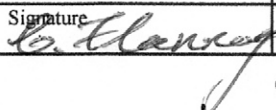


AUDIT
FLAMMABLE LIQUID STORAGE
AS 1940

SHOALHAVEN STARCHES

BOLONG ROAD
BOMADERRY NSW

DATE	REV	STATUS	PREPARED	VERIFIED	AUTHORISED
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TABLE OF CONTENTS

1.	EXECUTIVE SUMMARY	3
2.	FACILITY DESCRIPTION	4
3.	HAZARDOUS CHEMICAL STORAGE AND HANDLING	4
4.	DEPOT AUDITS - DESCRIPTION AND RECOMMENDATIONS	6
4.1	Ethanol Tank Bund 1 (Tank Depots 1 to 8).....	6
4.2	Ethanol Tank Bund 2 (- Depot 16)	7
4.3	Drum, IBC and ISO tank Storage Compounds.....	7
4.4	Denaturant Storage Tanks.....	8
4.5	Acetic Anhydride Storage Tank No 35.....	9
5.	AS 1940 COMPLIANCE CHECK LISTS	10
5.1	Compliance Check List - Ethanol Tank Bund 1- Tanks 1 to 7.....	10
5.2	Compliance Check List – Denaturant Storage Tanks	14
6.	REFERENCE DOCUMENTS	18

Appendix 1

Site Layout

1. EXECUTIVE SUMMARY

The Shoalhaven Starches facility is located within an industrial and farming area of Bomaderry, approximately 3km north of the city of Nowra.

The industrial processes carried out on this site require the storage and handling of large quantities of hazardous chemicals. This report summarises compliances audits of the bulk storage of Class 3 flammable liquids on this site. A separate report will summarise the compliance audits of the bulk storage and handling of Class 8 corrosive substances. The compliance audits summarised in this report were carried out in late 2019 and early 2020.

Australian Standard AS 1940 – *The storage and handling of flammable and combustible liquids* specifies requirements appropriate to the storage and handling of these fire-risk chemicals. The summary reports and check lists in this document advise non-compliances with this standard.

Summary of Major Findings

- (i) The major storages of flammable liquids on this site are Ethanol Bulk Storage tanks. Ethanol is a major product of this site. Ethanol is stored in these bulk tanks, prior to loading into road tankers and iso-tanks.
- (ii) The road tanker loading area has been upgraded to achieve the requirements of Section 6 of AS 1940.
- (iii) The food grade ethanol storage tanks in tank bund 2 are of recent construction. These tanks are of stainless steel construction. The vapour space of these tanks is blanketed with nitrogen. The nitrogen blanket minimises the fire risk, and enhances the safety of these storages.
- (iv) It is proposed that five additional food grade ethanol storage tanks be added to an extended tank bund 2, as part of approved Mod 18 and new Mod 19. These will be identical to the current food grade ethanol storage tanks, and will be provided with high integrity overfill protection, and nitrogen padding.
- (v) The tanks in tank bund 2 are also provided with high integrity overfill protection. The risk of spillage is effectively controlled.
- (vi) These safeguards are not currently provided on the ethanol storage tanks in tank bund 1.
- (vii) It is recommended that the tanks in tank bund 1 be upgraded and provided with the safety features installed on tanks in tank bund 2.

2. FACILITY DESCRIPTION

The Shoalhaven Starches facility is located within an industrial and farming area of Bomaderry, in the Shoalhaven Local Government Area which is located approximately 160 km south of Sydney. The facility is located on Bolong Road which is the main road from the Princess Highway to Shoalhaven Heads. The manufacturing facility is located approximately 3km north of the city of Nowra, and is situated on a flat alluvial plain on the northern banks of the Shoalhaven River.

The immediate surrounding environment can be described as follows:

- North: The property boundary faces the sealed Bolong Road. The company has approximately 1000 hectares of cattle grazing land beyond Bolong Road.
- South: The property faces onto the south bank of the Shoalhaven River.
- East: The property boundary faces onto vacant land, with the decommissioned Australian Paper plant located a few hundred meters beyond.
- West: The property boundary faces a Concrete Batching Plant.

The Shoalhaven Starches facility operates on a 24 hour, seven days a week, production cycle. There are four shift teams named Red, Green, Yellow and Blue shifts. Each shift consists of approximately 35 personnel who work 12 hour shifts being: Day Shift - 6:00am to 6:00pm and Night Shift - 6:00pm to 6:00am.

On Day Shift Monday to Friday there are approximately 120 employees on site, including engineering personnel at the Main Administration Building situated at 36 Bolong Road, Bomaderry. Contract personnel on-site can range from twenty to two hundred personnel depending on the number of construction or maintenance projects underway at any one time.

The facility manufactures a product range that includes Starch, Gluten, Glucose, Brewer's Syrup, Gem Sweet, Ethanol and Dried Distillers Grain (DDGS). The production process involves mixing flour with water and separating the watery starch substance from the dough. The starch and gluten are dried in various steam and gas heated driers. The waste in liquid and solid form from the starch and gluten plant is distilled to produce high grade Ethanol.

Waste Syrup, Mill-mix (pelletised grain husks) and other protein-rich waste are processed to produce Dried Distillers Grain (DDGS) a protein-rich stockfeed that is sold in both liquid, powder and pellet form.

Waste water from the production processes is treated and reused in the factory and to irrigate pastures on a 1000 hectare Environmental Farm where grasses are grown as feed for beef cattle that graze on the farm. Bio Gas produced from the factory effluent is recirculated back to the factory for steam production in the Boilers.

3. HAZARDOUS CHEMICAL STORAGE AND HANDLING

The industrial processes carried out on this site require the storage and handling of large quantities of hazardous chemicals. These processes result in the production and storage and handling of large volumes of ethanol. Ethanol is a highly flammable liquid and is also classified as a hazardous chemical.

This report summarises compliances audits of the bulk storage of Class 3 flammable liquids on this site. A separate report will summarise the compliance audits of the bulk storage and handling of Class 8 hazardous chemicals.

Australian Standard AS 1940 – The storage and handling of flammable and combustible liquids specifies requirements appropriate to the storage and handling of these chemicals.

The compliance audits summarised in this report were carried out in late 2019 and early 2020. These bulk storages reviewed in this report are listed in the table below.

Class 3 Bulk Storage Depots Shoalhaven Starches Bomaderry Site						
Depot No.	Contents	DG Class	Tank Capacity litres	Storage Type	Tank Location	Map Ref. No.
Ethanol Tank Bund 1	Ethanol UN 1170	3- PG II	3,715,000 (total capacity)	Above-Ground Tanks	Ethanol	Tanks 1-8
Tank Depot 16	Ethanol UN 1170	3- PG II	944,000 (total capacity)	Above-Ground Tank	Ethanol	Tanks 10,11,12 & 13
Tank Depot 16	Ethanol UN 1170	3- PG II	2 tanks at 236,00 each	Above-Ground Tank	Ethanol	Mod 18 Tanks 14, 15 Not yet constructed
Tank Depot 16	Ethanol UN 1170	3- PG II	3 tanks at 236,00 each	Above-Ground Tank	Ethanol	Mod 18 Tanks 16, 17, and 18 Not yet constructed
Denaturant Tank11	Methanol	3- PG II	5,000	Above-Ground Tank	Ethanol	11
Denaturant Tank12	Unleaded Petrol	3- PG II	5,000	Above-Ground Tank	Ethanol	12
Denaturant Tank13	Tertiary Butyl Alcohol	3- PG II	5,000	Above-Ground Tank	Ethanol	13
Denaturant Tank14	Unleaded Petrol	3- PG II	5,000	Above-Ground Tank	Ethanol	14
Denaturant Tank15	Unleaded Petrol	3- PG II	5,000	Above-Ground Tank	Ethanol	15
23	Xylene N-Propyl Acetate Ethyl Acetate	3- PG II	6,000 6,000 6,000	Roofed IBC Store	Ethanol	23
51	Methyl Isobutyl Ketone Methoxy Propanol Propyl Alcohol N Propyl Acetate Xylene	3- PG II	50,000	IBC Store	Ethanol	51
35	Acetic Anhydride UN 3463	8 sub risk 3 - PG II	3,000	Above-Ground Tank & Drums	Starch	35

4. DEPOT AUDITS - DESCRIPTION AND RECOMMENDATIONS**4.1 Ethanol Tank Bund 1 (Tank Depots 1 to 8)**

Ethanol Tank Bund 1 contains 7 tanks. Dimensions and Capacity of these tanks are in the table below

Ethanol Tank Bund 1

Tank No.	Tank Working Capacity litres	Tank Diameter m	Max Fill Level m	Tank Height (approx.) m	Distance to Adjacent Tanks m. (approx.)	PV Vent Size/Set Pressure	Emergency Vent Size/Set Pressure	Nitrogen Blanket/ Foam Injection
1	230,000	6.74	6.45	8	0.7m & 1m	Free Vent 100mm flame arrestor	500mm weighted	Foam Injection
2	560,000	8.17	10.68	12	1 m & 0.7m	As above	As above	Foam Injection
3	560,000	8.15	10.73	12	1 m	As above	As above	Foam Injection
4	118,000	4.16	8.68	10	1	As above	As above	Foam Injection
5	98,000	3.23	11.96	14	1.5	As above	As above	Foam Injection
6	123,000	4.4	8.09	10	1	As above	As above	Foam Injection
7	441,000	7.7	9.47	11	1.2	As above	As above	Foam Injection
8	770,000	7.35		22	1	150 NB Vac -.22kPa Press 0.75kPa	450mm Set Press 2 kPa	Foam Injection & Nitrogen Blanket

- Tank Bund 1 contains Industrial Ethanol Storage - Tanks 1 to 7, and Food Grade Ethanol - Tank 8.
- The total capacity of tanks in this bund is 2.9 Million Litres.
- The separation distance between tanks in this bund is approximately 1 metre. These storages are classified as a 'Tank Cluster'. AS 1940 discourages this close packed arrangement and specifies that the bund capacity for tank clusters be at least the 110% of the total tank capacity = 3.2 million litres.
- AS 1940 also requires that all tanks in a tank cluster have foam injection systems.
- Tank Bund 1 does not have the containment capacity required by AS1940. Tanks in this bund do not have foam injection systems.
- The distance from tanks to the bund wall does not comply with the requirements of AS 1940.
- It is not practical to upgrade this bund to achieve a 3.2 million litre capacity. Complete rebuilding would be necessary.
- Overflows from this bund would enter the site waste-water drainage system, which feeds to the waste water treatment plant at the Farm, approximately 2 kilometers from the main site. Large flows of dilution water could drop the ethanol concentration below 20%, and decrease the flash point of this water ethanol solution.

Recommendations for Ethanol Tank Bund 1

- It is practical to implement controls that would significantly reduce the risk of fire or explosion in these tanks. These additional controls should include;
 - Provision of high integrity overfill protection, including two independent level monitoring instruments on each tank, and independent shut off valves.
 - Provision of inert gas blanketing for each tank. (already provided on Tank 8)
 - Investigate the possibility of draining Tank Bund 1 to a remote containment compound.
- Implementing the controls listed above would be much less expensive than rebuilding this tank bund, and rebuilding the tanks within the bund.
- Flammable liquid storage tanks should be emptied, degassed, cleaned and inspected internally at least every ten years. These internal inspections should be scheduled as soon as possible. The ten yearly tank inspection should be carried out by an independent external inspection company.

- Emergency vents, PV vents, isolation valves and other critical tank equipment should be inspected and tested at least annually. These maintenance activities should be scheduled as soon as possible.
- Records of tank inspections, and critical equipment maintenance must be maintained.

4.2 Ethanol Tank Bund 2 (- Depot 16)

Ethanol Tank Bund 2

- Tank Bund 2 contains Food Grade Ethanol Storage Tanks 10, 11,12, and 13 .
- The total capacity of the 4 tanks in this bund is 944,000 Litres.
- The separation distance between these tanks appears to be in excess of one third of the tank diameter. This is not classified as a tank cluster.
- The four tanks in this bund were constructed in 2017. The tanks are of stainless steel construction.
- The capacity of Tank Bund 2 is in excess of 110% of the capacity of the largest tank in the bund. Bund Capacity is 455,000 litres.
- The four existing tanks are provided with high integrity overfill protection.
- The four existing tanks are provided with inert gas blanketing (nitrogen).
- The four existing tanks have 150mm PV vents set at 0.22kPag Vacuum, and 0.75 kPag.
- The four existing tanks have 450mm Emergency vents set at 1.35kPag
- The 5 tanks proposed as Mod 18 and Mod 19 will also have high integrity overfill protection, and nitrogen blanketing. PV and Emergency Vents will be as for the existing tanks. All tanks will be separated at least one third of the tank diameter.
- The distance from tanks to the bund wall does not comply with the requirements of AS 1940. External screening is required.

Recommendations for Ethanol Tank Bund 2

- Emergency vents, PV vents, isolation valves and other critical tank equipment should be inspected and tested at least annually. These maintenance activities should be scheduled as soon as possible.
- Records of tank inspections, and critical equipment maintenance must be maintained.
- Schedule ten yearly internal tank inspections for these tanks. Records of tank inspections, and critical equipment maintenance must be maintained.

4.3 Drum, IBC and ISO tank Storage Compounds

- AS 1940 specifies that package storage compounds be separated from flammable liquid storage tanks, by a tank diameter, and at least 6 metres.
- Drum Stores 23 and 51 appear to be too close to Storage Tanks.
- Drum Stores 23 and 51 are not bunded at the fork truck entrance. Ride over bunds are required.
- These bunds must be relocated.

Relocating iso tank stores to the old paper mill site would address these issues and greatly relieve congestion in the ethanol storage area.

4.4 Denaturant Storage Tanks

The Ethanol Storage Area of the Shoalhaven Starches site includes six denaturant tanks, each having a capacity of 5,000 litres. Contents of each tank are:

Tank 1 ULP Motor Spirit	Tank 2 ULP Motor Spirit	Tank 3 Tertiary Butyl Alcohol (2- METHYLPROPAN- 2-OL)	Tank 4 ULP Motor Spirit	Tank 5 Methyl IsoButyl Ketone	Tank 6 Methanol
UN1203	UN1203	UN1120	UN1203	UN1245	UN1203
F.P<-40 deg C	F.P<-40 deg C	F.P 11 deg C	F.P<-40 deg C	F.P 14 deg C	F.P 11 deg C
Class 3	Class 3	Class 3	Class 3	Class 3	Class 3 SubRisk 6.1
PG II	PG II	PG II	PG II	PG II	PG II

These six tanks are identical in size and construction detail.

Details of tank construction, and tank fittings are summarised below;

- Tank dimensions are approximately 1.2 m diameter by 4 m high.
- Capacity of each tank is 5,000 litres.
- The outlet pipes for the three ULP tanks are connected. Leak or failure of any section of this piping could result in the loss of the contents of all three tanks. (15,000 litres).
- Spacing between tanks is approximately 1.2 m
- Bund dimensions are approximately 5.5 m by 15.5 m. by 600 mm high.
- Bund capacity is approximately 50 cu metres.
- Bund contained about 50 mm of dirty water.
- Each tank is fitted with a flame arrestor.
- Pressure vacuum vents are fitted on five of the tanks.
- Each of these tanks is fitted with two earthing connections.
- Temperature transmitters are installed on all tanks.
- Level transmitters are operational on five of the tanks.
(the level transmitter on one ULP tank 2 is not functional, but the level transmitters on Tanks 1 and 4 monitor the common level in these three tanks.
- Tanks are loaded from the tanker loading area.
- Products are unloaded from IBCs using spear.
- ULP is unloaded from tanker.
- Dry Break coupling is provided at the loading point to control the risk of back flow from piping to the denaturant tanks.
- Loading piping discharges to the top of each tank.
- The tank level of the selected tank, is displayed at the loading point.
- The denaturants are added to road tankers at the time of loading. The ratio controller is set to 1% approximately.
- The tanker filling Scully system controls of risk of overfilling road tanker.
- Nitrogen blanketing system has been disconnected.

Recommendations for Denaturant Tanks

- Flammable liquid storage tanks should be emptied, degassed, cleaned and inspected internally at least every ten years. These internal inspections should be scheduled as soon as possible.
- Emergency vents, PV vents, isolation valves and other critical tank equipment should be inspected and tested at least annually. These maintenance activities should be scheduled as soon as possible.
- Records of tank inspections, and critical equipment maintenance should be maintained.

- Checks required to ensure that the PV vents installed are sufficient to allow emergency venting.
- Tank construction drawings and records should be located and retained.
- Bund should be drained and cleaned.
- Tanks require cleaning.
- Consider the reconnection of the nitrogen blanketing system.

4.5 Acetic Anhydride Storage Tank No 35

- Acetic Anhydride is a flammable liquid. The requirements of AS 1940 are applicable.
- Acetic Anhydride is also a corrosive liquid. The requirements of AS 3780 are also applicable. (AS 1940 requirements are generally more demanding.)
- Safework notification advises that the capacity of this depot is 3,000 litres.
- This vertical HDPE tank is within a concrete block bund. Bund height is approx 1.5 m.
- Distance between tank and bund is approximately 1 m.
- This tank is filled from 200 litre plastic drums, using an air operated drum pump.
- Drums of Acetic Anhydride may be stored just outside the tank bund.
- Class 3 Signage is displayed at the bund and at the tanker unloading point. Pumps and other equipment requiring regular maintenance are within the bunded area.
- Piping within bund and transfer piping is HDPE.
- Piping in bund is not labelled and not colour coded.
- A level transmitter, and level switch are installed on this tank. Level transmitter display is local.

Recommendations for Acetic Anhydride Tank No 35

- Ensure that the operation of the tank high level switch, and level transmitter are checked regularly.
- AS 1940 specifies metal tanks for the storage of flammable liquids. Plan for the replacement of this tank.
- The preferred material for Acetic Anhydride is stainless steel.
- Acetic Anhydride drums should not be stored within 6 metres of this tank.
- Consider replacement of this tank by a larger tank filled from a road tanker or isotank.

5. AS 1940 COMPLIANCE CHECK LISTS**5.1 Compliance Check List - Ethanol Tank Bund 1- Tanks 1 to 8****Ethanol Storage – Tank 1 to Tank 8
AS 1940 check list for Tanks, Compound & Tanker Loading**

Code Precaution	True	Not True	Code Reference	Comment
DESIGN & CONSTRUCTION: A static storage tank shall be designed and constructed to AS 1692 or equivalent standard.	Design Code not known		5.2.1	Design drawings required. Hydrostatic test certificate required for each tank.
MARKING: Each tank shall be distinguished by individual identification numbers.			5.2.2	
PIPEWORK: Pipes shall be constructed from a material resistant to attack, and compatible with liquid.. Pressure piping shall comply with As 4041. All pipes shall be protected from physical damage. Pipes shall be colour coded or labelled. Flexible hoses shall not be used except at transfer points,			5.2.4	
FILL POINTS: Fill point shall be readily accessible. Fill point shall be protected from damage. Fill point shall be in open air, -no ignition sources within hazardous area. Fill point located so that tank vehicle is not required to enter the tank compound. Each fill point shall be clearly identified. Area around the fill point and hose connection shall be impervious to the product.	Not filled from Road Tankers		5.3.2	Assume that product is pumped across from fermentation process tanks. SCADA screen displays indicate that tanks 1 to 7 do not have high integrity overfill protection, and do not have inert gas blanketing systems.
LIQUID LEVEL INDICATION: -It shall be possible to monitor the amount of liquid in any tank intended to receive a delivery. The gauge shall show the normal fill level of the tank. -The Fill level shall not exceed 95% of the tank capacity. -Tanks (with capacity > 5,000 litres of flammable) shall have a high level alarm set at a maximum of 97% of tank capacity. -A contents gauge and LAH remote from the tank, shall be provided at the fill point, or... -In addition to the LAH they shall incorporate an independent			5.3.2	

LAHH.- set at below the tank rated capacity				
VENTING: Each tank shall be fitted with; -A free vent or Pressure Vacuum Vent. -An emergency vent when conditions of 5.5 apply. -Vapours shall be safely discharged outdoors unless recovery and treatment is required. -Flame arrestor is required			5.4	Details of PV vents not known.
SEPARATION OF ABOVE GROUND TANKS: -Diameter of tank or 15 m to fill point (for road tanker), but not less than 6 m. -Diameter of tank or 15 m to security fence, but not less than 6 m., or distance required by table 5.4			5.4 Table 5.3 Table 5.4	
DISTANCE BETWEEN VERTICAL TANKS: 5.7.3 (b) requires separation between tanks of half the diameter of the larger tank, if one tank has diameter > 6m. 5.7.5 allows reduced spacing for Tank Clusters. -Total cross-sectional area <320 sq m. -distance between tanks at least 1 m. -Foam fire protection required on all tanks if total cross-sectional area > 30 sq m. -where required compound capacity and clearances from other structures is being calculated, the cluster shall be regarded as one tank of aggregated volume.	NO Yes 230 sq m. Provided Refer below		5.7.3 5.7.5	
BUND CAPACITY: -110% of aggregated capacity of cluster.	Does not Comply		5.8.2	3.1 Million litres capacity required.
BUND DESIGN AND CONSTRUCTION: -Impervious -Retain structural integrity in fire situation. -Not higher than 1.5 m unless safe and rapid exit provided. -Distance from inside perimeter of bund to protected place or on site protected place shall be at least half that required by Table 5.4, or 15m whichever is less.			5.8.3	

BUND DRAINAGE: -Bund shall drain away from tank to sump. -Normally closed valve installed in sump or manually operated pump.				
BUND LOCATION LIMITS:	Does not comply.		5.8.3(h) Fig 5.2	
TANK FOUNDATIONS: -foundation designed to support direct load when tank full of water. -foundation designed to resist overturning moment due to wind, earthquake -Tanks in flood prone area shall be anchored to prevent floating.			5.11.1 5.11.4	
FUEL DISPENSING:	NA		SECTION 6	
TANK VEHICLE LOADING: -Location of Fill Point in accordance with Table 5.3 -Diameter of tank or 15 m to fill point (for road tanker), but not less than 6 m. -15 m from connection point to protected places -8 m from connection point to package store.	Yes		SECTION 8 8.2.2.1 8.2.2(b) 8.2.3(b)	
TANKER LOADING BUILDING: -Open on at least 3 sides -Collision protection required -Direction of entry clearly marked. -Tankers must be able to drive away in case of emergency. -The vehicle standing area shall be graded so that spillage will drain away to dedicated tank or compound. -Capacity of spillage control system must be the capacity of the largest tanker compartment, or 9000 litres, whichever is less, or -The volume that can be discharged from two filling points having the greatest flow. -Drainage system requires isolating valve, or separator pit, or remote compound.	Yes		8.2.3 8.2.4 8.2.5 8.2.6.1 8.2.6.2 8.2.6.3	
FLOW RATES: < 1 m/sec initially < 7 m/sec then reduced			8.2.7	
EMERGENCY SHUT OFF: -Emergency stop valve located > 10 m from fill point, but < 30m. -Earthing and Bonding must be provided. -Signage required for Emergency Shut Off Valve			8.2.8 8.2.9	Is vapour collection system installed?
TOP FILLING REQUIREMENTS:			8.3	Industrial ethanol tanks are bottom filled, with Scully System protection.

				Food grade ethanol isotanks are top filled. Consider vapour collection system.
BOTTOM LOADING REQUIREMENTS:			8.4	Food grade ethanol isotanks are top filled. Consider Dead man valve provision.
INSPECTION SCHEDULE FOR TANKS AND FITTINGS: -Must be in accordance with Table 9.1			TABLE 9.1	Ten yearly Tank Inspection required. Reports to be retained.
FIRE PROTECTION FOR TANKS AND COMPOUND: -Foam system required for every tank over 6 m diameter. (alternatively inert gas blanket). -Foam system required for bund compound, by monitors or hydrants. -Cooling water deluge sprays required on these tanks. -Hydrant system required for this area.	Foam injection is provided on Tanks 1 to 7. Foam can be provided to bund.		11.13	Compound Capacity > 2000 Tonnes Tanks 1 to 8 are a Tank Cluster. Tanks 8,10,11,12 and 13 are provided with nitrogen gas blanketing. Tanks 1 to 7 do not have inert gas blanketing. Inert gas blanketing recommended for tanks 1 to 7 This would greatly reduce risk of tank fire.

5.2 Compliance Check List – Denaturant Storage Tanks

Denaturant Storage Tanks
AS 1940 check list for Tanks, Compound & Tanker Loading

Code Precaution	True	Not True	Code Reference	Comment
DESIGN & CONSTRUCTION: A static storage tank shall be designed and constructed to AS 1692 or equivalent standard.			5.2.1	Design drawings required. Hydrostatic test certificate required for each tank. No evidence to suggest that these tanks do not comply with AS 1692 requirements. Tanks appear to be fit for service.
MARKING: Each tank shall be distinguished by individual identification numbers.			5.2.2	Tanks are labelled 1 to 6.
PIPEWORK: Pipes shall be constructed from a material resistant to attack, and compatible with liquid.. Pressure piping shall comply with As 4041. All pipes shall be protected from physical damage. Pipes shall be colour coded or labelled. Flexible hoses shall not be used except at transfer points,	Complies No		5.2.4	Piping is not colour coded. Labelling of lines to advise contents is required.
FILL POINTS: Fill point shall be readily accessible. Fill point shall be protected from damage. Fill point shall be in open air, -no ignition sources within hazardous area. Fill point located so that tank vehicle is not required to enter the tank compound. Each fill point shall be clearly identified. Area around the fill point and hose connection shall be impervious to the product.	Complies		5.3.2	ULP tanks are filled from road tanker in the tanker loading bay. Other tanks are filled from IBCs, in the tanker loading bay.
LIQUID LEVEL INDICATION: -It shall be possible to monitor the amount of liquid in any tank intended to receive a delivery. The gauge shall show the normal fill level of the tank. -The Fill level shall not exceed 95% of the tank capacity. -Tanks (with capacity > 5,000 litres of flammable) shall have a high level alarm set at a maximum of 97% of tank capacity. -A contents gauge and LAH remote from the tank, shall be provided at the fill point, or... -In addition to the LAH they shall incorporate an independent	Complies These tanks have capacity < 5000 litres		5.3.2	Remote Level display shows tank level whilst filling. Connection point incorporates a dry break coupling. (as required by Clause 5.3.4)

LAHH.- set at below the tank rated capacity				
<p>VENTING:</p> <p>Each tank shall be fitted with;</p> <p>-A free vent or Pressure Vacuum Vent.</p> <p>-An emergency vent when conditions of 5.5 apply.</p> <p>-Vapours shall be safely discharged outdoors unless recovery and treatment is required.</p> <p>-Flame arrestor is required</p>	<p>Comply</p> <p>Check vent sizing.</p> <p>Comply</p>		5.4	<p>Five of the tanks have PV vents. PV vents require regular inspection, cleaning and testing.</p> <p>Check required to ensure that the vent size is sufficient for emergency venting.</p> <p>All tanks have flame arrestors. Flame arrestors require regular inspection and cleaning.</p>
<p>SEPARATION OF ABOVE GROUND TANKS:</p> <p>-Diameter of tank or 15 m to fill point (for road tanker), but not less than 6 m.</p> <p>-Diameter of tank or 15 m to security fence, but not less than 6 m., or distance required by table 5.4</p>	Complies.		5.4 Table 5.3 Table 5.4	
<p>DISTANCE BETWEEN VERTICAL TANKS:</p> <p>5.7.3 (b) requires separation between tanks of half the diameter of the larger tank, if one tank has diameter > 6m.</p> <p>5.7.5 allows reduced spacing for Tank Clusters.</p> <p>-Total cross-sectional area <320 sq m.</p> <p>-distance between tanks at least 1 m.</p> <p>-Foam fire protection required on all tanks if total cross-sectional area > 30 sq m.</p> <p>-where required compound capacity and clearances from other structures is being calculated, the cluster shall be regarded as one tank of aggregated volume.</p>	<p>N.A.</p> <p>Not a tank Cluster</p>		5.7.3 5.7.5	
<p>BUND CAPACITY:</p> <p>-110% of aggregated capacity of cluster.</p>	Complies		5.8.2	<p>Bund Size in excess of the capacity of tanks.</p> <p>Bund Dimensions: 5.5 m by 15.5m Bund Height:600 mm Bund capacity ; 50 cu m.</p>

BUND DESIGN AND CONSTRUCTION: -Impervious -Retain structural integrity in fire situation. -Not higher than 1.5 m unless safe and rapid exit provided. -Distance from inside perimeter of bund to protected place or on-site protected place shall be at least half that required by Table 5.4, or 15m whichever is less.	Complies Complies		5.8.3	Bund of concrete construction
BUND DRAINAGE: -Bund shall drain away from tank to sump. -Normally closed valve installed in sump or manually operated pump.				Bund contained approximately 50 mm of dirty at the time of inspection.
BUND LOCATION LIMITS:	Complies.		5.8.3(h) Fig 5.2	
TANK FOUNDATIONS: -foundation designed to support direct load when tank full of water. -foundation designed to resist overturning moment due to wind, earthquake -Tanks in flood prone area shall be anchored to prevent floating.	Complies		5.11.1 5.11.4	Tanks of steel frame on concrete bund floor.
FUEL DISPENSING:	NA		SECTION 6	
TANK VEHICLE LOADING: -Location of Fill Point in accordance with Table 5.3 -Diameter of tank or 15 m to fill point (for road tanker), but not less than 6 m. -15 m from connection point to protected places -8 m from connection point to package store.			SECTION 8 8.2.2.1 8.2.2(b) 8.2.3(b)	These tanks filled from Tanker Loading area.
TANKER LOADING BUILDING: -Open on at least 3 sides -Collision protection required -Direction of entry clearly marked. -Tankers must be able to drive away in case of emergency. -The vehicle standing area shall be graded so that spillage will drain away to dedicated tank or compound. -Capacity of spillage control system must be the capacity of the largest tanker compartment, or 9000 litres, whichever is less, or -The volume that can be discharged from two filling points having the greatest flow. -Drainage system requires isolating valve, or separator pit, or remote compound.	Complies		8.2.3 8.2.4 8.2.5 8.2.6.1 8.2.6.2 8.2.6.3	
FLOW RATES: < 1 m/sec initially < 7 m/sec			8.2.7	

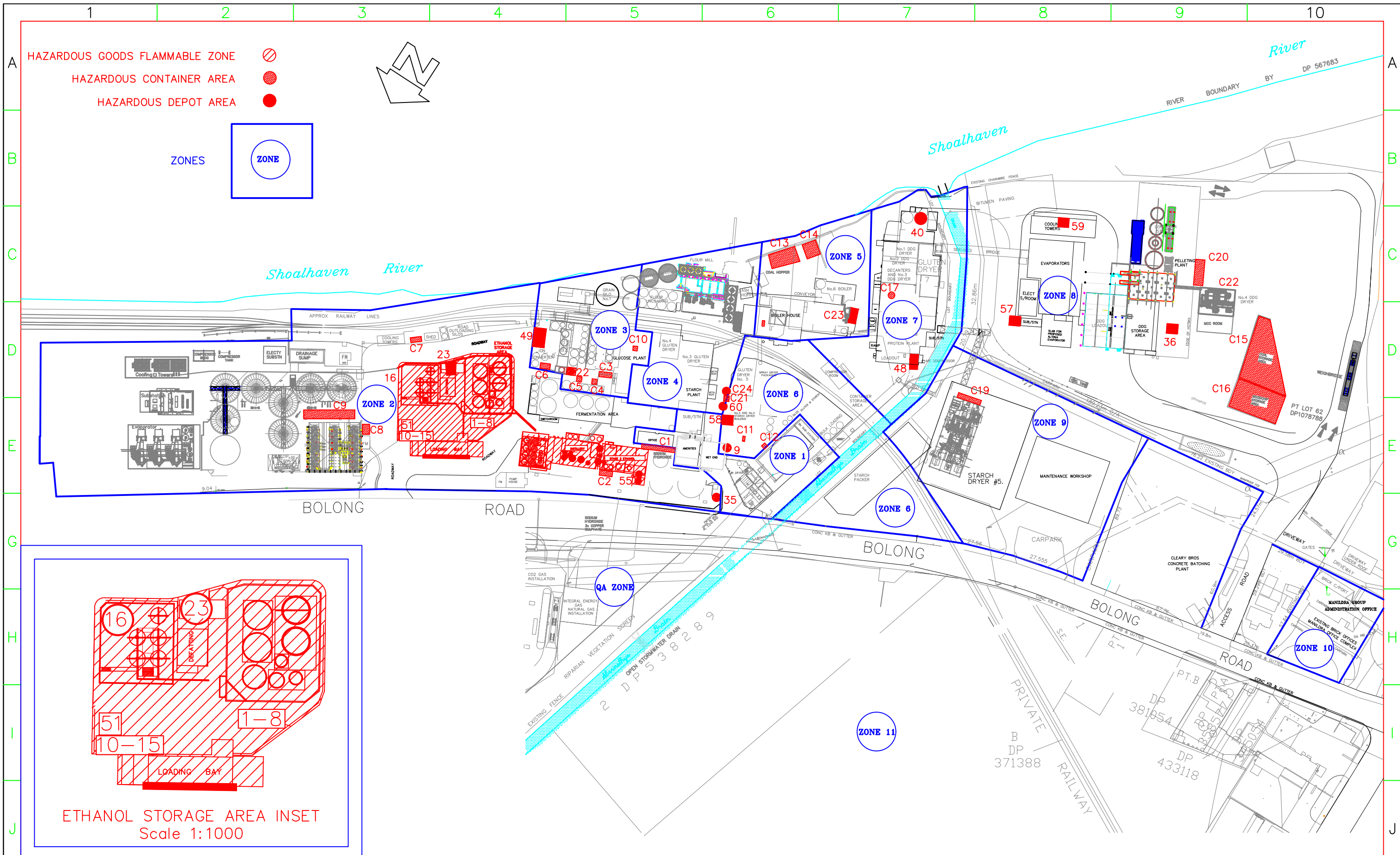
then reduced				
EMERGENCY SHUT OFF: -Emergency stop valve located > 10 m from fill point, but<30m. -Earthing and Bonding must be provided. -Signage required for Emergency Shut Off Valve	Complies		8.2.8 8.2.9	
TOP FILLING REQUIREMENTS:			8.3	
BOTTOM LOADING REQUIREMENTS:			8.4	Scully System installed for road tanker filling.
INSPECTION SCHEDULE FOR TANKS AND FITTINGS: -Must be in accordance with Table 9.1 -Full internal Inspection at least every 10 years.	CHECK		TABLE 9.1	CHECK Tank Inspection Reports required.
FIRE PROTECTION FOR TANKS AND COMPOUND: An emergency plan shall be prepared, and staff trained to implement this plan -Foam system required for every tank over 6 m diameter. (alternatively inert gas blanket). -Foam system required for bund compound, by monitors or hydrants. -Cooling water deluge sprays required on these tanks. -Hydrant system required for this area.			11.13	Portable fire extinguishers of the appropriate type, number and capacity shall be provided. The fire-fighting medium shall be compatible with the specific substances handled

6. REFERENCE DOCUMENTS

- (i) Australian Standard AS 1940-2017 -The storage and handling of flammable and combustible liquids.
- (ii) NSW Work, Health and Safety Regulation.
- (iii) Shoalhaven Starches – Emergency Plan SA-P-235 1.0.E 14-2-2019
- (iv) Shoalhaven Starches – Fire Safety Study. - Pinnacle Risk Management - Rev 17


Appendix 1

Site Layout



L	24-09-19	All	C24 was 61, C23 was 19, DDC #4 added & C22.	P.C.	J.S.
K	15-02-19	E6	9 was 8.	P.C.	Rowan
J	15-02-19	H1	16 was 62, 58 relocated.	P.C.	J.S.
I	14-02-19	H1	62 added to ethanol storage area.	P.C.	Rowan
H	09-11-18	All	C18 & emergency 150 tank storage removed.	P.C.	J.S.
G	10-04-18	All	Latest plant additions added.	P.C.	J.S.
F	30-12-16	C5	Starch dryer 5 added.	P.C.	J.S.
E	30-06-16	D2	Depot 1B & ethanol evaporator removed.	P.C.	J.S.
ISS	DATE	ZONE	CHANGE AMENDMENTS	BY	CKD


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DRAWN	PC	DATE	10/12/12	JOB TITLE	SHOALHAVEN STARCHES.	SHT SIZE	A3
CHKD	JS	DATE		DWG TITLE	OVERALL SITE PLAN. DANGEROUS GOODS AREAS.	REV.	L
APPD		DATE		PROJECT No.	4978	DWG No.	MN00-001
		SCALE	1 : 2000				