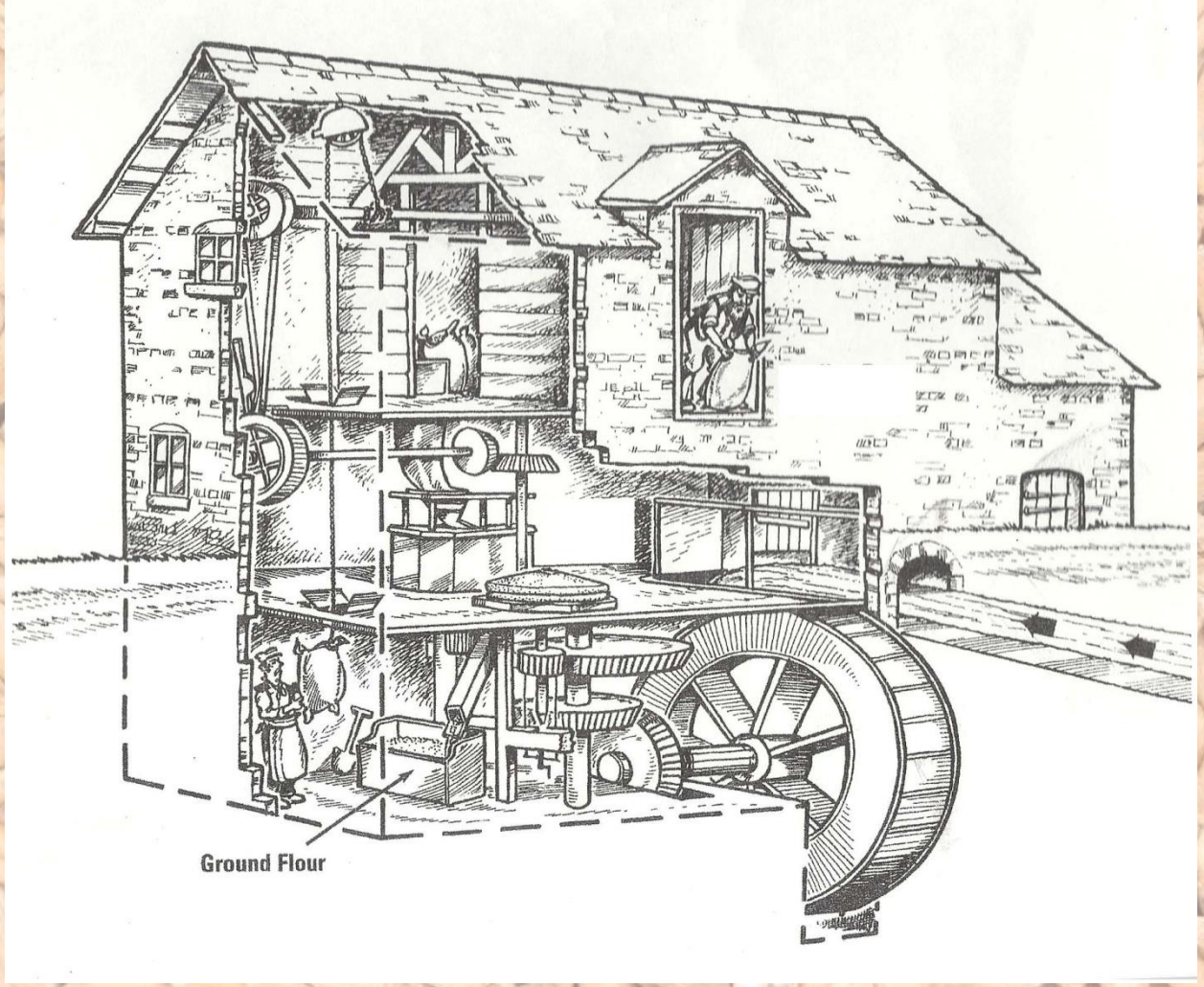
Bunbury Mill

Lubrication Schedule



Document purpose

This document (Held in the mill workshop and in the maintenance section of the mill web site) gives guidance to all mill volunteers on individual component requirements for Lubrication, time intervals and work required to ensure continued safe running of equipment. This document covers the Lubrication of the items noted, should a more detailed inspection or repair be required it should be subject to an individual assessment and work method.

Safety

Care must be taken when working in or around the mill complex. When carrying out work where rotation or movement can take place the (head-race/leat) sluice gate must be **Pad-locked closed**, the penstock closed (tightly) and the **Mill stone in its lowered position**.

These measures are taken to prevent the mill wheel from turning uncontrolled.

Contaminated waste

Plastic gloves should be worn when handling oils or grease.

When rags are used to clean / remove grease or oil these should be returned to the mill workshop, placed in a bin bag, marked as oil / grease waste and disposed off site.

Tools / Others required to carry out lubrication tasks

Tools such as sockets set, spanner, ladder, rags, oil can, WD40, grease tube compression gun etc. are held in the mill workshop. On completion of the tasks tools should be cleaned and returned for safe storage until next use.

When applying grease use either scraper or hand (Ref note above use of plastic gloves) to smooth over and fill any voids.

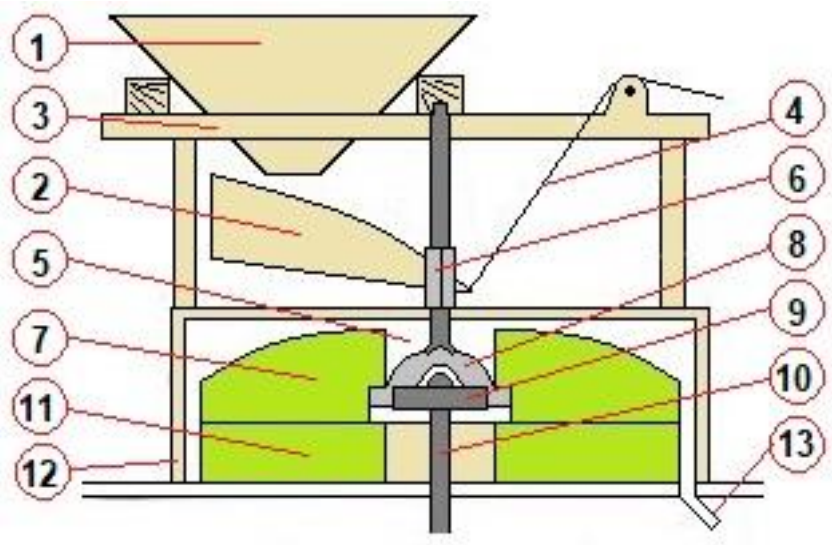
When applying oil use sparingly so as to prevent drips onto floors or other equipment. Any oil drips should be cleaned immediately.

Index

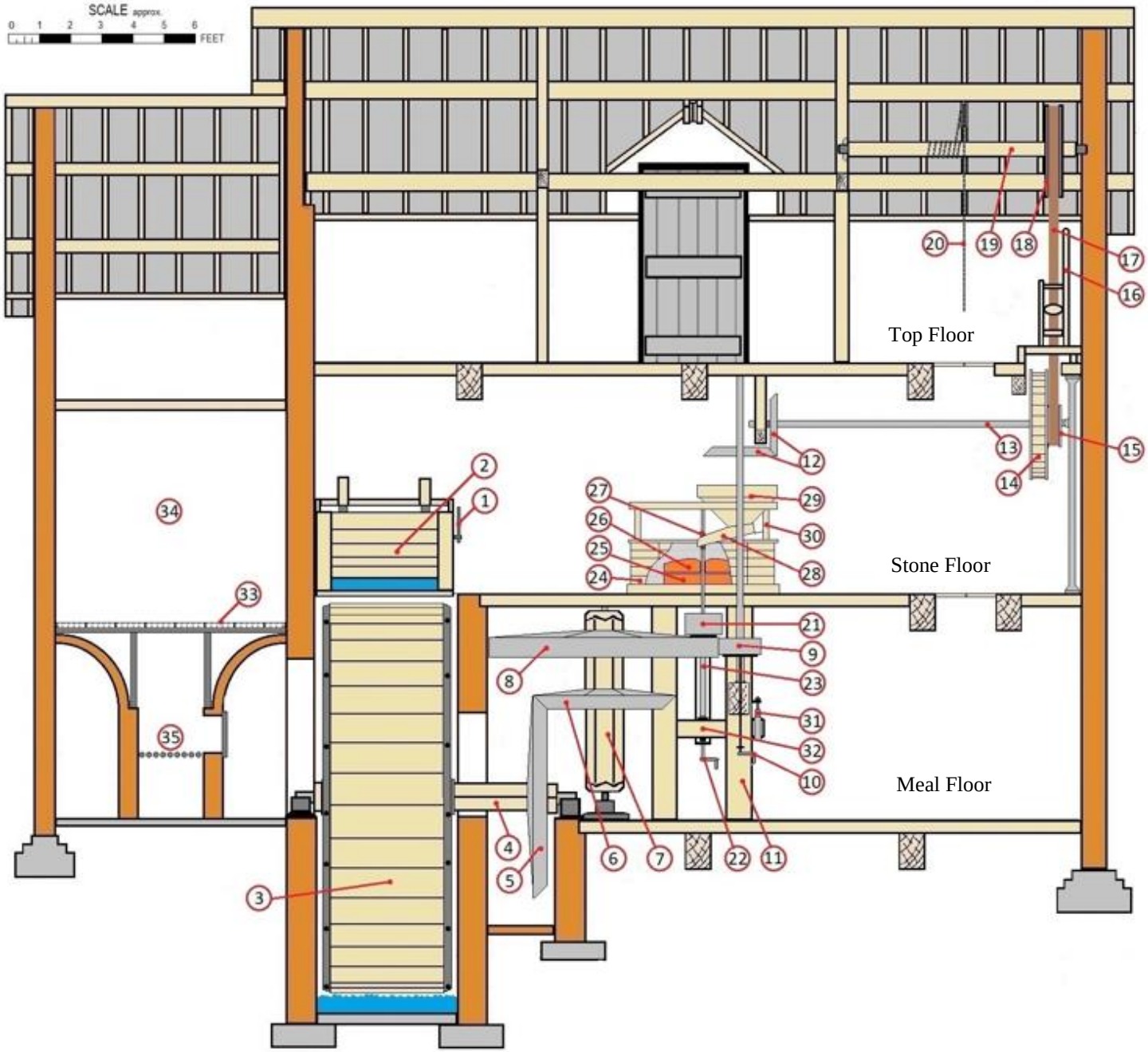
1 - HOW THE MILL WORKS

THE HOPPER, SHOE and TUN

Grain stored on the top or 'bin' floor is poured through a small, lidded hole in the floor into the hopper (1) below. The hopper and shoe (2) rest on a frame known as a horse (3). The front of the shoe is supported by the crook string (4) passing over part of the horse, and down through a hole in the floor to a control knob above the flour bin. By tightening or slackening the crook string the angle of the shoe can be varied to adjust the amount of grain entering the eye (5) of the runner stone. The shoe is also held slightly to one side so that it touches the damsel (6) a star shaped rod which rotates with the top grinding stone (7) and shakes grain off the shoe. Of the pair, only the upper or 'runner' stone (7)



revolves, supported on the 'rhynd' (8), which itself is supported by the 'mace-head' (9) mounted on the stone spindle (10) so that there is a minute gap (0.3mm or 1/100th inch) between it and the bedstone (11). Encasing each pair of stones is a wooden framework called a 'tun' or vat (12). This helps to contain the flour that is pushed out to the edges of the rotating stone. The rotating movement, aided by a 'sweeper' attached to the stone, moves the flour around to a hole (13) leading down to a wooden chute to the 'meal' floor below.


SCALE approx.
0 1 2 3 4 5 6
FEET
Top Floor
Stone Floor
Meal Floor
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Moving the penstock lever (1) causes the gate of the sluice box, the ‘pentrough’, (2) to open or close, controlling the flow of water onto the waterwheel (3) mounted on the water shaft or axle (4). At the other end of the axle is the pit wheel (5) which rotates at the same rate as the waterwheel.

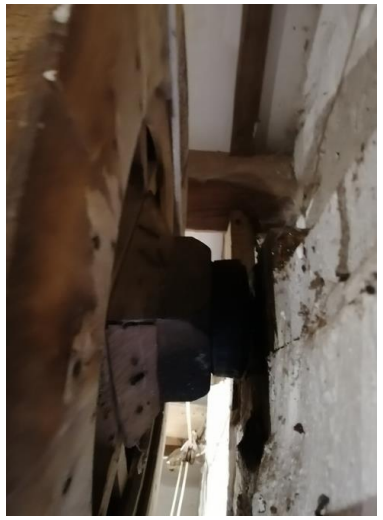
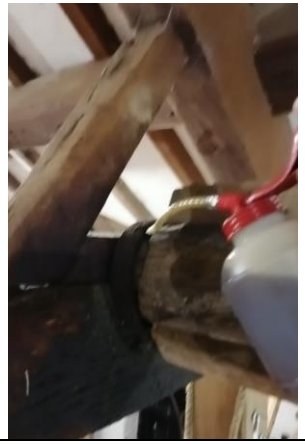
The pit wheel meshes with the wallower (6) mounted on the main upright shaft (7), and being smaller, the wallower rotates at a faster rate than the pit wheel.

The main upright shaft also carries, above the wallower, the great spur wheel (8) which rotates at the same rate as the wallower.

The lay-shaft nut (9) *(shown engaged)* meshes with the great spur wheel, and being smaller rotates faster than the spur wheel. The nut is raised or lowered by the jack (10), mounted on the hurst frame (11), to disengage or engage it with the spur wheel. When engaged, the nut turns the vertical shaft to rotate the meshing gears (12) on the floor above, thus rotating the lay-shaft (13) to drive the roller-mill pulley (14) and the sack-hoist pulley (15). When the jockey pulley lever (16) is moved, it causes the hoist-belt (17) to tighten onto the sack-hoist pulley (18) making the sack-hoist shaft (19) turn, thus winding up the sack-hoist chain (20). Releasing the jockey-pulley will cause the chain to fall under gravity, if loaded.

The stone nut (21) *(shown disengaged)* also meshes with the great spur wheel, and being smaller turns faster than the spur wheel. The stone nut is raised or lowered by the stone nut jack (22), mounted on the hurst frame (11), to disengage or engage it with the spur wheel. When engaged, the nut turns the vertical stone spindle (23) to turn the mill-stone on the floor above, enclosed by the wooden tun (24). It passes through the bed stone (25), and supports the top ‘runner stone’ (26). Just above the runner stone on the spindle is the ‘damsel’ (27) which causes the shoe (28) to oscillate, allowing the grain to slowly trickle from the hopper (29), sitting on the horse (30), into the eye of the top of the runner stone. The gap between the runner stone and the bed stone is controlled by the tentering gear (31), which adjusts the moveable arm, the ‘bridge tree’ (32) of the hurst frame, raising or lowering the stone spindle by miniscule amounts to control the fineness of the flour being produced. If the grain is too damp for milling, it is spread out on the perforated tile floor (33) of the drying kiln (34) above the fire box (35).

2 Lubrication Schedule

2.1	Sack hoist axle bearings - Location Top Floor
Item Ref - 2.1.1	**Action – Every 12 Months**
Tools required: - Ladder - Oil can Notes:	Drop oil into two end bearings    

2.1	Sack hoist chain pulley - Location Top Floor
Item Ref - 2.1.2	**Action – Every 12 Months**
Tools required: - Ladder - Oil can Notes: Visual check all smaller rope guide blocks	Check pulley and chain – lightly oil spindle  

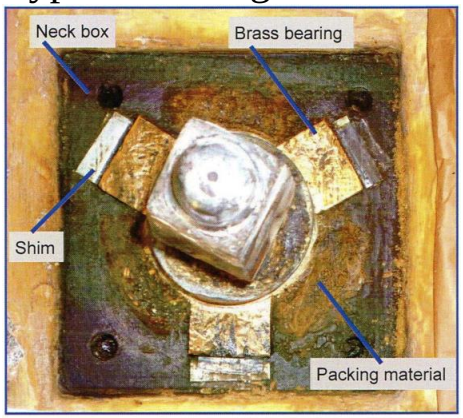
2.1	Sack hoist jockey roller - Location Top Floor
Item Ref - 2.1.3	**Action – Every 12 Months**
Tools required: - Ladder - Oil can Notes:	Check Jockey roller and pivot – lightly oil spindle  

2.1	Auxiliary shaft top bearing- Location Top Floor
Item Ref - 2.1.4	**Action – Every 12 Months**
Tools required: - Scraper - Grease - Cleaning rags Notes: a) Grease spec. Castrol SPHEEROL SX2	Lift floor hatch, inspect bearing, if grease shown signs of discolouring or water ingress, scrape clean and reapply grease, smooth over with gloved hand.    If shaft shows signs of horizontal movement this should be noted and a larger task to remove locking nuts and bearing collar undertaken. (Not detailed in this document)

2.1	Winnower - Location Top Floor
Item Ref - 2.1.5	**Action – Every 12 Months**
Tools required: - Oil can - Cleaning rags Notes:	Check bearings and gear teeth– lightly oil as required   

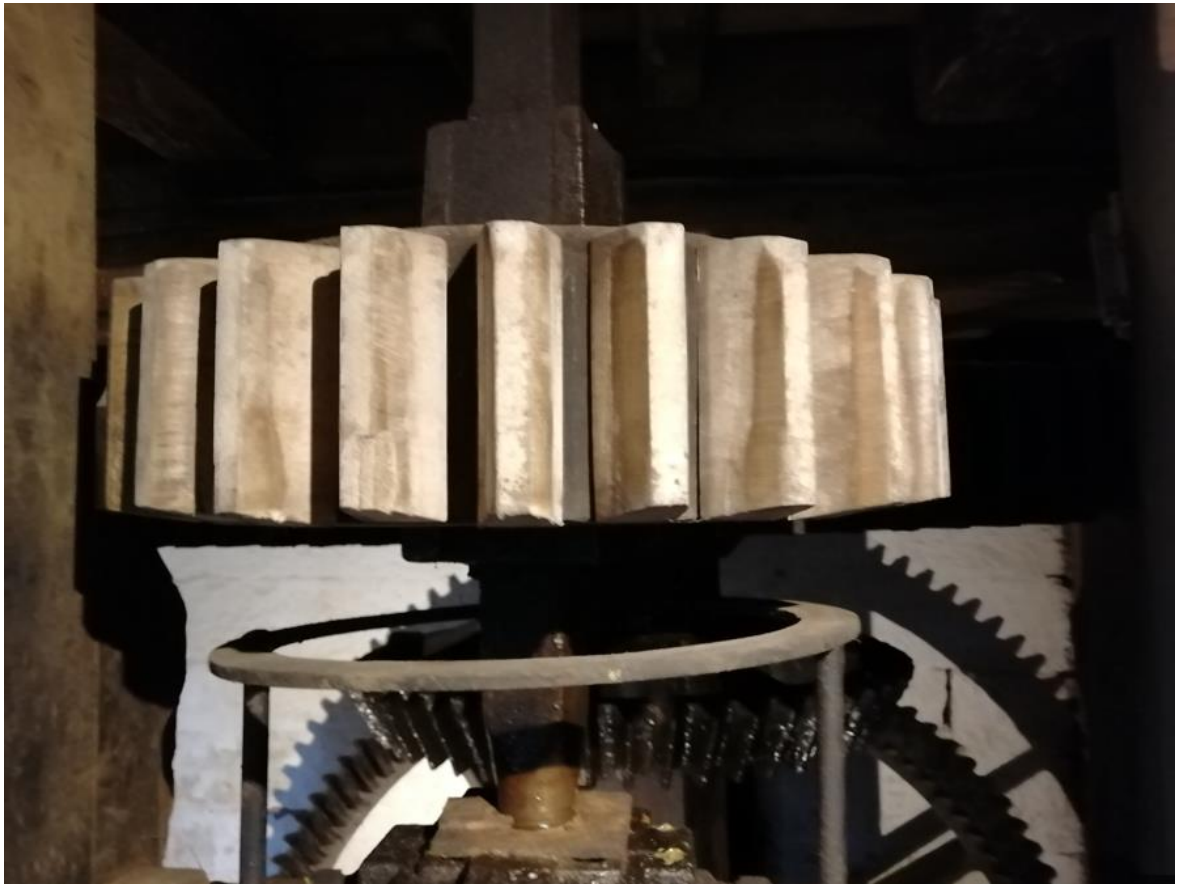
2.1	Scales - Location Top Floor
Item Ref - 2.1.6	**Action – Every 12 Months**
Tools required: - WD40 - Cleaning rags Notes:	Wipe lightly with WD40 

2.2	Auxiliary shaft bearings - Location Stone Floor
Item Ref - 2.2.1	**Action – Every 12 Months**
Tools required: - Scraper - Grease - Cleaning rags Notes: - Grease spec. Castrol SPHEEROL SX2	Inspect horizontal shaft bearings (2 no.), note if grease shows signs of discolouring or water ingress, scrape clean and reapply grease, smoothing over with gloved hand.   

2.2	Grindstone - Location Stone Floor
Item Ref - 2.2.2	**Action – Every 12 Months**
Tools required: Under review Notes:	Check bearings A detail review of what is required for the neck bearing is underway. It is difficult to access with the grindstone in place and to remove the grindstone is a major task. It is suggested that: a) The stone was oiled when the miller removed to sharpening the stone. b) No oil was required as brass bearings were used and to prevent any oil contamination of the grain. Typical bearing and seal combination.  **Figure 6.24** The three brass bearings with shims and adjacent packing material is now visible.

2.2	Penstock- Location Stone Floor
Item Ref - 2.2.3	**Action – Every 12 Months**
Tools required: - Ladder - Oil can Notes:	Check end bearings (2 off) - Lightly oil. Check lifting chains. Visual check plug is clean and good fit to drain hole in base.    

2.3	Water Wheel Main Bearing- Location Meal Floor
Item Ref - 2.3.1	**Action – Every 6 Months**
Tools required: - Scraper - Grease - Cleaning rags - ¾ W spanner - Tube compression gun Notes: - Grease spec. Castrol SPHEEROL SX2 - Do not over tighten housing bolts	Remove 4 square headed bolts (Spanner required) and lift off top bearing housing. If grease shows signs of discolouring or water ingress, scrape clean and reapply with tube compression gun, smoothing over with scraper or gloved hand. Visual check for cracks or wear marks.   **During routine maintenance, do not attempt to 'adjust' the bolts at the sides of the bearing casings or hurst frame tentering screws. Doing so can alter the true running and engaging of the wheels or grind stones and can cause significant damage**

2.3	Stone Nut(s) - Location Meal Floor
Item Ref - 2.3.2	**Action – Every 12 Months**
Tools required: - Linseed oil - Cleaning rags Notes:	Using a clean rag wipe linseed oil onto cogs in use. Check for cracks or excessive wear in teeth. 

2.3	Main wallower shaft bottom bearing- Location Meal Floor
Item Ref - 2.3.3	**Action – Every 6 Months**
Tools required: - Scraper - Grease - Cleaning rags - Tube compression gun Notes: - Grease spec. Castrol SPHEEROL SX2	Inspect bearing – Move cover to side, if grease shown signs of discolouring or water ingress, scrape clean and use tube compression gun to reapply grease, smoothing over with scrapper or gloved hand.  

2.3	Pit wheel and wallower wheel- Location Meal Floor
Item Ref - 2.3.4	**Action – Every 12 Months**
Tools required - Scraper - Grease - Cleaning rags Notes: - Grease spec. Castrol SPHEEROL SX2	Inspect teeth – by gloved hand apply a thin film of grease to teeth.  

2.3	Bridge Tree Bearings - Location Meal Floor
Item Ref - 2.3.5	**Action – Every 12 Months**
Tools required: - Scraper - Grease - Cleaning rags - Tube compression gun Notes: - Grease spec. Castrol SPHEEROL SX2	Inspect bearing – Move cover to side, note if grease shows signs of discolouring or water ingress, wipe off with clean rag and using tube compression gun to reapply, smooth over with gloved hand.   

2.3	Jack rings, Tenter beam screws - Location Meal Floor
Item Ref - 2.3.6	**Action – Every 12 Months**
Tools required: - Oil can - Cleaning rags Notes	Visually Inspect threads and pivot for signs of wear, with clean rag wipe threads and lightly reapply oil.  

2.4	Water Wheel Main Bearing - Location Side Cellar
Item Ref - 2.4.1	**Action – Every 6 Months**
Tools required: - Scraper - Grease - Cleaning rags - Socket set & 13mm socket Notes: - Grease spec. Castrol SPHEEROL SX2 - Do not over tighten housing bolts.	Remove 4 hex headed bolts (Socket set required) and lift off top bearing housing. If grease shows signs of discolouring or water ingress, scrape clean and reapply with tube compression gun, smooth over with gloved hand. Visual check for cracks or wear marks.   **During routine maintenance, do not attempt to 'adjust' the bolts at the sides of the bearing casings or hurst frame tentering screws. Doing so can alter the true running and engaging of the wheels or grind stones and can cause significant damage**

2.5	Main Sluice - Location Pond
Item Ref - 2.5.1	**Action – Every 12 Months**
Tools required: - Oil can - Cleaning rags Notes:	Inspect threads for damage and lightly oil top and bottom of screw collar. Clean lower shaft threads and lightly oil.  

2.5	Mill feed Sluice - Location Pond
Item Ref - 2.5.2	**Action – Every 12 Months**
Tools required: - Oil can - Cleaning rags Notes:	Inspect threads for damage and lightly oil top and bottom of screw collar. Clean lower shaft threads and lightly oil.  

3 - INSPECTION RECORD

Record task(s) carried out and any immediate or longer term action that is required, take photographs to help explain further actions. Share comments and actions with Trustee members.

Keep completed record sheet in mill workshop.

Date	TASK CARRIED OUT	BY	COMMENTS

4 Lubrication Programme

Bunbury Mill Lubrication Programme														
Location	Ref	Task	Interval	Month										
			Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Top floor	2.1.1	Sack hoist axle bearings	12												
	2.1.2	Sack hoist chain pulley	12												
	2.1.3	Sack hoist jockey roller	12												
	2.1.4	Auxiliary shaft top bearing	12												
	2.1.5	Winnower	12												
	2.1.6	Scales	12												
Stone floor	2.2.1	Auxiliary shaft bearings	12												
	2.2.2	Main shaft top bearing	12												
	2.2.3	Grindstone	12												
	2.2.4	Penstock	12												
Meal floor	2.3.1	Waterwheel bearing	6												
	2.3.2	Stone nut(s)	12												
	2.3.3	Main shaft bottom bearing	6												
	2.3.4	Pit wheel and wallower	12												
	2.3.5	Bridge tree bearings	12												
	2.3.6	Jack rings, tenter beam screws	12												
Side celler	2.4.1	Waterwheel main bearing	6												
Pond	2.5.1	Main Sluice	12												
	2.5.2	Mill feed Sluice	12												
	2.5.3	Pond	3												
Notes	a)	Main equipment lubrication be carried out before mill restarts for visitors.													

REFERENCES

1. Behind the Door – Its history and how it works. Publication 2020/21
2.

Revision Table

Revision	Date	Change description	By
1	2019	Original thoughts gather and added to word doc	PR /DA/MW/KA
2	Jan 2022	Extensive changes made to layout, cover page, Index and references added, photographs added, rewrite of tasks description, tool requirements added, Inspection record added. Issued for comment	KA
3	Feb 2022	Updated with comments received and issued as final	KA