LINNELL BROS (Silverstone)

Engineering & Technical Services Report

Part A2 Supplementary Information

Date: 9th January 2015
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### C1.1 Treatment Plant 1

<table>
<thead>
<tr>
<th>Plant Component</th>
<th>Treatment Vessel</th>
<th>Operational Tank 1</th>
<th>Concentrate Tank</th>
<th>Mix Tank (1 &amp; 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>1.83m dia. x 14.14m Lg.</td>
<td>L 8.83m x H3.36m x W 1.90m</td>
<td>Diameter 2.51m x H 3.55m</td>
<td>L 2.5m x W 1.5m x H 2.03m</td>
</tr>
<tr>
<td>Construction</td>
<td>Carbon steel welded</td>
<td>Carbon steel welded</td>
<td>Carbon steel welded</td>
<td>Carbon steel welded</td>
</tr>
<tr>
<td>Total Volume</td>
<td>37,500 litres</td>
<td>56,371 litres</td>
<td>17,631 litres</td>
<td>7,613 litres</td>
</tr>
<tr>
<td>Working Volume</td>
<td>31.971m³ (31,971 litres)</td>
<td>50,000 litres</td>
<td>17,000 litres</td>
<td>6,000 litres</td>
</tr>
<tr>
<td>Working Pressure</td>
<td>12.00 bar g &amp; Full Vacuum</td>
<td>Atmospheric</td>
<td>Atmospheric</td>
<td>Atmospheric</td>
</tr>
<tr>
<td>Timber Volume</td>
<td>12.00m³</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Reference</td>
<td>Ref 26598 Fred Watkins Engineering. (Leeds &amp; Bradford door design)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year of Construction</td>
<td>Not known</td>
<td>Not known</td>
<td>Not known</td>
<td>Not known</td>
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</table>
## High Pressure Treatment Plant 2

<table>
<thead>
<tr>
<th>Plant Component</th>
<th>Treatment Vessel</th>
<th>Operational Tank Pt1</th>
<th>Operational Tank Pt2</th>
<th>Water Tank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>1.80m dia. x 15.13m Lg.</td>
<td>4.92m x H 2.82 x W 2.62</td>
<td>6.25m x H 2.28 x W 1.97m</td>
<td>~3.0m dia. x 6.4m L.</td>
</tr>
<tr>
<td>Construction</td>
<td>Carbon steel welded</td>
<td>Carbon steel welded</td>
<td>Carbon steel welded</td>
<td>Carbon steel welded</td>
</tr>
<tr>
<td>Total Volume</td>
<td>39,000 litres</td>
<td>36,351 litres</td>
<td>28,073 litres</td>
<td>45,721 litres</td>
</tr>
<tr>
<td>Working Volume</td>
<td>39,000 litres</td>
<td>34,000 litres</td>
<td>26,000 litres</td>
<td>44,000 litres</td>
</tr>
<tr>
<td>Working Pressure</td>
<td>12.00 bar g &amp; Full Vacuum</td>
<td>Atmospheric</td>
<td>Atmospheric</td>
<td>Atmospheric</td>
</tr>
<tr>
<td>Timber Volume</td>
<td>12.00m³</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Reference</td>
<td>IPV vessel door design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year of Construction</td>
<td>Not known</td>
<td>Not known</td>
<td>Not Known</td>
<td>Not known</td>
</tr>
</tbody>
</table>
C2 How will the installation operate?

This section of the application aims to describe:
- the context of the application in relation to the Environmental Permitting Regulations 2010 (as amended) in terms of the activities undertaken at the installation, and;
- the installation, including an overview of the equipment and chemicals used, and;
- the timber treatment processes.

C2.1 Activities undertaken

C2.1.1 Wood preservation

LINNELL BROS operates an activity for the preservation of wood and wood products with a production capacity exceeding 75 m³ per day.

This places the activity within Chapter 6, Section 6.6 (Timber Activities) Part A(2)(a) of Schedule 1 to the Environmental Permitting (England and Wales) Regulations 2010 (as amended) (The EPR) as follows:

Part A2

(a) Preservation of wood and wood products with chemicals with a production capacity exceeding 75 m³ per day other than exclusively treating against sap stain.

The production capacity is generally considered to be the greatest potential throughput of the installation, based on the treatment vessel volume (the maximum useable volume of wood that can be treated) and the maximum number of treatment cycles that could be undertaken in a 24-hour day as follows:

Production capacity = N x V
Where:
N = number of treatment cycles that can be undertaken in a 24 hour period, based on the shortest possible treatment cycle that the plant is capable of.
V = Volume of wood treated in each cycle.

The maximum theoretical production capacity is 454.80 m³ per day. The maximum theoretical production capacity is calculated as follows:

<table>
<thead>
<tr>
<th>Tanalith Plant 1</th>
<th>Tanalith Plant 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical UC1/2 cycle:</td>
<td>65 mins</td>
</tr>
<tr>
<td>Change over time:</td>
<td>30 mins</td>
</tr>
<tr>
<td>Total charge time:</td>
<td>95 mins</td>
</tr>
<tr>
<td></td>
<td>1.58 hours</td>
</tr>
<tr>
<td>Charges in 24 hours (N)</td>
<td>15.16</td>
</tr>
<tr>
<td>Vessel Capacity (V):</td>
<td>12 m³</td>
</tr>
<tr>
<td>Production Capacity:</td>
<td>181.92 m³</td>
</tr>
<tr>
<td>Total Production Capacity</td>
<td>363.84 m³</td>
</tr>
</tbody>
</table>

The only restrictions on capacity are technical or legal limitations such as treatment vessel capacity and planning conditions limiting treatment working hours. Site permitted operating hours are 7am to 8pm are in place for LINNELL BROS. Adjustment of capacity to a 13 hour operating day is therefore 246.35 m³.
C2.1.2 Manufacturing wood products

LINNELL BROS currently does not hold any other environmental permits for this site.

For the purposes of this application, the stationary technical unit forming the Part A timber treatment activity is the limits of the treatment facility within the site boundary. See site plan.

C2.1.3 Solvent Emission Activities

LINNELL BROS do not operate a Solvent Emission Activity.

C2.2 The installation

C2.2.1 Overview

LINNELL BROS operates two specially constructed treatment vessels for wood preservation at the Silverstone installation, these being:

Two vacuum pressure timber impregnation plants for the application of Tanalith E, which is a water based wood preservative that contains copper and organic biocides.

Tanalith E pressure treated timber has a long term protection against fungal and insect attack, for both in and out of ground contact, interior and exterior applications when treated to the correct end use specification. TANALITH E pressure treated timber has an initial natural green colouration. Upon external exposure, the green colour slowly weathers to a warm, honey brown and in the longer term becomes a natural silver grey. This weathering process does not indicate any loss of preservative protection.

The ‘end use specification’ mentioned above is usually referred to as Use Class. Use Classes are based on the potential threat to the timber from decay or insect attack in its end-use application. A summary of the four Use Classes is as follows:

- Use Class 1: Internal, dry (e.g. upper floor joists)
- Use Class 2: Internal, risk of wetting (e.g. tile battens)
- Use Class 3.1: Outdoors, coated, above ground (e.g. window frames)
- Use Class 3.2: Outdoors, uncoated above ground (e.g. fence panels)
- Use Class 4: Direct soil or fresh water contact (e.g. fence posts)

The type of timber treated and the desired use class will have an impact on the timber treatment time, and therefore the number of treatment cycles that can be undertaken in any day. In general, the greater the level of protection required, the longer the timber treatment cycle and therefore the fewer treatment cycles that can be undertaken in any one day.

Vacuum, high pressure treatments are most suitable for the full range of timber end uses. They are particularly relevant for external applications, both in and out of ground contact – Use Classes 1 to 4 – providing a service life protection ranging from 15 to 60 years. They force the preservative deep into the cellular structure of the timber and generally result in a pale green colouration to the finished component. Additives are available that can give either a rich brown colouration, usually for rough sawn fencing and landscaping timbers, or an effective extra water repellent protection for decorative external timbers, such as decking and cladding timbers.

Timber is a naturally variable material, whose characteristics and properties vary from species to species and from tree to tree in the same species. A growing tree consists of two types of wood, the inner heartwood and the outer sapwood under the bark. The sapwood is living cells that transport water up the trunk and store food...
for tree growth, and a new ring of sapwood grows on the tree each year. The cells in the sapwood (called lumen) are hollow are naturally connected to each other and run up and down the tree (the grain), as mentioned for the transport of water and food within the growing tree. The lumen in heartwood are filled with the trees naturally occurring waste products.

![Figure 1: The structure of wood](image)

Waste materials from the trees growth systems in the softwood are disposed of in the heartwood. The darker heartwood containing the waste products from the tree is unattractive to fungi and insect pests, making it naturally resistant to decay and insect attack. Sapwood is rarely naturally resistant to fungi and insect pests unless it is treated with preservative. For economic reasons, trees that are now used for building timber are grown fast and felled quite young, and all of the wood is used quite efficiently (i.e, not just the heartwood is used). This means that nearly all timber used for building must be preserved if it is to be protected from decay. The durability classes of timber are detailed in table 1 below.

<table>
<thead>
<tr>
<th>Durability class</th>
<th>Description</th>
<th>Example species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Very durable</td>
<td>Afromosa, Greenheart</td>
</tr>
<tr>
<td>Class 2</td>
<td>Durable</td>
<td>European Oak, Iroko</td>
</tr>
<tr>
<td>Class 3</td>
<td>Moderately durable</td>
<td>Western Red Cedar, Keruing</td>
</tr>
<tr>
<td>Class 4</td>
<td>Slightly durable</td>
<td>Scots Pine(Redwood), Norway Spruce (whitewood)</td>
</tr>
<tr>
<td>Class 5</td>
<td>Not durable</td>
<td>Beech, Birch</td>
</tr>
</tbody>
</table>

*Table 1: Wood durability classes*

When timber is being preserved, some preservative is forced into the end grain, where the wood has been cut across the lumen. However, most of the preservative is being forced through the side of the wood, and across the cell walls. The final penetration of the preservative depends on how easily is will pass though the cell walls. The penetration is determined by the size and structure of the pits that connect the cells together. Some species such as Scots pine (redwood) are easier to treat than other Spruce (whitewood). Wood can therefore also be classified according to treatability. The treatability classes of timber are detailed in table 2 below.
<table>
<thead>
<tr>
<th>Treatability class</th>
<th>Description</th>
<th>Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Easy to treat (permeable)</td>
<td>Timber can be completely penetrated by pressure treatment</td>
</tr>
<tr>
<td>Class 2</td>
<td>Moderately easy to treat (moderately resistant)</td>
<td>Usually complete penetration not possible; 6mm lateral penetration expected</td>
</tr>
<tr>
<td>Class 3</td>
<td>Difficult to treat (resistant)</td>
<td>3mm to 6mm lateral penetration expected</td>
</tr>
<tr>
<td>Class 4</td>
<td>Extremely difficult to treat (extremely resistant)</td>
<td>Very minimal lateral and longitudinal penetration</td>
</tr>
</tbody>
</table>

*Table 2: Wood treatability classes*

The durability of the wood and the treatability of the wood are all considered when determining how the timber is treated in order to achieve the desired or certified Use Class. An example of treatment time with species and Use Class are shown in table 3 below.

<table>
<thead>
<tr>
<th>Use class</th>
<th>Species</th>
<th>Treatment time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1/2</td>
<td>Redwood</td>
<td>35 minutes</td>
</tr>
<tr>
<td>Class 1/2</td>
<td>Whitewood</td>
<td>60 minutes</td>
</tr>
<tr>
<td>Class 3</td>
<td>Redwood</td>
<td>75 minutes</td>
</tr>
<tr>
<td>Class 3</td>
<td>Whitewood</td>
<td>120 minutes</td>
</tr>
<tr>
<td>Class 4</td>
<td>Redwood</td>
<td>120 minutes</td>
</tr>
<tr>
<td>Class 4</td>
<td>Whitewood</td>
<td>180 minutes</td>
</tr>
</tbody>
</table>

*Table 3: Wood treatment times with Use Class and Species*

**C2.2.2 Untreated timber**

Timber for treatment is either kiln dried seasoned timber such as decking, or unseasoned timber such as feather edge board and posts. Timber is either kiln or air dried on site or delivered to site ready for treatment.

**C2.2.3 Timber treatment chemicals & their storage**

Timber treatment chemicals are solely supplied by Arch Timber Protection, and are:

- Tanalith E8000
- Tanagard
- Tanatone

The location of the storage tanks can be seen in plan LIN-EXTPL-02.pdf. All preservative chemicals are stored under cover within the process building as follows:

**Tanalith E8000**

Tanalith E8000 preservative concentrate is supplied by bulk tanker. The Tanalith concentrate storage tank is located between the two treatment vessels within the main plant bunded area. The tank, measuring 2.51m (d) x 3.55m (h), with a calculated maximum volume of 17,631 litres and designed for a maximum s.g. of 1.5. The storage is connected to the treatment plant using carbon steel pipe work, pump and valves. See figure 2 below.
Tanalith E8000 is mixed with water in the mix tank system before transferring to the relevant ready to use storage tank.

**TANAGARD**

TANAGARD preservative additive is supplied in 640 litre Intermediate Bulk Containers (IBCs) on a just in time basis. When in use, the TANAGARD concentrate IBC is located within the main plant bund. The IBC is connected to the treatment plant using a braided stainless steel hose, pump, valves and stainless steel pipe work also equipped with shut off valves.

**TANATONE**

Tanatone preservative additive is supplied in 1000 litre Intermediate Bulk Containers (IBCs) on a just in time basis. When in use, the Tanatone concentrate IBC is located within the main bund on a dedicated IBC stand. The IBC is connected to the treatment plant using a braided stainless steel hose, pump, valves and stainless steel pipe work also equipped with shut off valves.

**Water**

In addition to the preservative chemicals storage tanks, one horizontal cylindrical water tank supplied from a ground water harvesting tank system installed on site. The tank, measuring 3m (d) x6.4m (L), with a calculated maximum volume of 45,721 litres.

All of the fixed storage tanks are equipped with digital level indicators located at the plant mixing station.
C2.2.4 Timber treatment equipment

Two separate timber treatment plants are operated within the installation: Plant 1 and Plant 2 both using Tanalith E8000. Both plants are very similar in size and operation methodology. Each plant is controlled with an independent control system using simple PLC control and timers to set vacuum and pressure times.

Plant 1: Tanalith E8000

<table>
<thead>
<tr>
<th>Treatment vessel information:</th>
<th>Leeds &amp; Bradford / Fred Watkins Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make:</td>
<td>Leeds &amp; Bradford / Fred Watkins Engineering</td>
</tr>
<tr>
<td>Serial number:</td>
<td>26598</td>
</tr>
<tr>
<td>Date of manufacture:</td>
<td>Not known</td>
</tr>
<tr>
<td>Maximum working vacuum / Pressure:</td>
<td>-1000 mbar / 12,000mbar</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>1.83m x 14.14m</td>
</tr>
<tr>
<td>Max vessel capacity:</td>
<td>12.0 m$^3$</td>
</tr>
</tbody>
</table>

*Table 4: Tanalith plant1 details*

Plant 2: Tanalith E 8000

Vacuum high pressure plant is in use for Tanalith E. The details of the plant are as follows:

<table>
<thead>
<tr>
<th>Treatment vessel information:</th>
<th>IPV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make:</td>
<td>IPV</td>
</tr>
<tr>
<td>Serial number:</td>
<td>Not Known</td>
</tr>
<tr>
<td>Date of manufacture:</td>
<td>Not Known</td>
</tr>
<tr>
<td>Maximum working vacuum / Pressure:</td>
<td>-1000 mbar / 12,000mbar</td>
</tr>
<tr>
<td>Dimensions:</td>
<td>1.83m x 15.13m</td>
</tr>
<tr>
<td>Max vessel capacity:</td>
<td>12.0 m$^3$</td>
</tr>
</tbody>
</table>

*Table 5: Tanalith plant 2 details*

The vessel is of all steel construction on a concrete foundation, and fully contained within a concrete bunded area. The plant can be seen in figure 3 below.

Each Tanalith E plant is equipped with the following:

- Ground level loading track.
- Interlocked loading door.
- Vacuum pumps.
Vacuum vents.
• Vacuum chest.
• Service liquid tank.
• Pressure pump.
• Flow control valves.
• High level limit switches.

The vessels are of all steel construction on a concrete foundation, and fully contained within a concrete bunded area.

Plant Control System

The treatment process on each plant is controlled through a PLC control panel for each treatment plant. This controls the automatic treatment cycle. The mixing system is controlled by the operators. A set of level displays is located in the mixing system area giving readouts off all storage tanks. The operator mixes the required amount of product, water (fresh or recovered) and additives into the chosen mix tank using local readouts on the flow meters. The completed mix is then transferred to the relevant storage tank. The transfer is controlled by the operator and he monitors the transfer to prevent overfill of the tanks.

Figure 5: Tanalith E Mixing & Main plants control systems
C2.2.5 Timber treatment process

The timber treatment processes are described as follows:

C2.2.5.1 Tanalith E treatment process

Packs of wood to be treated are loaded onto a motorised track system set into the concrete floor in front of the treatment vessel. The concrete floor slopes towards the treatment vessel bund for the collection of any preservative fluid run-off.

Packs are stacked on the track either flat or with a slight slope (depending on the wood being treated) to promote the free drainage of preservative solution after the treatment process. Packs are loosely strapped to the track with webbing straps or chains to enable preservative fluid penetration, but also to prevent wood floating around the vessel during the treatment process. The track is retained in the vessel by way of an anti-flotation rail to additionally prevent the buoyancy of the pack lifting it off the rail system.

Tracks are loaded into the vessel via the track system using a rail bridge to span the gap across the tank and the vessel itself. The rail bridge must be moved aside to enable the vessel door to be locked shut for treatment to take place.

The treatment process consists of the following stages:

1. Initial vacuum
2. Flood
3. Pressurise
4. Drain
5. Vacuum
6. Air release and drain

The phases of the pressure vacuum treatment cycle are shown in figure 6 and are described below:

![Figure 6: Pressure vacuum treatment cycle](image)
1. Initial vacuum

The objective of the full cell treatment process is to obtain maximum retention of preservative in the treated timber. The timber is loaded into the treatment vessel and the door is closed and safely locked. The initial vacuum removes air from the timber, which would otherwise inhibit preservative penetration. The duration and level of vacuum affects the penetration and retention of the preservative in the timber, and this will be adjusted according to the timber being treated and the required treatment specification. For very permeable species, the initial vacuum may be omitted to reduce the possibility of over-absorption of the preservative. A treatment process where the initial vacuum is omitted is often referred to as the empty cell process. The initial vacuum is applied (vacuum pump on and valve opened) and a vacuum is held at around 600mmhg or above for 15 minutes.

2. Flooding

Preservative solution is pumped from the mix tank under the vessel to the treatment vessel once the initial vacuum period has finished by opening the main flood valve. The vacuum is maintained during preservative solution transfer so that its effect is maintained.

3. Pressure period

The pressure period is the time the timber spends in the flooded timber treatment vessel under high pressure. The pressure is achieved by pumping more preservative into the vessel once it is flooded (pressure pump started and pressure pump valve opened). This stage of the process forces the preservative solution into the timber until the desired level of penetration is achieved. Pressure is often held for 60-120 minutes.

4. Pressure Release & Empty

At the end of the pressure period, the pressure is released though the main flood valve and the preservative fluid is transferred back to storage in the tank under the vessel. As soon as the pressure is released from the vessel, any air compressed in the pressure period expands and blows the preservative out of the cells of the timber being treated such that only the cell walls are coated with preservative. This is referred to as ‘kickback’; however the initial vacuum stage should minimise this effect.
5. Final vacuum

A final vacuum is applied to the timber in the empty vessel to help remove excess preservative from the surface of the treated timber, which speeds-up the dripping of the excess preservative into the vessel. The final vacuum is general 15 minutes or when a vacuum of 600mmHg is achieved.

6. Air release and drain

After the air is released, any excess preservative leaving the treated timber is drained back into the storage tank for re-use. The treated timber is then ready to be removed from the vessel.

C2.2.5.2 Post treatment drying

After the treatment process has been completed, the vessel door is opened and the treated timber removed from the vessel on the track rails.

Treated timber packs are unstrapped from the rail system, and then lifted using the fork lift truck used to load the packs to allow any excess treatment solution to drain from the wood. This initial draining process is undertaken over the rails on the concrete pad immediately in front of the treatment vessel, meaning that the preservative liquid is collected for re-use in the treatment process.

Once the initial drain has been completed, particularly for pressure treated timber, treated packs are transferred to the drying area for the final drying period. The final drying period is undertaken at ambient conditions and is therefore temperature and weather dependent but can take between 24 hours and 2 days depending on the type of timber treated and the prevailing weather conditions. The capacity of the holding area is currently approximately 400m³ plus the combined capacity of the rail systems in front of the treatment vessels (24.0m³).
C3: Releases, techniques and monitoring
C3.1: Releases
The process flow is described as follows:

Potential or Expected releases
Preservative delivery
- No volatile emissions to air
- Potential for odour
- Potential for trace emission to sewer in abnormal event

Preservative storage tanks
- No volatile emissions to air
- Low / No potential for odour
- Potential for loss to containment bund in abnormal event

Treatment vessel
- No volatile emissions to air
- Low / No potential for odour
- Potential for loss to containment bund in abnormal event

Unloading area
- No volatile emissions to air
- Low / No potential for odour

Timber drying area
- No volatile emissions to air
- Low / No potential for odour
- Potential for trace emission to sewer in abnormal event

*Figure 7: Process flow diagram*
A description of releases and the quantification of those releases under normal operating circumstances for each process stage (including start-up, shutdown) and accidental releases are detailed in this section. The wood preservation activity does not include any combustion processes, nor are there any process chimneys or associated ductwork. This means that:

- There are no contained emissions to air.
- Abatement plant is not necessary to meet emission limit values.
- There are no substantial emissions to air.
- The activity is free from smoke emissions.
- There are no persistent visible emissions or emissions of water vapour that could lead to droplet fallout.
- There are no contained emissions to water.
- There is potential for trace emissions to sewer.

C3.1.1 Releases from receipt of chemicals

**Release under normal operating circumstances**

There are no releases of Tanalith E under normal operating circumstances. It is delivered by bulk road tanker. A minor release within the timber treatment area (a few millilitres) is possible during the hose connection and disconnection procedure. This is captured using a simple drip tray arrangement and can be recovered in to the plant.

**Accidental releases**

Accidental release of Tanalith E is could occur in the event of delivery hose or valve failure. However the tanker off-loading point is within the contained area so potential for loss to the environment is low.

C3.1.2 Releases from storing chemicals

**Release under normal operating circumstances**

There are no releases of Tanalith E under normal operating circumstances. It is stored in the closed concentrate storage tank within the timber treatment area.

**Accidental releases**

Accidental release of Tanalith E in the treatment area could only occur in the event of storage tank failure or pipeline failure. The maximum potential for release is the volume of the relevant storage tank as detailed in section C1.

C3.1.3 Releases from mixing chemicals

**Release under normal operating circumstances**

Tanalith E concentrate is mixed with water in the mix tank to the desired concentration (usually 3% or 5%). There are no releases during normal mixing operations. There is no process effluent from the activity, with no direct emissions to water.

**Accidental releases**

A release of mixed product to the treatment area could occur if the storage tanks were to overflow. However, operation of the mix system is under operator control and monitors the transfer through out.
C3.1.4 Releases from vessel loading

**Release under normal operating circumstances**
Opening the vessel doors for loading may result in a small amount of preservative being released to the drip tray directly below the relevant treatment vessel door.

**Accidental releases**
Accidental releases of preservative fluid during vessel loading are unlikely. The process pumps are not operating.

C3.1.5 Releases from timber treatment

**Release under normal operating circumstances**
Other than air displaced through the vacuum system during initial and final vacuum stages of the process there are no emissions from the process.

**Accidental releases**
Any failure of the vessel during a treatment cycle would lead to a liquid release into the treatment area. The liquid contents of the vessel depends on the pack size being treated, however the maximum liquid capacity of the Tanalith E vessel is approx. 47,000 litres.

C3.1.6 Releases from vessel unloading

**Release under normal operating circumstances**
Opening the vessel doors at the start and end of the treatment cycle may lead to some liquid release (a few litres) from the Tanalith plant to the drip tray below the door. There is no process effluent from either timber treatment operation, and no release to water. The vessel door is open for the duration of the unloading procedure. Timber saturated with chemical preservative is withdrawn from the vessel for initial draining, where excess preservative will run off the freshly treated timber and onto the concrete pad. It is not possible to quantify the quantity of fun-off from each charge as this will depend on the type of wood being treated, the quantity of wood in the change and the prevailing weather conditions. There is no process effluent from the activity, with no direct emissions to water.

**Accidental releases**
Accidental releases could only occur if the concrete treatment area was compromised.

C2.1.7 Releases from drying area

**Release under normal operating circumstances**
Treated wood is placed in the post treatment timber holding area to dry. There is no process effluent from the activity, with no direct emissions to water. Any run off from the timbers is recovered to the treatment process. The timber holding area is currently not covered. Rain falling on to this area drains in to the main plant bund and is recovered back in to the process. In the event of excessive rainfall the site has two emergency tanker barrels that can be utilised to temporarily store any excess contaminated water.

**Accidental releases**
Accidental releases could only occur if the concrete treatment area was compromised or if dripping timber was removed from the timber treatment area.
C3.1.8 Releases from ancillary activities

Releases under normal operating circumstances
Treated timber has the potential to cause trace emissions of preservative to sewer, however this should be no more significant than storing treated timber at a builders merchants.

Process vessel cleaning will produce a residue.

Accidental releases
There should be no potential releases from ancillary activities.

C3.2: Techniques

C3.2.1 Techniques to minimise releases from receipt of chemicals

IBCs of preservative additive chemicals are delivered to site by road vehicle on a just in time basis. IBCs and kegs are off loaded by forklift into the treatment area. The whole of the treatment area is protected by a containment kerb, meaning that any leak would be contained within the bund. The IBCs remain lidded and capped until connected to the treatment plant.

Bulk tanker deliveries are received in accordance with a delivery procedure. The tanker connection point is located with the storage tank containment bund. All delivery lines are blown though to ensure that they are free from preservative solution at the close of the delivery. Delivery connection points are also equipped with manual shut-off valves and connection point caps. The treatment area containment kerb and bulk tanker delivery connection point are shown in general arrangement drawing 2570-LON-GA-01. Spillage kits are available for use during bulk tanker deliveries.

C3.2.2 Techniques to minimise releases from storing chemicals

Control techniques for the storage of IBCs prior to use are the same as that for delivery.

With the exception of one storage tank for plant 2 the bulk storage tanks for Tanalith E are contained within a formed concrete containment bund as shown in figure 8. The pump system for the Tanalith E systems are also within this area. The storage tank for Plant 2 is sited outside the main plant building but within the contained drip area. In the unlikely event of a leak the fluid would be captured on the drip area and drain back in to the main plant bunded are.

Figure 8: Tanalith E storage tanks containment bunds
C3.2.3 Techniques to minimise releases from mixing chemicals

Tanalith E concentrate is mixed to a precise concentration by the Auto-Treater control system, using preservative solution from concentrate storage and water to the storage tanks positioned below the treatment vessels.

Preservative concentrate is stored in the concentrate storage tank positioned to the side of the treatment plant area within the bunded plant area.

Water is supplied to system from the plant water storage tank which is supplied from the water harvesting system on site and is fitted with a Type A air gap. Thus ensuring there is no direct connection of town water with the mixing system. This eliminates the potential for back-siphoning of preservative solution to the mains water supply.

C3.2.4 Techniques to minimise releases from vessel loading

A forklift truck is used for timber treatment operations. The vessel loading area is under cover, and is a fully concreted area. A potential localised release when the treatment vessel door is opened is possible due to passing valves; therefore the vessel door is opened for the shortest time possible when loading the track system, and the vessel door is kept closed and locked when the vessel is not in active use.

C3.2.5 Techniques to minimise releases from timber treatment

Tanalith E treatment process

The timber treatment vessel is purpose built and is contained within the covered process building and within the containment bund area. The control system controls the preservative mix concentration, the flow of liquid preservative and the pressure / vacuum period according to the desired specification. The treatment plant can be operated manually to safe closedown should the computer system fail.

The vessel is fitted with interlocks and devices to prevent the operation of the vessel if the loading door is not locked shut, and to prevent the vessel door from opening or being opened during the treatment process, or whilst there is working liquid in the process vessel as follows:

- Vessel door closed / locked position switch.
- Low level test cock device with position switch
- Empty switch in the bottom outlet of the treatment vessel.

Electrical interlocks on the process vessel door that confirm that the door is locked shut. The interlocks prevent the operation of the treatment process if the vessel door is not properly closed. See figure 9.

Figure 9: Tanalith E treatment plant door locking ring interlocks and low level test cock
The digital readout at the mixing control station provides a visual indication of the liquid level in the storage tank so that it can be determined whether or not there is liquid in the process vessel. The vessel is also fitted with sensors to detect that the vessel is empty.

In an emergency situation, or in the event of door failure, the vessel can be manually controlled. The area in front of the vessel door forms part of the plant main bund meaning that any preservative fluid released in the event of a problem will be safely contained. The bunded area is always maintained at a level that would allow it to contain the contents of the process vessel in an emergency situation.

Other safety equipment fitted to the process vessel is as follows:

- Safety relief valve on the pressure pump (set to operating pressure by the preservative manufacturers engineers to maintain the pressure treatment period, usually 12.0 BarG for Tanalith plants).
- Emergency relief valve and overflow on the top of the plant (all fluid contained within the bund under the process vessel) usually set to 14BarG for Tanalith plants. This is set at the design pressure of the vessel and the valve should be set by the valve supplier and be fitted with a sealed / tagged cap.
- Digital and analogue gauges display working pressure and vacuum in the vessel during operation.

C3.2.6 Techniques to minimise releases from vessel unloading

Tanalith E treatment process

Wood packs are stacked, spaced and sloped in order to maximise the free drainage of solution whilst the pack is inside the treatment vessel. Packs are also lightly strapped with webbing straps to ensure that the timber remains on the track during treatment, but not so tight that the preservative cannot fully penetrate the timber. Tracks are held in the vessel during treatment by way of an anti-floatation rail. All of the above minimise the likelihood of timber becoming stuck within the treatment plant, which cause operational problems in clearing blockages and prolongs the period of time that the vessel door is open for unloading. Again, the tracks are also designed to shed preservative solution.

On opening the vessel door after treatment, a small amount of preservative fluid will escape from the door seal. This is unavoidable, but is contained and returned to the storage tank for re-use.

The track system removes the treated pack from the vessel on the rail system. The rail system is a raised system with integral drip tray to ensure that all residual preservative dripping from the treated pack flows back into the storage tanks for re-use. See figure 10.
C3.2.7 Techniques to minimise emissions from storage and drying

Treated packs are removed from the track systems with a forklift. They are transferred to the holding areas for drip drying. Drip drying generally relates to the Tanalith process which produces a wetter product due to the pressure treatment process. Drip drying takes place within a dedicated drying area with falls that return the liquid and any rain water back to the main plant bund for recovery back in to the mix system.

Packs of treated timber remain in the drying area until the packs are defined as dry. The time taken for the pack to be defined as dry is dependent on a number of factors, including:

- The type of timber treated (seasoned timber usually dries faster than unseasoned timber).
- Weather conditions.

To be defined as dry, the pack must be free from drips of liquid preservative and the treatment plant operator will use his judgement based on the type of timber treated and the prevailing weather conditions. If a pack is lifted and drips are identified, the pack will remain in the drying area until drying has been completed.

The main timber holding area has a surface area of 775m² which equates to a 775litres per mm of rain landing on the area. The plant has available 2 / 3 road tankers available to store contaminated water from this area in the event of a high rainfall period.

C3.2.8 Techniques to minimise releases from ancillary activities

Only empty IBCs are stored outside the bunded areas. All storage areas are of concrete construction. All IBCs stored are capped and lidded. When emptied IBCs are washed out thoroughly with water which is re-used in the treatment process. Only clean decontaminated IBCs will be stored outside the timber treatment plant. Once decontaminated the IBCs can be returned to Schutz for re-use/recycling.

Dried and treated timber is stored on site (inside and/or outside) for dispatch to the customer. Once the preservative solution has initially dried, it is considered ‘fixed’ into the timber and is unlikely to cause pollution if stored on a concrete surface.
Whilst a fork lift is used for the timber treatment operations, this vehicle can occasionally leave the timber treatment area for use in other areas and for maintenance. Timber storage within the timber holding area will be done such that any run off from the timbers is away from the main areas the fork lift is operating meaning the potential for migration of chemical is minimal.

Process vessel cleaning if it is to be needed at some time in the future will be undertaken by a specialist contractor as required. The contractor would remove any effluent produced in the cleaning process that cannot be re-used within the timber treatment activity in a tanker for specialist disposal at a waste water treatment facility.

C3.3: Monitoring

C3.3.1 Monitoring releases from receipt of chemicals
No emission concentration limit needs to be met for emissions to air from the receipt of product. No emissions monitoring is possible, however the following monitoring will be undertaken:
- IBCs containing preservative additives are regularly inspected for their contents and for damage and leaks.
- The potential for trace emissions to land from this area will be confirmed by the site condition report.

C3.3.2 Monitoring releases from storing chemicals
No emission concentration limit needs to be met for emissions to air from the storage of chemicals other than the absence of offensive odour beyond the installation boundary. No emissions monitoring is possible, however the following monitoring will be undertaken:
- Storage tanks containing preservative solution are regularly inspected for damage and leaks.
- Pipework carrying preservative solution are regularly inspected for damage and leaks.
- High level warning alarms are regularly tested.
- The potential for trace emissions to land from this area will be confirmed by the site condition report.

C3.3.3 Monitoring releases from mixing chemicals
No emission concentration limit needs to be met for emissions to air from the storage of chemicals other than the absence of offensive odour beyond the installation boundary. No emissions monitoring is possible, however the following monitoring will be undertaken:
- Storage tanks containing preservative solution are regularly inspected for damage and leaks.
- Pipework carrying preservative solution are regularly inspected for damage and leaks.
- High level warning alarms are regularly tested.
- The potential for trace emissions to land from this area will be confirmed by the site condition report.

C3.3.4 Monitoring releases from track loading

The process vessel doors will be only be kept open for the shortest time practicable. This will form an auditable item.

C3.3.5 Monitoring releases from timber treatment

No emission concentration limit needs to be met for emissions to air from timber treatment other than the absence of offensive odour beyond the installation boundary. No emissions monitoring is possible, however the following monitoring will be undertaken:
- The concrete containment bund is regularly inspected for damage.
- Pipework carrying preservative solution are regularly inspected for damage and leaks.
- The potential for trace emissions to land from this area will be confirmed by the site condition report.
C3.3.6 Monitoring emissions from vessel unloading

No emission concentration limit needs to be met for emissions to air from treatment vessel unloading and timber draining other than the absence of offensive odour beyond the installation boundary. No emissions monitoring is possible, however the following monitoring will be undertaken:

- The concrete containment bund is regularly inspected for damage.
- The potential for trace emissions to land from this area will be confirmed by the site condition report.

C3.3.7 Monitoring releases from drying area

No emission concentration limit needs to be met for emissions to air from treated timber drying area other than the absence of offensive odour beyond the installation boundary. No emissions monitoring is possible, however the following monitoring will be undertaken:

- Packs are managed using pack labels and charge sheets.
- The dripping area is regularly inspected.
- The potential for trace emissions to land from this area will be monitored.

C3.3.8 Monitoring releases from ancillary activities

No emission concentration limit need to be met for emissions to air from stored chemicals other than the absence of offensive odour beyond the installation boundary.

- The potential for trace emissions to land from this area will be monitored.

C4 Groundwater discharges

Under the groundwater Directive and the groundwater Regulations, groundwater is all water which is below the surface of the ground in the saturated zone and in direct contact with the ground or subsoil.

C4.1 Discharges of List I and List II substances

C4.1.1 List I substances

There are no intentional point source emissions of List I substances. List I substances include:

a) organohalogen compounds and substances which may form such compounds in the aquatic environment;
b) organophosphorus compounds;
c) organotin compounds;
d) substances which possess carcinogenic, mutagenic or teratogenic properties in or via the aquatic environment (including substances which have those properties which would otherwise be in list II);
e) mercury and its compounds;
f) cadmium and its compounds;
g) mineral oils and hydrocarbons;
h) cyanides.

No List I substances are used in the wood preservation activity.
C4.1.2 List II substances

There are no intentional point source emissions of List II substances.

List II substances include:

A substance is in list II if it could have a harmful effect on groundwater and it belongs to one of the following families or groups of substances–

a) the following metalloids and metals and their compounds:
   - Zinc
   - Tin
   - Copper
   - Barium
   - Nickel
   - Beryllium
   - Chromium
   - Boron
   - Lead
   - Uranium
   - Selenium
   - Vanadium
   - Arsenic
   - Cobalt
   - Antimony
   - Thallium
   - Molybdenum
   - Tellurium
   - Titanium
   - Silver

b) biocides and their derivatives not appearing in list I;

c) substances which have a deleterious effect on the taste or odour of groundwater, and compounds liable to cause the formation of such substances in such water and to render it unfit for human consumption;

d) toxic or persistent organic compounds of silicon, and substances which may cause the formation of such compounds in water, excluding those which are biologically harmless or are rapidly converted in water into harmless substances;

e) inorganic compounds of phosphorus and elemental phosphorus;

f) fluorides;

g) ammonia and nitrites.

The following list II substances are in use at the installation:

- Copper.
- Biocides.

C5 Raw materials, water etc.

C5.1 Preservative chemicals and additives

The following raw materials are in use at the installation in addition to timber:

- Tanalith E 8000
- Tanagard
- Tanatone
- Water

The raw materials in use are described as follows:

C5.1.1 Tanalith E 8000

Tanalith E 8000 is the main wood preservative in use at the installation. It is a water-based timber preservative that has been available since the 1980’s. It is applied by vacuum pressure and contains a combination of Copper and Triazole biocides. It is bright blue in concentrate, does not contain any ammoniacal component and does not contain Chromium or Arsenic. Tanalith E 8000 is supplied as a concentrated product, which is mixed with water on site to produce a ready-to-use solution. Treated timber is green. The Copper acts as both an internal fungicide and insecticide, and the Triazoles are effective against brown rots. Tanalith E is normally diluted to a 3.0% w/v solution. Higher solution strength may be used for heavy industrial uses at 5%w/v. A 3% & 5% solution will be used.
The Safety Data Sheet for Tanalith E 8000 is provided in appendix 2. Tanalith E 8000 is an approved product for use as a wood preservative, and as a supplied mixture, contains the Risk Phrases R20/21/22, R34, and R50/53. It is not a mixture classified as carcinogens, mutagens, or toxic to reproduction, are assigned or need to carry the hazard statement designations H340(R45), H350(R46), H350i(R49), H360D(R60), or H360F(R61), so does not need to be replaced, as far as possible by less harmful substances or mixtures within the shortest possible time.

Tanalith E 8000 as a mixture contains the following components:
- 2-Aminoethanol.
- Copper(II) carbonate–copper(II) hydroxide (1:1).
- Tallow alkyl amines, ethoxylated.
- Organic acids.
- Fatty acids, C8-10.
- N,N-Didecyl-N,N-dimethylammonium carbonate (3:2).
- Propiconazole.
- Tebuconazole.
- Didecyldimethylammonium chloride.

Tanalith E contains 2-Aminoethanol (MEA). In their pure form, amines may be classed as Volatile Organic Compounds (VOCs)

Chapter V of IED gives provisions for installations and activities using organic solvents and points to Annex VII for the relevant emission limits. In these documents the definition of organic solvent is given as:

(46) ‘Organic solvent’ means any volatile organic compound which is used for any of the following:

(a) alone or in combination with other agents, and without undergoing a chemical change, to dissolve raw materials, products or waste materials.

In the preservative concentrate, the 2-Aminoethanol is not used as a solvent carrier but is a constituent part of the product. The Copper raw materials are dissolved by reaction with an amine, before the addition of water and the additional co-biocide(s), and are physically bound in both solution and ultimately the treated timber and therefore not free for release.

Therefore in copper-amine based wood preservatives amines are neither volatile nor solvents. Tanalith E 8000 is considered fit for purpose, even though is and its components are considered to be very toxic to aquatic organisms, and may cause long-term adverse effects in the aquatic environment. The product should not be allowed to enter drains, water courses or the soil. There are no current alternatives or substitutes for the required level of timber treatment. The wood preservative manufacturers update their products according to the prevailing chemical and biocide legislation, meaning that the Operator cannot substitute with materials presenting lower risks to the environment.
C5.1.2 Tanagard
Tanagard 3755 is a component of the Tanalith E treatment process, acting as a treatment solution sterilant. It is always added to the ready to use mixture using a dosing system. This is to minimise Operator exposure to the Tanagard concentrate. The Auto-Treater system handles the Tanagard dosing arrangements. The operator uses the Tanagard as a supplied mixture carries the Risk Phrases R20/21/22, R34, R43 and R50/53, so does not need to be replaced, as far as possible by less harmful substances or mixtures within the shortest possible time. The Safety Data Sheet for Tanagard is provided in appendix 3.

Tanagard as a mixture contains the following components:
- mixture of: 5-chloro-2-methyl-4-isothiazolin-3-one and 2-methyl-2Hisothiazol-3-one (3:1).
- 2-Octyl-2H-isothiazol-3-one.
- Copper (II) nitrate, trihydrate.

Tanagard is fit for purpose and does not contain any substance considered to be persistent, bio accumulating or toxic (PBT), nor does it contain substances considered to be very persistent or very bio accumulating (vPvB), however it should not be allowed to enter drains, water courses or the soil as it is very toxic to aquatic organisms, and may cause long-term adverse effects in the aquatic environment.

C5.1.3 Tanatone
Tanatone 3950 is a component used in conjunction with Tanalith E, providing the treated timber with a mid brown colour. Typically this is dosed at 1%w/v to the treatment solution storage designated for brown treatments. The operator uses the Tanatone as a supplied mixture carries the Risk Phrase R43 so does not need to be replaced, as far as possible by less harmful substances or mixtures within the shortest possible time. The Safety Data Sheet for Tanatone is provided in appendix 3.

Tanatone as a mixture contains the following components:
- Azo dyestuff
- Hydrochloric acid

Tanatone is fit for purpose and does not contain any substance considered to be persistent, bio accumulating or toxic (PBT), nor does it contain substances considered to be very persistent or very bio accumulating (vPvB), however it should not be allowed to enter drains, water courses or the soil.

C5.2 Waste minimisation (optimising the use of raw materials)
The use of raw materials in the wood preservation industry is at quite an advanced stage of optimisation, with the widespread use of rainwater harvesting, treatment solution re-use and the capture and containment of process water run-off. 2014 annual consumption of raw materials are:
- 24,010 m³ timber
- 70,729 kg Tanalith E concentrate

Arch Timber Protection has developed a generic assessment tool to compare the quantity of treated timber against preservative consumed, as a ready reckoner for preservative use efficiency.
The approximate product use against timber treated as estimated by the Arch tool is shown in figure 11. The actual use of the preservative varies however depending on the type of timber treated, and the use class to which that timber is treated and can be obtained from the Auto-Treater plant control system once the site is operational.

### C5.3 Water use

A water efficiency audit cannot be undertaken prior to the submission of this application given this is a new installation. The information in this application presents an estimate of water use at the timber treatment installation based on forecast production rates when the plant is fully operational.

Water used in the activity is both mains (Town) water and harvested rainwater. Tanalith E 8000 is generally supplied as a concentrate, diluted on site with water for use as a 3% or 5%w/v solution. This could be used as the basis of an assessment of water use, where the calculated water requirement is compared to the metered water use for the installation.

Arch Timber Protection has devised a tool for the purpose of benchmarking, and a screen shot of the tool containing approximate annual water consumption data for the wood preservation activity is shown below in figure 12.

<table>
<thead>
<tr>
<th>Treated Timber Volumes</th>
<th>Production Split</th>
<th>Treated Volume</th>
<th>Tanalith E @ 3%</th>
<th>Vacsol</th>
<th>Additive usage</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>kg Litres / kg</td>
<td></td>
<td></td>
<td>kg</td>
</tr>
<tr>
<td>Tanalith E</td>
<td>70</td>
<td>16,807</td>
<td>49,580</td>
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<td>Tanagard</td>
<td>1,180</td>
</tr>
<tr>
<td>Tanatone 3999 treated</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td>Tanatone 3999 usage</td>
<td>0</td>
</tr>
<tr>
<td>Tanatone 3950 Treater</td>
<td>30</td>
<td>7,203</td>
<td>21,249</td>
<td></td>
<td>Tanatone 3950 usage</td>
<td>7,083</td>
</tr>
<tr>
<td>Extra (water repellant)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td>Extra (water repellant)</td>
<td>0</td>
</tr>
</tbody>
</table>

*Figure 11: Approximate annual product consumption*

<table>
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<td></td>
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<td></td>
<td>Tanatone 3999 usage</td>
<td>0</td>
</tr>
<tr>
<td>Tanatone 3950 Treater</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Tanatone 3950 usage</td>
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</tr>
<tr>
<td>Extra (water repellant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Extra (water repellant)</td>
<td>0</td>
</tr>
</tbody>
</table>

*Figure 12: Approximate annual water consumption*

The initial assessment for the water required to use Tanalith E at an average working concentration is 2,298m³. At present a large proportion of the water used in the treatment facility is recovered rainwater that falls on the drip area. It is not possible to quantify this as the towns water is not currently metered to the plant.
C6 Waste

C6.1 Waste produced
The main wastes produced in operating the process are:
- Empty IBCs and containers formerly holding preservative additive chemicals.
- Waste treatment water removed during planned preventative maintenance.
- Damaged treated timber.
- Plastic wrapping.

C5.2 Waste streams, quantities, fate and opportunities
The waste streams, quantities, fate and opportunities are detailed below:

<table>
<thead>
<tr>
<th>Waste type</th>
<th>Quantity</th>
<th>Handling &amp; storage</th>
<th>Fate</th>
<th>Opportunity for prevention</th>
<th>Opportunity for re-use</th>
<th>Opportunity for recycling</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2.1 Empty IBCs and containers formerly holding preservative additive chemicals.</td>
<td>Approx 10 per annum.</td>
<td>Once empty are fully washed out. So no environmental risk</td>
<td>Recycled.</td>
<td>The only way that this waste stream could be reduced is to use bulk tanker deliveries of chemicals. This would require additional delivery infrastructure not currently in place at the installation.</td>
<td>Limited use on site.</td>
<td>SCHÜTZ UK collection system</td>
</tr>
</tbody>
</table>

*Table 6: Waste streams, quantities, fate and opportunities*
C7 Energy

Electricity if the sole source of energy used in the activity, which are used to drive the following types of equipment:

- Vacuum pumps.
- Pressure pumps.
- Air compressor.
- Empty / recovery pump
- Water pumps.
- Preservative concentrate and additive dosing pumps.

Arch Timber Protection has developed an energy use calculator based on the type and number of pumps in operation, and the number of treatment charges. See figure 23 below.

There is some scope for improvements in energy use efficiency by operating equipment only operated when required (as opposed to all of the time through the process step). Pumps etc will be replaced for more efficient models when replaced at the end of useful life.

<table>
<thead>
<tr>
<th>Name of Motor</th>
<th>Power Rating - kW</th>
<th>Running Time per Cycle - Minutes</th>
<th>Voltage - V</th>
<th>Running Current - Amps</th>
<th>For Single Phase Motor</th>
<th>Estimated Consumed Power per hour kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum Pump_1</td>
<td>11.00</td>
<td>50.00</td>
<td>415.00</td>
<td>26.51</td>
<td>9.17</td>
<td>enter actual running time of the motor</td>
</tr>
<tr>
<td>vacuum Pump_2</td>
<td>0.00</td>
<td>0.00</td>
<td>415.00</td>
<td>0.00</td>
<td>0.00</td>
<td>enter actual running time of the motor</td>
</tr>
<tr>
<td>Pressure Pump</td>
<td>11.00</td>
<td>25.00</td>
<td>415.00</td>
<td>26.51</td>
<td>4.58</td>
<td>enter actual running time of the motor</td>
</tr>
<tr>
<td>Air Compressor</td>
<td>11.00</td>
<td>60.00</td>
<td>415.00</td>
<td>13.25</td>
<td>1.10</td>
<td>enter actual running time of the motor</td>
</tr>
<tr>
<td>Hydraulic Pump</td>
<td>5.50</td>
<td>40.00</td>
<td>415.00</td>
<td>4.58</td>
<td>0.02</td>
<td>enter actual running time of the motor</td>
</tr>
<tr>
<td>Empty / mix Pump</td>
<td>0.46</td>
<td>3.00</td>
<td>415.00</td>
<td>1.11</td>
<td>0.00</td>
<td>enter actual running time of the motor</td>
</tr>
<tr>
<td>Concentrate Pump</td>
<td>0.46</td>
<td>0.00</td>
<td>415.00</td>
<td>1.11</td>
<td>0.00</td>
<td>enter actual running time of the motor</td>
</tr>
<tr>
<td>Tanagard Pump</td>
<td>0.46</td>
<td>0.00</td>
<td>415.00</td>
<td>1.11</td>
<td>0.00</td>
<td>enter actual running time of the motor</td>
</tr>
<tr>
<td>Tanatone / Extra Pump</td>
<td>0.46</td>
<td>0.00</td>
<td>415.00</td>
<td>1.11</td>
<td>0.00</td>
<td>enter actual running time of the motor</td>
</tr>
</tbody>
</table>

Only Modify the Numbers in the Blue Shaded Area.

Unit cost per kW Hour. £0.15 Enter unit cost per kW hour

<table>
<thead>
<tr>
<th>Name of Motor</th>
<th>Power Rating</th>
<th>Running Time per Cycle - Minutes</th>
<th>Running Time (Hours)</th>
<th>kW Hours</th>
<th>kJ</th>
<th>Cost per kilowatt hour</th>
<th>Cost per kilojoule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vacuum Pump_1</td>
<td>9.17</td>
<td>50.00</td>
<td>0.833</td>
<td>7.639</td>
<td>27500.0</td>
<td>£1.15</td>
<td>£1.15</td>
</tr>
<tr>
<td>vacuum Pump_2</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>£0.00</td>
<td>£0.00</td>
</tr>
<tr>
<td>Pressure Pump</td>
<td>4.58</td>
<td>25.00</td>
<td>0.417</td>
<td>1.910</td>
<td>6875.0</td>
<td>£0.29</td>
<td>£0.29</td>
</tr>
<tr>
<td>Air Compressor</td>
<td>1.10</td>
<td>60.00</td>
<td>1.000</td>
<td>1.100</td>
<td>3960.0</td>
<td>£0.17</td>
<td>£0.17</td>
</tr>
<tr>
<td>Hydraulic Pump</td>
<td>0.00</td>
<td>0.00</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00</td>
<td>£0.00</td>
<td>£0.00</td>
</tr>
<tr>
<td>Empty / mix Pump</td>
<td>3.67</td>
<td>40.00</td>
<td>0.667</td>
<td>2.444</td>
<td>8800.0</td>
<td>£0.37</td>
<td>£0.37</td>
</tr>
<tr>
<td>Concentrate Pump</td>
<td>0.02</td>
<td>2.00</td>
<td>0.033</td>
<td>0.001</td>
<td>1.8</td>
<td>£0.00</td>
<td>£0.00</td>
</tr>
<tr>
<td>Tanagard Pump</td>
<td>0.00</td>
<td>0.00</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00</td>
<td>£0.00</td>
<td>£0.00</td>
</tr>
<tr>
<td>Tanatone / Extra Pump</td>
<td>0.00</td>
<td>0.00</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00</td>
<td>£0.00</td>
<td>£0.00</td>
</tr>
<tr>
<td>Total Running Time</td>
<td>177.00</td>
<td>2.95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Electricity Unit Cost Total kW Hours Total kJ. £0.15 £0.0004

Total Energy 13.09 47136.84

Total Cost per charge £1.96 £1.96

Number of charges 2,001 Total Cost per Year £3,930.03

Figure 13: Approximate annual energy consumption
C8 Noise and vibration

C8.1 Noise report specification
Wood preservation activities are not inherently noisy operations; however an assessment has been completed. The specification for the noise assessment report was as follows:

1. A description of the location and environmental setting including:
   - Plant and equipment (main noise sources).
   - Other activities on site (main noise sources).
   - Locations of noise sensitive receptors.

2. Noise assessments including:
   - Noise assessments (background and source specific).
   - Complaints.
   - Opportunities for noise attenuation.

C8.1 Noise report

CONCLUSIONS AND RECOMMENDATIONS

The noise levels measured within the plant are not dissimilar to those measured near to the A43 trunk road. The noise levels measured in the plant area are only during normal working hours so will not contribute to the road noise during the evenings.

Conclusion is the plant is unlikely to be a cause of complaint.
C9 Site report

C9.1 Site report specification
The aim of the site report is to identify whether or not current activities subject to environmental permitting have had a detrimental impact on land such that land can be returned to a satisfactory state on cessation of regulated activates. Land will be assumed as ‘clean’ or ‘uncontaminated’ unless the site condition report identifies historical activities having the potential to cause contamination. The presence of actual contamination caused by either historical or current land uses may be confirmed by soil testing, however soil testing will not be carried out to the detriment of any containment bund or solid concrete surface, as this is likely to have the potential to cause pollution.

A general specification for the site condition report is as follows:

1. A description of the location and environmental setting (e.g. Envirocheck or Groundsure), including:
   ➢ Geology
   ➢ Hydrogeology
   ➢ Surface waters

2. A description of the historical land uses, to identify whether any former land uses may have caused or have had the potential to cause contamination.
   ➢ Historical land use mapping (such as Envirocheck or Groundsure)

3. A description of the site and current land use
   ➢ History of the use of the land in its current form, for example previous treatment vessels, their locations and chemicals used (in particular chromated copper arsenate).
   ➢ Description of the site and activities.
   ➢ Include a site plan.
   ➢ Include a site drainage plan.

4. A summary of likely pollution:
   ➢ Likely pollution from all land uses.
   ➢ Is there any evidence of land pollution?
   ➢ Describe the condition of containment measures and hard standing.
   ➢ Any previous contaminated land assessments?

5. A risk assessments:
   ➢ Assess risks to soil and groundwater etc.
   ➢ Guides decision for the need for environmental sampling.

6. Baseline data:
   ➢ Soil, sediment and water samples as necessary / practicable.
   ➢ Do not under any circumstances compromise containment bunds or hardstanding areas to obtain an environmental sample. If a suitable area adjacent to the treatment area is accessible, and has the potential to have been contaminated, take the sample there. Likewise, if any surface water run-off is likely to have caused the migration of preservative chemicals to a land drain or pond, take a sample (sediment and/or water) from the land drain or pond.
   ➢ Provide results in a report.
C9.2 Site report

The main findings of the Baseline Study are as follows:

**Location of site, historical land use and basic site description:**

- The site is located in Silverstone, Towcester at approximate National Grid Reference (NGR) SP 681 456. The site comprises a roughly rectangular shaped area of land which is presently used as a timber treatment plant and associated materials storage yard. The site also includes a previously undeveloped area to the east, of approximately 0.11 ha, which is the proposed extension for the present timber treatment area.

- The site is bounded to the north, west and south by the wider Silverstone Fields Farm site, currently used as a timber merchants, and to the east by agricultural fields used for livestock grazing.

- Silverstone Fields Farm was present in its current location on the earliest maps from the area (dated 1883), surrounded by agricultural land. Minimal change has taken place in the surrounding area since this time, although the site has expanded noticeably to the south west.

- There are few historical land uses within 250 m of the site that have the potential to cause significant contamination. Those that should be considered as potential contamination sources are the wider Silverstone Fields Farm site, which is currently a timber yard and the river, 150 m to the north west, which has been artificially straightened (possible infill).

- No obvious signs of contamination were observed during the site visit. An overground fuel storage tank, possibly used for vehicle refuelling, was present to the north of the timber treatment building. Two overground chemical tanks were also present to the south of the timber treatment building, presumed to be associated with the timber treatment process. All tanks present on site were observed to be in good condition; however, none of the tanks were located within bunded areas.

**Geology, hydrogeology and hydrology:**

- The solid geology present on site is shown to be Rutland Formation Mudstone and Wellingborough Limestone Member from the Jurassic Period.

- No superficial deposits are present within the vicinity of the site.

- Although the (BGS) map sheet for the area indicates no Made Ground within the vicinity of the site, it is considered highly likely that Made Ground is present due to the previous development of the wider site.

- The site is not considered to be located within a Brine Compensation Area or an area which may be affected by coal mining. Stability hazards on the site are generally considered to be negligible to low.

- The site is located in a radon affected area; however no radon protection measures are considered necessary.

- The site is located on both Secondary A and Secondary B Bedrock aquifers. The closest aquifer within the superficial deposits lies 43 m to the south east. There is no groundwater Source Protection Zone (SPZ) within 500 m of site. However, the site is located within a Nitrate Vulnerable Zone (NVZ).

- No groundwater abstraction licences are present within 1 km of the site and two discharge consents are present within 500 m of the site, both relating to Shacks Barn Farm, 300 m to the south east, the receiving water being an unnamed ditch and a tributary of the Silverstone Brook.
The Silverstone Brook is located 185 m to the north-west of the site. Zone 2 and Zone 3 floodplains are present 164 m north-west of the site. The site is not within an area benefiting from flood defences and there are no flood water storage areas within 250 m.

The site is within a zone that is susceptible to ground water flooding below the surface, meaning that given the geological conditions there may be a groundwater flooding hazard to basements and other below surface infrastructure.

**Conceptual site model:**

- The potential for contamination has been assessed in terms of a source-pathway-receptor framework, and a list of possibly significant pollutant linkages (if contamination is present) has been identified.

- In terms of human health receptors, it should be noted that the proposed end-use of the site is industrial/commercial.

- The primary controlled waters receptors are considered to be the secondary (A) and secondary (B) aquifers in the bedrock geology, Silverstone Brook and the man-made ponds (depending on their construction).

- The main potential sources of contamination on-site have been identified as:
  - Possible Made Ground
  - Daily movement of vehicles around the site, including large commercial lorries and possible refuelling;
  - Timber treatment plant daily site activities;
  - Chemicals (Tanatone, Tanagard Tanalith and Antifoam) - for specific associated contaminants refer to Table 2) and fuel stored in tanks without any spill containment bunds.

- The main potential sources of contamination off-site have been identified as:
  - Amended river channel – possible infill
  - Timber Works, on the wider Silverstone Fields Farm site
  - Possible Made Ground

- An intrusive ground investigation would be required in order to confirm the current contamination status of the site.
C10 How will the installation be returned to a satisfactory state?

C10.1 Site closure plan

LINNELL BROS envisage many years of trading from the Silverstone site, however we are obliged to produce a site closure plan and is attached in Appendix 7. This document will provide information on the steps which may be taken if the treatment activity closes, and associated plant, buildings and structures are decommissioned for alternative use.

The site closure plan will detail the general principles the company proposes to follow upon the definitive cessation of the regulated activity.

The site closure plan will include:

- Site security
- General principles of decommissioning, dismantling and site clearance
- Site specific decommissioning, dismantling and site clearance proposals
- Site condition and soil testing
- Plan updates
- Site closure report

The site closure plan review process is based on the principles shown in the flow diagram below, and in section 10.2:

![Site closure planning flow diagram](image)

*Figure 14: Site closure planning flow diagram*
C10.2 Maintaining the site closure plan

The decision on the future of the site, its structures, plant and equipment may change at the time of closure, and this may result in alterations to the site closure plan. Considerations for the alteration of the site plan are as follows:

C10.2.1 Changes to the activity

Where there have been changes to the installation affecting the boundary, the site boundary plan will be re-drawn. It may also be necessary to consider updating the baseline data to include or exclude areas within or outside the new boundary.

Where there have been changes to the activity that fundamentally affect the site closure plan, for example a change to the treatment chemicals, replacement treatment vessel, new or substantial building alterations, these changes and any potential for impact of the site closure plan and the baseline data will be recorded.

Where any ‘dangerous substances’ not identified in the Application Site Condition Report have been used or produced as a result of the permitted activities these changes and any potential for impact of the site closure plan and the baseline data will be recorded.

C10.2.2 Measures taken to protect land

Site audit records will be used to summarise whether pollution prevention measures worked. This will include:

- Inspection records and summary of findings of inspections for all pollution prevention measures.
- Records of maintenance, repair and replacement of pollution prevention measures.

C10.2.3 Pollution incidents that may have had an impact on land, and their remediation

All pollution incidents that may have damaged the land will be recorded. The records aim to demonstrate how pollution incidents were investigated and remedied. This will include:

- Records of pollution incidents that may have impacted on land.
- Records of their investigation and remediation.

C10.2.4 Soil, gas and water quality monitoring

Where relevant, soil and water quality information for the installation will be updated. Where new data is obtained, this will be assessed against the baseline to see if the quality has deteriorated as a result of the permitted activities. Monitoring information will include:

- The investigation process.
- A description of the soil and/or water monitoring undertaken.
- Monitoring results.
- Any remediation undertaken.

C10.3 Site closure planning

LINNELL BROS will endeavour to ensure that a financial contingency in place to return the site of the installation to a satisfactory state upon definitive cessation of activities.
C11 Environmental management

Linnell Bros deploys and plan to deploy the following systems and procedures in relation to the wood preservation activity. Operational procedures etc will be finalised on receipt of the environmental permit in order to ensure the permit requirements are fully reflected in our systems.

Environmental management systems include:
- Operational procedures.
- Planned preventative maintenance.
- Training.
- Pollution incidents.

11.1 Operational procedures

General operational procedures are available in the form of the Arch Timber Protection 'Treat Right' Plant Operator and Site Management training manual. The full manual is not reproduced in this application, however a summary of the information included in the manual is as follows:
- The structure and enemies of wood.
- Preservatives, preservation and timber treatment specifications.
- Good treatment practice.
- Operation and maintenance of treatment plant.
- Environmental protection.
- Personal health and safety.

11.2 Planned preventative maintenance.

Planned preventative maintenance will be undertaken by both Arch Timber Protection Service Engineers and LINNELL BROS site staff.

C11.2.1 Arch Timber Protection planned preventative maintenance

2 visits per year are made by Arch Timber Protection Service Engineers for treatment vessel servicing, amounting to a 6-month and a 12-month service. Emergency call-outs are also included in the timber treatment vessel service package.

C11.2.2 Arch Timber Protection planned preventative maintenance

The treatment activity Operators complete a Plant Maintenance Record Sheet which includes both daily and weekly planned preventative maintenance and vessel cleaning. The checks demonstrate on going compliant operation of the treatment vessels and provide a structured mechanism for the early identification of faults and defects.

11.3 Training

All staff authorised to operate the timber treatment vessels are trained by Arch. A list of staff authorised to operate the equipment and their training certificates will be held on site.

11.4 Pollution incidents

A pollution incident reporting system is being developed to complement the site condition report process / closure plan process.
C12 Impact on the environment

C12.1 Potential significant local environmental effects
The potential significant local environmental effects (including nuisance) of the foreseeable emissions have been subjectively assessed, taking account of the Best Available Techniques proposed by this application. This assessment specifically excludes accidental release detailed in section C11.2 of this permit application. The key emissions to consider include:

- Odour

<table>
<thead>
<tr>
<th>Nuisance &amp; other sensitivities e.g. AQMA in relation to foreseeable emission</th>
<th>Emissions Compliance</th>
<th>Risk Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No nuisance or AQMA</td>
<td>Acceptable</td>
<td>Generally Acceptable</td>
</tr>
<tr>
<td>Generally acceptable</td>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td>High Risk</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td>High Risk</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td>High Risk</td>
</tr>
</tbody>
</table>

C12.2 Accidental releases
The prevention of accidental releases from the activity will be achieved through good management and handling techniques, principally to avoid leaks and spills of preservative materials, and by maintaining a good level of housekeeping.
Accidental releases from the installation have also been considered, both in terms of the nature of these accidental releases, the likely environmental hazard and the subsequent environmental risk using the following risk matrix:

<table>
<thead>
<tr>
<th>Foreseeable emissions</th>
<th>Likelihood of occurrence</th>
<th>Severity of impact</th>
<th>Risk Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preservative leak from high pressure treatment vessel</td>
<td>Possible</td>
<td>Low</td>
<td>Trivial</td>
</tr>
<tr>
<td>Vessel is maintained in good condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tank under vessel area and concrete containment bund and secondary kerb should provide sufficient containment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No open drains within containment area</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 7: Likely release environmental impact assessment
<table>
<thead>
<tr>
<th>Foreseeable emissions</th>
<th>Likelihood of occurrence</th>
<th>Severity of impact</th>
<th>Risk score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additive spillage during IBC delivery</td>
<td>Possible</td>
<td>Medium&lt;br&gt;Leak will be contained in spill containment bund and the main plant bund forms a back up to this.&lt;br&gt;Open drains which then collects to oil interceptor outside bundled area. Potential to contain spill if material was lost outside the contained area.</td>
<td>2&lt;br&gt;Generally Acceptable</td>
</tr>
<tr>
<td>Preservative spillage during bulk tanker delivery</td>
<td>Possible&lt;br&gt;Delivery point and connections are under cover and well within the containment bund</td>
<td>High&lt;br&gt;Larger quantities involved.&lt;br&gt;Open drains which then collects to oil interceptor outside bundled area. Potential to contain spill.&lt;br&gt;Low probability of reaching the drains as the connections will be in the plant area.</td>
<td>3&lt;br&gt;Moderate</td>
</tr>
<tr>
<td>Additive leak during IBC storage</td>
<td>Possible&lt;br&gt;IBCs are sealed and robust.</td>
<td>Low&lt;br&gt;IBCs stored within bundled area.&lt;br&gt;Open drains which then collects to oil interceptor outside bundled area. Potential to contain spill.</td>
<td>1&lt;br&gt;Trivial</td>
</tr>
<tr>
<td>Preservative leak from bulk storage</td>
<td>Possible&lt;br&gt;Storage tanks are single skin</td>
<td>Low&lt;br&gt;Capacity of bund sufficient to hold all storage tanks.&lt;br&gt;Open drains to foul sewer outside bunded area will not be affected</td>
<td>1&lt;br&gt;Trivial</td>
</tr>
<tr>
<td>Preservative drag-out from contained area on forklift wheels</td>
<td>Likely&lt;br&gt;Fork truck not fully dedicated to timber treatment area.</td>
<td>Low&lt;br&gt;Very small quantity of contamination likely to be moved on vehicle wheels. Data from other sites have shown no actives detected from modern preservatives.</td>
<td>2&lt;br&gt;Generally Acceptable</td>
</tr>
<tr>
<td>Preservative dripping from treated timber outside containment area</td>
<td>Possible&lt;br&gt;Treated timber overhanging containment area.</td>
<td>Medium&lt;br&gt;Small quantity of contamination.&lt;br&gt;All storage is within contained area so very low probability&lt;br&gt;Open drains which then collects to oil interceptor outside bundled area.</td>
<td>2&lt;br&gt;Generally Acceptable</td>
</tr>
</tbody>
</table>

Table 8: Accidental release environmental impact

The combination of plant maintenance, good management and handling practices coupled with emissions monitoring will ensure that the risk of the environmental hazards actually occurring through unforeseen or uncontrolled emissions remain as low as possible.

**C12.3 Sites of special scientific interest (SSSIs) and other designated sites**
The installation is unlikely to have any effect on sites of special scientific interest (SSSIs) or European protected sites and therefore no implications for the purposes of the Conservation (Natural Habitats etc.) Regulations 1994 because none of the following are within 2 kilometres of the installation:
- Special Areas of Conservation (SACs).
- Special Protection Areas (SPAs).
- Sites of Special Scientific Interest (SSSIs).
- RAMSAR sites.
DEFRA’s MAgiC Map service was used to confirm the absence of the designated sites listed above. Maps are included below in figure 15.

Figure 15: DEFRA Magic Map Images for Linnell Bros Silverstone site vicinity
C12.4 Environmental impact assessment
A full environmental impact assessment is not required in addition to the contents of this application, nor was one required under planning legislation.

C13 Alternatives

C13.1 Alternative control techniques

The treatment plant is designed to operate on a total containment basis for operation. Currently there is no formally issued guidance documentation at assess BAT for a timber treatment installation. The design of the new timber treatment installation is thought to meet all the requirements of the Wood Protection Association Code of Practice for timber treatment installations and should allow safe operations of the facility with little or no risk to the environment.

C13.2 Alternatives to customers in the event of not receiving permit approval

Given this is a new installation it will be operating at the highest levels of environmental protection standards. If this installation is not granted a permit it is unlikely that any treatment installation will meet requirements and the availability of treated timber in the area severely restricted and will result in loss of business and jobs.