Starling Environmental Limited

67 Chorley Old Road, Bolton, Greater Manchester, BL1 3AJ
www: starlingenvironmental.co.uk
Tel: 07989 673122

FIRE PREVENTION PLAN

for
EDEN WORKS TRANSFER STATION
KELBROOK, LANCASHIRE

Report No 112/3

October 2024

For

Blackburn Skips Limited
Handbridge Mill
Oxford Road
Burnley
BB11 3AZ

BBS WASTE MANAGEMENT SERVICES

DOCUMENT CONTROL

DOCUMENT TITLE	Fire Prevention Plan
REPORT NO	112/3
DATE ISSUED	4/10/2024
PREPARED BY	C Gettinby
STATUS	Final
REVISIONS	

CONTENTS

APPENDICES

DRAWINGS

1.   INTRODUCTION

1.1   Purpose and Scope

1.1.1   Starling Environmental Limited has been commissioned by Blackburn Skips Limited to prepare a Fire Prevention Plan (FPP) for their waste transfer station at Eden Works, Colne Road, Kelbrook, Lancashire, BB18 6SH. The site is regulated under environmental permit EPR/JB3101SK.

1.1.2   The site currently operates under Standard Rules 2015 No 6: 75kte household, commercial and industrial waste transfer station with treatment. It is proposed to vary the permit to a bespoke permit to allow external storage of a wider range of waste types, allow processing in the yard and also to add a number of new waste codes. An FPP is required to support the permit variation application.
.

1.1.3   Assessment of the site for fire prevention has been conducted in accordance with Environment Agency (EA) guidance on Fire Prevention Plans[1].

1.1.4   The FPP contains details to demonstrate that the site can be operated to meet the three objectives stated in the EA guidance of:

- Minimise the likelihood of a fire happening
- Aim for a fire to be extinguished within 4 hours
- Minimise the spread of fire within the site and to neighbouring sites

1.1.5   This FPP forms part of the site's Environmental Management System (EMS).

1.1.6   All drawings referenced are contained in Appendix A.

1.2   Responsibilities

- It is the responsibility of the Site Manager (SM) to ensure that all employees that work at the site are familiar with this plan

- The SM will review and improve this plan as necessary particularly where emergency situations have occurred

- It is the responsibility of the SM to maintain adequate fire precautions at the site

- The SM shall ensure that this plan is clearly understood and complied with by all employees and visitors to the site

---

[1] https://www.gov.uk/government/publications/fire-prevention-plans-environmental-permits (last updated Jan 2021)

- The SM or nominated Fire Warden shall supervise the safe evacuation of the site and ensure all personnel report to the Fire Assembly Point in the event of a fire or during a drill exercise

- The SM or nominated representative will conduct monthly inspections of fire points, fire exits, fire service access and monitor the requirements of this FPP to ensure a safe working environment at all times

- The SM or representative will maintain records of all fire drills

1.3   Site Details

1.3.1   The site is located on the Eden Works Industrial Estate accessed from the A56 (Colne Road), situated to the north of Kelbrook, a small settlement 3km to the southeast of Barnoldswick, Lancashire. The approximate National Grid Reference for the centre of the site is SD 90252 45199. The site location is shown on Drawing No 112/01.

1.3.2   Surrounding land use includes farmland to the east and industrial units to the south, west and north. Neighbouring units within the industrial estate includes precast concrete manufacturer, vehicle storage depot, building suppliers yards and other industrial uses.

1.3.3   The nearest residential properties are situated approximately 95 m to the north of the site located on Colne Road.

1.3.4   The site area is approximately 5,200 m2 and features includes a waste processing building of approximately 720 m2, a workshop, portacabin style offices and a weighbridge. There is a large concreted yard which provides parking for vehicles, storage space for empty skips and waste storage in both concrete block bays and containers.

1.3.5   The site is securely fenced with a combination of palisade fencing approximately 2 m high to the west and north with lockable security gates at the entrance on the western boundary. The eastern and southern perimeter is secured with fencing and concrete block walls.

1.3.6   The yard is mostly surfaced with concrete, with a small portion on the west as hardstanding. The extent of the concreted area is shown on the Site Layout Plan. Drawing No 112/02. The operator plans to concrete the hardstanding area before the end of December 2024, alongside upgrade works to the existing concrete surface.

1.3.7   Surface water is contained within the site by a shallow concrete bund (speed-bump style) and water drains to an interceptor at the low point towards the workshop. From there it is pumped to public sewer which is located to the west, close to Colne Road.

1.3.8   The waste processing building is fitted with lockable doors. The base of the building comprises a reinforced concrete pavement. A CCTV system is in use at the site to provide additional security.

1.3.9   Site features are shown on the Site Layout Plan, Drawing No 112/02.

1.4 Receptors

1.4.1 The location of the site in relation to potential receptors is shown on Drawing No 112/03. This identifies environmental receptors within 1 km of the site boundary, which are summarised below in Table 1.

Ref	Receptor	Direction from	Approximate Distance from (m)
	Domestic Dwellings		
1	Closest residences off Colne Road (A56), Sough	NW	95 - 620
	Residences on Church Lane, Kelbrook	S	260
	Residences on Colne Road, Harden Road and Main Street, Kelbrook	S	430
	Residences in Kelbrook	S	750 – 1 Km
	Residences in Green End	N	795 – 1 Km
	Turnstead Farm	E	380
	Spen Head Farm, Spen Farm, Moor Farm, Alpha Street	NW	710 - 740
	Moor Hall	NE	950
	Residences in North Holme	N	660 – 1 Km
	Industrial/Commercial Premises		
2	AM Bowden Groundworks	N	5
	EP Climbing	W	Adjacent
	Wolfenden Concrete	S	6
	Subaru Car Dealership	NW	20
	Other industrial/commercial business on Eden Park	S	80 – 150
	Lower Greenhill Caravan Park	W	780
	Water Features		
3	Drain	E	Adjacent
	Kelbrook Beck	W	100
	New Cut	W	265
	Drains	E, S, W, N	310 – 1 Km
	Salterforth Beck	W	485
	Amenity/Recreation		
4	Sough Park Recreation Ground	NNE	360
	Kelbrook Playing Field	SSW	430
	Highway/Major Road or Transport Link		
5	Colne Road (A56)	W	70
	Kelbrook Road (B6383)	S	620
	Public Rights of Way		
6	Footpaths and Tracks	N,E,W,S	80 – 1km
	Designated Sites/ Ecological Receptors		
7	LWS Colne/Skipton disused Railway	W	140
	Priority Habitat Deciduous Woodland	W	250
	Schools/Colleges		
8	Kelbrook Primary School	S	640
	Farmland		
9	Farmland	N, S, E, W	Adjacent – 1 Km
	Hospitals/Care Homes		
-	None identified	-	-

Table 1: Location of Receptors within 1 km

1.4.2   The closest residential properties are off Colne Road approximately 95 m north. The site is surrounded by industrial neighbours on three sides within the industrial estate and by farmland on the eastern boundary.

1.4.3   Kelbrook Primary School is the only school identified within 1 km of the site and is located approximately 640 m to the south.

1.4.4   There were no hospitals or care homes identified within 1 km of the site.

2. WASTE TYPES AND OPERATIONS

2.1 Waste Operations

2.1.1 The majority of waste brought to site is in skips from household or commercial sources and are classed as either EWC 20 03 01 mixed municipal waste or EWC 17 09 04 mixed construction and demolition waste. The waste is largely from renovation or building projects.

2.1.2 Full skips are deposited inside the transfer building in the waste reception area. Waste is pre-sorted in the reception area by removing large pieces of uPVC, plasterboard, hardcore, scrap metal or green waste. Any waste identified as WEEE is also removed to a segregated area. This waste is removed and placed in the appropriate storage container for onward recycling.

2.1.3 Larger items of general waste, such as plastic is separated and stored in a small stockpile close to the entrance door before being placed (using a loading shovel or grab) into one of the general waste storage containers.

2.1.4 The remaining waste is fed into the treatment process which consists of mechanical treatment using a trommel followed by sorting on a manual picking line. Materials recovered from this process include hardcore, soil, scrap metal (ferrous and non-ferrous) and wood. Scrap metal is stored in bays below the picking line and the soil, wood, hardcore are conveyed out of the building and stored in external bays.

2.1.5 The trommel produces fines as a by-product, which are also conveyed outside and stored in a dedicated storage bay. These are further processed using an external flip-flow screening plant to separate fractions for recovery into hardcore and fines. The screening plant is covered by a canopy constructed with steel frame and corrugated roof panels. Both fractions produced by the flip-flow screener are stored outside.

2.1.6 General waste is also picked out on the picking line and dropped into a bay below the picking line inside the transfer station. This is added to the general waste container. This waste is dispatched for treatment at a third party transfer station to try to further recover any of the material.

2.1.7 The process is shown in the process flow diagram in Appendix B.

2.1.8 Treatment and storage locations are shown on the Site Layout Plan, Drawing No 112/02.

2.2   Waste Acceptance Procedures

2.2.1   The site operates according to a waste acceptance procedure (MIS-PRO-0018 contained in Appendix D) which instructs operators to check contents of the skip before uplift and remove unsuitable items. Customers are also advised by email beforehand on which items are not suitable to place in the skip as follows:

NO Plasterboard, Asbestos, Gas Bottles, Fridges, Fertilisers or their empty containers, Aerosols of any kind, containers that have had any in, Oil Drums - Full or Empty, Paint Tins - Full or Empty, Batteries, any form of hazardous chemicals, Gripfill Tubes - Full or Empty, Fluorescent Tubes, Freezers, Pesticides, Mattresses, Televisions or Tyres

2.2.2   If unsuitable items are not visible and are brought to site they will be rejected immediately and returned to the producer without delay. If this is not possible then the material will be quarantined until either its return can be arranged, or agreement on disposal to a suitable site.

2.2.3   When waste arrives on site, operatives will conduct a visual check at the point of deposit inside the building to ensure it is as expected and take photographs using an ipad, which are electronically stored. If the waste (or individual items) does not conform it will be reloaded and rejected.

2.2.4   In particular the waste will be inspected for batteries or battery containing gadgets (eg, e-cigarettes). Any found will be removed to the WEEE area before the waste is pushed into the stockpile for processing.

2.2.5   The temperature of incoming loads of fines (EWC 19 12 12) will be checked on arrival using a long temperature probe. Any loads above 50°C will be spread out to cool in the reception area before being moved into the storage bay for processing. As the operator controls the depot where the fines come from, a temperature check will be carried out before they are loaded for dispatch and they will not be loaded if above 50°C.

2.3   Storage of Combustible Wastes

2.3.1   Table 2 lists the stockpiles by waste type and size, and the location is shown on Drawing No 112/04.

2.3.2   Storage of waste will be in accordance with EA guidance on maximum stockpile sizes and separation distances. Waste will not be stored more than 4 m high and positioned so that there is 6 m separation distance between each stockpile, or a firewall. For waste stored in bays, there will be 1 m freeboard between the top of the waste pile and the top of the storage bay.

2.3.3   Firewalls are shown on Drawing No 112/04 are constructed from concrete blocks conforming to CE Rating Euro Class A1 (incombustible) materials to achieve a fire-resistant rating of at least 120 minutes.

Ref*	Waste Type	Maximum storage time	Location	Containment/ Stockpile type	Dimensions (m) (L x W x H)*	Maximum Volume (approx m³)**
1	Incoming Mixed Waste		Building	Free standing	15 x 8 x 4	270
2	Fines		Building	Bay under trommel	4 x 2.1 x 2	10
3	Ferrous Metals	7 days	Building	Bay under picking line	2 x 3 x 2	8
4	General Waste		Building	Bay under picking line	3 x 3 x 2	12
5	General Waste		Building	Bay under picking line	3 x 3 x 2	12
6	Plasterboard		Building	Container	6.1 x 2.4 x 3.1	30.5
7	WEEE	4 weeks	Building	Builders bag/IBC	2 x 2 x 1	2
8	General Waste		Building	Container	6.1 x 2.4 x 3.1	38
9	General Waste		Building	Container	6.1 x 2.4 x 3.1	38
10	Mixed Metals	7 days	Building	Container	6.1 x 2.4 x 3.1	38
11	PVC		Yard	Container	6.1 x 2.4 x 3.1	38
12	Tyres	4 weeks	Yard	Container	6.1 x 2.4 x 2	22.9
13	General Waste		Yard	Container	6.1 x 2.4 x 2.6	30.5
14	General Waste		Yard	Container	6.1 x 2.4 x 2.6	30.5
15	Steel	7 days	Yard	Container	4.9 x 2.4 x 2	15.3
16	Fines		Yard	Three sided bay	8.5 x 8.3 x 4	212.5
17	Wood		Yard	Three sided bay	5.4 x 8.3 x 4	135

Table 2 (continued over): Maximum Waste Storage and Volume of Combustible Waste

Ref*	Waste Type	Maximum storage time	Location	Containment /Stockpile type	Dimensions (m) (L x W x H)*	Maximum Volume (approx m³)**
18	Fines		Yard	bay	4.6 x 8.3 x 4	115
19	Fines	7 days	Yard	Bay under screener	4.7 x 2.8 x 1.5	14.1
20	Oversize Fines		Yard	Enclosed bay	9.8 x 6 x 4	1666.6
21	Wood		Yard	Three sided bay	16.5 x 5.75 x 4	264
22	Hazardous wood		Building	Container	4.9 x 2.4 x 2	15.3
-	Non-Ferrous		Building	Bay under picking line	2 x 3 x 2	8
-	Aluminium	4 weeks	Yard	Container	4.9 x 2.4 x 2	15.3
-	Aggregates		Yard	Container	4.9 x 2.4 x 2	15.3
-	Hardcore	7 days	Yard	Two sided bay	3.9 x 8.3 x 4	97.5
-	Soil		Yard	Three sided bay	3.9 x 8.3 x 4	97.5
-	Hardcore		Yard	Three sided bay	9 x 8.3 x 4	225

Table 2 (continued): Maximum Waste Storage and Volume of Combustible Waste

Notes:
*   as shown on Drawing No 112/04
** see stockpile calculation spreadsheet in Appendix C

1. Waste types are as positioned at the time of surveying for production of the FPP. Overtime the positions may change but the FPP principals will be upheld ie. 6 m separation distance or firewall between combustible waste; max dimensions and volumes not greater than the FPP guidance maximum; largest individual stockpile will not be greater than the current max of 270 m³ for water retention purposes.

2. Entries in grey are non-combustible but have been included to match the drawing.

2.4   Stock Recording and Rotation

2.4.1   All incoming and outgoing waste is weighed over the weighbridge and quantities are recorded electronically.

2.4.2   Stockpiles will be formed by adding waste to one side but taking waste out from the opposite side, so that the 'first in first out' principle can be applied to ensure the oldest waste is transferred off site first.

2.5   Maintenance of Plant/ Equipment

2.5.1   Mobile plant is maintained in accordance with a scheduled maintenance plan. Maintenance works will be conducted on site in the workshop.

2.5.2   There is a small bunded fuel tank (~ 2,500 litres) on site for fuelling mobile plant.

2.5.3   A spill kit is located in the workshop, and staff will be trained in its use and to follow the Spillage procedure (MIS-POL-019 contained in Appendix D). Leaks will be soaked up using absorbent material from the spill kit.

2.6   Alarms and Fire Fighting Provision

2.6.1   An automatic fire detection and alarm system is installed in the transfer station building. The system is designed, installed and maintained by a UKAS accredited body. The system is triggered by heat detection.

2.6.2   The site operates with a manual suppression system consisting of fire extinguishers and a firehose. Fire extinguishers are located around the building and there is a mains water supply and firehose located at the points marked 'W' on the plan.

2.6.3   The site is covered by CCTV, including the transfer station, yard and workshop. This is observed out of hours by a security contractor who alert the duty manager if there is a problem.

2.6.4   All mobile plant has its own extinguisher and these are checked as per 2.6.5 below.

2.6.5   Inspection of extinguishers will be carried out annually by an independent company and records will be maintained.

2.6.6   If the fire alarm is activated out of hours, or CCTV picks up an incident, a message is sent to the duty manager to attend site. Attendance will be within 30 minutes. In the event of a fire, the fire service will also be called by the security contractor.

2.7   Monitoring

2.7.1   In the event of waste being stored within the building for longer than fourteen days, then monitoring of stockpiles will be conducted. Monitoring will be carried out on waste that may be prone to self-heating, ie. fines.

2.7.2   Monitoring will be carried out using a FLIR thermal imaging heat detection gun. Waste that is bulky and in large form (eg. Wood or WEEE) that is not capable of self-heating will not be monitored.

2.7.3   If the temperature is rising the stockpiles will be turned to dissipate heat. If it rises above 50∘C, the stockpile will be dismantled and spread out across the reception area to cool.

2.7.4   In the event of a prolonged period of hot weather, daily temperature monitoring will be implemented as above.

2.7.5   If waste has to be spread out to cool in the reception area, incoming waste will be temporarily halted whilst the reception area is unavailable.

2.8   Cleaning and Housekeeping

2.8.1   Surfaces within the waste storage building will be inspected and cleaned down weekly to prevent build-up of loose combustible material.

2.8.2   Vehicles used to move waste will undergo daily checks for dust and debris and cleaned down.

2.8.3   Cleaning and inspections will be recorded in the site diary.

2.9   Site Drainage

2.9.1   The yard is surfaced with a combination of hardstanding and concrete and drains to sewer via an interceptor. The small area of hardstanding (shown on the site plan) will be concreted by the end of 2024. The hardstanding area is at a slightly higher elevation than the concreted area and so water will shed off it rather than on to it.

2.9.2   The building floor is reinforced concrete.

2.10   Security

2.10.1   The site is securely fenced with a combination of palisade fencing approximately 2 m high to the west and north with lockable security gates at the entrance on the western boundary. The eastern and southern perimeter is secured with fencing and concrete block walls.

2.10.2   The site is fitted with CCTV which can be viewed remotely by the management team. This is monitored out of hours by a security contractor.

2.11   Sources of Ignition

2.11.1   There will be no sources of ignition (i.e. heating pipes, lights bulbs, heaters, flammable gas cylinders etc) within 6 m of the combustible stockpiles. Mobile plant (possible hot exhausts) will be stored inside the building when not in use, and will be located >6m from the nearest stockpile as shown on the FPP drawing.

2.11.2   A dedicated smoking shelter is situated close to the site entrance and this is the only place that smoking is allowed on site. The location of the shelter is shown on the FPP drawing.

2.11.3   Any hot works will be carried out in the workshop where there is no storage of combustible waste.

3. FIRE RISK ASSESSMENT AND MANAGEMENT

3.1   Potential causes of fire have been identified that will require management and monitoring to reduce the risk of fires. These accord with section 7 of the EA FPP guidance and are listed in Table 3 along with management controls and an assessment of residual risk.

3.2   A summary of management techniques already described are:

- Waste acceptance procedures to control waste inputs

- Turnaround of material will be such that the oldest material is always removed from the building first.

- Stockpiles will be stored with either a 6 m separation distance or a concrete block firewall

- Stockpile sizes will be restricted by sizes of bays and containers and maintained below the maximum dimensions stated in EA guidance

- A UKAS accredited fire detection and alarm system is installed in the building.

- Manual fire suppression system

Hazard	Prevention and Controls	Mitigated Risk
Arson &/ or Vandalism	▪ The site gates will be locked outside of operating hours and the site is securely fenced ▪ The site is fitted with CCTV which is monitored out of hours by a security contractor	Low
Stockpiles – Self Combustion	▪ Fast turnaround time (7 days) ▪ Oldest material will always be removed from the building first (first in, first out) ▪ Stockpiles will be stored on concrete surface ▪ There will be no sources of ignition (ie heating pipes, light bulbs, heaters etc) within 6 m of the waste stockpiles ▪ A fire detection and alarm system is installed ▪ Temperature monitoring will be conducted in periods of hot weather or if stockpiles are stored for longer than 14 days ▪ Waste will be stored in its original and largest form for as long as possible	Low
Accumulation of Dust	▪ Clearing material from mobile plant including exhausts as part of daily checks ▪ Cleaning of dust build-up around the waste storage building on a weekly basis	Low
Flammable and Combustible Liquids storage	▪ Bunded fuel tank will be stored outside (no fuels or oils inside the transfer station building) and oils stored on a drip tray in the workshop, away from waste storage area ▪ No smoking on the site except in dedicated smoking shelter next to site entrance	Low
Electrical Equipment Faults	▪ Regular checks for exposed wiring ▪ Periodic inspection of all electrical wiring and mobile electrical equipment by a qualified electrician ▪ Staff training to ensure electrical safety awareness ▪ Ensure all cables are kept secured and out of the way ▪ The use of extension cables and multi-points is kept to a minimum ▪ Fire extinguishers fitted to all mobile plant	Low
Build-up of Combustible Material around Equipment	▪ Clearing material from mobile plant including exhausts as part of daily checks	Low
Discarded Smoking Materials/ Unauthorised Smoking	▪ No smoking allowed on the site except in dedicated smoking shelter next to site entrance ▪ Staff training and awareness	Low

Table 3: Fire Risk Assessment and Mitigation

Hazard	Prevention and Controls	Mitigated Risk
Hot Exhausts	▪ In-cab monitoring of vehicle temperatures by individual machine operators ▪ Staff training and awareness	Low
Hot Works (eg welding/ cutting)	▪ Hot works (eg cutting or welding) will only be carried out in the workshop which is not a waste storage area	Low
Sparks from loading shovels/ buckets	▪ Fire extinguishers are fitted within all mobile plant and periodically checked ▪ Staff training and awareness	Low
Hot Loads	▪ Temperature checks on incoming loads of fines ▪ Hot loads will be spread out to cool in the reception area if temperature greater than 50 degrees ▪ Skip drivers would not collect a hot or smouldering skip	Low
Ignition sources within waste	▪ Waste will be checked on tipping for batteries or battery containing items ▪ Any items found will be stored separately in the WEEE storage area	Low
Use of industrial heaters	▪ Industrial heaters will not be used on site	Low
Adverse weather conditions: Prolonged dry/warm conditions	▪ Hot weather monitoring and management procedure will be implemented as per section 2.7	Low

Table 3: Fire Risk Assessment and Mitigation (continued)

4.   FIRE RESPONSE PLAN

4.1   General

4.1.1   The number of staff working on the site will be recorded and details kept in the site office, including visitor records. In the event of a fire, all staff should go to the designated fire assembly point which is located close to the site entrance. A fire marshal will ensure that all staff are accounted for.

4.1.2   The plant that can be utilised in any fire response to help with the Fire and Rescue Service (FRS) will be stored away from combustible material and operatives will be available to move unburnt material to the quarantine area.

4.1.3   The SM will be responsible for ensuring that access to the site is always available to FRS vehicles.

4.1.4   Drawing No 112/04 shows the location of the fire extinguishers, fire assembly point, location of combustible waste and quarantine area to be used in the event of a fire.

4.2   Emergency Action

4.2.1   The following fire response procedures should be followed on discovering a fire at the site:

- Raise the alarm and initiate evacuation of people on the site

- Call the Fire Service on 999 immediately

- Attack the fire if it's safe to do so using a fire extinguisher or a fire hose

- Remove unburnt waste materials to the quarantine area ensuring that it doesn't block access for emergency services

- Stop all operations at the site and stop personnel and vehicles entering the site

- Notify neighbouring properties using contact details shown on Drawing No 112/04

- Ensure plant operators are standing by to help create fire breaks, under the direction of the FRS when they arrive

- Appoint a fire marshal (a responsible, clearly identified person) to liaise with the emergency services on site;

- Ensure access routes are clear

- Cover interceptor with drain mat

4.2.2   The fire response procedures and will be displayed on site and followed in the event of a fire.

4.3   Fire Fighting Techniques

4.3.1   The following active fire-fighting techniques will be employed to help a fire be extinguished within 4 hours:

- Immediately contact the Fire Service to provide assistance in the event of a fire that cannot be controlled on site by using fire extinguishers or the fire hose

- Access for fire engines to the site is via the site entrance which will always remain clear of vehicles

- Fire extinguishers will be available around the site for use by staff if appropriate. Staff will be trained in their use, and they will be maintained and inspected appropriately

- Mains water will always be available on site for use for firefighting, or cooling unburned material that has been moved to the quarantine area

- Staff will be available immediately during working hours to assist FRS in firefighting and within 30 minutes out of hours through contact numbers provided to the security contractor. These staff will be trained to operate site plant.

4.4   Water Supply

4.4.1   The water supply required has been calculated as per the EA guidance (at least 2,000 litres per minute for a minimum of 3 hours for a 300 m^3 pile). The largest stockpile is the incoming waste stockpile at 270 m^3. It has been calculated that a total of 324 m^3 of water would be required as shown in the following calculation:

$$2000 \text{ L per minute for } 300 \text{ m}^3$$
$$300 \text{ m}^3/2000 \text{ L} = 0.15 \text{ m}^3/ \text{ 1 L}$$
$$270 \text{ m}^3/ 0.15 \text{ m}^3 = 1800 \text{ L per minute}$$
$$1,800 \text{ L} \times 180 \text{ mins} = 324,000 \text{ L}$$
$$= 324 \text{ m}^3$$

4.4.2   Although this stockpile has the potential to be the largest on site, it is usually cleared at the end of each working day so that the largest stockpile in the building overnight is usually the general waste container which is just 38 m^3.

4.4.3   There is a fire hydrant located approximately 190 m to south-west of the site off Colne Road. The hydrant is marked with a yellow H plate and is maintained by the FRS. The location of the hydrant is shown on Drawing No 112/04.

4.4.4   There is also a mains water supply to the site and a hose available for use along with a bowser used for dust suppression which could be utilised as an additional water source.

4.5   Managing Firewater

4.5.1   The site is contained with a bund across the entrance as shown on Drawing No 112/04. The bunded area has the capacity to contain 328 m³, as follows:

$$\text{Bunded area} = 3{,}281 \text{ m}^2$$
$$\text{x depth of bund of } 0.10 \text{ m}$$
$$= 328 \text{ m}^3 \text{ firewater containment volume}$$

4.5.2   The available containment volume is in excess of the 324 m³ of water required to extinguish the largest combustible stockpile.

4.5.3   A drain mat will be placed over the interceptor to stop water from leaving site. The mat will be stored on the wall of the garage, next to the interceptor, as shown on the FPP drawing.

4.5.4   Firewater contained inside the site would then be tested and removed by tanker to a licensed disposal facility using a third-party contractor. Any remaining sludge would be scraped up and placed in a container for testing, classification and off-site disposal.

4.6   Managing Waste/ Combustion Products

4.6.1   A designated quarantine area will be used in the event of a fire and is located as shown on Drawing No 112/04. The size of the area is 10 m x 10 m which is sufficient to contain 50% of the largest stockpile as shown on the drawing. Dimensions for the quarantine area are provided on the stockpile calculation sheet in Appendix C.

4.6.2   In the event of a fire, the waste operator will work with the EA, FRS, and the insurers to dispose of any waste combustion material to a suitable location as quickly as possible to reduce the risk of this material posing a risk to the environment.

4.7   Contingency Plan

4.7.1   In the event of a fire at the site, no waste will be brought to site until any combustion products and firewater has been cleared and any repairs carried out. Any fire damaged waste will be removed from site for disposal to a suitably permitted facility.

4.7.2   Depending on the length of time that the site remains non-operational following a fire, additional measures may be required to manage any stored waste at the site. This would include daily monitoring of combustible wastes and/or removal of combustible wastes to other treatment facilities.

5.   STAFF TRAINING

.

5.1   All staff have or will have fire awareness training which includes fire prevention and fire response. All staff will be made aware of the location of the FPP.

5.2   All staff will be trained so that they are familiar with the fire response plan, and there will be regular exercises to test how well the fire response procedures work. Staff undergo emergency procedure training at induction and then with ongoing 12-monthly refresher training, or sooner if operations change. Fire drills are carried out every 12 months as a minimum. At permit issue the staff will be trained on the fire prevention plan, and this will be reinforced in the 6-monthly refresher training.

5.3   Staff will receive training to tackle small fires and understand the importance of ensuring control measures are carried out. All staff will be aware that they should not put themselves at risk and to call the FRS as soon as possible in accordance with the fire response plan.

5.4   All employees will be trained to look for fires, hot loads, smoke and signs of smoulders and what action to take if they see one, such as the use of mobile plant to move any suspect loads to a safe area or dousing suspect loads with water.

5.5   Any contractors working on the site will be given a basic induction prior to commencement of works, which will include the location of fire exits and what to do in the event of a fire.

APPENDIX A

Drawings
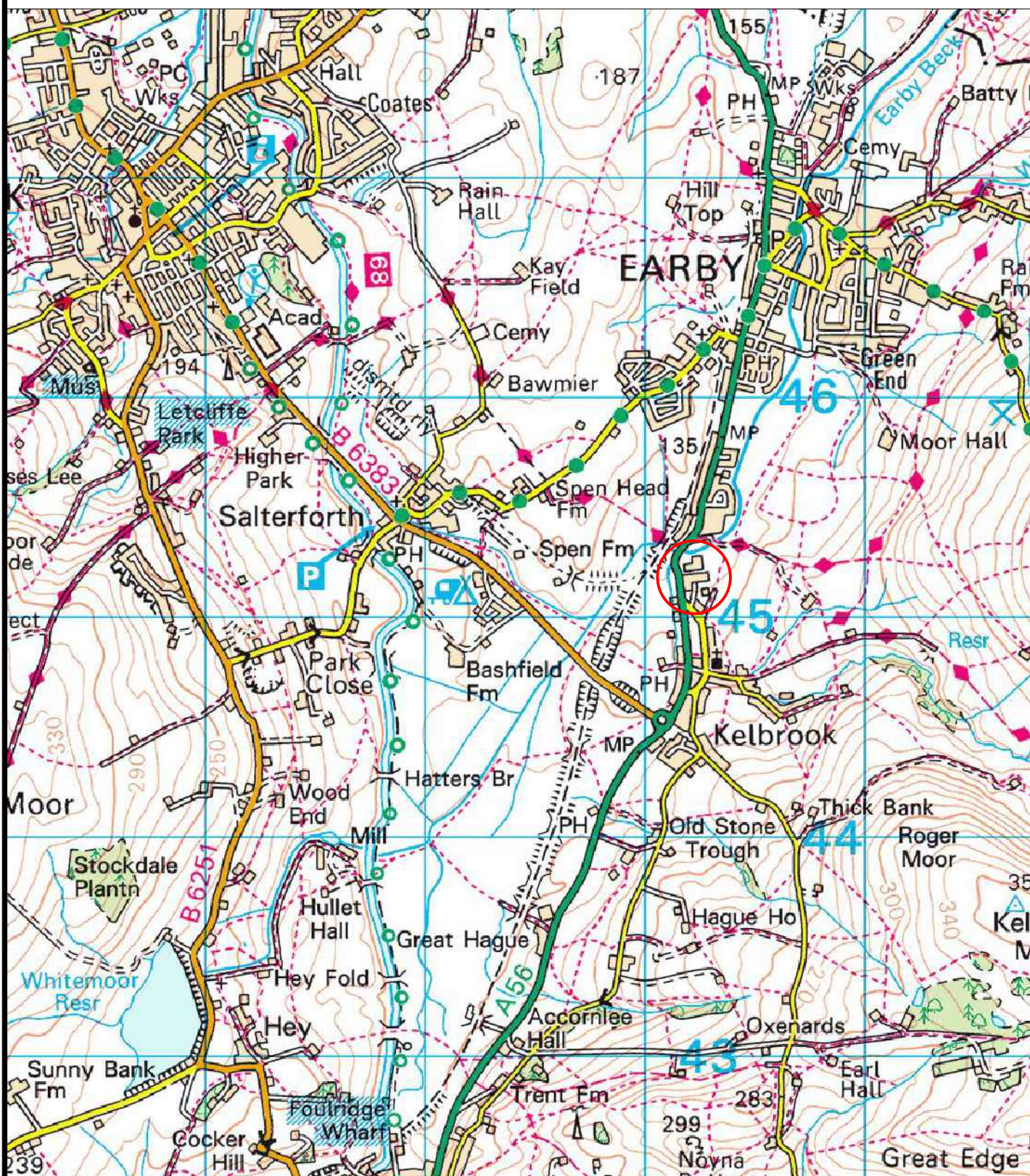
LEGEND ——— SITE LOCATION

STARLING ENVIRONMENTAL LIMITED 67 Chorley Old Road, Bolton, Greater Manchester, BL1 3AJ www: starlingenvironmental.co.uk email: claire@starlingenvironmental.co.uk Tel: 07989 673122	CLIENT BLACKBURN SKIPS LIMITED	DRAWN BY. M.Y.B	APPROVED BY. C.G
	JOB TITLE. EDEN WORKS TRANSFER STATION, COLNE	DATE. 27/03/2024	DRAWING No. 112-01
	DRAWING TITLE. SITE LOCATION PLAN	SCALE @ A4. 1:25,000	

SITE & SURROUNDING AREA PLAN
(SCALE 1:2000)

AM BOWDEN GROUNDWORKS

AM BOWDEN GROUNDWORKS

SUBARU

EP CLIMBING

GARAGE

TRANSFER STATION

SITE

EDEN WORKS BUSINESS PARK

ENTRE-PRISES

WOLFDEN SUPPLIES

COLNE ROAD (A56)

NOTES:
SURFACING IS CONCRETE UNLESS HARDSTANDING AS SHOWN.

PREVAILING WIND DIRECTION (FROM THE WEST)

REV.	DESCRIPTION	DATE	BY

STARLING ENVIRONMENTAL LIMITED
67 Chorley Old Road, Bolton,
Greater Manchester, BL1 3AJ
www.starlingenvironmental.co.uk
email: claire@starlingenvironmental.co.uk
Tel: 07989 673122

CLIENT.

BLACKBURN SKIPS LIMITED

JOB TITLE.

EDEN WORKS TRANSFER STATION COLNE

DRAWING TITLE.

SITE LAYOUT PLAN

Site Layout Plan

ASBESTOS

TYRES

GARAGE

2,500 L DIESEL

E

METALS

GEN WASTE

GEN WASTE

INCOMING WASTE

TROMMEL

FINES

PVC

HAZARDOUS WOOD

FH
JW

WASH PIT

INTERCEPTOR

QUARANTINE AREA

PICKING LINE

FH

GAS CYLINDERS

WATER BOWSER

PLASTER BOARD

WEE

NON FE

MACHINERY

GEN WASTE

EN WASTE

FE

ALUMINIUM

STEEL

GREEN WASTE

GREEN WASTE

AGGREGATES

EMPTY SKIPS

HARDCORE

SOIL

FINES

HARDCORE

WOOD

FINES

SHELTER

SCREENING PLANT

SMOKING SHELTER

WEIGHBRIDGE

MOBILE PLANT STORAGE AREA

HARD CORE

FINES

OFFICE

EMPTY SKIPS

OFFICE

WOOD

OVERSIZE FINES

SITE LAYOUT PLAN SCALE 1:250

DRAWN BY.	APPROVED BY.	DRAWING No.
M.Y.B	C.G	112/02
DATE.	SCALE @ A2.	
19/04/24	AS SHOWN	

LEGEND

- PERMIT AREA
- 1 KM RECEPTOR BOUNDARY
- FOOTPATHS
- RESIDENTIAL AREA
- INDUSTRIAL/COMMERCIAL AREA
- SCHOOL
- WOODLAND
- WATERBODIES/WATERWAYS
- PRIORITY HABITAT DECIDUOUS WOODLAND
- LOCAL WILDLIFE SITE (COLNE/SKIPTON DISUSED RAILWAY)
- FIRE STATION
- 1 RECEPTOR REFERENCE
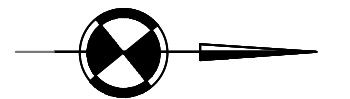
PREVAILING WIND DIRECTION (FROM THE WEST)

REV.	DESCRIPTION	DATE	BY

STARLING ENVIRONMENTAL LIMITED
67 Chorley Old Road, Bolton,
Greater Manchester, BL1 3AJ
www: starlingenvironmental.co.uk
email: claire@starlingenvironmental.co.uk
Tel: 07989 673122

CLIENT.

BLACKBURN SKIPS LIMITED

JOB TITLE.

EDEN WORKS TRANSFER STATION KELBROOK

DRAWING TITLE.

RECEPTORS WITHIN 1 KM

DRAWN BY.	APPROVED BY.	DRAWING No.
M.Y.B	C.G	
DATE.	SCALE @ A1.	112/03
08/03/24	1:4000	

SITE LAYOUT & COMBUSTIBLE WASTE PLAN (SCALE 1:250)

2,500 L DIESEL

GARAGE

ASBESTOS

12.TYRES
6.1 m
2.4 m

QUARANTINE AREA
10.0 m
6.0 m
10.0 m

10.METALS
9.GEN WASTE
8.GEN WASTE
1.INCOMING WASTE
TROMMEL

11.PVC
22.HAZARDOUS WOOD

PICKING LINE

2.FINES
3.7 m
4.0 m
2.1 m

GAS CYLINDERS

ALUMINIUM
15. STEEL
14.GREEN WASTE
13.GREEN WASTE
6.PLASTER BOARD
7.WEEE
NON FE
MACHINERY
5.GEN WASTE
4.GEN WASTE
3.FE

AGGREGATES
EMPTY SKIPS
HARDCORE
SOIL
16.FINES
HARDCORE
17.WOOD
18.FINES
SHELTER
SCREENING PLANT

COMBUSTIBLE WASTE STOCKPILES:
LARGEST STOCKPILE INCOMING WASTE: 270 m³
WATER REQUIRED TO EXTINGUISH: 324 m³

WEIGHBRIDGE

MOBILE PLANT STORAGE AREA

SMOKING SHELTER

OFFICE
OFFICE

EMPTY SKIPS
21.WOOD
20.OVERSIZE FINES
19.FINES
16.5 m
9.8 m

Legend

PERMIT AREA
GATES/SHUTTER DOORS
PALLISADE/PANEL FENCING
COMBUSTIBLE WASTE
W MAINS WATER
E MAINS ELECTRIC
H HYDRANT FOR FIRE SERVICES
JW JET WASH
FIRE ALARM CALL POINT
FAS FIRE ALARM SYSTEM
HEAT DETECTOR CAMERA

MUSTER POINT
SPILL KIT
F FIRE EXTINGUISHER
ACCESS FOR FIRE SERVICES
FH FIRE HOSE
FUEL/OIL STORAGE
OPEN DRAIN
SURFACE WATER DRAINAGE DIRECTION (SUBSURFACE)
FIREWATER CONTAINMENT
CONVEYOR
HARDSTANDING
FIRE WALL
DRAIN MAT

×140.31 SPOT LEVELS (mAHD)

NOTES:
SURFACING IS CONCRETE UNLESS HARDSTANDING AS SHOWN.

PREVAILING WIND DIRECTION (FROM THE WEST)

SITE LOCATION PLAN & FIRE SERVICE ACCESS SCALE 1:1000

AM BOWDEN GROUNDWORKS
AM BOWDEN GROUNDWORKS (07801 108442)
SUBARU (01282 797555)
EP CLIMBING (01282 444800)
EDEN WORKS BUSINESS PARK
ENTRE-PRISES (01282 444800)
WOLFDEN SUPPLIES (01282 844213)
ROBERT SHAWS (01282 843612)
WOLFDEN SUPPLIES (01282 844213)
WOLFDEN SUPPLIES (01282 844213)
NDT NEWGEN
A56 COLNE ROAD
KELBROOK BECK
Sluice
Drain
Issues
H

FIRE WATER DRAINAGE CONTAINMENT PLAN (SCALE 1:250)

TO STORM
CONCRETE BLOCK KERB
×140.31
GARAGE
QUARANTINE AREA
TRANSFER STATION
FH
JW
INTERCEPTOR
WATER BOWSER
SURFACE WATER DRAIN
×140.07
CONCRETE BLOCK KERB
DRAINAGE BUND
WEIGHBRIDGE
MOBILE PLANT STORAGE AREA
OFFICE
OFFICE
EMPTY SKIPS
×140.45
140.33
TO SEWER

FIRE WATER CONTAINED BY DRAINAGE BUND
3450 m³ x 0.1 m = 345 m³

REV. | DESCRIPTION | DATE | BY

STARLING ENVIRONMENTAL LIMITED
67 Chorley Old Road, Bolton,
Greater Manchester, BL1 3AJ
www: starlingenvironmental.co.uk
email: claire@starlingenvironmental.co.uk
Tel: 07989 673122

CLIENT.
BLACKBURN SKIPS LIMITED

JOB TITLE.
EDEN WORKS TRANSFER STATION COLNE

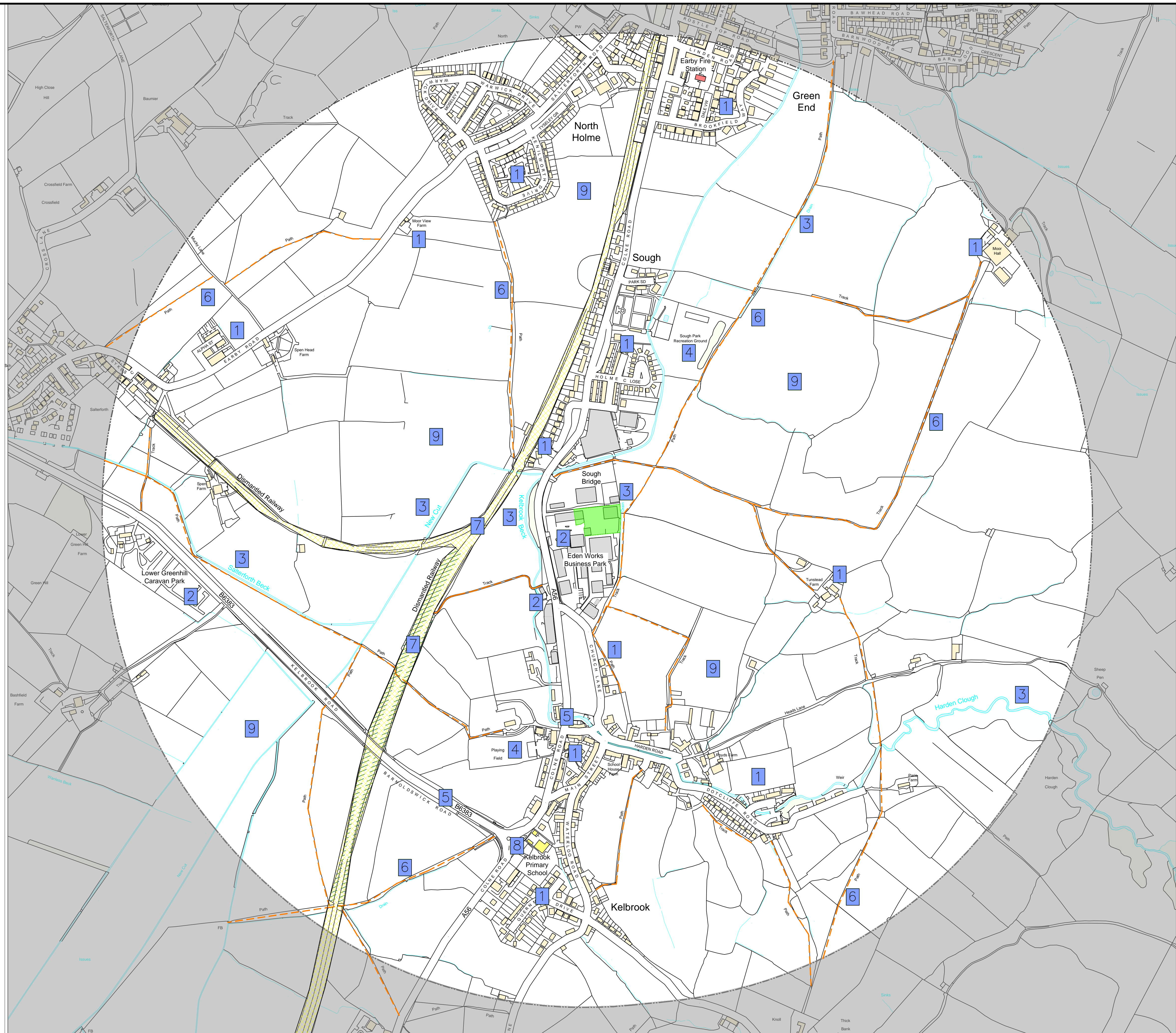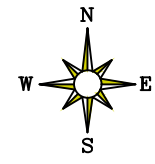DRAWING TITLE.
FIRE PREVENTION PLAN
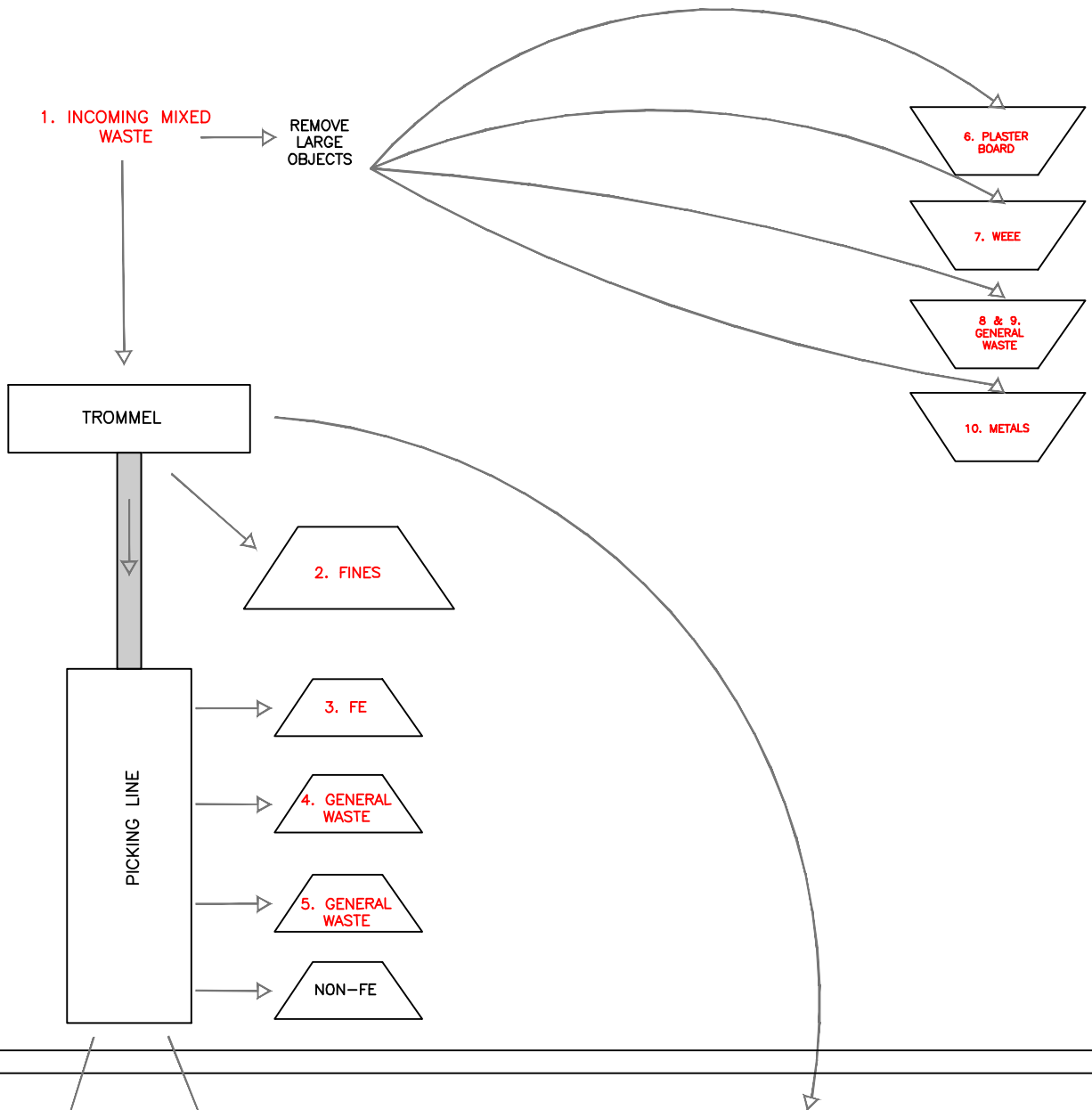
DRAWN BY. M.Y.B
APPROVED BY. C.G
DRAWING No. 112/04
DATE. 12/03/24
SCALE @ A1. AS SHOWN

APPENDIX B

Process Flow

PROCESS FLOW DIAGRAM

TRANSFER STATION BUILDING

1. INCOMING MIXED WASTE

REMOVE LARGE OBJECTS

6. PLASTER BOARD

7. WEEE

8 & 9. GENERAL WASTE

10. METALS

TROMMEL

2. FINES

PICKING LINE

3. FE

4. GENERAL WASTE

5. GENERAL WASTE

NON-FE

YARD

17. WOOD

HARDCORE

18. FINES

FLIP FLOOR

HARDCORE

19. FINES
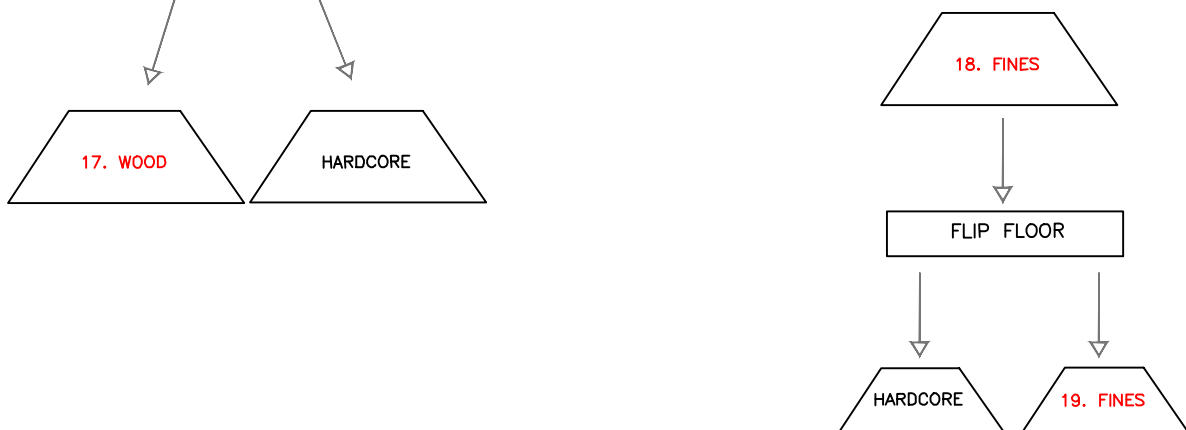
NOTES: REFER ALSO TO DRAWING NO. 112-04 AND STOCKPILE CALCULATION SPREADSHEET
        STOCKPILES LABELED IN RED ARE COMBUSTIBLE
        STOCKPILES LABELED IN BLACK ARE NON-COMBUSTIBLE

APPENDIX C

Stockpile Calculation Spreadsheet

COMBUSTIBLE WASTE CALCULATION SPREADSHEET

Ref	Location	Waste Type	Length	Width*	Height	Stockpile Type	Truncated (c)	Truncated (d)	Other Calculations	Volume (m^3)	Water Req'd (m^3)
1	Waste Processing Building	Incoming Mixed Waste	15	8	4	Truncated Pyramid	7	3.8	See Truncated Pyramid Calulation	270	324
2	Waste Processing Building	Fines	4	2.1	2	One Sided Truncated Pyradmid	-	-	Area of side of stockpile = 2.5 m^2 2.5 m^2 x 4 m = 10 m^3	10	12
3	Waste Processing Building	Ferrous Metals	2	3	2	One Sided Truncated Pyradmid	-	-	Area of side of stockpile = 4 m^2 4 m^2 x 2 m = 8 m^3	8	9.6
4	Waste Processing Building	General Waste	3	3	2	One Sided Truncated Pyradmid	-	-	Area of side of stockpile = 4 m^2 4 m^2 x 3 m = 12 m^3	12	14.4
5	Waste Processing Building	General Waste	3	3	2	One Sided Truncated Pyradmid	-	-	Area of side of stockpile = 4 m^2 4 m^2 x 3 m = 12 m^3	12	14.4
6	Waste Processing Building	Plaster Board	6.1	2.4	3.1	Skip Container	-	-	40 yard skip = 30.5 m^3	30.5	36.6
7	Waste Processing Building	WEEE	2	2	1	IBC & 1m^3 Bag	-	-	2 x 1 m3 IBC/Bag	2	2.4
8	Waste Processing Building	General Waste	6.1	2.4	3.1	Skip Container	-	-	50 yard skip = 38 m3	38	45.6
9	Waste Processing Building	General Waste	6.1	2.4	3.1	Skip Container	-	-	50 yard skip = 38 m^3	38	45.6
10	Waste Processing Building	Mixed Metals	6.1	2.4	3.1	Skip Container	-	-	50 yard skip = 38 m3	38	45.6
11	Yard	PVC	6.1	2.4	3.1	Skip Container	-	-	50 yard skip = 38 m3	38	45.6
12	Yard	Tyres	6.1	2.4	2	Skip Container	-	-	30 yard skip = 22.9 m3	22.9	27.48
13	Yard	Green Waste	6.1	2.4	2.6	Skip Container	-	-	40 yard skip = 30.5 m3	30.5	36.6
14	Yard	Green Waste	6.1	2.4	2.6	Skip Container	-	-	40 yard skip = 30.5 m3	30.5	36.6
15	Yard	Steel	4.9	2.4	2	Skip Container	-	-	20 yard skip = 15.3 m3	15.3	18.36
16	Yard	Fines	8.5	8.3	4	One Sided Truncated Pyradmid	-	-	Area of side of stockpile = 25 m^2 25 m^2 x 8.5 m = 212.5 m^3	212.5	255
17	Yard	Wood	5.4	8.3	4	One Sided Truncated Pyradmid	-	-	Area of side of stockpile = 25 m^2 25 m^2 x 5.4 m = 135 m^3	135	162
18	Yard	Fines	4.6	8.3	4	One Sided Truncated Pyradmid	-	-	Area of side of stockpile = 25 m^2 25 m^2 x 4.6 m = 115 m^3	115	138
19	Yard	Fines	4.7	2.8	1.5	One Sided Truncated Pyradmid	-	-	Area of side of stockpile = 3 m^2 3 m^2 x 4.7 m = 14.1 m^3	14.1	16.92
20	Yard	Oversize Fines	9.8	6	4	One Sided Truncated Pyradmid	-	-	Area of side of stockpile = 17 m^2 17 m^2 x 9.8 m = 166.6 m^3	166.6	199.92
21	Yard	Wood	16.5	5.75	4	One Sided Truncated Pyradmid	-	-	Area of side of stockpile = 16 m^2 16 m^2 x 16.5 m = 264 m^3	264	316.8
22	Waste Processing Building	Hazardous Wood	4.9	2.4	2	Skip Container	-	-	20 yard skip = 15.3 m3	15.3	18.36
	Quarantine Area	Unburnt Waste/Burnt Waste	10	10	4	Truncated Pyramid	2	2	See Truncated Pyramid Calulation	165	198

Notes: * The width of the stockpile is used to calculate the side/area of a stockpile which is then multiplied by the length.

Truncated Pyramid Calculator
Calculate volume of a truncated rectangular pyramid
and surface areas, surface to volume ratio, lengths of slants and length of edge for right truncated rectangular pyramids

Truncated pyramid or **frustum of a pyramid** is a pyramid whose vertex is cut away by a plane parallel to the base. The distance between the bottom and the top bases is the truncated pyramid height **h**. This page calculates volume of any truncated pyramid whose bottom and top bases are rectangles with sides **a, b** and **c, d** respectively. This truncated pyramid has 6 faces: base, top and 4 lateral faces.

Base a: 10 Base b: 10
Top c: 2 Top d: 2 Height h: 4 in: meter ⌄

precision: 2 ⌄   Surface to volume | Convert 165.33 meter³ to weight for: compounds | foods | gravels

☐ show all units   ☐ show all units

The volume of the truncated pyramid = **165.33**

centimeter³	165 333 333.33	inch³	10 089 259.02
foot³	5 838.69	**meter³**	**165.33**

The length of the edge of the truncated pyramid = **6.93**

centimeter	692.82	inch	272.76
foot	22.73	**meter**	**6.93**

The surface to volume ratio of this truncated pyramid = **1.45**

Surface area to volume ratio is also known as *surface to volume ratio* and denoted as sa÷vol, where **sa** is the surface area and **vol** is the volume.

Unit	The area of the	
☐ all	base of the truncated pyramid = **100**	top of the truncated pyramid = **4**
centimeter²	1 000 000	40 000
foot²	1 076.39	43.06
inch²	155 000.31	6 200.01
meter²	**100**	**4**

Unit	The area of the plane	
☐ all	*ac* of the truncated pyramid = **33.94**	*bd* of the truncated pyramid = **33.94**
centimeter²	339 411.25	339 411.25
foot²	365.34	365.34
inch²	52 608.85	52 608.85
meter²	**33.94**	**33.94**

Unit	The lateral surface area of the truncated pyramid = **135.76**	The total surface area of the truncated pyramid = **239.76**
☐ all		
centimeter²	1 357 645.02	2 397 645.02
foot²	1 461.36	2 580.8
inch²	210 435.4	371 635.72
meter²	**135.76**	**239.76**

Unit	The length of the			
☐ all	base side a = **10**	base side b = **10**	top side c = **2**	top side d = **2**

Unit	The perimeter of the	
☐ all	base of the truncated pyramid	top of the truncated pyramid

Unit	The length of the		
☐ all	height h of the truncated pyramid	slant_a of the truncated pyramid	slant_b of the truncated pyramid

X

Truncated Pyramid Calculator
Calculate volume of a truncated rectangular pyramid
and surface areas, surface to volume ratio, lengths of slants and length of edge for right truncated rectangular pyramids

Truncated pyramid or **frustum of a pyramid** is a pyramid whose vertex is cut away by a plane parallel to the base. The distance between the bottom and the top bases is the truncated pyramid height **h**. This page calculates volume of any truncated pyramid whose bottom and top bases are rectangles with sides **a, b** and **c, d** respectively. This truncated pyramid has 6 faces: base, top and 4 lateral faces.

Base a: 15   Base b: 8

Top c: 7   Top d: 3.8   Height h: 4   in: meter ▾

precision: 2 ▾   Surface to volume | Convert 270.8 meter³ to weight for: compounds | foods | gravels

☐ show all units   ☐ show all units

The volume of the truncated pyramid = **270.8**		The length of the edge of the truncated pyramid = **6.03**	
centimeter³	270 800 000	centimeter	603.41
inch³	16 525 229.9	inch	237.56
foot³	9 563.21	foot	19.8
meter³	**270.8**	**meter**	**6.03**

The surface to volume ratio of this truncated pyramid = **1.15**

Surface area to volume ratio is also known as *surface to volume ratio* and denoted as sa÷vol, where sa is the surface area and vol is the volume.

Unit ☐ all	The area of the	
	base of the truncated pyramid = 120	top of the truncated pyramid = 26.6
centimeter²	1 200 000	266 000
foot²	1 291.67	286.32
inch²	186 000.37	41 230.08
meter²	**120**	**26.6**

Unit ☐ all	The area of the plane	
	ac of the truncated pyramid = 49.7	*bd* of the truncated pyramid = 33.38
centimeter²	496 951.71	333 754.4
foot²	534.91	359.25
inch²	77 027.67	51 732.04
meter²	**49.7**	**33.38**

Unit ☐ all	The lateral surface area of the truncated pyramid = 166.14	The total surface area of the truncated pyramid = 312.74
centimeter²	1 661 412.22	3 127 412.22
foot²	1 788.33	3 366.32
inch²	257 519.41	484 749.86
meter²	**166.14**	**312.74**

Unit ☐ all	The length of the			
	base side a = 15	base side b = 8	top side c = 7	top side d = 3.8

Unit ☐ all	The perimeter of the	
	base of the truncated pyramid	top of the truncated pyramid

Unit ☐ all	The length of the		
	height h of the truncated pyramid	slant$_a$ of the truncated pyramid	slant$_b$ of the truncated pyram X

foot	49.21	26.25	22.97	12.47
inch	590.55	314.96	275.59	149.61
meter	**15**	**8**	**7**	**3.8**

centimeter	4 600	2 160
foot	150.92	70.87
inch	1 811.02	850.39
meter	**46**	**21.6**

centimeter	400	451.77	565.69
foot	13.12	14.82	18.56
inch	157.48	177.86	222.71
meter	**4**	**4.52**	**5.66**

About this page: *Truncated Pyramid Calculator*

Calculation formulas:

How to find the volume of a truncated pyramid?
$V = \frac{1}{6} \times h \times (A_{base} + (a+c) \times (b+d) + A_{top}) = \frac{1}{6} \times h \times (a \times b + (a+c) \times (b+d) + c \times d)$

How to find the area of the base of a truncated pyramid?
$A_{base} = a \times b$

How to find the area of the top of a truncated pyramid?
$A_{top} = c \times d$

How to find the area of the plane *ac* of a truncated pyramid?[*]
$A_{ac} = \frac{1}{2} \times (a+c) \times slant_a = \frac{1}{2} \times (a+c) \times \sqrt{\frac{1}{4} \times (b-d)^2 + h^2}$

How to find the area of the plane *bd* of a truncated pyramid?[*]
$A_{bd} = \frac{1}{2} \times (b+d) \times slant_b = \frac{1}{2} \times (b+d) \times \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the lateral surface area of a truncated pyramid?[*]
$A_{lateral} = 2 \times A_{ac} + 2 \times A_{bd} = (a+c) \times slant_a + (b+d) \times slant_b = (a+c) \times \sqrt{\frac{1}{4} \times (b-d)^2 + h^2} + (b+d) \times \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the total surface area of a truncated pyramid?[*]
$A_{total} = A_{base} + A_{top} + A_{lateral} = a \times b + c \times d + 2 \times A_{ac} + 2 \times A_{bd} = a \times b + c \times d + (a+c) \times slant_a + (b+d) \times slant_b = a \times b + c \times d + (a+c) \times \sqrt{\frac{1}{4} \times (b-d)^2 + h^2} + (b+d) \times \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the perimeter of the base of a truncated pyramid?
$p_{base} = 2 \times (a+b)$

How to find the perimeter of the top of a truncated pyramid?
$p_{top} = 2 \times (c+d)$

How to find the length of the slant$_a$ of a truncated pyramid?*
$slant_a = \sqrt{\frac{1}{4} \times (b-d)^2 + h^2}$

How to find the length of the slant$_b$ of a truncated pyramid?*
$slant_b = \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the length of the edge of a truncated pyramid?*
$e = \sqrt{\frac{1}{4} \times (a-c)^2 + slant(a)^2} = \sqrt{\frac{1}{4} \times ((a-c)^2 + (b-d)^2) + h^2}$

where:
slant$_a$ is the distance between the pyramid's sides a and c;
slant$_b$ is the distance between the pyramid's sides b and d.

X

[*] denotes calculations that are valid for *right* rectangular truncated pyramids only.

Reference (ID: N/A)

1. I.N. Bronshtein, K.A. Semendyayev, Gerhard Musiol, Heiner Mühlig. Handbook of Mathematics 6th ed. Springer. Berlin, Heidelberg, New York. 2015. Last accessed: 29 August 2020 (amazon.com paid link).

X

foot	32.81	32.81	6.56	6.56
inch	393.7	393.7	78.74	78.74
meter	**10**	**10**	**2**	**2**

centimeter	4 000	800
foot	131.23	26.25
inch	1 574.8	314.96
meter	**40**	**8**

centimeter	400	565.69	565.69
foot	13.12	18.56	18.56
inch	157.48	222.71	222.71
meter	**4**	**5.66**	**5.66**

About this page: *Truncated Pyramid Calculator*

Calculation formulas:

How to find the volume of a truncated pyramid?

$V = \frac{1}{6} \times h \times (A_{base} + (a+c) \times (b+d) + A_{top}) = \frac{1}{6} \times h \times (a \times b + (a+c) \times (b+d) + c \times d)$

How to find the area of the base of a truncated pyramid?

$A_{base} = a \times b$

How to find the area of the top of a truncated pyramid?

$A_{top} = c \times d$

How to find the area of the plane *ac* of a truncated pyramid?[*]

$A_{ac} = \frac{1}{2} \times (a+c) \times slant_a = \frac{1}{2} \times (a+c) \times \sqrt{\frac{1}{4} \times (b-d)^2 + h^2}$

How to find the area of the plane *bd* of a truncated pyramid?[*]

$A_{bd} = \frac{1}{2} \times (b+d) \times slant_b = \frac{1}{2} \times (b+d) \times \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the lateral surface area of a truncated pyramid?[*]

$A_{lateral} = 2 \times A_{ac} + 2 \times A_{bd} = (a+c) \times slant_a + (b+d) \times slant_b = (a+c) \times \sqrt{\frac{1}{4} \times (b-d)^2 + h^2} + (b+d) \times \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the total surface area of a truncated pyramid?[*]

$A_{total} = A_{base} + A_{top} + A_{lateral} = a \times b + c \times d + 2 \times A_{ac} + 2 \times A_{bd} = a \times b + c \times d + (a+c) \times slant_a + (b+d) \times slant_b = a \times b + c \times d + (a+c) \times \sqrt{\frac{1}{4} \times (b-d)^2 + h^2} + (b+d) \times \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the perimeter of the base of a truncated pyramid?

$p_{base} = 2 \times (a+b)$

How to find the perimeter of the top of a truncated pyramid?

$p_{top} = 2 \times (c+d)$

How to find the length of the slant$_a$ of a truncated pyramid?*

$slant_a = \sqrt{\frac{1}{4} \times (b-d)^2 + h^2}$

How to find the length of the slant$_b$ of a truncated pyramid?*

$slant_b = \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the length of the edge of a truncated pyramid?*

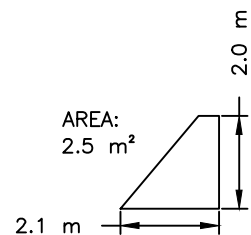$e = \sqrt{\frac{1}{4} \times (a-c)^2 + slant(a)^2} = \sqrt{\frac{1}{4} \times ((a-c)^2 + (b-d)^2) + h^2}$

where:

slant$_a$ is the distance between the pyramid's sides a and c;
slant$_b$ is the distance between the pyramid's sides b and d.

[*] denotes calculations that are valid for *right* rectangular truncated pyramids only.

Reference (ID: N/A)

1. I.N. Bronshtein, K.A. Semendyayev, Gerhard Musiol, Heiner Mühlig. Handbook of Mathematics 6th ed. Springer. Berlin, Heidelberg, New York. 2015. Last accessed: 29 August 2020 (amazon.com paid link).
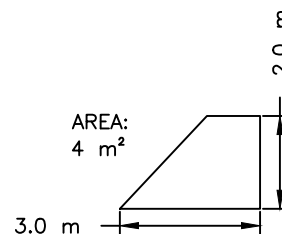
X

TRANSFER STATION
BUILDING

SITE DRAINAGE CONTAINMENT
3450 m² x 0.1 m = 345 m³
PLUS INTERCEPTOR VOLUME 36 m³
= 381 m³

Truncated (d)

3.8 m

4.0 m

8.0 m

Truncated (c)

7.0 m

4.0 m

45° m

15.0 m
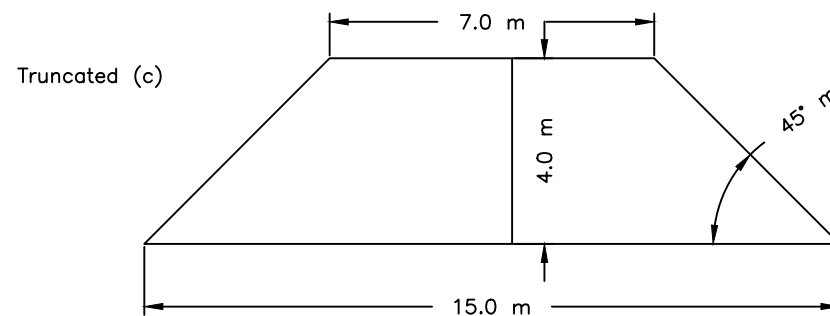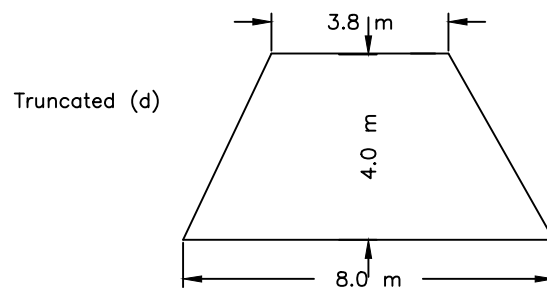
1. INCOMING WASTE = 270 m³
(REFER ALSO TRUNCATED PYRAMID CALCULATION)

AREA:
2.5 m²

2.0 m

2.1 m

2. FINES
AREA: 2.5 m² x 4 m = 10 m³

AREA:
4 m²

2.0 m

3.0 m

3. FE
AREA: 4 m² x 2 m = 8 m³

AREA:
4 m²

2.0 m

3.0 m
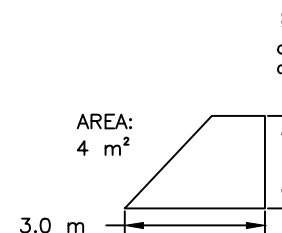
4 & 5. GENERAL WASTE
AREA: 4 m² x 3 m = 12 m³

YARD

AREA: 25 m²

4.0 m

8.3 m
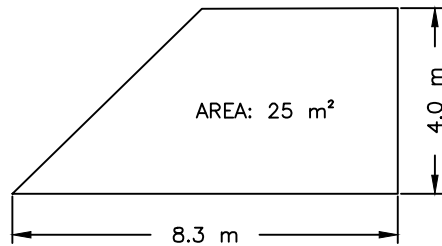
16. FINES IN YARD
AREA: 25 m² x 8.5 m = 212.5 m³

AREA: 25 m²

4.0 m

8.3 m
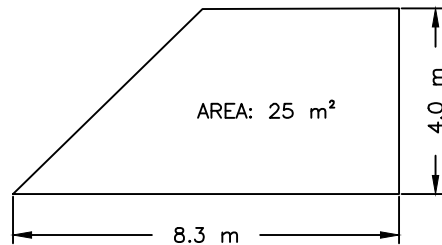
17. WOOD IN YARD
AREA: 25 m² x 5.4 m = 135 m³

AREA: 25 m²

4.0 m

8.3 m
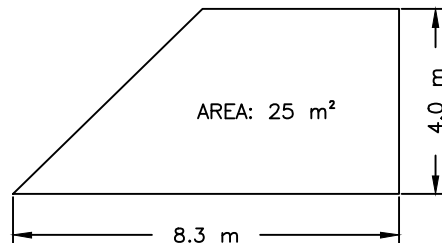
18. FINES IN YARD
AREA: 25 m² x 4.6 m = 115 m³

AREA: 3 m²

1.5 m

2.8 m
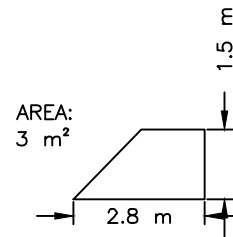
19. FINES IN YARD
AREA: 3 m² x 4.7 m = 14.1 m³

AREA: 17 m²

4.0 m

6.0 m
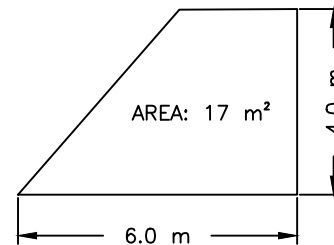
20. FINES IN YARD
AREA: 17 m² x 9.8 m = 166.6 m³

AREA: 16 m²

4.0 m

5.75 m

21. WOOD IN YARD
AREA: 16 m² x 16.5 m = 264 m³

Truncated (c)

2.0 m

4.0 m

45°

10.0 m

Truncated (d)

2.0 m

4.0 m

45°

10.0 m
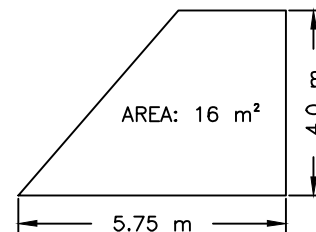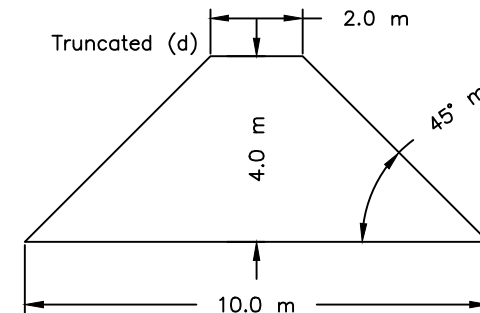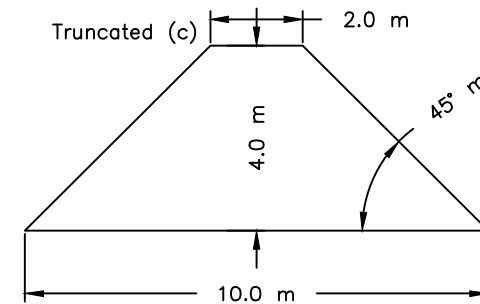
QUARANTINE AREA = 165 m³
(REFER ALSO TRUNCATED PYRAMID CALCULATION)

Truncated Pyramid Calculator
Calculate volume of a truncated rectangular pyramid
and surface areas, surface to volume ratio, lengths of slants and
length of edge for right truncated rectangular pyramids

Truncated pyramid or **frustum of a pyramid** is a pyramid whose vertex is cut away by a plane parallel to the base. The distance between the bottom and the top bases is the truncated pyramid height **h**. This page calculates volume of any truncated pyramid whose bottom and top bases are rectangles with sides **a**, **b** and **c**, **d** respectively. This truncated pyramid has 6 faces: base, top and 4 lateral faces.

Base a: 10 Base b: 10
Top c: 2 Top d: 2 Height h: 4 in: [meter   ▼]

precision: [2 ▼]   Surface to volume | Convert 165.33 meter³ to weight for: compounds | foods | gravels

☐ show all units   ☐ show all units

The volume of the truncated pyramid = **165.33**		The length of the edge of the truncated pyramid = **6.93**	
centimeter³	165 333 333.33	centimeter	692.82
inch³	10 089 259.02	inch	272.76
foot³	5 838.69	foot	22.73
meter³	**165.33**	**meter**	**6.93**

The surface to volume ratio of this truncated pyramid = **1.45**

Surface area to volume ratio is also known as *surface to volume ratio* and denoted as sa÷vol, where **sa** is the surface area and **vol** is the volume.

Unit	The area of the	
☐ all	base of the truncated pyramid = **100**	top of the truncated pyramid = **4**
centimeter²	1 000 000	40 000
foot²	1 076.39	43.06
inch²	155 000.31	6 200.01
meter²	**100**	**4**

Unit	The area of the plane	
☐ all	*ac* of the truncated pyramid = **33.94**	*bd* of the truncated pyramid = **33.94**
centimeter²	339 411.25	339 411.25
foot²	365.34	365.34
inch²	52 608.85	52 608.85
meter²	**33.94**	**33.94**

Unit	The lateral surface area of the truncated pyramid = **135.76**	The total surface area of the truncated pyramid = **239.76**
☐ all		
centimeter²	1 357 645.02	2 397 645.02
foot²	1 461.36	2 580.8
inch²	210 435.4	371 635.72
meter²	**135.76**	**239.76**

Unit	The length of the			
☐ all	base side a = **10**	base side b = **10**	top side c = **2**	top side d = **2**

Unit	The perimeter of the	
☐ all	base of the truncated pyramid	top of the truncated pyramid

Unit	The length of the		
☐ all	height h of the truncated pyramid	slant$_a$ of the truncated pyramid	slant$_b$ of the truncated pyramid

X

foot	32.81	32.81	6.56	6.56
inch	393.7	393.7	78.74	78.74
meter	**10**	**10**	**2**	**2**

centimeter	4 000	800
foot	131.23	26.25
inch	1 574.8	314.96
meter	**40**	**8**

centimeter	400	565.69	565.69
foot	13.12	18.56	18.56
inch	157.48	222.71	222.71
meter	**4**	**5.66**	**5.66**

About this page: *Truncated Pyramid Calculator*

Calculation formulas:

How to find the volume of a truncated pyramid?

$V = \frac{1}{6} \times h \times (A_{base} + (a+c) \times (b+d) + A_{top}) = \frac{1}{6} \times h \times (a \times b + (a+c) \times (b+d) + c \times d)$

How to find the area of the base of a truncated pyramid?

$A_{base} = a \times b$

How to find the area of the top of a truncated pyramid?

$A_{top} = c \times d$

How to find the area of the plane *ac* of a truncated pyramid?[*]

$A_{ac} = \frac{1}{2} \times (a+c) \times slant_a = \frac{1}{2} \times (a+c) \times \sqrt{\frac{1}{4} \times (b-d)^2 + h^2}$

How to find the area of the plane *bd* of a truncated pyramid?[*]

$A_{bd} = \frac{1}{2} \times (b+d) \times slant_b = \frac{1}{2} \times (b+d) \times \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the lateral surface area of a truncated pyramid?[*]

$A_{lateral} = 2 \times A_{ac} + 2 \times A_{bd} = (a+c) \times slant_a + (b+d) \times slant_b = (a+c) \times \sqrt{\frac{1}{4} \times (b-d)^2 + h^2} + (b+d) \times \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the total surface area of a truncated pyramid?[*]

$A_{total} = A_{base} + A_{top} + A_{lateral} = a \times b + c \times d + 2 \times A_{ac} + 2 \times A_{bd} = a \times b + c \times d + (a+c) \times slant_a + (b+d) \times slant_b = a \times b + c \times d + (a+c) \times \sqrt{\frac{1}{4} \times (b-d)^2 + h^2} + (b+d) \times \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the perimeter of the base of a truncated pyramid?

$p_{base} = 2 \times (a+b)$

How to find the perimeter of the top of a truncated pyramid?

$p_{top} = 2 \times (c+d)$

How to find the length of the slant$_a$ of a truncated pyramid?[*]

$slant_a = \sqrt{\frac{1}{4} \times (b-d)^2 + h^2}$

How to find the length of the slant$_b$ of a truncated pyramid?[*]

$slant_b = \sqrt{\frac{1}{4} \times (a-c)^2 + h^2}$

How to find the length of the edge of a truncated pyramid?[*]

$e = \sqrt{\frac{1}{4} \times (a-c)^2 + slant(a)^2} = \sqrt{\frac{1}{4} \times ((a-c)^2 + (b-d)^2) + h^2}$

where:

$slant_a$ is the distance between the pyramid's sides a and c;
$slant_b$ is the distance between the pyramid's sides b and d.

X

[*] denotes calculations that are valid for *right* rectangular truncated pyramids only.

Reference (ID: N/A)

1. I.N. Bronshtein, K.A. Semendyayev, Gerhard Musiol, Heiner Mühlig. Handbook of Mathematics 6th ed. Springer. Berlin, Heidelberg, New York. 2015. Last accessed: 29 August 2020 (amazon.com paid link).

X

APPENDIX D

EMS Procedures

Blackburn Skips Ltd: Waste Acceptance procedure

MIS-PRO-018

A method statement is to be produced in conjunction with a Task Related Risk Assessment. It should be specific and relevant to the job in hand and describe clearly the precautions and system of work identified during the risk assessment.

Persons Undertaking Task	All Staff
Description of Task	Waste acceptance
Frequency	Daily

1) When customers are booking skips, inform them what can go in the skip, 'No plasrterboard or hazardous wastes permitted, this includes fridges/freezers, Electrical items (WEEE), gas bottles etc.

2) On collection of full skips drivers are required to have a 'safe' look at the contents within the skip. This is to determine if the waste streams are as described on your waste transfer note (tablet) and that there are no potential hazardous wastes in the load. If unsure take pictures and ring the office. Who will confirm if can collect or if the customer needs to be informed of the discrepancy/ problem.

3) When traveling with a loaded skip ensure that the waste is contained in the skip to prevent it from escaping, this is achievable by collecting skips that are level loaded and by using nets. Secure nets/ easy sheets over the skips using the bungie cords attached.

4) Due to recent legislation changes/ updates, if upholstered furniture is in the skip you must update your tablet to indicate that it may include POPs. Inform the banksman when you are entering the transfer station and provisions will be made to remove the items before tipping and placing them in a specified bin.

5) Gas bottles found in skips at customer addresses must be removed before collecting the skip. If the customer is present ask them to remove it, if not and you can do so safely remove the bottle and place in a safe area. Take pictures of the bottle in the waste and where you have placed it when removed. update your tablet notes accordingly.

6) Upon receiving waste in the transfer station all loads tipped must have a picture taken. If discrepancies are found ie not matching the waste description update your tablet accordingly.

7) Hazardous wastes found in the waste must be quarantined immediately, inform the office and provisions will be made to remove from site as soon as possible to a suitable facility. Relevant persons will be informed from the office.

8) Waste wire is now under a RPS 276 (Regulatory Position Statement) by the Environment agency and unless proved (analysed) it is classed as hazardous waste. This must be removed from the waste pile and placed in a wire only bin before the pile is processed through the trommel system.

9) WEEE wastes are also classed as hazardous waste, small inconsequential items such as toasters, irons etc that are found in household skips can be placed in a WEEE waste skip and disposed of to a suitable facility.

10) Large items of WEEE waste ie fridges / freezers must be removed and placed in a suitable receptacle and not placed in the general scrap bay (gasses are released into the foam surrounding the fridge and could potentially be hazardous) again update tablet accordingly and the office will deal with the issue.

11) Due to legislation changes we no longer accept wood wastes that have the 'potential' to be hazardous, so wood produced before 2006 is classed as hazardous, along with railway sleepers, telegraph poles, tanalised woods (fence panels/ posts etc), barge boards etc. if any 'unsure' loads come into the transfer station, segregate from the other waste streams (put in a separate bin) and inform the office. Who will arrange return to customer or disposal at a suitable facility.

12) Plasterboard must not be processed through the trommel system, it must be kept separate of other waste streams. If you suspect that the waste you have brought in contains plasterboard inform the banksman and he will advise where to tip, tablets should be updated accordingly.

13) Wastes that come in that are particularly dry/dusty are to be damped down as tipping commences to avoid 'dust clouds' forming and escaping.

14) 'Smelly or offensive' wastes are to be loaded into a bin as soon as discovered and disposed of as soon as possible to a suitable facility. If this is an ongoing problem that occurs on a regular basis inform the office and an investigation will be carried out to rectify the problem before it becomes an issue. Customers will be informed accordingly.

15) Any increase in presence of pests or vermin are to be reported immediately to the office. Assured Environmental will be contacted to arrange additional visits (additional to the routine visits scheduled) until the problem has been rectified.

16) Daily walk round checks are to be completed and any issues logged in the site diary (a check list is located in the rear of the diary).

Precautions

As per task related Risk Assessment – HS- RA- 001– Skip and Container Movement

Hazard	Control Measure
Physical injury, possible fatality Cutting or severing; Entanglement; Trapping; Friction or abrasion; Projectile ejection;	Follow safe working methods as laid out above Drive and operate vehicles and attachments with due care and attention All employees must be adequately trained to carry out their task safely; Use appropriate PPE provided;
Working environment	All site rules must be practiced
Leptospirosis, Tetanus	Use good hygiene practices; use PPE provided; use push sticks and rakes;

Equipment Requirements
All equipment must be checked prior to use. Where certificates are required these must be valid and available for inspection

Equipment	Description
Vehicle Skip Container Plant Machinery	Large vehicle with lifting equipment Small to large containers for the collection of waste Rear opening large containers for the collection of waste. Fixed and mobile plant machinery in the waste transfer station.

Personal Protective Equipment Requirements
To be used as instructed and in line with Regulations

Steel toe-capped and mid soled safety shoes/boots with anti-slip soles
High visibility waistcoat or jacket to be kept fastened
Protective safety gloves
When required: - Dust mask : Hard Hat: safety glasses/ goggles

Specialist Competence Requirements

Statutory Inspections and Examinations: LOLER

Prepared By

Name in Capitals JACKIE MURPHY	Signature	**Date issued:11-03-2024** **Review Date: 10-03-2025**

When a spillage occurs:

Stop traffic/plant and personnel from entering the area of spillage and if necessary, evacuate the immediate area.

- Where possible, take immediate action to contain the spillage using spill kit located in the immediate area eg behind the seat of wagon /plant equipment, garage.
- Where large spillages cannot be realistically contained or where the substance is unknown, DO NOT attempt to clean up the spill, prevent the spillage from running into drains and water courses using spill kit and call your immediate supervisor.
- Ensure the appropriate Personnel Protective Equipment (PPE) is worn and the potential hazards are understood.
- Check the vicinity for injured or affected persons
- Barrier off the area or cordon the area off to avoid further spreading and injury to persons
- If the spillage is thought to have entered any drains or watercourses, the site supervisor must be consulted for advice and necessary actions to be taken.
- When the spillage has been satisfactorily contained the contaminated absorbent material must be disposed of in the correct manner i.e placed in the container located in the garage area, where it will be disposed of at an authorised disposal facility.
- The area affected must be swept clean, leaving the area free of any residue. Residue from steam/pressure cleaning must be contained and discharged via suitable separators.
- Label the disposal container with the waste description.
- Inform the site manager who will record the incident in the site diary and inform the regulatory authority if deemed necessary.

Drivers to **Ring Office** as soon as possible to log all details of incident: **01282 427770**

Contents of spill kit include:

1 x disposable gloves, to be put on before attempting to deal with the spill.

2 x socks, to be used first to contain the spill, (they will still create a barrier when soaked).

8 x pads to be used for final mop up once the spill is contained. (each pad holds approximately 1ltr of fluid).

1 x disposal bag and zip tie for placing used pads, socks and gloves into once the spillage has been dealt with.

Please remember that if you use any item from the kit, it will need replacing immediately. Inform the office or the garage.

Starling

Environmental

Limited