

APPENDIX 5 HAZARD ANALYSIS AND RISK ASSESSMENT

Hazard Identification:

The various activities associated with the establishment, commissioning and operation of the facility are included in the hazard analysis following:

Activity	Frequency	Equipment / personnel	Hazards
Excavation for foundation works	Initial works for construction	Excavator, dump trucks. Earthmoving contractor	<ul style="list-style-type: none"> Excessive noise impact on neighbours. Excessive dust impact on neighbours and visual impact. Hydrocarbon spill to ground or watercourse.
Pouring foundation concrete	Construction works	Concrete pump, agitator trucks, concrete finisher	<ul style="list-style-type: none"> Excessive noise impact on neighbours. Truck washout spill to ground or watercourse.
Concrete blockwork	Construction works	Concrete mixer, utilities, brick layer	<ul style="list-style-type: none"> Minor concrete washout to ground
Installing equipment pieces to foundations	Construction works	Floats and crane, Civil works contractor	<ul style="list-style-type: none"> Excessive noise impact on neighbours. Hot works fire risk (cutting, welding, grinding).
Energising plant equipment	Construction works	Electrical contractor	<ul style="list-style-type: none"> Spark fire risk.
Connection to main water supply	Construction works	Plumber	<ul style="list-style-type: none"> Erosion arising from excessive water escape to ground.
Delivery of trial tyre load	Initial trial and daily there after	Directors and Operators.	<ul style="list-style-type: none"> Excessive noise impact on neighbours. Litter and unsolicited waste arriving with tyres. Tyre delivery quantities exceed processing capacity.
Commissioning plant	Initial trial	Directors and Operators.	<ul style="list-style-type: none"> Excessive noise impact on neighbours. Excessive atmospheric gas emissions. Gas escaping from equipment prior to emission control equipment. Fire associated with miss-firing the retort.
Ongoing plant operation	24 / 7	Operating personnel	<ul style="list-style-type: none"> Excessive noise impact on neighbours. Excessive atmospheric gas emissions.

			<ul style="list-style-type: none"> • Litter and unsolicited waste arriving with tyres. • Tyre delivery quantities exceed processing capacity. • Fire associated with miss-firing the retort.
Plant shut-down and re-start for maintenance	6 month intervals	Operating personnel, contractors	<ul style="list-style-type: none"> • Excessive noise impact on neighbours. • Excessive atmospheric gas emissions. • Gas escaping from equipment. • Fire associated with miss-firing the retort. • Hot works fire risk (cutting, welding, grinding).
Plant shut-down and re-start for maintenance	As required	Operating personnel	<ul style="list-style-type: none"> • Excessive noise impact on neighbours. • Excessive atmospheric gas emissions. • Gas escaping from equipment. • Fire associated with miss-firing the retort. • Hot works fire risk (cutting, welding, grinding).
Decommissioning plant	End of facility life	Operating personnel, Contractors, floats and crane, Civil works contractor	<ul style="list-style-type: none"> • Excessive noise impact on neighbours. • Excessive dust impact on neighbours and visual impact. • Hydrocarbon spill to ground or watercourse waste products from vessels and pipe spill to ground • Hot works fire risk (cutting, welding, grinding). • Erosion arising from excessive water escape to ground

TABLE OF RISK ASSESSMENT

Likelihood		
A	Almost certain	Event expected in 12 month period
B	Likely	Event likely to occur in 12 month period
C	Possible	Event may occur (but not likely) in 12 month period
D	Unlikely	Event not expected in 12 month period
E	Rare	Event extremely unlikely to occur in a 12 month period
F	Extremely rare	May only occur in extreme and exceptional circumstances over a 12 month period

Consequence		
1	Insignificant	Negligible or no environmental harm or nuisance e.g. <ul style="list-style-type: none"> • Contained oil spill <20 litres. • Incidental and local impact on flora and fauna.
2	Minor	Material environmental harm or nuisance, but prosecution unlikely, local publicity only, local nuisance impacts on community e.g. <ul style="list-style-type: none"> • Technical breaches of legal requirements regardless of harm or nuisance. • Spills to waterways <100 litres where dispersal/cleanup is simple.
3	Moderate	Serious environmental harm, possible prosecution, local state publicity possible temporary permit and lease restrictions e.g. <ul style="list-style-type: none"> • Significant oil spill (4000 litres to land, >100 litres to water). • Ecosystem impact requiring expert remedial action and follow up.
4	Major	Serious environmental harm, prosecution probable, national publicity, reputation impacts, probable temporary permit and lease restrictions e.g. <ul style="list-style-type: none"> • Significant ecosystem impact with residual effects after follow up.
5	Extreme	Serious environmental harm, prosecution certain, severe reputation impact, national publicity, probable permanent permit and lease restrictions e.g. <ul style="list-style-type: none"> • Significant impact on regional ecosystem, with significant residual effects likely.
6	Catastrophe	Serious environmental harm, prosecution certain with jail terms, permanent damage to reputation, certain loss of permit and mining lease e.g. <ul style="list-style-type: none"> • Significant and permanent impact on regional ecosystem.

RISK ASSESSMENT MATRIX

Likelihood		Consequence					
		1	2	3	4	5	6
		Insignificant	Minor	Moderate	Major	Extreme	Catastrophe
A	Almost certain	Low	Moderate	High	Extreme	Extreme	Extreme
B	Likely	Low	Moderate	High	Extreme	Extreme	Extreme
C	Possible	Low	Low	Moderate	High	Extreme	Extreme
D	Unlikely	Low	Low	Low	Moderate	High	Extreme
E	Rare	Low	Low	Low	Low	Moderate	High
F	Extremely rare	Low	Low	Low	Low	Low	Moderate

RISK LEVEL ACTION TABLE

Risk rating	Low	Moderate	High	Extreme
Action	Acceptable, activity can proceed, with controls.	Site Manager to assess efficacy of controls and authorise activity.	SHE Manager to assess efficacy of controls and authorise activity.	Unacceptable, activity cannot proceed.

HIERARCHY OF CONTROLS

Control	Example
1	Eliminate Don't proceed with activity or fundamentally rework activity to remove hazard.
2	Substitute Introduce alternative activity with lower risk rating.
3	Isolate Install permanent design features to protect against hazard.
4	Engineer out Change equipment used or introduce features to lower risk rating e.g. improved silencers on equipment.
5	Administrative Reinforce active controls through documented work procedures and toolbox meetings.
6	Response equipment Provide workers with equipment to reduce severity of consequences e.g. hydrocarbon spill kits.

RISK ASSESSMENT

Hazard	Likelihood / Consequence	Risk rating	Controls	Risk rating with control
Excessive noise impact on neighbours.	A / 3	High	<ul style="list-style-type: none"> • • Locate pyrolysis plant and chipper behind sound walls and distant from receptors (3) • Modern quiet wheel loader for material processing (4) • Impose curfew on night time delivery and stacking operations (5) • 	(D / 3) Low
Excessive dust impact on adjacent residences and visual impact.	A / 2	Moderate	<ul style="list-style-type: none"> • Apply sealed section to access road (3) • Maintain trafficked areas in good condition (6) • Self-imposed speed limit, slow vehicle speeds (5) • 	(D / 2) Low
Excessive atmospheric emissions impact on neighbouring residences.	A / 4	Extreme	<ul style="list-style-type: none"> • Construct plant with capacity to install additional emission control equipment if required. (3) • Install proprietary emission control equipment (3) • Regular stack tests during commissioning (4) • Commissioning reports to Regulator (5) • Development operating procedures during commissioning for operation and shutdowns (4) • 	(D / 4) Moderate
Fire in tyre stockpile produces excessive atmospheric emissions.	C / 4	High	<ul style="list-style-type: none"> • Manage delivery to keep stockpile volumes small (2) • Adopt recommendations of Bushfire Management Plan for site layout (3) • Adopt stockpile arrangement to facilitate fire suppression (3) • Develop procedures for safe start up and shut down (5) • Install fire hydrants for first strike capability (6) • 	(D / 4) Moderate

Hazard	Likelihood / Consequence	Risk rating	Controls	Risk rating with control
Fire suppression runoff affects St Pauls River water quality.	C / 3	High	<ul style="list-style-type: none"> • Construct 'bunded' stockpile pads with capacity to retain fire suppression runoff (3) • Operating procedure to manage isolation of tyre stockpile 'bunds' (5) • Operating procedure to prohibit 'hot work' on total fire ban days (5) • Procedures to manage start up and shutdown of retort without fire risk (5) • 	(D / 3) Low
Hydrocarbon spill to ground while operating mobile equipment.	C / 2	Moderate	<ul style="list-style-type: none"> • Use modern well maintained wheel loader (4) • Keep hydrocarbon spill kit on hand while equipment is operating (5) • 	(D / 2) Low