless
		Freshwater Consumption	E	N	1	2	2	Relatively Harmless
		Marine and Terrestrial Ecosystem						
		Socio-Cultural and Economic Issues	SE	P	1	1	1	Relatively Harmless
		Land Use Planning and Management	E &SE	N	1	1	1	Relatively Harmless
		Storage and Use of Harmful Substances						
		Air Quality, Noise and Odour	E, SE & H&S	N	2	4	8	Mild Effect, Easily Correctable
		Wastewater Generation	E	N	2	2	4	Relatively Harmless
		Solid Waste Generation	E	N	3	3	6	Mild Effect, Easily Correctable
		Safety and Health Hazards	H&S	N	2	1	2	Relatively Harmless
2	**Operation Phase:** Operation of scrap tyre/rubber and plastic pyrolysis plant	Greenhouse Gas Emissions	E	N	2	2	4	Relatively Harmless
		Energy Consumption	E	N	1	5	5	Mild Effect, Easily Correctable
		Freshwater Consumption	E	N	1	5	5	Mild Effect, Easily Correctable
		Marine and Terrestrial Ecosystem						
		Socio-Cultural and Economic Issues	SE	P	1	1	1	Relatively Harmless
		Land Use Planning and Management	E &SE	N	1	1	1	Relatively Harmless
		Storage of Scrap Tyres and Waste Plastic	E & H&S	N	3	2	6	Mild Effect, Easily Correctable
		Air Quality, Noise and Odour	E, SE & H&S	N	4	3	12	Harmful but Correctable
		Wastewater Generation	E	N	4	3	12	Harmful but Correctable
		Solid Waste Generation	E	N	3	1	3	Relatively Harmless
		Safety and Health Hazards	H&S	N	3	2	6	Mild Effect, Easily Correctable

Table 4.18

Severity \ Likelihood	1	2	3	4	5
5	5	10	15	20	25
4	4	8	12	16	20
3	3	6	9	12	15
2	2	4	6	8	10
1	1	2	3	4	5

21 to 25	Requires Immediate Action
10 to 20	Harmful but Correctable
5 to 9	Mild Effect, Easily Correctable
1 to 4	Relatively Harmless

Severity

1	No Impact
2	Negligible Impact
3	Considerable Impact
4	Great Impact
5	Very Great Impact

Likelihood

1	Very Improbable
2	Not Probable
3	Rarely Occurring
4	From Time to Time
5	Fairly Regularly

E- Environmental Impact

S- Safety Impact

SE- Socio Economic Impact

N- Negative Impact

P- Positive Impact

Table 4.19

4.20 WATER AND ENERGY RESOURCES

4.21 Water

- As previously mentioned, due to the nature of pyrolysis plants the only required water will initially be essential for the water tower(s), condensers and heat exchange and be constantly recycled through the water towers and scrubbers, only needing top-ups from time to time due to evaporation.
- Where evaporation losses of water are encountered, additional water will need to be transported to the proposed site. At no point will bore water or artesian water be drawn from the allocated land, to be used on the pyrolysis plant site.

4.22 Energy

- Due to the location, mains electricity is non-existent and up to this point of time, there is no framework for future plans of extending the power grid along the Dorat and Daly River Roads.
- A large electrical diesel/LPG generator will be procured to provide adequate electricity to supply the proposed pyrolysis plants, accessories and outer facilities.
- The chosen electrical generator will have the ability to accept and perform on treated crude oil/LPG fuels, provided by the pyrolysis process.

4.23 The handling (storage and transport) of hazardous substances

- The pyrolysis process produces two "hazardous" substances which have limited on-sale value, Sodium Sulphate and Calcium Sulfate. Both substances on their own in controlled surroundings pose minimal safety issues. The transporting of these substances in closed and airtight containers have proven to be hazardous free. The handling, transport and storage of all/any chemicals will be within the N.T. Environment Protection Authority guidelines of Licences/Permits.
- Sodium Sulphate is not officially classified as hazardous/dangerous goods according to Safe Work Australia, it is used in paper pulp, plate/window glass, soaps/detergents, ceramic glazes and numerous other industries and in the unlikely event of a fire, is easily extinguished with water. Sodium Sulphate can be safely stored in mild steel or plastic airtight containers. What cannot be saved for recovery or recycling can be disposed of according to relevant local, state and federal government regulations. This material is not expected to significantly bio accumulate.
- Calcium Sulfate is also not officially classified as hazardous according to Safe Work Australia and is used widely in industries as cement retarders, soil treatment, metallurgy, paint, enamels and in many other numerous products. It is non-combustible and disposal by secure landfill and may be acceptable where authority is given. (For further information supporting these claims, please see attached Material Safety Data Sheets.)

4.24 Waste water and solid waste stream requirements

- As previously stated, there is no waste water discharge from the pyrolysis plants, the only water required is recycled through the cooling tower and heat exchange units, where water evaporation only will take place. Water and solid waste from wash rooms and toilets will be chemically treated using biochemic methods or alternatively taken off-site.
- The solid waste from the pyrolysis process, excluding the sodium/calcium products, is entirely recyclable or suitable for on-selling etc.

4.25 Decommissioning and rehabilitation measures

- Where, in the future the pyrolysis plants have outlived their potential or unforeseen circumstances require the decommissioning of the entire plant and machinery, the remaining infrastructures and buildings could be utilised as covering for farming implements, transport vehicle sheds, packing or sorting areas for various industries etc.
- All tanks and receiving receptacles will be set above ground, as with pipes, hoses and connections for ease of replacement or permanent removal.
- As no mains electricity is available in the local area and remote electrical generation will be deployed, all certifiable electrical cables will be discretely installed above ground for ease of decommissioning and to prevent electrocution during wet weather.
- Being the landowner of the said property, I will be personally supervising the land clearing and only choosing flora and trees on a "need-to-go" basis, **not** an "all-to-go" mentality, keeping in mind the relationship to the planning and design of the site and infrastructure, so that in the unlikely event of closure, there will still be a maximum area of bushland to enjoy.
- Roads, pathways and carparks will consist of the naturally occurring road base gravel which is found elsewhere on the property, where if the land needs to be reclaimed, will make rehabilitation of ground works and flora around the site more effective and expedient.

4.26 Alternative locations, timeframe and activities

- Other locations had been discussed i.e. East Arm Development Business Park, however, leasing or renting land could restrict future developments, expansion, activities and schedules. By owning the land freehold, we feel that we are only beholding to the NTEPA, DENR licensing/approvals/conditions and not additional Landlord(s) or Leasers.

4.27 Landscape

4.28 Land clearing and extent of land disturbance

- A 7.9 hectares rectangle shaped parcel of land, measuring 200 metres x 395 metres or 3.5% of the total 224.6 hectare block on the most eastern side of the property, has been ideally chosen, which will require clearing. The said parcel of land is nearest to the Dorat Road boundary

and is the most strategically placed area, farthest away from native flora and fauna, creeks and spillways located elsewhere on the property. The said parcel of land is ideally located due to the elevated position in order to avoid flooding, poor driving vision and to aid in the continuity of entry/exit with loading and unloading of heavy transport vehicles.

4.29 Digging, re-contouring, trenching, removal or reshaping of land

- Limited amounts of soil disturbance are the intentions of the Applicant, once the required trees and flora have been removed, the already exposed natural road-base, which was initially used to construct the Old Stuart Highway (now Dorat Road), located elsewhere on the property, will be layered in areas designated for carparks, internal roads and pathways.
- As the proposed parcel of land is flat with an approximate gradient of 3 degrees, free of naturally formed drains, spillways and run-offs, disturbance to the local environment will be minimal. Due to the nature of the above ground electrical/plumbing design, within the required infrastructure for the proposed pyrolysis project, there will be very few requirements for the reshaping, trenching and digging of the proposed parcel of land.
- The nearest coastline is approximately 140 kilometres to the North and 100 kilometres to the West, effectively the proposed parcel will be unaffected by any coastal reshaping.

4.30 Surface and ground water

- Ground water will not be extracted from the proposed land, initial requisition of water will be transported in from a commercial supplier. As stated earlier, The amount of water required for 2 pyrolysis plants will be approximately 3.2 m3/week and the wet scrubber will have a makeup water requirement of 1.50 m3/week (17% of water consumed).
- 2.0 m3/week of make-up water will also be required by the condenser to compensate for the water lost through evaporation during the heating process in the cooling tower. Water will be collected from the rooves of infrastructure during the wet season and stored in appropriate water holding receptacles and the excess will be directed to the lowest run-off point. Self-sufficient rain water collection will take the burden away from neighbouring land owners who depend on bores for their livelihoods.
- Heat exchangers, condensers and wet scrubbers do not need to discharge water, only recycle the water through cooling towers and then returned to their designated locations. Sludge and slime is controlled by means of filtration, chlorine and bromine based bio dispersants to prevent microbial and Legionella growth.
- There will be no water volumes or discharging events during or after the pyrolysis process. No discharges of contaminants are required as none are created.
- No nutrient loading is derived from endothermic reaction.
- No discharge site will be required.

4.31 Air quality

4.32 Source of emissions

- Odours of waste tyres, petroleum products and the like, which could arise in the Storage Area, will be minimised by having clean conditions and impeccable house-keeping skills, without spillages, maintenance of closed arrangement liquid connections of receiving and holding receptacles.

4.33 Estimated volumes and rates of emissions

- Estimated fugitive emissions from a 'generic' pyrolysis plant have variational reports between as 5 to 50 kg/day of VOC (volatile organic chemicals) gases and using the dispersion formula this quantity would result in approximately <1.2µg/m3 in the air, depending on the type/style of pyrolysis plant selected. Effluent will be filtered and the treatment of the particulate solids has been described.

4.34 Expected contaminants

- The non-condensable gases will be re-used for re-heating purposes in the next pyrolysis process and sent to a pressure vessel via a specifically designed compressor until such time is required.

4.35 Discharge locations

- Possible discharge locations will be loose or damaged connection fittings to hoses and pipes.

5.0 LAND USE HISTORY

5.1 Previous land use(s)

- Prior and during World War II, the proposed land was part of the training and practice range for the Department of Defence, which was common for most or if not all, of the Escarpment Ranges, during that era.
- Since World War II, the proposed land has only been used for free range cattle grazing, water from the nearest wet season stream to quench the thirst of the wild Escarpment brumbies and recreational purposes.

5.2 Has the proposed land been registered as a contaminated site?

- As stated on the Lands Title Certificate, "Results of site contamination assessment – None found."

6.0 Existing environment

6.1 Where the proposed action is to occur

- Very limited environmental action is required due to the very nature of the pyrolysis process, minimal if any disruption to the surrounding locales. The pyrolysis plants themselves are basically a huge rotating oven, which captures and condenses the gases under negative pressure, to liquids, which self-supplies the hydrocarbon fuels to continue the pyrolysis cycle.
- There are no aspects of the actions likely to be impacted by the proposed activities.
- Accidents, human error and acts of Mother Nature will always be a likely influence of impacts to the environment, careful planning and discipline will lessen the likelihood of all three. Servicing and regular maintenance on plant and machinery will also narrow down avoidable incidents.

6.2 Natural environment

6.3 Climate

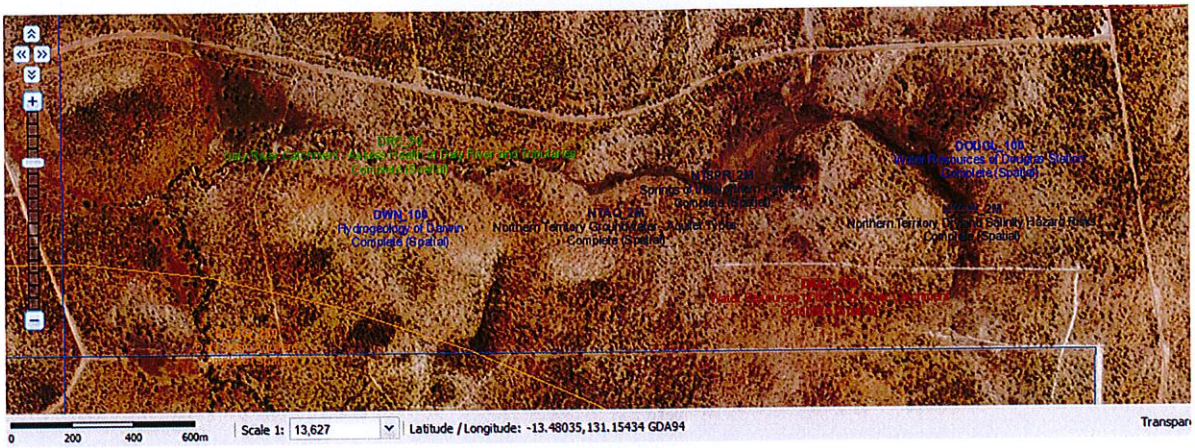
- The study area is located within the monsoonal tropics. The dominant feature of the north-west monsoon is the occurrence of two distinct seasons, an almost rainless dry season from May to September, and a wet season from November to March. April and October are transitional months. (Woodroffe et al., 1986). Over 90% of the rainfall at Mango Farm (Daly River), Douglas River, Pine Creek and Katherine falls during the wet season (November to March). Rain is usually high-intensity falls. Most of the region's rain comes as hard, intermittent, tropical showers, often associated with thunder and lightning (Bauer, 1964) or as monsoon troughs and tropical lows, which are often the remains of cyclonic depressions. Intensity of rainfall is important in relation to rate of runoff and soil erosion. The normal falls are quite sufficient to cause local flooding and erosion.
  Mean monthly temperatures range from 19.8o C – 34.4o C. Relative humidity varies daily and seasonally. Dry season (May-September) relative humidity averages range from 58.4–62.2 percent at 9am and 28.4-32.2 percent at 3pm. Whilst wet season (November to March) relative humidity averages range from 75.6-84.2 percent at 9am and 46.6-58.6 percent at 3pm.

6.4 Soils

- Dermosol soils are highly developed structural characteristics. They occur in the Tindal area and other parts of the Daly River Basin. Kandosols soils are often referred to as red, yellow and brown earths, these massive and earthy soils are important for agricultural and horticultural production. They occur throughout the NT and are widespread across the Top End, Sturt plateau, Tennant Creek and Central Australian regions with fair to good drainage and water retention. Mostly Low, Mixed or Scrubby Open Forest; limestone Red soil, Sandstone Lateritic Podsol, "Elliott Creek" soil, Deep Red Sandy

soil and skeletal soils, small areas of Levee soils. No sandsheet soils can be located on the proposed parcel of land.

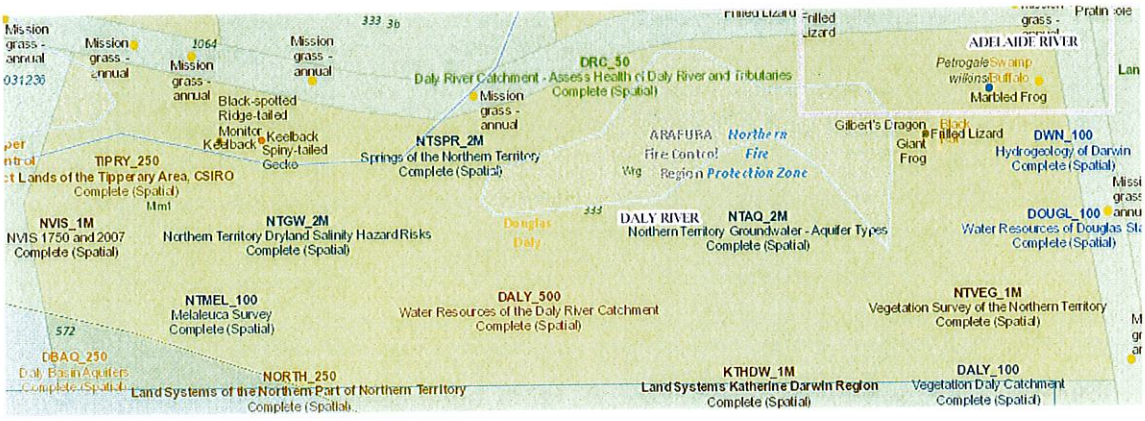
6.5 Map Types of Soils



6.6 Geomorphology and geology

- The area has been divided into the Daly plateaux province and the Daly plains province, with major relief due to the survival of the Cretaceous cover in the former and to the removal of this cover exposing the underlying Cambrian rocks in the latter. These provinces have been subdivided into regions which, although embracing a diversity of rock types, have a unity of relief that is expressive of a unity of geomorphic history. Mixed low hills and undulating plains.

6.7 Map Spatial Legend and Land Systems Lot# 05216



6.8 Topography, natural flooding, surface groundwater hydrology, soil

- Standing at the intersection of Daly River Road and Dorat Road near to where the proposed site is located, it is noticeable that the proposed parcel of land, is positioned on the most elevated and level side of the boundary (Dorat Road side), than that of the remaining property on Lot# 05216, to the West. Located on the far Western side of the said

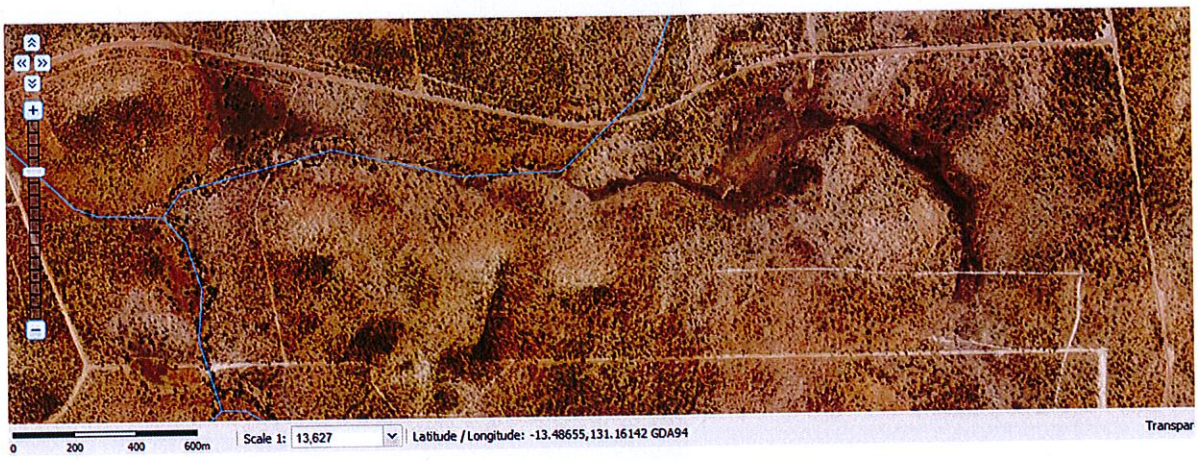
property, the proposed parcel of land is nestled amongst tabletop hills and undulating rock features, whilst having a decline of approximately 3 degrees in a Westerly direction, running parallel with the Daly River Road.

- Two distinct hydrology areas which cover approximately 10% of the total land area, one is located North/West of the proposed parcel of land, the other hydro area, approximately 1/100th in size is found near the North/Western boundary, extending into the adjoining neighbouring land (Lot# 05217).

6.9 Map Hydrology Areas of Lot# 05216

- A small wet season stream is also located North of the foothills, commencing approximately 1.5 kilometres from the Eastern boundary and heading due West into the neighbouring property. Wet season flooding does occur, effecting roads, nearby creeks and low laying areas, however the soils have good drainage and the flood plains located in the North of Tipperary Station capture much of the water. Red Kandosol type soils are mostly present on the proposed parcel of land, as with a mixture of grey clays, rocky out-crops and road base type materials. Bushfires and intentional/unintentional burn-offs are part and parcel of rural and remote Territory living, the proposed parcel of land is strategically located near the "T" intersection at Daly River and Dorat Roads, where the pyrolysis activities and operations are protected from the threat of uncontrolled fire, from the East and North. The Tipperary land system, which lays within the Daly River Catchment, was one of three systems and a more detailed survey was carried out in 1961 by Speck et al (1965), General Report on Lands of the Tipperary Area, Northern Territory, 1961.

7.0 Map Stream of Lot# 05216



7.1 Flora and Fauna

7.2 Flora and vegetation

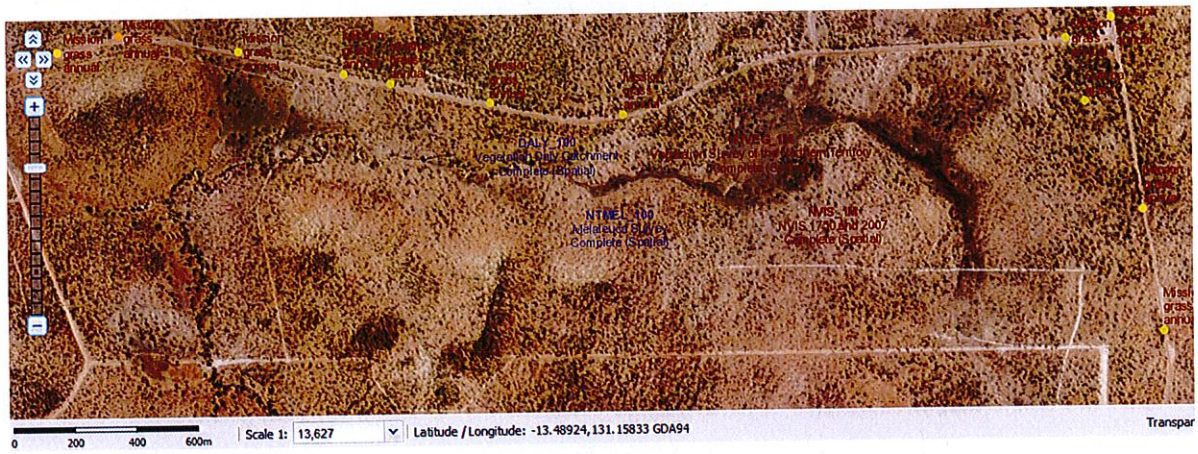
- Located on the proposed land are a number of vegetation species, including but not limited to Eucalypts, Ironbark's, and Box, Bloodwoods, WoolyButt, Stringybark and Melaleuca trees. No Paperbark trees are to be found on the proposed land. There appears to be no threatened or registered range flora located on the proposed parcel of land according to the DENR online Mapping system. To the North/Eastern corner of the proposed land (outside the boundaries of the proposed parcel of land), patches of native sorghums, sand palms and eucalypts can be found. No riparian corridors, wetlands or monsoon vine forests are located anywhere on the entirety of Lot# 05216.
  The two most common grasses found on and around Lot# 05216 are Mission and Gamba grasses which are burned annually to keep foliage fuel loads down.

7.3 Introduced flora

- Heteropogon contortus (black speargrass) is a perennial tussock grass that grows up to 1.5 m tall though it is rather variable in habit. Leaves and stems are green to blue-green and usually hairless or with only a few scattered hairs. The leaf sheath and blade are folded along the mid-rib and leaves are 5–30 cm long. The seed heads arise singly or in pairs from the axils of the upper leaves. The spikelets (Spikelet - consists of one or more florets and is the basic unit of the inflorescence in grasses) are paired, with one member of each pair being fertile, the other being male or sterile. The fertile spikelet bears an awn (Awn - an elongated bristle-like appendage attached to the apex, back or base of the glume, lemma or palea) 5–12 cm long, the basal part of which is twisted. The awns of the spikelets in a seed head intertwine at maturity. Patches of this grass can be found on the North/Eastern corner of Lot# 005216.

- Gamba Grass is Native to Africa's tropical and subtropical savannas, Gamba grass is a perennial tussock grass introduced to many parts of the world for use as an improved pasture plant. Gamba grass was imported into Queensland as a pasture grass in 1942, but was not planted on a large scale until about 1983.Gamba grass is a useful cattle feed in parts of far north Queensland, but also has significant negative impacts, including replacing native plants and increasing fire risk. It is regarded as a Weed of National Significance. Gamba grass can be found across the Top End and unfortunately the proposed block of land isn't immune to the viralous growth of this weed. Can be controlled with spray or fire.
- Mission grass is native to tropical Africa. It was originally introduced into Australia for testing as a pasture species. Naturalised plants were first noticed in the Darwin area in the early 1970s.
  Mission grass has since spread throughout the Darwin rural area and along many road networks. It also occurs in Arnhem Land and in the Katherine region. Also located on and around Lot# 05216 and can be controlled by spray or fire.

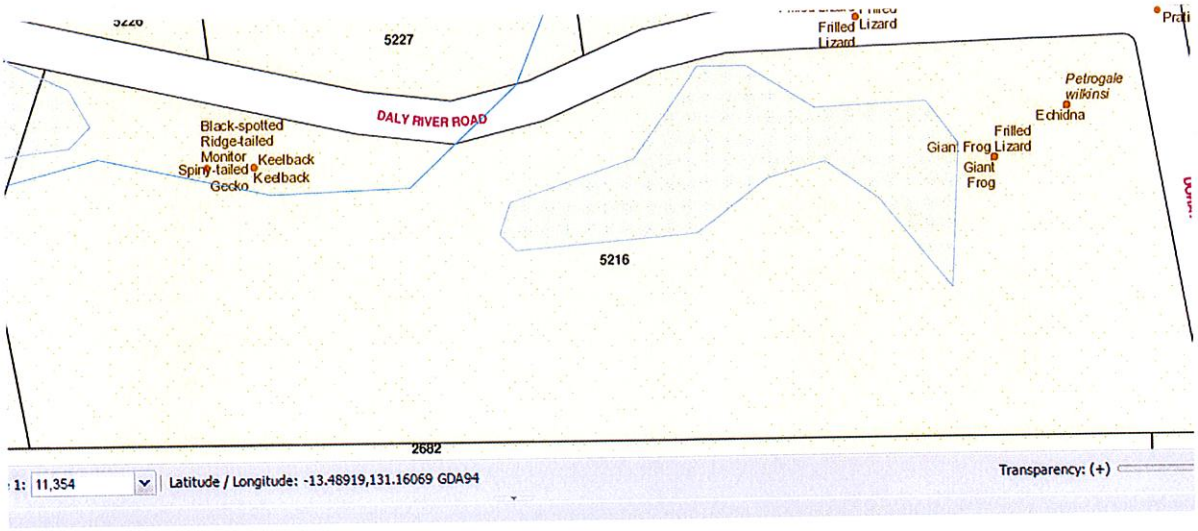
7.4 Map Introduced Flora of Lot# 05216



7.5 Fauna

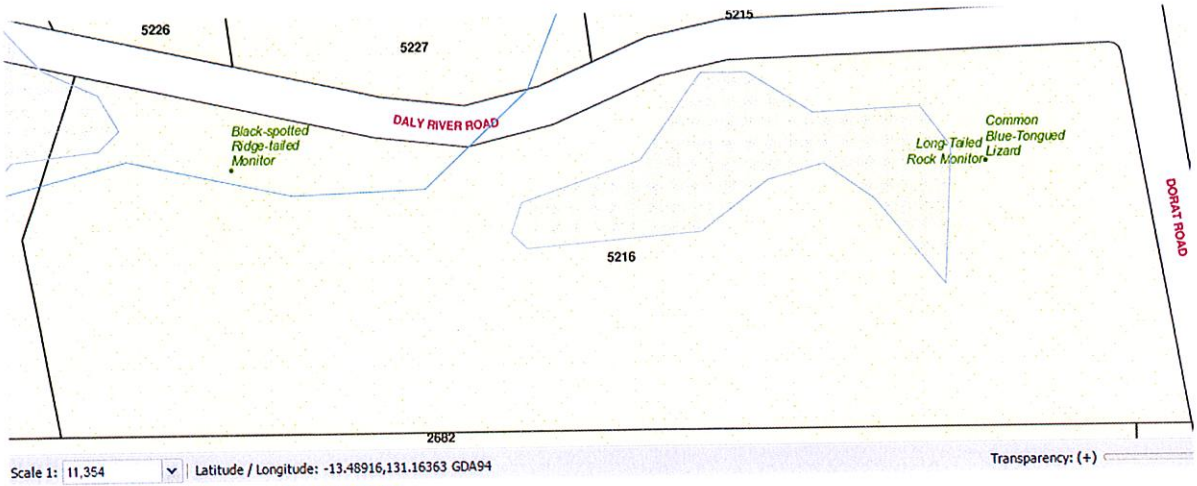
- As per the data provided by the DENR, the native fauna located in various areas inside the boundaries of the proposed land are and not limited to, the spiny-tailed gecko, frilled neck lizard, giant frog, sand goanna, marbled frog, northern fantail, echidna, dingo, gilberts dragon and dusky honey eater.
- On neighbouring properties the northern quoll, Roth's tree frog, northern dtella, olive python and zig-zag gecko, can be found.

7.6 Map Native Fauna of Lot# 05216



7.7 Significant fauna

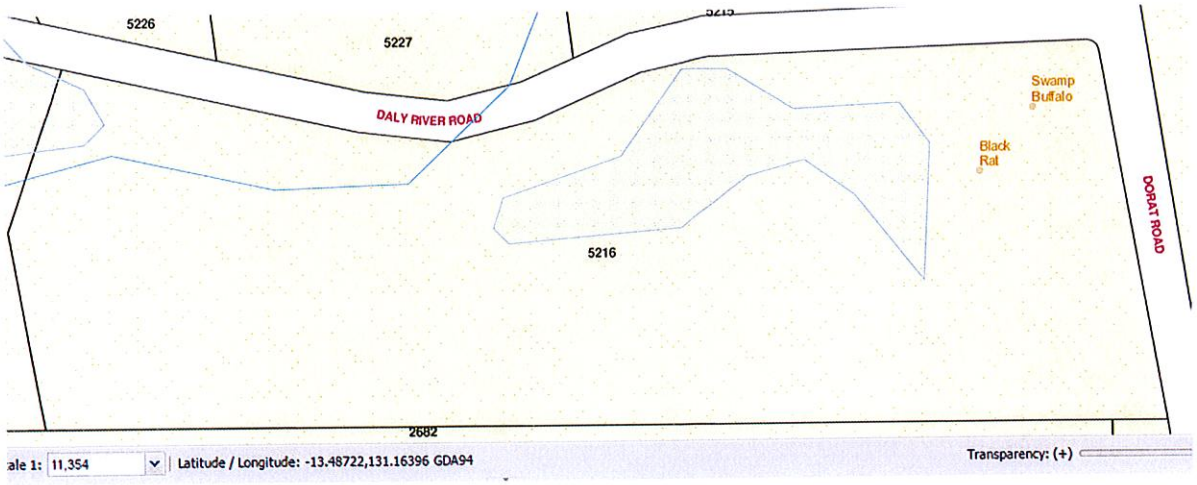
- On the North/Eastern and North/Western boundaries of the proposed Lot# 05216, the long tailed rock monitor, the blue tongue lizard and the black spotted ridge-tailed monitor can be located.



7.7 Map Significant Fauna of Lot# 05216

Introduced fauna

Intermittently, swamp buffalo, wild pigs, feral cats, wild dogs and the odd black rat can be seen in the local area, trying to survive the elements. The arrival of the dreaded cane toad in 2009 decimated many native species of the Northern Territory.



7.8 Map Introduced Fauna of Lot# 05216

7.9 Significant sites and features

- Approximately 17 kilometres along Dorat Road, to the North of the proposed land is the popular Robins Falls swimming and camping area. To the West, at approximately 30 kilometres, the world renowned Litchfield National Park "4wd only" entrance from the Daly River Road can be located. 40 kilometres to the South/East, the Douglas-Daly horticultural and primary production district is located just North/West of the town of Katherine.
- No other National Parks, Conservation Reserves, Marine Parks/Reserves or sites of conservation significance, World Heritage properties, National Heritage, public/private reserves, Conservation zones under a planning scheme or significant natural land feature(s) can be located near or in the vicinity of the land for the proposed pyrolysis project.
- The proposed project is over 100 kilometres from the nearest coastline.

7.10 Cultural heritage

- There is no heritage, sacred or cultural sites within the vicinity of the proposed land, for the proposed pyrolysis project.

7.11 Waterways used for recreation and fishing

- Natural streams and creeks found along Dorat Road, to the North of the proposed project, relieve the table-top hills of water from the heavy monsoonal rains. These streams and creeks provide a source of recreational activity for local residents and tourists alike and are unlikely to provide much in the way of fishing for local Indigenous families. The three largest of the creeks which can be found along the Northern end of Dorat Road are: Georges Creek, Anniversary Creek and Burrells Creek, are mostly wet season creeks but during some dry seasons, water can still be found in certain sections. As these creeks are isolated from tidal creeks and rivers by the Escarpment Ranges, fish and marine life are almost non-existent but provide water to the free-ranging cattle which roam the areas.

7.12 Local residents and social infrastructure

- Once in the operating phase of the proposed pyrolysis project, a number of local staff, of up to 6 initially, will need to be employed for the on-going operations of the primary activities, creating additional employment opportunities in the future. The completed project could become a teaching aid for schools/community groups and increasing awareness for recycling and responsible waste management. No accommodation areas are on offer.

7.13 Tourism

- Pending future developments and approvals, a wide scope of tourism opportunities could be gained due to the nature of expansion. There are no areas for accommodation on offer.

7.14 Existing visual amenity

- The proposed pyrolysis plant will not be seen from either Daly River Road or Dorat Roads.
- Daly River Road will have a buffer zone of natural bushland of approximately 260 metres and Dorat Road will have a buffer zone of natural bushland of approximately 25 metres, including another 10 metres for verge zones which run parallel with Dorat Road.
- No aesthetic views will be disrupted or access to visually important landmarks including sunlight or night sky views, will be impeded upon.
- As the proposed pyrolysis plant site is located on the "T" intersection on the only road to the world class fishing area of the Daly River, which is approximately 100 kilometres in distance, the proposed site is well disguised by natural bushland from discerned motorists.

8.0 Potential impacts

8.1 The natural environment

- The natural environment will benefit in the long term using the reasoning, waste tyres and medical waste will not be going into landfill sites and shortening their life expectancies. Waste tyres and medical plastic waste not going to landfill will also stop unwanted leachates appearing in decommissioned landfill sites creating long term problems, for future generations to come, just as we're experiencing with Shoal Bay. Various levels of recycling from waste products have been considered and pyrolysis was compared with incineration (with energy recovery) and landfill for disposal of the remainder (optional). Increased recycling gave reduced environmental impact in almost all categories considered, although inefficient recycling decreased that benefit. Significant differences between pyrolysis, incineration and landfill were seen in climate change impacts, carbon sent to landfill and other resources saved. Landfill had the least short-term impact on climate change so could be a temporary means of sequestering carbon. Incineration left almost no carbon to landfill, but produced the most greenhouse gases. Pyrolysis or incineration saved most resources, with the balance depending on the source of electricity replaced by incineration. Pyrolysis emerged as a strong compromise candidate since the gases and oils produced could be used as fuels and so

provided significant resource saving without high impact on climate change or landfill space.

8.2 Significant sites or cultural heritage environment

- As there are no other significant sites or features additional to areas already mentioned elsewhere on this Notice of Intent, no concerns should arise. No heritage sites or sites of significance within the DENR have been identified. No previously recorded archaeological sites or declared heritage places are shown on the heritage system.

8.3 Human health

- The risks associated with odour and contamination has been discussed elsewhere in this Notice of Intent. Staff and Visitors will receive the necessary training for Occupational Health & Safety guidelines. All activities encompassing the pyrolysis process will be protected from members of the public and non-staff.
- The major risk will be unauthorised access to the carbon storage and crude oil receiving and holding tanks via fencing, which will be constructed to minimise the risks of tampering and unauthorised entry.

8.4 The social and economic environment

- There's ongoing and increasing evidence that *social and economic* factors such as poverty, unemployment, illiteracy, poor housing and *social* isolation impact upon health status. These determinants are characteristic features of certain segments of the population in developed countries. The Proponent understands by creating employment prospects and opportunities that this project will provide further potential business, trade and unemployment relief.

9.0 Measures to avoid or mitigate impacts

9.1 Effectiveness of the proposed measure

- Receiving and storage tanks can pose environmental threats if preventative measures are not taken. Bunded storage tank farms which have walls at heights equal to the tanks volumes have proven to be successful. Fire is a real-time threat, water storage tanks with permanent firefighting equipment will constantly be serviced/checked and on standby and fire extinguishers coded to their Class will be commissioned. Emissions and residual products have been discussed elsewhere in this Notice of Intent.

9.2 Confidence the measure will be implemented

- Regular grass cutting and weed spraying around the parameter fences and internal areas will lessen the threat of fire. Scheduled maintenance and servicing on plant electrical pumps/motors/equipment to avoid overheating of required appliances.

10.0 Matters of National Environmental Significance and Proponents statement.

- We personally cannot envisage any slight or significant environmental impacts occurring once all safeguards are put into place. The pyrolysis process is a straight forward operation using heat as the source of procurement and electrical/mechanical for the transfer of bi-products.

Safety Data Sheet

Info safe No. 1CH1P Issue Date: March 2014 RE-ISSUED by CHEMSUPP
Product Name: **CALCIUM SULFATE**
Not classified as hazardous

1. Identification

GHS Product CALCIUM SULFATE
Identifier
Company Name CHEM-SUPPLY PTY LTD (ABN 19 008 264 211)
38 - 50 Bedford Street GILLMAN
SA 5013 Australia
Address
Tel: (08) 8440-2000
Fax: (08) 8440-2001
Telephone/Fax
Number
Portland-cement retarder soil treatment metallurgy manufacture of Plaster of Paris, paint (filler, glaze), white pigment in paints, enamels, pharmaceuticals and paper manufacture of sulfuric acid, ammonium sulfate, CaC2 and porous polymers surgical plaster casts polishing powders dyeing and calico printing insecticide dusts drying industrial gases, solids and many organic liquids yeast manufacture water treatment food additive analytical reagent and laboratory reagent.
Recommended use
of the chemical and
restrictions on use
Other Names Name Product Code
CALCIUM SULFATE Hemihydrate TG CT018
Plaster of paris, Gypsum
CALCIUM SULFATE Dihydrate AR CA017
CALCIUM SULFATE Dihydrate LR CL017
EMERGENCY CONTACT NUMBER: +61 08 8440 2000
Business hours: 8:30am to 5:00pm, Monday to Friday.
Chem-Supply Pty Ltd does not warrant that this product is suitable for any use or purpose. The user must ascertain the suitability of the product before use or application intended purpose. Preliminary testing of the product before use or application is recommended. Any reliance or purported reliance upon Chem-Supply Pty Ltd with respect to any skill or judgement or advice in relation to the suitability of this product of any purpose is disclaimed. Except to the extent prohibited at law, any condition implied by any statute as to the merchantable quality of this product or fitness for any purpose is hereby excluded. This product is not sold by description. Where the provisions of Part V, Division 2 of the Trade Practices Act apply, the liability of Chem-Supply Pty Ltd is limited to the replacement of supply of equivalent goods or payment of the cost of replacing the goods or acquiring equivalent goods.
Other Information

2. Hazard Identification

Not classified as hazardous according to the Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004] 3rd Edition, Safe Work Australia.
Not classified as dangerous goods according to the Australian Dangerous Goods Code (ADG).
GHS classification
of the
substance/mixture
WARNING - DO NOT attempt to make an enclosed cast of any body parts such as hands or fingers. This product gives off heat when mixed with water for setting, which may result in serious skin burns if used for casting body parts. If this product is repackaged by distributors, this warning must be repeated on any new packaging. (hemihydrate)
Other Information

3. Composition/information on ingredients

Chemical Solid
Characterization
Ingredients Name CAS Proportion Hazard Symbol Risk Phrase
Calcium sulfate hemihydrate 10034-76-1 98-100 %
Calcium sulfate dihydrate 10101-41-4 98-100 %

4. First-aid measures

Inhalation Remove victim to fresh air. Employ artificial respiration if indicated. Seek medical attention.
Ingestion Rinse mouth thoroughly with water immediately. Seek medical advice if effects persist.
Wash affected areas with copious quantities of water immediately. Remove contaminated clothing and

wash before re-use. If irritation occurs seek medical advice.

Skin

Immediately irrigate with copious quantity of water for at least 15 minutes. Eyelids to be held open. Seek medical advice if effects persist.

Eye contact

Drinking glycerin, gelatin solutions or large volumes of water may delay the hardening of calcium sulphate in the stomach. Surgical relief of obstruction, particularly at the pylorus, may be necessary.

Advice to Doctor

For advice, contact the National Poisons Information Centre (Phone Australia 13 11 26 New Zealand 0800 764 766) or a doctor.

Other Information

Safety Data Sheet

Not classified as hazardous

5. Fire-fighting measures

Specific Methods Use extinguishing media most appropriate for the surrounding fire.

Specific hazards arising from the chemical Fire will produce toxic gases. Runoff may pollute waterways.

Precautions in connection with Fire Use protective clothing and equipment suitable for surrounding fire.

6. Accidental release measures

Avoid substance contact. Avoid generation of dusts: do not inhale dusts. Ensure supply of fresh air in enclosed rooms.

Personal Precautions

Personal Protection Wear protective clothing specified for normal operations (see Section 8)

Sweep up (avoid generating dust) and remove to a suitable, clearly labelled container for disposal in accordance with local regulations.

Clean-up Methods - Small Spillages

7. Handling and storage

Avoid generation or accumulation of dusts. Avoid prolonged or repeated contact with skin, eyes and clothing . Wash hands and face thoroughly after working with material.

Precautions for Safe Handling

Store in a cool,dry place. Keep containers closed at all times. Store away from incompatible substances.

Conditions for safe storage, including any incompatabilities

8. Exposure controls/personal protection

A time weighted average (TWA) has been established for Calcium sulfate anhydrous (Worksafe Aust) of 10 mg/m3. This value is for inspirable dust containing no asbestos and less than 1% crystalline silica. See Chapter 14: Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment, published by Worksafe Australia.

The exposure value at the TWA is the average airborne concentration of a particular substance when calculated over a normal 8 hour working day for a 5 day working week.

Other Exposure Information

In industrial situations maintain the concentrations values below the TWA. This may be achieved by process modification, use of local exhaust ventilation, capturing substances at the source, or other methods.

Appropriate engineering controls

Where ventilation is not adequate, respiratory protection may be required. Avoid breathing dust, vapours or mists. Respiratory protection should comply with AS 1716 - Respiratory Protective Devices and be selected in accordance with AS 1715 - Selection, Use and Maintenance of Respiratory Protective

Devices. Filter capacity and respirator type depends on exposure levels. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

Respiratory Protection

The use of a face shield, chemical goggles or safety glasses with side shield protection as appropriate. Must comply with Australian Standards AS 1337 and be selected and used in accordance with AS 1336.

Eye Protection

Hand protection should comply with AS 2161, Occupational protective gloves - Selection, use and maintenance.

Hand Protection

Clean clothing or protective clothing should be worn, preferably with an apron. Clothing for protection against chemicals should comply with AS 3765 Clothing for Protection Against Hazardous Chemicals.

Body Protection

Always wash hands before smoking, eating or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

Hygiene Measures

9. Physical and chemical properties

Form Solid

Appearance White powder, crystals or granules.

Odour Odourless.

Melting Point 1450 °C

Boiling Point Loses 1.5 waters at 128 °C. Becomes anhydrous at 163 °C.

Slightly soluble in water (0.8 g/L@ 20 °C, hemihydrate) Slightly soluble (2 g/L@ 20 °C, dihydrate) Slightly soluble (2 g/L@ 25 °C, anhydrous).

Solubility in Water

Safety Data Sheet

Soluble in ammonium salts, acids, glycerin and sodium thiosulfate. Very slowly soluble in glycerol. Practically insoluble in most organic solvents.

Solubility in Organic Solvents

Specific Gravity 2.96 g/cm3 (anhydrous, hemihydrate) 2.32 g/cm3 (dihydrate).

5.0-7.5 (0.01 M, H2O, 25 °C) a 7.0 (200 g/l, H20, 20 °C, slurry, hemihydrate) pH value of 20% aqueous suspensions is 6 to 7.6.

pH

Volatile Component Zero.

Flammability Non combustible material.

Molecular Weight 172.17

Taste: Tastless

Refraction index: 1.505

Other Information

10. Stability and reactivity

Chemical Stability Stable.

Conditions to Avoid Incompatibles. Moisture.

Aluminum, diazomethane and phosphorous. Water, acids, aluminium, strong oxidizing agents, diazomethane and phosphorous.

Incompatible Materials

Hazardous Sulfur oxides.

Decomposition Products

Reduction of calcium sulfate by aluminum at high temperature may cause violent explosion. Diazomethane vapour contacting calcium sulfate generates heat which can lead to detonation.

Possibility of hazardous reactions

Hazardous Will not occur.

Polymerization

11. Toxicological Information

In the presence of water (or moisture), the material hardens quickly, which may result in obstruction in stomach. Symptoms include stomach pain and distress.

Ingestion

Causes irritation to mucous membrane and respiratory tract. Symptoms may include of coughing sneezing, shortness of breath.

Inhalation

Skin If absorbed through skin, may cause irritation, redness and pain.

Eye May cause irritation, redness and pain.

Carcinogenicity No evidence of carcinogenic properties.

Long-term exposures to high concentrations of dust may cause increased mucous flow in the nose and airways. This condition usually disappears after exposure ceases. Repeated or prolonged exposure to massive concentrations of dust may cause lung injury by obstruction as well as impaired sense of smell and taste and bleeding nose.

Chronic Effects

Mutagenicity No evidence of mutagenic properties.

WARNING - DO NOT attempt to make an enclosed cast of any body parts such as hands or fingers. This product when mixed with water releases heat, which may result in serious skin burns if used for casting body parts. If this product is repackaged by distributors, this warning must be repeated on any new packaging. (Hemihydrate)

Other Information

12. Ecological information

Ecotoxicity No ecological data available for this product.

Persistence and degradability No persistence/degradability data available for this product.

Mobility No mobility data available for this product.

13. Disposal considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and disposed of according to relevant local, state and federal government regulations.

Disposal Considerations

Waste Disposal Disposal by secure landfill may be acceptable.

14. Transport information

Not classified as a Dangerous Good according to the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG) by the IATA Air Transport Dangerous Goods Regulations or by the

Transport Information

Safety Data Sheet

Infosafe No. 1CH1P Issue Date :March 2014 RE-ISSUED by CHEMSUPP

Product Name : **CALCIUM SULFATE**

Not classified as hazardous

IMDG (International Maritime Dangerous Goods) Code.

15. Regulatory information

Regulatory Information Listed in the Australian Inventory of Chemical Substances (AICS).

Poisons Schedule Not Scheduled

16. Other Information

'Standard for the Uniform Scheduling of Medicines and Poisons No. 4', Commonwealth of Australia, June 2013.

Lewis, Richard J. Sr. 'Hawley's Condensed Chemical Dictionary 13th. Ed.', Rev., John Wiley and Sons, Inc., NY, 1997.

National Road Transport Commission, 'Australian Code for the Transport of Dangerous Goods by Road and Rail 7th. Ed.', 2007.

'Labelling of Hazardous Workplace Chemicals, Code of Proctice' Safe Work Australia.

Standards Australia 'AS 1940-2004 The Storage and Handling of Flammable and Combustible Liquids.

Standards Australia, 'SAA/SNZ HB 76:2010 Dangerous Goods - Initial Emergency Response Guide', Standards Australia/Standards New Zealand, 2010.

Worksafe Australia, 'Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)]'.

Worksafe Australia, 'Hazardous Substances Information System, 2005'.
Worksafe Australia, 'National Code of Practice for the Labelling of Workplace Hazardous Substances (2011)'.
Worksafe Australia, 'National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003(1995)]'.
Literature References
Paul McCarthy Ph. (08) 8440 2000 DISCLAIMER STATEMENT:
All information provided in this data sheet or by our technical representatives is compiled from the best knowledge available to us. However, since data, safety standards and government regulations are subject to change and the conditions of handling and use, or misuse, are beyond our control, we make no warranty either expressed or implied, with respect to the completeness or accuracy to the information contained herein. Chem-Supply accepts no responsibility whatsoever for its accuracy or for any results that may be obtained by customers from using the data and disclaims all liability for reliance on information provided in this data sheet or by our technical representatives.
Contact Person/Point
Empirical Formula & CaSO4.2H2O
Structural Formula
...End Of MSDS...

Safety Data Sheet

Info safe No. 1CH6Q Issue Date : July 2014 RE-ISSUED by CHEMSUPP
Product Name : **SODIUM SULFATE Anhydrous**
Not classified as hazardous

1. Identification

GHS Product Identifier SODIUM SULFATE Anhydrous
Company Name CHEM-SUPPLY PTY LTD (ABN 19 008 264 211)
38 - 50 Bedford Street GILLMAN
SA 5013 Australia
Address
Tel: (08) 8440-2000
Fax: (08) 8440-2001
Telephone/Fax Number
Paper pulp, plate and window glass, soaps and detergents, sodium salts, ceramic glazes, processing textile fibers, dyes, tanning, pharmaceuticals, freezing mix, food additive, laboratory reagent, solar heat storage, air-conditioning and pharmaceutical production.
Recommended use of the chemical and restrictions on use
Other Names Name Product Code
SODIUM SULFATE Decahydrate LR SL066
Glauber's salt
SODIUM SULFATE
SODIUM SULFATE Anhydrous Granular AR SA192
SODIUM SULFATE Anhydrous Powder AR SA007
SODIUM SULFATE Anhydrous Powder LR SL007
SODIUM SULFATE Anhydrous Powder BP SP007
EMERGENCY CONTACT NUMBER: +61 08 8440 2000
Business hours: 8:30am to 5:00pm, Monday to Friday.
Chem-Supply Pty Ltd does not warrant that this product is suitable for any use or purpose. The user must ascertain the suitability of the product before use or application intended purpose. Preliminary testing of the product before use or application is recommended. Any reliance or purported reliance upon Chem-Supply Pty Ltd with respect to any skill or judgement or advice in relation to the suitability of this product of any purpose is disclaimed. Except to the extent prohibited at law, any condition implied by

any statute as to the merchantable quality of this product or fitness for any purpose is hereby excluded. This product is not sold by description. Where the provisions of Part V, Division 2 of the Trade Practices Act apply, the liability of Chem-Supply Pty Ltd is limited to the replacement of supply of equivalent goods or payment of the cost of replacing the goods or acquiring equivalent goods.

Other Information

2. Hazard Identification

Not classified as hazardous according to the Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004] 3rd Edition, Safe Work Australia.

Not classified as dangerous goods according to the Australian Dangerous Goods Code (ADG).

GHS classification of the substance/mixture

3. Composition/information on ingredients

Chemical Characterization Solid

Ingredients Name CAS Proportion Hazard Symbol Risk Phrase

Sodium Sulfate Decahydrate 7727-73-3 98-100 %

Sodium sulfate 7757-82-6 98-100 %

4. First-aid measures

If inhaled, remove from contaminated area to fresh air immediately. Apply artificial respiration if not breathing. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.

Inhalation

Rinse mouth thoroughly with water immediately. Give plenty of water to drink. Do not induce vomiting. Seek medical advice if effects persist.

Ingestion

Wash affected areas with copious quantities of water. Remove contaminated clothing and wash before re-use. Seek medical advice if effects persist.

Skin

Eye contact Irrigate with copious quantity of water for 15 minutes. Seek medical assistance if symptoms persist.

First Aid Facilities Maintain eyewash fountain and safety shower in work area.

Advice to Doctor Treat symptomatically.

For advice, contact the National Poisons Information Centre (Phone Australia 13 11 26 New Zealand 0800 764 766) or a doctor.

Other Information

5. Fire-fighting measures

Safety Data Sheet

Not classified as hazardous

Hazards from Combustion Products May librate toxic fumes in fire (sulfur oxides).

Small fire: Use dry chemical, CO2, water spray or foam.

Large fire: Use water spray, fog or foam.

If safe to do so, move undamaged containers from the fire area. Cool containers with flooding quantities of water until well after the fire is out.

Contain escaping vapours with water. Prevent runoff entering surface water or groundwater.

Specific Methods

Not considered a fire hazard. Violent explosions occur when potassium sulfate and sodium sulfate are melted with aluminium. Ambient fire may liberate hazardous vapours.

Specific hazards arising from the chemical

Precautions in connection with Fire Use suitable protective equipment for surrounding fire.

6. Accidental release measures

Do NOT touch or walk through this product. Stop leak if safe to do so. Prevent entry into waterways, drains, confined areas. Prevent dust cloud.

Spills & Disposal

Personal Protection Wear protective clothing specified for normal operations (see Section 8)

7. Handling and storage

Avoid generation or accumulation of dusts. Use in well ventilated areas away from all ignition sources. In case of insufficient ventilation, wear suitable respiratory equipment. Wash hands and face thoroughly after working with material.

Precautions for Safe Handling

Keep containers closed at all times. Keep container tightly closed and in a cool, dry, well-ventilated place.

Conditions for safe storage, including any incompatabilities

Dry product can be stored in mild steel. Hot concentrated aqueous solutions are corrosive to mild steel. Wet product or hot solutions are aggressive towards ordinary concrete.

Other Information

8. Exposure controls/personal protection

A time weighted average (TWA) concentration for an 8 hour day, and 5 day week has not been established by Safe Work Australia for this product. There is a blanket limit of 10 mg/m^3 for dusts or mists when limits have not otherwise been established.

Other Exposure Information

In industrial situations maintain the concentrations values below the TWA. This may be achieved by process modification, use of local exhaust ventilation, capturing substances at the source, or other methods.

Appropriate engineering controls

Where ventilation is not adequate, respiratory protection may be required. Avoid breathing dust, vapours or mists. Respiratory protection should comply with AS 1716 - Respiratory Protective Devices and be selected in accordance with AS 1715 - Selection, Use and Maintenance of Respiratory Protective Devices. Filter capacity and respirator type depends on exposure levels. In event of emergency or planned entry into unknown concentrations a positive pressure, full-facepiece SCBA should be used. If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection.

Respiratory Protection

The use of a face shield, chemical goggles or safety glasses with side shield protection as appropriate. Must comply with Australian Standards AS 1337 and be selected and used in accordance with AS 1336.

Eye Protection

Hand protection should comply with AS 2161, Occupational protective gloves - Selection, use and maintenance.

Recommendation: Rubber or plastic gloves.

Hand Protection

Final choice of personal protective equipment will depend on individual circumstances and/or according to risk assessments undertaken.

Personal Protective Equipment

Safety boots in industrial situations is advisory, foot protection should comply with AS 2210, Occupational protective footwear - Guide to selection, care and use.

Footwear

Clean clothing or protective clothing should be worn, preferably with an apron. Clothing for protection against chemicals should comply with AS 3765 Clothing for Protection Against Hazardous Chemicals.

Body Protection

Always wash hands before smoking, eating or using the toilet. Wash contaminated clothing and other protective equipment before storing or re-using.

Hygiene Measures

9. Physical and chemical properties

Form Solid

Not classified as hazardous
Appearance Colourless to White crystals, granules or powder.
Odour Odourless.
Melting Point 888 °C (anhydrous) 32.4 °C (decahydrate)
Solubility in Water Soluble.
Solubility in Organic Soluble in glycerol, hydrogen iodide. Insoluble in alcohol.
Solvents
Specific Gravity 2.67 (anhydrous) 1.46 (decahydrate)
5.2 - 8.0 (50 g/L, H2O, 20 °C)
Solutions neutral to litmus.
pH
Volatile Component Zero.
Flammability Non combustible material.
Molecular Weight 142.04 (anhydrous) 322.13 (decahydrate)
Other Information Taste: Saline taste

10. Stability and reactivity

Chemical Stability Stable under normal use conditons. Hygroscopic Sensitive to strong heating.
Conditions to Avoid Strong heating. Exposure to air. Incompatibles.
Incompatible Strong mineral acids and bases. In combination with sodium sulfate, aluminium and magnesium.
Materials
Hazardous Oxides of sulfur and sodium.
Decomposition
Products
Possibility of Violent reaction with aluminium.
hazardous reactions
Hazardous Will not occur.
Polymerization

11. Toxicological Information

Acute Toxicity - Oral LD50 (mouse): 5989 mg/kg.
Mildly toxic by ingestion. Slowly absorbed from the alimentary tract. May cause gastrointestinal irritation. Because of osmotic activity, this substance will draw water into the lumen of the bowel and may cause purging, fluid loss, blood in stools, fall of blood pressure and high sodium levels in the blood.
Ingestion
Inhalation May cause irritation to respiratory tract and mucous membranes.
Skin May cause skin irritation.
Eye Dust may cause mechanical irritation to the eyes.
Carcinogenicity No evidence of carcinogenic properties.
Prolonged or repeated skin contact may result in dermatitis. After swallowing of large amounts may cause cardiovascular disorders and symptoms in the gastrointestinal tract, possibly including nausea and vomiting.
Chronic Effects
Mutagenicity No evidence of mutagenic effects.

12. Ecological information

When released into soil, this material is expected to leach into groundwater. This material is not expected to significantly bioaccumulate.
Bioaccumulative
Potential
LC50 (Gambusia affinis): 120 mg/l/96 h.
LC50 (L. macrochirus): ~ 3040-4380 MG/L/96 H.
LC50 (P. promelas): 13500-14500 mg/l/96 h.
The following applies to sulfate in general:
fish: toxic as from 7 g/l.
Acute Toxicity - Fish
Acute Toxicity - EC50 (Daphnia magna): 2564 mg/l/48 h.
Daphnia
The following applies to sulfate in general:
bacteria: toxic as from 2.5 g/l.
Acute Toxicity -

Safety Data Sheet

Infosafe No. 1CH6Q Issue Date : July 2014 RE-ISSUED by CHEMSUPP

Product Name : **SODIUM SULFATE Anhydrous**

Not classified as hazardous

Whatever cannot be saved for recovery or recycling should be disposed of according to relevant local, state and federal government regulations.

Disposal Considerations

14. Transport information

Not classified as a Dangerous Good according to the Australian Code for the Transport of Dangerous Goods by Road and Rail.

Transport Information

15. Regulatory information

Regulatory Information Listed in the Australian Inventory of Chemical Substances (AICS).

Poisons Schedule Not Scheduled

16. Other Information

'Standard for the Uniform Scheduling of Medicines and Poisons No. 4', Commonwealth of Australia, June 2013.
Lewis, Richard J. Sr. 'Hawley's Condensed Chemical Dictionary 13th. Ed.', Rev., John Wiley and Sons, Inc., NY, 1997.
National Road Transport Commission, 'Australian Code for the Transport of Dangerous Goods by Road and Rail 7th. Ed.', 2007.
'Labelling of Hazardous Workplace Chemicals, Code of Proctice' Safe Work Australia.
Standards Australia 'AS 1940-2004 The Storage and Handling of Flammable and Combustible Liquids.
Standards Australia, 'SAA/SNZ HB 76:2010 Dangerous Goods - Initial Emergency Response Guide', Standards Australia/Standards New Zealand, 2010.
Worksafe Australia, 'Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)]'.
Worksafe Australia, 'Hazardous Substances Information System, 2005'.
Worksafe Australia, 'National Code of Practice for the Labelling of Workplace Hazardous Substances (2011)'.
Worksafe Australia, 'National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003(1995)]'.

Literature References

Paul McCarthy Ph. (08) 8440 2000 DISCLAIMER STATEMENT:
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Contact Person/Point

Empirical Formula & Na2SO4 (anhydrous) Na2SO4.10H2O (decahydrate)

Structural Formula

...End Of MSDS...

END OF NOTICE OF INTENT