Standard Operating Procedure (SOP)

Title	Liming of Biosolids

Purpose	*Ensure liming is performed where necessary, safely and in compliance with regulatory requirements*
Who	*Biosolids team, Biosolids contractors, other stakeholders including BR Ops, BR Process and other teams at sites where liming is performed*

Must Have (H&S, Quality, Quantity, Environment, Training, Resources)

- Knowledge of BAS, HACCP & SUiAR
- Suitable Training for operation of liming equipment
- Knowledge of site operations & layout
- Liming rig validation
- Copy of Active Work Authorisation for the ytask being undertaken
- Copy of Pre-Liming Checklist
- Details of COSHH for materials (biosolids and lime)
- PPE including Gas Monitor
- Suitable first aid equipment including Diphoterine solution in case of contact with lime

Remember – 'Stop, Think, Take 20'

Summary Must Do

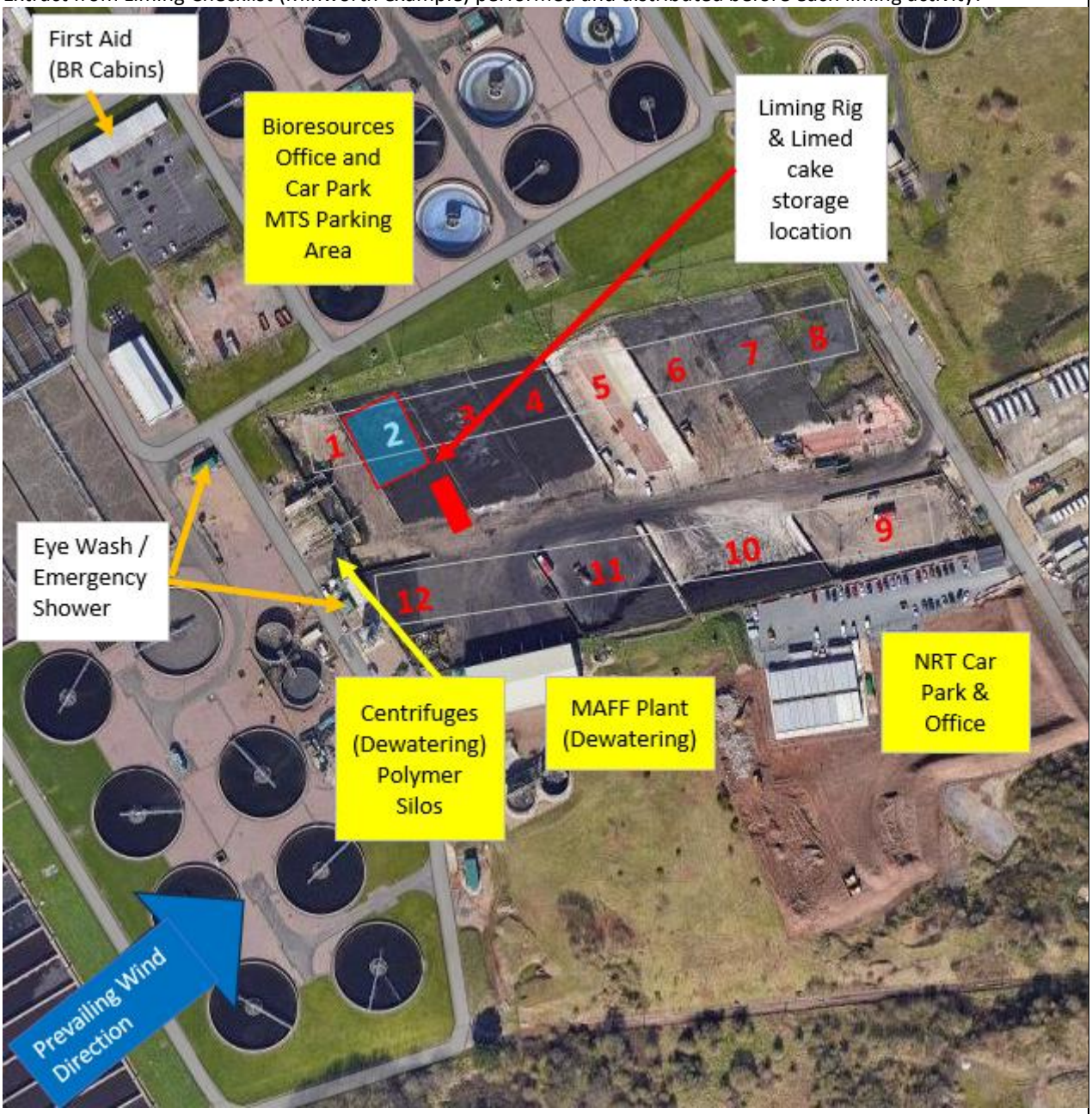
Enter here no more than 10 key points / requirements of this SOP..... If none required then just add 'N/A'

1 Follow the requirements of the Work Authorisation & RAMS 2 Wear the required PPE including RPE (if required) & a personal gas monitor 3 Consider any possible impact on other stakeholders on site and surrounding area (odour or other nuisance) including awareness and review of wind direction & strength 4 Ensure biosolids are contained within the cake pad at all times	5 Halt the operation is any concerns are raised and communicate with the Biosolids team to agree the appropriate course of action. 6 Perform all relevant and required checks to ensure safe operations and compliance with the HACCP plan 7 Ensure accurate records are maintained 8 Ensure adequate segregation between limed and non-limed biosolids 9 Install the raequired signage during liming operations

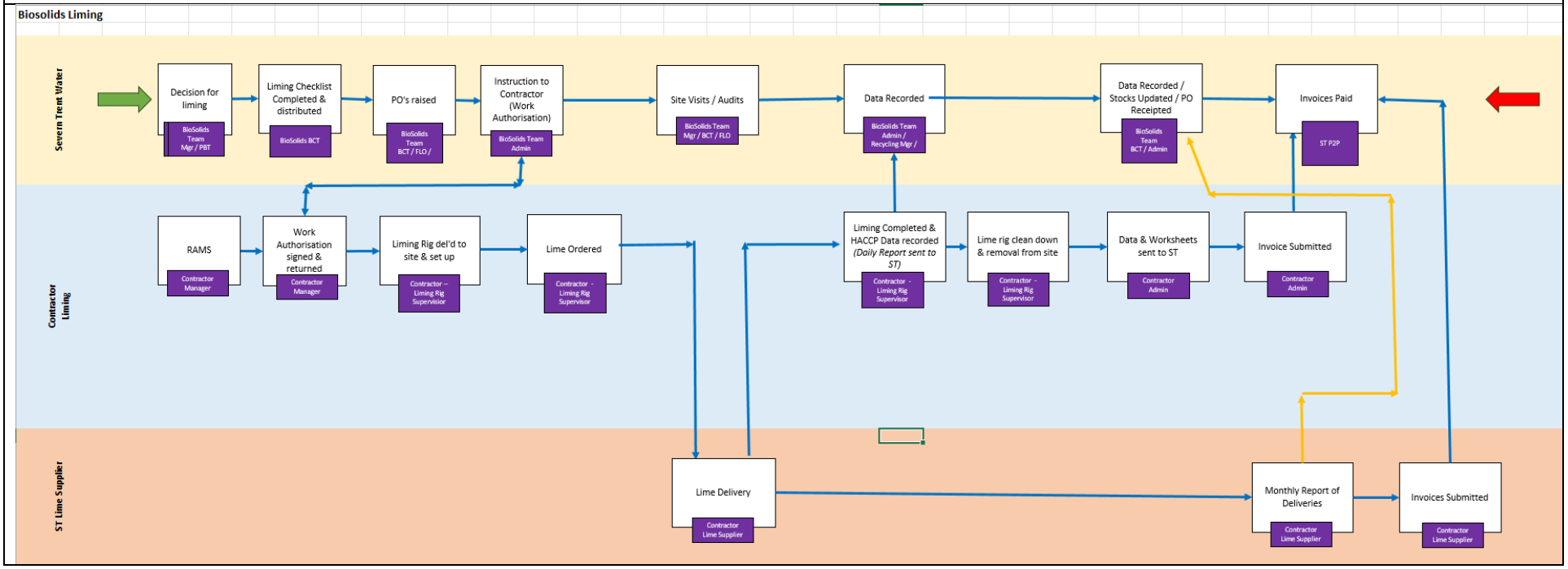
SOP

1. Determine if liming is required for compliance or stability of the biosoldis cake (Biosolids & Process Teams)
2. Communicate the requirement for liming to all relevant stakeholders (BR Ops, BR Process, BR Biosolids, Finance)
3. Confirm availability of liming rig, validation and HACCP Plan
4. Complete the liming checklist of each liming event & distribute to the relevant stakeholders (as listed in the distribution list of the checklist)
    a. The liming checklist provides information for site, volume of biosolids to be limed, confirmation of compliance or stability, H&S information (eye wash & first aid stations) and location of receptors
    b. If the liming operation is delayed, the liming checklist should be updated and re-distributed
    c. A liming checklist is not required for continuous operations (Hattons Farm)
5. Complete a Work Authorisation for each liming event
    a. A copy of the liming checklist and Work Authorisation must reviewed by the liming rig Operators prior to work commencing and be available at all times during the operation
    b. A work authorisation is not required for continuous operation (ST Rig - Hattons Farm)
6. Ensure Purchase Orders have been raised and communicated to the liming rig Operators
7. Arrange delivery and set up of the liming rig
8. Order lime delivery for the start date and advise the supplier of the likely volumes / deliveries that will be required for the liming event
9. Receive delivery of lime
    a. Lime deliveries must be supervised by the contractor (or ST personnel (Hattons Farm)
10. Commence Liming operation in accordance with the RAMS, Liming Checklist & Work Authorisation
    a. Continous review and awareness of weather conditions, stakeholders and possible receptors. There are wind socks available on sites and weather information such as wind speed available to make a robust assessment of weather conditions.Wind or extreme storms would be the main weather activities of concern.
    b. If any concerns are raised, such as high wind speed or very wet conditions, cease operations and report to Biosolids Team to confirm appropriate actions. A dynamic risk assessment would be undertaken by the Liming team if extreme weather conditions were noted, and operations may be delayed until better weather.
    c. Locations of non-limed and limed biosolids are are stated on the Liming Checklist. Any deviations from the planned storage locations must be agreed with the biosoldis team.
11. Complete and record testing in accordance with the rig HACCP Plan
12. Cease liming operation either at the end of the working day or when the agreed biosolids tonnage has been limed
13. Provide daily report to the Biosolids Team
14. Ensure all equipment is safe & secure while unattended
15. Non-compliant biosolids must be suitably quarantined with adequate signage at all times. If signage, etc is moved during liming operations, it must be replaced if the site is to be left unattended.
16. When the operation is complete, inform the Biosolids Team and clean down the liming rig and any associcated equipment
17. The site stocks must updated with the location and status of the limed biosolids
18. Arrange for the liming rig to be removed from site
    a. If the liming rig is to be left unattended on site; agreement must provided by the Biosolids team and the equipment stored in a safe manner
19. Any maintenance activity other than routine checks and inspections must be performed off site. If any requirement for on site maintenance to be performed, this must be agreed with the Biosolids Team and a review of the requirement for an additional Work Authorisation completed.
20. Minworth Only - Deliveries of the liming rig, associated equipment, lime deliveries and site attendance by contractor personnel must be pre-booked with the Security team.

Wherever possible cake is limed in bay two to maximise distance from receptors, but if cake is already in another bay it won't be moved to bay two for liming to minimise movement.
Extract from Liming Checklist (Minworth example) performed and distributed before each liming activity:



Process Flow



Records, Appendices & References

Liming Worksheet must completed for each day and each site (e.g. Worksop / Mansfield limed on the same site – a daily worksheet is required for each site)
Ensure HACCP data is recorded as required
Ensure site checks are completed regularly during operation to mimimise any possible nuisance risks

Document Control & Governance:

Owners Name	Lee Musgrove
Owners Role	Biosolids Recycling
Date of Next Review	01/08/27
Version Number	1.0

Revision History (enter the revision history here including summary of changes made):

Version No.	Date	Notes
e.g.		
1.0	*xx/xx/xx*	*First issue*
2.0	*xx/xx/xx*	*New process diagram added on page 5*

The only valid version of this SOP is the electronic version held in Waterpedia.
If this is a printed version it is only valid on the date of printing.
Ensure this SOP is still within the current review period
If not 'DO NOT USE' and contact your line manager for the new version

Appendix:

Example Liming Rig Specification

Specifications

Fig. 5: Diagram of the Barford BF4048 Tracked Pugmill

- Machine Weight: Approx. 13 Tonne
- Power unit: CAT 4.4 74KW Engine
- Tracks: 400mm wide Steel (Dog lead remote control STD)
- Hopper capacity (LEVEL): 6.0M3.
- Feeder belt width 1000mm, variable speed.
- Main conveyor belt width 1200mm, variable speed. Hydraulic Folding Mechanism.
- Transport Dimensions 40Ft container: 12000mm L x 2293mm W x 2566mm H.
- Fuel tank 250l.
- Hydraulic oil tank 400l.

Loading & Unloading

- The Barford BF4048 Tracked Pugmill lime stabilisation plant will be transported to the site of operation via articulated lorry and low-loader trailer. Peripheral components will also be included in the load to make the delivery as straight forward as possible.

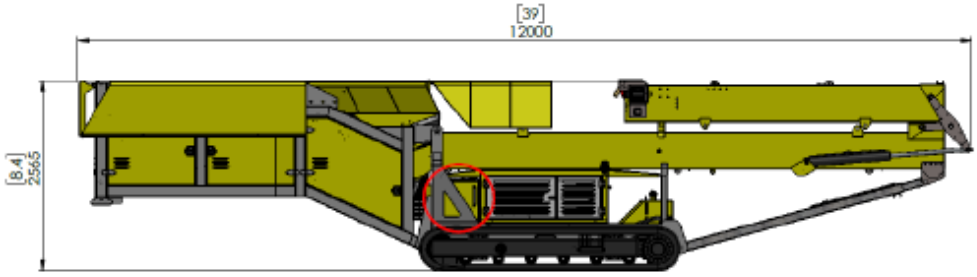
- Likewise, the Lime Dosing and supply of lime will also be delivered to site via an articulated lorry (towing a designated powder tanker).

- On arrival the trailer and contents will be positioned and then removed from the trailer.

- The Barford BF4048 Tracked Pugmill is self-propelled so can be quickly and safely driven into position.

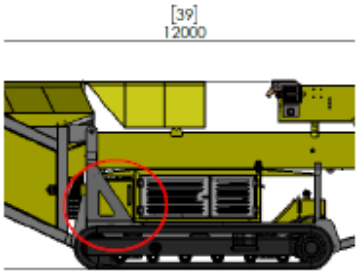
- The main elevator arm is then unfolded and stabiliser legs deployed using electronic controls:

- The elevator arm housing/deflector is positioned and secured.
- The lime supply is connected.
- The system is then ready for pre-use checks.
- Start/Stop control panel (see circled red):



Turn on Engine

- Using the red stop start on the control panel:



- Ensure the elevator will discharge approximately the loading shovel's depth beyond the entrance of the bay..
- Before loading the mixing hopper open the elevator doors and allow the machine to discharge any extraneous matter from the previous job, e.g. stones or metal bars.
- Once completed, close the doors ready for the loading of lime from the powder tanker.
- Start the paddle augers. Once loaded, adjust the speed of the augers to provide the correct mix and set the dosing percentage.

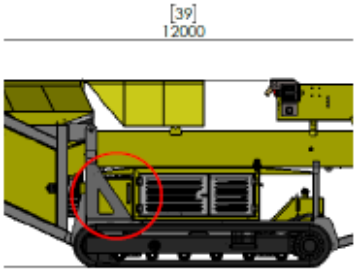
Dosing

- Lime is stored in road powder tankers.
- A connector feeds directly from the powder tanker to a feed hopper/mixer.
- The hopper/mixer supplied with this unit is intended to receive lime from bulk air discharge tankers and care should be taken to ensure it is not over-filled.
- The safe/controlled filling process is carried out as follows:
    - Start air compressor.
    - Open airline to supply air to dust collector.
    - Do not over fill the hopper/mixer or fill when the compressor isn't running.
    - Inform the driver that it is safe to commence filling (Start).
    - Stop using the following light indicators, then stop the air compressor/close air tap to powder tanker:
- Level indicators are installed with visible (red light ON) and audible (SIREN) warning for full conditions and visible warning for empty conditions low level (red light OFF) and low GEMS level (red light OFF), these should not be overridden or ignored.
- The siren also sounds when the low-level indicator is reached in the filling process. When the siren has been acknowledged it can be muted using the mute button located on the main panel. Silo filling should not disrupt normal operation of the rest of the plant.
- The feed hopper is connected directly to the Barford BF4048 Tracked Pugmill for direct and controlled dosing.

- When the level in the silo drops below the low-level probe the plant automatically shuts down to prevent un-limed material being produced.

Controls

- Complete 'Daily Production Sheet'
- Complete 'Daily Production Sheet' Part 2 using pH sampling instructions (see following section).
- Complete 'Daily Production Sheet' Part 3 as required.
- Maintain sludge feed into the plant.
- Monitor lime hopper levels and transfer lime from the bulk powder tanker.
- Monitor fuel levels and re-order as required (where applicable - bulk storage tank, mechanical shovel, bulk powder tank donkey engine, generator).
- Carry out regular plant walk round checks.
- EMERGENCY SHUTDOWN via red button in the control panel:



pH Sampling

- Collect a sample of lime stabilised finished product using the sample scoop from the top of the stockpile, trailer, or skip.
- Transfer sufficient finished product to fill a clean beaker to a depth of approximately 10 mm and add the same volume of distilled water.
- Stir using a spatula.
- Insert a pH testing stick into the liquid part of the sample.
- Read pH stick chart or pH meter display and record result on 'Daily Production Sheet' Part 2.
- Wash out beaker and pH probe if used.
- **Note:** Lime stabilised product must be pH sampled at a frequency agreed with customer and recorded on the 'Daily Production Log' Part 2.