

ATTACHMENTS BOOKLET FOR SPECIAL COUNCIL MEETING

20 September 2023 at 5:00pm

7.1.1 Drill Site Camp Application	1
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20 Walters Dr, Osborne Park, WA 6017 Locked Bag 13, Osborne Park, WA 6017 P +61 8 9329 3600 F +61 8 9329 3601

Tuesday, July 18, 2023

Shire of Mingenew 21 Victoria Street, Mingenew, Western Australia 6522

Attention: Matt Fanning

Dear Matt.

RE: PLANNING APPLICATION FOR THE RIG SITE CAMP ASSOCIATED WITH THE MINERAL RESOURCES LIMITED LOCKYER-4 EXPLORATION DRILLING PROGRAM

Please find attached a planning application for the installation and operation of a rig camp site that will be utilized to support the upcoming Lockyer-4 exploration drilling program for Mineral Resources Limited within Petroleum Licence EP368 managed under the *Petroleum and Geothermal Energy Resources Act 1967*. The drilling activities are expected to commence in October 2024 although may be delayed until January 2025 based on potential variations to the current rig schedule.

Once drilling activities have commenced, they will be conducted continuously on a 24-hour basis with two crews working back-to-back on 12-hour shifts. The rig site camp is planned to accommodate up to six (6) persons that are required on-site at the drilling rig for the duration of the drilling activity. There will be up to 22 additional non-accommodated personnel on site during each 12-hour shift.

The drilling program is temporary in nature and planned to be completed within 60 days for this well, however there may be a requirement (over a period of up to 2 years) for various short-term maintenance or well testing activities to be completed. These activities may require accommodation on site but would also be temporary in nature.

The rig site location map is provided as Attachment 1 and will be accessed via Strawberry North East and Watson Road. The rig site camp will be installed within the first five days of the drilling activity and will be conducted in conjunction with the installation of the drilling rig. The rig site equipment layout is provided as Attachment 2. The modular camp units will be transported to the site utilizing semi-trailers or winch trucks. There will be a total of eighty trailer loads (two of which will be the modular sleeper units) required to transport the drilling rig, rig camp units and associated equipment to the site. The rig site camps are plug-and-play oilfield camp units that have depreciated in value. The \$10,000 installation cost covers the transportation, loading/unloading of the units utilizing side-loaders or winch trucks. Minimal plumbing and cabling are required to commission the camp units as they are designed to be highly mobile, to be readily moved from site to site with the drilling rig.

The cost breakdown of the two sleeper units are as follows:

Rig up:

- 3 hours x Unloading/spotting/rig up of sleeper units with side loader: \$750 (based on a \$250/hour side loader cost)
- 1 x Electrician and 2 x assisting personnel: \$3,062.

Rig down:

- 3 hours x Rig down/spotting/rig up of sleeper units with side loader: \$750 (based on a \$250/hour side loader cost)
- 1 x Electrician and 2 x assisting personnel: \$3,062.

The rig camp location is not within close proximity to any residential dwellings with the distance to the nearest residential dwelling being greater ~1.6 kms. At the rig site camp, there will be no food preparation facilities (this will be conducted off site at the main camp).

The following information has been provided as attachments to the completed Development Application Form:

- Attachment 1: Site location showing the exploration well location with regards to the lot boundaries and lot area.
- ▶ Attachment 2: A site layout schematic that provides an indication of where the accommodation units will be situated with regards to additional key drilling rig infrastructure and wellsite boundaries.
- ▶ Attachment 3: A compilation of information regarding the rig site camp with plan views, dimensions and images associated with the temporary building structures.
- Attachment 4: The information and manual associated with the ATU system. The ATU application form has been submitted to the Shire of Mingenew EHO together with its supporting documentation.

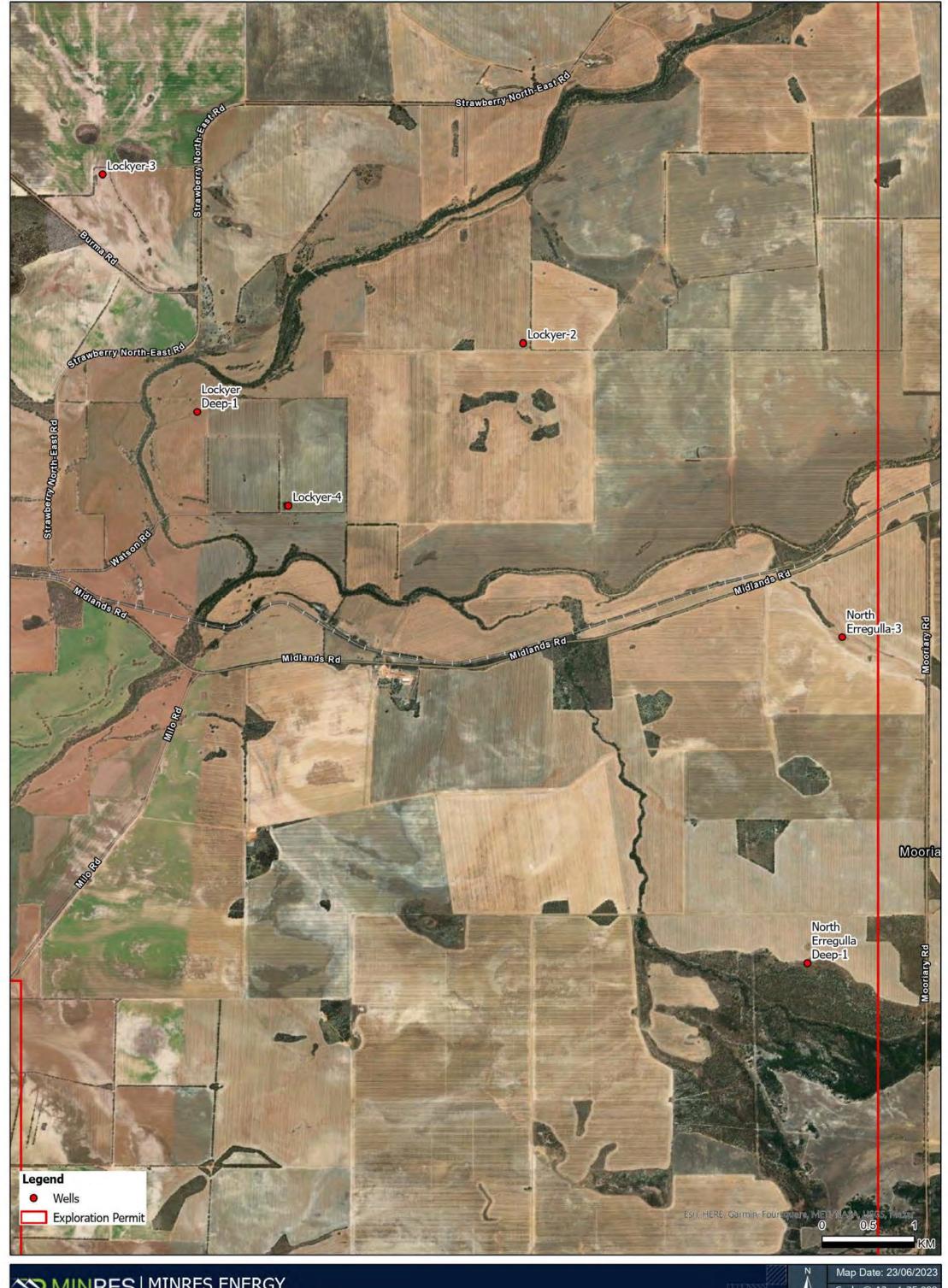
This information has been collated and submitted for and on behalf of Mineral Resources Limited.

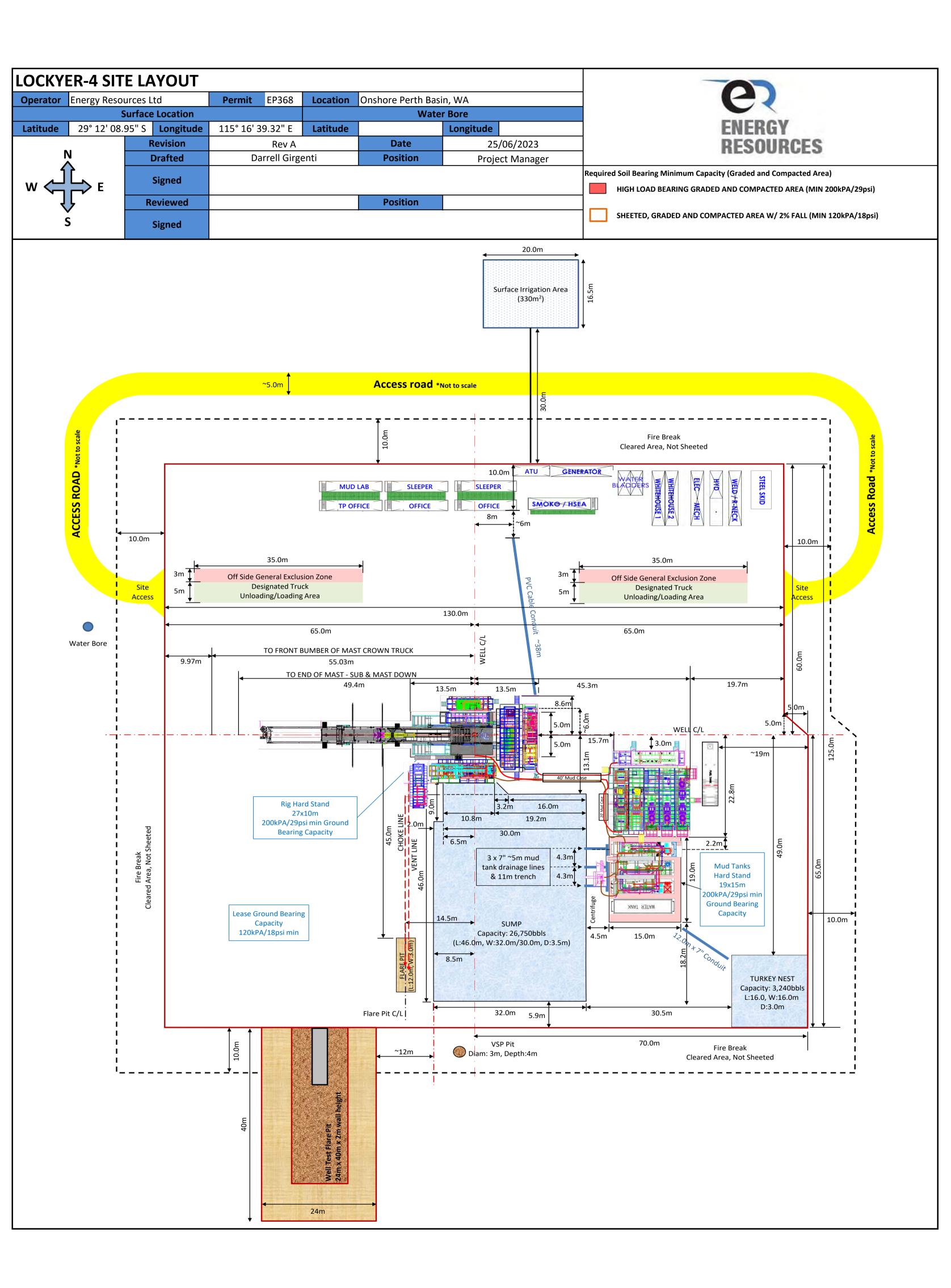
Yours sincerely,

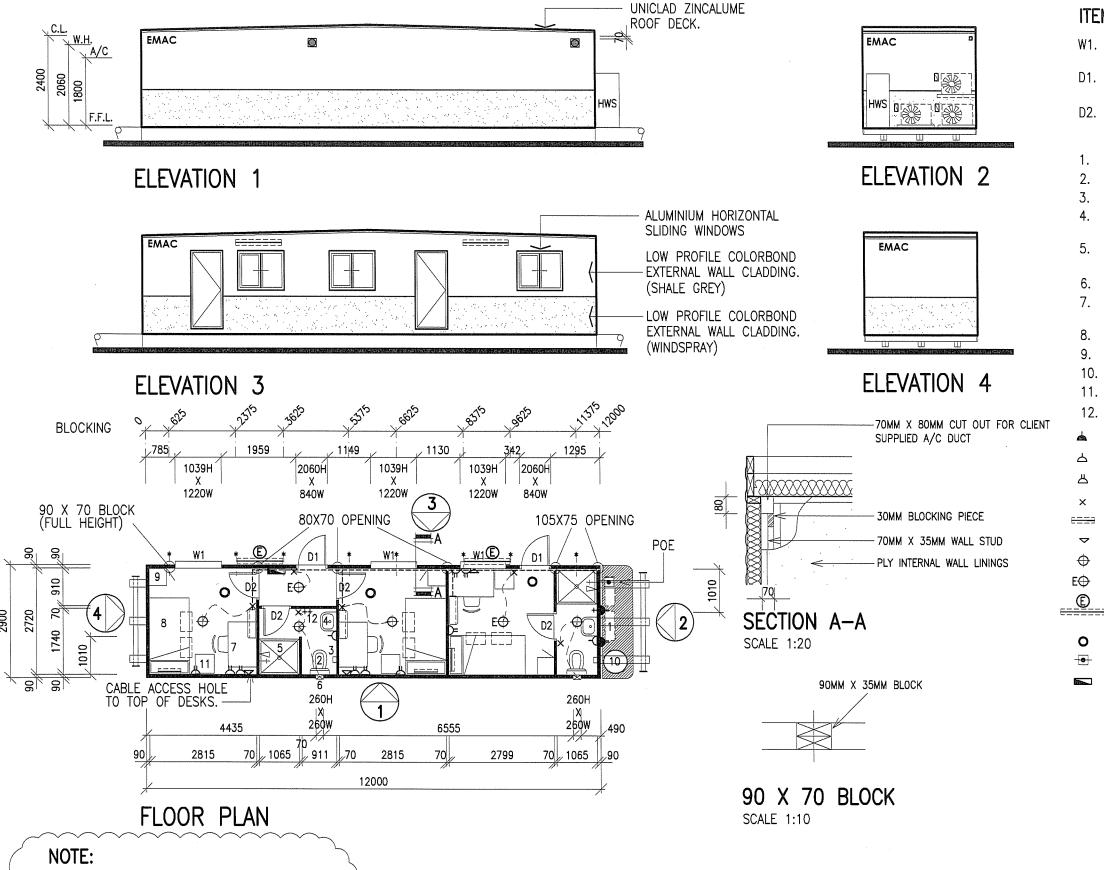
Darrell Girgenti *Project Manager*

Mineral Resources Limited

Paignt







ITEM:	DESCRIPTION:	QTY:
W1.	1029H. X 1210W. HORIZONTAL SLIDING WINDOW (6.38 LAMINATED — GREY)	3.
D1.	2040H. X 820W. METAL CLAD REBATE EDGE EXTERNAL DOOR C/W SPRING RESTRAINER & EXIT SIG	2. N.
D2.	2040H. X 720W. S.P.M. HOLLOW CORE INTERNAL DOOR C/W EXIT SIGN AND DOOR CATCHES TOP AND BOTTOM.	4.
1.	SPLIT R/CYCLE A/C.	3.
2.	TOILET SUITE.	2.
3.	TOILET ROLL HOLDER.	2.
4.	500MM X 400MM HAND BASIN C/W MIRROR OVER.	2.
5.	1055MM X 945MM F/GLASS SHOWER CUBICLE C/W SHOWER CURTAIN.	2.
6.	WALL MOUNTED EXHAUST FAN.	2.
7.	1200MM X 750MM DESK C/W PLASTIC STACK CHAIR.	3.
8.	KING SINGLE BED C/W STORAGE DRAWERS.	3.
9.	LOCKER.	3.
10.	250L ELECTRIC HOT WATER SERVICE.	1.
11.	BAR FRIDGE	3.
12.	COAT HOOKS.	3.
4	15 AMP ISOLATOR.	3.
占	SINGLE GPO.	2.
Д	DOUBLE GPO (100 A.F.F.L.)	9.
×	LIGHT SWITCH.	6.
====	FLUORESCENT BED LIGHT.	3.
ightharpoons	DATA POINT.	3.
\oplus	BATTEN CEILING LIGHT	4.
E⊕	BATTEN CEILING LIGHT C/W BATTERY BACKUP.	2.
©	1 X 36W FLOURO. VANDALITE @ 2400 HEIGHT C/W BATTERY BACKUP & PE CELL.	2.
0	SMOKE DETECTOR.	3.
•	WILCO 5 PIN MALE PLUG FOR GENERATOR CONNECTION.	1.
	CIRCUIT BREAKER BOARD (3 PHASE).	1.

SU	IBMITTAL STATUS	INITIAL	DATE
Α	CONTRACT DRAWINGS		
В	BILL OF MATERIALS		
С	ISSUE FOR PURCHASING		
D	ISSUE FOR PRODUCTION		
E	RELEASE FOR DELIVERY		
F	APPROVED BY MANAGER		

CLIENT:

ENSIGN INTERNATIONAL

P.E. CELL.

SALES ORDER NO: -

 ALL DOORS TO HAVE STICK ON REFLECTIVE EXIT SIGNS ON INSIDE FACE OF DOOR.
 ALL EXTERNAL LIGHTS TO BE ON SAME

PROJECT: **12.0M X 2.9M**

3 PERSON LIVING QUARTERS

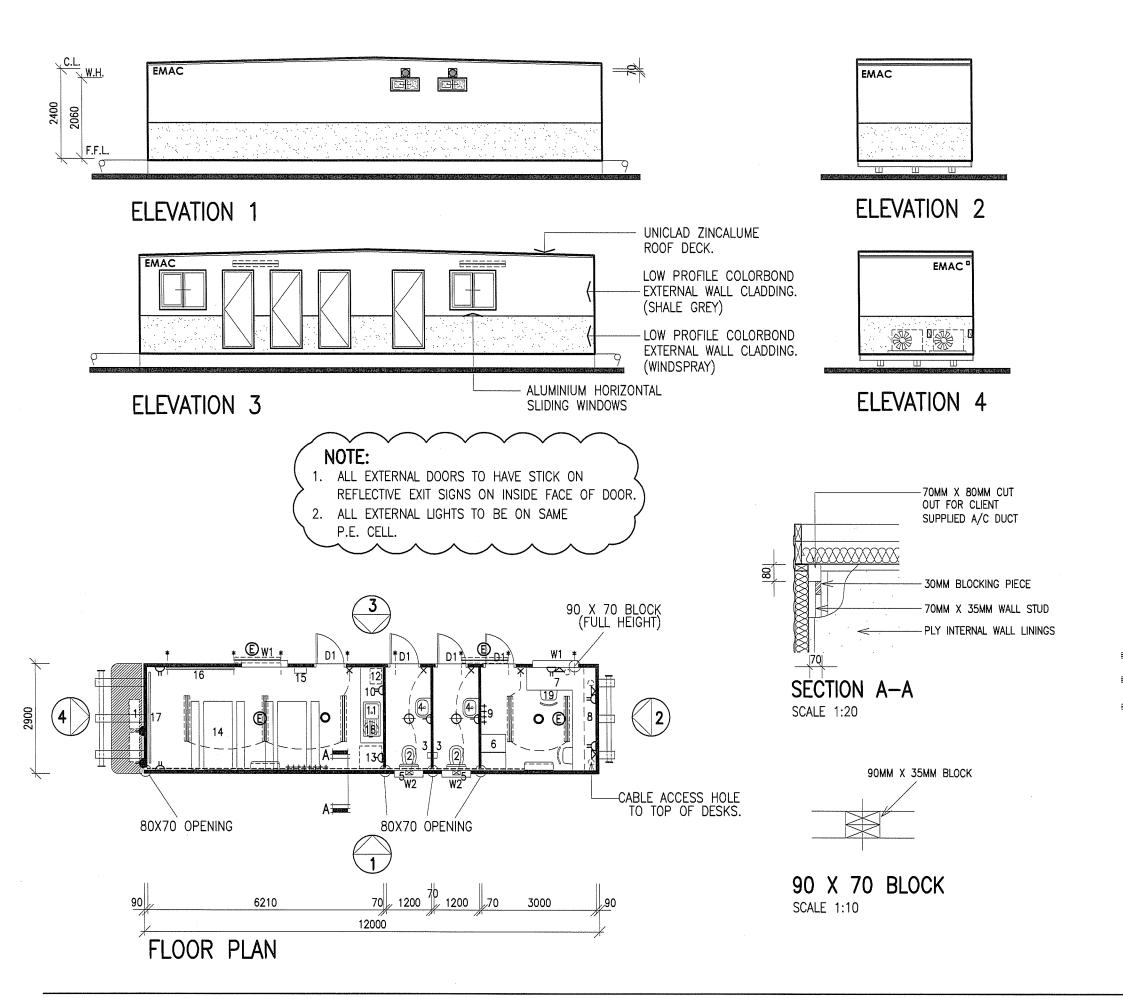
SERIAL NO: -

SITE: **EX PLANT**



KARYDAV PTY. LTD. A.C.N. 061 115 133 1253 MAIN NORTH ROAD, PARA HILLS WEST, SOUTH AUSTRALIA 5096 P.O. BOX 46, PARA HILLS PH: (08) 8260 4866 FAX: (08) 8349 6273 BUILDERS LICENCE NO. GL 102757

DWG NO: 3 PERS LQ		SHEET: 1	OF 1
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ITEM:	DESCRIPTION:	QTY:
W1.	1029H. X 1210W. HORIZONTAL SLIDING WINDOW (6.38 LAMINATED — GREY)	2.
W2.	350H. X 750W. ALUMINIUM SLIDING WINDOW. (OBSCURE GLAZING)	2.
D1.	2040H. X 820W. METAL CLAD REBATE EDGE EXTERNAL DOOR C/W SPRING RESTRAINER & EXIT SIG	4. N.
1.	SPLIT R/CYCLE A/C.	2.
2.	TOILET SUITE.	2.
3.	TOILET ROLL HOLDER.	2.
4.	500MM X 400MM HAND BASIN C/W MIRROR OVER.	2.
5.	WALL MOUNTED EXHAUST FAN.	2.
6.	4 DRAW FILING CABINET.	2.
7.	750MM DEEP DESK UNIT C/W	1.
8.	CABLE ACCESS HOLES. SHELVING OVER DESK (AS PER DETAIL).	1.
9.	COAT HOOKS.	12.
10.	LAMINATED CUPBOARD UNIT.	1.
11.	900MM S/STEEL INSET SINGLE BOWL SINK.	1.
12.	CHILLER/BOILER UNIT.	1.
13.	380L FRIDGE.	1.
14.	TABLE AND BENCHES (SCREWED TO FLOOR).	2.
15.	FIRST AID BOX.	1.
16. 17.	1000 X 1800 WHITE BOARD. 1000 X 2400 WHITE BOARD.	1. 1.
18.	50L UNDERBENCH HOT WATER UNIT.	1.
19.	CLERICAL CHAIR.	2.
_	15 AMP ISOLATOR.	2
۵	SINGLE GPO.	3.
Д	DOUBLE GPO (100 A.F.F.L.)	6.
×	LIGHT SWITCH.	4.
\oplus	BATTEN CEILING LIGHT	2.
	2 X 36W. DIFFUSED FLUORO.	3.
Œ	2 X 36W. DIFFUSED FLUORO C/W BATTERY BACKUP.	2.
Ē	1 X 36W FLOURO. VANDALITE @ 2400 HEIGHT C/W BATTERY BACKUP & PE CELL.	2.
0	SMOKE DETECTOR.	2.
•	ELECTRICAL POINT OF ENTRY (TBA).	1.
	CIRCUIT BREAKER BOARD (3 PHASE).	1.

The second	SUBMITTAL STATUS		INITIAL	DATE
202020	Α	CONTRACT DRAWINGS		
	В	BILL OF MATERIALS		
	С	ISSUE FOR PURCHASING		
Total Spaces	D	ISSUE FOR PRODUCTION		
200	Ε	RELEASE FOR DELIVERY		
	F	APPROVED BY MANAGER		

CLIENT:

ENSIGN

SALES ORDER NO: -

INTERNATIONAL

PROJECT: **12.0M** X **2.9M**

OFFICE/TOILET/LUNCHROOM

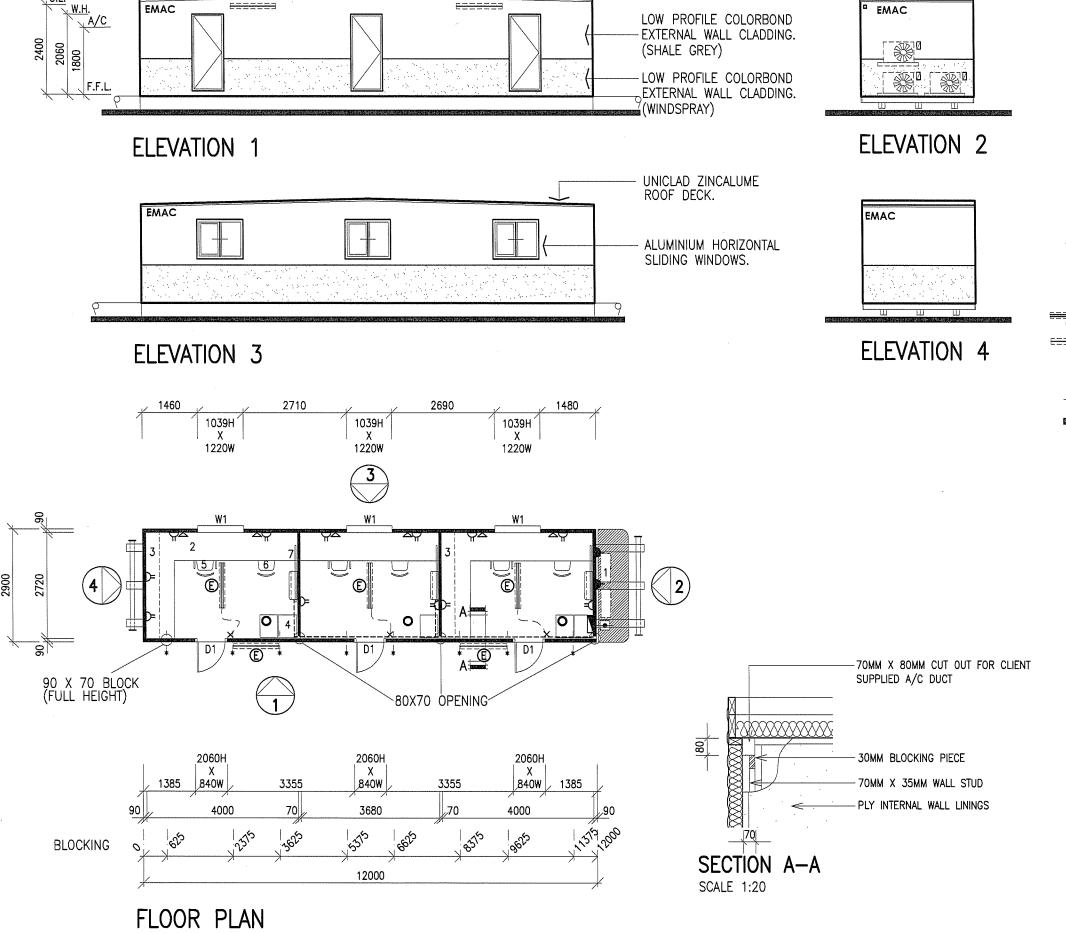
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SITE: -

KARYDAV PTY. LTD. A.C.N. 061 115 133 1253 MAIN NORTH ROAD, PARA HILLS WEST, SOUTH AUSTRALIA 5096 P.O. BOX 46, PARA HILLS PH: (08) 8260 4866 FAX: (08) 8349 6273

BUILDERS LICENCE NO. GL 102757

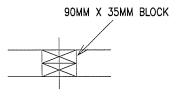
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ITEM:	DESCRIPTION:	QTY:
W1.	1029H. X 1210W. HORIZONTAL SLIDING WINDOW (6.38MM LAMINATE — GREY)	3.
D1.	2040H. X 820W. METAL CLAD REBATE EDGE EXTERNAL DOOR C/W SPRING RESTRAINER & EXIT SIG	3. N.
1.	SPLIT R/CYCLE A/C.	3.
2.	FULL WALL 750MM DEEP DESK.	5.
3.	BOOK SHELF OVER DESK C/W BRACKETS UNDER.	2.
4.	4 DRAW FILING CABINET.	5.
5.	TYPIST CHAIR WITH ARMS.	3.
6.	TYPIST CHAIR NO ARMS.	3. 7
7.	1000H X 1500W WHITEBOARD	3.
À	15 AMP ISOLATOR.	3.
Д	DOUBLE GPO.	12.
×	LIGHT SWITCH.	3.
ightharpoons	DATA POINT.	6.
(E)	2 X 36W. DIFFUSED FLUORO C/W BATTERY BACKUP.	3.
©	1 X 36W FLOURO. VANDALITE @ 2400 HEIGHT C/W BATTERY BACKUP & PE CELL.	2.
0	SMOKE DETECTOR.	3.
•	WILCO 5 PIN MALE PLUG FOR GENERATOR CONNECTION.	1.
	CIRCUIT BREAKER BOARD (3 PHASE).	1.

NOTE:

- 1. ALL DOORS TO HAVE STICK ON REFLECTIVE EXIT SIGNS ON INSIDE FACE OF DOOR.
- 2. ALL EXTERNAL LIGHTS TO BE ON SAME P.E. CELL.



90 X 70 BLOCK

SCALE 1:10

SU	IBMITTAL STATUS	INITIAL	DATE
Α	CONTRACT DRAWINGS		
В	BILL OF MATERIALS		
С	ISSUE FOR PURCHASING		
D	ISSUE FOR PRODUCTION		
Ε	RELEASE FOR DELIVERY		
F	APPROVED BY MANAGER		

CLIENT:

ENSIGN

INTERNATIONAL

PROJECT: 12.0M X 2.9M 3 ROOM OFFICE

SITE: **EX PLANT**



KARYDAV PTY. LTD. A.C.N. 061 115 133 1253 MAIN NORTH ROAD, PARA HILLS WEST, SOUTH AUSTRALIA 5096 P.O. BOX 46, PARA HILLS PH: (08) 8260 4866 FAX: (08) 8349 6273 BUILDERS LICENCE NO. GL 102757

	DWG NO: 3	SHEET: 1	OF 1	
	SCALE: 1:100		DATE: 5,	/03/10
DRAWN: JR		CHECK: TS	REV	0

SALES ORDER NO: -

SERIAL NO: -

CERTIFIED A.PRESCOTT RP-16002 A Prent



Proudly owned, designed and manufactured by Suncoast Waste Water Management

Technical Specifications OZZI KLEEN Sewage Treatment Systems SK20A-G



1. DESIGN CAPACITY

The design capacity of the SK20A-G treatment plant is 4,000L per day, producing advanced secondary effluent quality as specified below.

2. DESIGN PARAMETERS

The performance of the OZZI KLEEN SK20A-G Sewage Treatment Plant will achieve advanced effluent quality provided the incoming wastewater parameters meet the following characteristics:

Sewage Inlet

Parameter	Unit	Influent	Advanced
Biological Oxygen Demand (BOD5)	mg/L	≤ 350	≤ 10
Total Suspended Solids (TSS)	mg/L	≤ 350	≤ 10
Total Nitrogen	mg/L	≤ 75	≤ 10
Total Phosphorus	mg/L	≤ 15	≤ 5
Faecal Coliforms, FC	cfu/100 mL	-	≤ 10
Chlorine Residual	mg/L	-	0.5 ≤ 2.0
рН		6.0 ≤ 8.5	6.0 ≤ 8.5

3. SERVICE LIFE

The Ozzi Kleen SK20A-G was designed for a minimum service life of 15 years

4. ENGINEERING CALCULATION AND POE

Description	Document No.	Revision
SK20A-G Design Calculation Sheet	OK-SK20A-G-CS	12/11/2020
SK20A-G Power & Operating Cost Estimate	OK-SK20A-G-POE	12/11/2020
SK20A-G Elevation View Drawing	GD-SK20A-G-H06	17/11/2020
SK20A-G Plan View Drawing	GD-SK20A-G-H05	17/11/2020

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ALF: 1235

Suncoast Waste Water Management

Plant Engineering Calculation Project: Ozzi Kleen SK20A-G

Model	Unit	SK20A-G	Notes
1. Process Design Parameters			
Plant Capacity	EP	20	
Hydraulic flow	I/day	4000	
BOD, loading	mg/l	350	
BOD, loading	kg/day	1.4	
Suspended solids loading	mg/l	350	
Suspended solids loading	kg/day	1.4	The street and an extension of the company of
Mixed Liquor Suspended Solids (MLSS)	mg/l	5000	Typical extended aeration: 2500 to 6000 mg/l
Sludge Age	days	40	Typical extended aeration: > 30 days
Flow hours per day - Hydraulic sizing	hi/ɗay	24	
Blower on time per cycle	min	60	
Settling time per cycle	With	30	
Decant time per cycle	Will.	30	
Total cycle time	സര	120	
Number of cycles per day	cycles	12	
Total decanting time per day	min	360	
Total decanting time per day	hr	6	
Total aeration time per day	min	720	
Total aeration time per day	μι	12	
2. Aeration Tank			
Number of Aeration Tanks		2	True PD Tanke, CDD approxima
Aeration Tank outside diameter		1900	Two RP Tanks, SBR operation
1	mm	1900	
Shell Thickness Aeration Tank inside diameter	mm	1864	
Aeration Tank Inside diameter Aeration Tank top water level	mm	1745	
Aeration Tank top water level Aeration Tank volume - actual, calculated	htre	8,414	Excluding 4 x ø450 OD tubes volume
Aeration Tank volume per EP actual	III.C	421	Excluding 4 x 6430 OD tubes volume
	:	450	
Maxinum decant depth	mm	150	
Aeration Tank max. decant volume	iitre %	723 18%]]
Max. decant volume to daily flow		7690	Two cells on same cycling
Aeration Tank minimum working volume	litre %	8.6%	
Max. decant ratio	70	6.0%	
Hydraulic Residence Time based on TWL	hr	50	24 hours mimimum: Ref: SA Dept. of Health
Hydraulic Residence Time based on BWL	hr	46	
Food to Microbial Mass ratio (F:M Ratio)	g/g.day	0.033	Typical for extended aeration, F:M 0.04 to 0.15
3. Air Flow			
Oxygen demand (kg O ₂ / kg BOD ₅)	kg/kg	2.4	Ref: SA Dept. of Health
BOD, loading	kg/kg kg/day	1.40	Inet, 3A Dept. of Health
Actual Oxygen demand required	kg O ₂ /day	3.4	Ref: SA Dept. of Health
Actual Oxygen demand required	kg Oyluay	3.4	ner. SA Dept. of Health
1 kmol of air at STP occupies:	m³/kmol	22,41	
1 kmol of dry air has mass of:	kg/kmal	28.96	
Gravimetric fraction of Oxygen in dry air	kg/kg	0.2314	
Mass of Oxygen per kmol of air	kg/kmol	6.701	
Mass of Oxygen per m³ of air at STP (dry basis)	kg/m³	0.299	
Inlet air temperature	°C	25	25°C default
Inlet air relative humidity	%	70	
Inlet air temperature	K	298.15	
Standard air temperature	°C	0	
Standard air temperature	K	273.15	
Inlet air pressure	bara	1.013	
Saturated vapour pressure at inlet conditions	bara	0.032	0.03166 for 25°C. 0.04242 for 30°C

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1	1 1		1
Blower discharge pressure at TWL	mbar	207	
Blower air flow (FAD) - actual	m³/hr	18	2 Blowers
Blower model	LP150HN	, , ,	2 Diovers
Number of Elastox-T type B diffusers	21 100/114	4	1
Air flow per diffuser (FAD at suction temperature)	m³/hr	4.50	
	1	4.50	
Ratio : Actual m ³ (wet basis) per Nm ³ (dry basis)	•	1.116	
Air flow per diffuser (at STP)	Nm³/hr	4.03	Recommended for Elastox-T: 2 to 6 Nm ³ /h
Elastox-T diffuser Oxygen transfer (from	g O ₃ /m Nm³	22	
Diffuser immersion depth at TWL	m	1.545	
Diffuser Oxygen transfer at immersion depth	g O ₂ /Nm³	33.99	
Oxygen transfer per diffuser	g O ₂ /hr	137.06	
Oxygen transfer, all diffusers	kg O₂/nr	0.55	
Oxygen transfer, all diffusers - daily basis at TWL	kg O₃/day	6.6	
Standard Oxygen transfer efficiency (wet basis)	%	12.7	
4 01 1 0 1 1 7			
4. Chlorine Contact Tank		10	December 1000
Decanting flow rate	i/min	16	Based on average flow plus 40% margin
Decanting flow rate	m³/hr	0.9	
Minimum CI contact time	min	30	
Minimum CI contact tank volume required	litre	467	
Number of Contact Tanks		2	
Contact Tank outside diameter	mm.	450	
Shell Thickness	mm	10	
Contact Tank inside diameter	mm	430	
Contact Tank Inside diameter Contact Tank top water level	mm	1745	
Contact Tank top Water level Contact Tank volume - calculated	litre	507	
CI contact time - actual	min	33	
C. Cortact arrie actual	17,41	55	
Chlorine tablet comsuption			
dosage rate	mg/L	10	-
daily tablet consumption	kg/d	0.04	†
min. storage - 3 months	kg kg	3.64	
number of tablets (200 g/ea) - 3 months	no.	18	
J			
5. Waste Sludge Tank			
Sludge oxidation ratio	40 1	40	
Sludge D.S. wastage based on SS loading	kg/daγ	0.035	
Wet sludge solids content in sludge tank	%DS	1	
Wet sludge mass to be wasted	kg/day	3.5	
Wet sludge volume wasted where SG = 1	l/day	3.5	
Describes and state of the			
Period between tank de-sludging	day	90	
Minimum sludge tank volume required	litre	315	
Number of Sludge Tanks		2	
Sludge Tank outside diameter	mm	450	
Shell Thickness	mm	10	
Sludge Tank inside diameter	mm	430	
Sludge Tank top water level	mm	1900	
Sludge Tank volume - calculated	litre	552	
Period between de-sludging - actual	day	158	
6. Alum Dosing System (SK20A / A-G O	1		_
Dosage rate	mg/L	30	
Daily alum consumption	kg/d	0.12	
Percentage of alum solution	%	20	
Daily alum consumption at 20% solution:	kg/d	0.6	
Daily alum consumption at 20% solution:	L/d	0.53	
Dosing rate per inflow at 20% solution	ml/m³	133	
Chemical tank volume	litre	80	
Minimum refill period of Alum	days	150	

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RP-16002 REF: 1235

Suncoast Waste Water Management

AWTS Process Design Parameters for Power Utilisation

Project: Ozzi Kleen SK20A-G

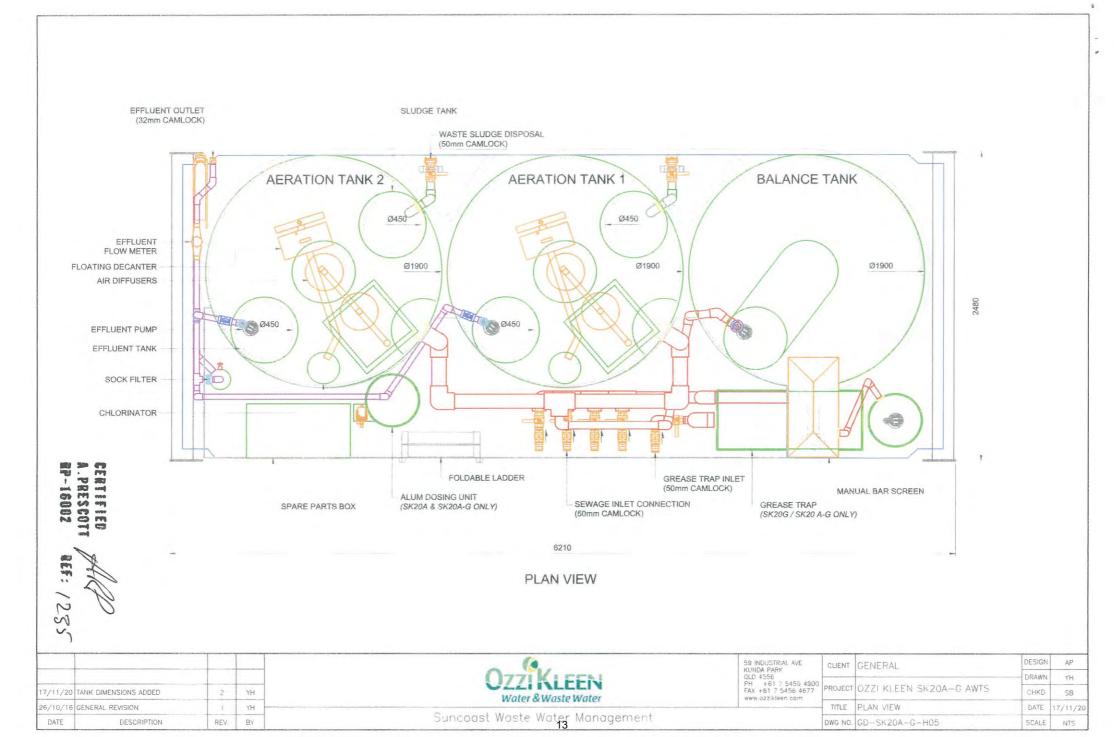
Design Parameter	EP	20				
Hydraulic Flow	I/day	4000	1			
Flow Hours per Day - Hydraulic Sizing	hr/day	24	1			
Blower ON Time per Cycle	min	60				
Settling Time per Cycle	min	30				
Decant Time per Cycle	min	30				
Total Cycle Time	min	120				
Number of Cycles per Day	cycles	12		Model		
Transfer Pump Flow Rate	I/min	200	Showfo	u STA-112		
Effluent Pump Flow Rate	I/min	100	Reefe F	RVS300		
Grease Trap Pump Flow Rate ISK20G / A-G ONLY)	l/min	200	Reefe F	RVS300		
Dosing Pump Flow Rate ISK20A / A-G ONLY)	I/hr	3	lwaki E	J B16		
Air Blower	m³/hr	18	Thomas	s LP150HN		
Power Utilisation Based on Rated Power	Installed	Power	Unit	Hrs/day	Energy Used	
	3 phase	1 phase		hr	kWh	
Transfer Pump		0.75	kW	0.33	0.25	
Effluent Pump 1		0.40	kW	0.33	0.13	
Effluent Pump 2		0.40	kW	0.33	0.13	
Grease Trap Pump (SK20G / A-G ONLY)		0.18	kW	0.11	0.02	
Dosing Pump (SK20A / A-G ONLY)		0.10	kW	0.37	0.04	
Blower 1		0.13	kW	12.00	1.56	
Blower 2		0.13	kW	12.00	1.56	
Control System		0.10	kW	24.00	2.40	
Total Installed Power	0.00	2.19	kW		6.1	
Average Power			kW		0.25	
Current Draw Based on Full Load Current	Full Load	Current	Unit	Hrs/day	Amp-hr Used	
	3 phase	1 phase			3 phase	1 phase
Transfer Pump		6.00	А	0.33		2.00
Effluent Pump 1		4.00	A	0.33		1.33
Effluent Pump 2		4.00	A	0.33		1.33
Grease Trap Pump (SK20G / A-G ONLY)		4.00	A	0.11		0.44
Dosing Pump (SK20A / A-G ONLY)		0.50	A	0.37		0.19
Blower 1		0.85	А	12.00		10.20
Blower 2		0.85	A	12.00		10.20
Control System		1.00	A	24.00		24.00
Total Installed Current	0.00	21.20	А		0.00	49.69
Average Current			А		0.00	2.07

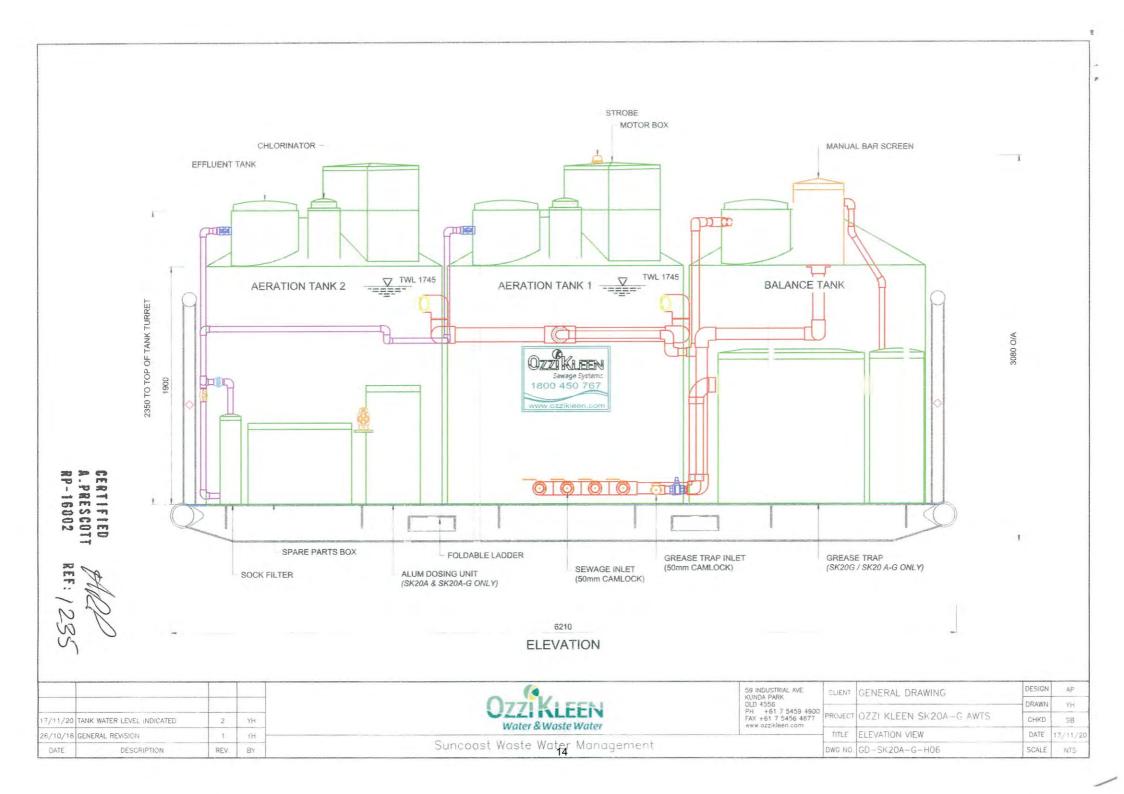
Operating Cost Estimating	unit	unit price	qty/d	qty/yr	\$/yr	
Power	kW	0.20	6.1	2224	445	
Chlorine	kg	12.50	0.04	15	183	
Alum	kg	1.50	0.12	44	66	
Waste Sludge Disposal	L	0.20	3.50	1278	256	
total:	\$/year				949	

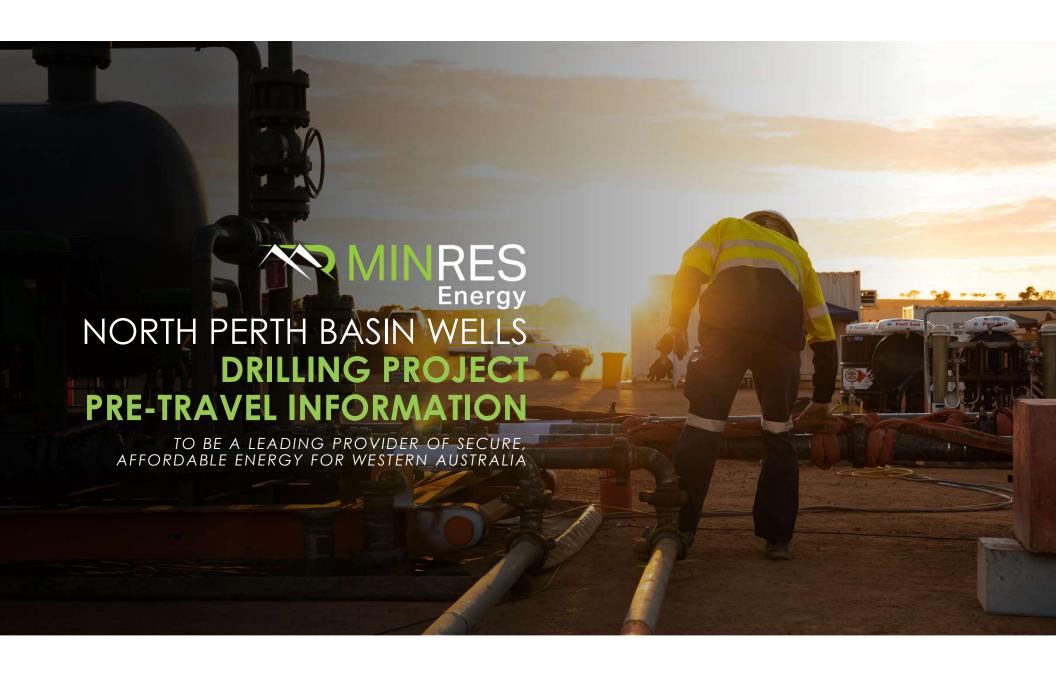
Note: All costs are estimated based on the SK20A-G operating for 365 days at full design capacity (4 kL/day), an adjustment should be made when less sewage is treated per year.

CERTIFIED A.PRESCOTT RP-16002

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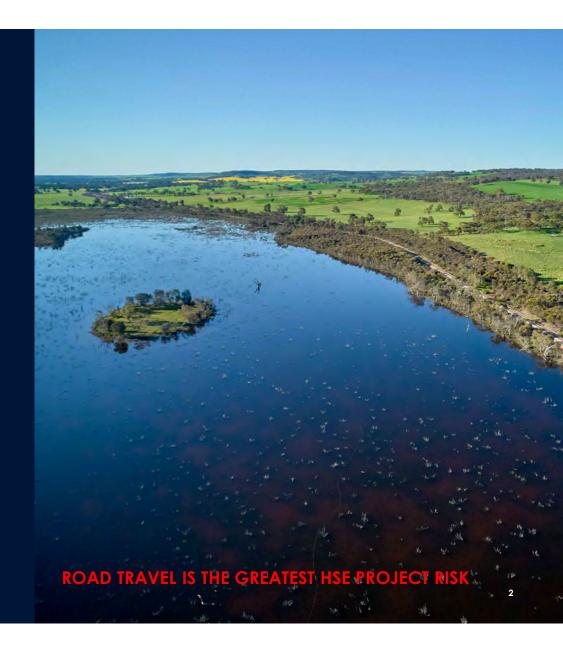




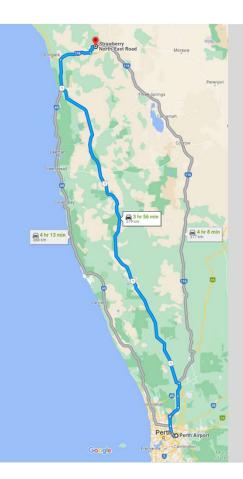
JOURNEY MANAGEMENT

- Road travel with a continuous duration >2 hours will require a journey management plan
 - o 15 minutes rest stops must be taken for every 2 hours of driving
- Personnel will use their own organisation's journey management procedure
 - Where there is no journey management procedure covering 3rd party personnel, the MRE Project journey management procedure will be used,
- Night travel is only permitted with approval of the Operations Superintendent or Lead Contractor's PIC
- ALL personnel must seek approval of the MRE Operations Superintendent before travelling to Site.
 - o Prior to departure the Operations Superintendent must be notified of the travel route and expected time of arrival at the Site.
 - o On arrival at Site the Operations Superintendent must be notified accordingly
 - o Excludes Lead Contractor personnel and freight companies
- Diesel AWD/4WD is preferred mode of transport.





TRAVELLING TO LOCKYER AREA WELL LOCATIONS FROM AIRPORT



Option 1: Via Brand Highway. For heavy vehicles and light vehicles from the Perth airport

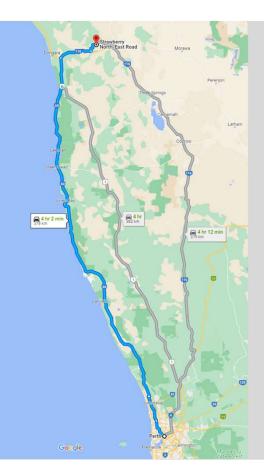
- Depart the Airport terminal and get onto the Tonkin Hwy north
 - Terminals 3 & 4: Travel along Snook Road to the 2nd round about, turn left onto Dunreath Road, travel 0.76 kms and turn right at the roundabout, cross over the Tonkin Hwy and turn right at the round about onto the Tonkin Hwy north
 - Terminals 1 & 2: Travel along Airport drive for \sim 4.3 kms, cross over the Tonkin Hwy onto the Tonkin Hwy north
- Travel north along the Tonkin Hwy to intersect the Brand Hwy near to Muchea (~47.3 kms)
- Travel along the Brand Hwy to the Midlands Rd intersection (296 kms)
- Turn right onto Midlands Rd and travel 26.3 kms to Strawberry North-East Rd turn off

Refer to the relevant site access map within this document for access to specific Lockyer area well locations.

Remember to report to the Site Supervisor on arrival at Site and log-off with your journey manager



TRAVELLING TO LOCKYER AREA WELL LOCATIONS FROM PERTH CITY



Option 2: Indian Ocean Drive – for light vehicles from Perth city

- Get onto Mitchell Fwy travelling north
- Travel to the end of the Mitchell Fwy and turn right on Hester Ave (36 kms)
- Travel east on Hester Ave and turn left onto Wanneroo Rd (1 km)
- Travel north along Wanneroo Rd / Indian Ocean Drive (State route 60), through Leeman to where the road intersects with the Brand Hwy (283 kms)
- Turn left onto the Brand Hwy and travel north to Midlands Rd intersection (24 kms)
- Turn right onto Midlands Rd and travel 26.3 kms to Strawberry North-East Rd turn off

Refer to the relevant site access map within this document for access to specific Lockyer area well locations.

Option 3: Brand Hwy – from the Perth city

• Alternatively, travel along Lord St / Guildford Rd (State Route 51) to intersect with Tonkin Hwy and revert to Option 1 directions

Remember to report to the Site Supervisor on arrival at Site and log-off with your journey manager



SITE ACCESS ROADS - GENERAL RULES



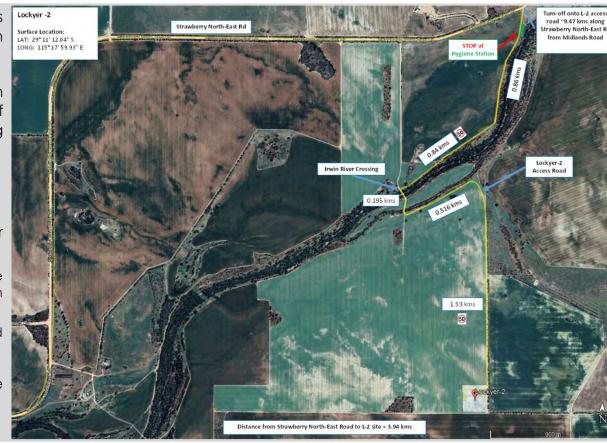
- **SPEED** Once you leave public roads on to the gravel access roads, drive to conditions and in **NO** circumstances faster than 50kph on these roads
 - 5kph on the rig site
- Be aware of trains on approach to the railway crossing from Midlands Road onto Strawberry North-East Road and the location of your trailer
- Always remember to drive on the left side of unmarked gravel access roads especially when approaching a blind crest
- Be aware of the potential for farm vehicles and machinery to be operating on the access roads or in the near vicinity of the well location. **ALWAYS** act in a courteous manner and be mindful we are guests on **THEIR** private property.
- Do NOT cross the Irwin river if water is flowing over the crossing
- Light vehicles to ALWAYS to give way to heavy vehicles on the access roads and river crossing
- All vehicles are to be parked in the designated parking areas
- A ZERO tolerance drug and alcohol policy is in place for this activity
- ALL personnel to check in at the Wellsite Supervisor's office on arrival at the rig site
 - o If first time at rig site then must complete Ensign site induction on arrival



5

SITE ACCESS ROADS - LOCKYER-2

- Turn off onto Strawberry North-East Road from Midlands Road and travel ~9.47 kms to the Lockyer-2 turn off on the right
- **Stop** at the Hygiene Station, inspect and brush down vehicle into garbage bags provided (if minor amount of mud, dirt, dust build up, plant seeds present) and bring waste with you.
 - o Register inspection in book at hygiene station
 - o Note: Requirement is for vehicles to arrive clean
- Travel 1.7 kms along the access road to the Irwin river crossing
 - Do NOT cross the river if there is water flowing over the river crossing (i.e. no depth visibility or more than 10cm in depth)
 - Contact the MRE Operations Superintendent or Lead Contractor Site PIC for advice on how to proceed.
- After crossing the river, continue to travel along the access road for another ~2.05 kms to the Lockyer-2 site





SITE ACCESS ROADS - NORTH ERREGULLA DEEP-1 & MAIN CAMP

North Erregulla Deep-1 (NED-1) Well Location

- If travelling west along Midlands Road, continue another ~9.7 kms west along Midlands Road past the Strawberry North-East Road intersection to Mooriary Road turn-off.
- Turn right onto Mooriary Road and drive south for 4.32 kms to the turn-off onto the North Erregulla Deep-1 wellsite access road
- Drive east along the access road for 1.05 kms, turn south and travel for an additional 0.48 kms along the access road to arrive at the North Erregulla Deep-1 well location





Main Camp Location

- Turn right onto Mooriary Road as you depart the NED-1 access road and drive south for 4.72kms
- If arriving from Midlands Road then turn south onto Mooriary Road and drive south for 8.93kms
- Turn right into the main camp access road as you approach the intersection.

BE AWARE AND ALWAYS GIVE WAY TO ANY ONGOING FARM ACTIVITY ON THE ACCESS ROADS TO THE SITE



7

PROJECT ENVIRONMENTAL CONSIDERATIONS

- ALL vehicles and equipment travelling to the well locations MUST be cleaned free of mud, dirt, dust build up, plant seeds or any other flora or fauna species that are not native to this area
 - Vehicles which arrive in a state which is considered unsuitable will be sent off Site for cleaning. If unsure, contact the MRE Operations Superintendent (OSI) to discuss
- Except in an emergency situation, vehicles can only travel on the existing access tracks
- The Sites are on privately owned agricultural farmland. Personnel are to refrain from walking onto the areas surrounding the Sites
- Please ensure you have forwarded an electronic copy of all SDSs and DG documentation to the MRE Operations Engineer and WSS prior to mobilising to location
- If encountered, leave any gates as you find them
- Except in an emergency situation, **NO** personnel are permitted onto local private properties or near to homes in the area
- MRE's activities will be conducted in compliance with the applicable Environment Plan (EP) as approved by the Department of Mines, Industrial Regulation and Safety (DMIRS)





OTHER PROJECT CONSIDERATIONS

Where possible, travel between the main camp site and well location should be via crew change bus

- Vehicles should preferentially remain at the main camp site
- Crew change trips occur at around 05:30 hrs, 11:30 hrs, 17:30 hrs and 23:30 hrs
- If driving to the well location, please use designated parking areas
- Large vehicles will be routinely driving through the location keep out of their way

Mandatory PPE to be brought and worn on site

- •Steel cap boots,
- Safety helmet
- Eye protection with side shields
- Hearing protection
- •Long sleeve cotton shirt with reflective strips
- Long leg cotton trousers with reflective strips
- Good quality protective gloves







PROJECT CONTACT DETAILS

The following are contact details for the key resources involved in execution of the well operations. If you already have established chains of communications, then continue with those accordingly.

Name	Position	Email	Office No	Mobile
Roo / Shaughan	Wellsite Supervisor	Mre.wss@aztechwc.com.au	-	0439 310 795
Mark / Sean	Wellsite HSE & Logistics	Mre.hsel@aztechwc.com.au	-	0458 808 826
Paul O'Shea	Operations Superintendent	poshea@aztechwc.com.au	+61 (0)8 6228 6300	0404 095 145
Rob Schenberg	Drilling Engineer	rschenberg@aztech.com.au	+61 (0)8 6228 6300	0431 914 747
Sundar Veerappan	Logistics Superintendent	sveerappan@aztechwc.com.au	+61 (0)8 6228 6300	0414 922 945
Nick Merdith	Project HSE Advisor	nmerdith@aztechwc.com.au	+61 (0)8 6228 6300	0400 088 666
Darrell Girgenti	Project Manager	darrell.girgenti@mrl.com.au	+61 (0)8 6228 6303	0409 055 989
Leah Fuller	Land Access Manager	leah.fuller@mrl.com.au	+61 8 9315 8537	0409 807 416





HEALTH, SAFETY AND ENVIRONMENT MANAGEMENT SYSTEM BRIDGING DOCUMENT

PERTH BASIN WELLS - DRILLING

EOC-SAF-PLN-008-APX4

Revision Number	Issue Date	Prepared By	Reviewed By	Approved By
0	8/02/2021	N Merdith	D Girgenti S Daniels T O'Keefe	S Daniels
1	01/04/2021	N Merdith	D Girgenti S Daniels T O'Keefe	S Daniels
2	22/06/2021	N Merdith	D Girgenti A Buchan T O'Keefe	S Daniels
3	24/11/2022	N Merdith	D Girgenti S Lee C Nesbitt	N Thompson
4	01/12/2022	N Merdith	D Girgenti S Lee C Nesbitt	N Thompson
5	17/01/2023	N Merdith	D Girgenti	N Thompson



DISTRIBUTION LIST

Position	Company
General Manager Exploration - Energy	MinRes Energy
Safety Manager	MinRes Energy
Project Manager	MinRes Energy/Aztech
Project Manager	MinRes Energy/Aztech
Operations Superintendent	MinRes Energy/Aztech
Project HSE Advisor	MinRes Energy/Aztech
Wellsite Supervisor	MinRes Energy/Aztech
Site HSEL	MinRes Energy/Aztech
Drilling Superintendent	Ensign Australia Pty Ltd
National HSEQT Manager	Ensign Australia Pty Ltd
Rig Manager	Ensign Australia Pty Ltd
Rig HSE Advisor	Ensign Australia Pty Ltd
Main Camp Manager	ASCO
The Minister's Delegate, WA Department of Mines, Industry, Regulations and Safety	DMIRS

REVISION HISTORY

Revision Number	Revision Details
1	Reissued following DMIRS review
2	Revised following HAZID Workshop and updated risk register
3	Revised to cover North Perth Basin drilling and completion activities under new WHS(PAGEO) Regulations 2022
4	Revised for acceptance of Ensign Rig 970 Safety Case (including transfer of drilling MAEs)
5	Revised following DMIRS SSRN. Updated title.



DOCUMENT CUSTODIAN

This Health, Safety and Environmental Management System Bridging Document (HSEMSBD) has been approved by the relevant officer of MinRes Energy prior to submission to the Regulator for review and assessment.

Details are provided below:

Neil Thompson

General Manager Exploration - Energy

MinRes Energy (Energy Resources Limited)

20 Walters Drive, Osborne Park, WA 6017

neil.thompson@mrl.com.au



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2000 Contractor	in force at the Project Site for the Activity Well Site – Ensign Main Camp – ASCO
JSA Lead Contractor	Job Safety Analysis The contractor whose MinRes Energy (Energy Resources Limited) approved HSEMS will be
HSE&T	Health, Safety, Environment and Training
поемо-во	Health, Safety and Environment Management System Bridging Document (this document) An addendum to the approved MinRes SMS covering a specific Activity (Safety Case Revision under WHS(PAGEO)R)
HSEMS HSEMS-BD	Health, Safety and Environment Management System Bridging Document (this document)
HSEL	Health, Safety, Environment and Logistics
HSEA	Health, Safety and Environment Advisor – Ensign Site-Based HSE Advisor
HSE	Health, Safety and Environment
FSA	Formal Safety Assessment
ERCL	Emergency Response Contact List
EP	Exploration Permit
Ensign	Ensign Australia Pty Ltd
DMIRS	Department of Mines, Industry, Regulation and Safety
CAR	Corrective Action Register
Camp	ASCO managed Pye Rd or Mobile Main Camp capacity to accommodate up to 52 personne
ВОР	Blow Out Preventer
ASCO	ASCO Australia Pty Ltd
ALARP	As Low As Reasonably Practicable
Activity	The drilling and completion phase of the Project



LTI	Lost Time Injury
MAE	Major Accident Event
Mini-Camp	Rig 970 includes site camp with accommodation for six operationally critical staff
MinRes Energy	Energy Resources Limited – Permit Title Holder
MOC	Management of Change
MTI	Medical Treatment Injury
OEM	Original Equipment Manufacturer
PAGERA	Petroleum and Geothermal Energy Resources Act 1967
PAGER(MoS)R	Petroleum and Geothermal Energy Resources (Management of Safety) Regulations 2010
PIC	Person in Charge
PMS	Preventative Maintenance System
PPE	Personal Protective Equipment
Project	The drilling, completion, well testing, well intervention or well decommissioning of a Well and all associated activities.
Psychosocial Hazards	Hazards that may cause psychological and physical harm and arise from or relate to, the design or management of work, the working environment, plant at a workplace or workplace interactions or behaviours (Safe Work Australia)
Safety Case	Ensign Rig 970 Safety Case (EN-AUS-HSE-SC-001)
SDS	Safety Data Sheet
SFAIRP	So Far As Is Reasonably Practicable
SIMOPS	Simultaneous Operations
Site or Location	Locations at which the Activity is being undertaken which may include the Well site, main camp site and access roads thereto
SMART	Specific, Measurable, Accountable, Reasonable and Timely



SMS	MinRes Energy (ERL) Safety Management System (EOC-SAF-PLN-00)
SOP	Safe or Standard Operating Procedure
SWA	Stop Work Authority
TPC	Third Party Contractor
TRI	Total Recordable Injuries
Well	An exploration, appraisal or development well with a DMIRS accepted WMP in force for the Activity within an MinRes Energy (Energy Resources Limited) operated permit area in the North Perth Basin
W-EP	Well Environment Plan
WHS	Workplace Health and Safety
WHS(PAGEO)R	Work Health and Safety (Petroleum and Geothermal Energy Operations) Regulations 2022
WMP	Well Management Plan (Drilling Program)
WSS	Well Site Supervisor



1 INTRODUCTION

1.1 Project Overview

MinRes Energy (previously Energy Resources Limited or ERL), a wholly owned subsidiary of Mineral Resources Limited, is the title holder of several exploration permits located in the North Perth Basin, including EP 368, EP 389, EP 426 and EP 507.

Within these permit areas, MinRes Energy are proposing to drill several Wells, including North Erregulla Deep-1, Lockyer-2, Lockyer-3, Lockyer-4, Dandaragan Deep-1 and Romanesque-1 and additional Wells as prospects are generated within the MinRes Energy permit areas.

The geographic location of the MinRes Energy permit areas is shown in Figure 1.

Most Activities will be undertaken in relative proximity to location of the previous Lockyer Deep-1 Well within EP 368, which was a significant gas discovery well for MinRes Energy in 2021.

As with the previously drilled Lockyer Deep-1, Project Wells will be drilled using the Ensign Rig 970. The Ensign Rig 970 Rig will operate under an accepted Safety Case [EN-AUS-HSE-SC-001] under the *Work Health and Safety (Petroleum and Geothermal Energy Operations) Regulation* 2022 (WHS(PAGEO)R).

1.2 Purpose

This Health, Safety and Environmental (HSE) Management System Bridging Document (HSEMS-BD) is a revision in part of the current Regulator accepted HSEMS-BD and covers the proposed Activities described above.

The HSEMS-BD is an addendum to the accepted *Safety Management System Perth Basin* (EOC-SAF-PLN-008), in accordance with the *Work Health and Safety (Petroleum and Geothermal Energy Operations) Regulation 2022* (WHS(PAGEO)R).

Note: The current revision of the *MinRes Energy Safety Management System Perth Basin (EOC-SAF-PLN-008)* was accepted under the repealed *Petroleum and Geothermal Energy Resources (Management of Safety) Regulations 2010* (PAGER(MoS)R).

This HSEMS-BD:

- Describes the Activity
- Identifies the agreed interfaces between the MinRes Energy Safety Management System Perth Basin Exploration Permits (EOC-SAF-PLN-008) and the Ensign Rig 970 Safety Case (EN-AUS-HSE-SC-001)
- Describes the hazard identification, risk assessment and risk management processes applied to ensure the risks associated with the Activity and not addressed within the Safety Case have been reduced SFAIRP (SFAIRP – broadly synonymous with ALARP)

Management of day-to-day operations of the Well Site during the Activity will be as per the DMIRS accepted Ensign Rig 970 Safety Case.



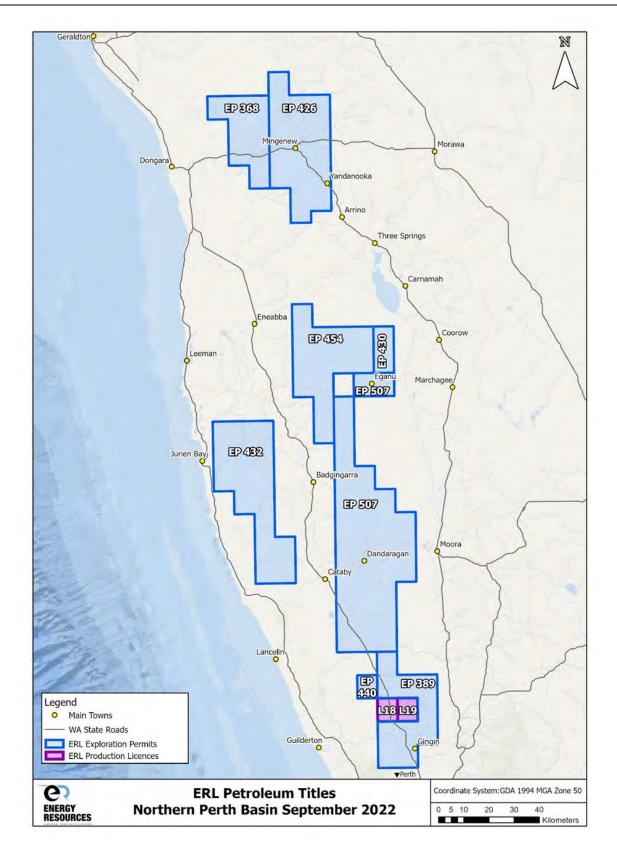


Figure 1. MinRes Energy North Perth Basin Permits



1.3 Revision

The MinRes Energy General Manager Exploration - Energy is responsible for ensuring the adequacy and control of this HSEMS-BD.

In accordance with WHS(PAGEO)R, this HSEMS-BD will be revised in the following circumstances:

- The technical knowledge relied upon to formulate this HSEMS-BD, including the knowledge of systems for identifying hazards and evaluating risks of major accident events, becomes outdated
- MinRes Energy proposes to modify or decommission a relevant facility, and the Safety
 Case for the operation does not provide, or adequately provide, for the proposed
 modification or decommissioning of the facility
- There are reasonable grounds for believing that a series of proposed modifications to a relevant facility would result in a significant cumulative change in the overall level of risk of major accident events
- MinRes Energy proposes to significantly change the safety management system for the operation (this would include a change in drilling contractor)
- the activities to be carried out as part of the operation are different from the activities contemplated in the HSEMS-BD.

It should be noted that this revision of the HSEMS-BD does not meet the above triggers for a resubmission. The updates in this revision largely result from the MAEs associated with the drilling operations that now fall within the Safety Case under the WHS(PAGEO)R.

1.4 Scope

1.4.1 In-Scope

The scope of this HSEMS-BD includes:

- HSE planning activities, in particular aspects of the Formal Safety Assessment (FSA) not specific to the Safety Case
- All Project Drilling Activities where the Ensign Rig 970 is on the Well Site
- Personnel movement between the Camp and Well Site by light vehicles or mini-bus

The ASCO Camp, Project personnel travelling in light vehicles to the Well Site and environmental aspects of the Activity are outside the scope of the WHS(PAGEO)R but are included in the HSEMS-BD as important aspects of general Project HSE management.

1.4.2 Out-of-Scope

Activities outside the scope of this HSES-BD:

- Rig mobilisation to Site and demobilisation activities off Site
- Freight transport off Site other than the requirements under the Western Australian Road Traffic Chain of Responsibility legislation.



1.5 Legal and Other Requirements

The following legislation applies to this bridging document:

- Work Health and Safety Act 2020
- Work Health and Safety (Petroleum and Geothermal Energy Operations) Regulations
 2022
- Work Health and Safety (General) Regulation 2022
- Dangerous Goods Safety Act 2004
- Workers Compensation and Injury Management Act 1981
- Workers Compensation and Injury Management Regulations 1982
- Petroleum and Geothermal Energy Resources Act 1967
 - Petroleum and Geothermal Energy Resources (Environment) Regulations 2012
 - Petroleum and Geothermal Energy Resources (Resource Management and Administration) Regulations 2015
- Environmental Protection Act 1986
 - Environmental Protection Regulations 1987
- Bush Fires Act 1954
 - o Bush Fires Regulations 1954
- Wildlife Conservation Act 1950
- Conservation and Land Management Act 1984
- Native Titles Act 1993
- Aboriginal Heritage Act 1972

Standards and Codes of Practice applicable to the Project are identified in the Ensign Safety Case and ASCO HSEMS.

2 PROJECT

2.1 General Description

The key operations of the Activity are:

- MinRes Energy Handover site to Ensign
- Ensign Mobilise the drilling rig package, personnel and supplies
- MinRes Energy Mobilise 3rd party services as required to support the Project
- Ensign Rig-up the drilling rig and 3rd party services at the Well Location
- Ensign Drill the Well as per the approved Well Management Plan (WMP)
- Ensign Suspend or abandon the Well as per the WMP
- Ensign Rig down and demobilise the rig, personnel and supplies
- MinRes Energy Demobilise 3rd party services from the Well Location
- Ensign Hand back site to MinRes Energy

The Activity is scheduled to commence Q1 of 2023 with this timing subject to the arrival date of the Ensign Rig 970 into Western Australia. On a successful case (suspension pending later completion), each Well is planned for ~60 days including mobilisation and rig up time.



2.2 Project Management

MinRes Energy, as permit title holder, is responsible for site preparation and the approved WMP.

On handover of the Site to Ensign (as the nominated operator of Rig 970), Ensign will be responsible for day-to-day drilling operations on the Well Site as per the accepted Safety Case and for the implementation of the WMP at the Well Site, as instructed by MinRes Energy.

Management of environmental aspects on Site will meet the requirements of the approved Well Environment Plan (W-EP) applicable to the Site.

2.3 Location

The initial proposed Wells are typically located on privately owned farmland in the local government shires of Dandaragan, Mingenew and Gingin (Figure 2 and Figure 3 below).

Note: Romanesque-1 location is still to be finalised.



Figure 2. Dandaragan Deep-1 Well Location



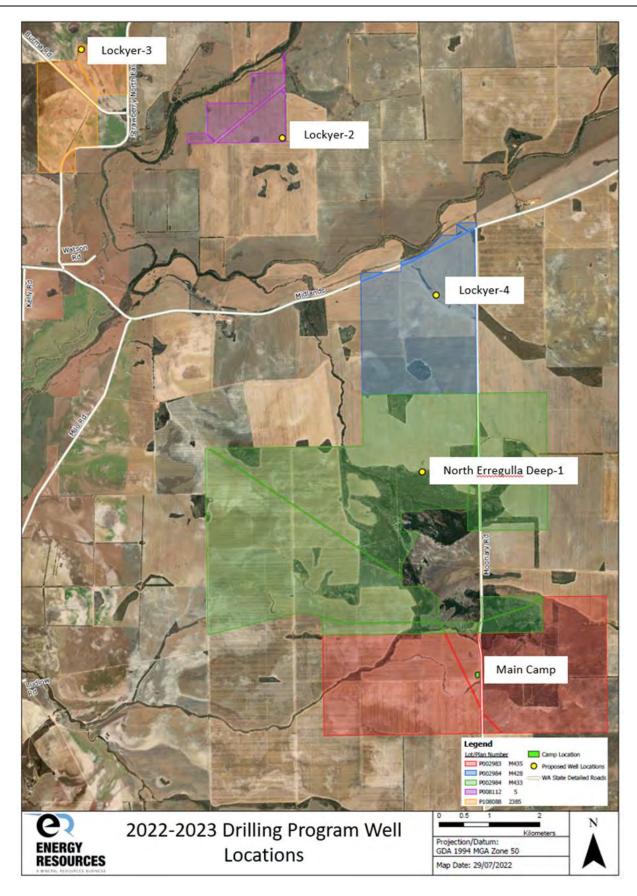


Figure 3. Proposed Well Locations - Mingenew



2.4 SIMOPS

The Well Sites are typically on privately owned farmland with the Site access roads likely to be shared with occasional farming operations, depending on the time of the season.

Due to the relative isolation of the Well Sites from general civilian activities, there are no interactions/SIMOPS with other petroleum operations identified for this Project.

2.5 Well Site Layout

The Well Site layout may vary according to site details. A typical Well Site layout is provided in **Figure 4** below.

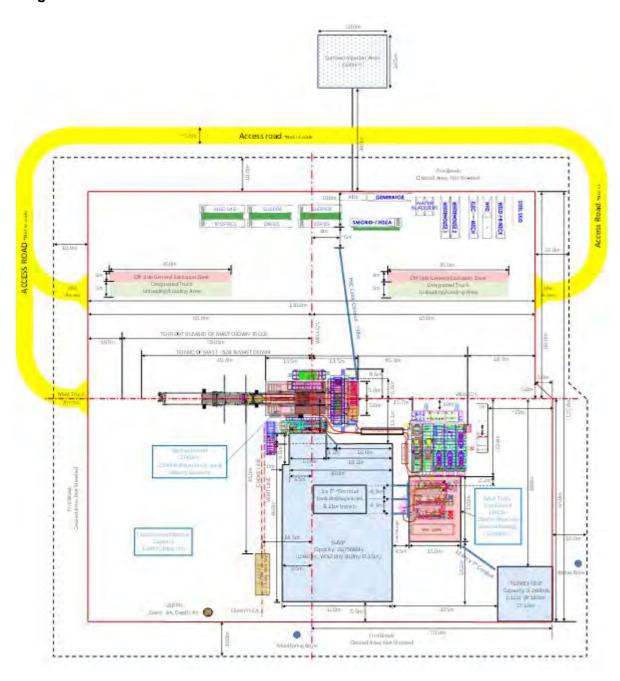


Figure 4. Typical Rig 970 Site Layout



2.6 Drill Rig - Rig 970

The Ensign Rig 970 is an automated drilling rig (ADR) 1500 with a 41 m mast height capable of racking up to 208 stands of drill pipe and with a drawworks capacity of 1500 hp.

Rig 970 includes a Site mini-camp with accommodation for six operationally critical staff.

For further details refer to the Safety Case.

2.7 Main Camp

An ASCO mobile Camp, will be used to accommodate personnel working on the Project and be typically located within 35kms travel distance to the Well Sites. This Camp has a capacity to accommodate up to 52 personnel.



Figure 5. ASCO Mobile Camp Photo

On arrival at the Camp Site, personnel will be required to register with the Camp Manager and complete an ASCO Camp induction.

Each person will be allocated a room, with their room number maintained in the Camp kitchen by the Camp Manager. On final departure from the Main Camp, each person must advise the Camp Manager accordingly and their names removed from the Camp personnel register.

To minimise traffic between the Camp and the Well Site, primary crew changes will be provided by the ASCO minibus.

3 SAFETY MANAGEMENT SYSTEM

The following section describes the Project specific process and agreed bridges between the approved MinRes Energy SMS and Safety Case.

A HSEMS Bridging Table is attached in Appendix 1 of this document.



3.1 Ensign HSE Management System Overview

The Ensign HSEMS, including on-site maintenance and operation of drilling units, is certified to AS/NZS ISO 45001:2018 and is based around seven elements (refer to Table 1 below).

Table 1. Ensign HSEMS elements and document framework

Element	Policy, Manuals and Procedures		
1 Leadership & Commitment	HSE Policy 1.0 HSES Manual	1.1 Mental Health & Wellbeing 1.2 *Leadership Visits	
2 Policy	2.0 Policy Manual	2.1 Policy Development	
3 Organisation Resources	3.1 Training and Development3.2 Employee Information3.3 Document Change3.4 Legal and Other Compliance3.5 Register of Legal Compliance	3.6 Evaluation of Legal Compliance3.7 Corrective Preventive Actions3.8 HSE Document Control3.9 Document Retention and Records Management	
4 Risk Management	 4.1 Risk Management 4.2 Personal Protection Equipment 4.3 Environmental Management 4.4 Dangerous Goods Management 4.5 Land Transport Management 4.6 Subcontractor Management 4.7 Plant and Equipment 	 4.8 Pressure Systems 4.9 Confined Space 4.10 Fatigue Management 4.11 Waste Management 4.12 Hazard Management 4.13 Air Transport Management 4.14 Process Safety Asset Integrity 	
5 Planning & Implementation	1 HSE Planning 5.2 Consultation and Communications 5.3 Permit to Work 5.4 Fall Protection 5.5 Slinging and Lifting Equipment 5.6 Management of Change 5.7 Health and Medical Management 5.8 Injury Management & Rehabilitation 5.9 Emergency Planning 5.10 Travel Security 5.11 Isolation, Lock-Out, Tag-Out & Testing	 5.12 Noise / Hearing Conservation 5.13 Hazardous Substances 5.14 Manual Handling Tasks 5.15 Hygiene Management 5.16 Heat Stress Management 5.17 Electrical Work Safety 5.18 Radiation 5.19 Dropped Object Prevention 5.19 Dropped Object Prevention 5.20 *Job Safety Analysis 5.21 Exclusion Zone & Barricading 5.22 Short Service Employees 5.23 Hydrogen Sulphide Management 	
6 Monitoring Implementation	6.1 Monitoring, Measuring & Reporting 6.2 *Incident Response and Reporting	6.3 * Incident Investigation 6.4 * Incident Review Board	
7 Audit and Management Review	7.1 Auditing Procedure 7.1b Audit Procedure OHSAS 18001-2007	7.2 Management Review	

*Ensign Global Procedures

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3.2 ASCO HSE Management System Overview

The ASCO Main Camp is operated under the ASCO HSEMS with the Camp Manager as Site PIC. Key ASCO HSE processes are:

- ASCO Safety Management Plan (PL-AUS-HSEQ-01)
- ASCO Remote Camps Operations Manual (OP-AUS-CMP-01)
- ASCO Camp Emergency Response Plan (ERP-CMP-HSEQ-01)
- ASCO Environment Management Plan (PL-AUS-HSEQ-06)

3.3 Leadership and Commitment

3.3.1 Policy and Leadership

MinRes Energy and Ensign are committed to ensuring that the health and safety of employees, contractors and visitors is protected throughout the Activity by controlling risks to SFAIRP in line with corporate policy objectives. Both companies also adopt a systematic approach to managing the potential impacts of operations on the environment, the community and heritage values.

MinRes Energy and Ensign's policies are endorsed by senior management who continue to take direct responsibility for implementation and maintenance of these policies, which include the health and safety policy (refer to Appendix 2).

Policies will be displayed in prominent locations at the Site. These locations include:

- Ensign Rig Managers Office
- WSS Office
- HSEA Office
- Crib Room
- Main Camp

Policies will be communicated to personnel, contractors and visitors during inductions.

3.3.2 Stop Work Authority

Both MinRes Energy and Ensign support the Stop Work Authority (SWA).

All personnel on the Project have the authority to stop work if they believe it is unsafe to proceed. The stop work will be reported to and recorded by the Rig Manager. Work can only resume when all involved parties have assessed the situation and identified appropriate controls to a level that is both acceptable and SFAIRP.

References:

• Ensign EN-AUS-POL-023 Stop Work Authority Policy



3.3.3 Objectives and Targets

MinRes Energy is committed to achieving a high-performance standard in HSE and has set the Project objectives and targets in consultation with Ensign - refer to Table 2 below. KPIs will be communicated at the pre-spud meeting and regularly reviewed during the Project.

Table 2. Project HSE KPIs

HSE Management System KPI	Measure	Target
Lead Indicators		
Compliance with this HSE Management System Bridging Document	Commitments Register	>90%
Risk Register Review	Commitments Register	100%
Corrective actions closed out by due date	Due date	90%
All HSE meetings held as per the schedule	Pre-Tour/Pre-Job Safety Meeting reports - Planned/Actual	90%
Stop Work Authority is communicated to all personnel working at Site	Inductions	100%
1 x Workplace Daily Inspection	Planned/Actual	100%
1 x Project Emergency Response Drill (desktop comms exercise)	Planned/Actual	100%
Lag Indicators		
Fatalities		0
Lost Time Injuries	LTI	0
Total Recordable Injuries	TRI	0
Random or For-Cause BAC testing on Site	BAC Test Report	100% 0 results

3.3.4 Organisation and Responsibilities

3.3.4.1 Organisation

The organisation structure for the Wellsite, including office-based support and the reporting relationships between the parties during the Activity, is defined in the below Project Operations HSE Organisation Chart provided in **Figure 6** below.



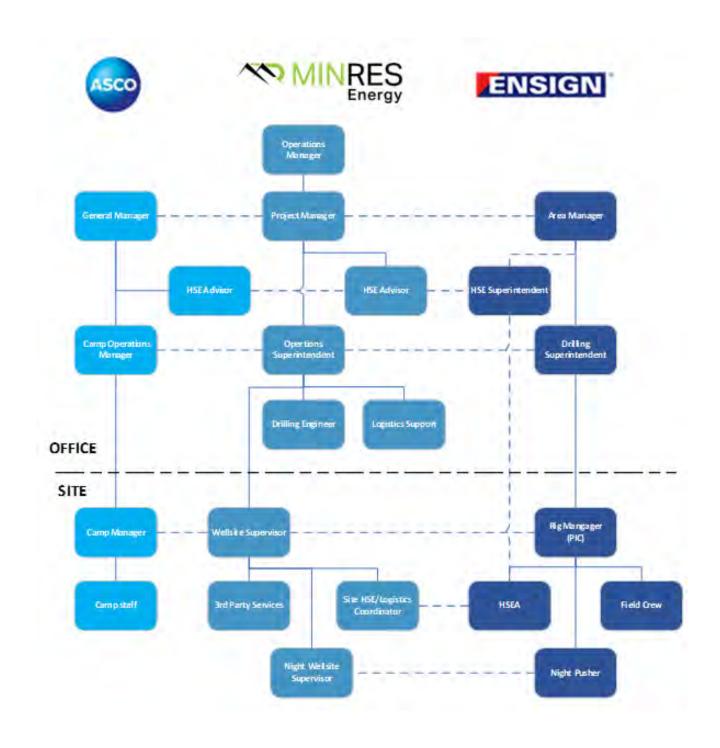


Figure 6. Project Operations HSE Organisation Chart



3.3.4.2 Responsibilities

Oversight and accountability to DMIRS for the Activity will be the responsibility of MinRes Energy with Site specific responsibility assigned as follows:

Well Site - On handover of the Well Site from MinRes Energy to Ensign:

- Ensign, as the Nominated Operator and Lead Contractor, will assume operational control of the Well Site which will be managed under the Safety Case
- The Rig Manager assumes the role of PIC as Operator's Representative at the Well Site
- The MinRes Energy WSS will direct and give guidance to the Ensign Rig Manager as to the objectives of the WMP but primary responsibility for drilling operations and well control remains with Ensign
- Site-based emergency response will be as per the Ensign Emergency Response Plan (ERP) with the Rig Manager filling the role of On Scene Commander, except where that role is assumed by emergency services or police (see Section 5 Emergency Response).

Camp Site:

- ASCO, as the Lead Contractor, has operational control of the Camp Site which will be managed under the ASCO HSEMS unless otherwise identified in this HSEMS-BD
- The Camp Manager assumes the role of PIC at the Camp Site
- Site-based emergency response will be as per the ASCO ERP with the Camp Manager filling the role of On Scene Commander, except where that role is assumed by emergency services or police.

Specific HSE responsibilities for the Activity are allocated to each role as described in Table 3 below.

Table 3. HSE Roles and Responsibilities

Position	Responsibilities			
	 Ensure appropriate HSE management systems are in place to meet regulatory requirements and MinRes Energy standards. 			
MinRes Energy Project Manager	 Complete a hazard identification and risk assessment of the Activity with key Project, Lead Contractor and Third Party Contractor (TPC) personnel 			
	Ensure all actions identified to reduce risks to SFAIRP are implemented.			
	 Ensure the required regulatory approvals for HSE management are obtained prior to commencement of the Activity. 			
	 Ensure adequate resources are available to manage the work in accordance with the SMS and this HSEMS-BD 			



Position	Responsibilities
MinRes Energy Operations Superintendent	 Ensure this HSEMS-BD is effectively implemented for the Activity Supervisory responsibility for the drilling operation and all MinRes Energy personnel on Site Conduct a pre-spud meeting at the Site to reinforce the MinRes Energy HSE and operational objectives for the Activity with the Rig crew and other third-party contractor personnel involved in the Activity Monitor and assess HSE performance throughout the Activity Ensure that appropriate communications are in place between MinRes Energy and other local stakeholders, and to keep them informed of Project issues and developments that may affect their activities.
MINRES Energy MinRes Energy WSS	 Continuously monitor effective implementation of all aspects of the Project HSE management plans and this HSEMS-BD ensuring they are consistent with the agreed operational standards throughout the Activity Ensure site inductions are provided to all MinRes Energy service providers prior to the performance of any Site work Maintain interface and communication links between Site and office-based MinRes Energy management and personnel Provide daily reports and updates on the Activity HSE performance Ensure environmental procedures specific to this Activity are adhered to by all personnel entering the Sites Support effective management of any incidents at the Sites and ensure all incidents are reported to MinRes Energy management in Perth at the soonest reasonable opportunity
MINRES Energy MinRes Energy Site HSEL Coordinator	 Support the WSS to ensure correct implementation of the HSEMS-BD Monitor and support the effective implementation of Safety Case and processes relevant to all Activity being undertaken at the Site Routinely inspect the Sites to ensure that appropriate corrective actions relating to statutory or management system non-compliance and/or substandard work practices, are implemented Provide guidance to all personnel on Site with a focus to achieving the HSE objectives of the Project



Position	Responsibilities
ENSIGN Ensign Rig Manager	 Operator's Representative under the Safety Case - PIC at the Well Site for the drilling and completion Activity including during emergencies. Ensure all relevant aspects of the Safety Case are implemented at the Well Site Ensure an Ensign Well Site induction is provided to all personnel working at the Well Site prior to commencing work Ensure safe execution of the Project Activity in accordance with SOPs and the works program Ensure all legislative regulatory and other standards, including environmental standards and procedures, specific to the Activity are adhered to by all personnel and sub-contractors entering the Well Site Provide daily reports and updates to MinRes Energy in accordance with reporting
ENSIGN Ensign Site HSE Advisor (HSEA)	 Co-ordinate Ensign's HSE initiatives at the Well Site Provide regular reports to the HSE&T Superintendent on safety performance, incidents, and other HSE issues Provide HSE advice and guidance to Site based personnel Conduct Site inspections and prepare inspection reports Conduct and record regular emergency drills as per schedule Monitor and report on Ensign's compliance with relevant legislative requirements Advise and assist supervisors in the investigation of any workplace injuries, illnesses or dangerous occurrences Review incident reports and follow up actions arising from these reports.
	 Provide input and advice on HSE considerations in relation to the MOC process Identify and recommend HSE training and development activities and promotions. Conduct Well Site inductions and specific safety awareness training. Effectively assist Ensign Human Resources Group in managing injuries and rehabilitation programmes to ensure early recovery and return to work. Maintain HSE records and statistics. Liaise with the MinRes Energy WSS (as directed by the Rig Manager) on all relevant HSE issues.
MINRES Energy MinRes Energy Project HSE Advisor	 Develop and maintain this HSEMSBD and supporting MinRes Energy systems Facilitate the risk management process including HAZID workshops and MOCs Develop and maintain the compliance register



Position	Responsibilities			
	 Provide HSE support to the Project Manager and Project team members Provide support for incident investigations as required 			
ASCO Camp Manager	 Ensure all aspects of the ASCO HSEMS are implemented at the Main Camp Manage the day-to-day maintenance and operations of the Camp Provide a Camp induction to all personnel being accommodated at the Camp on their first arrival Manage safe operations of ASCO employees during the Activity Act as On Scene Commander for Camp emergencies 			

3.3.5 Employee Involvement and Communications

3.3.5.1 General

The Project team will seek the involvement of Project personnel in the development and evolution of the HSE management for an Activity through the identification and control of HSE aspects of the Site. Employee involvement is recognised as an opportunity to contribute to the continuous improvement of the HSE management of the Activity.

Suitable on-site communications for normal operations and emergency response will be provided, consisting of:

- Voice communications between Site personnel, the Well Site, the Camp Site and the MinRes Energy Perth Project offices by mobile phone.
- Data communications between Site personnel, the Well Site, the Camp Site and the MinRes Energy Perth Project offices by Telstra 3G or 4G network.
- Office-based MinRes Energy and Lead Contractor personnel involved in day-to-day operational support and emergency response management will be equipped with mobile phones to facilitate after-hours communication.
- Alternative communications will be via UHF radios and satellite phone.

3.3.5.2 Project HSE Communications

In addition to the communication described in the Safety Case, key Project meetings will be held as described in **Table 4** below



Table 4. Key Project HSE Meetings

Description	Frequency	Responsible	Attendees	Estimated Duration
Project HAZID Workshop	Prior to commencement of the Activity	MinRes Energy	MinRes Energy, Ensign Service Providers	½ Day
Project Introduction / DWOP	Prior to commencement of the Activity	MinRes Energy	MinRes Energy, Ensign Service Providers	¾ Day
Site Pre-spud Meeting	Prior to commencement of drilling operations	MinRes Energy	Site Personnel	2 hours

3.3.5.3 Consultation

In accordance with MinRes Energy and Ensign policies and WA legislation, MinRes Energy and Ensign will consult with their employees and contractors regarding health and safety matters.

The Project will support and collaborate with Site Safety and Health Representatives (where elected) and Safety and Health committees (where established).

Reference:

- MinRes Energy Communication HSEQ 1.07
- Ensign EN-AUS-HSE-P-5.02 Consultation, Meetings and Communications

3.3.6 Training and Competency

MinRes Energy and Ensign have the responsibility to ensure their respective management, supervisors, employees and contractors have the necessary skills and knowledge to advise and enforce compliance of the Site HSE system requirements. To meet this requirement:

- Personnel working on Site will be appropriately trained relevant to the scope of work in which they are engaged.
- No person is to execute work, which requires a permit, license and/or certificate unless that
 person has received relevant training and possesses the relevant authorised permit, license
 and/or certificate.

Well control competencies are described in Table 5.

Copies of certificates will be provided to MinRes Energy.



Table 5. Minimum Well Control Certification Requirements

Position	Company	Certificate
Operations Superintendent	MinRes Energy	WellCap or IWCF - Supervisor level
Wellsite Supervisor	MinRes Energy	WellCap or IWCF - Supervisor level
Drilling Superintendent	Ensign	WellCap or IWCF - Supervisor level
Rig Manager	Ensign	WellCap or IWCF - Supervisor level
Night Tool Pusher	Ensign	WellCap or IWCF - Supervisor level
Driller	Ensign	WellCap or IWCF - Driller level
Assistant Driller	Ensign	WellCap or IWCF - Driller level

References:

- Ensign EN-AUS-Pol 022 Training and Development
- Ensign EN-AUS-HSE-P-3.01 Training and Development
- National Training Package RII Drilling Onshore
- Ensign Rig 970 Training Standard Matrix

3.3.7 Project Inductions

As well as the Rig's site induction, all personnel will complete a Project induction covering:

- Project summary
- HSE policies
- HSE expectations
- Stop work authority
- Project HSE management
- Risk assessment, risk management and MAEs
- COVID-19 management (as appropriate)
- Journey management
- Environment Plan
- Oil Spill Contingency Plan
- Emergency Response

3.3.8 Site Inductions

Ensign will provide a Site-specific induction for all personnel before commencing work at the Well Site.

ASCO will provide a Site-specific induction for all personnel before being accommodated at the Camp Site.



3.4 Visitors

Visitors to Site require the written approval of the Operations Superintendent and must report to the Rig Manager on arrival at the Site.

Visitors to the Well Site will, as a minimum, receive a Well Site visitor's induction prior to being able to move around the Site away from the Rig Manager's office area. All visitors who have only received the Site visitor's induction must always be accompanied by a fully inducted person while on the Site.

Day visitors to the Camp Site who have not received the Camp Site induction must always be accompanied by a fully inducted person while on the Site.

Transportation providers will be considered as visitors to the Sites.

3.4.1 Access to the Well Site and Site Security

Unauthorised access will be managed under the Ensign ERP. Where trespassers refuse to leave the Site, local police will be called to manage.

3.5 Planning and Implementation

3.5.1 Hazard Identification and Risk Management

The MinRes Energy Risk Management Standard (EOC-SAF-STD-0002) applies to:

- Project execution risk (high level)
- Environmental risk assessment
- Well design and integrity
- Project specific health, safety and system interface risk.

The Ensign *Risk Management Procedure* (EN-AUS-HSE-P-4.1) applies to the existing Ensign hazard register and the management of ongoing drilling rig operational risk.

Both systems apply the hierarchy of controls when assessing control effectiveness and identifying additional controls to reduce residual risk – refer to **Figure 7** below.

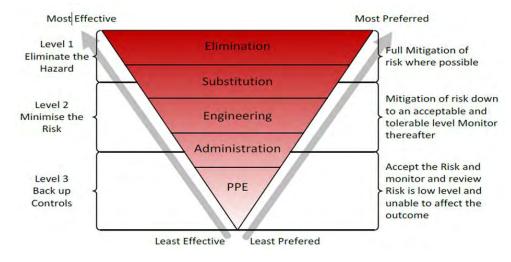


Figure 7. MinRes Energy Hierarchy of Controls



References:

- Ensign EN-AUS-POL-002 Risk Management
- Ensign EN-AUS-HSE-P 4.1 Risk Management Procedure
- Ensign EN-AUS-HSE-P-4.14 Process Safety and Asset Integrity Procedure
- Ensign Rig 970 Risk Register
- MRL MRL-SAF-PRO-0014 Hazard and Risk Management Procedure
- MinRes Energy EOC-SAF-STD-0002 Risk Management Standard
- MinRes Energy Project Risk Register

3.5.2 Document and Records Management

Regulatory required documentation generated specific to the Project by the MinRes Energy Project Team will be managed through the MinRes Energy Project document control process.

The Project Manager is responsible for ensuring Project documentation is effectively controlled through the document control process.

As per WHS(PAGEO)R r.31 and r.50:

- A copy of the accepted HSEMS-BD along with the associated HSEMS documents must be kept for a period of 5 years after the date of acceptance.
- A copy of any written audit report of this HSEMS-BD must be kept for a period of 5 years.

During the Activity, MinRes Energy and Lead Contractors will maintain records relating to the ongoing operational and HSE performance for the Activity and make these available for audit and reviews as required.

References:

- MinRes MRL-SAF-STD-0009 Document Control and Records Management
- Ensign EN-AUS-HSE-P-3.8 HSE Document Control
- Ensign EN-AUS-HSE-P-3.9 Document Retention and Records Management

3.5.3 Design and Construction

Design of the Wells is managed by MinRes Energy as documented in the DMIRS approved WMPs and in accordance with Project and industry standards. Key stakeholders are invited to attend a workshop at which the Well design and implementation plan is reviewed prior to commencement of Well operations.

Ensign is responsible for review of the WMP to ensure the plan is complaint with Ensign's operating standards and subsequent construction of the Well as designed with implementation oversight by MinRes Energy.

3.5.4 Handover

MinRes Energy will hand management control of the Well Site over to Ensign prior to the start of the Activity. Site handover is via formal acknowledgement by both parties using a signed MinRes *Site Handover Form.*



Following completion of the Activity, the Site will be formally handed back to MinRes Energy and the MinRes Energy SMS re-instated as the in-force SMS at the Site.

References:

MinRes Energy MERL-SAF-FRM-008 Site Handover Form

3.5.5 Management of Change

A change management process is required where a significant variation to any approved plan, procedure or practice, a change to HSE critical equipment, or a change to a HSE critical position is proposed that has the potential to impact the management of HSE, quality or technical requirements for the Activity.

Changes to the approved WMP, key contractors or temporary changes to a commitment made under a permissioning document, will be managed under the MinRes Energy *Management of Change (MOC) Standard.*

All significant modifications or changes to the rig equipment or its standard operating procedures will be carried out in accordance with the Ensign MOC procedure.

All significant modifications or changes to the Camp equipment or its standard operating procedures will be carried out in accordance with the ASCO MOC procedure.

References:

- MinRes Energy ECO-SFA-STA-0001 Management of Change Standard
- Ensign EN-AUS-HSE-P-5.06 Management of Change Procedure
- ASCO HSEQP033 Management of Change Procedure

3.5.6 Contractor Management

MinRes Energy and Ensign are each responsible for managing their contractors, including subcontractors, in a way that does not cause injury to people, damage to plant and equipment or the environment and that ensures no other detrimental impact on the Activity.

Contractors are accountable for:

- Promoting, demonstrating and building commitment to manage risks to SFAIRP
- Demonstrating personal leadership and commitment by visiting work sites regularly and engaging with all contractor personnel
- Complying with all Site HSE requirements
- Preparing and submitting to the contracting party specific HSE management documentation required for the completion of the Project Activity prior to working on Site
- Meeting with the Rig Manager and WSS before starting work on Site to confirm HSE requirements
- Ensuring all contractor provided plant and equipment used on or in connection with the Activity is fit for purpose, meets Site-specific standards and holds all required compliance/maintenance records for such plant and equipment



- Ensuring all works under the Activity are completed in a safe manner
- Supporting, attending and contributing to any incident analysis.

References:

- Ensign EN-AUS-HSE-P-4.6 Subcontractor Management
- Ensign Third Party Contractor Checklist

3.5.7 Journey Management

All travel to and from Site by light vehicle greater than 2 hours will be covered by the driver's organisation's journey management procedures. Where there is no journey management procedure covering TPC personnel travel to Site, the MinRes Energy Project Journey management process will be used.

References:

- MinRes MRL-SAF-PRO-0035 Journey Management Procedure
- Ensign EN-AUS-HSE-P-4.05 Transport Management, Land and Air Procedures
- ASCO FRM-AUS-HSEQ-10 Journey Management Plan

3.5.8 COVID-19 Management

COVID-19 controls for the Activity will be maintained in compliance with the latest Australian Department of Health, Western Australian Department of Health and Western Australian Government regulations and restrictions in force.

A COVID-19 Management Plan may be developed to ensure the Activity is conducted in a manner to minimise the risk of spread of the virus among the work force and within the general community.

References:

MinRes MRL-SAF-PRO-0092 Infectious Diseases Management Procedure

3.5.9 Standard Operating Procedures

Ensign Standard Operating Procedures (SOPs) apply on the Well Site and other operations under Ensign management to support the implementation of Ensign Corporate, Vision, HSE Policy, Global HSE Standards and Procedures. Applicable SOPs are listed in the Safety Case.

3.5.10 Permit to Work

Ensign will use the Wellsite Permit to Work Rev 3 on the Well Site.

The Rig Manager / Tour Pusher is the Wellsite Permit Authority for all permits.

The WSS will review and sign permits raised at the Well Site during the Activity.

Ensign is responsible for ensuring the training and competency of all personnel, including contractors, using the Permit to Work system at the Well Site throughout the Activity.



References:

- Ensign EN-AUS-HSE-P-5.03 Permit to Work
- WPTW Rev3 Handbook

3.5.11 Confined Space Entry

Confined spaces, such as mud tanks and cellars (the cellar becomes a confined space after drilling has commenced when there is a potential for a hazardous atmosphere to be present) will be managed in accordance with the *Ensign Confined and Restricted Space Procedure*.

References:

- Ensign EN-AUS-HSE-P-4.09 Confined and Restricted Spaces
- Ensign EN-AUS-HSE-P-5.03 Permit to Work procedure
- WPTW Rev3 Handbook

3.5.12 Job Safety Analysis

Ensign has a Job Safety Analysis (JSA) process that will be used for:

- Jobs that have a history of or a potential for injury or harm to personnel
- New jobs or new equipment
- Jobs where new personnel are performing the task or the job is unfamiliar

TPCs, when required and specific to their equipment or task, may use their own JSA process.

Reference:

Ensign EN-AUS-HSE-P-5.20 Job Safety Analysis

3.5.13 Radioactive Sources

Radioactive sources on Site are managed under the providing TPC's radiation safety plan.

Reference:

Ensign EN-AUS-HSE-P-5.18 Radiation Procedure

3.5.14 Explosives

Explosives will only be handled at the Well Site by the suitably trained and licensed TPC personnel. The TPC will maintain a list of explosives on Site and ensure that the correct storage and transportation procedures are applied.

Reference:

Ensign H-06.001 Explosives

3.5.15 Well Control

Well control and BOP testing will be managed as specified in the Ensign Well Control Manual and the relevant Well Management Plan. Ensign's W006 Well Control Standards will be implemented in the event of a well control situation.



References:

- Ensign EN-AUS-HSE-P-4.14 Process Safety and Asset Integrity Procedure
- Ensign W006 Well Control Standards
- MinRes Energy-DR-PL-07-1 Well Management Plan for the Well

3.5.16 Management of Waste Fuel, Lubricants and Hazardous Substances

MinRes Energy is responsible for the provision of waste management services on Site.

Management of waste, fuel, lubricants and hazardous chemicals are described in the W-EP.

The MinRes Energy WSS, in consultation with the Ensign Rig Manager, will be responsible for monitoring the storage and disposal of waste, ensuring it is in accordance with local shire, legislative and W-EP requirements.

Ensign is responsible for the implementation of the hydrocarbon spill practices described in the *North Perth Basin Well Operations* (OSCP EOC-EN-PLN-0005) at the Site should a significant spill occur.

References:

- The relevant Well Environment Plan
- MinRes Energy EOC-EN-PLN-0005 North Perth Basin Well Operations OSCP
- Ensign EN-AUS-HSE-P-4.11 Waste Management

3.5.17 Traffic Management

No unauthorised vehicles are permitted at the Well Site. All vehicles on Site will drive to the Site speed limit and observe all traffic controls imposed at the Site.

A designated parking area will be allocated at the Well Site where vehicles can park on arrival.

There are two designated truck loading and unloading areas identified at the Well Site. Loading, unloading exclusion zone principles will be applied the ensure the separation of people and vehicles.

Reference:

Ensign EN-AUS-HSE-P-4.5 Land Transport Management

3.5.18 Materials Handling and Storage

3.5.18.1 Mobile Plant

Forklift trucks and front-end loaders must only be driven by trained and competent licensed drivers.

The Site has two designated truck unloading/loading areas with off-side general exclusion zone. Other exclusion zones will be established and communicated as required.

Seat belts must always be worn while operating mobile plant fitted with a roll-over protection system.

Reference:

- Ensign EN-AUS-HSE-P-4.05 Transport Management, Land and Air Procedures
- Ensign EN-AUS-HSE-P-5.12 Exclusion Zones & Temporary Barricading



3.5.18.2 Hazardous Substances

Ensign will maintain a register of all hazardous materials and dangerous goods stored at the Well Site along with a complete compilation of Safety Data Sheets (SDSs) for each of these materials.

TPCs are required to complete the Third-Party Contractor Checklist, provide SDSs and submit to Ensign prior to mobilising hazardous substances to Site.

All hazardous materials on Site will be appropriately stored in compliance with its classification, SDS, applicable codes and regulations, and the W-EP.

References:

- Ensign EN-AUS-HSE-P-4.4 Dangerous Goods Management
- Ensign EN-AU-HSE-P-5.13 Hazardous Substances
- Ensign EN-AU-HSE-P-4.6 Sub-contractor Management

3.5.19 Lifting Operations

It is the responsibility of all personnel to ensure they, and all others working on the Site, use lifting equipment which is:

- Certified and approved in accordance with applicable regulations and Australian standards
- Suitable for the task
- In a safe condition

Ensign uses a tagging system on all lifting equipment including the lifting equipment of TPCs.

Lifting equipment is inspected by a competent person and tags are updated following inspection in accordance with the lifting/sling register.

If the equipment date is found to have expired or the equipment is damaged, it is withdrawn from service and reported to the Ensign Rig Manager and HSEA.

Personnel operating lifting equipment must be trained and competent in the use of the specific equipment item and in the case of crane operations, be assessed and hold the appropriate high-risk work licence for the class of equipment being used.

Where a crane may be required for TPC equipment lifts a competent third-party crane operator will be engaged.

References:

- Ensign EN-AUS-HSE-P-5.3 Permit to Work
- Ensign EN-AUS-HSE-P-5.5 Sling and Lifting Equipment
- Ensign EN-AUS-HSE-P-12 Exclusion Zones and Barricading
- Ensign EN-AU-HSE-P-4.6 Sub-contractor Management



3.5.20 Workplace Environment

3.5.20.1 Atmospheric Contaminants

Atmospheric contaminants will be managed on Site to comply with the requirements of Code of Practice – Managing risks of hazardous chemicals in the workplace 2008. Exposure standards will be determined from the Hazardous Chemicals Information System (HCIS) database.

Management of atmospheric contaminants at the Well Site will include:

- Gas detectors will be strategically placed in high-risk areas to detect gas emissions in the atmosphere and to alert of any hazards
- Dust suppression as required
- Equipment and plant which may cause particulates and emissions will be maintained in line with Ensign's maintenance systems to minimise contamination potential
- Specific respiratory PPE will be required for tasks that may involve personnel exposure to atmospheric contaminants and will be determined by SDS, JHA and SOP requirements.

Reference:

• Ensign EN-AUS-HSE-P-5.7 Health & Medical Management Procedure

3.5.20.2 Housekeeping

Ensign is responsible for maintaining housekeeping to a high standard at the Well Site. This includes:

- Rubbish and waste receptacles are in place and used
- Food waste will be disposed of appropriately so as not to attract rats, mice, snakes, insects, birds and other animals
- Access ways always kept clear of obstructions
- Leads/hoses are rolled up and stored when not in use
- Hazardous materials are stored appropriately
- Floors are maintained free from any build-up of dirt, grease etc
- Unserviceable/derelict equipment is removed to an appropriate quarantine storage area

MinRes Energy is responsible for the provision of bulk waste bins at the Well Site, waste collection and disposal, and will ensure:

- Bins will be available for the segregation of waste
- Bins will have suitable lids or covers to prevent rubbish from being blown out-and prevent wildlife entering

Reference:

Ensign EN-AUS-HSE-P-4.11 Waste Management Procedure

3.5.20.3 Lighting and Ventilation

Ensign is responsible for maintaining suitable lighting and ventilation at the Well Site. All internal work areas will be appropriately lit and air-conditioned.



Lighting for night operations will be maintained to provide adequate visibility in all work and common pedestrian areas at the Well Site.

Reference:

Ensign EN-AUS-HSE-P-5.7 Health & Medical Management Procedure

3.5.20.4 Noise and Vibration

Ensign will manage personnel exposure to noise, limiting exposure to 85 dB(A) averaged over an eight-hour period, 82 dB(A) over 12 hours or a peak noise level of 140 dB(C).

Where these values are exceeded, Ensign is responsible for taking all practicable measures to reduce the noise level by engineering noise control.

Ensign will report to MinRes Energy any concerns regarding any MinRes Energy contractor equipment that requires additional noise management measures to be implemented to reduce personnel exposure to excessive noise levels.

MinRes Energy will be responsible for addressing the issue with the MinRes Energy contractor and monitoring implementation of suitable controls.

Reference:

- Ensign EN-AUS-HSE-P-5.12 Noise Pollution and Hearing Conservation
- MinRes MRL-SAF-PRO-0096 Exposure Risk Management Governance

3.5.20.5 PPE

The minimum mandatory PPE for the Site is:

- Hard hat
- Reflective non-static coveralls or long-sleeved shirt and trousers
- Safety Glasses
- Gloves as appropriate to the task being performed
- Lace up steel capped safety boots (min 150mm high)
- Hearing protection for where signs indicate hearing protection is required
- Specific PPE where appropriate to the task being performed.

The WSS and the Rig Manager are responsible for ensuring their respective personnel, contractors and visitors either supply or are supplied with all PPE required for the protection of personnel at the Site for the task being undertaken.

References:

- Ensign EN-AUS-POL 017 Personal Protective Equipment Policy
- Ensign EN-AUS-HSE-P-4.02 Personal Protective Equipment Procedure



3.5.20.6 Working in Hot Climates

Ensign conducts in-house training to all crew members for the management of heat stress and heat stress awareness will be incorporated into the Well Site induction programs when appropriate.

References:

- Ensign EN-AUS-Pol 006 Hours of Operation Policy
- Ensign EN-AUS-Pol 012 Exposure to Ultraviolet Radiation Policy
- Ensign EN-AUS-HSE-P-5.16 Heat Stress Management

3.5.21 Fitness for Work

3.5.21.1 Medical Fitness

All personnel must report to work medically fit to safely conduct their work. Where personnel have an illness or are taking prescription or over the counter medications that may impair performance, they must notify their supervisor.

Personnel are notified of the requirement to report the taking of prescription medication which may impair work performance to their supervisor on arrival at site through both the MinRes Energy Project induction and Ensign Site induction.

Reference:

Ensign EN-AUS-HSE-P-5.7 Health & Medical Management Procedure

3.5.21.2 EpiPens

Individuals who are required to carry an EpiPen must notify their supervisor and the Ensign HSEA of their specific sensitivities and location of their EpiPen(s). It is considered prudent to bring additional EpiPens to Site. This requirement is communicated in the Project induction.

3.5.21.3 Fatigue

The Ensign Rig Manager, WSS, Site HSEL Coordinator and all senior contractor personnel on Site are responsible for monitoring their own and their subordinates work hours to ensure work hours are maintained within those specified in the respective companies OH&S requirements and in compliance with the below guideline.

To minimise the effects of fatigue the following minimum standards will apply during the Project:

- Site based personnel usually work a 12-hour shift. In exceptional circumstances, personnel
 may be asked to work in excess of 12 hours but not for more than 3 consecutive days
- Work in excess of 14 hours requires the approval of the PIC
- The absolute maximum hours that can be worked is 16 hours in a 24-hour period
- A least 8 hours of rest must be provided between shifts
- A continuous work period on Site should not exceed 28 days without a minimum of 7 continuous days of rest away from the Site.



References:

- Ensign EN-AUS-HSE-P-4.10 Fatigue Management
- Ensign EN-AUS-POL-006 Hours of Operation

3.5.21.4 Drugs and Alcohol

There is a zero tolerance for alcohol and illicit drugs on Site. Personnel taking prescription medication that may affect their ability to undertake works or drive vehicles during the Project will be required to declare these to their supervisor as part of their Fitness for Work and managed accordingly.

MinRes Energy and the Lead Contractors reserve the right to conduct drug and alcohol testing at random or for cause.

All Ensign personnel will undergo a daily pre-start alcohol breath test with a required blood alcohol content (BAC) of 0.00%.

References:

- MinRes Energy EOC-STA-STD-0004 Drug and Alcohol Management Standard
- Ensign EN-AUS-POL-011 Fitness for Work Alcohol & Other Drugs Policy
- Ensign Fitness for Work Questionnaire

3.5.22 General Health and Wellbeing

It is important that a healthy workplace is maintained, and this will be communicated through inductions and safety meetings. This includes providing nutritious food options, making sure the workforce remains well hydrated and understands the dangers of heat stress, ensuring there are appropriate rest and recreation facilities, and controlling health hazards so that the risk is SFAIRP.

Psychosocial hazards will be identified as part of the risk management process and controls put in place for the Project, including:

- Pre-employment drug and alcohol screening
- Fatigue management
- Code of Conduct / Respectful behaviours (Harassment and bullying policy)
- Pre-tour meetings discuss workload
- Safety committee (when in place)
- Safety meetings
- Employee Assistance Program

These will be communicated through inductions, training and health and well-being programs throughout the Project. Project personnel will be encouraged to check-in on their mates and make proactive use of Employee Assistance Programs.

References:

- Ensign EN-AUS-POL-025 Mental Health & Wellbeing Policy
- Ensign Global-003 Harassment, Discrimination and Bullying Policy
- Ensign EN-AUS-HSE-P-1.01 Mental Health & Wellbeing
- Ensign EN-AUS-HSE-P-5.7 Health & Medical Management Procedure



3.5.23 First Aid Facilities and Access to Medical Services

First aid kits at the Well site are in the Rig Managers office, the doghouse and the lunchroom, as well as all Ensign vehicles.

Rig 970 has four eye wash stations and two safety showers.

In addition to standard occupational first aid equipment there are two automated external defibrillators and three snake bite kits available at the Well Site.

The Well Site HSEAs hold St Johns Occupational First Aid certificates.

Medical facility details can be found in the Emergency Response Contact List.

Reference:

- Ensign EN-AUS-HSE-P-5.7 Health & Medical Management Procedure
- Ensign Emergency Response Contact List

3.6 Monitoring and Evaluation

3.6.1 Workplace and Site Inspections

Rig safety inspections will be conducted as described in the Safety Case.

Ensign HSEAs will conduct regular safety inspections as per Project Audit and Inspection schedule.

MinRes Energy will conduct rolling audits of both the Well Site and Camp Site against the requirements in this HSEMS-BD, commensurate with the Project duration.

Reference:

Ensign EN-AUS-HSE-P-6.01 Monitoring, Measuring and Reporting

3.6.2 Integrity Management

All periodic inspections, certification of critical equipment and HSE audit / inspection schedules will be managed through Ensign's preventative maintenance system and will be in accordance with the appropriate standards.

All well control equipment tests are recorded on the IADC Daily Drilling Report.

An inspection and review of Rig 970 equipment and processes was undertaken by an independent rig inspection company in accordance with reg 21(2)(e) of the PAGER(MOS)R prior to the commencement of the Strike Energy 2020 / 2021 Project in the north Perth Basin and again in July of 2021 by MinRes Energy immediately prior to the commencement of drilling the Lockyer Deep-1 well.

All corrective actions resulting from the inspection were closed out to the reasonable satisfaction of MinRes Energy.

A new 3rd party inspection may be conducted on the drilling rig prior to commencement of the drilling operations on the Wells. Verification of any critical and major corrective action closeouts will be reviewed prior to spud of the Wells. The WSS, in conjunction with the Rig Manager, will conduct a pre-spud inspection using the Ensign checklist.



References:

- Ensign EN-AUS-HSE-P-6.01 Monitoring, Measuring and Reporting
- Ensign EN-AUS-HSE-P-4.14 Process Safety and Asset Integrity Procedure

3.7 Incident and Hazard Reporting and Investigation

3.7.1 Reporting

All incidents, including near misses, must be reported to the Well Site PIC and the MinRes Energy WSS in accordance with **Table** *6*.

Note that notification and investigation consider the potential consequences of the incident, that is, the worst credible consequences in slightly different circumstances.

Table 6. Incident Notification Matrix

Consequences		Notification	
Actual	Potential		
Minor	Low	Rig Manager advises WSS verbally as soon as practical and before end of shift. Recorded on DDR and HSE Scorecard	
Low	Medium	Rig Manager notifies WSS verbally as soon as practical (within 2 hours) WSS notifies Operations Superintendent verbally as soon as practical (within 2 hours) Incident Report Form to be provide as soon as practical (within 4 hours)	
Medium	High (HiPo)	Rig Manager notifies WSS immediately WSS notifies Operations Superintendent/Project Manager immediately Project Manager notifies DMIRS as required Activate emergency response as required – See ERIP	
High/ Extreme	Extreme	For fatality PIC notify police immediately WSS notifies Operations Superintendent/ Project Manager immediately Project Manager notifies DMIRS Activate emergency response	

Note: incidents of medium actual consequences and some safety related incidents of medium potential may be reportable to DMIRS

References:

- Ensign EN-AUS-HSE-P-6.02 Incident Reporting and Investigation
- Ensign MS15-PRO1.1 Incident Response, Notification, Reporting, Classification and Claims Procedure

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Ensign EN-AUS-HSE-P-4.14 Process Safety and Asset Integrity Procedure

3.7.2 Investigation

The level of the investigation and investigation team make-up will be determined by the potential consequences of the incident in **Table 7** below.

Table 7. Investigation Levels

Incident	Ir	nvestigation	Requirements
Potential	Level	Method	
Minor	-	Report only	Not routinely investigated but may be, at Ensign or MinRes Energy management discretion, where it has been determined the value of the learnings outweighs the cost
	1	5 Whys	Conducted by Ensign
Low / Medium	2	TapRoot	Led by Ensign but may have MinRes Energy input / participation
High / Major	3	TapRoot	Led by Ensign with active participation of MinRes Energy Must have trained and experienced investigation facilitator Team members should be independent with no direct supervisory relationship with key people involved Should include a team member with an understanding of human and organisational factors MinRes Energy may conduct independent investigation

References:

- Ensign EN-AUS-HSE-P-6.02 Incident Reporting and Investigation
- Ensign EN-AUS-HSE-P-6.03 Incident Investigation
- Ensign EN-AUS-HSE-P-4.14 Process Safety and Asset Integrity Procedure
- Ensign EN-AUS-HSE-P-6.04 Incident Review Boards
- MinRes Energy MRL-SAF-PRO-0007 Incident Management Procedure

3.7.3 Recording

Rig 970 uses the Ensign Online Incident Reporting Program (EHS Insight), to capture and manage all incidents that occur on the Well Site. An initial report is entered into the system to advise management immediately by group email that an incident has occurred. Information regarding the actions taken at the time of the incident and further preventative actions can be added along with supporting evidence such as photos and statements.

MinRes Energy will maintain copies of all incident records on the INX-InControl database.



3.7.4 DMIRS Notification

Health and safety incidents (dangerous incidents and occurrences) will be reported to DMIRS by Ensign as described in the Safety Case.

Environmental incidents will be reported by MinRes Energy in accordance with the approved W-EP (Appendix 3).

Well integrity events will be reported by MinRes Energy in accordance with the approved WMP (Appendix 3).

3.8 Safety and Health Information and Reports

Ensign, unless otherwise agreed or requested in writing, will provide copies of the relevant Site related information as scheduled in **Table 8** to MinRes Energy WSS and Operations Superintendent.

Table 8. HSE Reporting

Description	Duration
HSE report, Stop Work & Hazard observation cards	Daily
HSE training records	On request
Serious hazard / incident injury and HSE-related property damage, loss and/or Project interruption investigation reports	See Incident Notification Matrix
Injury statistical information: Numbers of Non-Lost Time Incidents MTIs LTI TRIs TRI Frequency Rate LTI Frequency Rate Hours worked	Monthly
Workplace Inspection Reports / Corrective Actions	Monthly
SDS Register	On request
JSA for each element of operational / maintenance activity	On request
Specific licenses, permits, certifications and/or registrations for the conduct of operational / maintenance activity	On request
Plant and equipment operating manuals, and inspection and maintenance records	On request
Environmental performance statistics	Monthly



4 Audits, Review and Continual Improvements

MinRes Energy and Ensign will undertake active monitoring and review throughout the Project to ensure all HSEMS standards and procedures are in place and effective. These will be conducted as per MinRes Energy and Ensign Audit Schedules. Any non-conformances and opportunities for improvement will be identified and managed under appropriate MinsRes Energy and Ensign HSEMS procedures and systems to ensure effective close-out of identified actions.

A Commitments Register has been developed based on the approved MinRes SMS, this HSEMS-BD, the W-EP, OSCP and the Emergency Response Interface Document. The commitments documented in the Commitments Register will be managed by the MinRes Energy Project HSE Advisor and progressively monitored and closed out during the planning and operational phases of the Project.

Non-conformances and identified preventative and corrective actions and the assigned responsible person are recorded in the CAR. Actions must be Specific, Measurable, Accountable, Reasonable and Timely (SMART) with a target close out date assigned to each item. The MinRes Energy Project HSE Advisor will be responsible for monitoring performance against the CAR.

References:

- Ensign EN-AUS-HSE-P-6.02 Incident Reporting and Investigation
- Ensign EN-AUS-HSE-P-6.03 Incident Investigation

5 Corrective Action Register

The Ensign Online Incident Reporting Program (EHS Insight) will be used to track corrective actions resulting from incident investigations, routine inspections, hazard observations, etc during Well Site Activities.

Corrective actions that impact the broader Project scope or have Company level learnings will be recorded in the Project CAR.

6 Formal Safety Assessment

6.1 FSA Objectives

Safety, health and environmental hazards will be identified, assessed and managed to reduce the risk to personnel and the environment to SFAIRP. This requirement applies to all phases of the Project.

An integral task of risk management is the hazard identification and risk assessment process initiated through several forums during the planning phase and ongoing throughout the Project. This section further describes the process in relation to Project health and safety risks that are associated with the Activity but not covered specifically by the Safety Case. The hazard identification and risk assessment process in relation to the Project environment related hazards is addressed in more detail within the Project W-EP.

6.2 Risk Acceptance Criteria

The risk matrix and risk acceptance criteria are attached as Appendix 4.



6.3 Risk Assessment Review

MinRes Energy, Ensign and ASCO have existing hazard registers which are live documents.

These registers were reviewed by the Project team to assess those risks that relate to the Activity that are not covered either the Safety Case, the MinRes Energy SMS or the ASCO management system, in relation to MAEs.

These MAEs were then subjected to a workshop review by MinRes Energy on 22/01/21.

A subsequent Project HAZID workshop was held on third of June 2021, with members of the MinRes Energy Project team, Ensign personnel including representatives from the rig crew, and key TPC personnel. The focus of the HAZID was to review the previously identified MAEs and controls and identify and assess project specific hazards associated with the Activity, the locations or the general environment that may not be covered in the Ensign and ASCO risk registers.

A Project-specific HAZID Workshop will be held with representatives of the workforce prior to commencing in 2023/24. Actions identified at the HAZID Workshop will be recorded and tracked in the project corrective action register. The CAR will be monitored by MinRes management to ensure all HAZID actions are closed out as agreed during the HAZID.

6.4 Major Accident Events

Table 9 lists three additional MAEs that have been identified for the Activity that are not covered by the Rig 970 Safety Case. Note that, although these MAEs are not petroleum activities, they are assessed as Project related MAEs.

MAE No Description An accident involving a light vehicle (car, ute or 4WD) on public MAE-01 Motor vehicle accident roads or access roads. Assumption is that the vehicle is carrying passengers or the accident involves other road users. A load (equipment and/or freight) is lost on a public road resulting Dropped load during MAE-02 transit causing vehicle in an accident involving other road users. MAE-03 Camp Fire Fire in the Main Camo

Table 9. Major Accident Events

6.5 Demonstration of SFAIRP

The SFAIRP assessment for each MAE was based on good practice (*Risk Related Decision Making Framework* – *OGUK Guidance on Risk Related Decision Making* (**Figure 8**)) according to the following Project context:

- Type of activity
 - Well understood
 - Nothing new or unusual
 - Good practice is well defined



- Risk and uncertainty
 - Risks are well understood
 - o Uncertainty is minimal
- Stakeholder influence
 - No conflict with company values
 - No significant media interest

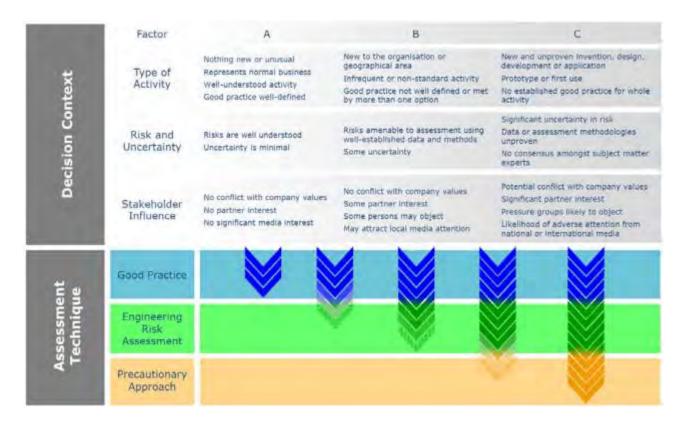


Figure 8. Risk Related Decision Making Framework (OGUK, 2014)

The preliminary SFAIRP assessments are detailed in Appendix 5. This assessment will be further reviewed and updated as required during the HAZID Workshop closer to the commencement of Project operations.

The MAEs are also graphically represented in a series of bowties diagrams (Appendix 6) which demonstrate the relationship between controls and each cause and consequence, the nature and effectiveness of controls, and those that are identified as safety critical.

6.6 Performance Standards

Performance standards for the safety critical controls associated with MAEs are listed in Appendix 7.



7 Environmental Management

Environmental management during the Activity will be in accordance with the approved W-EP which ensures the impact to the receiving environment of the Activity is reduced to SFAIRP.

The W-EP incorporates the following:

- Relevant environmental legislation
- Description of the Activity
- Description of the regional and local existing environments
- Assessment and protection of the receiving environment
- Stakeholder engagement, consultation processes and outcomes including
 - o Native Title and Aboriginal Heritage compliance requirements
 - Land holder agreement
- An environmental impact identification assessment and mitigation measures
- The objectives, standards and criteria for the environmental management of the Activity
- The implementation strategy
- Reporting arrangements (internal and external).

The environmental management practices of Ensign have been reviewed to ensure they complement the general requirements of the MinRes Energy environment management standards to reduce the environmental impacts of the Activity on the receiving environment to SFAIRP.

It is the responsibility of MinRes Energy to ensure the requirements of the appropriate W-EP are suitably incorporated into the Activities and for ensuring all personnel working at or visiting the Sites are aware of the commitments made within.

It is the responsibility of the Lead Contractors to ensure the Site Activities under their respective control are conducted in compliance with the environmental standards and procedures as stated in their HSEMS and additionally to the commitments and procedures as specified in the appropriate W-EP.

8 Emergency Response

8.1 PIC

The Rig Manager, as PIC, will assume the role of on scene commander during an emergency at the Well Site, except where that role is assumed by emergency services or police.

The Camp Manager, as PIC, will assume the role of on scene commander during an emergency at the Camp Site, except where that role is assumed by emergency services or police.

The MinRes Energy WSS is responsible for ensuring an appropriate level of emergency response is being implemented at the Site where the emergency has occurred and to support the Site PIC in providing the most effective response.

8.2 Emergency Response Plan

Site based emergency response is managed under:



- Ensign Rig 970 Emergency Response Plan WA
- Ensign Rig 970 Wellsite Emergency Response Plan
- ASCO Emergency Response Plan (ERP-CMP-HSEQ-01)

An *Emergency Response Interface Plan* (EOC-SAF-PLN-002-APX1) has been prepared by MinRes Energy specific to the Activity. This describes the interfaces between the Lead Contractor's emergency response processes and the *MinRes Energy Emergency Response Plan* (EOC-SAF-PLN-0002).

8.3 Exercises

A desktop emergency response exercise will be conducted annually during the Project. This exercise will test the office-based emergency response teams and the communication interfaces between both MinRes Energy and Ensign and the office and the field.

Any corrective actions arising from the exercise will be entered in the Project CAR.

Well control drills will be routinely conducted during well operations at a frequency determined by crew performance during these drills and other emergency response drill scenarios conducted weekly during well operations.

8.4 Well Control

A Well Control situation may progress through three phases which are described as follows:

Phase I (Alert)

Well has kicked and is being killed using normal well control procedures.

Phase II (Alert)

Well Control may not be achieved due to equipment failure or operational problems. When a Phase II alert is declared, all non-essential personnel are to evacuate the Well Site and assemble at the Designated Muster Station.

All attempts are to be made to control the Well, provided personnel safety is not jeopardised.

Phase III (Emergency)

Uncontrolled blow-out and control of the Well can no longer be regained. The crew, equipment, Well and environment is in imminent danger. Alarm is to be sounded. All personnel are to evacuate the Site and assemble at the Designated Muster Station. All personnel are to be accounted for.

In the case of Phase III emergency MinRes Energy will activate third party well control services.

8.5 Oil Spill Contingency Plan

Ensign is responsible for the implementation of the hydrocarbon spill practices described in the *North Perth Basin Well Operations* (OSCP EOC-EN-PLN-0005) at the Site should a significant spill occur.



Appendix 1 - HSEMS Bridging Table

Element	MinRes Energy	Ensign	ASCO
HSE Policies	Х	Х	Х
Stop Work Authority		X	Χ
Project Objectives and Targets	X		
Training and Competency	X	X	Х
Site Handover	X	X	
Management of Change	X	X	Х
Contractor Management	X	X	Х
Journey Management	X	X	Х
Site Security		X	Х
Site Induction		X	Х
Project Induction	X		
SOPs		X	Х
Incident Investigation	X	X	Х
Environmental Reporting	X		
Health and Safety Reporting		X	Х
Well Integrity Reporting	X		
Site-Based Emergency Response		Χ	Х
Site-Based Well Control		X	
Third-Party Well Control	Х		



Appendix 2 - MinRes Energy and Ensign HSE Policies



Mineral Resources Limited (MRL) strives to incorporate health and safety as a culture, as a value, and as a priority for our employees, contractors, visitors and the communities within which we operate (our Stakeholders).

OUR COMMITMENT

Via our Health and Safety Policy (this Policy) we will:

- Conduct business in a healthy, safe, and sustainable manner in recognition of the fundamental role that Health and Safety plays in enabling and supporting MRL to achieve its Purpose, Vision and Values
- Comply with all applicable legislation, standards, and codes
- Maintain appropriate objectives and targets to continually monitor and improve safety within our business
- Maintain all necessary Safety Standards and Management Systems to assist us in conducting our business safely and effectively
- Regularly review and refine safety policies and procedures and ensure their efficient communication.
- Prevent injury through the early identification and management of hazards and operational risks
- Prevent occupational illnesses through the identification, assessment, and management of risk factors, and monitoring the health status of our workforce
- Finance incidents are promptly managed and seize opportunities for corrective action
- Facilitate health and safety education and targeted training
- Provide and maintain employee awareness of MRL's expectations
- Ensure Stakeholders are treated with dignity, care, and respect
- Recognise the health and safety achievements and outcomes of our Stakeholders
- Ensure this Policy is appropriately communicated to all Stakeholders and is made available to interested parties.

OUR GOALS

Safety is an integral part of how we do business at MRL and, through our commitment to this Policy, MRL aims to protect the health and safety of all our Stakeholders.

OUR RESPONSIBILITY

We shall continue to:

- Prioritise our own individual health and safety and do all things possible to avoid adversely affecting the health and safety of any other person
- Take a proactive approach toward creating a safe and healthy work environment
- Seek continual commitment and development in improving our safety performance
- Ensure resources are made available to achieve our Commitment to this Policy.

This Policy will be reviewed every two years.

Derek Oelofse

Group Financial Controller and Company Secretary

25 January 2022





ENVIRONMENT POLICY

PURPOSE

As a leading Australian mining services, contracting and resource development company, Mineral Resources Limited (MinRes/the Group) is committed to environmental management that maintains our licence to operate in an environmentally responsible and sustainable manner.

SCOPE

This Policy applies to all MinRes Stakeholders, defined for this purpose as employees (including contractors and consultants) and Directors for all entities within the Group.

OUR COMMITMENT

MinRes commits to:

- Develop, implement, and continually improve environmental management systems that enable MinRes to identify and manage environmental risks and opportunities at all stages of our operations
- Measure and continuously improve our environmental performance through setting environmental objectives, performance measures and performance targets
- Minimise the adverse environmental impacts associated with our operations and where possible protect the environment through
 the efficient use of natural resources such as energy and water; reduction of waste; prevention of pollution; minimisation of dust,
 air quality and operational GHG emissions; and the responsible management of land and biodiversity
- · Continually improve practices to manage the safe operation and closure of tailings storage facilities
- Integrate rehabilitation and closure considerations throughout all stages of our activities to transition to closure effectively
- Implement environmental initiatives and encourage the development of environmental technologies that contribute to greater environmental responsibility
- Commit resources to comply with this Policy and to manage and monitor our environmental performance
- Comply with all applicable legislation, standards, compliance obligations and codes of practice
- Understand and consider the expectations of all stakeholders in our operations for diligent environmental management
- Report our Environmental performance to stakeholders in a transparent, timely and regular manner.

OUR GOALS

We will ensure we cause no environmental harm beyond that which is absolutely necessary to conduct our businesses and for which statutory approval has been received.

OUR RESPONSIBILITY

Every employee has a personal responsibility to maintain a high level of environmental awareness and to comply with the principles of this Policy and any associated policies, procedures, or processes.

Leaders at all levels in the group are required to communicate this Policy to all Stakeholders and involve them in its ongoing enforcement

REVIEW OF POLICY

This policy will be reviewed, revised, and re-published where necessary to ensure that it remains relevant and appropriate to MinRes' activities.



Derek Oelofse

Group Financial Controller and Company Secretary

1 July 2022





Health Safety & Environmental Policy

Ensign Australia recognises its responsibilities and is totally committed to the health and safety of its employees and to the protection of the environment. Ensign will conduct its activities to ensure:

- That the risks to the health and safety of all workers are eliminated or minimised so far as is reasonably practicable
- The safe operation and maintenance of all plant and equipment.
- The protection of the environment from pollution and damage.
- The prevention of personal injury and property damage to third parties, arising from the company's operations.

Ensign expects its employees to make every effort to protect their own and fellow workers' health and safety, and to participate in, and contribute to the establishment and observance of safe working practices and procedures. While at their place of work all employees will use the equipment provided to them in a safe and correct manner, obey all practical instructions as issued by their supervisors, and comply with the policies and procedures published and approved by the Company with the aim of protecting the local environment, the health and safety of all individuals at the work site. These instructions, policies and procedures comply with relevant legislation governing workplace health, safety and environmental matters. The Policies are set out in detail in the Ensign Global Risk Management System. Each of these documents is available to all employees.

This Policy and the pursuit of the Company's objectives are based on the conviction and resolute determination to ensure that all activities are carried out in a healthy, safe and environmentally sensitive manner. This Policy and its safety objectives are designed to reduce individual suffering and loss as well as contribute directly to the efficiency and success of the Company's core business of drilling contracting.

Ensign believes that all incidents can be prevented and a safe, healthy, clean and productive working environment can be maintained through leadership, participation, accountability, consistency, communication and training of all employees.

The HSE objectives will be achieved by:

- The promotion of Health, Safety and Environmental Protection as an integral part of the business.
- The promotion of Mental Health and Wellbeing initiatives and programs to all parts of the business
- Establishing annual measurable objectives and targets for continuous improvement that are aimed at the elimination of workplace injuries and illnesses
- Complying with all Legal and Legislative requirements
- Promoting a belief that all incidents are preventable.
- Investigating all work related injuries and high potential near misses.
- By encouraging all employees to participate in discussion about incident prevention.
- Consulting with employees on matters of HSE relative to their work.
- Implementing rehabilitation and claims management processes in respect to all workers suffering a work-related injury or illness.
- Empowering all employees and subcontractors to stop the job if the job is not safe to start or continue.

This policy will be reviewed on a 2 yearly basis or as required to suit any relevant changes in legislation.

Peter Koutsoukos Vice President Australia

EN-AUS-Pol 001 VERSION: 1.0: REVISION 0.5

REVIEWED: APRIL 2021 NEXT REVIEW DATE: Feb 2023 Page 1 of 1



Appendix 3 - Regulatory Reporting Guideline

Well Integrity Incidents

For reporting significant matters relating to well integrity contact the DMIRS Resource and Environment Compliance Incident Line on 0419 960 621 (recorded message) with follow up written reports to petroleum.reports@dmirs.wa.gov.au

Reportable Environmental Incidents

If any answer to Statement 2 is YES, the incident is classified as a *Reportable Environmental Incident*.

Statement 2 – is the incident a:		
Accidental release of hydrocarbons or	☐ Yes	Reportable Incident
hazardous materials in excess of 80L on inland waters	☐ No	
Accidental release of hydrocarbons or	☐ Yes	Reportable Incident
hazardous materials in excess of 500L (eg. Diesel, hydrocarbons / reservoir fluids etc.),	☐ No	
Accidental release of hydrocarbons or	☐ Yes	Reportable Incident
hazardous materials that affect a ground surface area greater than 100m² (eg. Diesel, hydrocarbons / reservoir fluids etc.).	☐ No	
Accidental release of hydrocarbon gas in excess	☐ Yes	Reportable Incident
of 500m ³ ,	☐ No	
Duck fire event equaed by the estivity	☐ Yes	Reportable Incident
Bush-fire event caused by the activity	☐ No	
Any additional incidents specified as reportable	☐ Yes	Reportable Incident
incidents in Project Specific Environment Plans	☐ No	

Reportable Environmental Incident Reporting Requirements

If the incident is classified as a Reportable environmental incident implement the following reporting requirements.



Reporting Requirements	Report to
Verbal or written notification must be undertaken within two hours of the incident or as soon as practicable (written is preferred). This information is required: the incident and all material facts and circumstances known at the time, any actions taken to avoid or mitigate any adverse environmental impacts.	Preferred method: Email: petroleum.environment@dmirs.wa.gov.au Alternative method: Phone: 0419 960 621 DMIRS Submissions Portal
Verbal notifications must be followed by a written report as soon as practicable, and not later than 3 days following the incident. The Environmental & Reportable Incident / Noncompliance Reporting Form should be completed (and can be found here): http://dmirs.wa.gov.au/Documents/Environment/ENV-PEB-189.docx Per the regulations, at a minimum, the written incident report will include: the incident and all material facts and circumstances, actions taken to avoid or mitigate any adverse environmental impacts, any corrective actions already taken, or that may be taken, to prevent a recurrence. If initial notification of a reportable incident was verbal, this information must be included in the written report.	DMIRS Submissions Portal

Recordable Environmental Incidents

If any answer to Statement 3 is YES, the incident is classified as a *Recordable Environmental Incident*.

Statement 3 – is the incident a:		
Breach of an Environmental Performance	☐ Yes	Recordable Incident
Objective	☐ No	
Breach of an Environmental Performance	☐ Yes	Recordable Incident
Standard	☐ No	



Recordable Environmental Incidents Reporting Requirements

If the incident is classified as a Recordable Environmental Incident implement the following reporting requirements

Reporting Requirements	Report to
Written notification to DMIRS by the 15 th of each month	
As a minimum, the written incident report must describe:	
 the incidents and all material facts and circumstances concerning the incidents any actions taken to avoid or mitigate any adverse environmental impacts any corrective actions already taken, or that may be taken, to prevent a repeat of similar incidents. If no recordable incidents occur during the reporting month, a 'nil report' will be submitted. 	Email: petroleum.environment@dmirs.wa.gov.au



Appendix 4 – Risk Matrix

RISK MATRIX							
Event Risk Rating / Priority							
Consequence	Minor (FAI) (nil or minor impact) (<\$20,000)	2 Low (MTI / RWI) (minor impact) (>\$20,000 ≤\$100,000)	3 Medium (LTI) (moderate impact) (>\$100,000 ≤\$500,000)	4 High (Fatality) (significant impact) (>\$500,000 ≤\$1,000,000)	5 Major (> 1 Fatality) (major impact) (>\$1,000,000)		
A Almost Certain (one or more per year)	Medium (11)	High (16)	High (20)	Extreme (23)	Extreme (25)		
B Likely (< once a year)	Medium (7)	Medium (12)	High (17)	Extreme (21)	Extreme (24)		
C Possible (one in 5 - 10 years)	Low (4)	Medium (8)	High (13)	High (18)	Extreme (22)		
D Unlikely (one in 10 - 20 years)	Low (2)	Low (5)	Medium (9)	High (14)	High (19)		
Rare (not likely in 20 years)	Low (1)	Low (3)	Medium (6)	Medium (10)	High (15)		



	CONSEQUENCE LEVEL (consider the maximum reasonable potential consequence from an unwanted event							
IMPACT		sification is based on a iss potential outcome		SERIOUS OUTCOME EVENT				
TYPE	Incident Report				Required* See MRL- it Management Prod on Actual or Potenti	edure Section 3.5		
	Level 1	Level 2	Level		Level 4	Level 5		
	Minor	Low	Mediu		High	Major		
Health (H) Harm to people – occupational health	No or minimal exposure to health hazard resulting in no effect or minor discomfort.	Exposure to health hazard resulting in symptoms requiring medical intervention and full recovery (no lost time). Exposure to health hazards / agents (over the OEL) resulting in reversible impact on health (with lost time) or permanent change with no disability or loss of quality of life.		pents EL) npact on lost manent no loss of	Exposure to health hazards / agents (significantly over the OEL) resulting in irreversible impact on health with loss of quality of life (permanent disability) or single fatality.	Exposure to health hazards / agents (significantly over the OEL) resulting in irreversible impact on health with loss of quality of life for multiple persons or multiple fatalities.		
Safety (S) Harm to people – safety	No treatment or First Aid Injury (FAI).	Medical Treatment Injury (MTI) Restricted Work Injury (RWI)	reatment Lost Time Injury (LTI).		Single permanent disability or single fatality. Direct breach of MRL Cardinal Rule(s) over multiple periods	Multiple permanent disabilities or fatalities.		
Environment (E) Harm to environment – negative impact	Nil or minor environmental impact. Insignificant fauna / flora, habitat, soil, aquatic and land ecosystems, atmosphere or water resources affected (e.g. oil spill >20 litres but s 100 litres in contained area).	Minor impact on fauna / flora, habitat, soil, aquatic and land ecosystems, atmosphere or water resources (e.g. single wildlife death, oil spill > 100 litres < 250 litres in contained area).	Moderate impact on fauna / flora, habitat, soil, aquatic and land ecosystems, atmosphere or water resources (e.g. multiple wildlife deaths, unapproved clearing / damage to vegetation, oil spill > 250 litres ≤ 1,000 litres in contained area).		Significant adverse impact on fauna / flora, habitat, soil, aquatic and land ecosystems, atmosphere or water resources lasting typically up to a year (e.g. oil spill > 1,000 litres in uncontained area).	Major adverse impact on fauna / flora, habitat, soil, aquatic and land ecosystems, atmosphere or water resources lasting typically multiple years.		
Community / Social (C) Harm to community / social structures – negative impact	Nil or minor disturbance of local community / social structures.	Low impacts on local community / social structures, issues, mostly		social tty e.g. applaints I local	Significant adverse community impact and reaction (e.g. organised community protests threatening business continuity).	Major adverse community impact and reaction affecting long term business continuity. "License to operate" revoked or under jeopardy.		
Legal / Regulatory (L & R)	Questionable or minor non-compliance with operating condition. No fine or prosecution. Unlikely to attract regulatory interest. Easy to resolve.	Non-compliance with operating condition. Could attract low level administrative response from regulator. No court appearance required.	Minor bread local or national or national or national with potential prosecution regulator. Continuing occurrence obreaches.	onal law al by	Significant breach of local or national law. Prosecution or penalties by regulator likely. Short term threat to operations continuing. Civil action initiated.	Major breach of national or international law with potential prison sentences. Operations suspended or cease (short or long term). Licenses withdrawn or revoked. Class action initiated.		

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	CONSEQUENT (consider the m		ble potentia	conse	quence from an ur	nwanted event)		
IMPACT		classification is based on actual ar miss potential outcome (e.g. fatality			SERIOUS OUTCOME EVENT			
TYPE	Incident Report Required				ICAM Required* See MRL-SAF-PRO-0007 - Incident Management Procedure Section 3.8 Based on Actual or Potential outcome			
	Level 1 Minor	Level 2 Low	Level	•	Level 4 High	Level 5 Major		
Material Losses / Business Interruption (M)	Minor impact, easily corrected with no loss of operations, and/or < \$20,000 asset damage / material loss.	Minor damage to equipment or infrastructure with minimal loss of operations (< 1 day), > \$20,000 and/or ≤ \$100,000 asset damage / material loss.	Damage to equipment or infrastructure causes temporary loss of operations (< 1 week), > \$100,000 and/or ≤ \$500,000 asset damage / material loss.		Significant damage to equipment or infrastructure causes operations (< to cease (< 1 month), > Major dam equipment infrastructure causes operations to cease (> 1 month), an			
Reputation (R)	Minor public concern restricted to local individual complaints. Infrequent scrutiny / attention from regulator (e.g. less than once every 2 years).	Infrequent local public or media attention and complaints. Infrequent scrutiny / attention from regulator (e.g. at least once per year).	Frequent ad attention fromedia and/o heightened of by local com Ongoing scr attention from regulator (e., than once po Some difficulgaining appro	m local or concern imunity. utiny / m g. more er year). ilties in	Significant adverse national media / public attention. Licence to operate threatened. Significant difficulties in gaining approvals for future projects.	Ongoing adverse public or media outcry (international coverage). May temporarily lose license to operate. Reputation adversely affected. Share price may be affected.		

LIKELIHOOD	DESCRIPTION
A Almost Certain	The unwanted event is almost certain to happen within a MRL controlled workplace. In the case of repetitive / frequent tasks the unwanted event has or will occur in order of one or more times per year. In terms of major events, as also in the case of long term health, environmental or social impacts, it may happen only once in a MRL controlled workplace.
B Likely	There is a high probability that the unwanted event will occur within a MRL controlled workplace. In the case of repetitive / frequent tasks the unwanted event has occurred or is likely to occur in order of less than once per year. In terms of major events, as also in the case of long term health, environmental or social impacts, it might happen once in a MRL controlled workplace.
C Possible	It is possible that the unwanted event can occur within the LOM or Project. In the case of repetitive / frequent tasks the unwanted event has occurred or is likely to occur in order of once every 5-10 years. In terms of major events, as also in the case of long term health, environmental or social impacts, it may possibly happen once in the LOM or Project.
D Unlikely	There is a low probability for the unwanted event to occur within a MRL controlled workplace. In the case of repetitive / frequent tasks the unwanted event has occurred sometime or is likely to occur not more than once every 10-20 years. In terms of major events, as also in the case of long term health, environmental or social impacts, there is a low probability for the event to happen in a MRL controlled workplace.
E Rare	There is a very low probability for the unwanted event to occur within a MRL controlled workplace. In the case of repetitive / frequent tasks there are no records of the event occurring or it is highly unlikely that it will occur within the next 20 years. In terms of major events, as also in the case of long term health, environmental or social impacts, there is a very low probability for the event to ever happen.

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Appendix 5 – SFAIRP Assessment

Note: controls assume standard prevention controls, such as inductions, JSA, pre-tours, and mitigation controls, such as ERP processes, 1st aid, emergency services, are in place.

SFAIRP Demonstration							
MAE	Moto	r vehicle accident	Ref	MAE-01			
Hazard	Vehi	cle transport – Excluding Commercial Heavy Vehicle	es				
Assumptions	Assu	An accident involving a vehicle on public roads or access roads. Assumption is that vehicle is carrying passengers or accident involves other road users.					
Cause		Control					
Driver under the		Daily pre-start BAC test (covers travel from Site or	nly)				
or drugs	OHOI	Road safety laws					
		Use of crew change bus at Site					
Driver fatigue		Journey management process - rest breaks					
		Daylight driving – night driving, that requires journey management to be conducted only with the permission of direct line manager and Operations Superintendent (Excludes freight transportation)					
		Use of crew change bus at Site					
Driver distraction	n	Road safety laws					
Wildlife / livestock		Daylight driving – night driving, that requires journey management to be conducted only with the permission of direct line manager and Operations Superintendent (Excludes freight transportation)					
		Speed limit signs posted on access road					
Speeding		IVMS in Ensign vehicles					
		Use of crew change bus at Site					
		Speed limit signs posted on access road					
Adverse driving conditions	ı	Daylight driving – night driving, that requires journe to be conducted only with the permission of direct and Operations Superintendent (excludes freight t	line m	anager			

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	ı							
	Use of crew change bus at Site							
	Drive to conditions							
Mechanical failure	Pre-start v	risual checks						
	Project ve	hicles service	d per manu	facturer's guideline	es			
	Rental vel	nicles undergo	pre-rental	inspection by renta	al agency			
Human error	Drivers to	hold current A	ustralian d	river's licence				
Other road users	Daylight driving – night driving, that requires journey management to be conducted only with the permission of direct line manager and Operations Superintendent (Excludes freight transportation)							
	Use of cre	w change bus	at Site					
Consequence	Control							
Multiple fatalities	No Projec	t specific conti	rols					
Rejected additional	controls ar	nd reason						
Rental vehicles for travel between Perth/Geraldton and Site can be requested to be fitted with IVMS but not always available and without a system to download and analyse post travel IVMS does not offer significant risk reduction								
Concoguence	5 Likelihood D Risk High							
Consequence			SFAIRP Summary					
•								



SFAIRP Demonstration								
MAE	Dro	ropped load during transit causing vehicle accident Ref MAE-02						
Hazard	Roa	ad transport o	of freight or equ	uipment				
Assumptions		,	ad (equipment and/or freight) is lost on a public road resulting in an dent involving other road users					
Cause		Control						
Incorrectly		Training in I	oad restraint					
restrained load			tion of the Auservice provider	stralian Loa	d Restraint Gu	ide by	Project	
		Awareness Legislation	and implemen	tation of Cl	nain of Respon	sibility	,	
		Trailer Load	I & Restraint C	heck List				
Failed restraint Implementation of the Australian Load Restraint Guide by Project transport service provider				Project				
		Awareness Legislation	and implemen	tation of Cl	nain of Respon	sibility	,	
		Use fit for p	urpose restraiı	nt equipme	nt			
Road conditions		Awareness Legislation	and implemen	tation of Cl	nain of Respon	sibility	,	
Consequence		Control						
Multiple fatalitie	:S	No Project	specific contro	ls				
Rejected addit	iona	l controls ar	nd reason					
Consequence		5	Likelihood	E	Risk	F	ligh	
SFAIRP Summ	nary							
The risk is well assessed as SF			controls are ba	sed on goo	od practice. The	e risk i	s therefore	

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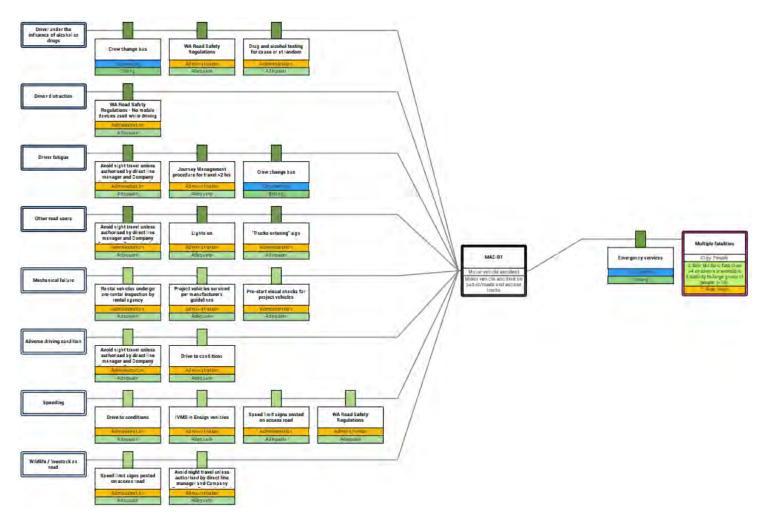
SFAIRP Demonstration							
MAE	Ca	mp fire Ref MAE-03			MAE-03		
Hazard	Co	ombustible ma	terials / flamm	able liquids	/gas on camp	site	
Assumptions	Ex	cludes impact	of bushfire as	covered in	MAE-03		
Cause		Control					
Galley operation	ns	Qualified coo	k				
		Galley and la	undry separat	ed from acc	commodation		
Smoking		Designated s	moking area				
Vehicles		Designated p	arking area				
Gas storage		Gas stored a	way from ignit	ion sources	;		
Electrical fault		Earthing/Miniature circuit breakers (MCBs)					
Hot work		PTW for hot work					
Laundry		Galley and laundry separated from accommodation					
Consequence		Control					
Multiple fatalitie	s	Smoke alarms					
		Fire alarm					
		Fire extinguishers					
		Galley and laundry separated from accommodation					
Rejected addit	ion	al controls an	d reason				
Consequence		5	Likelihood	Е	Risk	ŀ	High
SFAIRP Summary							
The risk is well understood, and controls are based on good practice. The risk is therefore assessed as SFAIRP.							

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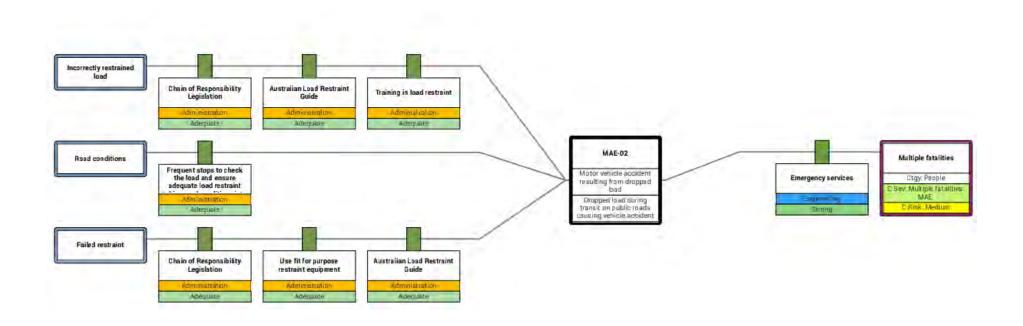
Appendix 6 – Bowties

MAE-01 Motor Vehicle Accident



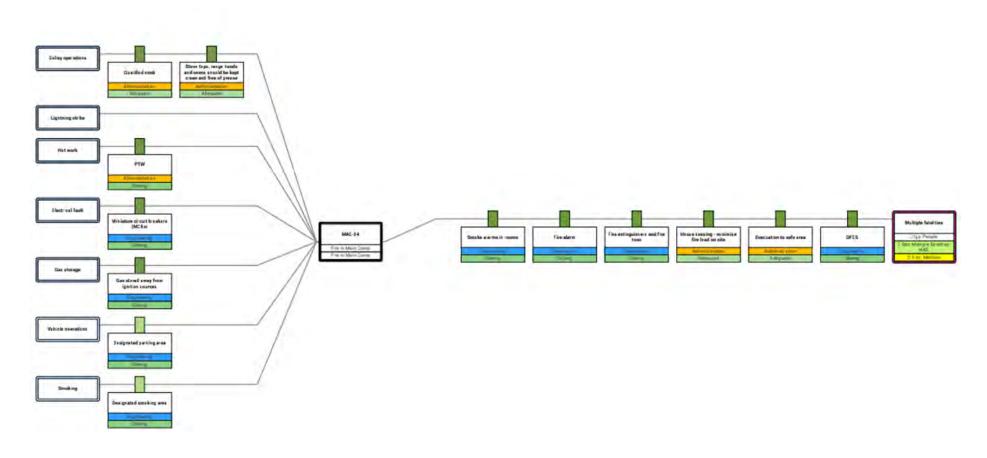


MAE-02 Dropped Load during transit causing Vehicle Accident





MAE-03 - Camp Fire





Appendix 7 – MAE Performance Standards

MAE	Critical Control	Function	Performance requirements	Verification
MAE-01 Motor vehicle accident	Crew change bus	Provide for safe transport between Camp and Site Reduce the number of vehicles travelling between Camp and Site Eliminate driver fatigue at end of 12-hour shift	Crew change bus used for personnel transfers between Camp and Site	DOT Certificate of Inspection Driver's license
	Journey Management	Ensure longer distance travel is managed to minimise travel risk	All Service providers utilising their journey management procedures for the project	Journey management plan records
MAE-02 Dropped load during transit causing vehicle accident	Minimum standard for load restraint is in accordance with the National Australian Load Restraint Guide 2004 (2018 does not apply in WA)	Ensure loads are restrained to a minimum safe standard to reduce likelihood of a dropped load during transit	All loads leaving the Site are correctly restrained and potential dropped objects removed or secured.	ASCO Trailer Load & Restraint Check List FRM-WA-GOP- TRAN-002.05.01



MAE	Critical Control	Function	Performance requirements	Verification
MAE-03 Camp Fire	Earthing / MCB	Prevent electric short circuits over overload	Trip test to confirm performance	Inspection/test records
	Fire alarm	To alert occupants of fire emergency	Alarm sounds on activation	Emergency training drills / records
	Fire extinguishers	To extinguish small fires	Extinguishers must be fit for purpose and functional	Inspection stamps on extinguishers
	Smoke detectors / alarms	To alert occupants of smoke presence	Smoke detectors alarm in the presence of smoke	Inspection/test records



Appendix 8 - Concordance Table

Regulation	Guide Section	Topic	Safety Case Section	Page #			
Wo	rk Health & Safe	ety (Petroleum and Geothermal Energy Operations)	Regulations 2022				
	Part 2 – Petroleum and geothermal energy operations Division 1 – Operators, Division 2 – Operator's representative						
r. 20 1		Facility to have an operator	Rig SC				
r. 21	1	Duties of an operator	Rig SC				
		Division 4 Safety Cases Subdivision 2 – Duties as to safety cases					
r. 27	1	Safety case required for operations	11	11			
r. 28	1	New or increased risks	1.3	13			
r. 29	2.11, 3.3.3	Compliance with safety case	Rig SC				
r. 30	2.11, 3.3.1	Persons to comply to safety case	Rig SC				
r. 31	2.10	Maintaining records for safety case	30	30			
	1	Subdivision 3 – Contents of safety cases	1				
r. 32 (1)(a-d)	3.1.1	Operation description, formal safety assessment, safety management system and emergency response plan	All				
r. 32 (2)(a-j)	3.2.1	Drill rig overview	Rig SC				
	3.2.2	Drill rig layout	Rig SC				
	3.2.3	Major modifications and upgrades	Rig SC				
	3.2.4	Drill rig moves including rigging up/down	Rig SC				
	3.2.5	Primary structure	Rig SC				
	3.2.6	Drilling, completion and well control	Rig SC				
	3.2.7	Plant and utilities	Rig SC				
	3.2.8	Design, control systems, structural integrity and safety critical items	Rig SC				
	3.2.9	Fire and explosion protection	Rig SC				
	3.2.10	Emergency systems	Rig SC				
	3.2.11	Accommodation/camp site	Rig SC				
	3.2.12	Well testing	Rig SC				
	3.2.13	Other third party equipment	Rig SC				
	3.2.14	Major accident events, safety critical elements and performance standards	Rig SC				
	3.2.15	Provision of drawings	Rig SC				



Regulation	Guide Section	Topic	Safety Case Section	Page #
Wo	rk Health & Safe	ety (Petroleum and Geothermal Energy Operations) Re	egulations 2022	
r. 32 (3)(a)	3.4.1, 3.4.2, 3.4.3	Purpose, scope and objective of FSA	Rig SC	
r. 32 (3)(b)	3.4.5	Major accident events	Rig SC	
r. 32 (3)(c)	3.4.6	Safety critical elements and bowtie diagrams	Rig SC	
r. 32 (3)(d)	3.4.7	Demonstration of SFAIRP	Rig SC	
r. 32 (3)(e)	3.4.4	Methodology	Rig SC	
	3.4.8	Summary of risk assessment studies	Rig SC	
r. 32(4)(a)	3.3.1	General requirements	Rig SC	
r. 32 (4)(b)	3.3.2	Policy and leadership	3.3.1	20
r. 32 (4)(c)	3.3.20	Permit to work system for safe performance of various activities	Rig SC	
r. 32 (4)(d)	3.3.11	Managing risks to health and safety	Rig SC	
r. 32 (4)(e)	3.3.26	Incident/hazard reporting and investigation	3.7	41
r. 32 (4)(f)	3.3.11	Managing risks to health and safety	Rig SC	
r. 32 (4)(g)	3.3.22	Maintenance and repair	Rig SC	
	3.3.23	Inspection, testing and monitoring	Rig SC	
	3.3.24	Integrity management	Rig SC	
r. 32 (4)(J)	3.3.12	Health and safety performance standards	3.3.3	21
r. 32 (4)(k)	3.3.6	Sources of information	Rig SC	
	3.3.10	Resources	Rig SC	
	3.3.15	Simultaneous operations and bridging documents	This Document	
	3.3.17	Management of change	3.5.5	31
	3.3.18	Deployment of drill rig to petroleum sites	Rig SC	
	3.3.19	Purchasing and control of materials and services	Rig SC	
	3.3.21	Materials handling and storage	Rig SC	
	3.3.26	Incident/hazard reporting and investigation	3.7	41
	3.3.30	Health monitoring systems	Rig SC	
r. 32 (4)(I)	3.3.25	Performance standards for safety critical elements	Rig SC	
r. 33 (a)	3.3.4	Implementation and improvement of safety management system	5	44
r. 32 (4)(l) r. 33 (b)	3.3.32	Safety management system audits	4	44

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Regulation	Guide Section	Topic	Safety Case Section	Page #
Wo	rk Health & Saf	ety (Petroleum and Geothermal Energy Operations) Ro	egulations 2022	!
r. 33 (c)	3.3.33	Review and continual improvement	4	44
r. 34	3.3.5	Standards to be applied	Rig SC	
r. 35	3.3.7	Command structure	3.3.4	21
r. 36	3.3.8	Competence of workers	3.3.6	27
r. 37	3.3.20	Permit to work system for safe performance of various activities	Rig SC	
r. 38	2.7, 3.3.9	Involvement of workers	3.3.5	26
r. 39	3.3.14	Adequacy of design, construction, installation, modification or maintenance	Rig SC	
r. 40	3.3.31	Medical and pharmaceutical supplies and services	Rig SC	
r. 41	3.3.22	Machinery and equipment	Rig SC	
r. 41 (1)	3.3.22	Maintenance and repair	Rig SC	
r. 41 (2)	3.3.23	Inspection, testing and monitoring	Rig SC	
r. 41 (2)	3.3.24	Integrity management	Rig SC	
r. 42	3.3.31	Drugs and intoxicants	3.5.21.4	39
r. 43	3.5.2	Emergency analyses	Rig SC	
r. 44	3.5.5	Emergency communications systems	Rig SC	
r. 45	3.5.6	Control systems	Rig SC	
r. 46	3.5.1	Emergency preparedness	8	47
r. 49	2.11.1	Access to safety case	Rig SC	
İ		Subdivision 4 – Record keeping		
r. 50	3.3.13	Arrangement for records	3.5.2	30
<u> </u>	Su	bdivision 5 – Submission and acceptance of safety cases		
r.51	4.2	Safety case to be submitted to regulator	1.2	11
r.52	3.5.3	Evacuation, escape and rescue analysis	Rig SC	
r. 53	3.5.4	Fire and explosion risk analysis	Rig SC	
		Subdivision 8 – Validation		
r. 67	3.3.16	Validation of proposed operations and proposed significant changes to operations	Rig SC	
Part 4 – Notifi	cations and Rep 2 – Notifications	-		
r. 100	3.3.27	Duty to notify of notifiable occurrences	Rig SC	



Regulation	Guide Section	Topic	Safety Case Section	Page #
Work Health	& Safety (Petrol	eum and Geothermal Energy Operations) Regulations	2022	
Part 5 – Gene Division 1 – M				
r. 101	3.3.27	Incident notification: prescribed serious illness	Rig SC	
r. 105	3.3.27	Dangerous incident (Act s.37)	Rig SC	
Division 2 – M	lanaging risks to	health and safety		
r. 108	3.3.11	Duty to identify hazards	Rig SC	
r. 109	3.3.11	Managing risks to health and safety	Rig SC	
	3.3.29	Managing the risk to health from psychosocial hazards	Rig SC	
r. 110	3.3.11	Hierarchy of control measures	Rig SC	
r. 111	3.3.11	Maintenance of control measures	Rig SC	
r. 112	3.3.11	Review of control measures	Rig SC	
Division 3 – M Subdivision 1	_	work health and safety		
r. 113	3.3.28	Person must leave a facility when required to do so	Rig SC	
r. 114	3.3.28.1	Avoiding fatigue	Rig SC	
r.115	3.3.31	Possession or control of drugs or intoxicants	Rig SC	
Subdivision 2	- Noise			
r. 116	3.3.28.2	Meaning of exposure standard for noise	Rig SC	
r. 117	3.3.28.2	Managing risk of hearing loss from noise	Rig SC	
r. 118	3.3.28.2	Audiometric testing	Rig SC	
Work Health	and Safety Act	2020		
Part 3 – Incide	ent notification	,		T
s. 38	3.3.27	Duty to notify of notifiable incidents	Rig SC	
s. 39	3.3.27	Duty to preserve incident sites	Rig SC	



LOCKYER-2, LOCKYER-3, LOCKYER-4 AND NORTH ERREGULLA DEEP-1 EXPLORATION / APPRAISAL WELLS ENVIRONMENT PLAN SUMMARY EOC-EN-PLN-0018

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0	13/05/2022	A. Fertch	D. Girgenti	B. Riegler
1	28/07/2022	T. Nottage	D. Girgenti	B. Riegler
2	10/11/2022	I. Sulaiman	D. Girgenti	B. Riegler
3	12/01/2023	I. Sulaiman	D. Girgenti	D. Girgenti



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Abbreviations and Definitions

Acronym / Word	Definition
APPEA	Australian Petroleum Production & Exploration Association
DMIRS	Department of Mines, Industry Regulation and Safety
DoW	Department of Water
DPLH	Department of Planning, Lands and Heritage
DRF	Declared Rare Flora
DWER	Department of Water and Environment Regulation
EP	Environment Plan
EP Act	Environmental Protection Act 1986 (WA)
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)
ERL	Energy Resources Limited
ESAs	Environmentally Sensitive Areas
ha	hectares
HSEQ	Health, Safety, Environment and Quality
HSEQMS	Health, Safety, Environment and Quality Management System
LKR-2	Lockyer-2
LKR-3	Lockyer-3
LKR-4	Lockyer-4
LOWC	Loss Of Well Control
NED-1	North Erregulla Deep-1
OSCP	Oil Spill Contingency Plan
PGER(E)R	Petroleum and Geothermal Energy Resources (Environment) Regulations 2012 (WA)
TDS	Total Dissolved Solids
VSP	Vertical Seismic Profiling

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1 Introduction

1.1 Background

Energy Resources Limited (ERL) are the titleholder and operator of the exploration permit EP 368, located in the North Perth Basin. Within EP 368, ERL are proposing to drill three exploration / appraisal wells, named Lockyer-2, Lockyer-3, Lockyer-4 and North Erregulla Deep-1, primarily targeting the Kingia sandstone. Secondary targets for these wells include the High Cliff, Dongara / Wagina and Arranoo sandstones.

The Lockyer-2 well is located on the northern side of Midlands Road and south off Strawberry North-East Road, approximately 3.2 km east northeast of the Lockyer Deep-1 well. The Lockyer-3 well is located on the northern side of Midlands Road and west off Strawberry North-East Road, approximately 4.38 km northwest of the Lockyer Deep-1 well. The Lockyer-4 well is located on the southern side of Midlands Road off Mooriary Road, approximately 6.6 km southeast of Lockyer Deep-1. The North Erregulla Deep-1 well is located on the southern side of Midlands Road off Mooriary Road, approximately 8.3 km southeast of the Lockyer Deep-1 well. The wells lay between the townships of Dongara and Mingenew, being approximately 19 kms west of Mingenew (Figure 2-1).

1.2 Scope

The EP covers the following activities:

- Site preparation operations;
- Drilling operations (including completion operations, suspension or decommissioning of the wells);
- Well test operations;
- Site reinstatement; and
- Care and maintenance.

1.3 Instrument Holder and Nominated Operator

The instrument holders for petroleum licence EP 368 include:

- Energy Resources Limited: 80% participating interest and operator; and
- Westranch Holdings Pty Ltd: 20% participating interest.

In accordance with the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012 (WA) (PGER(E)R), contact details for the operator are listed below:

Operator: Energy Resources Limited

Contact Person: Bernie Riegler, Senior Environmental Advisor

Address: 20 Walters Drive, Osborne Park

Western Australia 6017

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Phone: (08) 9329 3600

Email: bernie.riegler@mrl.com.au



2 Description of the Activity

2.1 Location of the Project

The Lockyer-2, Lockyer-3, Lockyer-4 and North Erregulla Deep-1 well locations are within the Shire of Mingenew, located approximately 35 km east of Dongara and 312 km north of Perth (Figure 2-1).

The coordinates for the surface hole locations are:

- Lockyer-2: 29° 11' 12.27" S, 115° 18' 00.9" E;
- Lockyer-3: 29° 10' 12.5758" S, 115° 15' 32.7179" E;
- Lockyer-4: 29° 12' 55.3231" S, 115° 19' 52.6542" E and
- North Erregulla Deep-1: 29° 14' 49.52" S, 115° 19' 40.47" E.



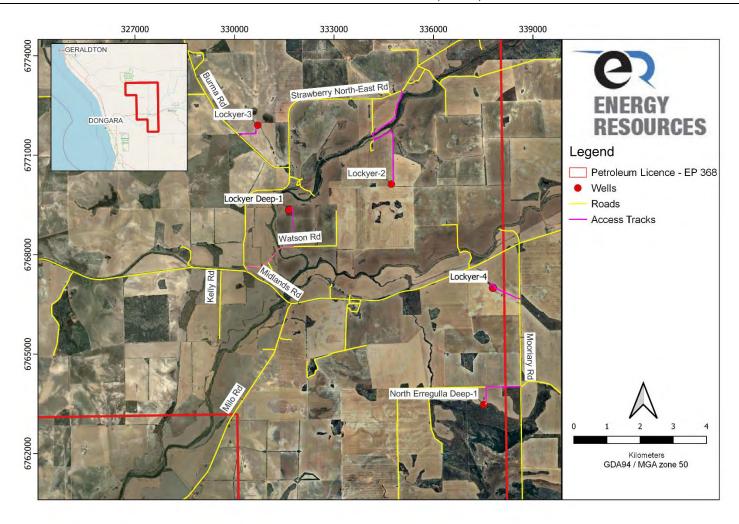


Figure 2-1: Regional map

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2.2 Overview of Activities

The activity involves the following key phases:

Site preparation operations:

- Well site construction comprising clearing, levelling, sheeting and preparation of surfaces to support compressive loads and limit erosion to the existing landscape;
- Groundwater extraction bore / monitoring bore and conductor installation;
- Construction of the lined mud sump, turkey's nest, Vertical Seismic Profiling (VSP) pit and well cellar; and
- Installation of the flare pits drilling and well test flare pits.

Drilling operations:

- Mobilisation of the drilling package, ancillary services, rig camp, personnel and supplies;
- Conducting the drilling activities;
- Evaluating the well, suspension or decommissioning of the well;
- Demobilisation of the drilling package, ancillary services, rig camp, personnel and supplies; and
- Completion activities (if the well is successful and not completed with the drilling rig);
 - Mobilisation of work-over rig package, ancillary services, personnel and supplies;
 - o Conducting the well completion activities; and
 - Demobilisation of work over rig package, ancillary services, site office, personnel and supplies.

Well Test Operations: (If the well is successful)

- Construction of the well test flare pit (if not done during site preparation operations);
- Mobilisation of the well test package, ancillary services, personnel and supplies;
- Conduct the well test activities to evaluate the well; and
- Demobilisation of the well test package, ancillary services, site support facilities, personnel and supplies.

Site Reinstatement operations, including sampling and removal of the:

- Drilling flare pit;
- VSP pit;
- Well test flare pit;

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- Mud sump;
- Turkey nest; and
- Well head.

Care and maintenance operations, including inspection of the well site and site infrastructure.

Well handover comprises the final administrative step after which the Environment Plan can be closed out.

2.3 Timeframe and Schedule

Activities covered under the EP are planned to commence in Q2 of 2022. A summary of the proposed schedule is provided as Table 2-1.

TABLE 2-1: WELL SCHEDULE

Activities	Approximate duration (per well)	Indicative timing	Environmental considerations
Site preparation operations	35 - 42 days	Q4 2022 - Q2 2023	12-hour operations (day light hours)
Mobilisation of drilling package, ancillary services, site office, personnel and supplies.	10 - 15 days	Q4 2022	Movement of vehicles and fauna impact potential
Drilling, evaluation, and suspension Or Drilling and well decommissioning	56 – 65 days	Q4 2022 – Q4 2023	24-hour operations – fauna impact potential from driving at dawn / dusk General impact of site operations
Well completion	3 – 5 days	ТВА	24-hour operations – fauna impact potential from driving at dawn / dusk General impact of site operations
Well test and shut in or suspension	60 - 90 Days	Q1 2023 - Q4 2023	24-hour operations - fauna impact potential from driving at dawn / dusk General impact of site operations
Care and maintenance	2 years	Subsequent to drilling	12-hour operations – fauna impact potential from driving at dawn / dusk

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3 Description of the Environment

3.1 Regional Landform and Climate

The wells are located within the coastal highlands of the Mid-West region of WA, within the Geraldton Hills Sandplain subregion of the Geraldton Sandplains Bioregion (Department of the Environment 2012).

The Geraldton Sandplains Bioregion (Interim Biogeographic Regionalisation for Australia, Version 7) is composed mainly of proteaceous scrub-heaths, rich in endemics, on the sandy earths of an extensive, undulating, lateritic sandplain mantling Permian to Cretaceous strata (Department of Conservation and Land Management 2002).

The regional climate is classified as dry Mediterranean with cool wet winters and hot dry summers. The mean monthly minimum temperature recorded at the nearest Bureau of Meteorology station (Geraldton Airport) ranges from 8.9 °C in August to 19.2 °C in February and the mean monthly maximum temperatures range from 19.5 °C in July to 32.6 °C in February (Bureau of Meteorology 2022).

The average annual rainfall is 440.9 mm with the majority of rainfall occurring during the winter months (Bureau of Meteorology 2022). A strong south-west sea breeze is a part of summer weather conditions. The winds arrive between 10:00 am and 12:00 pm and can reach 30 knots. The winds during the winter months are more variable and influenced by the cold fronts coming in from the Indian Ocean.

3.2 Geology and Soils

The well locations lie within the sedimentary Perth Basin. This basin lies both onshore and offshore and extends for about 700 km along the southern portion of the west coast of Western Australia. The basin is bounded to the east by the Darling Fault, which extends the full length of the basin. The onshore portion of the basin averages 65 km in width and extends from the southern coast to Geraldton in the north. The dominant feature in the northern section of the Perth Basin is the Dandaragan Trough, in which up to 20 km of sediments have been deposited.

3.2.1 Geomorphology

The well locations are situated in the geomorphic unit 'Eneabba Plain' (Playford, Cockbain and Low 1976). This unit is a low-lying area between the Spearwood Dune System and the Gingin Scarp. The plain is restricted to the area north of Cockleshell Gully. The plain consists of a series of shoreline, lagoon and dune deposits of early Pleistocene to possibly late Tertiary age, which locally have high concentrations of heavy minerals. These deposits are associated with a series of low alluvial fans fronting the Gingin Scarp (Playford, Cockbain and Low 1976). The streams have ill-defined channels and form ephemeral lakes.

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3.2.2 Soils

The well locations are situated in the northern agricultural region of West Midlands and the soil-landscape zone is 'Arrowsmith Zone' code 224 (Schoknecht, Tille and Purdie 2004). This soil landscape zone is characterised as dissected lateritic sandplain on Cretaceous and Jurassic sediments. It is bounded in the east by the Dandaragan Scarp and in the south and west by the Gingin Scarp and comprises sandy and gravelly soils formed in colluvium and rock weathered in situ (Schoknecht, Tille and Purdie 2004).

The soil systems that overlap the Lockyer-2, Lockyer-3, Lockyer-4 and North Erregulla Deep-1 well locations as identified by the Department of Primary Industries and Regional Development (2022) are classified as:

• Mount Horner System (224Mh): Long gentle slopes broken by low gravel ridges and broad open depressions. Some lateritic breakaways with spillway sands.

3.3 Hydrology

3.3.1 Surface Water and Drainage

The well locations are situated in the Irwin River surface water catchment of the West Midlands Region (DoW 2017). The closest river to the Lockyer-2 well site is the Irwin River, located approximately 900 m north-west (with the Lockier River) located approximately 2.8 km southeast of this well. The nearest point of the Irwin River runs approximately 2.2 km south southeast of the Lockyer-3 well location. The Lockyer-4 well site is located ~900m south of the Lockier River and additionally separated by the built up Midlands Road. Approximately 550 m southwest of the North Erregulla Deep-1 well site is an un-named non perennial watercourse that branches from the Lockier River located approximately 4.5 km to the north.

The following information is provided by the Department of Water (DoW) on the hydrology of the Irwin River catchment (DoW 2017).

The river flows in a southerly direction between Geraldton, Mount Magnet Road and the Mullewa–Wubin Road, where it expands into a relatively wide river. It then turns south-westerly and constricts as it passes through hilly terrain before flowing into Arurine Bay near Dongara. The Irwin River catchment is 6071 km². As of 2016, there are six operational streamflow gauging stations in the catchment, with the first opening in 1976. Mountain Bridge gauging station, with a catchment area of 5264 km², has a mean annual flow recorded since 2000 of 16 GL/a.

Permanent summer baseflow is maintained by groundwater discharge from the Yarragadee aquifer between the Strawberry Bridge and Mountain Bridge gauging stations (Allen 1980, Commander, Groundwater prospects for irrigation in the Irwin River valley, Western Australia, Hydrogeology report HR10 1996, Schafer 2016, DoW 2017).

The river is moderately saline and becomes increasingly more so where saline groundwater discharges from Permian aquifers east of Mingenew (Mayer, Ruprecht and Bari 2005). The

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river is less saline in areas where it or its tributaries receive fresh groundwater discharge from the Yarragadee aquifer (e.g. Springy Creek).

3.3.2 Groundwater

The primary major aquifers of the northern Perth Basin are the Superficial, Leederville, Leederville—Parmelia and Yarragadee aquifers (DoW 2017). A review of National Groundwater Information System Australian Groundwater Insight aquifer boundaries data (Bureau of Meteorology 2022) indicate that aquifers relevant to this Activity include the Superficial, Leederville-Parmelia and Yarragadee Aquifers.

DWER (2022) provides information for depth to groundwater measured in water bores licenced / managed by the department. The depth to groundwater at the Lockyer-2, Lockyer-3, Lockyer-4 and North Erregulla Deep-1 well sites is expected to be <25 m, given the proximity to the to the nearby surface water bodies.

3.3.3 Superficial Aquifer

The Superficial aquifer is a laterally extensive but relatively thin unconfined aquifer, extending throughout the Swan Coastal Plain found in the western portion of the northern Perth Basin between Geraldton in the north, Gingin in the south and bound by the Gingin Scarp to the east (DoW 2017). The Superficial aquifer is typically 20–30 m thick, with a maximum saturated thickness of about 60 m west of Regans Ford (Moncrieff and Tuckson 1989, Kern 1993).

Groundwater recharge to the Superficial aquifer is mainly by direct infiltration from rainfall over permeable sand and limestone, predominantly during winter and early spring. However, the Superficial aquifer also receives groundwater recharge by infiltration of surface water from lakes and streams, and from upward groundwater flow where it is present.

Groundwater flow in the Superficial aquifer is predominantly east to west, from the elevated areas along the Gingin Scarp towards the coast. The water table is highest adjacent to the Gingin Scarp, where it is up to approximately 90 m AHD near Eneabba and Cataby.

3.3.4 Leederville-Parmelia Aquifer

The Leederville–Parmelia aquifer extends from Mingenew to Gingin over an area of about 6650 km² beneath the Dandaragan Plateau, within a predominantly eastward-deepening portion of the Perth Basin (DoW 2017).

The Leederville–Parmelia aquifer thickens eastward from the margin of the Otorowiri Formation outcrop, reaching a maximum thickness of about 1300 m west and south of Moora, but elsewhere it is generally between 300 and 500 m thick (DoW 2017).

Groundwater salinity in the Leederville–Parmelia aquifer ranges from 200 mg/L to 4500 mg/L except along the eastern margin of the aquifer but is mostly between 500 and 1000 mg/L total dissolved solids (TDS) (Commander 1981, Bekele, Salama and Commander 2006).

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In the western part of the aquifer, groundwater with less than 500 mg/L TDS is associated with palaeodrainage valleys (Commander 1981). Groundwater with a salinity of about 200 mg/L TDS is also present east of Eneabba Spring (Commander 1981).

3.3.5 Yarragadee Aquifer

The major aquifer which underlies the well locations is the Yarragadee Aquifer. The formation is multi-layered with groundwater occurring within beds of fine to course-grained sandstone confined between thick sequences of shale and siltstone. The potentiometric surface is fairly deep, ranging up to as much as 150 m below the surface. The potentiometric surface reaches the ground surface in the Hill River valley where the aquifer is artesian around Hill River Spring (Earth Tech Engineering 2002).

Groundwater salinity is lowest (500-700 mg/L) within the middle of the catchment and highest (1,000-1,500 mg/L) towards the east of the catchment along the boundary with the Urella Fault (Earth Tech Engineering 2002). Areas of higher salinity occur along the Arrowsmith River and the Irwin River due to recharge of brackish runoff water. Groundwater salinity is also known to vary within the different sandstone beds and there is a general trend of increasing salinity with depth (Johnson and Commander 2006).

3.4 Vegetation

The Lockyer-2 well pad is located within cleared paddocks that have been historically used for agricultural purposes. Similarly, the Lockyer-3 well pad area is primarily within cleared paddocks which includes a 0.15 hectares (ha) thicket of *Eucalyptus camaldulensis* (river gum) regrowth saplings. The Lockyer-4 well pad is located within cleared paddocks that have historically been used for agricultural purposes. The North Erregulla Deep-1 well is located within a cleared paddock with approximately half of the well site (approximately 1.25 hectares) intersecting an area of degraded vegetation associated with a historical stockyard.

3.4.1 Flora

A desktop flora survey (Strategen-JBS&G 2022) found that the vegetation communities immediately adjacent to the North Erregulla Deep-1 well site are described as 'Allocasuarina huegeliana tall shrubland over Rhagodia preissii shrubland' With the vegetation communities approximately 100 m away described as 'Eucalyptus flocktoniae subsp. flocktoniae open mallee woodland over Allocasuarina huegeliana and Hakea recurva subsp. recurva tall open shrubland.' None of these vegetation communities are known Groundwater Dependent Ecosystems or priority communities.

The proposed Lockyer-3 well location is within a cleared paddock. Section 3.4 describes a 0.15 ha of *Eucalyptus camaldulensis* (river gum) regrowth saplings that will require clearing in the southwest portion of the proposed well site. As the vegetation is regrowth in nature, specific information on flora composition is not provided.

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The proposed Lockyer-2 and Lockyer-4 well locations are within cleared paddocks, and with no native vegetation planned to be impacted, specific information on flora composition is not provided.

3.4.2 Declared Rare Flora and Priority Listed Flora

Given that the proposed activity is within cleared paddocks and areas of degraded remnant vegetation and regrowth vegetation, it is expected that no Declared Rare Flora (DRF) or Priority Listed Flora will be encountered.

3.4.3 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared under section 51B of the *Environmental Protection Act 1986* (WA) and protected under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (WA). ESAs are selected for their environmental values at state or national levels and may include:

- Defined wetlands and riparian vegetation within 50 m;
- Areas covered by Threatened Ecological Communities;
- Area of vegetation within 50 m of DRF; and
- Declared World Heritage property sites.

The closest designated ESAs are located approximately 5.5 km to the northeast of the Lockyer-2 well location, 7.5 km east northeast of the Lockyer-3 well location. 6.8 km north of the Lockyer-4 well location, and approximately 10.5 km to the northeast of the North Erregulla Deep-1 well location.

3.4.4 Ecological Communities

Given that the Lockyer-2 and Lockyer-4 well sites are within cleared paddocks, no ecological communities are planned to be impacted.

3.5 Weeds and Pathogens

Given the proposed activity is within highly disturbed cleared paddocks and degraded remnant vegetation, there is the potential for weeds and pathogens to be present. A survey of the area in 2021, recorded 28 species within vicinity of the well locations. One species (*Echium plantagineum*) is a Declared Plant species in Western Australia pursuant to Section 22 of the Biosecurity and Agriculture Management Act 2007 (BAM Act). However, only one location of this species was recorded, approximately 12 km to the north, and it is not considered to have a contiguous connection with the operational area.

3.6 Fauna

A search of the Living Atlas of Australia database (accessed 31 January 2022) with a 5 km buffer around the well locations returned records for no threatened fauna species.

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The Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth) Protected Matters search conducted for the well locations identified nine listed threatened species (six birds, one mammal, one reptile and one invertebrate) and eight listed migratory species as known or likely to occur within a 5 km buffer around the well locations.

Given that the proposed activity is within cleared paddocks and areas of degraded remnant vegetation and regrowth vegetation, no significant fauna habitat is expected to be encountered.

3.7 Socio-economic Environment

3.7.1 Land Use and Economic Environment

The Shire of Mingenew's major industry is agriculture and is the Southern Hemisphere's largest grain facilitator. The major tourism drawcards for the Shire are the historical town centre and wildflowers during the wildflower season. The current land use for each of the well sites is for agricultural purposes.

3.7.2 Visual Amenity

The Lockyer-2, Lockyer-3, Lockyer-4 and North Erregulla Deep-1 well locations are located approximately 3.8 km north, 4.5 km north, 0.72 km southeast and 4.4 km south respectively of the Midlands Road which is the main transit route between Dongara and Mingenew. The well sites are located away from residential developments and local tourist attractions.

The nearest dwelling to the Lockyer-2 well location is located approximately 2.6 km to the west on the opposite side of the Irwin River. The nearest dwelling to the Lockyer-3 well location is located approximately 2.1 km to the southeast on the opposite side of the Strawberry North-East Road. The nearest dwelling to the Lockyer-4 well location is located approximately 2.4km to the northeast off Midlands Road. The nearest dwelling to the North Erregulla Deep-1 well location is located approximately 4.7 km to the northwest.

3.8 National Heritage

The National Heritage List is Australia's list of natural, historic and Indigenous places of outstanding significance to the nation. There are no National Heritage places within proximity of the well locations. The closest Natural Heritage Property, the Lesueur National Park, is more than 88 km south of the nearest well locations.

3.9 Indigenous and Non-Indigenous Cultural Heritage

3.9.1 Native Title Applications

A search of the National Native Title Tribunal database (http://www.ntv.nntt.gov.au/ntv.asp) on 03 February 2022 reveals one registered Native Title in effect at the location of the well sites; the Native Title of the Yamatji Nation (WCD2020/001).

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3.9.2 Archaeology and Ethnology

Searches of the Aboriginal Heritage Inquiry System (AHIS), maintained by the Department of Planning, Lands and Heritage (DPLH) were undertaken for the well locations on 03 February 2022.

The searches show that within EP 368 there are three registered aboriginal sites associated with the Irwin and Lockier Rivers:

- The access track to Lockyer-2 passes through Registered Aboriginal Site 18907 Irwin River (SC04); however, the access track does not extend beyond the existing disturbed footprint. Acceptance of the planned activity will be provided by the PBC & DPLH prior to undertaking the activity. Engagement with these stakeholders is provided for in Error! Reference source not found. and is ongoing;
- The proposed location of the Lockyer-2 well site is outside the boundary of the Registered Aboriginal Site 18907 Irwin River (SC04);
- The L4 well location and ~200m of access road fall within the open site boundary for the Lockier River Registered Site (24381) by virtue of the graticular block system used to demarcate this registered site. The close site boundary is based on the actual Lockier River banks with the activity being close to 900m in distance from the close site boundary on the southern side of midlands Road. There will be no impact to the Lockier River itself. Clarification is being sought from the DPLH to confirm the Lockyer-4 access road and site are outside of the close site boundary with no potential for disturbance of the Lockier River Register Site (24381);
- The activity area for the Lockyer-3 and North Erregulla Deep-1 well locations do not fall within any registered aboriginal sites;
- A single artefacts / scatter (5683) named Santa Fe is located south of Midlands Road along the Irwin River to the northwest of the Lockyer-4 and North Erregulla Deep-1 well sites and south of the Lockyer-2 and Lockyer-3 well sites.



4 Environmental Risk Assessment Methodology

A risk assessment of the aspects that will and may occur during operations was undertaken using ERL's risk assessment methodology which follows Australian Standard AS/NZS ISO 31000:2009: Risk management – Principles and guidelines. Hazards, their associated aspects and their associated management and mitigation measures are detailed bellow in Table 4-1.

TABLE 4-1: SUMMARY OF ENVIRONMENTAL HAZARDS, THEIR ASSOCIATED ASPECTS AND MANAGEMENT AND MITIGATION MEASURES

Aspect	Hazard	Management and Mitigation Measures		
Physical Interaction – Soil and Vegetation	 Spread of non-indigenous species (weeds / pathogens) Damage to heritage sites / artefacts Unintentional clearing of native vegetation Inadequate site reinstatement 	 Construction fill verified as having low weed/dieback risk Hygiene management requirements Induction Desktop heritage evaluation Consultation Complaints management system Heritage artefact identification procedure Land Access Agreement 		
Atmospheric Emissions	Disturbance to sensitive fauna / relevant stakeholders	 Emissions are monitored and reported Complaints management system Use of pilot flame during flaring, National Greenhouse and Energy Reporting 		
Extraction of Groundwater	Damage to vegetation due to drawdown of shallow groundwater	 Ground water licences Meter calibration and monitoring		
Physical Interaction – Fauna	Injury or fatality to terrestrial fauna	Fauna exclusion and egressSite inspectionsSpeed limitsInduction		
Fire	 habitat and vegetation loss; fauna injury / fatality; and damage to adjacent pastoral lands and crops. 	 Gas flaring exemption Bush Fires Regulations 1954 (WA) Emergency Response Plan Permit to Work (PTW) Induction Consultation Fire breaks 		
Erosion / Contamination surface water run-off	Unplanned disturbance to adjacent pastoral land / soil contamination	HSE InspectionMud sump designInspection of sumps		

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Aspect	Hazard	Management and Mitigation Measures
Accidental release of drilling or completion fluid	Surface spill of drilling or completion fluid resulting in contamination of soil / useable groundwater aquifers; Subsurface spill of drilling fluid resulting in contamination of useable groundwater aquifers.	 Rig inspection Surface casing cemented across all useable freshwater aquifers Chemical disclosure Bund construction Soil sampling Low toxicity drilling fluid Site will be manned 24 hours a day Monitoring of groundwater bore Oil Spill Contingency Plan Fugitive discharges are monitored and reported
Accidental release of solid waste	Attraction and / or injury of protected fauna species within the vicinity of the well locations.	 Appropriate rubbish bins and waste segregation Appropriately licensed waste contractor Waste sampling Waste register Induction
Accidental release of Hydrocarbons or Hazardous Materials (excluding Loss of Well Control [LOWC])	Contamination of soil / groundwater	 Spill protection during refuelling Chemical and hazardous liquid material storage Groundwater sampling Well testing – equipment pressure testing Well testing – Emergency Shut Down Induction Spill kits Oil Spill Contingency Plan Emergency Response Plan
Accidental Release of Hydrocarbons - LOWC	 Atmospheric emissions and contamination of soil / groundwater Fire 	 Well Management Plan HSE Management Plan / bridging document Groundwater sampling Induction Spill Kits Oil Spill Contingency Plan Blow out control equipment and expertise Emergency Response Plan
Noise Emissions	Noise emission disturbance of nearby occupied residential housing from gas flaring during well testing	 Well test design Flare noise modelling to determine noise impact radius.

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5 Implementation Strategy

To meet the requirements of Regulation 15(1) of the PGER(E)R, Implementation Strategy for the EP, this Section describes the implementation strategy—the systems, practices, and procedures used to ensure that the environmental impacts and risks of the activities are continuously reduced to 'As Low As Reasonably Practicable', and the environmental performance objectives and standards detailed in Section 4 are achieved.

5.1 Management System Overview

The ERL Health, Safety, Environment & Quality Management System (HSEQMS) aligns with the Plan/Do/Check/Act approach. Figure 6-1 illustrates how the ERL HSEQMS elements fit this model

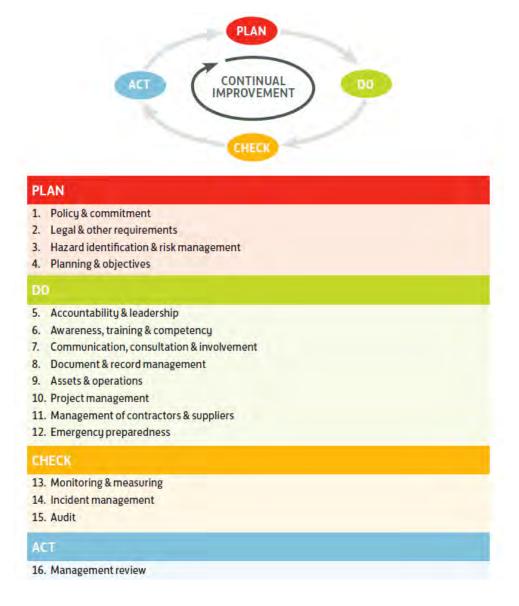


FIGURE 6-1: ERL HSEQMS

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5.1.1 Oil Spill Contingency Plan

The ERL North Perth Basin Well Operations Oil Spill Contingency Plan (OSCP) (EOC-EN-PLN-0005) outlines the response structure and considers the four key aspects of prevention, preparedness, response and recovery. An OSCP is required to set out the following:

- Preparations are on hand for the possibility of an oil spill;
- Emergency response arrangements are implemented if an oil spill occurs; and
- Recovery arrangements are implemented if an oil spill occurs.

The OSCP describes the Emergency Management framework that is in place to ensure any emergency events are managed effectively.

5.2 Environment Plan Revision

Regulation 18 of the PGER(E)R requires that ERL review and submit a proposed revision of the accepted EP:

- before the commencement of a new activity;
- or any significant modification, change of a new stage of an existing activity; and
- before, or as soon as practicable after, the occurrence of any significant new environmental impact or risk, or significant increase in an existing environmental impact or risk which occurred or is to occur.

Additionally, Regulation 20 of PGER(E)R requires that ERL submit a proposed revision of the EP five years from the date when the EP is accepted by the Minister.



6 Stakeholder Consultation

Minimising and mitigating the potential environmental impacts associated with the well activities is assisted by the engagement of key stakeholders to ensure all issues are identified and addressed.

In accordance with Regulation 17 of PGER(E)R, ERL completed a scoping exercise to determine which authorities, persons and organisations were considered to be relevant.

Given the isolated location of the well locations, limited stakeholders were identified but include:

- Department of Mines, Industry Regulation and Safety (DMIRS);
- Department of Water and Environmental Regulation (DWER);
- Department of Planning, Lands and Heritage;
- Environmental Protection Authority;
- Shire of Mingenew;
- Prescribed Body Corporate for Southern Yamatji;
- Southern Yamatji people (Traditional Land Owners); and
- Landowners.

In addition to these stakeholders, ERL also identified other contractors that may be called upon in the event of a major spill to support response and recovery operations. Although not relevant to the petroleum activities, they were identified and may be consulted over the course of the program. These companies include:

- Lenane Holdings civil earthworks;
- Toxfree;
- Clean away; and
- SGS.

A summary of the consultation with these stakeholders is include as Table 6-1.

TABLE 6-1: SUMMARY OF STAKEHOLDER CONSULTATION AND ASSESSMENT OF MERITS

Stakeholder	Date	Summary of Consultation	Objections / claims raised	ERL response	Close out of Issues (if any)
Landowner #1	11/02/2019 to present	Ongoing routine communication with the landowner regarding all activities at the Lockyer Deep-1 well location and future potential work scopes.	Through a positive wo relationship there is o being provided by the relation to improveme incorporated into the process.	ngoing guidance landowner in ents that can be	N/A

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Stakeholder	Date	Summary of Consultation	Objections / claims raised	ERL response	Close out of Issues (if any)
Shire of Mingenew	14/08/2019 to present	Ongoing communication with the Mingenew Shire CEO on various issues relating to the Lockyer Deep-1 well operations, other work in the area and associated services and road use in the area.	None.	Ongoing	N/A
YSRC	7 – 16 December 2021	EMAIL correspondence with YSRC regarding entering a Yamatji Proponent Standard Heritage Agreement (YPSHA) for EP 368, EP 426, EP 430 and EP 454.	EnRes requested amendments to YPSHA to provide for petroleum activities and Joint Venture provisions.	Parties discussed proposed amendments.	Meeting held 16 December 2022.
YSRC	16 December 2021	MEETING with YSRC to discuss YPSHA and present activities for next 6 months.	YSRC require advice from State Solicitor's Office on amendments to YPSHA.	Parties agree to cooperation in good faith as if agreement was in place.	N/A
YSRC	December 2021 – January 2022	EMAIL correspondence with YSRC regarding YPSHA.	N/A	N/A	N/A
Landowner #2	18/01/2022	Call and text message to landowner to arrange on site meeting regarding NED-1 well.	Landowner proposed a date, Aztech responded to confirm date.	N/A	N/A
Landowner #3	18/01/2022	Call and text message to landowner to arrange on site meeting regarding LKR-2 well.	Landowner proposed a date, Aztech responded to confirm date.	N/A	N/A
Landowner #2	01/02/2022	Aztech Drilling Project Manager and Land Access & Approvals Manager met with landowner in person in ERL office to discuss drilling NED-1 location and present plans for consideration. We discussed access locations, pad size, disruption, duration etc.	No objections.	Maps sent to landowner – location agreed in principal. Access allowed for location scouting. Agreement for seismic surveys finalised – landowner progressing agreement for drilling using same template.	Aztech to continue to work with landowner to progress agreement through corporate hierarchy. They are aware and agreeable to timing.
Landowner #3	03/02/2022	Aztech Drilling Project Manager and Land Access & Approvals Manager met with the landowner in person to discuss drilling Lockyer-2 and present	No objections.	Maps sent to landowner for consideration – location agreed in principal.	Agreement to be reviewed and signed

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Stakeholder	Date	Summary of Consultation	Objections / claims raised	ERL response	Close out of Issues (if any)
		plans for consideration. We discussed access locations, pad size, disruption, duration etc. Access allowed by landowner to scout the proposed access track and river crossing to well location.		Aztech drafting agreement with compensation particulars for consideration and signing.	
Landowner #1	03/02/2022	Aztech Drilling Project Manager and Land Access & Approvals Manager met with the landowner in person to discuss drilling Lockyer-3 and present plans for consideration. We discussed access locations, pad size, disruption, duration etc. Access allowed by landowner to scout the proposed access track and river crossing to well location. Ongoing discussions in relation to this work scope	No objections.	Maps provided to landowner for consideration – location agreed in principal. Aztech drafting new agreement with compensation particulars for consideration and signing.	Agreement to be reviewed and signed
Landowner #3	11-14 March 2022	EMAIL: Correspondence regarding proposed access route to the drilling location	Response by email accepting the proposed location 14/3	N/A	Access approved in principle
DMIRS	23/03/2022	Communication with DMIRS to advise of the pending submission of this EP and the person taking over role as the Environmental Officer assigned to ERL.	N/A	N/A	N/A
Landowner #3	10 May 22	EMAIL: Draft access and compensation agreement sent for consideration	No objections	N/A	N/A
YSRC	10 – 31 May 2022	EMAIL correspondence to set up meeting with YSRC and Knowledge Holders for EnRes to present on upcoming activities in 2022-2023 (including wells on EP 368).	N/A	N/A	Meeting held 7 June 2022.
Landowner #2	11 May 22	EMAIL: Draft access and compensation agreement sent for consideration	No objections	N/A	N/A
Landowner #3	16 -20 May 22	EMAIL: request for bore location and provided drawings for proposed river crossing improvements	No objections/response	N/A	N/A

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Stakeholder	Date	Summary of Consultation	Objections / claims raised	ERL response	Close out of Issues (if any)
Landowner #2	16 – 20 May 22	EMAIL: correspondence regarding location of the water bores and drilling camp	No objections	Landowner advised he was discussing water bore and camp location with the farm manager and would revert back with location.	Responded with agreement of locations and acceptance of proposed compensation.
Landowner #3	31 May 22	EMAIL: ERL follow up email to bore and crossing request	No objections/response	N/A	N/A
YSRC	June – July 2022	EMAIL correspondence regarding YPSHA.	N/A	N/A	Draft deed of variation provided to EnRes.
YSRC	3 June 2022	EMAIL correspondence providing YSRC with copy of presentation on upcoming activities on EP 368.	N/A	N/A	N/A
DPLH	15 June 2022	EMAIL correspondence with DPLH seeking advice on approvals required for river crossing improvement works.	DPLH requested details of activity and letter of support from Traditional Owners/YSRC.	N/A	Details of activity provided 11 July 2022.
Landowner #4	15 June 2022	Darrell Girgenti (Wells Project Manager) & Leah Fuller (Land Access & Approvals Manager) met with the Michaels family in person to discuss drilling Lockyer-4 and present plans for consideration. We discussed access locations, pad size, disruption, duration etc. Access allowed by family to scout the proposed access track and well location. Ongoing discussions in relation to this workscope.	While not enthusiastic about the presence of the well, no objections were raised	Maps provided to Michaels family for consideration – location agreed in principal. Leah drafting new agreement with compensation particulars for consideration and signing.	Agreement to be reviewed and signed
Landowner #3	22 June 22	EMAIL: Response to draft access agreement with comments	Some minor amendments to the agreement T&C, and amendments required to compensation	Some follow up phone calls and meeting planned for 10/7	N/A
YSRC	30 June 2022	EMAIL – Activity description for North Erregulla Deep-1 exploration well provided to YSRC.	Pending – no response as at 21 July 2022.	N/A	Pending

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Stakeholder	Date	Summary of Consultation	Objections / claims raised	ERL response	Close out of Issues (if any)
YSRC	July 2022	PHONE and EMAIL correspondence requesting updates on activity descriptions.	N/A	N/A	N/A
YSRC	11 July 2022	EMAIL – Activity description for Irwin River crossing improvement works provided to YSRC.	Heritage survey required for river crossing	Pre activity survey conducted and monitors on site for the activity – no items of heritage significance encountered	Closed
DPLH	11 – 13 July 2022	EMAIL – Activity Management Plan for Irwin River Crossing Improvement Works provided to DPLH.	Clarification on scope of works and noting support from Traditional Owners/YSRC.		Approval received on the 6 th Oct 2022
Landowner #2	15 June 22	EMAIL: response with questions for drilling and camp location and water bore location, some questions to answer and request for execution version of agreements.	No objections	Some further questions regarding vegetation and agreement specifics.	Answers sought from Project Manager/Legal.
Landowner #2	5 July 22	EMAIL: Clean version of drilling and camp access and compensation agreement attached and answers to questions provided.	No objections	Answers to all questions provided by email.	N/A
Heritage consultant	20 July 2022	PHONE – Call to discuss the activity notices that were submitted to the YSRC. Consultant advised that these would be discussed at the weekly heritage meeting and the YSRC should come back to EnRes with any feedback on the activity notices.	N/A	Pre activity survey conducted and monitors on site for the activity – no items of heritage significance encountered	Closed
Landowner #4	04 Aug 2022	Darrell Girgenti (Wells Project Manager) and Allan Lenane (Civils contractor) met with Daniel to discuss civils plan and revisit the proposed well location. Also discussed alternate access for Lockyer-2 through their farm.	No objections RE Lockyer-4 discussion however not enthusiastic about alternate access to Lockyer-2	N/A	N/A
Perpetual	27 Sept 2022	Land Access Agreement finalised between the parties	No objections raised	N/A	Closed
Rob Holmes	13 Oct 2022	Land Access Agreement finalised between the parties	No objections raised	N/A	Closed
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Stakeholder	Date	Summary of Consultation	Objections / claims raised	ERL response	Close out of Issues (if any)
Rebecca, Paul and Sue Kelly	28 Nov 2022	Land Access Agreement finalised between the parties	No objections raised	N/A	Closed
DPLH	23 Nov 2022	Response letter advising the L-4 activity area is outside the closed boundary for Aboriginal site ID 24381 (Lockier River)	N/A	N/A N/A	N/A
YSRC	30 Nov 2022	EMAIL – Activity description for Lockyer-4 exploration well provided to YSRC	No objections raised - no heritage survey is required	Invitations for monitors to be on site during stripping of top soil	Closed

6.1 Ongoing Consultation

ERL will continue to engage with identified relevant stakeholders for the duration of the project. ERL plans to be operating in the Perth Basin for a long time, and wishes to ensure we are seen as a valued and respected member of the communities we will be working in. ERL aim to ensure all dealings with the community are transparent and based on honesty and integrity.

ERL is committed to working with the local community to ensure people are kept informed and can ask questions and raise issues if required. All questions, feedback or concerns are considered and responded to. Some of the stakeholder engagement activities related to the wells and other activities in EP 368 are summarised in Table 6-2.

TABLE 6-2: SUMMARY OF ONGOING STAKEHOLDER ENGAGEMENT

ENGAGEMENT	PROCESS/ACTIVITY	RATIONALE
Landowner meetings	Ensure suitable timing to landowner for meetings.	Used for consultation about land access agreements for flora and fauna surveys and seismic activities.
1:1 face-to-face meetings	Special face to face meetings with key stakeholders on as needs basis.	Used for consultations with decision making authorities, regulatory agencies, Traditional Owners, industry peers, community groups and individual stakeholders.
Letters and direct correspondence		Used for specific stakeholders with specific areas of interest.
Site visits	,	Offered to interested stakeholders to visually demonstrate well activities in progress on an as needs basis.
Face to face information and Q&A sessions	key stakeholders and community groups on	Used for consultations with decision making authorities, regulatory agencies, Traditional Owners, industry peers, community groups and individual stakeholders
Facts sheets	from technical specialists, peers, APPEA,	Used to educate stakeholders on operational capability and explain how ERL plans to manage key issues/risks. Content will be presented in an

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informative, but non-technical way. Visual element essential.
May also be used for public events such agricultural shows and other community events.

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7 References

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Appendix 1 Chemical Disclosure

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1. **Drilling Fluid Chemical Disclosure**

A. SYSTEM DETAILS:	
OPERATOR:	ERL
PROJECT / WELL NAME:	Lockyer-2, Lockyer-3, Lockyer-4, North Erregulla Deep-1 Exploration Wells
SYSTEM:	Drilling Fluids, HT Logging Pill & Completion Brine
TOTAL VOLUME OF SYSTEM (m³):	*3180 m³ per well

^{*} includes 100% contingency volume

B. PRODUCT LIST	B. PRODUCT LIST							
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached			
Water	N/A	Base Fluid	Bore water sourced onsite	69.31%	N			
Barite / API Barite	Newpark	Weighting Agent	Constituents: BARIUM SULPHATE QUARTZ (CRYSTALLINE SILICA) Toxicity: Low toxicity. Under normal conditions of use, adverse health effects are not anticipated. QUARTZ (SILICA CRYSTALLINE) (14808-60-7) LCLo (inhalation) 300 ug/m³/10 years (human) TCLo (inhalation) 16 000 000 particles/ft3/8 hours/17.9 years (human-fibrosis) Aquatic toxicity: Fish Toxicity LC50 (Rainbow trout) > 7500 ppm/96hrs. LC50 (Fresh Water Trout) > 21,000 ppm/96hrs. LC50 (Salt Water StickleBack) > 56,000 ppm/96hrs. Biodegradation/bioaccumulation: Barium sulphate (major ingredient of barite (60-100%)) is insoluble in water and not biodegradable. Not expected to bioaccumulate.	0.19%	Y			

B. PRODUCT LIS					
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities.		
			OCNS Rated E - 24310, Exp 09/08/2021		
			Constituents: BENTONITE		
			QUARTZ (CRYSTALLINE SILICA) SODA ASH		
		Toxicity: The main component/s of this product are not anticipated to cause any adverse effects to plants or animals. QUARTZ (SILICA CRYSTALLINE) (14808-60-7) LCLo (inhalation) 300 ug/m³/10 years (human) TCLo (inhalation) 16 000 000 particles/ft3/8 hours/17.9 years (human-fibrosis)			
			effects to plants or animals. QUARTZ (SILICA CRYSTALLINE) (14808-60-7)		
Bentonite / Maxigel / API Bentonite	Newpark	Viscosifier	BENTONITE (1302-78-9) LD50 (intravenous) 35 mg/kg (rat) LD50 (oral): >2000mg/kg (rat) LDLo (intravenous) 10 mg/kg (dog) Inhalation LC 50: >5.27 mg/L, 4hr (rat)	2.00%	Y
			Ecotoxicity Data: Bentonite (1302-78-9) EC50 Daphnia > 100 mg/l, 48 hours		
			EC50 Freshwater algae > 100 mg/l, 72 hours LC50 Freshwater fish 16000 mg/l, 96 hours		
			LC 50 Marine water fish 2800 - 3200 mg/l, 24 hours EC50 Coon stripe shrimp (<i>Pandalus danae</i>) 24.8 mg/l, 96 hours		
			EC 50 Dungeness or edible crab (Cancer magister) 81.6 mg/l, 96 hours LC50 Rainbow trout, donaldson trout (<i>Oncorhynchus mykiss</i>) 19000 mg/l, 96 hours		
			Persistence and degradability: Not relevant for inorganic substances Mobility: Low water solubility, expected to sink and migrate into the sediment. Expected to partition to		

Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			sediment and wastewater solids. <u>Bioaccumulation:</u> Will not bio-accumulate. <u>Other adverse effects:</u> No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component. OCNS Rated E - 26210 Exp 01/02/2021		
Potassium Chloride	Newpark	Shale swelling inhibition (smectite & illite clays)	Constituents: POTASSIUM CHLORIDE Toxicity: Acute toxicity: LD50 (Ingestion): 1500 mg/kg (mouse) LD50 (Intraperitoneal): 620 mg/kg (mouse) LD50 (Intravenous): 117 mg/kg (mouse) LDLo(Ingestion): 20 mg/kg (mouse) LDLo (Intraperitoneal):900 mg/kg (guinea pig) LDLo (Intravenous): 77 mg/kg (guinea pig) LDLo (Subcutaneous): 2120 mg/kg (frog) TDLo (Ingestion): 60 mg/kg/days (woman) Ecotoxicity: In short-term acute toxicity tests with fish, daphnia and algae the following results were found (lowest test result values): Ictalurus punctulus 48h-LC50 = 720 mg/l; Daphnia magna: 48h-LC50 = 177 mg/l; Nitzschia linearis: 120 h-EC50 = 1337 mg/l. A chronic reproductive test with the invertebrate Daphnia magna gave a LOEC of 101 mg/l. All the studies compiled on the acute and chronic aquatic toxicity were > 100 mg/L. Thus, it is concluded that KCl is not hazardous to freshwater organisms. Taking into considerations the background concentrations of KCl in seawater (380 mg/l K+ and 19,000 mg/l Cl-), it is concluded that there is no reason for further investigations of KCl on marine species. The low concern for the environment is supported by the absence of a bioaccumulation potential for the substance. Biodegradability does not pertain to inorganic substances. Does not	3.66%	Υ

B. PRODUCT LIST					
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			bioaccumulate. Mobile in Soil: No impact if small amount is released to the soil. OCNS Rated E - 24330, Exp 11/03/2021		
Calcium Carbonate Various Grades – TrueCarb's, Limestone t / Circal's / Unical C300C, Omyacarb's	Newpark	Bridging & Weighting Agent	CONSTITUENT 1 (>96%) Toxicology Data: Oral Toxicity (LD50) - > 5000 mg/kg (rat) CONSTITUENT 2 (<1%) Toxicology Data: LCLo (inhalation) = 300 ug/m³/10 years (human) TCLo (inhalation) = 16 000 000 particles/ft3/8 hours/17.9 years (human-fibrosis) Ecotoxicity Data: Calcium carbonate occurs naturally in a wide variety of substances including limestone, marble and egg shells. It is not anticipated to cause adverse environmental effects. Biodegradation/Bioaccumulation: This product does not bioaccumulate.	2.93%	Y
Salt (Sodium Chloride all grades)	Newpark	Weighting Agent	Constituents: SODIUM CHLORIDE INORGANIC SALT(S) WATER Toxicity: Acute toxicity: LC50 (Inhalation): > 42000 mg/m3/1 hour (rat) LD50 (Ingestion): 3000 mg/kg (rat) LD50 (Skin): > 10000 mg/kg (rabbit) Ecotoxicity: LC50 (water flea) is 2122 mg/L/48 hours;	19.80%	Y

B. PRODUCT LIST					
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			LC50 (fathead minnow) is 6.57 g/L/96 hours. This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. <u>Biodegradation/Bioaccumulation:</u> Biodegradability does not pertain to inorganic substances. Does not bioaccumulate.		
NewZan D/Xanthan gum	Newpark	Viscosifier	Constituents: XANTHAM GUM WATER Toxicity: Acute toxicity: LD50 (oral) > 1000 mg/kg (mouse) LD50 (oral) > 45,000 mg/kg (rat) LD50 (oral) > 20,000 mg/kg (dog) LD50 (intraperitoneal): > 50 mg/kg (mouse) LD50 (intravenous): 100-250 mg/kg (mouse) Biodegradation/Bioaccumulation: This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Not expected to bioaccumulate. OCNS Rated E - 26280, Exp 22/02/2021	0.43%	Y
NewPac LV / NewPac PLV / Drispac SL	Newpark	Fluid Loss	Constituents: SODIUM CARBOXYMETHYL CELLULOSE SODIUM CHLORIDE WATER SODIUM GLYCOLATE Toxicity: Acute toxicity data available for ingredients: SODIUM CARBOXYMETHYL CELLULOSE (9004-32-4)	0.52%	Y

Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			LD50 (Ingestion): 16000 mg/kg (guinea pig)		
			LD50 (Skin): > 2000 mg/kg (rabbit)		
			TDLo (Ingestion): 140 mg/kg (rat)		
			SODIUM CHLORIDE (7647-14-5)		
			LC50 (Inhalation): > 42000 mg/m3/1 hour (rat)		
			LD50 (Ingestion): 3000 mg/kg (rat)		
			LD50 (Intraperitoneal): 2602 mg/kg (mouse)		
			LD50 (Intravenous): 645 mg/kg (mouse)		
			LD50 (Skin): > 10000 mg/kg (rabbit)		
			LD50 (Subcutaneous): 3000 mg/kg (mouse)		
			LDLo (Ingestion): 8000 mg/kg (rabbit)		
			LDLo (Intravenous): 300 mg/kg (guinea pig)		
			LDLo (Subcutaneous): 2160 mg/kg (guinea pig)		
			TDLo (Ingestion): 12357 mg/kg (human) SODIUM GLYCOLATE (2836-32-0)		
			LD50 (Ingestion): 6700 mg/kg (mouse) LDLo (Ingestion): 500 mg/kg (cat)		
			Ecotoxicity:		
			LC50 (Fresh Water Trout) > 21,000 ppm/96hrs.		
			LC50 (Salt Water StickleBack) > 56,000 ppm/96hrs.		
			Biodegradation/Bioaccumulation:		
			This product is not anticipated to cause adverse effects to animal or plant life if		
			released to the environment in small quantities. Not expected to bioaccumulate.		
			NewPac LV - OCNS Rated E - 28129, Exp 18/05/2021		
		Prevent lost	Constituents:		
NDFT 376 & NDFT		circulation	ORGANIC FIBRE(S)		
377	Newpark		Not classified as hazardous according to Safe Work Australia criteria.	0.05%	Υ
311			Toxicity:		

B. PRODUCT LIST	Г				
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			This product is expected to be of low acute toxicity. Under normal conditions of use, adverse health effects are not anticipated.		
			Oral Toxicity (LD50) > 5000 mg/kg (rat),		
			Dermal Toxicity (LD50) > 2000 mg/kg (rabbit)		
			Biodegradation/Bioaccumulation:		
			No information provided.		
			CONSTITUENT 1 (68-72%)		
			Toxicology Data:		
			Oral Toxicity (LD50) 6400 mg/kg (rat)	0.04%	
			Dermal Toxicity (LD50) > 2000 mg/kg (rabbit)		
			LD50 (Ingestion): 2200 mg/kg (rabbit)		
			LD50 (Intraperitoneal): 1450 mg/kg (mouse)		
Ancor 1	Nowpork	Corrosion	LD50 (Skin): > 20 mL/kg (rabbit)		Y
Alicor	Newpark	Inhibitor	TDLo (Ingestion): 16 g/kg/64 weeks (mouse - cancer)		T
			Ecotoxicity Data:		
			LC50 (shrimp): > 100 ppm.		
			Biodegradation/bioaccumulation:		
			Not expected to bioaccumulate.		
			CONSTITUENT 2 (28-32%)		
			Non-hazardous ingredient.		
			Constituents:		
		Encapsulating	Not applicable – Non-hazardous ingredients		
AvaPolymer 5050	Newpark	Agent - provides	Hazard Identification:	0.15%	Υ
		shale inhibition	Not a dangerous substance or mixture according to the Globally Harmonized		
			System (GHS).		

B. PRODUCT LIS	B. PRODUCT LIST						
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached		
			Constituent 1 – (60%) ATEmix (oral) 27,000.00 mg/kg ATEmix (dermal) 2,002.00 mg/kg Constituent 2 - (40%) Oral Toxicity (LD50) - 16000 mg/kg (guinea pig) Dermal Toxicity (LD50) - > 2000 mg/kg (rabbit) TDLo (oral) 140 mg/kg (rat) Ecotoxicity: The environmental impact of this product has not been fully investigated. 100% of the mixture consists of component(s) of unknown hazards on the aquatic environment. This product has an CEFAS OCNS Gold rating. Registration number 27397 Biodegradation/Bioaccumulation: No information available.				
Caustic Soda	Newpark	pH control- prevents bacteria & corrosion.	Constituents: SODIUM HYDROXIDE Toxicity: Toxicity Data available for the ingredients: SODIUM HYDROXIDE (1310-73-2): LD50 (Intraperitoneal): 40 mg/kg (mouse) LDLo (Ingestion): 1.57 mg/kg (human) SILICA, AMORPHOUS (7631-86-9): LD50 (ingestion): 3160 mg/kg (rat)	0.10%	Υ		

B. PRODUCT LIST Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			Biodegradation/Bioaccumulation: Biodegradability does not pertain to inorganic substances. Does not bioaccumulate. WATER: If released to waterways, alkaline products may change the pH of the waterway. Fish will die if the pH reaches 10-11 (goldfish 10.9, bluegill 10.5). SOIL: May leach to groundwater with toxic effects on aquatic life as above. ATMOSPHERE: Not expected to reside in the atmosphere. Drops or particles released to atmosphere should be removed by gravity and/or be rained out. OCNS category and registration number E - 24316		
Sodium Sulphite	Newpark	Oxygen Scavenger	Constituents: SODIUM SULPHITE SODIUM SULPHATE SODIUM CARBONATE WATER Toxicity: Acute toxicity: LD50 (Ingestion): 820 mg/kg (mouse) LD50 (Intraperitoneal): 950 mg/kg (mouse) LD50 (Intravenous): 175 mg/kg (mouse) LDLo (Ingestion): 2825 mg/kg (rabbit) LDLo (Intravenous): 400 mg/kg (cat) LDLo (Subcutaneous): 600 mg/kg (rabbit) SODIUM CARBONATE (497-19-8) LC50 (inhalation) 800 mg/m³/2 hours (guinea pig) LD50 (ingestion) 4090 mg/kg (rat) LD50 (subcutaneous) 2210 mg/kg (mouse) SODIUM SULPHATE (7757-82-6) LD50 (ingestion) 5989 mg/kg (mouse)	0.16%	Y

B. PRODUCT LIST						
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached	
			LDLo (intravenous) 1220 mg/kg (mouse) TDLo (ingestion) 14 g/kg (mouse - 8-12 days pregnant) TDLo (subcutaneous) 806 mg/kg/26 weeks intermittently (mouse) Biodegradation/Bioaccumulation: Biodegradability does not pertain to inorganic substances. Does not bioaccumulate. OCNS category and registration number E - 26232			
Soda Ash	Newpark	pH / Hardness control	Constituents: SODIUM CARBONATE Toxicity: LD50 (Ingestion): 4090 mg/kg (rat) LC50 (Inhalation): 800 mg/m3/2 hours (guinea pig) LD50 (Intraperitoneal): 117 mg/kg (mouse) LD50 (Subcutaneous): 2210 mg/kg (mouse) Ecotoxicity: Fishes, Lepomis macrochirus, LC50, 96 h, 300 mg/l Crustaceans, Ceriodaphnia dubia, EC50, 48 h, 200 - 227 mg/l Biodegradation/Bioaccumulation: Biodegradability does not pertain to inorganic substances. Does not bioaccumulate. WATER: If released to waterways, alkaline products may change the pH of the waterway. Fish will die if the pH reaches 10-11 (goldfish 10.9, bluegill 10.5). SOIL: May leach to groundwater with toxic effects on aquatic life as above. ATMOSPHERE: Not expected to reside in the atmosphere. Drops or particles released to atmosphere should be removed by gravity and/or be rained out. OCNS category and registration number E - 26180	0.11%	Y	
Sodium Bicarbonate	Newpark	pH Buffer, Contamination Treatment	Constituents: SODIUM BICARBONATE Toxicity:	0.15%	Υ	

B. PRODUCT LIS			I		
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			Acute toxicity: LD50 (Ingestion): 3360 mg/kg (mouse) LC50 (inhalation): 4.74 mg/L (rat) Ecotoxicity: Fishes, Lepomis macrochirus, LC50, 96 h, 300 mg/l Crustaceans, Ceriodaphnia dubia, EC50, 48 h, 200 - 227 mg/l Ecotoxicity Data: LC50 (Oncorhynchus mykiss), 96 h, 7.700 mg/l LC50 (Lepomis macrochirus), 96 h, 7.100 mg/l EC50 (Crustaceans, Daphnia magna) 48 h, 4.100 mg/l LOEC (Crustaceans, Daphnia magna) 48 h, 3.100 mg/l Biodegradation/Bioaccumulation: Biodegradability does not pertain to inorganic substances. Not expected to bioaccumulate. This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. OCNS category and registration number E - 26175		
ldcide-20	Newpark	Biocide/Prevents bacterial contamination of the mud	Constituents: TETRAKIS(HYDROXYMETHYL)PHOSPHONIUM SULPHATE(2:1) WATER Toxicity: Toxicity data available for ingredient: TETRAKIS(HYDROXYMETHYL)PHOSPHONIUM SULPHATE (55566-30-8) LD50 (ingestion) 248 mg/kg (rat) TDLo (ingestion) 650 mg/kg/13 weeks - intermittent (rat) Ecotoxicity: 75% TETRAKIS(HYDROXYMETHYL)PHOSPHONIUM SULPHATE (55566-30-8): LC50 (Rainbow Trout) = 119 mg/L/96 hr LC50(Bluegill Sunfish) = 93 mg/L/ 96 hr	0.09%	Y

Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			EC50 (Daphnia Magna) = 19 mg/L/48 hr		
			LC50 (Brown Shrimp) = 340 mg/L/96 hr		
			LC50 (Mysid Shrimp) = 9.5 mg/L/96 hr		
			LC50 (Sheepshead Minnow) = 94 mg/L/96 hr		
			LC50 (Jevenile Plaice) = 86 mg/L/96 hr		
			Waste Water management EC50 (Activated Sludge) = 24 mg/L/3 hr		
			Persistence and degradability:		
			This product is readily biodegradable.		
			http://www.inchem.org/documents/ehc/ehc/ehc218.htm		
			Constituents:		
	Newpark	wpark pH Buffer	CITRIC ACID	0.03%	
			WATER		
			Toxicity:		
			Acute toxicity:		
			LD50 (Ingestion): 3000 mg/kg (rat)		
			LD50 (Intraperitoneal): 290 mg/kg (rat)		
			LD50 (Intravenous): 42 mg/kg (mouse)		
Citric Acid			LDLo (Ingestion): 7000 mg/kg (rabbit)		Υ
Citric Acid			Ecotoxicity:		T
			LC50 (Leuciscus idus melanotus): 440 mg/L - 48 h		
			LC 50 (Daphnia magna) (Water flea) - 1.535 mg/L - 24 h		
			Biodegradation/Bioaccumulation:		
			Readily Biodegradability. Does not bioaccumulate.		
			If citric acid is released to water, it is expected to biodegrade rapidly. May be toxic		
			to fish at moderately high levels (120 ppm is fatal to daphnia; 894 ppm with pH 4		
			is fatal to goldfish) due to acidic nature. Fairly high biological oxygen demand		
			(BOD) which may cause oxygen depletion in large spills. Citric acid occurs naturally in many plants.		

B. PRODUCT LIST						
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached	
			OCNS category and registration number E - 24317			
Magnesium Oxide	Newpark	pH Indicator	Constituents: MAGNESIUM OXIDE CALCIUM OXIDE SILICON DIOXIDE (SILICA, AMORPHOUS) Not classified as hazardous according to Safe Work Australia criteria. Toxicity: Acute toxicity: This product is expected to be of low toxicity. Ecotoxicity: No information provided. Bioaccumulation/Biodegradation: No information provided. OCNS category and registration number E - 28127	0.05%	Υ	
TEA	Newpark	Polymer stabiliser which effectively reduces the degradation of polymers at high temperatures	Constituents: TRIETHANOLAMINE DIETHANOLAMINE Toxicity: Acute toxicity: CONSTITUENT 1 (>60%) Oral Toxicity (LD50) 2200 mg/kg (rabbit), Dermal Toxicity (LD50) > 20 mL/kg (rabbit) CONSTITUENT 2 (10 – 30%) Oral Toxicity (LD50) 620 uL/kg (rat), Dermal Toxicity (LD50) > 20 mL/kg (rabbit) CONSTITUENT 3 (<10%) Component is naturally occurring and not intrinsically hazardous. Biodegradation/Bioaccumulation: The substance is expected to be readily biodegradable according to the AS 4351 Part 2 test method.	0.12%	Υ	

Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			In soil and water, triethanolamine will biodegrade fairly rapidly following acclamation (half-life in the order of days to weeks). In soil, residual triethanolamine may leach to groundwater. LC50 (shrimp): > 100 ppm.		
Driscal D	Newpark	High temperature polymer	Constituents: Not applicable – Non-hazardous ingredients. Not a dangerous substance or mixture according to the Globally Harmonized System (GHS). Toxicity: LCLo (Inhalation): 300 ug/m3/10 years (human), LDLo (Intratracheal): 200 mg/kg (rat) LDLo (Intravenous): 20 mg/kg (dog), TCLo (Inhalation): 16 000 000 particles/ft3/8 hours/17.9 years (human-fibrosis) The product contains no substance classified as hazardous to health in concentrations which should be taken into account. Bioaccumulation: Accumulation in aquatic organisms is unlikely. Biodegradability: Taking into consideration the properties of several ingredients, the product is estimated not to be readily biodegradable according to OECD classification.	0.03%	Y
Gagetrol	Newpark	HT Fluid Loss	Constituents: CARBOXYMETHYL STARCH Not classified as hazardous according to Australian WHS Regulations. Toxicity: Low toxicity - low irritant. Under normal conditions of use, adverse health effects are not anticipated. Ecotoxicity:	0.03%	Υ

B. PRODUCT LIST	Γ				
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities.		
			Biodegradation/Bioaccumulation:		
			Not expected to bioaccumulate.		
			OCNS category and registration number Gold - 27759		
Defoam-AP400	Newpark	Defaomer suitable for High Temperatures	Constituents: POLYETHYLENE GLYCOL OCTAN-2-OL Not classified as hazardous according to Safe Work Australia criteria. Toxicity: Low toxicity - low irritant. This product has the potential to irritate mucous membranes. Use safe work practices to avoid eye or skin contact and inhalation. Due to the low vapour pressure of this product, an inhalation hazard is not anticipated with normal use. Chronic exposure to some glycols may result in liver and kidney damage. POLYETHYLENE GLYCOL (25322-68-3) LD50 (ingestion) 33750 mg/kg (rat) Ecotoxicity: No information provided. Biodegradation/Bioaccumulation: No information provided. ATMOSPHERE: Vapour phase glycols are expected to degrade fairly rapidly by reaction with hydroxyl radicals (eg half-life 32 hours for propylene glycol). Removal from air by rainfall is possible. WATER: Should degrade relatively rapidly via biodegradation. SOIL: If released to soil, relatively rapid biodegradation should also occur. Leaching to groundwater may occur.	0.05%	Y
			, , ,		
TOTAL				100%	

B. PRODUCT LIST						
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached	
Ancor 1	Newpark	Corrosion Inhibitor	CONSTITUENT 1 (68-72%) Toxicology Data: Oral Toxicity (LD50) 6400 mg/kg (rat) Dermal Toxicity (LD50) > 2000 mg/kg (rabbit) LD50 (Ingestion): 2200 mg/kg (rabbit) LD50 (Intraperitoneal): 1450 mg/kg (mouse) LD50 (Skin): > 20 mL/kg (rabbit) TDLo (Ingestion): 16 g/kg/64 weeks (mouse - cancer) Ecotoxicity Data: LC50 (shrimp): > 100 ppm. Biodegradation/bioaccumulation: Not expected to bioaccumulate. CONSTITUENT 2 (28-32%) Non-hazardous ingredient.	0.04%	Y	
AVADEFOAM NS	Newpark	Defoamer suitable for WBM	Constituents: Not applicable – Non-hazardous ingredients. Not a dangerous substance or mixture according to the Globally Harmonized System (GHS). Toxicity: CONSTITUENT 1 (95%) - Acute toxicity - Acute oral toxicity (LD50): 9380 mg/kg [Rat]. Ecotoxicity: Ecotoxicity in water (LC50): 100 mg/l 96 hours [Fish]. Possibly hazardous short-term degradation products are not likely. However, long term degradation products may arise. The product itself and its products of degradation are not toxic. Toxicity:	0.03%	Υ	

B. PRODUCT LIS	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			CONSTITUENT 2 (5%) - Acute toxicity - Dermal LD50 Albino rabbit - > 2000 mg/kg, 14 days At this dose no death occurred. LD50 Oral Albino Sprague-Dawley rat > 10000 mg/kg, 14 days At this dose no death occurred. Ecotoxicity: Product Information: Product does not present an acute toxicity hazard based on known or supplied information. The following values are calculated based on chapter 3.1 of the GHS document ATEmix (oral) 10,010.00 mg/kg. The product is not classified as environmentally hazardous. Components Species Test Results Tall Oil Fatty Acids EC50 Bacteria (<i>Pseudomonas putida</i>) > 10000 mg/l, 16 hr Aquatic Algae EL50 > 1000 mg/l, 72 hr Growth rate; OECD 201 Green algae (<i>Selenastrum capricornutum</i>) Crustacea EL50 Water flea (<i>Daphnia magna</i>) > 1000 mg/l, 48 hr OECD 202 Fish LL50 Zebra danio (<i>Danio rerio</i>) > 10000 mg/l, 96 hr 95 % of the mixture consists of component(s) of unknown hazards to the aquatic environment Biodegradation/Bioaccumulation: - Percent degradation (Aerobic biodegradation) Tall Oil Fatty Acids 88 - 100 % CO2 Evolution Test Species: Activated sewage sludge Test Duration: 28 d OCNS category and registration number Gold - 27915		
New Perm NF / AvaPerm NF	Newpark	Prevent swelling clays by blocking the site for water hydration.	An equivalent product to AVAPERM NF has been registered on the CEFAS Offshore Chemical Notification Scheme with a 'Gold' rating & Registration # 24780 Constituents (mixture): HEXANEDINITRILE, HYDROGENATED, HIGH-BOILING FRACTION – (30 to 50%)	0.80%	Y

Supplier	Purpose	Toxicity & Eco toxicity Info	0/ 5 1 1	
		Toxicity & Eco toxicity into	% Product in system fluid	SDS Attached
		HYDROCHLORIC ACID (<15%)		
		NON-HAZARDOUS INGREDIENTS – (Remainder)		
		<u>Toxicity:</u>		
		Skin corrosion/irritation: Not corrosive (B.40 Bis - Reg. 440/2008/EC).		
		Skin contact: Harmful and irritant.		
		Eye contact: Irritant.		
		Inhalation: Irritant.		
		Ingestion: Harmful.		
		Acute oral toxicity on rats (LD50): > 500 < 1000 mg/kg.* (based on components)		
		Following information is confidential:		
		Ecotoxicity:		
		EC 50 (Skeletonema costatum) 54.4 mg/l		
		LC50 (Acartia tonsa) 52.4 mg/l		
		LC50 (Scophthalmus maximus juvenile) >51.0 mg/l		
		Biodegradation/Bioaccumulation:		
		Biodegradation Seawater test OECD 306 75 %		
		Bioaccumulation OECD 117 LogPow ≤ 1.36		
Newpark	Weighting Agent	See Above	6.49%	Υ
		Constituents:		
	0	SODIUM ERYTHORBATE		
Newpark		<u>Toxicity:</u>	0.02%	Υ
	sulphur based,	Constituent 1 – (>99%) The following values are calculated based on chapter 3.1 of the GHS document ATEmix (oral) 5,005.00 mg/kg	3.0270	
	Newpark	Agent Oxygen Newpark Scavenger Non-	NON-HAZARDOUS INGREDIENTS – (Remainder) Toxicity: Skin corrosion/irritation: Not corrosive (B.40 Bis - Reg. 440/2008/EC). Skin contact: Harmful and irritant. Eye contact: Irritant. Inhalation: Irritant. Ingestion: Harmful. Acute oral toxicity on rats (LD50): > 500 < 1000 mg/kg.* (based on components) Following information is confidential: Ecotoxicity: EC 50 (Skeletonema costatum) 54.4 mg/l LC50 (Acartia tonsa) 52.4 mg/l LC50 (Scophthalmus maximus juvenile) >51.0 mg/l Biodegradation/Bioaccumulation: Biodegradation Seawater test OECD 306 75 % Bioaccumulation OECD 117 LogPow ≤ 1.36 Newpark Weighting Agent See Above Constituents: SODIUM ERYTHORBATE Toxicity: Constituent 1 – (>99%) The following values are calculated based on chapter 3.1	NON-HAZARDOUS INGREDIENTS — (Remainder) Toxicity; Skin corrosion/irritation: Not corrosive (B.40 Bis - Reg. 440/2008/EC). Skin contact: Harmful and irritant. Eye contact: Irritant. Inhalation: Irritant. Inhalation: Irritant. Ingestion: Harmful. Acute oral toxicity on rats (LD50): > 500 < 1000 mg/kg.* (based on components) Following information is confidential: Ecotoxicity; EC 50 (Skeletonema costatum) 54.4 mg/l LC50 (Acartia tonsa) 52.4 mg/l LC50 (Scophthalmus maximus juvenile) >51.0 mg/l Biodegradation/Bioaccumulation: Biodegradation Seawater test OECD 306 75 % Bioaccumulation OECD 117 LogPow ≤ 1.36 Newpark Weighting Agent See Above 6.49% Constituents: SODIUM ERYTHORBATE Toxicity: Constituent 1 − (>99%) The following values are calculated based on chapter 3.1 of the GHS document ATEmix (oral) 5,005.00 mg/kg

B. PRODUCT LIST	Т				
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			Ecotoxicity: The environmental impact of this product has not been fully investigated. Unknown aquatic toxicity. 100 % of the mixture consists of component(s) of unknown hazards to the aquatic environment. Biodegradation/Bioaccumulation: Persistence/Degradability: Possibly hazardous short-term degradation products are not likely; However, long term degradation products may arise.		
Thinpol	Newpark	Liquid dispersant	CONSTITUENT 1 (30-60%) Toxicology Data: This product is expected to be of low acute toxicity. Under normal conditions of use, adverse health effects are not anticipated Oral Toxicity LD50 - 2500 mg/kg (rat) LD50 (intraperitoneal) 39 mg/kg (mouse) LD50 (intravenous) 70 mg/kg (mouse) CONSTITUENT 2 (<100%) Toxicology Data: Non-hazardous ingredient. Ecotoxicity Data: (10000 ppm test concentration) (EPA-821-R-02-012) Mysidopsis Bahia = 48HR LC50 = 16.2mg/L. Menidia Beryllina = 48hr LC50 = 34.2 mg/L. Scophthalmus Maximus = 96hr LC50 > 1000 mg/L. Skeletonemia Costatum = 72hr EC50 = 393 mg/L [NOEC = 118 mg/L] Acartia Tonsa = 48hr EC50 = 393 mg/L [NOEC = 112 mg/L] Corophium Volutator = 10 day LC50 = 9338 mg/Kg [NOEC = 1000mg/Kg]	0.10%	Y

B. PRODUCT LIST							
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached		
			No information available.				
NDFT 376 & 377	Newpark	Prevent lost circulation	Toxicology Data: Oral LD50 - > 5000 mg/kg (rat) Dermal LD50 - > 2000 mg/kg (rabbit) Inhalation LC50 - > 5800 mg/m³/4 hours (rat) Ecotoxicity Data: No information available. Biodegradation/bioaccumulation: No information available.	0.11%	Y		
Calcium Chloride (94%) Powder	Newpark	Weighting Agent	Constituents: CALCIUM CHLORIDE ANHYDROUS SODIUM CHLORIDE WATER Toxicity: Acute toxicity: Based on available data, the classification criteria are not met. Toxicity Data available for the ingredients: CALCIUM CHLORIDE ANHYDROUS (10043-52-4) LD50 (Ingestion): 1000 mg/kg (rat) LD50 (Intraperitoneal): 210 mg/kg (mouse) LD50 (Subcutaneous): 823 mg/kg (mouse) LD50 (Subcutaneous): 823 mg/kg (mouse) LDLo (Ingestion): 1384 mg/kg (rabbit) LDLo (Intravenous): 150 mg/kg (guinea pig) LDLo (Subcutaneous): 249 mg/kg (cat) TDLo (Intravenous): 20 mg/kg/1 hour (woman) SODIUM CHLORIDE (7647-14-5) LC50 (Inhalation): > 42000 mg/m3/1 hour (rat) LD50 (Ingestion): 3000 mg/kg (rat)	0.07%	Y		

B. PRODUCT LIST							
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached		
			LD50 (Intraperitoneal): 2602 mg/kg (mouse) LD50 (Intravenous): 645 mg/kg (mouse) LD50 (Skin): > 10000 mg/kg (rabbit) LD50 (Subcutaneous): 3000 mg/kg (mouse) LDL0 (Ingestion): 8000 mg/kg (rabbit) LDL0 (Intravenous): 300 mg/kg (guinea pig) LDL0 (Subcutaneous): 2160 mg/kg (guinea pig) TDL0 (Ingestion): 12357 mg/kg (human) Ecotoxicity: No information provided. Biodegradation/Bioaccumulation: Biodegradability does not pertain to inorganic substances. Does not bioaccumulate.				
MEG	Newpark	Agent to free differentially stuck pipe	Constituents: ETHYLENE GLYCOL Toxicity: Toxicity data available for ingredient: ETHYLENE GLYCOL (107-21-1) LC50 (inhalation) 10 876 mg/kg (rat) LD50 (ingestion) 1650 mg/kg (cat) LD50 (skin) 9530 ug/kg (rabbit) LDLo (ingestion) 398 mg/kg (human) TCLo (inhalation) 10,000 mg/m³ (human - cough) TDLo (ingestion) 5500 mg/kg (child - anaesthesia) Ethylene glycol will mainly exist in the vapour phase in the ambient atmosphere where it will be degraded by reaction with hydroxyl radicals. Expected to be very highly mobile in soil. Not anticipated to volatilise from moist soil or water surfaces. Ecotoxicity: LC50 (Aquatic species): >100mg/L/96hrs. Non-hazardous to aquatic organisms. Biodegradation/Bioaccumulation:	0.33%	Y		

B. PRODUCT LIST					1
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			Biodegradation in both soil and water is expected to be a major fate process for this compound. Not expected to bioconcentrate in aquatic organisms. Safe Work Australia Exposure Standards: http://hsis.ascc.gov.au/DocumentationES.aspx?ID=722 http://hsis.ascc.gov.au/DocumentationES.aspx?ID=271 CICADS Available:		

B. PRODUCT LIS	T				
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			TCLo (inhalation) 16 000 000 particles/ft3/8 hours/17.9 years (human-fibrosis) CELLULOSE (9004-34-6) LC50 (inhalation) > 5800 mg/m³/4 hours (rat) LD50 (ingestion) > 5000 mg/kg (rat) LD50 (intraperitoneal) > 31600 mg/kg (rat) LD50 (skin) > 2000 mg/kg (rabbit) POLYETHYLENE (9002-88-4) LDLo (ingestion) 3000 mg/kg (rat) MAGNESIUM OXIDE (1309-48-4) TCLo (inhalation) 400 mg/kg (human) Ecotoxicity: This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities Biodegradation/Bioaccumulation: Not expected to bioaccumulate. This product has low mobility in soil.		
Frac Attack	Newpark	Prevent lost circulation	Constituents: CELLULOSE DIATOMACEOUS EARTH FULLERS EARTH CALCIUM OXIDE CALCIUM HYDROXIDE CRISTOBALITE QUARTZ (CRYSTALLINE SILICA) MAGNESIUM OXIDE 1,3 BUTADIENE/STYRENE COPOLYMERS 2-PROPENENITRILE-1,3-BUTADIENE RUBBER NATURAL RUBBER POLYISOPRENE	0.05%	Y

Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			Toxicity: Toxicity: Toxicity data available for the ingredients: CALCIUM HYDROXIDE (1305-62-0) LD50 (ingestion) 7300 mg/kg (mouse) CRISTOBALITE (14464-46-1) TCLo (inhalation) 16 mppcf/8hours/17.9 years (human-fibrosis) QUARTZ (SILICA CRYSTALLINE) (14808-60-7) LCLo (inhalation) 300 ug/m³/10 years (human) TCLo (inhalation) 16 000 000 particles/ft3/8 hours/17.9 years (human-fibrosis) CELLULOSE (9004-34-6) LC50 (inhalation) > 5800 mg/m³/4 hours (rat) LD50 (ingestion) > 5000 mg/kg (rat) LD50 (intraperitoneal) > 31600 mg/kg (rat) LD50 (skin) > 2000 mg/kg (rabbit) MAGNESIUM OXIDE (1309-48-4) TCLo (inhalation) 400 mg/kg (human) Ecotoxicity: The manufacturer reports that this product is harmful to aquatic life. Acute aquatic toxicity. CALCIUM HYDROXIDE (1305-62-0) EC50 Crustacea – 49.1 mg/L (Daphnia magna (water flea); 48-hour) ErC50 Algae – 184.6 mg/L (Pseudokirchneriella subcapitata (algae); 72-hour) Biodegradation/Bioaccumulation: No information was located.		
JK-161 LV / JK-26 / JK-261HP	¹ Newpark	Encapsulating Agent - provides shale inhibition	Constituents: ACRYLAMIDE, SODIUM ACRYLATE COPOLYMER WATER Toxicity:	0.07%	Y

B. PRODUCT LIS	Т				
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			This product is expected to be of low toxicity. Under normal conditions of use, adverse health effects are not anticipated. LD50 rat (oral): > 2,000 mg/kg (OECD Guideline 401). Ecotoxicity:		
			(10000 ppm test concentration) (EPA-821-R-02-012) Mysidopsis bahia = 48hr LC50 = 16.2 mg/L. Menidia beryllina = 48hr LC50 = 34.2 mg/L. Scophthalmus Maximus = 96hr LC50 > 1000 mg/L. Skeletonemia costatum = 72hr EC50 = 393 mg/L [NOEC = 118 mg/L] Acartia tonsa = 48 hr EC50 = 393 mg/L [NOEC = 112 mg/L] Corophium Volutator = 10 Day LC50 = 9338 mg/Kg [NOEC = 1000 mg/Kg]		
			Biodegradation/Bioaccumulation:		
			Not readily biodegradable (by OECD criteria).		
			Based on its structural properties, the polymer is not biologically available. Accumulation in organisms is not to be expected.		
			Constituents:		
			Not applicable – Contains no hazardous ingredients (substance or mixture) according to GHS.		
			<u>Toxicity:</u>		
Driscal D	Newpark	High temperature	LCLo (Inhalation): 300 ug/m3/10 years (human), LDLo (Intratracheal): 200 mg/kg (rat) LDLo (Intravenous): 20 mg/kg (dog), TCLo (Inhalation): 16 000 000 particles/ft3/8 hours/17.9 years (human-fibrosis)	0.02%	Υ
	·	fluid loss control agent	Ecotoxicity:		
		agent	This material is not expected to be harmful to aquatic organisms.		
			Biodegradation/Bioaccumulation:		
			Taking into consideration the properties of several ingredients, the product is estimated not to be readily biodegradable according to OECD classification. Accumulation in aquatic organisms is unlikely.		

Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
Defoam-AP400	Newpark	Defoamer suitable for High Temperatures	CONSTITUENT 1 – (45-60%) Toxicology Data: LD50 (ingestion) 33750 mg/kg (rat) CONSTITUENT 2 – (45-50%) Toxicology Data: This product is expected to be of low toxicity. Under normal conditions of use, adverse health effects are not anticipated. Ecotoxicity Data: Toxicity to Algae - No information available Toxicity to Fish – No information available Toxicity to Microorganisms - No information available Toxicity to Invertebrates – No information available Biodegradation/bioaccumulation: Component is considered not Bioaccumulative.	0.04%	Y
DSCO™ Defoam	Newpark	Defoamer	Constituents: POLYPROPYLENE GLYCOL Toxicity: This product is expected to be of low acute toxicity. Under normal conditions of use, adverse health effects are not anticipated. Not classified as hazardous according to Safe Work Australia criteria. Constituent 1 – (>60%) Oral Toxicity: An oral LD50 300 - 57000 mg/kg (range) Constituent 2 – (remainder) No Hazard Biodegradation/Bioaccumulation: This product is not expected to bioaccumulate.	0.04%	Y
SAPP	Newpark	Deflocculate or disperse	Constituents:	0.07%	Υ

B. PRODUCT LIST							
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached		
		bentonite muds or fluids with high levels of low gravity solids.	DISODIUM PYROPHOSPHATE Toxicity: Acute toxicity: Low toxicity. Ingestion of large quantities may result in nausea, vomiting and gastrointestinal irritation. Ingestion of large quantities may also result in serious disturbances in calcium metabolism. LD50 (Ingestion): 2650 mg/kg (mouse) LD50 (Intraperitoneal): 1 g/kg (mouse) LD50 (Intravenous): 59 mg/kg (mouse) LD50 (Subcutaneous): 480 mg/kg (mouse) Biodegradation/Bioaccumulation: Biodegradability does not pertain to inorganic substances. Does not bioaccumulate. OCNS category (actual or equivalent chemical) and Registration number. E-2449				
Sandseal Fine	Newpark	LCM	Toxicology Data: This product is expected to be of low acute toxicity. Under normal conditions of use, adverse health effects Ecotoxicity Data: No information available. Biodegradation/bioaccumulation: No information available.	0.08%	Υ		
Calcium Carbonate Various Grades – TrueCarb's, Limestone t / Circal's / Unical	s Newpark	Bridging & weighting agent	Constituents: LIMESTONE (CALCIUM CARBONATE) QUARTZ (CRYSTALLINE SILICA) No classified as hazardous according to Australian WHS Regulations. Toxicity:	0.16%	Υ		

B. PRODUCT LIST							
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached		
C300C, Omyacarb's			This product is expected to be of low toxicity. Under normal conditions of use, adverse health effects are not anticipated. LD50 (Ingestion): 6450 mg/kg (rat). Ecotoxicity: Calcium carbonate occurs naturally in a wide variety of substances including limestone, marble and eggshells. It is not anticipated to cause adverse environmental effects. Biodegradation/Bioaccumulation: Biodegradability does not pertain to inorganic substances. Dissolved calcium carbonate dissociates into calcium and carbonate ions. Calcium ions will be assimilated by living organisms in the water and the carbonate will become part of the carbon cycle. This product does not bioaccumulate. Due to its limited solubility, calcium carbonate precipitates and deposits on the				
Flexfirm KA	Newpark	Inhibits dispersion of drilled shale cuttings	Toxicology Data: Oral Toxicity (LD50) 1600 mg/kg (rat) Ecotoxicity Data: The ecotoxicity of potassium silicate has not been tested. The following data is reported for chemically similar sodium silicates on a 100% solids basis: A 96 hour median tolerance for fish (Gambusia affnis) of 2320 ppm; a 96 hour median tolerance of water fleas (Daphnia magna) of 247 ppm; a 96 hour median tolerance for snail eggs (Lymnea) of 632 ppm; and a 96 hour median tolerance for Amphipoda of 160 ppm Biodegradation/bioaccumulation: Neither silica nor potassium will appreciably bio-concentrate up the food chain.	0.13%	Y		
SPA	Newpark	High temperature	Constituents: ACRYLATE – ACRYLAMIDE COPOLYMER Toxicity:	0.05%	Υ		

B. PRODUCT LIST					
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
		fluid loss control agent	This product is expected to be of low toxicity. Based on available data, the classification criteria are not met.		
			Ecotoxicity: (10000 ppm test concentration) (EPA-821-R-02-012) Mysidopsis Bahia = 48HR LC50 = 16.2 mg/L. Menidia Beryllina = 48hr LC50 = 34.2 mg/L. Scophthalmus Maximus = 96hr LC50 > 1000 mg/L. Skeletonemia Costatum = 72hr EC50 = 393 mg/L [NOEC = 118 mg/L] Acartia Tonsa = 48hr EC50 = 393 mg/L [NOEC = 112 mg/L] Corophium Volutator = 10 day LC50 = 9338 mg/Kg [NOEC = 1000 mg/Kg] Biodegradation/Bioaccumulation: No information provided.		
Fracseal F / M / C	Newpark	LCM	Toxicology Data: Oral LD50 (rat) is > 5000 mg/kg. Dermal LD50 (rabbit) is > 2000 mg/kg. LC50 (rat) is 510 mg/m³/2 hours. Inhalation LC50 - > 5800 mg/m³/4 hours (rat) LD50 (intraperitoneal) > 31600 mg/kg (rat) Ecotoxicity Data: No information available. Biodegradation/bioaccumulation: No information available.	0.06%	Y
QUICKSEAL F / M / C	Newpark	LCM / Well Bore Strengthening	CELLULOSE Toxicity: This product is expected to be of low toxicity. Under normal conditions of use, adverse health effects are not anticipated Acute Toxicity: Acute Oral Toxicity: LD50 (oral) > 5000 mg/kg (rats).	0.18%	Υ

B. PRODUCT LIST					
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			Acute Dermal Toxicity: LD50 (dermal) > 2000 mg/kg (rats). Acute Inhalation Toxicity: LC50 (Inhalation) = 5800 mg/m3/4hrs (rat). <u>Ecotoxicity:</u> Low toxicity to aquatic organisms. <u>Biodegradation/Bioaccumulation:</u> This product is readily biodegradable. This product is not expected to bioaccumulate.		
AvaGreenLube	Newpark	Lubricant	Constituents: METHYL ESTERS OF FATTY ACIDS Ecotoxicity: LC50 (Fish) 48 h: > 10000 μg / L LC50 (Mollusc) 48 h: > 10000 μg /L LC50 (Amphibious) 48 h: > 7600 μg/L Biodegradation/Bioaccumulation: Persistence and degradability: 70% 28 days (method OECD 301 B). Low potential for bioaccumulation in aquatic organisms or terrestrial even after repeated exposure. It is not volatile and not expected to persist in the environment	0.53%	Y
Zinc Oxide	Newpark	H2S Scavenger	Constituents: ZINC OXIDE Toxicity: Acute toxicity: This product is expected to be of low toxicity. Based on available data, the classification criteria are not met. ZINC OXIDE (1314-13-2) LD50 (Oral) 7950 mg/kg (mouse) LC50 (Inhalation): 2500 mg/m³ (mouse) Additional ingredient toxicity values:	0.13%	Y

B. PRODUCT LIST					
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			LD50 (intraperitoneal) 240 mg/kg (rat) LDLo (oral) 500 mg/kg (human) TCLo (inhalation) 600 mg/m³ (human) Ecotoxicity: Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Biodegradation/Bioaccumulation: This product is not readily biodegradable		
Victosal HT	Newpark	HT Fluid Loss Additive	Toxicology Data: Low toxicity - low irritant. Under normal conditions of use, adverse health effects are not anticipated Ecotoxicity Data: This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Biodegradation/bioaccumulation: Not expected to bioaccumulate.	0.05%	Υ
Victosal NS	Newpark	Modified Starch	Toxicology Data: This product is expected to be of low acute toxicity. Under normal conditions of use, adverse health effects are not anticipated. Ecotoxicity Data: This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Biodegradation/bioaccumulation: No information available.	0.05%	Υ
Salt (Sodium Chloride all grades)	Newpark	Weighting Agent	Toxicology Data: LC50 (Inhalation): > 42000 mg/m3/1 hour (rat) LD50 (Ingestion): 3000 mg/kg (rat)	4.00%	Υ

B. PRODUCT LIS	т				
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			LD50 (Skin): > 10000 mg/kg (rabbit		
			LD50 (intraperitoneal) 2602 mg/kg (mouse)		
			LD50 (intravenous) 645 mg/kg (mouse)		
			LD50 (subcutaneous) 3000 mg/kg (mouse)		
			LDLo (intravenous) 300 mg/kg (guinea pig)		
			LDLo (oral) 8000 mg/kg (rabbit)		
			LDLo (subcutaneous) 2160 mg/kg (guinea pig)		
			TDLo (oral) 12357 mg/kg (human)		
			Ecotoxicity Data:		
			LC50 (water flea) is 2122 mg/L/48 hours;		
			LC50 (fathead minnow) is 6.57 g/L/96 hours.		
			This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities.		
			Biodegradation/bioaccumulation:		
			Biodegradability does not pertain to inorganic substances. Does not bioaccumulate.		
			Low toxicity - low irritant. Under normal conditions of use, adverse health effects are not anticipated.		
			Ecotoxicity Data:		
Gagetrol	Newpark	HT Fluid Loss Additive	This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities.	0.05%	Υ
			Biodegradation/bioaccumulation:		
			Not expected to bioaccumulate.		
			OCNS category and registration number Gold - 29306		

B. PRODUCT LIST					
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
CleanTrol **(Alternative for Gagetrol)	Newpark	HT Fluid Loss Additive	The product contains no substances which at their given concentration, are considered to be hazardous to health. Ecotoxicity Data: The environmental impact of this product has not been fully investigated. Biodegradation/bioaccumulation: No information available.	0.05% **	Υ
NDFT 530 **(Alternative for Cleantrol)	Newpark	HT Fluid Loss Additive	The product contains no substances which at their given concentration, are considered to be hazardous to health. Ecotoxicity Data: The environmental impact of this product has not been fully investigated. Biodegradation/bioaccumulation: No information available.	0.05% **	Y
Magnesium Oxide	Newpark	Ph Buffer	CONSTITUENT 1 – (>94%) Toxicology Data: This product is expected to be of low toxicity. CONSTITUENT 2 – (<3.5%) Toxicology Data: This product is expected to be of low toxicity. CONSTITUENT 3 – (<2.5%) Toxicology Data: LD50 (oral) 3160 mg/kg (rat) Ecotoxicity Data: This product is expected to be of low toxicity. Biodegradation/bioaccumulation: Not expected to bioaccumulate.	0.09%	Y

B. PRODUCT LIS	т				
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			OCNS category and registration number E – 28127		
			CONSTITUENT 1 (>60%)		
			Toxicology Data:		
			Oral Toxicity (LD50) 2200 mg/kg (rabbit)		
			Dermal Toxicity (LD50) > 20 mL/kg (rabbit)		
			LD50 (intraperitoneal) 1450 mg/kg (mouse)		
			TDLo (oral) 16 g/kg/64 weeks (mouse – cancer)		
			CONSTITUENT 2 (10 – 30%)		
	Polymer stabiliser which effectively reduces the degradation of polymers at high temperatures		Toxicology Data:		
			LD50 (intramuscular) 1500 mg/kg (rat)		
TEA		LD50 (intraperitoneal) 120 mg/kg (rat)	0.09%	Υ	
			LD50 (intravenous) 778 mg/kg (rat)		
		LD50 (subcutaneous) 2200 mg/kg (rat)			
			LDLo (oral) 3 g/kg (rat)		
			CONSTITUENT 3 (<10%)		
			Non-hazardous ingredient.		
			Ecotoxicity Data:		
			No information available.		
			Biodegradation/bioaccumulation:		
			No information available.		
			Constituents:		
		High	D-GLUCURONO-6-DEOXY-L-MANNO-D-GLUCAN, ACETATE, CALCIUM		
Geovis	Newpark	temperature	MAGNESIUM POTASSIUM SODIUM SALT	0.05%	Υ
		viscosifier	Toxicity:		
			This product is expected to be of low toxicity. Under normal conditions of use, adverse health effects are not anticipated.		

B. PRODUCT LIST					
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			Oral Toxicity – (LD50) - > 5000 mg/kg (rat)		
			Ecotoxicity:		
			The notified polymer is not toxic to fish (rainbow trout), aquatic invertebrates (daphnia magna) and marine invertebrates (acartia tonsa) under test conditions.		
			Biodegradation/Bioaccumulation:		
			Considered readily biodegradable.		
			No experimental results provided. However, based on the molecular weight, water solubility and 35now value the notified polymer is not expected to bioaccumulate.		
			Constituents:		
			SWEET ORANGE OIL		
			ISOPROPYL ALCOHOL		
		Toxicity:			
		Stimulation	Acute toxicity: May be harmful if swallowed.		
			Constituent 1 : ISOPROPANOL – (15-50%)		
			Oral Toxicity: An oral LD50 in mice of 3600 mg/kg		
Microflow	Newpark	Additive	Constituent 2 : SWEET ORANGE OIL – (20-60%)	0.03%	Υ
			No Hazard		
			Ecotoxicity:		
			Not expected to be dangerous to the aquatic environment. <u>Biodegradation/Bioaccumulation:</u>		
			This product is readily biodegradable.		
			This product is not expected to bioaccumulate.		
		Relatively volatile and would therefore readily evaporate from dry soil and			
			surfaces.		
			CONSTITUENT 1 – (10-30%)		
INCORR	Newpark	Corrosion Inhibitor	Toxicology Data:	0.04%	Υ
		minibitor	Oral LD50 = 1500 mg/kg (Rat)		
			Ecotoxicity Data:		

Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			The environmental impact of this product has not been fully investigated.		
			CONSTITUENT 2 – (1-10%)		
			Toxicology Data:		
			The environmental impact of this product has not been fully investigated.		
			Ecotoxicity Data:		
			The environmental impact of this product has not been fully investigated.		
			CONSTITUENT 3 – (1-10%)		
			Toxicology Data:		
			Oral LD50 = 3310 mg/kg (Rat)		
			Dermal LD50 = 1060 mg/kg (Rabbit)		
			Inhalation LC50 = 1060 mg/kg (Rabbit)		
			Ecotoxicity Data:		
			Fish 79: 96 h Pimephales promelas mg/L LC50 static 75: 96 h Lepomis macrochirus mg/L LC50 static		
			Toxicity to microorganisms EC50 = 8.8 mg/L 15 min, EC50 = 8.8 mg/L 25 min, EC50 = 8.8 mg/L 5 min		
			Crustacea 65: 48 h Daphnia magna mg/L EC50 Static 47: 24 h Daphnia magna mg/L EC50		
			CONSTITUENT 4 – (Remainder)		
			Non-hazardous ingredient.		
			Biodegradation/bioaccumulation:		
			Partition coefficient -0.31		
			OCNS category and registration number Gold – 27554		
TOTAL					
	micals are highligh	nted arev		114.34%	

C. Chemical List (Chemicals within fluid system identified in Table B)				
Chemicals Name	CAS number	Mass fraction (%)		
Water	7732-18-5	70.18%		
Bentonite	1302-78-9	1.83%		
Potassium Chloride	7447-40-7	3.55%		
Calcium Carbonate (Limestone)	471-34-1	2.82%		
Sodium Chloride	7647-14-5	19.14%		
Barium Sulphate	7727-43-7	0.24%		
Sodium carboxymethyl Cellulose	9004-32-4	0.59%		
Xanthan Gum	11138-66-2	0.39%		
Polyvinylalcohol	9002-89-5	0.07%		
Quartz (Silica Crystalline)	14808-60-7	0.10%		
Sodium Hydroxide	1310-73-2	0.10%		
Sodium Carbonate (Soda Ash)	497-19-8	0.14%		
Sodium Sulphite	7757-83-7	0.16%		
Sodium Sulphate	7757-82-6	0.004%		
Sodium Bicarbonate	144-55-8	0.15%		
Citric Acid, Anhydrous	77-92-9	0.03%		
Sodium Glycolate	2836-32-0	0.004%		
Magnesium Oxide	1309-48-4	0.05%		
Calcium Oxide	1305-78-8	0.002%		
Silicon Dioxide	7631-86-9	0.001%		
Carboxymethyl Starch	9057–06-1	0.20%		

C. Chemical List (Chemicals within fluid system identified in Table B)		
Chemicals Name	CAS number	Mass fraction (%)
Polyethylene Glycol	25322-68-3	0.03%
Octan-2-Ol	123-96-6	0.02%
2-acrylamido-2-methylpropane Sulfonic Acid	5165-97-9	0.03%
Tetrakis(hydroxymethyl)phosphonium Sulphate(2:1)	55566-30-8	0.10%
Diethanolamine	111-42-2	0.02%
Organic Fiber(s)	9004-34-6	0.046%
TOTAL	•	100%
Octan-2-ol	123-96-6	0.02%
Cellulose	9004-34-6	0.06%
Calcium Chloride	10043-52-4	0.06%
Sodium Chloride	7647-14-5	3.91%
Ethylene Glycol	107-21-1	0.33%
Quartz (Silica Crystalline)	14808-60-7	0.20%
Natural Rubber	9006-04-6	0.15%
Polyisoprene	9003-31-0	0.015%
Diatomaceous Earth	68855-54-9	0.045%
Fuller's earth	8031-18-3	0.03%
D-glucurono-6-deoxy-L-manno-D-glucan, Acetate, calcium magnesium potassium sodium Salt	595585-15-2	0.03%
Calcium Carbonate	1317-65-3	0.15%
Polyethylene	9002-88-4	0.01%
Cristobalite	14464-46-1	0.015%
Isopropyl Alcohol	67-63-0	0.01%

C. Chemical List (Chemicals within fluid system identified in Table B)				
Chemicals Name	CAS number	Mass fraction (%)		
Calcium Oxide	1305-78-8	0.003%		
Organic fibres	9004-34-6	0.11%		
Magnesium oxide	1309-48-4	0.09%		
Triethanolamine	102-71-6	0.05%		
Hydrochloric acid	7647-01-0	0.12%		
Zinc Oxide	1314-13-2	0.13%		
Carboxymethyl starch	9057-06-1	0.11%		
Acrylamide, Sodium Acrylate Copolymer	25987-30-8	0.06%		
Barium Sulphate	7727-43-7	5.89%		
Methyl esters of fatty acids	68990-52-3	0.53%		
Sweet Orange Oil	68647-72-3	0.01%		
Fatty Acids – Avadefoam NS	68990-52-3	0.03%		
Hexanedinitrile, Hydrogenated, High-Boiling Fraction	68411-90-5	0.32%		
Silicon Dioxide	7631-86-9	0.002%		
Polyethylene Glycol	25322-68-3	0.02%		
Polypropylene Glycol	25322-69-4	0.04%		
Potassium Silicate	1312-76-1	0.13%		
Vegetable Materials	100209-45-8	0.08%		
Disodium Pyrophosphate	7758-16-9 231-	0.07%		
2-Propenoic Acid, Homopolymer	9003-01-4	0.05%		
Diethanolamine	111-42-2	0.02%		
Sodium Erythorbate	6381-77-7	0.02%		

C. Chemical List (Chemicals within fluid system identified in Table B)			
Chemicals Name	CAS number	Mass fraction (%)	
Modified Starch	9005-25-8	0.06%	

2. Cement and Spacer Chemical Disclosure

A. SYSTEM DETAILS:		
OPERATOR:	ERL	
PROJECT / WELL NAME:	Lockyer-2, Lockyer-3, Lockyer-4, North Erregulla Deep-1 Exploration Wells	
SYSTEM:	Pre-job Cement System	
TOTAL VOLUME OF SYSTEM:	CEMENT Blend: 251,118 gal per well	

B. PRODUCT	B. PRODUCT LIST								
Trade name	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached				
Cement – Class A	Halliburton	Cement	CONSTITUENT 1 (≤ 90%): LD50 Oral: >2000 mg/kg (Rat), LD50 Dermal: >2000 mg/kg, LC50 Inhalation: >1.0 mg/L (4h) (Rat) After hardening with water or moister, cement presents no ecotoxicity risks. (Source: IUCLID 2000) Static Aquatic Toxicity − Freshwater and Marine Algae: - 72-hour EC50: >1,000 mg/L Static Aquatic Toxicity − Freshwater and Marine Invertebrates: - 48-hour LC50: >1,000 mg/L Static Aquatic Toxicity − Freshwater and Marine Fish: - 96 hour LC50: >1,500 mg/L Partition Coefficient, n-Octanol/Water: Not Applicable for inorganics Oxygen Demand, Chemical Oxygen Demand: Not Applicable for inorganics Biodegradability, Seawater − Indigenous microbes: Not Applicable for inorganics CONSTITUENT 2 (≤ 8%): LD50 Oral: 3000 mg/kg (Rat), LD50 inhalation: >3.26 mg/L Freshwater Algae Toxicity 72h EC50: > 14 mg/L (Desmodesmus subspicatus) [ECHA] (Solubility Limit); Freshwater Crustacean Toxicity 48h EC50: > 14 mg/L (Daphnia magna) [ECHA] (Solubility Limit);	21.234%	Y				

Trade name	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached
			Freshwater Fish Toxicity 96h LC50: > 14 mg/L (Oncorhynchus mykiss) [ECHA] (Solubility Limit); Bioaccumulation: Substance is inorganic − bioaccumulation is not applicable. Biodegradation: Substance is inorganic − biodegradation is not applicable. CONSTITUENT 3 (≤ 5%): LD50 Oral: 6450 mg/Kg (Rat), LD50 Inhalation: >3.0 mg/L (Rat), LD50 Dermal: >2000 mg/Kg (Rat) Freshwater Algae Toxicity 72h EC50: > 100 mg/L (Selenastrum capricornutum) [OECD SIDS] (similar substance); Freshwater Crustacean Toxicity 48h EC50: > 100 mg/L (Daphnia magna) [OECD SIDS] (similar substance); Freshwater Fish Toxicity 96h EC50: > 100 mg/L (Oryzias latipes) [OECD SIDS] (similar substance); Bioaccumulation: Substance is inorganic − bioaccumulation is not applicable. Biodegradation: Substance is inorganic − biodegradation is not applicable. CONSTITUENT 4 (≤ 5%): LD50 Oral: >2000 mg/Kg (Rat), LD50 Inhalation: >5.235 mg/L (Rat), LD50 Dermal: >4000 mg/Kg (Rat) Freshwater Algae Toxicity 72hr EC50: >100 g/L (Desmodesmus subspicatus) Freshwater Crustacean Toxicity 48hr EC50: > 100 g/L (Daphnia magna) Freshwater Fish Toxicity 96hr LC50: >100 g/L (Leuciscus idis) Bioaccumulation: Substance is inorganic − bioaccumulation is not applicable. Biodegradation: Substance is inorganic − bioaccumulation is not applicable. Chronic Effects: Portland Cement is not classified as a carcinogen by NOHSC. Crystalline silica and hexavalent chromium compounds are classified as carcinogenic to humans (IARC Group 1), however due to low levels present and product application, the criterion for classification is not met.		
Cement – Class G + 35% SSA-1	Halliburton	Cement	CONSTITUENT 1 (≤65%):	19.601%	Υ

B. PRODUCT	1	<u> </u>			1
Trade name	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached
			LD50 Oral: >2000 mg/kg (Rat), LD50 Dermal: >2000 mg/kg, LC50 Inhalation: >1.0 mg/L (4h) (Rat)		
			After hardening with water or moister, cement presents no ecotoxicity risks. (Source: IUCLID 2000)		
			Static Aquatic Toxicity – Freshwater and Marine Algae: - 72 hour EC50: >1,000 mg/L		
			Static Aquatic Toxicity -Freshwater and Marine Invertebrates: - 48 hour LC50: >1,000 mg/L		
			Static Aquatic Toxicity- Freshwater and Marine Fish: - 96 hour LC50: >1,500 mg/L		
			Partition Coefficient, n-Octanol/Water: Not Applicable for inorganics		
			Oxygen Demand, Chemical Oxygen Demand: Not Applicable for inorganics		
			Biodegradability, Seawater – Indigenous microbes: Not Applicable for inorganics		
			CONSTITUENT 2 (≤35%):		
			LD50 Oral: >15000 mg/kg (human)		
			Freshwater Crustacean Toxicity 24h LL50: > 10000 mg/L (Daphnia magna) [Health Canada] (similar substance);		
			Freshwater Fish Toxicity 96h LL0: 10000 mg/L (Danio rerio) [Health Canada] (similar substance);		
			Bioaccumulation: Substance is inorganic – bioaccumulation is not applicable.		
			Biodegradation: Substance is inorganic – biodegradation is not applicable.		
			Carcinogenicity: Classified as a human carcinogen (IARC Group 1)		
			PRODUCT CEFAS LISTED		
			100% PLONOR		
		Weighting	CONSTITUENT 1 (≤100%):		
Barite	Halliburton	Agent	Oral LD50: >5000 mg/kg (Rat), Oral LD50: >3000 mg/kg (Mouse), Inhalation LC50: >1.1 mg/L (Rat, Aerosal, 4h) (similar substance	5.575%	Y
			Freshwater Algae Toxicity 72h EC50: > 61.1 mg/L (Pseudokirchneriella subcapitata) [ECHA];		

Trade name	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached
			Freshwater Crustacean Toxicity 48h LC50: 14.5 mg/L (Daphnia magna) [ECHA] (similar substance);		
			Freshwater Fish Toxicity 96h LC50: > 3.5 mg/L (Danio rerio) [ECHA];		
			No Marine Data		
			Marine sub-chronic Crustacean Toxicity NOEC (7d) 100 mg/L (Cancer anthonyi)		
			Bioaccumulation Fish BCF: 1.2-74.4 (Lepomis macrochirus) [ECHA];		
			Biodegradation: Substance is inorganic – biodegradation is not applicable.		
			CONSTITUENT 2 (≤5%):		
			LD50 Oral: >15000 mg/kg (human)		
			Freshwater Crustacean Toxicity 24h LL50: > 10000 mg/L (Daphnia magna) [Health Canada] (similar substance);		
			Freshwater Fish Toxicity 96h LL0: 10000 mg/L (Danio rerio) [Health Canada] (similar substance);		
			Marine Water Algae Toxicity 72h EC50: 4717 mg/L (Skeletonema costatum)		
			Marine Water Crustacean Toxicity 48h LC50: 7713 mg/L (Acartia tonsa)		
			Marine Water Fish Toxicity 96h LC50: > 4200 mg/L (Scophthalmus maximus) [Halliburton Sponsored Study];		
			Bioaccumulation: Substance is inorganic – bioaccumulation is not applicable.		
			Biodegradation: Substance is inorganic – biodegradation is not applicable.		
			Carcinogenicity: Classified as a human carcinogen (IARC Group 1)		
			PRODUCT CEFAS LISTED		
			100% PLONOR		
Econolite	te Halliburton Ad	Cement Additive	CONSTITUENT 1 (≤60%):	1.399%	Y
Liquid		Stabiliser	LD50 Oral: 800 mg/kg (Rat), LD50 Oral: 770 mg/kg (Mouse), LD50 Dermal: > 5000 mg/kg (Rat) (Similar substance), LC50 Inhalation > 2.06 mg/L (Rat) 4h (Similar substance)	1.33370	T T
			Freshwater Algae Toxicity 72h EC50: > 345 mg/L (Scenedesmus subspicatus) [ECHA];		

Trade name	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached
			Freshwater Crustacean Toxicity 48h EC50: 1700 mg/L (Daphnia magna) [OECD SIDS];		
			Freshwater Fish Toxicity 96h LC50: 1108 mg/L (Danio rerio) [OECD SIDS];		
			Bioaccumulation: Substance is inorganic – bioaccumulation is not applicable.		
			Biodegradation: Substance is inorganic – biodegradation is not applicable.		
			CONSTITUENT 2 (≤60%):		
			Component is naturally occurring and is not intrinsically hazardous		
			No data available to indicate product or components present at greater than 0.1% are chronic health hazards		
			CONSTITUENT 1 (≤30%):		
			Marine Water Acute Algae Toxicity 72h EC50: > 10000 mg/L (Skeletonema costatum) [Halliburton Funded Study];		
			Marine Water Acute Crustacean Toxicity 48h LC50: > 10000 mg/L (Acartia tonsa) [Halliburton Funded Study];		
			Marine Water Acute Fish Toxicity 96h LC50: > 5600 mg/L (Scophthalmus maximus) [Halliburton Funded Study];		
			Constituent is a clay mineral of soil and therefore biodegradability is not applicable.		
		Mud/	Constituent is a clay mineral of soil and therefore bioaccumulation is not applicable.		
Tuned Spacer	Halliburton	Cement	CONSTITUENT 2 (≤10%):	1.329%	Υ
		Spacer	Oral LD50: >5000 mg/kg (Similar Substance), Inhalation LC0 >0.139 mg/L (Similar Substance), Dermal LC50: > 5000 mg/kg (Rabbit)		
			Freshwater Acute Algae Toxicity 72h EC50: > 10000 mg/L (Scenedesmus subspicatus) [OECD SIDS] (similar substance);		
			Freshwater Acute Crustacean Toxicity 24h EC50: > 10000 mg/L (Daphnia magna) [OECD SIDS] (similar substance);		
			Freshwater Acute Fish Toxicity 72h LC50: > 10000 mg/L (Cyprinus carpio) [LOLI];		
			Bioaccumulation: Substance is inorganic – bioaccumulation is not applicable.		
			Biodegradation: Substance is inorganic – biodegradation is not applicable.		

Trade name	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached
			CONSTITUENT 3 (≤5%):		
			Component is naturally occurring and not intrinsically hazardous.		
			CONSTITUENT 4 (≤1%):		
			Oral LD50 5400 mg/kg (Rat), Dermal LD50 >2000 mg/kg		
			Freshwater Acute Crustacean Toxicity 48h EC50: > 50 mg/L (Daphnia magna) [ECHA];		
			Freshwater Acute Fish Toxicity 96h LC50: > 100 mg/L (Pimephales promelas) [ECHA];		
			Freshwater Acute Plant Toxicity 72h EC50: 990 mg/L (Lactuca sativa) [ECHA];		
			Bioaccumulation BCF: 3.2 [ECHA];		
			Freshwater Biodegradation 28d: 97 % [ECHA];		
			CONSTITUENT 5 (≤100%):		
			Oral LD50: >15000 mg/kg (Human)		
			Freshwater Acute Crustacean Toxicity 24h LL50: > 10000 mg/L (Daphnia magna) [Health Canada] (similar substance);		
			Freshwater Acute Fish Toxicity 96h LL0: 10000 mg/L (Danio rerio) [Health Canada] (similar substance);		
			Bioaccumulation: Substance is inorganic – bioaccumulation is not applicable.		
			Biodegradation: Substance is inorganic – biodegradation is not applicable.		
			CONSTITUENT 6 (≤1%):		
			Oral LD50: >15000 mg/kg (Human) (Similar Substance)		
			Freshwater Acute Crustacean Toxicity 24h LL50: > 10000 mg/L (Daphnia magna) [Health Canada] (similar substance);		
			Freshwater Acute Fish Toxicity 96h LL0: 10000 mg/L (Danio rerio) [Health Canada] (similar substance);		
			Bioaccumulation: Substance is inorganic – bioaccumulation is not applicable.		
			Biodegradation: Substance is inorganic – biodegradation is not applicable.		

B. PRODUCT I	LIST				
Trade name	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached
			PRODUCT CEFAS LISTED		
			CONSTITUENT 1 (≤30%):		
			Oral LD50: >2000 mg/kg (Rat)		
			Marine Water Algae Toxicity 72h EC50: 1102 mg/L (Skeletonema costatum) [OSPAR];		
			Marine Water Crustacean Toxicity 48h LC50: > 2000 mg/L (Acartia tonsa) [OSPAR];		
Halad-413L	Halliburton	Fluid Loss Additive	Marine Water Fish Toxicity 96h LC50: > 1000 mg/L (Scophthalmus maximus) [OSPAR];	0.437%	Υ
		Additive	Bioaccumulation Log 47now: < 3.5 [Halliburton Funded Study];		
			Marine Water Biodegradation 28d: 6 % [Halliburton Funded Study];		
			CONSTITUENT 2 (≤100%):		
		Product is naturally occurring and not intrinsically hazardous No data available to indicate product or components present at greather chronic health hazards	Product is naturally occurring and not intrinsically hazardous		
			i i i		
			PRODUCT CEFAS LISTED		
			100% PLONOR		
			CONSTITUENT 1 <=1%		
			Oral LDL: 500 mg/kg (Rabbit), Dermal LD50: 1350 mg/kg (Rabbit)		
			Freshwater Crustacean Toxicity 48h EC50: 40.4 mg/L (Ceriodaphnia sp.) [ECHA];		
		Cement	Freshwater Fish Toxicity 96h LC50: 45.4 mg/L (Oncorhynchus mykiss)		
Gascon 469	Halliburton	Additive	Freshwater Fish Toxicity 96h LC50: 125 mg/L (Gambusia affinis) [OECD SIDS];	0.365%	Υ
		Stabiliser	Bioaccumulation: Substance is inorganic – bioaccumulation is not applicable.		
			Biodegradation: Substance is inorganic – biodegradation is not applicable.		
			CONSTITUENT 2 <=60%		
			Oral LD50: >10,000 mg/kg, Inhalation LC50: >0.69 mg/L (4h) (Rat)		
			Freshwater Algae Toxicity 72h EC50: 440 mg/L (Selenastrum capricornutum) [IUCLID; LOLI];		
			Freshwater Crustacean Toxicity 48h EC50: 7600 mg/L (Ceriodaphnia dubia) [IUCLID; LOLI];		

B. PRODUCT	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in	SDS
				system fluid (mass %)	Attached
			Freshwater Fish Toxicity 96h LC50: 5000 mg/L (Brachydanio rerio) [IUCLID; LOLI];		
			Bioaccumulation: Substance is inorganic – bioaccumulation is not applicable.		
			Biodegradation: Substance is inorganic – biodegradation is not applicable.		
			CONSTITUENT 3 <= 100%		
			Component is naturally occurring and is not intrinsically hazardous		
			No data available to indicate product or components present at greater than 0.1% are chronic health hazards		
			PRODUCT CEFAS LISTED		
		Friction	CONSTITUENT 1 (≤60%):		
			Oral LD50: >5000 mg/kg (Rat)		
			Marine Water Algae Toxicity 72h EC50: 7631.73 mg/L (Skeletonema costatum);		
			Marine Water Crustacean Toxicity 48h LC50: 2200 mg/L (Acartia tonsa);		
			Marine Water Fish Toxicity 96h LC50: 1006 mg/L (Scophthalmus maximus);		
CFR-8L	Halliburton	Reducer	Fresh Water Crustacean Toxicity 48h LC50: >100 mg/L (Daphnia magna);	0.343%	Υ
			Bioaccumulation Log Pow: < 0;		
			Inherently biodegradable: Biodegradation 28d: 38%.		
			<u>CONSTITUENT 2 (≤100%):</u>		
			Component is naturally occurring and not intrinsically hazardous		
			No data available to indicate product or components present at greater than 0.1% are chronic health hazards		
			PRODUCT CEFAS LISTED		
			100% PLONOR		
HR-6L	Halliburton	Cement	CONSTITUENT 1 (≤100%):	0.031%	Y
III OL	, lambarton	Retarder	Component is naturally occurring and not intrinsically hazardous	0.031%	'
			No data available to indicate product or components present at greater than 0.1% are chronic health hazards		

B. PRODUCT	.IST				
Trade name	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached
			CONSTITUENT 2 (≤60%):		
			Oral LC50: >5000 mg/L, Inhalation LC50: > 480 mg/m3		
			Freshwater Fish Toxicity LC50: >1000 mg/L (Danio rerio)		
			Marine Water Algae Toxicity 72h EC50: 301 mg/L (Skeletonema costatum) [Halliburton Funded Study];		
			Marine Water Crustacean Toxicity 48h LC50: 1261 mg/L (Acartia tonsa) [Halliburton Funded Study];		
			Bioaccumulation Log Pow: -3.45 (Calculated) [Halliburton Funded Study];		
			Biodegradation: No data – expected to be inherently biodegradable		
			No data available to indicate product or components present at greater than 0.1% are chronic health hazards		
			PRODUCT DATA		
			Marine Water Algae Toxicity 72h EC50: 1100 mg/L (Skeletonema costatum) [Halliburton Funded Study];		
			Marine Water Crustacean Toxicity 48h LC50: > 1000 mg/L (Acartia tonsa) [Halliburton Funded Study];		
		Reduces air	Marine Water Fish Toxicity 96h LC50: > 1000 mg/L (Scophthalmus maximus) [Halliburton Funded Study];		
		entrainmen	Marine Water Biodegradation 28d: 70% [Halliburton Funded Study];		
NF-6	Halliburton	t into	CONSTITUENT 1 (≤10%)	0.0905%	Υ
		cement slurry	Marine Algae Toxicity 72h EC50: 991.02 mg/L (Skeletonema costatum)		
		Sidily	Marine Crustacean Toxicity 48h LC50: 2500 mg/L (Acartia tonsa);		
			Marine Fish Toxicity 96h LC50: >3200 mg/L (Scophthalmus maximus);		
			Bioaccumulation: Calculated Log Pow: 7.45		
			CONSTITUENT 2 (≤5%):		
			Oral LD50: >15900 mg/kg (Mouse), Inhalation LC50: >5 mg/L (4h) (Rat)		
			Marine Algae Toxicity 72h EC50: 41 mg/L (Skeletonema costatum)		

B. PRODUCT	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached
			Marine Crustacean Toxicity 48h LC50: >10000 mg/L (Acartia tonsa);	(111435 76)	
			Marine Fish Toxicity 96h LC50: >1800 mg/L (Scophthalmus maximus);		
			Bioaccumulation: Calculated Log Pow: 4.28		
			CONSTITUENT 3 (≤5%)		
			Oral LD50: > 5000 mg/kg (Rat), Dermal LD50: >5000 mg/kg (Guinea Pig)		
			Marine Algae Toxicity 72h EC50: 6488.87 mg/L (Skeletonema costatum)		
			Marine Crustacean Toxicity 48h LC50: 5085.71 mg/L (Acartia tonsa);		
			Marine Fish Toxicity 96h LC50: >5600 mg/L (Scophthalmus maximus);		
			Bioaccumulation: Calculated Log Pow: 22.69 (MW>700)		
			CONSTITUENT 4 (≤10%)		
			No Hazard Product is naturally occurring		
			CONSTITUENT 5 (≤100%)		
			Oral LD50: 90 mg/kg (Mouse) (Similar Substance)		
			Marine Algae Toxicity 72h EC50: >3200 mg/L (Skeletonema costatum)		
			Marine Crustacean Toxicity 48h LC50: >10000 mg/L (Acartia tonsa);		
			Marine Fish Toxicity 96h LC50: >5600 mg/L (Scophthalmus maximus);		
			Bioaccumulation: Calculated Log Pow: 7.09		
			No data available to indicate product or components present at greater than 0.1% are chronic health hazards		
			PRODUCT CEFAS LISTED		
		Fluid Loss	<u>CONSTITUENT 1 <=100%</u>		
		Additive	Marine Water Algae Toxicity EC50: >3300 mg/L (Skeletonema costatum [HES Interal		
Halad-344	Halliburton	for High	Study]	0.0693%	Υ
		Temperatu	Marine Water Crustacean Toxicity EC50: > 2000 mg/L (Acartia tonsa) [HES study]		
		re	Marine Fish Toxicity LC50: >1000 mg/L (Scophthalmus maximus) [HES study]		
			Bioaccumulation Log Pow: <0 OECD 117 [HES Study]		

B. PRODUCT	1	T_	T==	1	
Trade name	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached
			0% (OECD 306) [HES Study]		
			CONSTITUENT 2 <=5%		
			PLONAR		
			CONSTITUENT 3 <= 5%		
			PLONAR		
			CONSTITUENT 4 <=5%		
			PLONAR		
			Effect concentrations in the aquatic environment are attributable to a change in pH value.		
			Oral LD50: 7340 mg/kg (Rat), Dermal LD50: >2500 mg/kg (Rabbit)		
			Freshwater Crustacean Toxicity 48h EC50: 49.1 mg/L (Daphnia magna) [ECHA];		
			Freshwater Fish Toxicity 96h LC50: 50.6 mg/L (Oncorhynchus mykiss) [ECHA];		
			Marine Water Crustacean Toxicity 96h LC50: 158 mg/L (Crangon septemspinosa) [ECHA];		
			Bioaccumulation: Substance is inorganic – bioaccumulation is not applicable.		
			Biodegradation: Substance is inorganic – biodegradation is not applicable.		
			PRODUCT DATA		
			Oral LD50: >2000 mg/kg (similar Product)		
			Marine Water Fish Toxicity 96h LC50: > 1000 mg/L (Scophthalmus maximus) [Halliburton Funded Study];		
			Bioaccumulation Log Pow: <0 [Halliburton Funded Study];		
			Marine Water Biodegradation 28d: 0% [Halliburton Funded Study];		
			PRODUCT CEFAS LISTED		
			PRODUCT DATA		
SCR-100L	Halliburton	Cement Retarder	Oral Toxicity LD50: >5000 mg/kg (Rat), Dermal LD50 : >2000 mg/kg (Rabbit)	0.0394%	Υ
		Retainel	Freshwater Fish Toxicity 96h LC50: 4900 mg/L (Oncorhynchus mykiss)		
			Freshwater Crustacean Toxicity 48h LC50: 2800 mg/L (Daphnia magna)		

B. PRODUCT I	LIST				
Trade name	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached
			Marine Water Algae Toxicity 72h EC50: > 3300 mg/L (Skeletonema costatum) [Halliburton Funded Study];		
			Marine Water Crustacean Toxicity 48h LC50: > 2000 mg/L (Acartia tonsa) [Halliburton Funded Study];		
			Marine Water Fish Toxicity 96h LC50: > 1000 mg/L (Scophthalmus maximus) [Halliburton Funded Study];		
			Marine Water Biodegradation 28d: 14% [Halliburton Funded Study];		
			Product was tested using OECD 117 no peaks detected MW>700Da. Product is not expected to be bioaccumulating		
			No data available to indicate product or components present at greater than 0.1% are chronic health hazards		
			PRODUCT DATA		
			Freshwater Algae Toxicity 72h EC50: >100 mg/L (Scenedesmus subspicatus);		
			Freshwater Crustacean Toxicity 48h EC50: >100 mg/L (Daphnia magna);		
			Freshwater Fish Toxicity 96h LC50: >100 mg/L (Oncorhynchus mykiss);		
SA-1015	Halliburton	Suspension Agent	Marine Water Algae Toxicity 72h EC50: > 5600 mg/L (Skeletonema costatum);	0.0134%	Υ
		Agent	Marine Water Crustacean Toxicity 48h LC50: 234.22 mg/L (Acartia tonsa);		
			Marine Water Fishn Toxicity 96h LC50: > 234.22 mg/L (Cyprinodon variegatus);		
			Readily biodegradable (95% at 28 days);		
			Bioaccumulation Log Pow: 0		
			PRODUCT CEFAS LISTED		
			CONSTITUENT 1 (≤60%):		
		Cement	No Hazard		
HR-25L	Halliburton	Retarder	CONSTITUENT 2 (≤60%):	0.031%	Υ
			Freshwater Algae Toxicity 72h EC50: 51.4 mg/L (Pseudokirchneriella subcapitata) [ECHA];		
			Freshwater Crustacean Toxicity 48h EC50: 93.3 mg/L (Daphnia magna) [ECHA];		

B. PRODUCT I	.IST					
Trade name	Supplier	Purpose	Toxicity & Ecotoxicity Info	Product in system fluid (mass %)	SDS Attached	
			Freshwater Fish Toxicity 96h LC50: > 100 mg/L (Danio rerio) [ECHA]; Bioaccumulation Log Pow: 0.24 [Halliburton Funded Study]; Marine Water Biodegradation 28d: 85 % [ECHA];			
Water	Customer Supplied	Water	None	49.418%	N	
Total		•		100%		

C. Chemical List					
Chemicals within products in Part B	CAS number	Maximum Mass fraction in System (%)			
Portland cement	65997-15-1	49.4%			
Water (Including Mix Water Supplied by Client) *	-	31.2%			
Crystalline silica (impurity)	14808-60-7	8.1%			
Barium Sulfate	7727-43-7	5.3%			
Water in Products	7732-18-5	1.66%			
Limestone	1317-65-3	1.49%			
Calcium sulfate dihydrate	10101-41-4	0.849%			
Sodium silicate	1344-09-8	0.560%			
Granulated Blast Furnace Slag	65996-69-2	0.425%			
Sepiolite	63800-37-3	0.266%			
Silica, amorphous – fumed	7631-86-9	0.146%			

C. Chemical List					
Chemicals within products in Part B	CAS number	Maximum Mass fraction in System (%)			
Humic acids, sodium salts, polymers with N,N-dimethyl-2-propenamide, sodium 2-methyl-2-[(1-oxo-2-propen-1-yl)amino]-1-propanesulfonate (1:1) and 2-propenenitrile, sodium bisulfite-terminated	473268-27-8	0.131%			
Sulfonated organic polymer	526203-62-3	0.0990%			
Rape Oil	8002-13-9	0.0796%			
Diatomaceous earth	61790-53-2	0.0664%			
N,N-dimethylacrylamide copolymer with calcium AMPS	103115-52-2	0.0589%			
Sodium Lignosulfonate	8061-51-6	0.0546%			
Acrylic acid polymer with sodium AMPS, sodium salt	37350-42-8	0.0157%			
Dilutan Gum	125005-87-0	0.0134%			
Citric acid	77-92-9	0.0133%			
Crystalline silica, cristobalite	14464-46-1	0.0133%			
Welan gum	72121-88-1	0.0133%			
Monopropylene glycol monooleate	1330-80-9	0.00453%			
Tartaric acid	87-69-4	0.00408%			
Sodium hydroxide	1310-73-2	0.00365%			
Calcium hydroxide	1305-62-0	0.00346%			
Lecithins	8002-43-5	0.00346%			
Sodium sulfate	7757-82-6	0.00346%			
Aluminium stearate	637-12-7	0.000905%			
Sorbitan, monopalmitate	26266-57-9	0.000905%			
2-Bromo-2-(bromomethyl)pentanedinitrile	35691-65-7	0.0000394%			
FD&C Blue 1	3844-45-9	0.000394%			
Total		~100.00%			

3. Alternative Drilling Fluid system

A. SYSTEM DETAILS:					
OPERATOR:	ERL				
PROJECT / WELL NAME:	Lockyer-2, Lockyer-3, Lockyer-4, North Erregulla Deep-1 Exploration Wells				
SYSTEM:	Alternative Drilling Fluid System / Alternative Plug and Abandonment Fluid System				
TOTAL VOLUME OF SYSTEM (m³):	301 m³ per well				

B. PRODUCT LIS	B. PRODUCT LIST					
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached	
Water	N/A	Base Fluid	N/a	98.74%	N/A	
Soda Ash	Redox	Calcium Sequester	Constituents: SODIUM CARBONATE Acute Toxicity: LD50 Oral (Rat): 4090 mg/kg LC50 Inhalation (Rat): 2300 mg/m3 (2h) Chronic Toxicity: No known sensitizing, carcinogenic, reproductive, or mutagenic effects. Ecotoxicity: This product is not considered toxic to algae, fish, daphnia, or invertebrates. LC50 (96h) Lepomis macrochirus: 300 mg/l LC50 (96h) Pimephales promelas: 310-1220 mg/l EC50 (120h) Nitzschia: 242 mg/l EC50 (48h) Daphnia magna: 265 mg/l Biodegradation/Bioaccumulation:	0.02%	Y	

B. PRODUCT LIST	Г				
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			Not applicable – inorganic material		
POLY-PLUS	MI Swaco	Viscosifier	Constituents: HYDROTREATED LIGHT PETROLEUM DISTILLATE Acute Toxicity: None Chronic Toxicity: Does not contain any components suspected to be sensitizing, mutagenic, or carcinogenic. No known reproductive or developmental toxicity Ecotoxicity: Not considered toxic to algae, fish, or invertebrates. Biodegradation/Bioaccumulation: No data available	0.18%	Y
DUO-VIS	MI Swaco	Viscofier	Constituents: GLYOXAL The product component(s) are not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment Acute Toxicity: None Chronic Toxicity: No known sensitizing orreproductive effects. Ecotoxicity: This product is not considered toxic to algae, fish, or invertebrates Biodegradation/Bioaccumulation:		Y
POLYPAC	MI Swaco	Fluid Loss	Product is biodegradable, does not bioaccumulate Constituents:	0.25%	Υ

B. PRODUCT LIS	ST .				
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			POLYANIONIC CELLULOSE		
			Acute Toxicity:		
			LD50 Oral (Rat): 27000 mg/kg		
			LD50 Dermal (Rabbit): >2 g/kg		
			LC50 Inhalation (Rat): > 5800 mg/m3 (4h)		
			Chronic Toxicity:		
			No known carcinogenic properties or chronic impacts		
			Ecotoxicity:		
			Not considered toxic to algae, fish, or invertebrates.		
			Biodegradation/Bioaccumulation:		
			Product is biodegradable, does not bio accumulate.		
			Constituents:		
			HEXAHYDRO-1,3,5-TRIS-(-2-HYDROXYETHYL)-S-TRIAZINE		
			Acute Toxicity:		
			LD50 Oral (Rat - Female): 2000 mg/kg		
			LC50 Dermal (Rat): >1009-3950 mg/kg		
			Chronic Toxicity:		
`N1 70	T	D'a d'ala	No known carcinogenic, reproductive, or teratogenic effects.	0.010/	V
`Nuosept 78	Troy	Biocide	Skin sensitizing	0.01%	Y
			Ecotoxicity:		
			Hexahydro-1,3,5-Tris-(-2-Hydroxyethyl)-S-Triazine		
			LC50 (96h) (Danio rerio (zebra fish)): > 100 mg/l		
			EC50 (48h) (Water flea (Daphnia magna)): >100 mg/l		
			EC50 (72h) (Algae, algal mat (Algae)): > 10 < 100 mg/l		
			2,2',2" -(Hexahydro-1,3,5-triazine-1,3,5-triyl) triethanol		

B. PRODUCT LIST					
Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			LC50 (96h) (oncorhynchus mykiss (rainbow		
			trout)): >100 mg/l		
			EC50 (48h) (Water flea (Daphnia magna)): 27,9 mg/l		
			ErC50 (72h) (Green Algae): > 10-100 mg/l		
			Biodegradation/Bioaccumulation:		
			2,2',2" -(Hexahydro-1,3,5-triazine-1,3,5-triyl)		
			triethanol		
			Biodegradation: >70% (28d)		
			Readily Biodegradable.		
			Has low bioaccumulation potential.		
			Acute Toxicity:		
		ЛI Swaco Lubricant	The product component(s) are not classified as environmentally hazardous.		
			Chronic Toxicity:		
			Does not contain any components suspected to be sensitizing, mutagenic, or carcinogenic. No known reproductive or developmental toxicity		
PLATINUM ROD	MI Swaco		Ecotoxicity:	0.14%	Υ
EASE			This product is not considered toxic to algae.		
			This product is not considered toxic to fish.		
			This product is not considered toxic to invertebrates.		
			Biodegradation/Bioaccumulation:		
			No product level data available.		
			Acute Toxicity:		
		Chala Cantuck	The product component(s) are not classified as environmentally hazardous.		
KLA-GARD	MI Swaco	Shale Control	Chronic Toxicity:	0.22%	Υ
	A	Agent	Does not contain any components suspected to be sensitizing, mutagenic, or carcinogenic. No known reproductive or developmental toxicity		

Trade name	Supplier	Purpose	Toxicity & Eco toxicity Info	% Product in system fluid	SDS Attached
			Ecotoxicity:		
			This product is not considered toxic to algae.		
			This product is not considered toxic to fish.		
			This product is not considered toxic to invertebrates.		
			Biodegradation/Bioaccumulation:		
			Readily biodegradable (ECHA data) (PRODUCT). Bioaccumulation is unlikely. (ECHA data) (PRODUCT)		
RING FREE	MI Swaco	Drill fluid additive	Constituents: POLYMER Acute Toxicity: None Chronic Toxicity: No known carcinogenic, mutagenic, or sensitizing properties or chronic impacts Ecotoxicity: The product component(s) are not classified as environmentally hazardous. Toxicity to algae: This product is not considered toxic to algae. LC50 / 72 hrs: > 100 mg/l (estimated). Biodegradation/Bioaccumulation:	0.27%	Y
			Not readily biodegradable. Does not bioaccumulate.		
Total					100.00%

C. Chemical List (Chemicals within fluid system identified in Table B)		
Chemicals Name	CAS number	Mass fraction (%)
Water	-	97.71410 %
Sodium carboxymethylcellulose	9004-32-4	0.58128 %
Xanthan Gum	11138-66-2	0.38403 %
2-hydroxy-N,N,N-trimethylethanaminium chloride	67-48-1	0.37396 %
Soybean oil, crude	8001-22-7	0.29175 %
Sodium polyacrylate	9003-04-7	0.29031 %
2-Propenoic acid, polymer with 2-propenamide, sodium salt	25987-30-8	0.10518 %
Distillates, petroleum, hydrotreated light	64742-47-8	0.10518 %
Sodium carbonate	497-19-8	0.04844 %
Oils, animal, mixed with vegetable oil Me esters, sulfurized	68990-81-8	0.04462 %
2,2',2''-(Hexahydro-1,3,5-triazin-1,3,5-triyl)triethanol	4719-04-4	0.02591 %
Sorbitan, mono-(9Z)-9-octadecenoate	1338-43-8	0.01052 %
Isotridecanol, ethoxylated	69011-36-5	0.01052 %
Polyoxyethylene sorbitan trioleate	9005-70-3	0.00686 %
Glyoxal	107-22-2	0.00349 %
Ethane-1,2-diol (impurity)	107-21-1	0.00267 %
2-aminoethanol	141-43-5	0.00100 %
N,N-dimethylmethanamine (impurity)	75-50-3	0.00016 %
Total		100.00%

	Schedule of Submissions - Temporary Workforce Accommodation (Exploration Drill Camp) - Lot 100 Watson Road, Lockier							
Submission & Date Received	Respondent	Nature of Submission	Comment	Recommendation				
1 (4/8/23)	Department of Biodiversity, Conservation	No objection DBCA has no objections to the proposal.	No additional comment	Note submission and provide copy to applicant.				
	& Attractions	It is anticipated that the proposed workforce accommodation and any associated environmental impacts will be appropriately managed through the existing planning framework.						
2 (3/8/23)	Department of Primary Industries & Regional Development	No objection DPIRD does not object to the proposal and offers the following comments. The rig site camp associated with the Lockyer-3 exploration program will be located on the soil-landscape type referred to as the Mount Horner system. Soils of this system are comprised of Pale and Yellow deep sands with sandy gravel and sand over gravel. These soils predominately have a low to moderate risk of water erosion (97%), low to moderate risk of phosphorus export (95%), but a high to very high risk of wind erosion (77%). The application advises that the environmental management of the drill site will be in accordance with an approved W-EP which ensures the impact to the receiving environment of the Activity is reduced to SFAIRP. DPIRD assumes this refers to the Wells Environment Plan and consequently may not include the camp site. While the soils of this system carry a low risk of water erosion, the camp site is located close to the valley floor of a catchment that feeds into the Lockier River. DPIRD suggests that the applicant considered a wind and water erosion management plan for the camp site to ensure the soil of the camp site is protected.	Copy of DPIRD submission has been provided to applicant to ensure they are aware of their advice. Given that the exploration drill site will be on private land it would be likely that a private arrangement would be in place requiring the applicant to return the site to the landowner in condition that enables prior farming use to resume upon decommissioning of the site. Nonetheless it is still recommended that, in the event that Council approves the application, the following conditions be applied to the determination: "The applicant is to prepare, submit and adhere to a Management Plan to the approval of the local government." "The applicant is to implement and maintain reporting mechanisms for complaints concerning the operation of the development. In the event of a substantiated complaint being received the applicant is required to demonstrate mitigation response(s) to the approval of the local government. Such response(s) will be treated as conditions of approval/required modifications to the Management Plan." It is also recommended that any approval include advice note stating	Note submission, provide copy to applicant and include condition and advice note as outlined in Comment section				
		As the drilling program and ongoing maintenance is expected to be completed within a period of 3 years and no plans are outlined for the ongoing use of these facilities after the completion of the drilling program, DPIRD requests approval should be conditional on a decommissioning and rehabilitation plan to ensure the land is	that: "The Management Plan is to include sections relating to Fire Management, Emergency Response Plan, Waste Management, Noise/Light/Dust Management and Post Camp Rehabilitation (that details post-closure obligations and clean-up and rehabilitation of the					

	S	chedule of Submissions - Temporary Workforce Accommodation	on (Exploration Drill Camp) - Lot 100 Watson Road, Lockier	
Submission & Date Received	Respondent	Nature of Submission	Comment	Recommendation
		restored to either its current or improved agricultural potential or revegetated to prevent wind erosion.	site) to the approval of the local government. In the event that the camps are sited within an area identified upon the Department of Fire & Emergency Services State Map of Bushfire Prone Areas the Fire Management Plan must be submitted as a separate document and prepared and implemented to the requirements of the Department of Fire & Emergency Services."	
3 (28/7/23)	Australian Gas Infrastructure Group	No objection AGIG has no objection to the proposal as indicated on the plans supplied.	No additional comment	Note submission and provide copy to applicant.
4 (28/7/23)	Water Corporation	No objection The proposed development does not appear to affect Water Corporation assets. If our assets are affected, the developer may be required to fund new works, or the upgrading of existing works and protection of all works associated with the Water Corporation. If a service is required, please contact as per above.	No additional comment	Note submission and provide copy to applicant.
5 (26/7/23)	Department of Mines, Industry Regulation & Safety	DMIRS lodges no objection to the development. DMIRS has assessed this proposal with respect to mineral and petroleum resources, geothermal energy, and basic raw materials and makes the following comment. There is a 1.4% encroachment on granted E70/6072 held by Anaheim Pty Ltd. The tenement holder was not contacted as the development is minor and temporary. However, the tenement holder should be notified and the drilling contractor should also be made aware of the exploration company as any potential exploration activity in the area has the potential to increase the risk to both companies (C/- McMahon Mining Title Services Pty Ltd, PO Box 6301, East Perth, WA, 6892).	Copy of DMIRS submission has been provided to the applicant to ensure they are aware of received comments. It is noted that the issue, and subsequent management, of Exploration Permit 358 (Energy Resources Pty Ltd) and Exploration Permit 70/6072 (Anahaim Pty Ltd) is a matter overseen by DMIRS. In the event that there are overlapping aspects and impacts this is a matter for DMIRS to give consideration to in its assessment of applications and subsequent management thereof. Local government is not party to the issuing of petroleum and mining licences.	Note submission and provide copy to applicant.
6 (26/7/23)	Western Power	Comment provided Unfortunately requests for general comments, feedback and approval for proposals can't be provided for without application and the investigation and dialogue that allows. We suggest: Reviewing your query against the processes referred to in our	The Shire wrote directly to Western Power providing sufficient information for it to be able it to make comment upon this application. Western Power have chosen to abrogate its responsibility to provide comment to local government in this matter and in other planning matters including scheme reviews, rezonings, development	Note submission and provide copy to applicant.

	Schedule of Submissions - Temporary Workforce Accommodation (Exploration Drill Camp) - Lot 100 Watson Road, Lockier						
Submission & Date Received	Respondent	Nature of Submission	Comment	Recommendation			
		 Strategic Planning web page Using our provided mapping tools and Before You Dig Australia to locate any assets that would be affected by any proposed change or development If there are transmission assets (66,000-330,000 volts) in proximity to your work, apply via our move or remove transmission and communication assets form, Ensuring any developers involved are aware that they will need to make an application to deal with any assets that are in the development area as well as for the power requirements for the development. Where our assets are present, continued physical access for maintenance and emergency response must be provided. If this is not via the original road path, changed access conditions should be communicated via our Land Entry Preferences form. Thank you and we look forward to receiving your information/applications through the correct channels. 	applications, road and ROW closures and general planning enquiries. Western Power's response reflects poorly upon it in comparison to the level of service provided by other utility providers. Copy of Western Power submission has been provided to the applicant to ensure they are aware of their own Dial Before Your Dig requirements prior to commencement. In the event that the applicant seeks to make/upgrade power connection this will be required to be done through their direct approach to Western Power and at their expense, as is standard Western Power practice.				



STRATEGIC PRIORITIES 2023-2033 and CORPORATE BUSINESS PLAN 2023-2027

SUMMARY

The following focus areas and actions are based on Council's Adopted Budget 2023/24 and strategic priorities identified within the draft Strategic Community Plan (currently undergoing a major review):

1. GROWING MINGENEW

GROWING MINGENEW		Aspiration: Develop key enabling and underpinning investments to foster population growth		
10YR OUTCOMES	STRATE	GIC PRIORITIES 2023-2033	COUNCIL ROLE	4YR PRIORITY ACTIONS 2023-2027
notwork		ocate for external funding to support truction and maintenance of key assets and pathways	ADVOCACY	- Advocate for a regional freight movement strategy and associated resourcing plan
	Loca	elop, deliver and review the Shire's I Roads Improvement Plan and ed Pathways Plan	SERVICE DELIVERY	 Develop and implement a Roads Improvement Plan Implement the Shire's 10 Year shared Pathways Plan
		ocate for improved access and road ment for the Mingenew CBH site	ADVOCACY	 Receive the Mingenew Bypass study and determine next course of action Continue to liaise with CBH on expansion plans to represent local traffic and grower needs
	ensu	age with industry stakeholders to re accountability for quality road dards	ADVOCACY	Negotiate road user agreements with relevant industry stakeholders, as required
1.2 Attract investment and grow resident population	stake	ner with MWDC and industry cholders to harness opportunities for stment in Mingenew	ADVOCACY COLLABORATION	- Ongoing engagement with MWDC on alignment with key regional priorities

		laboratively to grow resource, ral and service industries in w	ADVOCACY LIAISON	 Attend resource sector events to promote local investment and leverage opportunities to support the local workforce. Continue to partner and engage with the Mingenew Irwin Group and local grower groups Maintain relations with space industry stakeholders to support the Mingenew Space Precinct
	•	a suitable asset renewal and ance program for Council's stock	SERVICE DELIVERY	 Develop a housing renewal and replacement program Develop a Building Maintenance Plan for Council-owned housing Support the purchase of two Karara-owned houses
	to extern resource	e for and promote opportunities al stakeholders, including the sector, to provide local diverse odation options	ADVOCACY	 Partner with government agencies and stakeholders to support housing shortage and explore solutions to housing shortages Develop a housing strategy for increasing key worker housing stock Identify external funding sources and apply to support the expansion of quality housing stock Advocate to Government agencies for local housing to be included in operational approvals for resource sector projects.
	e. Expand t residentia	he number of industrial and al lots	SERVICE DELIVERY	 Complete land swap transactions for rural land development around Mingenew Hill Investigate strategies for releasing and/or optimizing use of industrial land
1.3 Supporting infrastructure initiatives	•	encourage pride in local es to represent town	SERVICE DELIVERY	- Create a welcoming Civic Precinct

that makes business easy and support them				- CAS support for improvements and promotion of local business
to thrive	b.	Advocate for reliable, high-speed mobile and internet access across the Shire	ADVOCACY	 Support the rollout of NBN to key community assets Advocate to ensure telecommunication services are consistently reliable and providers are accountable Identity and advocate for funding to improve mobile blackspots
	C.	Advocate for and promote local spending and business partnerships	ADVOCACY	 Continue to participate in the local Business Alliance Ensure shared facilities are accessible and affordable for mobile business Continue to practice procurement activities that support local business
	d.	Deliver effective online services and information	SERVICE DELIVERY	- Ensure the Shire's website is geared towards doing business in Mingenew
1.4 Visitors have a positive experience and extend their length of stay	a.	CRC is supported to deliver tourism and information services	SERVICE DELIVERY COLLABORATION	 Agreement to deliver tourism and information services Review local visitor servicing model in conjunction with CRC to continue cultivating and sharing local knowledge
	b.	Maintain and utilize 'See you in Mingenew' and 'Make Mingenew the Centre of your Universe' campaigns	SERVICE DELIVERY	 Maintain a cost effective online presence to promote our tourism products Use social media to promote the Shire as a desirable tourist destination
	C.	Delivery of well-maintained and safely accessible attractions and amenities	SERVICE DELIVERY	- Investigate feasibility of a water play space at Cecil Newton Park

			 Design and consult on development of the Mingenew Spring Botanical Garden Support free camping initiatives Improve accessibility of Mingenew Hill
	d. Leverage and engage through regional partnerships to broaden tourism products, events, assets and programs	ADVOCACY PARTNERING	 Advocate for the continuation of Wildflower Country Identify and cultivate partnership opportunities with Tourism WA, Australia's Coral Coast, Astrotourism WA etc.
1.5 Local talent returns and is retained to support the local workforce	Deliver a fit for purpose Mingenew Childcare Facility to support current demand and future needs	SERVICE DELIVERY	Prepare and select the best value tender for design and construction of Childcare Facility Complete construction of Childcare Facility
	Attract and retain a quality and sustainable service provider to deliver local childcare and educational services	ADVOCACY	 Develop user agreement for lease and management of Childcare facility Utilise available key worker housing to support Childcare staff to live local
	c. Offer career opportunities – "Grow Your own" targeted at the local market	SERVICE DELIVERY	 Appoint an Engineer Cadet Appoint Horticultural Trainee/Apprentice Promote the Shire to secondary and tertiary institutions as potential career path
	d. Negotiate with resource companies to support local employment, development and training opportunities for youth	ADVOCACY	 Negotiate with regional industry to offer local apprenticeships and/or traineeships Host training programs available to local industry

2. LOVE MINGENEW

LOVE MINGENEW		Aspiration: A place where people are welcomed, can live a healthy life, and where people can reach their potential			
10YR OUTCOMES	STRATEGIC	PRIORITIES 2023-2033	COUNCIL ROLE	4YR PRIORITY ACTIONS 2023-2027	
2.1 Strong sense of community and culture		ity facilities continue to be fit for multi-use and meet sustainable ty needs	SERVICE DELIVERY	 Investigate and design an upgrade to the Rec Centre Develop a management plan for the Sports Club Facilitate minor upgrades to the CRC 	
	investme	social inclusion through co- nt with local community groups ting clubs	SERVICE DELIVERY	 Ensure the CAS is adaptive to deliver positive community-based outcomes Establish and maintain sponsorship agreements for community and sporting groups Manage community cropping to support financially sustainable initiatives 	
		nd rebrand the Town Hall to as a community hub	SERVICE DELIVERY	 Investigate renewal options for the Town Hall Attract new cultural and recreational activities to support community use of the Hall 	
		oreserve and celebrate local assets, culture and traditional	SERVICE DELIVERY CONSULTATION	 Support the service and operation of the Museum and Historical Society Continue to support and work with our traditional owners 	
2.2 Mingenew is valued as a livable community that supports diversity		e local celebrations, events, nents, heroes and stories	SERVICE DELIVERY	 Proactively maintain a positive social media presence Acknowledge funders and contributors of community projects and outcomes 	
	deliver su	d activate community spaces to uccessful local and regional and programs	SERVICE DELIVERY PARTNERING	 Continue to partner with and support Mingenew Expo to increase participation and attendance Continue to partner with and support the Turf Club for the annual race event 	

	c. Support and include disabled and vulnerable community members	SERVICE DELIVERY CONSULTATION	 Review and implement the Shire's Disability Access and Inclusion Plan Continue to support the CRC in delivery of seniors activities
2.3 A healthy and active community with access to local health services and facilities	Support and advocate to retain local GP services in Mingenew	ADVOCACY	Develop a service delivery agreement with service providers to ensure regular (at least fortnightly) doctor services are offered in Mingenew Provide quality facilities to encourage visiting health service providers
	b. Facilitate local access to primary and allied health services and support for inhome care and recovery	ADVOCACY	Support and promote local St John Ambulance services Advocate for HACC services in Mingenew Advocate and support Silver Chain services
	c. Provide and maintain affordable housing for aged and disabled residents to meet demand	SERVICE DELIVERY	Maintain and upgrade existing APUs / Independent living units Increase residential housing for aged and disabled residents
	d. Identify and monitor key community safety and health needs	SERVICE DELIVERY	 Develop a Public Health Plan Continue to utilize external resources for environmental Health services, as required Continue to support the WA Police in running youth engagement programs
	e. Continue to offer affordable residential and commercial facilities to support attraction and retention of health services	SERVICE DELIVERY	 Continue to offer available housing for Silver Chain Continue to promote and maintain the Autumn Centre for aged and health services

2.4 Increased participation in sport and recreational activities	a. Facilitate options and funding to reduce volunteer fatigue, local club sustainability and administration efficiencies	FACILITATE SERVICE DELIVERY	 Facilitate discussions on potential Club amalgamations Provide resources and support training and development opportunities to build local governance skills
	b. Public recreational assets are maintained and renewed in accordance with agreed service levels and accepted asset management practice	SERVICE DELIVERY	 Develop and facilitate implementation of a Sport and Recreation Master Plan, with a focus on rationalizing assets Complete the Tennis Clubhouse upgrade Maintain safe and ser friendly playgrounds and open spaces

3. PROTECTING MINGENEW

PROTECTING MINGENEW		Aspiration: Healthy natural environment with sustainable use of resources			
10YR OUTCOMES	STRA	TEGIC PRIORITIES 2023-2033	COUNCIL ROLE	4YR PRIORITY ACTIONS 2023-2027	
3.1 Valued and protected natural environment	a. Community jointly engages in the management of invasive species and environmental initiatives		ADVOCACY	 Completion of rural roadside vegetation management plan Develop weed management plan for Littlewell and Mingenew Hill Implement a mosquito management plan Develop a management plan for Mingenew Spring 	
		ully compliant Mingenew Waste facility ransfer Station)	SERVICE DELIVERY	 Conduct compliance audit of Mingenew Transfer Station Review and implement Transfer Station Management Plan 	

3.2 Minimise risk, support recovery and build resilience from emergencies and natural disasters	Collaboratively plan, run scenarios and respond to emergency situations	SERVICE DELIVERY	 Utilise LEMC to establish and review LEMA and recovery plans Adopt and Implement a Bushfire Risk Management Plan
	b. Advocate for sufficient funding and resourcing to support emergency volunteers and management	ADVOCACY	 Establish appropriate minimum standards for bushfire volunteers Advocate for DFES to increase resources to support local government in management of emergency volunteers Advocate for increased funding for emergency preparedness and recovery
	c. Facilitate initiatives, infrastructure and networks for natural disaster preparedness and resilience	ADVOCACY	- Implement Council-led actions from Local Community Recovery Plan
	d. Standalone resources at Rec Centre for community emergency hub	SERVICE DELIVERY	 Investigate access to standalone potable water services at Rec Centre Seek funding support for solar and backup power at Rec Centre
3.3 Sustainable Council practices	a. Install renewable energy on Council facilities where feasible	SERVICE DELIVERY	- Investigate and implement feasible renewable, energy efficient utilities and services for facility renewals / builds
	b. Capture and use water efficiently	SERVICE DELIVERY	 Investigate water efficiency initiatives for sporting and recreation grounds Advocate for local industry to adopt efficient water usage strategies
	c. Commit to developing locally appropriate mitigation and adaption strategies to manage climate change	SERVICE DELIVERY	- Measure local climate impacts and develop a Climate Change Action plan

		Advocate for effective and adequately funded Commonwealth and State Government climate change policies and programs
d. Support community-led waste reduction strategies	SERVICE DELIVERY	- Support availability of Drummuster

4. LEADING MINGENEW

LEADING MINGENEW		Aspiration: Responsible, accounta	able and transparent	leadership to deliver our priorities
10YR OUTCOMES	STRATEG	GIC PRIORITIES 2023-2033	COUNCIL ROLE	4YR PRIORITY ACTIONS 2023-2027
4.1 Community feel they are heard and can understand Council decision making	a. Demonstrated achievement towards priority projects and SCP outcomes b. Community expectations are measured and reported		SERVICE DELIVERY	 Report quarterly on achievement of priority projects Utilise the Annual Report to celebrate annual achievements and barriers to unmet priorities
			SERVICE DELIVERY	 Conduct community satisfaction survey every two years and report on outcomes Report outcomes of community engagement activities and outcomes, as required
		op effective communication, gement and marketing strategies	SERVICE DELIVERY	 Undertake a review of the Shire's marketing and communication activities in September 2023 Implement recommendations from the Marketing and Communications Strategy
4.2 Continued high standard of good governance and	impro	innovative ways to continually ve organisational efficiency and iveness	SERVICE DELIVERY	 Transition from IT Vision's Synergysoft systems to Altus Undertake review of the Shire's ICT services

transparency	b. Prepare and respond in a timely manner to Local Government Act reforms	SERVICE DELIVERY	 Participate in consultation opportunities to inform Reform changes Advocate for Reform changes to consider resourcing capabilities of small, rural local governments
	c. Influence positive local and regional outcomes through WALGA and government agencies	ADVOCACY	actively participate and represent matters through NCZ
	d. Identify risks and implement adequate management controls	SERVICE DELIVERY	 Review, at least annually, Council's risks and mitigation strategies Continue to participate in the LGIS Regional Risk Coordinator Program
4.3 Financial practices are responsive to compliance requirements and revenue needs	Build our operational reserves to support long term goals and/or enable adaptation to changing needs	SERVICE DELIVERY	- Establish a policy position on reserve management
	b. Balance value for money principles and compliance in procurement practices	SERVICE DELIVERY	 Undertake a review of the Shire's Local Supplier Policy and Panel Implement best practice in procurement
	c. Develop an updated LTFP that considers asset management capabilities	SERVICE DELIVERY	Review and update Asset Management plans Develop and update LTFP
4.3 Resources are sourced efficiently through cooperation and collaboration	a. Consider amalgamation, resource sharing and partnership opportunities where feasible	SERVICE DELIVERY	 Continue to support shared Planning Services Continue to support shared Building Services Continue to participate in regional discussions on amalgamation and resource sharing opportunities

	b. Participate in regional collaborations to advocate for local needs	ADVOCACY	- Continue to participate in the Midwest Library Consortium
	c. Connect with networks to access resources	SERVICE DELIVERY	-
4.4 Competent, invested and capable Council and organisation	Identify and promote incentives and alleviate barriers to create an environment for civic pride and participation on Council	SERVICE DELIVERY	 Review and promote benefit packaging for elected Members Survey the community on barriers to participating in Council Identify and establish opportunities to engage youth to be involved in local decision making Advocate for increased incentives for Elected Members
	b. Councillors participate in mandatory training and professional development opportunities	SERVICE DELIVERY	 Enforce mandatory training for Elected Members Support attendance at the Elected Member networking opportunities and professional development Advocate for delivery of regional training opportunities for elected members
	c. Continue to attract and retain high caliber staff as an employer of choice	SERVICE DELIVERY	 Adopt an Attraction and Retention policy Continue to offer quality and affordable residential options for Shire employees Actively promote the Shire as an Employee of Choice Proactively engage with sources of talent
	d. Build the skills and capacity of a resident Shire workforce	SERVICE DELIVERY	- Develop an Attraction and Retention Policy, incentivising resident workers, for Council adoption by August 2023

e. Maintain a s proactive sa	ITETY CUITURE	SERVICE DELIVERY	 Implement a comprehensive safety management system Establish a suitable safety program for volunteers
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Elections Timetable Template

Local Government Elections 2023



Enter election date>> 13/12/2023

	Note: Please manu	ually adjust dates in the 'Date' column which fall on a public holiday to the next busine	ess day.		
	Days from Polling Day	Election Activities or Events	Relevant Act sections or Regulations	Day	Date
	371 to 98	If an elected member's office becomes vacant on or between these days, the council may, with the approval of the Electoral Commissioner, allow the vacancy to remain unfilled until the ordinary election.	LGA s4.16(4) LGA s4.17(2)	Wed to Wed	7/12/2022 to 6/09/2023
	91	If an elected member's office becomes vacant on or after this day the vacancy will remain unfilled until the ordinary election.	LGA s4.16(2)(3) LGA s4.17(1)	Wed	13/09/2023
	80	Last day for local governments to gain agreement from the Electoral Commissioner to conduct the election (compulsory if intent is to hold a postal election).	LGA s4.20 (2)(3)(4) LGA s4.61 (2)(4)	Sun	24/09/2023
	80	A decision for the Electoral Commissioner to conduct the election cannot be rescinded after this day.	LGA s4.20(6) LGA s4.61(5)	Sun	24/09/2023
	77 to 63	Between these days, the CEO of the local government is to give Statewide public notice of the closing date and time for elector enrolments.	LGA s4.39(2)	Wed to Wed	27/09/2023 to 11/10/2023
	63	Last day for the local government's CEO to advise the Electoral Commissioner of the need to prepare an updated residents roll.	LGA s4.40(1)	Wed	11/10/2023
Close of Rolls	63	Advertising may begin for council nominations from 63 days, and no later than 52 days, before election day.	LGA s4.47(1)	Wed	11/10/2023
	57	Close of Rolls – 5.00pm	LGA 4.39(1)	Tue	17/10/2023
Nominations Open	52	Last day for advertisement to be placed calling for council nominations.	LGA s4.47(1)	Sun	22/10/2023
·	51	Nominations Open First day for candidates to lodge completed nomination papers, in the prescribed form, with the Returning Officer. Nominations are open for 8 days.	LGA s4.49(a)	Mon	23/10/2023
	44	Close of Nominations – 4.00pm	LGA 4.49(a)	Mon	30/10/2023
	43	Last day for the Electoral Commissioner to prepare an updated residents roll for the election. Last day for the local government's CEO to prepare an owners and occupiers roll.	LGA s4.40(2) LGA s4.41(1)	Tue	31/10/2023
	43	Returning Officer to give Statewide public notice of the election as soon as practicable but no later than 19 days before election day.	LGA s4.64(1)	As soon	as practicable
	29	The preparation of any consolidated roll (combined roll of residents, owners and occupiers) under regulation 18(1) is to be completed on or before this day.	LGA s4.38(1) Reg. 18(1)(2)	Tue	14/11/2023
	26	Last day for the Returning Officer to give Statewide public notice of the election.)	LGA s4.64(1)	Tue	26/09/2023
	4	Close of absent voting and close of postal vote applications for 'voting in person' elections – 4.00pm.	LGA s4.68(1)(c) Reg. 37(3)(4)	Sat	9/12/2023
Election Day	1	Close of early voting for 'voting in person' elections – 4.00pm.	LGA s4.71(1)(e) Reg. 59(2)	Tue	12/12/2023
	0	Election Day Close of poll – 6.00pm.	LGA s4.7 LGA s4.68(1)(e)	Wed	13/12/2023
	2	Election results declared and published.	LGA s4.77	As soon	as practicable
	2 - 14	Report to Minister. The report relating to an election under section 4.79 is to be provided to the Minister within 14 days after the declaration of the result of the election. (See Online 'Form 20' at www.dlgc.wa.gov.au)	LGA s4.79(1)(2) Reg. 81	As soon	as practicable
	Within 28 days of result publication	An invalidity complaint can be made to a Court of Disputed Returns, constituted by a magistrate, but can only be made within 28 days after notice is given of the result of the election.	LGA s4.81(1)	As a	applicable
	Within 2 months of result declaration	Newly elected members to make their declarations of office.	LGA s2.29(1)(2) LGA s2.32(c) LGA s2.34(1)(c)	As soon	as practicable
	Within 3 months of members making declarations	Newly elected members to lodge their Primary Returns with the local government's CEO.	LGA s5.75(1)	As soon	as practicable

^{*} All Act sections refer to the Local Government Act 1995. At 1995. At 1995 and 1997.

Shire of Mingenew



RECOVERY NARRATIVE

About our community

Mingenew describes itself as an agricultural powerhouse and is the southern hemisphere's largest grain facilitator. Surrounded by breakaway country with fantastic flat-top ridges, Mingenew is a sought-after wildflower destination. Mingenew has many supporting industries, facilities, and employment opportunities, and is home to around 470 people. The main industry is agriculture, and others work in local government, small business, ag support companies and essential support services.

Mingenew loves its sport and has a strong focus on its sporting community facilities. Mingenew has a caravan park with a variety of accommodation options from suites through to open-air camping and some of the best nights under the stars in WA.

Mingenew is a proud and passionate community, home to many volunteers and community groups dedicated to making our district the best possible place to live. It's a great place for families too, with a local long day-care centre, highly regarded primary school and easy bus access to two local high schools.

In addition to the largest on-shore grain receival facility in the southern hemisphere, and a space and satellite

communications industry established by NASA over 40 years ago, Mingenew is also home to one of Australia's leading producer-driven organisations in the Mingenew Irwin Group, a collaborative, connected and capable Community Resource Centre, a Silver Chain nursing post, the famous Mingenew Bakery, and a host of successful small businesses.

The Shire of Mingenew had a Total Revenue of \$7.03m (including operating and capital grants) for the 2020/21 financial year. A total of 46% (\$3.26m) of the Shire's revenue for 2020/21 were Non-Operating Grants which helped to fund a number of key capital projects, in particular the beginning of the construction of the new Coalseam Road Bridge, drainage upgrades on Milo Road and widening on part of Mingenew Mullewa Road. Operating Grants and Contributions account for 11% of total revenue, while Rates (28%) and Fees & Charges (4%) are also significant contributing factors to the total revenue figure.

Severe Tropical Cyclone Seroja

Severe Tropical Cyclone (STC) Seroja crossed the Western Australian coast south of Kalbarri on 11 April 2021, as a Category 3 system with wind gusts of up to 170 kilometres per hour. STC Seroja is the strongest system on record in the Midwest Gascoyne Region. The cyclone impacted a population of almost 50,000 people and an area of more than 170,000 square kilometres and more than 16 local government areas.

The Shire of Mingenew experienced widespread damage across built and natural assets including significant impact on the townsite. A total of 24 farm properties were impacted and 39 residentials have been deemed uninhabitable following Seroja.

Local Recovery Coordination

The Shire of Mingenew has responsibility for coordinating recovery in its district under the *Emergency Management Act* 2005. The Shire and the Local Emergency Management Committee (LEMC) worked with district recovery staff to organise a Local Recovery Planning Workshop to inform this Recovery Plan. The workshop was conducted on the 4th of April 2022.

Key recovery stakeholders in attendance:

- Shire of Mingenew elected members and staff
- Community members and organisation
- Local business and industry representatives
- Department of Fire and Emergency Services
- Department of Communities
- Department of Education
- St John Ambulance
- Red Cross
- Rural Aid
- WA Police Service

The Western Australian Minister for Emergency Services, the Hon Stephen Dawson MLC, also attended the workshop briefly and met with community members.

Short term

Medium term

Long term

Facilitate emergency preparedness training

Streamline community groups - reduce fatigue

Volunteer recruitment program

Host community event to lift spirits

Improve long-term community psychosocial support

Organise connect activities for elderly residents and for young people

ECONOMIC

Develop a housing business and investment model

Investigate models for community owned infrastructure

Prepare economic development strategy to attract investment, workers and new residents

Town beautification campaign

NATURAL

"How to guide" for on-farm revegetation

Implement Masterplan for Cecil Newton Park

Audit town trees, organise community and school planting days

Clean-up and regenerate Coal Seam and **Depot Hill Trails**

Explore workers accommodation options

Funding to repair and upgrade tennis club

Back-up power for Mingenew Recreation Centre

Collaborate to increase infrastructure resilience

Advocacy on insurance challenges

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Shire of Mingenew



	KEY DAMAGE AND IMPACTS	RECOVERY OBJECTIVES	RECOVERY TASK/ACTIVITY	ACTIVITY PARTNERS	MEASURES OF SUCCESS
	 Groups, Institutions and Social Connection Damage to community infrastructure prevented use e.g. tennis courts. Psychosocial and Wellbeing Concern for other vulnerable groups in the community including elderly residents, children and farmers. Access for services for mental health and psychosocial support services is challenging as they are underresourced and are over-committed. Health and Medical Lack of telecommunications and damage to infrastructure prevented Silver Chain Nursing Post and St Johns Ambulance from resuming services. Cultural / Heritage A number of heritage buildings have been damaged. 	Building resilience Improved emergency preparedness of households and businesses	S1 Develop and implement a community resilience and preparedness resource/training to support the community to develop personal/ household/business disaster plans.	 Shire of Mingenew Department of Fire and Emergency Services ARC 	S1 Resources and training funded, and delivery commenced by Oct 2022. Number of people attended. Number of personal disaster plans developed as a result.
		Supporting volunteers and community groups	PRIORITY 2 S2 Support community groups to streamline administration and governance functions of community groups to reduce volunteer fatigue and to better manage community expectations.	 Local Community Groups Department of Local Government, Sport and Cultural Industries (support and funding) 	S2 Mingenew clubs and associations are supported to develop a model constitution/template to allow clubs to reduce the number of constitutions and administrative requirements, without losing their autonomy.
ENVIRONMENT			S3 Develop and implement a recruitment program for new community volunteers and support with training.	 Shire of Mingenew Community Resource Centre Communities (funding) 	S3 Establish volunteer development program by Jan 2023.
SOCIAL EN			PRIORITY 5 S4 Host an event to lift community spirits.	Community Resource Centre	S4 2022 event delivered. Consideration given to an event in 2023.
AN AND		Mental health and wellbeing Increased social connection for vulnerable community members	S5 Recovery Hub to provide connections to psychosocial support for community members. Work with support providers, community and government to assess, plan for and implement long-term community psychosocial support.	 Shire of Mingenew Community Resource Centre Department of Communities ARC 	S5 Continued community engagement with services. no. of new clients, no. of community events
HUM/		Actively encourage and support positive culture of community engagement			
		Support for vulnerable community members Connect two key cohorts with activities	S6 Connect services for elderly residents and support their preparedness training. Connect: Red Cross door knocking Bowling Club social outings CRC Monday morning sessions Develop activities for 12 to 24 year cohort.	 Australian Red Cross Bowling Club Community Resource Centre PCYC North Midlands 	S6 Services successfully network and identify priority elderly residents by Dec 2022.S7 One activity identified and implemented in 2022.

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Shire of Mingenew



Shaded boxes highlight recovery related activities

	Shaded boxes highlight recovery related activities				
	KEY DAMAGE AND IMPACTS	RECOVERY OBJECTIVES	RECOVERY TASK/ACTIVITY	ACTIVITY PARTNERS	MEASURES OF SUCCESS
ENVIRONMENT	Residential and Household Availability and rising prices of trades and materials causing frustration and hold-ups in recovery. Many residents and businesses	Economic infrastructure and planning	PRIORITY 1 E1 Investigate a housing business model (and investment framework) to address housing crisis and enable construction of variety of suitable accommodation options.	Shire of Mingenew	E1 Research on innovative housing options identified by Sept 2022.
	 Many residents and businesses found it too time consuming to negotiate the insurance claim process. Whether people were insured or not seems to be a leading factor in the level of financial impact. 		PRIORITY 3 E2 Investigate model of community ownership of key assets and businesses.	Shire of Mingenew	E2 Community ownership models identified by Sept 2022.
	 Local and State Government Infrastructure /Resources Lack of access to workforce and accommodating employees. Limited LG resources and fatigue levels of LG employees. Primary Production 		E3 Develop economic development strategy and prospectus to attract investment and labour supply.	Shire of Mingenew	E3 SoM to commence development of an economic development strategy and prospectus by June 2023. Linked to E4 and E5.
	 22/24 primary producers in Mingenew were impacted. Impact of the cyclone on stock and crop programming/rotation. Balancing clean-up and farming activities as competing priorities 		E4 Support local businesses to develop reward packages to attract and retain staff.	 Shire of Mingenew Small Business Development Corporation MWDC/RDA 	E4 Engagement strategy for support to business owners to be developed by June 2023. Linked to E3 and E5.
ECC	 (initially and ongoing). Significant loss and damage to critical infrastructure (sheds, equipment, stock, rural water infrastructure). 		E5 Develop a Welcome to Town resource and process.	Community Resource Centre Shire of Mingenew	E5 CRC and SoM to develop a welcome to town resource by June 2023. Linked to E3 and E4.
	 Ongoing concerns about finding and accommodating workers. Tourism, Industry and Small Business 		E6 Town beautification campaign.	Shire of MingenewCommunity	E6 Identify key projects for implementation and include in community/shire planning.
	 Contractors using accommodation impacted availability for tourism. Difficulty obtaining goods and services (fuel, food etc.) due to availability, impact to roads and extended power outages. 				

Shaded boxes highlight recovery related activities

Shire of Mingenew



	KEY DAMAGE AND IMPACTS	RECOVERY OBJECTIVES	RECOVERY TASK/ACTIVITY	ACTIVITY PARTNERS	MEASURES OF SUCCESS
	 Plants and Animals Damage to some trees in public spaces. 	Recovery of biodiversity	N1 Source "how to guide" for on farm plantings with species list and where to buy seedlings.	 Local Emergency Management Committee NACC 	N1 NACC to develop regional resource for Seroja recovery.
	 Perceived and actual increase to fuel loads because of defoliation. Perceived and actual increase to 		N2 Audit town trees to determine best actions, organise community and school planting days and replant with wind resistant species.	Shire of MingenewCommunityNACC	N2 Trees audited by Dec 2022.One tree planting day to be conducted in 2023.
ENVIRONMENT	risk of structurally compromised (uprooted/defoliated)trees and widespread debris. Public Land/Recreation • Debris and fallen trees affecting creek lines, reserves and parks and reduction in shade for public. • Damage to public infrastructure in reserves and parks (signage, carparks, drainage, walk trails) which impact public access and enjoyment.	oliated)trees and enjoyment of natural spaces reation llen trees affecting eserves and parks and hade for public. ublic infrastructure in parks (signage, inage, walk trails)	N3 Regenerate Coal Seam and Depot Hill Trails by moving fallen trees and reducing fire load.	Department of Biodiversity, Conservation and Attractions	N3 Coordinate rehabilitation works with relevant stakeholders by Dec 2022.
			N4 Implement Masterplan for Cecil Newton Park and replant trees.	Shire of Mingenew	N4 Masterplan implementation commenced by 2023.
NATURAL			N5 Develop lookout/picnic area on Mingenew Hill to build sense of place.	Shire of Mingenew	N5 Include for consideration in Strategic Community Plan consultation.
2	Impact to Coalseam Reserve.	Management of pests, hazards and disease	N6 Explore possible training options for different fuel mitigation techniques (i.e. cool burns). Encourage fire breaks on Crown Land.	Shire of MingenewDepartment of Fire and Emergency Services	N6 Training to be considered as part of the development and implementation of the Bushfire Risk Management Plan.
			N7 Develop information on waste disposal, safe burning, green waste collection, information on tarp management and maintenance.	Shire of MingenewDepartment of Fire and Emergency Services	N7 Ongoing information provision until 2023.

Shaded boxes highlight recovery related activities

July 2022 Page **4** of **5**

Shire of Mingenew



	KEY DAMAGE AND IMPACTS	RECOVERY OBJECTIVES	RECOVERY TASK/ACTIVITY	ACTIVITY PARTNERS	MEASURES OF SUCCESS
	 Public and Private infrastructure Damage to private and public infrastructure. Damage in town and on farms, 39 residences deemed uninhabitable. 	Rebuild support Ensure accommodation within the community is	PRIORITY 6 B1 Provide workers accommodation through overflow options and or CBH.	Shire of Mingenew	B1 Innovative housing model developed – link to E1.
F	 Some properties still tarped, possibly with uncleared cyclone debris. Difficulty accessing building contractors, engineers, materials and an inflation of costs associated with rebuild. 	sufficient to enable recovery.	B2 Provide support to Mingenew Hotel to enable their recovery process.	Shire of Mingenew	B2 Ongoing check-ins with hotel owners to give support.
	 Essential Services Debris on roads and damage to road signs in weeks following the cyclone. Significant damage to utility infrastructure with ongoing supply and reliability issues to some utilities. 	Recreation facilities	PRIORITY 8 B3 Seek additional funding to repair and upgrade Tennis Club.	Shire of MingenewMingenew Tennis Club	B3 Additional funding identified, and funding processes commenced by Sept 2022.
BUILTE	Clean Up Damage to buildings with asbestos containing materials on private property. Rapid Damage Assessments Completed Banid Damage Assessments	Utilities	PRIORITY 7 B4 Develop a plan for assessing the resilience of utilities and seek support from relevant providers to increase resilience.	Shire of MingenewWestern PowerTelstra	B4 Baseline information sought from utility providers by 2023.
	 Completed Rapid Damage Assessments. Further assessments are ongoing to validate and identify additional needs. 		B5 Investigate free standing power supply for Mingenew Recreation Centre.	Shire of Mingenew	B5 Determine feasibility of potential project by December 2023.
	 Insurance Issues include forced pay-outs, increase in work costs, and additional financing needs. 	Insurance advocacy	B6 Continue regional advocacy for reported insurance challenges and issues (e.g. forced pay-outs, increase in works costs, additional financing needs).	Local Emergency Management Committee	B6 Targeted and timely communications to relevant agencies and regulatory bodies.

Shaded boxes highlight recovery related activities

This plan was developed with funding support through the Commonwealth-State Disaster Recovery Funding Arrangements and the support of the following organisations:





Department of Fire and Emergency Services
Department of Communities



July 2022 Page **5** of **5**

Sprout Activator by Waterplay Solutions or approved equivalent

FS Charlotte by Waterplay Solutions or approved equivalent

-GS Ants 5 by Waterplay Solutions or approved equivalent

-FS Solis (Monster 5) by Waterplay Solutions or approved equivalent HS

ENTO

Z

STR



Watter

WATER PLAY
Mingenew Hill, Western Australia
MIDWEST EXPO August 2023



Application and Road Owner Support to Add or Amend a Road on a Restricted Access Vehicle Network

Main Roads Heavy Vehicle Services will consider adding a road to the Restricted Access Vehicle (RAV) Network provided support from the relevant road owner is obtained. This application <u>must be completed by the applicant</u> and forwarded to Main Roads who will liaise directly with the relevant road owner to ensure they have no objections to the access.

Applicant Details									
Operator Name / Company	Holmwoo	od Pty Ltd							
Contact Name	Robert Ho	olmes		Contact Phone	Number	04277	28015		
Mobile Phone Number	04277280	015							
Email Address	holmwoo	odfarms@outlook.co	om						
RAV Length Category	to be as	sessed							
Tandem Drive RAV Catego	ries 2-10	Refer to the Prime	Mover or Truck Comb	inations Operating C	onditions f	for appr	oved combination	ns on our web	osite.
RAV Category 7 (36.5m	1)								~
Tri Drive Categories 1-5 Re	efer to the	Tri Drive Prime Mo	over, Trailer or Tri Driv	ve Truck, Trailer Oper	ating Cond	ditions	for approved com	binations on	our website.
									_
PBS Categories Refer to the	WA Perfo	ormance Based Sta	andards (PBS) Scheme	- Access Levels & Pr	inciples on	the PB	S page on our we	bsite.	
									_
8 Tyre Per Axle Low Loade		ss Categories Refe	r to the Class 1 RAV 8	Tyre Per Axle Low Lo	der Overn	nass Pe	riod Permit Ope	rating Condit	ions for approved
combinations on our websit	te.								
Other Categories (i.e. Overs	size Road T	Train) Refer to the o	operating conditions of	the particular Permit	Product fo	r appro	ved combinations	on our webs	ite
Concessional Mass Le	vel to be	e assessed			Conces	sional l	Mass Levels		
Level 1 concessional mass is a Tandem Drive, Tri Drive or PB				e relevant base			Tandem Axle Group	Tri Axle Group	Quad Axle Group (PBS)
For Level 2 and 3 concessiona	al mass, ple	ease select the requ	ested level below. Ref	er to the Operating	Leve Leve		17.0t 17.0t	21.5t 22.5t	24.0t 27.0t
Conditions on the AMMS page					Leve	el 3	17.5t	23.5t	28.5t
Requested Mass Level									
									_
Transport Task Detail	S								
Estimated Annual Tonnage		2000	(t)	Estimated Loaded	Movemen	its 10		per m	
Reason for RAV Access App	olication	Carting grain from	paddocks at harvest tii	ne - October to Decen	nber				(Please Select)
Roads to be assessed	Please list a	all requested roads	where RAV Access is re	equired (including star	t and end p	oints) a	nd attach maps.		
Coalseam Road Road No. 5090003 Start SLK 14.251 (Nane End SLK 21.888	ekine roa	ad intersection)							





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Standard Restricted
Access Vehicle Route
Assessment Guidelines

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Document Control

Owner	Director Heavy Vehicle Services
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Review Frequency	As required

Amendments

Revision Number	Revision Date	Description of Key Changes	Section / Page No.
1	May 2016	Removed Appendix G 'Turning Radii' Removed Appendix K 'Assessment Form Template' Updated Appendix H 'Low Volume Condition 7' Updated Appendix D to include the wording 'with dedicated cycle lane'. Updated contact details.	Appendices & 1.5
2	July 2016	Updated to include revised minimum road widths for RAV Categories 2-7 and 9-10 & moved Type B traffic volume / road length table. Added Type B traffic volume / road length table.	Appendix C and 2.4.4
3	October 2016	Amended list of standard turning templates. Updated web location for turning templates. Amended low volume condition 1.	Appendix G & H, 2.92
4	March 2017	Remove section.	2.9.5
5	April 2017	Updated Main Roads website details.	1.4
6	May 2017	Amended low volume condition 6.	Appendix H
7	July 2017	Note added relating to private driveways.	1.2
8	December 2017	Amended stopping sight distances. Amended entering sight distances. Amended wording relating to road parking. Amended wording to include load/vehicle height being 4.6m.	Appendix E, F, D, 2.3
9	August 2018	Amended wording relating to provision for overtaking. Amended wording relating to turning at intersections. Amended wording and requirements for railway level crossing. Amended wording relating to off-road parking. Amended appendices, Appendix E, (Templates) & I removed. Added Figure 1 to 8. Incorporated concessional assessment requirements Amended section 2.4.1 Signage, 2.8.1 Acceleration Lanes, 2.9.1 Signage & 2.9.4 Rail Crossings.	2.6, 2.9, 2.10, 2.11, Appendix A, B, C, D, E 1.1, 2.21

10	September 2018	Amended wording relating to turning at intersections. Amended wording relating to provision of overtaking and removed Figure 1. Amended wording relating to Approach Sight Distance and Entering Sight Distance.	2.6, 2.8, 2.84, 2.85
11	November 2019	Amended introduction to clarify the intent of the guidelines.	Page 6
12	13 May 2022	Reviewed entire document and moved onto current branding (no technical changes).	All

REFERENCES AND RELATED DOCUMENTS

The following documents relate to these Guidelines and are available on the Access Requirements in WA page on the Main Roads website.

Document Number	Description
D16#198414	Guidelines for Approving RAV Access
D16#374056	Tri Drive Route Assessment Guidelines
N/A	RAV Route Assessment Form

DEFINITIONS

The following are definitions for terms used in these Guidelines.

Term	Definition
AADT	Annual Average Daily Traffic (AADT) the daily number of vehicles travelling on a road, averaged over one year. It is determined by the total yearly two-way traffic volume divided by 365, expressed as vehicles per day.
Approach Sight Distance (ASD)	The distance required for a driver of a RAV, travelling at a given speed, to observe the approaching intersection, and react or stop if necessary.
Bridge	A structure (with the exception of gantries) having a clear opening in any span of greater than 3 metres measured between the faces of piers and/or abutments or structures of a lesser span with a deck supported on timber stringers.
Carriageway Width	That portion of a road or structure devoted particularly to the use of vehicles that is between guide posts, kerbs or barriers where these are provided, inclusive of shoulders and auxiliary lanes.
Culvert	A structure under a road having only clear openings of less than or equal to 3 metres measured between the faces of piers and/or abutments or a pipe shaped structure of any diameter.
Entering Sight Distance (ESD)	The required sight distance for a RAV driver to see a sufficient gap in oncoming traffic that will allow a RAV, with greater length and lower acceleration capacity, to clear the intersection safely.
HVS	Main Roads Heavy Vehicle Services.
Main Roads website	www.mainroads.wa.gov.au
Passenger Car Equivalence	Passenger Car Equivalence (PCE) factors are a relative measure of the traffic flow impedance effects of different vehicle types. The PCE factor for a particular vehicle type is the equivalent number of passenger cars (AUSTROADS Vehicle Class 1) that would have the same impedance effect as a single vehicle of that type.
Order	An Order issued under the Road Traffic (Vehicles) Act 2012.
RAV	Restricted Access Vehicles (RAV) consists of all combinations of vehicles exceeding 19 metres in length or 42.5 tonnes gross mass including B-Doubles, road trains and truck-and-trailer combinations.

Term	Definition
Remote Road	A general term for a main arterial road carrying mostly long distance traffic.
Rural Road	All roads that provide a secondary network of National, State and local government roads connecting cities and towns.
Seal Width	Width between edges of sealed surface or between edge lines (where installed on undivided carriageways), whichever is less.
Structure	A bridge or culvert.
TPA	Tonnes per annum.
Urban and Town Site Road	All roads within a populated area of established dwellings, a central place of trade and recognised as a distinct place. Generally the area will act as a central hub of activity for the community.
VPD	Vehicles Per Day (VPD) is the number of vehicles observed passing a point on a road in both directions for 24 hours. It is a measure of daily traffic volume, often more relevant to low volume, local government roads, typically rural roads in these guidelines. VPD can differ from AADT in being a better measure of traffic volume during periods of more intensive RAV usage or seasonal tourist traffic.
Vehicle Regulations	The Road Traffic (Vehicles) Regulations 2014.

1 INTRODUCTION

1.1 Purpose

These guidelines have been prepared to provide guidance to a person conducting an onsite assessment, on an existing road, for the purpose of assisting Main Roads Heavy Vehicle Services (HVS) in making an informed decision as to whether a road is suitable for use by a particular category of Restricted Access Vehicle (RAV).

These guidelines are to be read in conjunction with the following documents, available on the Access Requirements in WA page on the Main Roads website:

- Guidelines for Approving RAV Access; and
- Tri Drive Route Assessment Guidelines:

The *RAV Route Assessment Form* is also available on the Main Roads website to further assist in ensuring the required information is captured during the onsite assessment.

These Guidelines form part of the overall RAV access assessment process, as outlined in <u>Appendix F</u>, to enable HVS to make an informed decision on behalf of the Commissioner of Main Roads, in accordance with the Commissioner's authority to approve RAV access under provisions of the *Road Traffic (Vehicles) Act 2012*.

These guidelines are not road design standards. However, if a road is constructed to the appropriate road design standards for the particular category of RAV and approved by Main Roads, the road will pass the RAV access assessment process.

1.2 Application

For the purpose of these guidelines, "standard" RAVs are those vehicle combinations specified as Category 1 to 10 Approved Vehicle Combinations under the *Prime Mover, Trailers Combinations Order 2017* and *Truck, Trailer Combinations Order 2017*.

For the purpose of these guidelines, the standard RAV Categories have been grouped into four (4) assessment groups, as follows:

- Group 1 RAVs Categories 2-4 (e.g., pocket road train, B-Double, and other RAVs with a maximum length of 27.5 m);
- Group 2 RAVs Categories 5-6 (e.g., RAVs with a maximum length of 36.5 m and a maximum mass of 87.5T);
- Group 3 RAVs Categories 7-8 (e.g., RAVs with a maximum length of 36.5 m and a maximum mass of 107.5T); and
- Group 4 RAVs Categories 9-10 (e.g., RAVs with a maximum length of 53.5 m).
- **Note 1:** A road approved for one of the standard RAV Categories, is also approved and added to AMMS level one (1) for the equivalent RAV network.
- **Note 2:** Where a RAV route assessment is for operations under a concessional loading scheme, such as the Accredited Mass Management Scheme (AMMS), the assessor must take into account the additional mass when requesting a structures assessment as per Section 2.2.

Where quantitative limits are recommended, they are intended as a guide only and are no substitute for common sense and judgement based on experience. In certain cases, routes which do not meet the requirements outlined in this document can be accepted as RAV routes by imposing conditions, such as speed restrictions. Refer to the *Guidelines for Approving RAV Access*.

1.3 Assessment Requirements

Route assessments will only be accepted from a suitably qualified person. The assessor should have experience and knowledge of the following:

- The principles of heavy vehicle operations, including vehicle configurations, maximum dimensions and axle load limits;
- Heavy vehicle dynamic performance characteristics, including limitations on the ability of heavy vehicles to accelerate, brake, ascend grades and negotiate intersections;
- Heavy transport issues, legal requirements and permit systems; and
- Road safety concepts and principles.

When considering a potential RAV route, the assessor is advised to initially perform a desktop assessment using all available information. In some cases, this initial assessment will identify physical constraints, such as posted bridge load limits and road width deficiencies, which may render the route unacceptable, without the need for further onsite assessment.

If the applicant is willing to pursue upgrades to the road, then a full assessment is required to identify all deficiencies. This is to alleviate any problems with some upgrades being carried out and then the full assessment conducted, only to then identify additional deficiencies. The assessment will only identify the deficiencies and will not provide upgrade design requirements.

RAV use on a particular route may have some negative impacts on the environment, community and traffic. Assessors must first determine if the proposed route is the most appropriate route for the particular operation(s) and recommend variations to the initially proposed route to reduce such impacts. Consideration should also be given to the impact if RAV access is not approved, i.e. will the operation(s) occur regardless and then be carried out with increased heavy vehicle movements.

As part of any route assessment for a RAV, HVS does not assess any access for driveways adjoining a RAV network road. It remains the responsibility of the property owner to ensure safe ingress and egress to the property.

Before making a decision on an application for RAV access, HVS may deem it necessary to do any or all of the following:

- Perform a further assessment of the route;
- Assess the suitability of the road pavement;
- Assess the suitability of all structures on the proposed route to accommodate the specific vehicle;
- Specify conditions of access, such as speed limits restrictions;
- Obtain local government agreement for the proposed RAV access;
- Recommend road improvements as condition of approval;
- Conduct a Performance Based Standards (PBS) Scheme assessment to assess the proposed vehicle's safety performance.

When assessing a road, all connection points to existing RAV networks must be assessed for suitability and a holistic approach should be taken to ensure overall RAV network connectivity in the area.

1.4 Planning Evaluation

Assessment of a proposed RAV route should be checked against any future planning proposals to evaluate the potential impact of RAVs. The relevant road managers should be consulted as part of the assessment process.

1.5 Further Assistance

Additional information and guidance is available from HVS via telephone 138 486 or hysrouteassessments@mainroads.wa.gov.au

2 ASSESSMENT CRITERIA

2.1 Traffic Data & Accident Statistics

2.1.1 Traffic Counts

In order to determine the suitability of a road for RAV access, it is essential to obtain current traffic counts for the particular road. The traffic counts must be considered when determining appropriate road widths, potential congestion issues and relevant operating conditions. If traffic data is not available, an estimate from the road manager should be obtained.

2.1.2 Accident Statistics

Consultation with the road manager is necessary to establish if there is an accident history on the particular road that needs to be considered during the assessment process. Consideration should be given to applying conditions to the proposed RAV access to mitigate the risks, such as speed restrictions or curfew conditions, which cannot be applied to general access heavy vehicles.

2.2 Structures

2.2.1 Load Capacity

All bridges and load restrictive culverts on the requested route will be assessed for the proposed RAV access by Main Roads Structures Engineering Branch, via HVS. When carrying out an assessment for Network 2, a separate Structures Engineering assessment must be carried out for the Short B-triple combination.

Any bridge restrictions for the Short B-triple combination must be specified in the access conditions for the relevant road.

Consultation with local governments is required to ensure all culverts on local government roads have been appropriately considered.

2.2.2 Structure Width Requirements

To ensure RAVs can safety pass oncoming vehicles when crossing structures, the minimum width between kerbs on a bridge or over a culvert must not be less than the width specified in Table 1.

Table 1: Minimum Width between Kerbs/Carriageway on a Structure

AADT	Minimum Width Between Kerbs/carriageway (m)	Quality of Approaches
Less than 75	3.5*	Structures with adequate Approach Sight Distance (ASD)**.
5.3 Stru		Structures with adequate ASD, clearly signed and road clearly marked.
75 to 150	7.0	Structures that have inadequate ASD, inadequate signage or no road markings.
5.8		Structures with adequate ASD, clearly signed and road clearly marked.
150 to 500	7.2	Structures that have inadequate ASD, inadequate signage or no road markings.
More than 500	7.2	All structures at this traffic volume

^{*}Conditions apply; refer to 2.4.2 and Appendix B;

^{**}RAV ASD should be measured from a truck driver's eye height of 2.4 metres. Minimum requirements for ASD refer to *Appendix D*.

2.3 Overhead Clearance

Standard RAVs are approved to travel with a height of up to 4.6 metres. RAV route assessments must confirm that adequate vertical clearances are available to safely accommodate a load/vehicle height of 4.6 metres. An adequate vertical clearance is considered to be 4.6 metres, plus the following overhead clearance:

- Overhead structures, such as bridges and gantry signs 300 millimetres overhead clearance; and
- Power lines the minimum overhead clearance required by telecommunications and electrical transmission cable providers.

Where telecommunications and/or electrical transmission cables cross the route, approval for a load/vehicle height of 4.6 metres must be obtained from the relevant controller(s) listed in the "Contact Details for Other Agency Approvals" located on the Oversize Over-mass Permits page of the Main Roads website.

Where the required load/vehicle height of 4.6 metres is not approved by the cable provider, the cable provider must specify the maximum approved load/vehicle height and the location of the restricting power line. RAV access may still be considered with appropriate height conditions.

2.4 Rural Road Widths

When the hauling unit of a RAV travels along a straight path over an uneven surface, the trailing units do not follow along the same path as the lead unit. This is defined as "off-tracking" and depends on several factors, including:

- The steering actions of the driver;
- Vehicle configuration and coupling arrangements between units;
- Misalignment of the axles;
- Suspension (geometry, bump and roll steer effects) and tyre characteristics;
- Vehicle length;
- External disturbances that include road roughness, cross-slope and side loading from wind-gusts; and
- Speed of travel.

The maximum deviation in tracking over a straight section of road, when added to the width of the RAV, and then a safety margin applied, determines how much road width is needed to safety accommodate the RAV.

To assess the widths of rural roads, tables of minimum carriageway widths and sealed widths to accommodate the RAV are listed at *Appendix A*.

To be suitable for RAV access, a road should be sealed if AADT is over 150 and annual freight tonnage is over 300,000 tonnes per annum. The requirement for the road to be sealed is partly for safety reasons, but more so for road sustainability.

In the absence of any traffic data, the following parameters may enable a judgement as to whether a road needs to be sealed:

- If the road is unlikely to be used by more than 10 RAVs per day; or
- If the road is unlikely to be used by more than 60 RAVs per day over a seasonal two month period.

When considering whether a road has adequate width, an assessment should also be made in relation to any potential risks posed by:

- Crests:
- Pronounced cambers;
- Poor shoulder condition;
- Surface roughness; and
- Reduced sight distances.

Despite a road's width being above the specified minimum in <u>Appendix A</u>, these factors may require additional width, application of specific RAV operating conditions, or in extreme cases, mean the route is unsuitable for RAV access.

Minor width deficiencies are acceptable, particularly if it is only for a small portion of the road. If width requirements are relaxed, consideration should be given to applying conditions to mitigate risk and to ensure safe operation.

Off-tracking of a vehicle combination is more severe at high speeds; therefore minimum seal width may be reduced where speeds are reduced to 60 km/h or less.

Minimum seal widths may also be reduced on roads where all other road users are familiar with the operation of heavy vehicles e.g., farm access roads, industrial areas and mine access roads.

2.4.1 Sight Distance Considerations at Curves and Tight Bends

When the hauling unit of a RAV travels around a curve or tight bend, the trailing units pull across the curve or tight bend and as such, require additional road with. This is defined as "swept width" and depends on several factors, including:

- Radius of the curve or tight bend;
- Length of vehicle combination;
- Number and type of articulation points; and
- Road surface and geometry.

In instances where it is identified the RAV would be required to utilise additional road width when travelling around a curve or tight bend, potentially encroaching into oncoming traffic, the assessor must ensure there is sufficient visibility on the approach to the curve or tight bend to observe oncoming vehicles, and react or stop if necessary. The table in <u>Appendix D</u> shows the required sight distance for RAVs, given the speed and the gradient of the road.

It will be necessary for the assessor to conduct swept path assessments on curves to determine if the RAV is likely to encroach into oncoming traffic.

Note: Access should be declined if the RAV crosses a solid white line when traversing a curve or tight bend, unless there is sufficient sight distance.

2.4.2 Low Volume Road Width

When assessing road width, where traffic volumes are less than 75 vehicles per day and the road width does not meet the requirements in <u>Appendix A</u>, the width of the road may be assessed in accordance with the requirements in <u>Appendix B</u> and the relevant conditions in <u>Appendix E</u> should be applied.

A Type B low volume road should not exceed the maximum road length stipulated in Table 2.

Table 2: Maximum allowable road length for Type B suitability

Daily Traffic Volume	0 to15 VPD	16 to 30 VPD	31 to 50 VPD	51 to 75 VPD
Max Road Length	5.0 km	2.0 km	1.5 km	1.0 km

2.4.3 Traffic Volume Consideration

It is important to use the most appropriate measure of traffic volume when determining if <u>Appendix A</u> or <u>Appendix B</u> should be applied.

AADT is an average daily traffic count for the year, while VPD is an actual measure of the daily traffic count, which is more appropriate for recording seasonal traffic.

<u>Appendix A</u> road widths should always be used, unless both the AADT and any increased seasonal traffic volumes (measured in VPD) are less than 75, in which case it is appropriate to use <u>Appendix B</u>.

2.4.4 Assessing a Road in Sections

The road may be composed of a number of sections that vary in their standard and that would fall into different categories of RAV suitability, or require different operating conditions (e.g., for low volume roads). Width variation is a typical example of this principle. Where differing sections are reasonably long, it can be beneficial to separately assess each section as to its category of RAV access and any applicable operating conditions. Assessors should only consider applying this method of assessment where there is a likely benefit and a practical start and finish point, otherwise it is extremely difficult for drivers to comply with the changing conditions.

2.4.5 Short Sections of Reduced Width

There may be short narrow sections along the road due to narrow structures, roadside vegetation or short narrow sections of pavement. The entire length of the road does not need to meet the minimum road width requirements, provided the narrow sections comply with paragraphs (a) and (b) below.

(a) Traffic Volume Less than 75 Vehicles per Day

This paragraph only applies to low volume rural roads that do not meet the width requirement in <u>Appendix A</u>, the road width has been assessed in accordance with <u>Appendix B</u> and the relevant conditions in <u>Appendix E</u> have been applied.

Where all narrow sections of the low volume rural road meet the following criteria, the narrow sections can be excluded from the overall road width assessment:

- Narrow sections must not be less than 3.5 metres wide:
- Each narrow section must not be more than 100 metres long;
- A combination of narrow points that are all within a single 100 metres length of road can be considered to be one single narrow section;
- Two adjacent narrow sections must not be within 150 metres of each other;
- The approach sight distance from both ends of the narrow section must comply with <u>Appendix D</u>; and

If any narrow section fails to meet the 3.5 metres minimum width criteria, the route shall be considered unsuitable for RAV access.

Where all narrow sections meet the 3.5 metres minimum width criteria, but do not meet all the remaining criteria, the road shall be considered unsuitable for two-way RAV access. However, the

road may still be suitable for one-way RAV access only, provided relevant conditions as per <u>Appendix B</u> for a Type B road are applied. Type B roads suitability is also subject to traffic volume and road length requirements outlined in Table 2.

(b) Traffic Volume from 75 to 500 Vehicles per Day

This paragraph only applies to medium volume roads that is having the road width assessed in accordance with *Appendix A*.

Where all narrow sections of a medium volume road meet the following criteria, the narrow sections can be excluded from the overall road width assessment:

- Narrow sections should not have a carriageway width more than 1.3 metres below the requirements in <u>Appendix A</u>;
- For a sealed road, narrow sections should not have a sealed width more than 0.2 metres below the requirements in Appendix A;
- Each narrow section should not be more than 2 kilometres long; and
- The combined length of narrow sections should not be more than 15% of total road length.

2.5 Urban and Town Site Road Widths

There are a number of width requirements to be considered for RAVs travelling in urban and town site areas. As well as accommodating the additional swept width of RAVs, the width requirements for activities such as cycling and kerbside parking also need to be taken into account. The minimum road width requirements for town site areas are listed in *Appendix C*.

2.6 Provision for Overtaking

RAVs tend to operate at lower average speeds than light vehicles. If the road does not have sufficient overtaking opportunities, drivers of light vehicles may experience delays behind slower moving RAVs and in some cases may form queues of vehicles waiting to overtake. This may cause driver frustration and thereby increase the risk of drivers attempting to overtake when it is not safe. Therefore, it is essential, from a road safety perspective, to have adequate overtaking opportunities on a RAV route.

It is recommended that AADT figures are used to assess overtaking opportunities, however the assessor should consider the impact of seasonal traffic during the assessment, as the AADT could be less than seasonal peak traffic volumes.

The volume of traffic and percentage of RAVs on the route affects the requirement for overtaking opportunities. To assess the suitability of overtaking opportunities, an AADT derived using the Passenger Car Equivalence (PCE) factors (refer to Table 3) shall be used. The derived AADT is calculated by multiplying the AADT for each of the Austroads vehicle classes by the PCE factor based on the road's terrain. This derived ADDT is the figure to use to determine the maximum distance between overtaking opportunities in Table 4.

An example of calculating the derived AADT is listed below:

	Sum of AVG AADT	PCE Flat Terrain	AADT Flat Terrain
Austroads 1 & 2	3,180	1	3,180
Austroads 3, 4 & 5	1,893	2	3,786
Austroads 6, 7 8 & 9	285	2.5	713
Austroads 10 (RAV 2 - 4)	120	4	480
Austroads 11 (RAV 5 - 8)	117	4	468
Austroads 12 (RAV 9 -10)	2	9	14
		AADT derived	8,640

PCE factors represent the equivalent number of light vehicles for a particular type of RAV or general access heavy vehicle. The use of PCE factors provides a derived AADT value that can then be used to better assess overtaking opportunities.

Table 3: Passenger Car Equivalence Factors for RAVs

Vehicle Types	PCE Factors on Flat Terrain	PCE Factors on Rolling Terrain
Austroads Class 1	1	1.3
Austroads Class 2	1	1.3
Austroads Class 3 to 5	2	3.5
Austroads Class 6 to 9	2.5	5
Austroads Class 10 - RAVs Categories 2-4	4	10
Austroads Class 11 - RAVs Categories 5-8	4	10
Austroads Class 12 - RAVs Categories 9-10	9	22

The maximum distances between overtaking opportunities are shown in Table 4.

Table 4: Maximum Distances between Overtaking Opportunities

AADT (Derived using PCE Factors)	Maximum average distance between overtaking opportunities	Maximum distance between any two overtaking opportunities	Notes
500 or below	N/A	N/A	Provision of additional opportunities is usually not justified.
501 to 1000	15 km	30 km	
1001 to 1800	8 km	15 km	
1801 and above	5 km	10 km	At AADT > 2700, additional opportunities that exceed the criteria may be necessary.

For each overtaking opportunity, the portion of road available to complete the overtaking opportunity should meet the minimum length shown in Table 5.

Table 5: Minimum Length for Overtaking Opportunities

Dood Cootion	A coursed Touck		Length (m)	
Road Section Operating Speed (km/h)	Assumed Truck Speed (km/h)	RAVs Categories 2-4	RAVs Categories 5-8	RAVs Categories 9-10
70	60	600	640	690
80	69	740	790	860
90	77	890	950	1040
100	86	1070	1130	1240
110	94	1290	1310	1440

Note: The above lengths are generally determined by measuring the length of the divided line where overtaking is permitted.

2.7 Steep Grades

2.7.1 RAVs Losing Speed on Grades

The speed of RAVs ascending long and steep grades can be reduced to the extent that the speed differential is hazardous for vehicles approaching from behind. If possible, steep ascending grades should have overtaking lanes.

In some cases where an overtaking lane is not provided, the drivers of faster following vehicles may become frustrated and attempt an overtaking manoeuvre when unsafe to do so. A RAV speed reduction to 40 km/h is considered the threshold point at which drivers will seek to overtake a slower vehicle, regardless of whether or not adequate sight distance is available.

Table 6 outlines the maximum distance required for a laden RAV travelling up a grade to slow down to 40 km/h. For roads with grades, or consecutive varying grades, exceeding these distances, it is recommended that the road should have an additional climbing lane for RAVs.

Table 6: Maximum distances (m) of uphill travel before RAV speeds are reduced to 40 km/h

	RAVs Cate	RAVs Categories 2-6		RAVs Categories 7-8		gories 9-10
Grade %	80 km/h Approach Speed	100 km/h Approach Speed	80 km/h Approach Speed	100 km/h Approach Speed	80 km/h Approach Speed	100 km/h Approach Speed
3	*	*	*	*	1080	1650
4	950	1410	900	1350	690	1110
5	640	980	610	960	520	840
6	480	760	470	750	410	680
7	390	630	380	620	340	570
8	330	530	320	530	290	490

^{*} RAV can maintain a higher speed than 40 km/h on these grades.

2.7.2 Maximum Grade Requirements for RAVs

For a route to be suitable for RAV access there must be no steep grades that are in excess of the limits in Table 7.

Table 7: Grades Limits for RAVs

	Sealed Roads	Gravel Roads
RAVs Categories 2-6	8%	5%
RAVs Categories 7-8	6%	4%
RAVs Categories 9-10	5%	3%

2.8 Turning at Intersections

It is essential that intersections can be safely negotiated, with minimal or no interference to other traffic and minimal risk of damage to property.

2.8.1 Vehicle Speed While Negotiating the Turn

The vehicle turning radius is directly related to the maximum turning speed of the vehicle:

- For intersections where the vehicle must always stop before turning (e.g., at a Stop sign), a turning speed of 5-15 km/h is generally sufficient;
- For intersections where the vehicle rarely or never needs to stop before turning, a speed of 20 km/h to 30 km/h can be assumed; and
- A turning speed of 30 km/h or more can be used on roads with high posted speed limits with high traffic volumes, where the RAV is likely to turn at a higher speed.

2.8.2 Turning Clearances

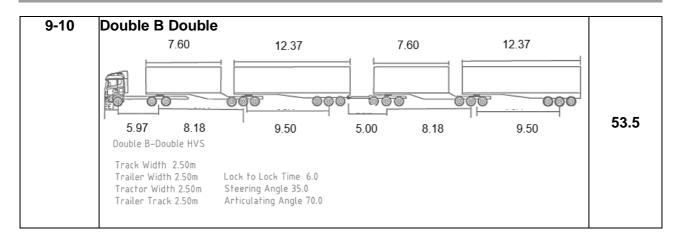
Where there is any possibility that the RAV may have insufficient clearance from kerbs or other nearby objects, standard turning templates shall be used to accurately check the swept path of the RAV.

Using a suitable vehicle swept path simulation software, the appropriate vehicle combination must be used to check all turning movements at all required intersections and any clearance problems should be noted on the *RAV Route Assessment Form*. As a rule:

- The wheel paths of the rear trailer of the RAV must not come any closer than 200 millimetres from the face of any kerb, unless the kerb is designed to be mounted, in which case the 200 millimetres clearance is not applied.
- If there is no kerb (such as a gravel road), the edge of the road formation can be taken as the kerb.
- The swept path must not come any closer than 200 millimetres to a nearby object.
- For a left or right turn, the wheel paths must not cross over the centreline of the road, unless the sight distances in all directions of the intersection are adequate according to Appendix D.

Table 8: Vehicle combinations for completing swept path assessments

RAV Categories		Maximum Length (m)
2-4	B-double 4.00 7.60 12.37 1.40 8.18 0.50 9.50 9.50 B-Double HVS meters Tractor Width 1.2.50 Trailer Width 1.2.50 Steering Angle 1.35.0 Tractor Track 1.2.50 Trailer Track	27.5
5-7	B-triple 4.00 7.60 7.60 7.60 12.37 1.40 8.18 0.39 8.18 0.50 9.50 9.50 1.35 5.98 1.40 D.45 Look to Look Time 1.40 Tractor Width 1.2.50 Steering Angle 1.36.0 Tractor Track 1.2.50 Tractor Track 1.2.50 Tractor Track 1.2.50 Articulating Angle 1.36.0 1.36.0	36.5



2.8.3 Intersection Layout

To assist in ensuring network performance levels are maintained, the assessor needs to identify if acceleration lanes and turn pockets are present at intersections and the length of these treatments.

Capturing this information in the assessment will assist in determining if network improvements are necessary, in consultation with the road manager.

2.8.4 Approach Sight Distance

The route shall be rejected if the driver of a RAV approaching the intersection has insufficient visibility to observe the intersection, or advance intersection warning, and react or stop if necessary. The table in <u>Appendix D</u> shows the required sight distances for RAVs, given the vehicle type, speed and the gradient of the road. When measuring the available approach sight distance, the measurement must be taken from a truck driver's eye height of 2.4 metres.

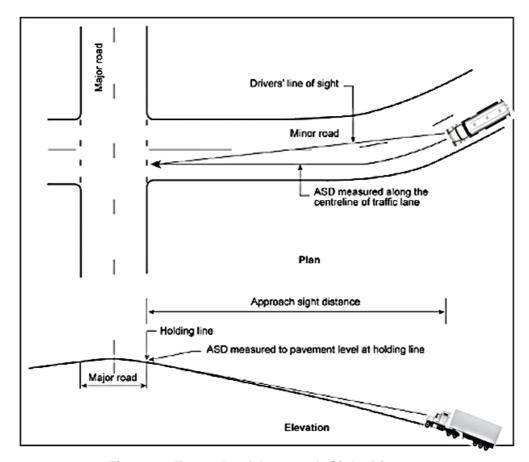


Figure 1: Example of Approach Sight Distance

2.8.5 Entering Sight Distance

The road shall be rejected if the driver of a RAV, entering a through road, does not have appropriate sight distance to see a sufficient gap in oncoming traffic that will allow a RAV, with greater length and lower acceleration capacity, to clear the intersection safely. The table in Appendix D shows the required sight distances for RAVs, given the vehicle type, speed and the gradient of the road. When measuring the available entering sight distance, the measurement must be taken from a truck driver's eye height of 2.4 metres to a height that considers all traffic.

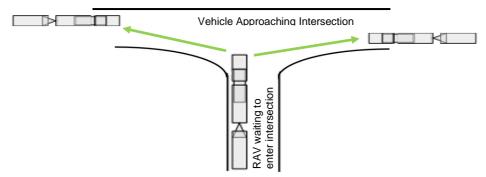


Figure 2: Example of Entering Sight Distance

The angle and gradient of the intersection should also be considered to determine if additional time is required for a RAV to manoeuvre the intersection, for instance a steep upgrade in the direction of travel will adversely affect the RAV's start up and acceleration when entering the through road.

Note: The entering sight distance requirement is only required for intersections that are not controlled by traffic signals, with the exception of a right turning movement with no right turn arrow.

2.9 Railway Level Crossings

The various operational requirements at railway crossings are described in the *Railway Crossing Control in Western Australia Policy and Guidelines* found on the Main Roads website.

The following points highlight the main considerations for RAVs at railway crossings for the various levels of protection.

2.9.1 Inadequate Approach Stacking Distance

Inadequate approach stacking distance occurs where the distance between the railway and a nearby intersection is insufficient to enable a vehicle to stop at the crossing without impeding the traffic flow at the intersection.

Approach stacking distance is measured from the vehicle stopping line at the railway crossing to the nearest shoulder edge of the crossroad. The vehicle stopping line at a railway crossing is normally indicated by a painted line or, in the absence of a marked line, it is assumed to be 3.5 metres back from the nearest rail.

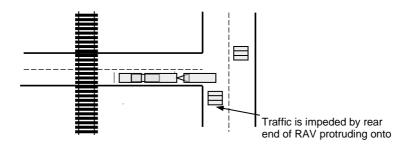


Figure 3: Examples of Inadequate Approach Stacking Distance

2.9.2 Inadequate Departure Stacking Distance

Inadequate departure stacking distance occurs when part of a vehicle would encroach within 3.5 metres of the railway track, while stopped to give way to traffic on the priority road of an adjacent intersection. An exception is in cases where the intersection is controlled by traffic signals that are coordinated with the railway crossing signals.

Departure Stacking Distance is measured from the vehicle stopping line at the intersection to within 3.5 metres of the nearest railway track. In the absence of marked lines, the measurement is to be taken from the edge of the through lane (if there are edge lines) or the edge of the seal.

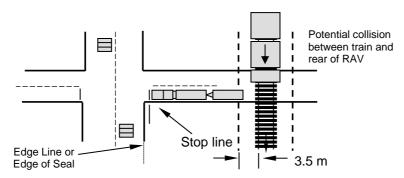


Figure 4: Examples of Inadequate Departure Stacking Distance

2.9.3 Adequate Stacking Distance

Figure 5 shows the methodology for measuring approach and departure stacking distances. Ideally, a clearance of 3.5 metres should be applied when assessing the available approach stacking distance. However, if the approach stacking distance is at least the length of the RAV and there is sufficient ESD for other vehicles departing the intersection, while there is a RAV stopped at the rail, a lesser clearance is acceptable.

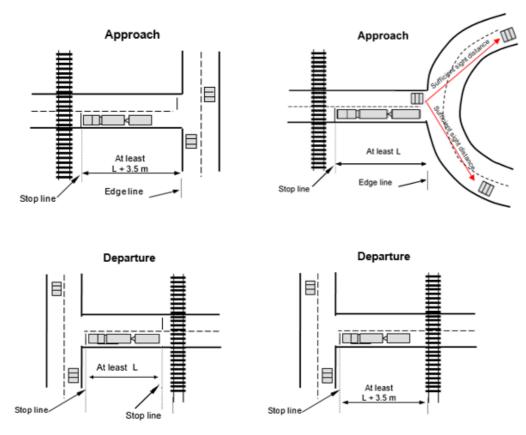


Figure 5: Examples of Adequate Stacking Distances

2.9.4 RAVs at Crossings Protected by Give Way or Stop Signs

The driver of a RAV approaching a railway crossing protected by a GIVE WAY or a STOP sign needs to be able to see the crossing from a sufficient distance to allow enough time to stop the RAV if required. The ASD to a railway crossing must meet <u>Appendix D</u>.

There also needs to be sufficient sight distance for the driver of a RAV, after having stopped at a railway crossing with a GIVE WAY or STOP sign, to see an oncoming train and allow adequate time to safely cross. The required sight distances for RAVs at railway crossings must meet:

 The S3 formula for STOP signs of the Australian Standards AS1742.7-2016 – Manual of Uniform Traffic Control Devices – part 7: Railway Crossings.

The S3 formula determines the minimum distance required for the driver of a vehicle stopped at the railway crossing to be able to see an oncoming train in order to safely cross.

When measuring the available sight distance to all directions at rail crossings, a truck driver's eye height of 2.4 metres is recommended.

Where railway crossings with STOP signs are located along the proposed route, the assessor must record the information shown below in Figure 6 on the *RAV Route Assessment Form*. This information is then used to calculate the S3 formula.

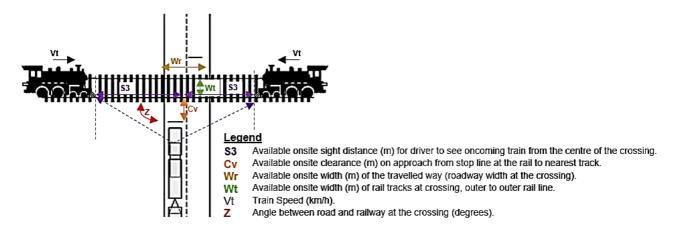


Figure 6: Required Information from Onsite Assessment for S3 Calculation

2.9.5 RAVs at Railway Crossings Protected by Flashing Lights

The visibility of the primary flashing lights and advance flashing yellow warning signs displayed on the approach to crossings, must be assessed so that the driver can safely stop if required. The sight distance to the flashing lights, or alternatively the advance flashing yellow warning signs must meet the minimum requirements in *Appendix D*.

When measuring the available sight distance to all directions at rail crossings, a truck driver's eye height of 2.4 metres is recommended.

2.10 Off-road Parking

In rural and remote areas, the route should have adequate off-road truck parking facilities at sufficient spacing along the route.

In any one direction of travel, the maximum spacing for off-road parking facilities should be:

- Rural Area roads 80 kilometres
- Remote Area roads 120 kilometres

Adequate off-road parking facility is defined as any:

- Service station or roadhouse, (or other commercial establishment), with provision for public truck parking;
- Signed parking bay, truck bay, rest area; or
- Designated road train assembly area.

Which meets the following criteria:

- Minimum approach sight distance (measured from a truck driver's eye height of 2.4 metres) to the entry/exit point are in accordance with <u>Appendix D</u>; and
- Minimum entering sight distance (measure from a truck driver's eye height of 2.4 metres
 to a height that considers all traffic.) from the entry/exit point in accordance with

 <u>Appendix D</u>; and
- The full length of the RAV can be parked within the parking area, without encroachment onto the carriageway. The ideal minimum clearance between the parked RAV and the adjacent road is shown in Table 9 (as per the example in Figure 7).

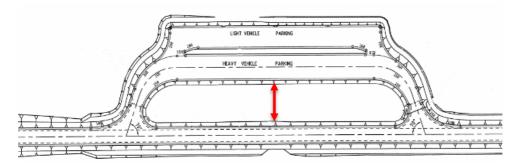


Figure 7: Minimum clearance between road pavement and parking bay

Table 9: Minimum safe clearance distance of parked RAV from road

Speed Limit (km/h)	Minimum Clearance from edge of pavement* (m)				
60	5				
70	5.7				
80	6.2				
90	7.6				
100	8.8				
110	11				

2.11 Other Road Users

Consideration must be given to the risks a RAV may pose to more vulnerable road users, such as the following:

- Pedestrians:
- Cyclists;
- Tourists and recreational users (who may be unfamiliar with the conditions);
- School buses, where the buses are dropping children adjacent to the road in a nondedicated bus stop.

3 COMMUNITY CONSIDERATIONS

HVS will consult with the relevant Local Government and/or Main Roads Region for input in relation to potential adverse impacts on the local community that may result from approving RAV access.

4 RAIL CONTESTABILITY

HVS will consult with the Department of Transport if they consider the proposed RAV access may be contestable with rail.

5 APPENDICES

Appendix	Title
Appendix A	Rural Road Minimum Widths
Appendix B	Low Volume Rural Road Minimum Widths
Appendix C	Townsite Road Minimum Widths
Appendix D	Required Sight Distance
Appendix F	Operating Conditions
Appendix F	RAV Access Assessment Process

Appendix A: Rural Road Minimum Width

	60 to 70	km/h	80 to 100 km/h				
	Carriageway Width (m)	Sealed Width (m)	Carriageway Width (m)	Sealed Width (m)			
0 to 150 AADT / VPD***							
RAVs Categories 2-4	7.6	3.3	7.9	3.4			
RAVs Categories 5-7	7.7	3.4	8.0	3.5			
RAVs Categories 8-10	8.2	3.8	8.6	3.9			
150 to 500 AADT / VPD							
RAVs Categories 2-4	7.6	5.6	7.9	5.9			
RAVs Categories 5-7	7.7	5.7	8.0	6.0			
RAVs Categories 8-10	8.2	6.1	8.6	6.4			
500 to 1 000 AADT							
RAVs Categories 2-4	7.9	6.1	8.2	6.4			
RAVs Categories 5-7	8.0	6.2	8.3	6.5			
RAVs Categories 8-10	8.6	6.6	9.0	6.9			
More than 1 000 AADT							
RAVs Categories 2-4	9.6	6.8	9.9	7.1			
RAVs Categories 5-7	9.7	6.9	10.0	7.2			
RAVs Categories 8-10	10.6	7.6	11.0	8.0			

Notes:

- The carriageway widths given in the above table should be used for assessing usable width on gravel roads.
- A road should be sealed if the AADT is over 150 and the annual freight tonnage is over 300,000 TPA. In the absence of any traffic data, the following parameters may be a guide: the uniform annual loaded RAV traffic volume exceed 10 vehicles per day; or the loaded RAV traffic volume exceed 60 vehicles per day over a seasonal two month period.

Appendix B Low Volume Rural Road Minimum Widths

Type A Road (suitable for two-way RAV traffic)

	40 km/h	60 km/h
	Carriageway Width (m)	Carriageway Width (m)
RAVs Categories 2-7	5.8	6.1
RAVs Categories 9-10	5.9	6.3

Notes:

- This section is not to be used for assessing routes for RAV Category 8.
- For Type A low volume roads, <u>Appendix E</u> operating conditions 1, 2, 3, 4, 5, 7 and 8 may be applied as a condition;
- If a road is at least 1.0 metre wider than the widths specified for 60km/h, an 80km/h speed restriction should be considered. A speed restriction above 80km/h should only be considered if the road is sealed, has good sight distance and presents no significant safety concern.

Type B Road (unsuitable for two-way RAV traffic)

	40 km/h
	Carriageway Width (m)
RAVs Categories 2-7	3.5*
RAVs Categories 9-10	3.5*

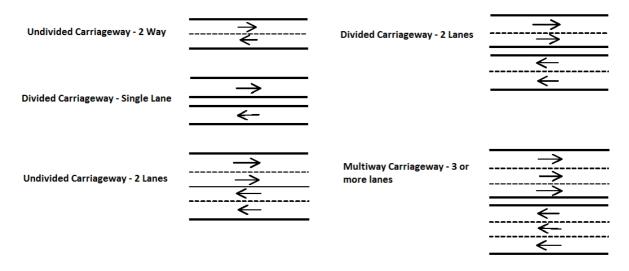
Note:

- For type B low volume roads, <u>Appendix E</u> operating conditions 1, 2, 3, 4, 5, 6, 7 and 8 may be applied as a condition.

Appendix C: Town Site Road Minimum Widths

	RAVs Cate	RAVs Categories 2-4		egories 5-8	RAVs Categories 9-10				
Feature	60 - 70	80-100	60 - 70	80-100	60 - 70	80-100			
	km/h	km/h	km/h	km/h	km/h	km/h			
(Undivided carriageway – 2 Way) Width between sealed edge and road centre (m)									
Basic / unmarked	3.2	3.5	3.3	3.7	3.6	4.1			
with marked separation line	3.5	3.8	3.6	4.0	3.9	4.4			
with dedicated cycle lane	4.7	5.5	4.8	5.7	5.1	6.1			
with dedicated or regular parallel parking	5.7	NA	5.8	NA	6.1	NA			
with dedicated angle (45°) parking	9.2	NA	9.3	NA	9.6	NA			
(Divided carriageway – single lane) Widt	h between sea	led edge and	d edge of me	dian or traffic	c island (m)				
Basic / unmarked	3.5	3.8	3.6	4.0	3.9	4.4			
with dedicated cycle lane	5.0	5.8	5.1	6.0	5.4	6.4			
with dedicated or regular parallel parking	6.0	NA	6.1	NA	6.4	NA			
with dedicated angle (45°) parking	9.5	NA	9.6	NA	9.9	NA			
(Undivided carriageway – 2 lanes) Width	between seal	ed edge and	road centre	(m)					
Basic / unmarked	6.6	7.0	6.7	7.1	7.0	7.5			
with dedicated cycle lane	8.1	9.0	8.2	9.1	8.5	9.5			
with dedicated or regular parallel parking	9.1	NA	9.2	NA	9.5	NA			
(Divided carriageway – 2 lanes) Width be	etween sealed	edge and ed	lge of media	n or traffic isl	and (m)				
Basic / unmarked	6.6	7.0	6.7	7.1	7.0	7.5			
with dedicated cycle lane	8.1	9.0	8.2	9.1	8.5	9.5			
with dedicated or regular parallel parking	9.1	NA	9.2	NA	9.5	NA			
(Multiple Lane Carriageways – 3 or more lanes) Width of additional through lane (m)									
basic	3.2	3.4	3.3	3.5	3.4	3.6			

Note: An explanation of road type descriptors is as follows:



Appendix D: Required Sight Distances

Posted	Downhill			Level	Uphill				
Speed km/h	-8%	-6%	-4%	-2%		2%	4%	6%	8%
40	74	72	70	68	66	65	64	62	61
50	102	98	95	92	89	87	85	84	82
60	134	128	123	119	116	112	110	107	105
70	170	162	155	149	144	140	136	133	130
80	209	198	190	182	176	170	165	161	157
90	252	239	228	218	210	203	197	191	186
100	308	290	275	263	252	242	234	227	220

The above values have been derived using the formula given in Austroads Guidelines with following factors:

(Deceleration rate of 0.29g up to 90 km/h, 0.28g at 100 km/h.)

Appendix E: Operating Conditions

These and other similar operating conditions may be applied to the assessment of low volume roads.

- 1. When travelling at night, the RAV must travel at a maximum speed of 40km/h and display an amber flashing warning light on the prime mover.
- 2. No operation on unsealed road segment when visibly wet, without road owner's approval.
- 3. Headlights must be switched on at all times.
- 4. Speed restrictions of 40 km/h or 60 km/h as determined from Appendix B.
- 5. Direct radio contact must be maintained with other RAVs to establish their position on or near the road (suggested UHF Ch 40).
- 6. For a single lane road, the road must not be entered until the driver has established via radio contact that there is no other RAV on the road travelling in the oncoming direction.
- 7. Operation is not permitted while the school bus is operating on the road. Operators must contact the relevant schools directly and obtain school bus timetables; or where direct contact can be made with the school bus driver, operation is permitted once the school bus driver confirms all school drop-offs/ pick-ups have been completed on the road.
- 8. Current written support from the road asset owner, endorsing use of the road, must be obtained, carried in the vehicle and produced upon request.

Appendix F: RAV Access Assessment Process

Step 1

•The "Application and Road Owner Support to Add or Amend a road on the RAV Network" is received by HVS.

Step 2

•HVS liaises with the relevant road manager for a preliminary assessment and comment in relation to public amenity, the road condition and future development plans.

Step 3

•Onsite assessment / data collection is conducted in accordance with the Standard Restricted Access Vehicle Route Assessment Guidelines.

Step 4

•HVS undertakes a review of the onsite assessment data and presents the outcomes at a Network Management Meeting.

Step 5

• The Network Management Committee considers the data in accordance with the *Guidelines for Approving RAV Access*, taking into consideration impacts on safety, network performance, road infrastructure and other relevant factors / policies.

Step 6

•The final recommendation is then presented to HVS Senior Management, who approves / declines the recommendation.

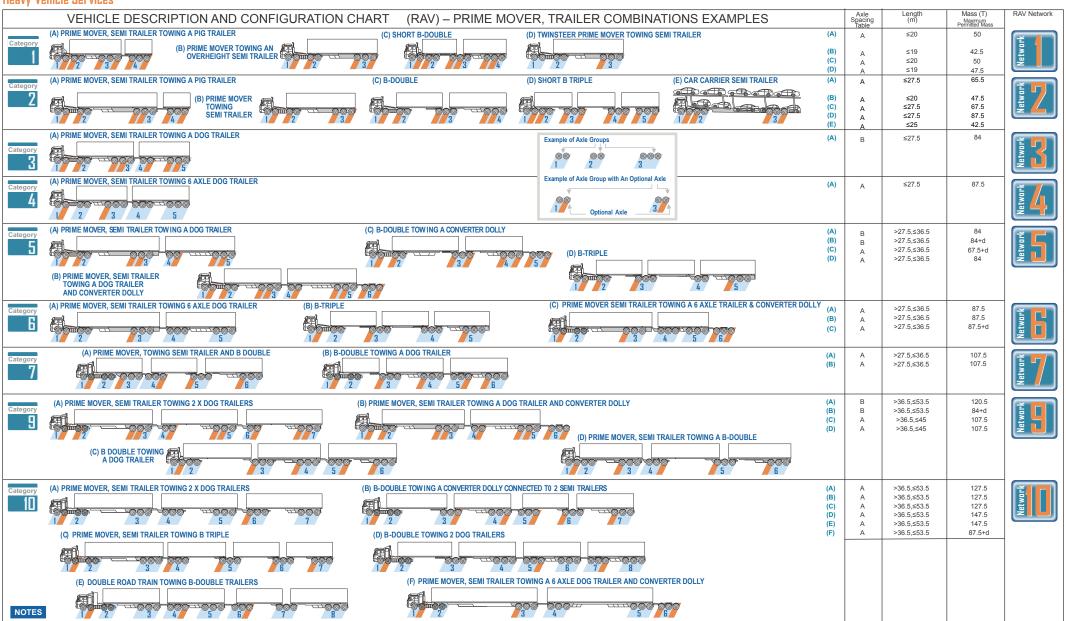
Step 7

•The applicant and road manager will be informed of the outcome and the road will be added to the relevant RAV Network or Permit, if applicable.

2016

Prime Mover, Trailer Combinations

Heavy Vehicle Services



Operators using a category of RAV outlined in this document must operate that RAV in accordance with the OPERATING CONDITIONS and only on the network specified.

These diagrams are a visual indication of the vehicle only

Maximum height of Pig Trailer must not exceed 3.5m.

Heavy Vehicle Services
Tel: 138 HVO (486)
Email: hvs@mainroads.wa.gov.au
Website: www.mainroads.wa.gov.au



^{3.} Operators must refer to the OPERATING CONDITIONS for the full vehicle description.

^{4.} The height of the vehicle can exceed 4.3 m but MUST NOT exceed 4.6 m when it is:

 built to carry livestock or, (ii) carrying a crate to carry livestock or, (iii) carrying vehicles on more than one deck or,
 carrying a multi modal container or, (v) carrying a large purphysisble item or,
 w) carrying with an appropriately licenced over height curtain side or pantechnicon trailer.