Department of
Agriculture,
Fisheries and Food
An Roinn
Talmhaíochta,
Iascaigh agus Bia

RNP 6-1 (Comp –33)

Mr Eamon Waters
Panda Waste
Rathdrinagh
Beauparc
Navan
Co Meath

31 August 2009

Re: 1st Stage Application to build a Composting Plant in accordance with the European Communities (TSE and Animal By-Products) Regulations (SI No 252 of 2008) as amended by S.I. No 291 of 2009

Dear Mr Waters

I wish to acknowledge receipt of your 1st stage application to build a Composting Plant at Rathdrinagh, Beauparc, Navan, Co Meath. Your application along with the documentation supplied has been forwarded to the Veterinary Inspectorate for assessment. It may be necessary to arrange a meeting to discuss the layout of your facility and the processing technology you intend using. If a meeting is required, I will be in contact with you shortly to make the necessary arrangements.

Please note construction of this new Plant should not commence until this application has been approved in principle, by this Department.

Also, only a copy of the first page of your 1st stage application has been submitted. Please be good enough to forward the original of this page directly to me, as soon as possible.

Yours sincerely

Geraldine Lanigan
Animal By-Products Section

cc Andrew Walsh

Department of Agriculture,
Fisheries and Food
An Roinn Talmhaíochta,
Iascaigh agus Bia

Pavilion B, Grattan Business Centre, Dublin Road, Portlaoise,Co Laois
Pailiún B, Ionan Gnó Grattan, Bóthar átha Cliath, Portlaoise, Co Laoise
Fax: 057 8694391

Department of Agriculture, Fisheries and Food
An Roinn Talmhaíochta, Iascaigh agus Bia

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Our Ref: RNP 6-1 COMP ☐☐☐
Date of Receipt: ☐☐☐☐☐☐☐☐

1st STAGE APPLICATION FORM

To build a Composting or Biogas Plant in accordance with Regulation EC No. 1774/2002 and European Communities (TSE and Animal By-Products) Regulations (S.I. No 252 of 2008)

The conditions for approval and operation of composting and biogas plants treating Animal by-Products in Ireland which is attached for your convenience, must be read before completing this application form

1. Applicant Details

Owner Name:	
PANDA WASTE	
Owner Address:	
RATHDRINAGH, BEAUPARC,	
NAVAN, CO. MEATH	
Registered Company Name:	
NURENDALE LTD	
Registered Company Address:	
RATHDRINAGH, BEAUPARC,	
NAVAN, CO. MEATH	
Registered Company Number:	115425
Telephone Number:	
Mobile Number:	
Email Address:	

Signature of Applicant: _____

(e.g. Owner or in the case of Corporate body, CEO, Managing Director or Company Secretary)

Position within the Company: _____

Date: ☐☐☐☐☐☐☐☐

Type of Plant: **COMPOSTING** [X] **BIOGAS** [X]
(Please tick relevant box)

DAFF SHOULD BE NOTIFIED IMMEDIATELY OF ANY CHANGES TO THE ABOVE INFORMATION

2. Plant Details

Plant Name:	PANDA BIO-WASTE TREATMENT FACILITY
Plant Address:	RATHDRINAGH, BEAUPARC, NAVAN, CO. MEATH

3. Consultant Details (if applicable)

Consultant Name:	DR ANDREW WALSH
Consultant Address:	CELTIC COMPOSTING SYSTEMS GEARAGH ROAD, BALLINACURRA MIDLETON, CO. CORK
Telephone Number:	021 4621721
Mobile Number:	086 3872139
Email Address:	awalsh@celticbioenergy.com

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1. Location	
National Grid Co-ordinates (XY) of the plant: 967366, 769351 — **Yes** [x] **No** [ ]	**YES** [ ] **NO** [ ]
Location maps of the plant to include details of distance from other premises/farms where farmed animals are kept and current use of the neighbouring land ..... **Yes** [x] **No** [ ]	**YES** [ ] **NO** [ ]
Details of type of fencing and security present or intended at the plant ..... **Yes** [x] **No** [ ]	**YES** [ ] **NO** [ ]
2. Site and Plant Plans	
Site map of the plant to include details of access roads and proposed perimeter fence location ..... **Yes** [x] **No** [ ]	**YES** [ ] **NO** [ ]
A premises plan and specifications showing internal layout of buildings, detailing the separate areas, i.e. reception area, processing area, curing/maturation area, designated area for cleaning and disinfection of vehicles including wheelwash facilities ..... **Yes** [x] **No** [ ]	**YES** [ ] **NO** [ ]

2. Site and Plant Plans contd.

Describe how the areas are physically separated**:**

The processes of material reception, biocell dry fermentation and tunnel composting (see appendix 1) occur indoors. This process takes approximately 10-11 weeks. At the end of the process the material is screened at 12mm using a trommel. The <12mm fraction is loaded into the three flow through tunnels where the 70^{o}C for one hour protocol is achieved. Once this has been achieved, the material is transfer through the back door using a separate loader into a fully isolated clean area where the material is quarantined, tested and stored prior to release. The >12mm material is either re-used in the process within the dirty area or transferred directly by conveyor to lorries for disposal to landfill or thermal treatment in accordance with DAFF MBT requirements.

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YES ☐ NO ☐

Describe the construction and drainage of the vehicle/container cleaning area:

The vehicle cleaning area consists of bunded concrete set down areas where vehicles exiting the dirty area of the building can be cleaned. This is achieved manually with the wheels of catering waste vehicles being power washed prior to exiting the building while any vehicles delivering former foodstuffs or Category 3 ABPs will be steam cleaned. The effluent from this area will discharge by sealed piping to the leachate storage tank for re-use in the process within the dirty area or for transfer off-site to a designated WWTP.

YES ☐ NO ☐

The plant plan must also indicate in different colour arrows, flow plans for the following:

- Feedstock flow plan from intake through to dispatch for both animal by-product and non- animal by-product materials …… **Yes** [x] **No** ☐ — YES ☐ NO ☐
- Flow plan for oversize/screening material ……..…… **Yes** [x] ☐ — YES ☐ NO ☐
- Personnel flow plan……..……**Yes** [x] **No** ☐ — YES ☐ NO ☐
- Machinery flow plans, including delivery, collection vehicles and on site vehicles……..…..... **Yes** [x] **No** ☐ — YES ☐ NO ☐
- Leachate/waste water flow plan …….. .**Yes** [x] **No** ☐ — YES ☐ NO ☐

(Please detail how and where waste water/leachate will be stored and treated in in accordance with environmental legislation)

The facility will be processing two primary feedstocks, i.e. MBT fines and source separated catering waste. These will initially be processed anaerobically within dry fermentation biocells and the "percolate" that will be generated will be captured and stored in separate tanks for re-use. Additional steel tanks will be provided to handle excess liquors. The leachate from tunnel composting, aerobic condensate and wash down of surfaces will be stored in separate tanks. This effluent will be re-used in the process. All excess process and wash down effluents will be transported to a designated wastewater treatment plant. As the facility is fully enclosed, there will not be any contaminated storm water. Roof water will be stored in a tank for grey water use on site. Pavement water will be directed to a soakaway via a petrol interceptor.

YES ☐ NO ☐

3. Intended Feedstock

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Will animal by-product feedstocks in excess of 5000 tonnes per annum be imported into your Plant (excluding manure/milk produced by animals on the same premises on which the Plant is located, i.e. 'own ABP')?……..……...**Yes**	x	**No**	**YES**	**NO**
Please indicate approximate quantities of imported ABP per annum: 50,000t			**YES**	**NO**
State the approximate quantities of 'own ABP', that will be used in the Plant per annum 0t			**YES**	**NO**

<u>Details of intended feedstock which the plant intend to accept and process/ transform including animal by-product and non animal by product material.</u>

<u>CATEGORY 2 MATERIAL</u> comprising the following:

• Manure (Article 5, 1 (a))……..…**Yes**		**No** x	**YES**	**NO**
• Digestive tract content separated from the digestive tract, (Article 5, 1 (a))……..……**Yes**		**No** x	**YES**	**NO**
• Milk (Article 5, 1 (c))…….……**Yes**		**No** x	**YES**	**NO**

<u>CATEGORY 3 MATERIAL</u> comprising the following:

• Catering waste which is defined as "all waste food including used cooking oil originating in restaurants, catering facilities and kitchens, including central kitchens and household kitchens." (Article 6, 1(f))……**Yes**	x	**No**	**YES**	**NO**
• Former foodstuffs of animal origin, or former foodstuffs containing products of animal origin, other than catering waste, which are no longer intended for human consumption for commercial reasons or due to problems of manufacturing or packaging defects or other defects, which do not present any risk to humans or animals, (Article 6,1(f))…...**Yes**	x	**No**	**YES**	**NO**
• Fish or other sea animals, except sea mammals, caught in the open sea for the purpose of fishmeal production (Article 6 1 (h)) ……..……**Yes**		**No** x	**YES**	**NO**
• Fresh by-products from fish from plants manufacturing fish products for human consumption (Article 6,1 (i))…...**Yes**		**No** x	**YES**	**NO**
• Raw milk originating from animals that do not show clinical signs of any disease communicable through that product to humans or animals (Article 6 1 (g) ……...**Yes**		**No** x	**YES**	**NO**
• Feathers (Article 6, 1(c)) ……..……**Yes**		**No** x	**YES**	**NO**
• Shells, hatchery by-products and cracked eggs by-products originating from animals which did not show clinical signs of any disease communicable through that product to humans or animals (Article 6 1 (j)) ……..……**Yes**		**No** x	**YES**	**NO**

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3. Intended Feedstock contd.

PROCESSED ANIMAL PROTEIN (PAP)

(Category 3 Meat and Bone meal) ……..…..**Yes** ☐ **No** ☒ x — **YES** ☐ **NO** ☐

If using processed animal protein, you must be in possession of an animal protein fertiliser licence. It is necessary when applying for approval, that this licence is applied for also ……**Yes** ☐ **No** ☒ x — **YES** ☐ **NO** ☐

NON ANIMAL BY-PRODUCT MATERIAL

(Please specify types and approximate quantities)

YES ☐ **NO** ☐

4. Intended end-use of compost/digestate

Details of proposed end-use for all product from the plant.

12mm compost derived from source-separated catering waste and source separated former food stuffs: Horticulture, home gardening and landscaping. 12mm compost-like output (CLO) from MBT line: landfill cover and land remediation (not agricultural), and/or thermal treatment. >12mm oversize reject material from both source separated and MBT lines: landfill void as stabilised bio-waste and/or thermal treatment

YES ☐ **NO** ☐

6. Processing Parameters

Details of the time, temperature and particle size parameters which the plant will use to process the feedstock

(Refer to conditions document before completing this section)

PROCESSING PARAMETERS

Processing Standard	Time	Temperature	Particle Size	(Please tick the relevant box)
EU Standard	**60 mins**	**70 degrees C**	**= or <12mm**	X
National Standard	**48 hrs twice**	**60 degrees C**	**= or <400mm**	
Alternative Standard (Please detail proposed processing standards.)				

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YES ☐ **NO** ☐

7. Processing Technology

Details of the intended plant design and processing technology. Information on how time, temperature and particle size parameters will be met and recorded must be included.

(Any additional information may be attached to this application form)

See Appendix 1 attached

YES ☐ **NO** ☐

Will the Plant be operated on a batch processing basis? **Yes** [x] **No** ☐

YES ☐ **NO** ☐

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7. End Product Is it intended to place the end product on the market? **Yes** [x] **No** [ ]	**YES** [ ] **NO** [ ]
8. Any other relevant information Any other information the applicant may consider relevant.	
	YES [ ] **NO** [ ]

ADDITIONAL INFORMATION SHOULD BE SUBMITTED SEPARATELY

Applications submitted as follows:

- **Incomplete**
- **Containing insufficient information**
- **With subsequent amendments**

will be returned to the applicant and a fully completed revised application must be re-submitted.

Completed applications should be sent in duplicate to:

Animal By-Products Section,
Department of Agriculture, Fisheries and Food,
Pavilion B,
Grattan Business Centre,
Dublin Road,
Portlaoise,
Co. Laois.

Telephone: 057 8694343

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VI RECOMMENDATION

Reject……	☐	**Less than 5000 tonnes per annum Plant……..**	☐
Additional information required….	☐	**Greater than 5000 tonnes per annum Plant….**	☐
Approve in Principle……..…	☐		

VI Signature: _____ **Date:** _____

Name:
(BLOCK LETTERS) _____

SVI Signature: _____ **Date:** _____

Name:
(BLOCK LETTERS) _____

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VI Comments: _____

_____

_____

_____

VI Signature: _____ **Date:** _____

SVI Comments: _____

_____

_____

_____

SVI Signature: _____ **Date:** _____

Appendix 1

Panda Waste ABPR Process Description
Draft for Discussion

Version Control

Author	Review	Version	Date
Andrew Walsh	Michael O'Gorman	Draft for discussion v1.0	17 August 2009

Table of Contents

1 Panda Waste ABPR Process Description

1.1 Introduction

Panda Waste plays a significant role in the management of MSW in the North East of Ireland. In brief, a fully enclosed facility has been designed that is capable of processing the following broad categories of bio-waste:

1. Source-separated bio-waste
   The dry source-separated bio-waste is dry digested within dry anaerobic digestion (AD) fermentation biocells with their solid-state digestate being post composted within a tunnel composting system. Finally the composted material is screened and pasteurised.

2. Mixed waste fines
   The dry mixed waste fines are similarly processed within dry fermentation biocells with the resultant solid-state digestate being post composted within a tunnel composting system with similar back end pasteurisation of the stabilised bio-waste in accordance with DAFF requirements.

Both dry fermentation and in vessel composting systems provide full enclosure of the bio-waste throughout the process. As a result, maximum control of emissions is provided for with no contaminated storm water being generated as all process liquors are contained. As the process is conducted using solid state materials with post-fermentation composting prior to pasteurisation, it is assumed that the ABPR licensing of the facility will be broadly in accordance with the composting guidance and hygenisation requirements.

1.2 Waste Quantities and European Waste Codes (EWC)

The proposed development is a combination dry AD designed to process a total capacity of 50,000 tonnes per year of ABPs

30-40,000 tpa of MBT fines (EWC 20 03 01)
10-20,000 tpa of source separated domestic and commercial catering waste (EWC 20 01 08)

1.3 Overview of Development Components

The following is a list of the major structural components of the development

- Waste reception hall

- Tipping and mixing area
- 14 no. Fermentation Chambers (30m x 7m x 5m)
- 8 no. Aerobic Composting Tunnels (30m x 7m x 5m) with single doors
- 3no. Pasteurisation Tunnels (20m x 7m x 5m) with double doors
- Compost screen
- Compost Storage Building
- 1no. Biofilter
- 1no. CHP Engine

1.4 Overview of Waste Flow

The input materials to be processed at this facility can be divided into two categories namely MBT fines and source separated food waste (domestic and commercial brown bin). The bio-stabilised MBT fines are ultimately destined for the landfill void or thermal treatment as Refuse Derived Fuel (RDF) whereas the source separated food waste will be transformed into a finished compost / fertiliser to be used in horticulture and landscaping. The source separated food waste will be processed separately from the MBT fines to ensure there is no cross contamination in terms of physical contaminants and heavy metals to the finished compost. Other than these issues, both input materials are processed identically from an ABPR perspective.

The MBT fines will be delivered into a dedicated section of the reception building and will be stockpiled until such time as the volume of feedstock is sufficient to half fill a fermentation chamber (225-325 m^3). Fermentation chambers numbered 1 to 7 are dedicated to processing MBT fines.

The source separated food waste will also be delivered into a dedicated section of the reception building and stock piled in a similar fashion to the MBT fines. Fermentation chambers 8 to 14 are dedicated to processing all types of high solids source-separated materials.

The feedstock remains within the dry fermentation chambers for 28 day cycles before unloading. When unloaded, 50% of the feedstock is mixed with fresh incoming feedstock and reloaded into the fermentation chamber for another 28 day cycle and 50% is transferred on to the tunnel composting phase of the process. In this way the mean retention time of a particle within the fermentation tunnels approaches 56 days.

Post fermentation, the feedstock is loaded into the composting tunnels for a further 21-28 days of aerobic maturation and bio-drying.

The dried composted feedstock is next screened at 50mm and subsequently 12mm. The overs from the 50mm screen will be directed to the landfill void as stabilised bio-waste while the overs from the 12mm screen will be recycled back into the composting process to act as a bulking agent for fresh material exiting the dry fermentation process. The unders from the 12mm screen will

be transferred to the solid state pasteuriser where they will be heated to 70°C for 60 continuous minutes in compliance with DAFF animal by-product regulations. This heating is facilitated through the use of biogenic heat supplemented with excess CHP heat. Samples for laboratory testing will be taken from the mass after the time/temperature protocol has been achieved. The operational logistics of the plant allow for a residence time within the pasteurisers of >7 days, consequently the material can be stored in the pasteurisation units while awaiting the laboratory results and will only be allowed out of the pasteurisers when the pathogen results are received.

Accordingly, the pasteurised compost that is retrieved from the rear of the pasteurisation tunnel will be stored in the enclosed compost storage area. The MBT output is stored separately from the source-separated compost. It is expected that the source-separated compost will be transferred off site for end use in horticulture and/or agriculture while the 12 mm MBT output will be used as landfill cover or as a refuse derived fuel (RDF).

1.5 Waste Reception and Pre-Treatment

The reception and pre-treatment of the bio-waste will occur within the waste reception building. The reception and pre-treatment method employed will vary depending on the incoming feedstock.

1.5.1 MBT Fines (Dry inputs)

The MBT fines consist of organic rich material that has been mechanically extracted from mixed waste delivered to the adjacent material recovery facility (MRF). The mixed waste is shredded and screened at 50mm within the MRF (building no. 3) and the fines (Figure 1) are transferred to the bio-waste building either by fully enclosed vermin proof conveyor or by hook-lift lorry. These fines are destined for the dry AD processing stream and will be delivered to the facility in a form that will not require any further pre-processing. The MBT fines will be stockpiled in a dedicated section of the reception building until such time as the volume of feedstock is sufficient to half fill a fermentation chamber (225-325 m^3).

Figure 1 Typical MBT fines produced from black bin municipal waste

1.5.2 Domestic Co-mingled Food & Green Bio-Waste (Dry inputs)

The combined domestic and commercial food and green bio-waste feedstock will be delivered to the facility by refuse lorry and or transfer trailer in a form directly suitable for dry AD. Consequently, this material is directly tipped onto the reception building floor and then contained within a dedicated reception area (Figure 2). As was the case with the MBT fines, this dry material will be stockpiled in the reception area until such time as there is an adequate supply to make a 50-50 mixture with the partially fermented contents of a recently unloaded fermentation chamber.

Figure 2 Bio-waste being tipped at the Broadpath in-vessel composting facility in Devon (left) and material being held prior to processing (right).

1.6 The Dry Anaerobic Digestion Process

Dry digestion is well suited to dealing with stackable bio-waste with high solids levels, (20% total solids and above) and high levels of physical contamination. Co-mingled brown bin material and MSW fines are typically stackable, have a high total solids content and are physically contaminated, consequently they are ideally suited to process via dry AD.

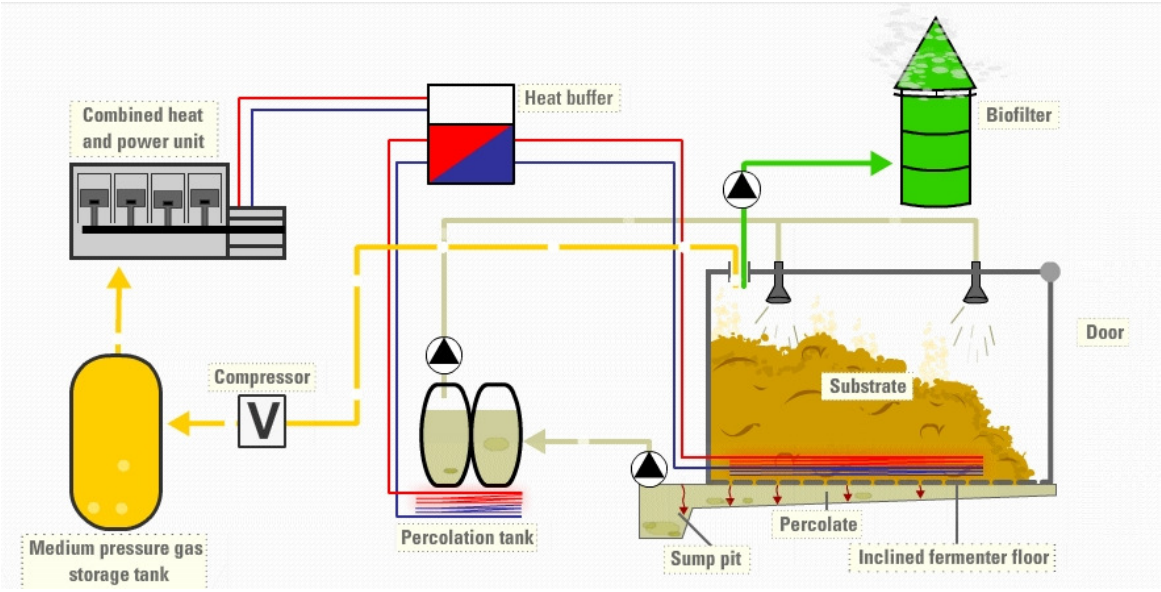

Figure 3 Schematic of the Bioferm dry fermentation system

The system is modular with increasing tonnages of material being managed by additional fermenters. The fermenters are typically 30m long, 7m wide with an internal stacking height of 3.5m. Each fermenter can typically process 2,500 tonnes of bio-waste per year. Due to the cyclical nature of the biogas production process, the minimum number of fermenters is three. This ensures that there is always biogas available to feed the CHP (Figure 8).

The process of dry fermentation is based on the following procedural steps:

1. Supply and storage of biomass
2. Fermentation
3. Extraction of digestate
4. Ventilation system
5. Gas utilization

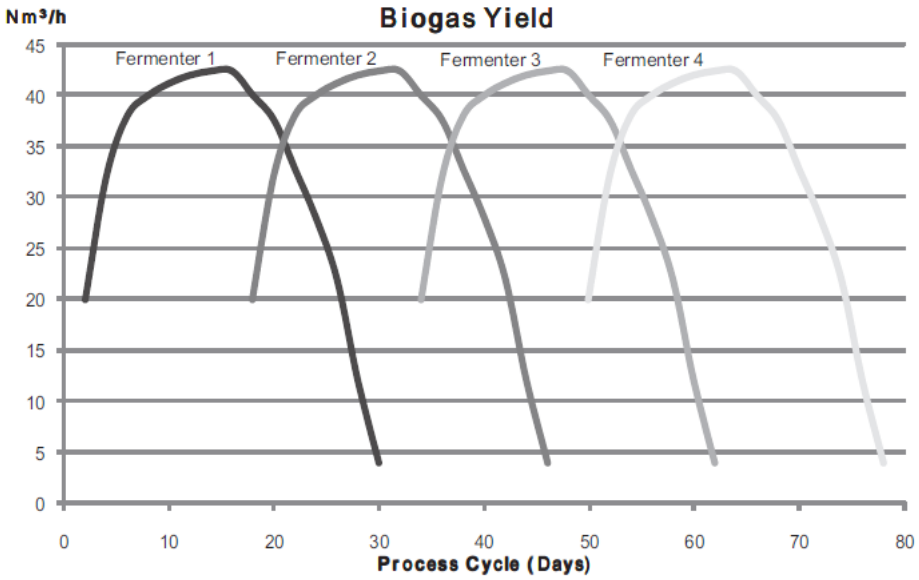

Figure 4 Typical biogas production cycle from a four fermenter facility

1.6.1 Supply and Storage of Biomass

When the plant is operational the supply of biomass to the fermentation chamber is based on a 28 day cycle. When a chamber is ready for fresh biomass the first step of the exchange requires the extraction of the partially fermented biomass within the chamber. One portion of the extracted biomass is kept on the building floor and then mixed in an approximate ratio with fresh biomass using a front loader. This ratio will be dictated by the tonnage of material being delivered to the facility and may fluctuate to accommodate seasonal peaks but is expected to be a 50-50 split.

Figure 5 Filling of a fermentation chamber with Bio-waste

1.6.2 The Fermentation Chambers

Each of the individual fermentation chamber units has inner floor dimensions of 7m x 30m with an internal height of 5m. The height of the stacked biomass however, must not exceed 4.0 meters and this is typically managed at 3.5m. The reinforced concrete fermentation chamber is gas tight to prevent the infiltration of oxygen (the presence of which would cause the methane producing bacteria to become inactive). This also prevents the leakage of biogas. An in-floor heating system holds the biomass at a constant temperature of 37-40℃. The plant engineering components are located in a dedicated technology section housed above the fermenters, the capture and storage of biogas is managed through a stainless steel piped biogas ventilation system while short to medium term gas storage bags are also located above the fermentation chambers. The percolate from the fermenters is stored in two sealed, insulated and heated tanks.

Figure 6 Interior of fermenter prior to filling (left) and with bio-waste prior to fermenter sealing.

To insure that the fermentation chamber is not opened before the methane gas is completely drawn from the chamber and safe atmospheric levels of CO_2 and H_2S are reached, the air inside the chamber is continuously measured and analysed. The values are communicated to the computerized security system controlling the chamber doors. With the exception of loading and unloading biomass from the fermentation chambers the entire plant is fully automated by PLC. Interruptions are immediately recognised and documented.

1.6.3 Gas Measurement and Storage

After loading the fermentation chambers, the biomass is kept undisturbed for a period of approximately four weeks, during which time the biomass is anaerobically fermented and biogas is produced. The gas quality (CH_4, CO_2, H_2S and O_2) is determined with a gas analysis device and communicated to the PLC system and the Siemens SCADA software interface. The plant operating parameters such as temperature, pressure, gas quantity and quality are stored in a database. Percolate quantity, valve and plant conditions (fermentation chamber, gas storage, CHP) are monitored via the PLC.

The biogas is extracted from the chamber with an explosion and leak proof ventilation mechanism and it is routed into the gas storage unit located on top of the fermentation chambers (Figure 7). The internal pressure of the gas storage unit under normal operating conditions is maintained at a maximum of 5 mbar. For safety reasons the internal pressure of the gas storage unit must never exceed 25 mbar. This is controlled by the PLC with a further mechanical pressure relief valve that routes the excess biogas to a flare. The gas storage bag is designed with enough capacity to buffer the biogas even during offline maintenance works on the degasification units of the plant or the CHP unit. When the degasification unit or the CHP unit comes back online the buffered gas can be reprocessed. Under normal operation the gas storage units are loaded to a maximal of 30 - 40 % of capacity via the level control sensor to guarantee enough buffer capacity for operational disturbances.

Continuous measurement of CH_4, CO_2, H_2S and O_2 levels and gas volume for each individual fermentation chamber as well as the volume and composition of the mixed gas in the gas storage unit is carried out to monitor the line operation. This is essential for optimal control of all processes and any interruptions can be detected and prevented at an early stage.

Figure 7 The pneumatic gas collection system on the roof of the fermenters (left) and the gas transfer blower to the gas bag (right).

A fermentation chamber gas extraction unit consisting of the following components is attached to each fermentation chamber on a gas tight ceiling conduit:

- Valve to the CHP
- Valve for the gas collection pipes with gas meter.
- Hydraulic safety valve for vacuum and pressure gauge

1.7 CHP

The CHP unit is supplied with biogas from the respective gas storage units via an individual gas control valve and gas compressor. The CHP units are installed in a separate, noise dampened containerised unit (Figure 8). The electricity produced by the CHP units is fed into the public grid and/or used for internal consumption. The thermal energy generated by the CHP units is needed in small amounts as process heat (approx. 5 %) in the plant (in-floor heating of wet and dry fermentation chambers, heating of buildings etc.); the surplus thermal energy can be provided for external thermal use. In cases where the thermal energy is not used, the CHPs are equipped with a standard emergency cooling mechanism.

Figure 8 Containerised CHP at the Decker biogas plant in Northern Germany

The accessories to the gas engines include the compressors, fire and smoke detectors within the room, a separate electrical control cabinet and remote control that enable the supplier to check the biogas engines on a daily basis or according to requirements. Exhaust gas emissions will be in accordance with European standards. Details can be adjusted for local requirements. Noise and exhaust gas quality are based on European regulations. All the safety design is according to German Safety Regulations for Agricultural Biogas Plants. In a situation where the gas engines are out of operation due to maintenance or repair, an emergency flare burns the surplus biogas. The emergency flare has a fully covered flame and is automatically turned on by the level control of the gas holder. It burns biogas at about 800 – 850 ℃ and follows international standards for this duty.

1.8 The Composting Process

1.8.1 The Compost Tunnels

Eight aerobic tunnels are provided (30m x 7m x 5m) to post process the dry AD fermenter output for both the MBT and source separated outputs from dry fermentation. The tunnels are constructed from re-enforced concrete designed to withstand strong chemical attack and high abrasion. They are sealed by insulated stainless steel lined sliding doors. The tunnels are equipped with a proprietary “C:N” aerated floor system with a computer controlled blower system that is mounted in a gallery on the roof of the tunnels overlooking the tunnel loading area. Approximately 50% of the output from the fermenters is transferred to the aerobic composting tunnels on each cycle and the material is mixed with screen overs to inoculate the material with aerobes.

This material is then stacked within the composting tunnels and aerated. The material readily de-waters and the aerobic microbial population rapidly increases. This is reflected by the autothermic increase in temperature of the biomass into the thermophilic range.

Figure 9 Exterior of the composting biocells illustrating the sliding doors (left) and the proprietary C:N in-pavement aeration system (right).

1.8.2 Control of the Composting Process

The composting process for the tunnels is controlled by a PLC / PC interface, which dictates the airflow within the biomass. The flow of air responds to temperature, pressure and oxygen changes in the composting mass that are continuously recorded by the PLC.

At the beginning of the process, when the composting mass is heating up, the computer system is in "oxygenation" mode. Here the process control system is programmed to blow air into the vessels on a periodic basis to maintain adequate oxygen levels and stimulate the growth of aerobic bacteria. A diagram of the aeration system is illustrated below.

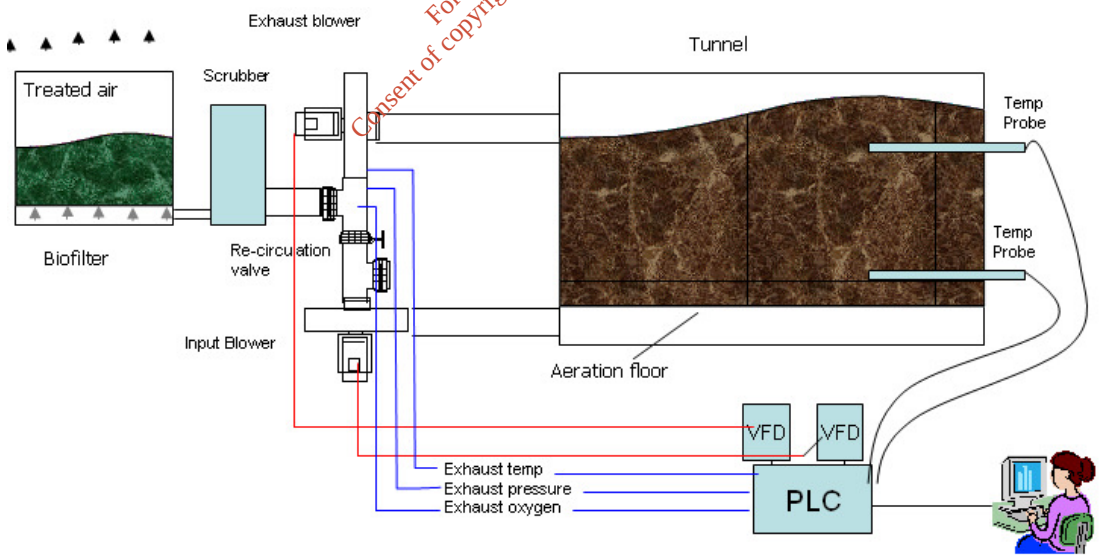

Figure 10 Schematic of the CCS PLC controlled biocell aeration system.

The PLC coupled with a windows based PC computer allows the operator to configure a temperature profile for the 21-28 days of post fermentation composting and bio-drying. This allows the temperature within the biomass to be controlled within set limits while excess moisture is driven off. Typically the

compost would be turned within 7-10 days to break up compaction during this aerobic stage. At the end of this period, a compost at Rottgrade IV will be produced with a moisture content of 35-40% that is then retrieved from the composting tunnels for screening.

Figure 11 The blower modules in the gallery of the Deepmoor tunnel composting facility in Devon

1.8.3 Compost Screening and Product Storage

The screening plant is housed within the main building to ensure that there are no fugitive emissions of odorous air during the screening operation. In order to achieve ABPR compliance, both MBT and source separated materials will be screened at 12mm. The overs from the MBT line will be landfilled as stabilised bio-waste or used as RDF, while a proportion of the source separated overs will be used to inoculate the digestate prior to tunnel composting. The unders from the 12mm screen will be segregated for pasteurisation.

Figure 12 Housed trommel screen illustrating multiple sections that produce different grades of compost and overs.

1.8.4 Compost Pasteurisation

The trommel screen will produce a fine grain 12mm compost fraction from both MBT and source separated lines. This material will be loaded into three dedicated pasteurisation tunnels that are aerated under maximum re-circulation. It has been demonstrated that recently screened compost will generate a short period of increased microbial activity due to the physical abrasion resulting from screening. As a result, this compost will reach high temperatures (60-80^{o}C) in the following days if oxygen is supplied. This is facilitated within the controlled tunnel environment and while temperatures in excess of 70^{o}C can be expected in the following 48 hours, additional heat can be introduced from the CHP heat exchanger that is connected to the input blower as a fail safe feature.

After the pasteurisation set points have been achieved, the blowers automatically revert to heat exchange mode to bring the temperature down and thus facilitate further mesophylic maturation during the remaining 4-7 days. This also ensures that when the compost is retrieved from the back door of the pasteurisation tunnels odour is all but eliminated.

Once the time/temperature set point has been achieved for a given pasteurisation tunnel, samples of the compost are retrieved from the material in situ within the tunnels from inspection hatches on the roof. The compost material is then only released when the pathogen criteria are found to be within the prescribed ABPR limits.

An area at the back of the facility has been designated for compost storage prior to release off site. The area will allow for approximately 2-3 weeks of compost storage to allow quarantine and seasonal demand issues.

1.9 Leachate and Surface Water Management

The drainage arrangement is illustrated in drawing 007. The facility will generate a number of effluents that will require management:

(1) Wheel wash effluent & reception building wash down
As a steam cleaner will be used to clean the wheels of exiting vehicles, potentially harmful disinfectants will be avoided. Due to the MBT nature of the facility, this wash down plus the general building floor wash down will be discharged to the leachate tank.

(2) Dry fermentation percolate
The dry fermentation process is facilitated by the “percolate cycle”. This involves the spraying of the biomass with an activated anaerobic sludge that is developed in a separate heated tank. This percolate inoculates the biomass while keeping it moist (>70% moisture). The bathing of the biomass in this activated percolate is key to the process.

In order to drain off excess percolate, a series of stainless steel gutters of 1 m length each with grating are built into the fermentation chamber floor. They absorb excess liquid from percolate sprinkling and route it in a controlled way to a gas tight pipe collection system. The fermentation liquid is pressure pumped into an insulated percolate storage unit. The entire piping system is routed in a frost-proof zone outside the fermentation chamber area.

This percolate storage unit is installed with capacity to hold enough percolate for the entire fermentation process. The percolate storage unit is heated via a heat exchanger attached to the CHP unit. The percolate is pumped back to the individual fermentation chambers via HDPE pressure pipes. The percolate pipes route to the sprinkling unit of the fermentation chambers through gas tight ceiling ducts. Excessively wet input substrates may result in the production of excess percolate that is pumped to the effluent storage tank for transfer off site to a WWTP.

(3) Composting tunnel leachate
The leachate from the tunnels is discharged to the leachate storage tank.

(4) Biofilter condensate
The biofilter condensate will be discharged to the leachate tank.

(5) Clean storm water from roofs
This clean water will be discharged to a storage tank for grey water re-use.

(6)Pavement water will be directed to soak-away via a petrol interceptor

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Department of Agriculture, Fisheries and Food,
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17 August 2009

Panda Bio-Waste Treatment facility – Animal By-Products Stage 1 Application

Dear Geraldine,

Please find attached a "1st Stage Application Form" submitted on behalf of Panda Waste for a bio-waste treatment facility to be located in Rathdrinagh, Beauparc, Navan Co. Meath.

The application consists of the following documents and drawings

Composting & Biogas 1st Stage Application Form
ABPR Drawing 001 – Facility Floor Plan
ABPR Drawing 002 – Facility Elevations
ABPR Drawing 003 – Facility Fencing

ABPR Drawing 004 – Facility Logistics
ABPR Drawing 005 – Internal Vehicle Logistics
ABPR Drawing 006 – Personnel Logistics
ABPR Drawing 007 – Effluent Segregation
ABPR Drawing 008 – Site Location Map
Appendix 1 Process Description Document
Appendix 2 Details of the Stock Proof Fencing to be used

If you have any questions or concerns regarding any of the above don't hesitate to contact me.

Best Regards,

Dr. Andrew Walsh

Directors:
A.R. Walsh *Nat.Cert., Nat.Dip., BSc., MSc., PhD*
J. Twomey *B.Eng, Mark O'Donovan B.Eng, Michael Murray*

Registered in Ireland No. 350269
VAT Registration No. 6370269Q /845 8537 86(UK)

Appendix 2

STOCK PROOF FENCING TO BE USED AT THE PANDA BIOLOGICAL TREATMENT FACILITY.

The proposed facility is adjoined to the east and south by land to which farmed animals have, or may have access. These boundaries will be surrounded by double fencing as per DAFF specification. A minimum distance of two metres between each fence will be maintained.

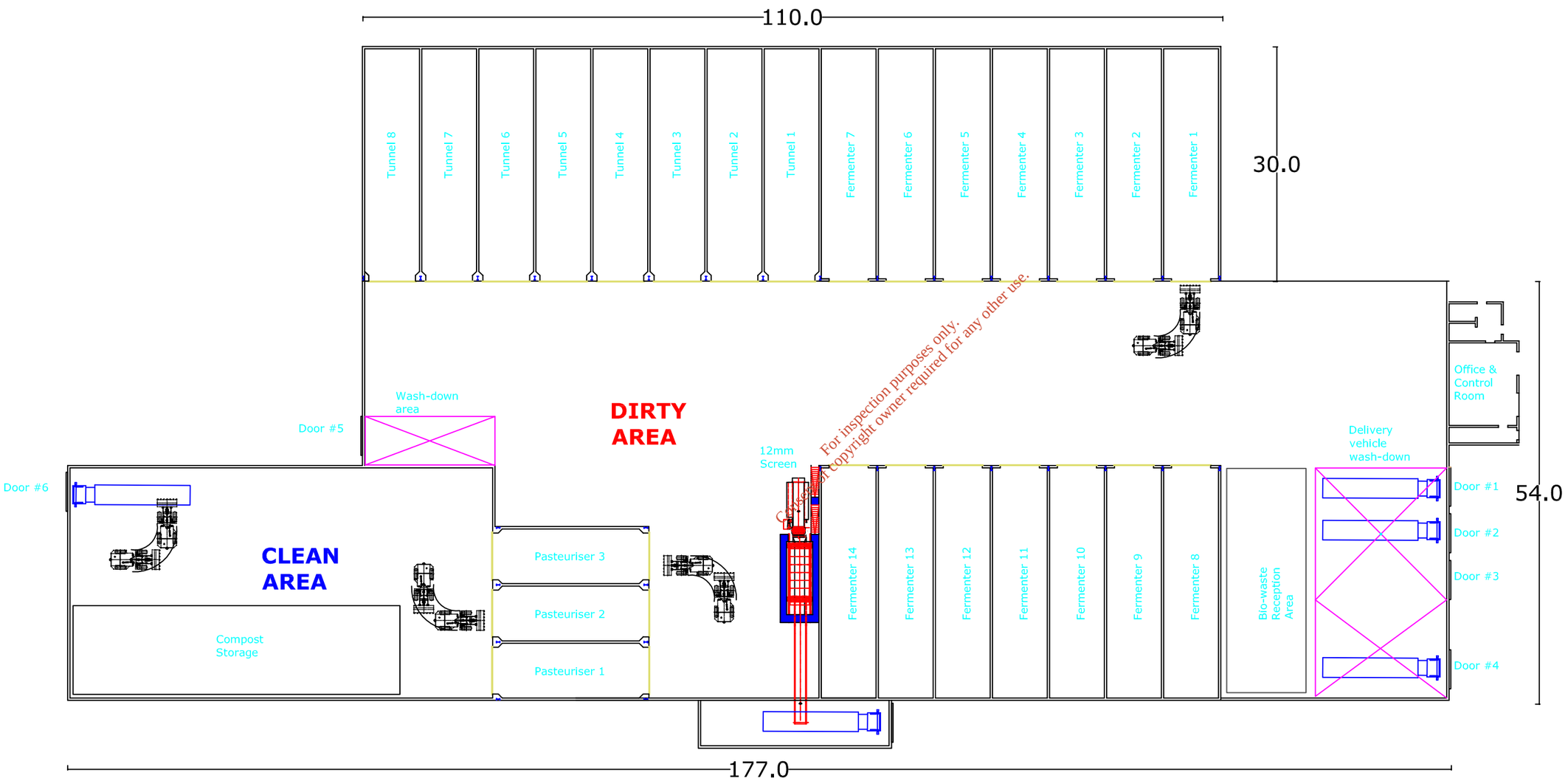
(1) The inside fence will be constructed as follows:

Permanent animal-proof fencing of a minimum height of 1.8 metres or as otherwise specified by DAFF. The posts will be 2.3 m long of galvanised tubular steel, 75mm outside diameter, and 3.2 mm thick.The uprights and strainers will be embedded in 0.5m square concrete bases, not more than 3.0m apart. Four strands of 3.2 mm plain wire shall be strained, and stapled or tied to the uprights with tying wire. Chain link fencing, 2.5mm, (to IS 130:1980), 1.8m high, shall be secured to the outside of the line wires over entire fence. One strand of 1.5mm barbed wire shall be placed along the top of the fence.

A gate 1.8m high, of galvanised steel, with closing bolts and locks shall be fitted at the entrance to the Plant. The only horizontal bars shall be at the top and bottom of the gates. Chain-link fencing shall be fitted to the outside of the gates. The gates shall be designed such that neither people nor animals can get through or under when closed.

(2) The outside fence will be of a permanent nature and be stock proof.

The proposed facility is adjoined to the west and north by land to which farmed animals do not have access as these lands are occupied by an existed waste management and recycling facility owned by Panda Waste. These boundaries will be surrounded by a single fencing as per DAFF specification for the inside fence described above.



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Rev.	Drawn	Chk'd	Chk'd	Apprvd.	Description:
Dr. A. Walsh	A. Pihurov				Issue for Discussion/Review 08/2009

Name of Client: Panda Waste

Name of Job: Bio-Waste Facility

Title of Drawing: Floor Plan

Scales Used: NTS

Dwg. No. CCS/Job024/001
ABPR

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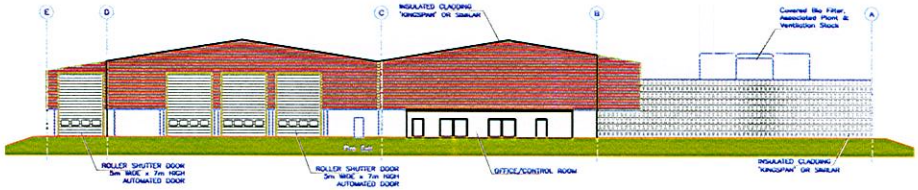
North Elevation
Scale 1:200



South Elevation
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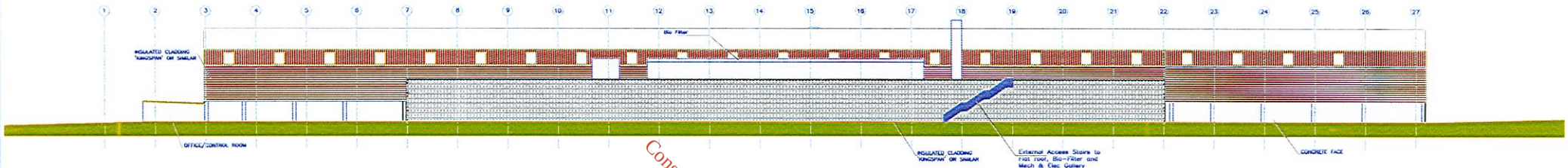
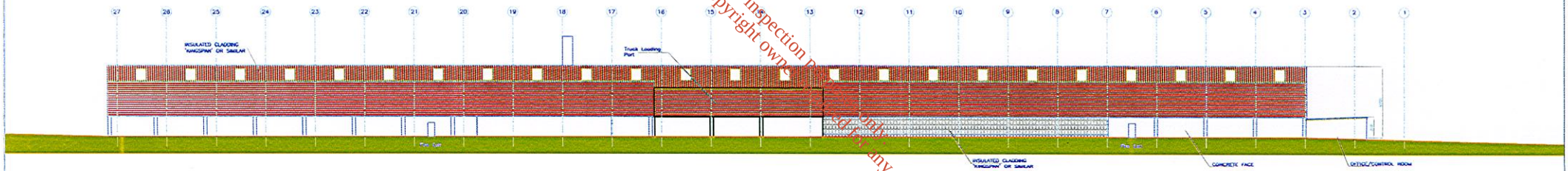
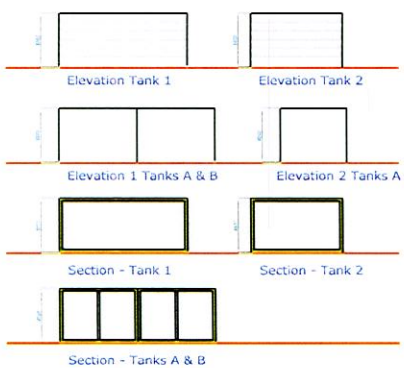


East Elevation
Scale 1:200



West Elevation
Scale 1:200



Percolation Tanks
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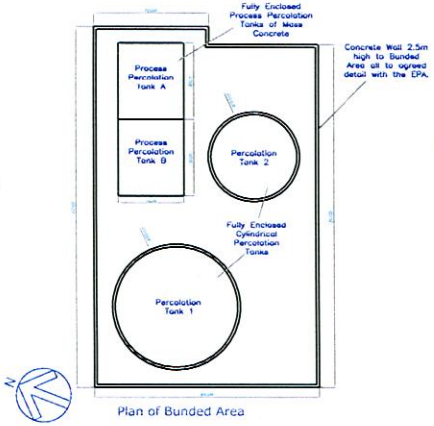
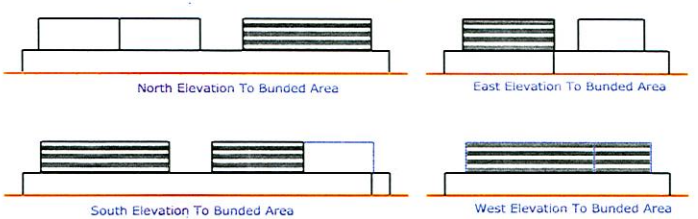


Plan of Bunded Area

Section A-A
Scale 1:200



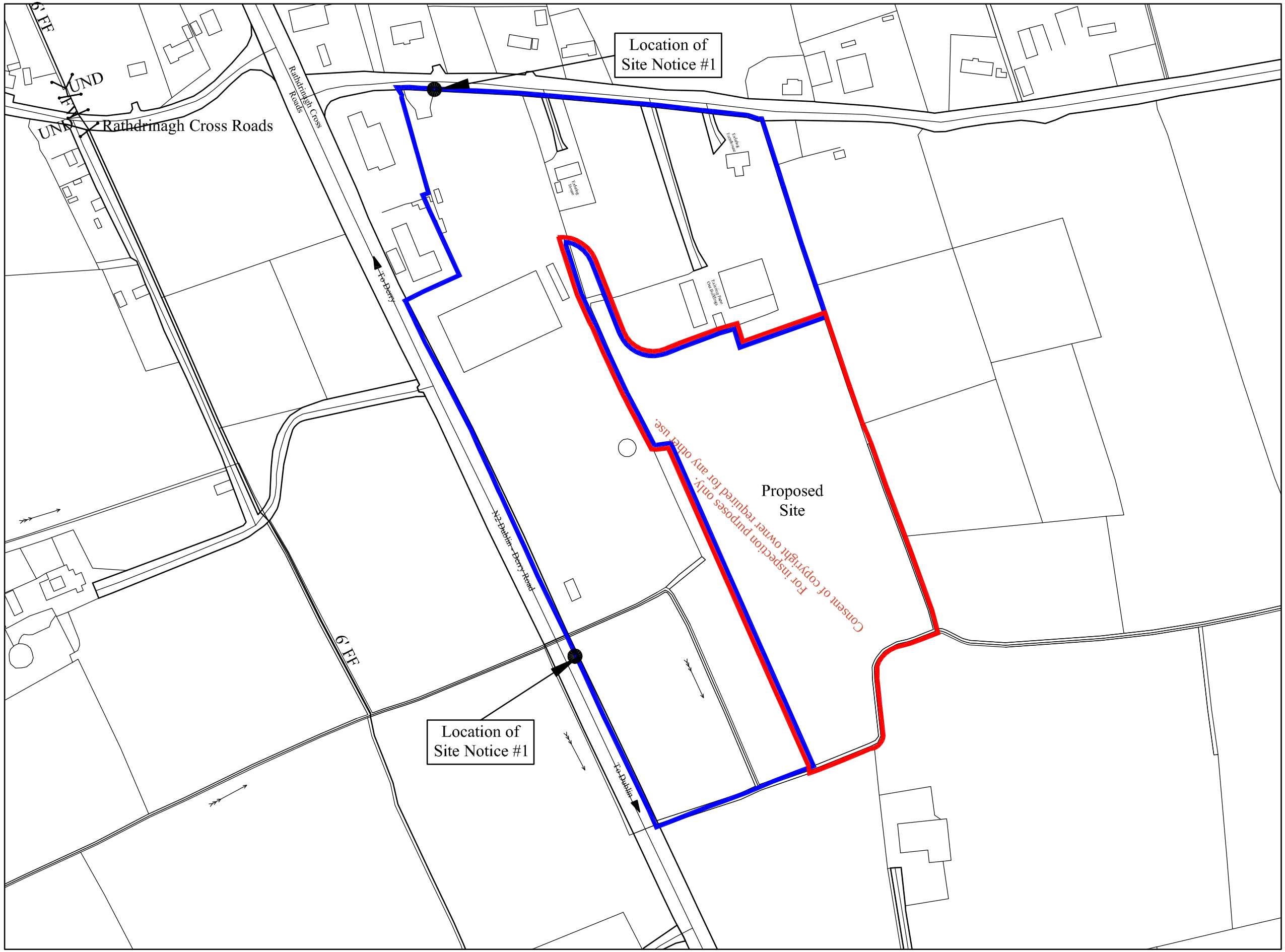
No.	REVISION	DATE

GAP architects

Nurendale Ltd.
(PANDA Waste)
Rathdonagh, Beauparc,
Navan, Co. Meath.

Phase IV
Recycling Facility

Building Elevs & Sec Tank Plan Elev & Sec	1:200 @ A0 N.T.S. @ A3	S. Hill
2009-101-201	June 2009	Planning



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ITM Centre Pt. Coords:

697366,769251

Map Series:

1:5000
2441

Revision Date 31-Jul-2004
Survey Date 31-Jul-2000
Levelled Date

GAP architects
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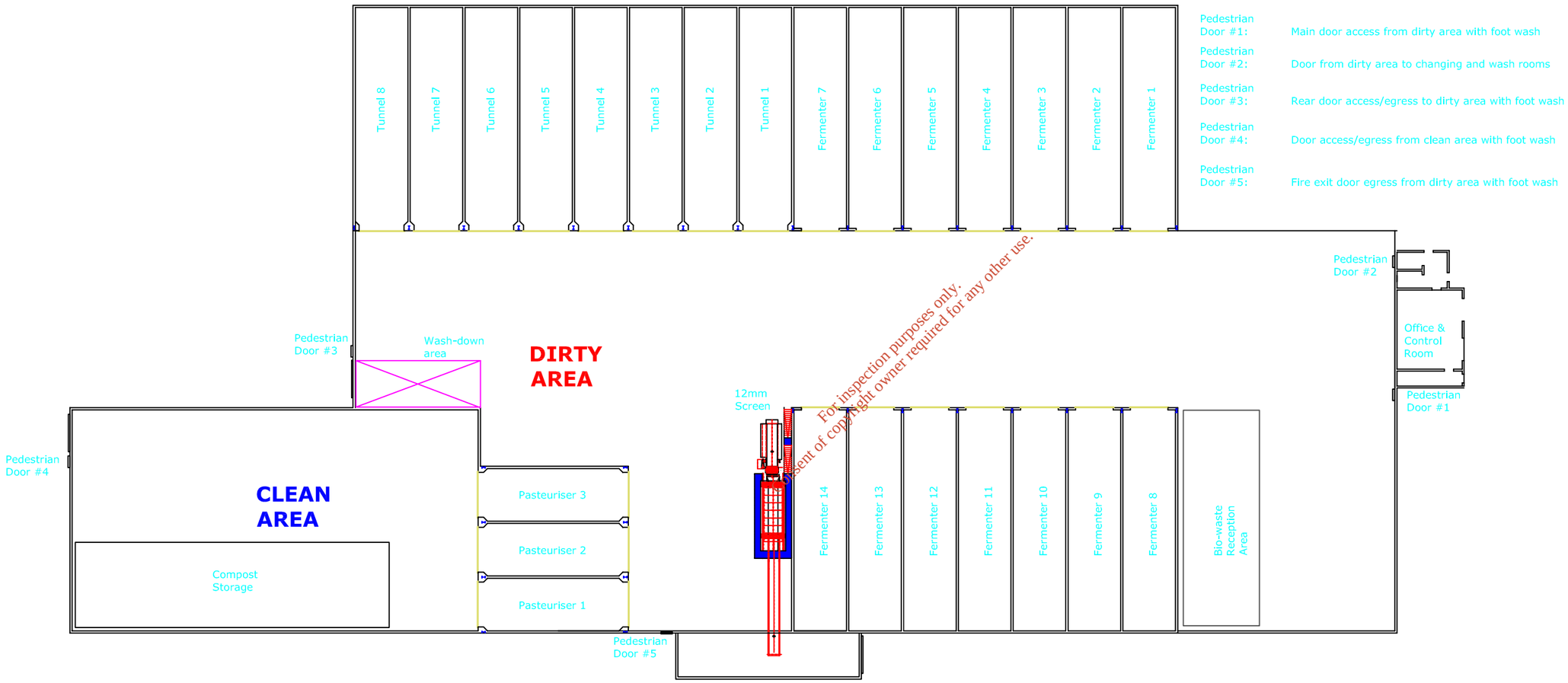
Nurendale Ltd., (PANDA Waste),
Rathdrinagh, Beauparc, Navan, Co. Meath.

Job. *Phase IV, Recycling Facility*

Title *Site Location Map*

Scale 1:2500
Date June 2009
Drawn Stephen Hill
Drg. No. 2009-101-101



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Dr. A. Walsh	A. Pinsonor				Issue for Discussion/Review 08/2009

Name of Client: Panda Waste

Name of Job: Bio-Waste Facility

Title of Drawing: Pedestrian Logistics

Scales Used: NTS

Dwg. No. CCS/Job024/006
ABPR

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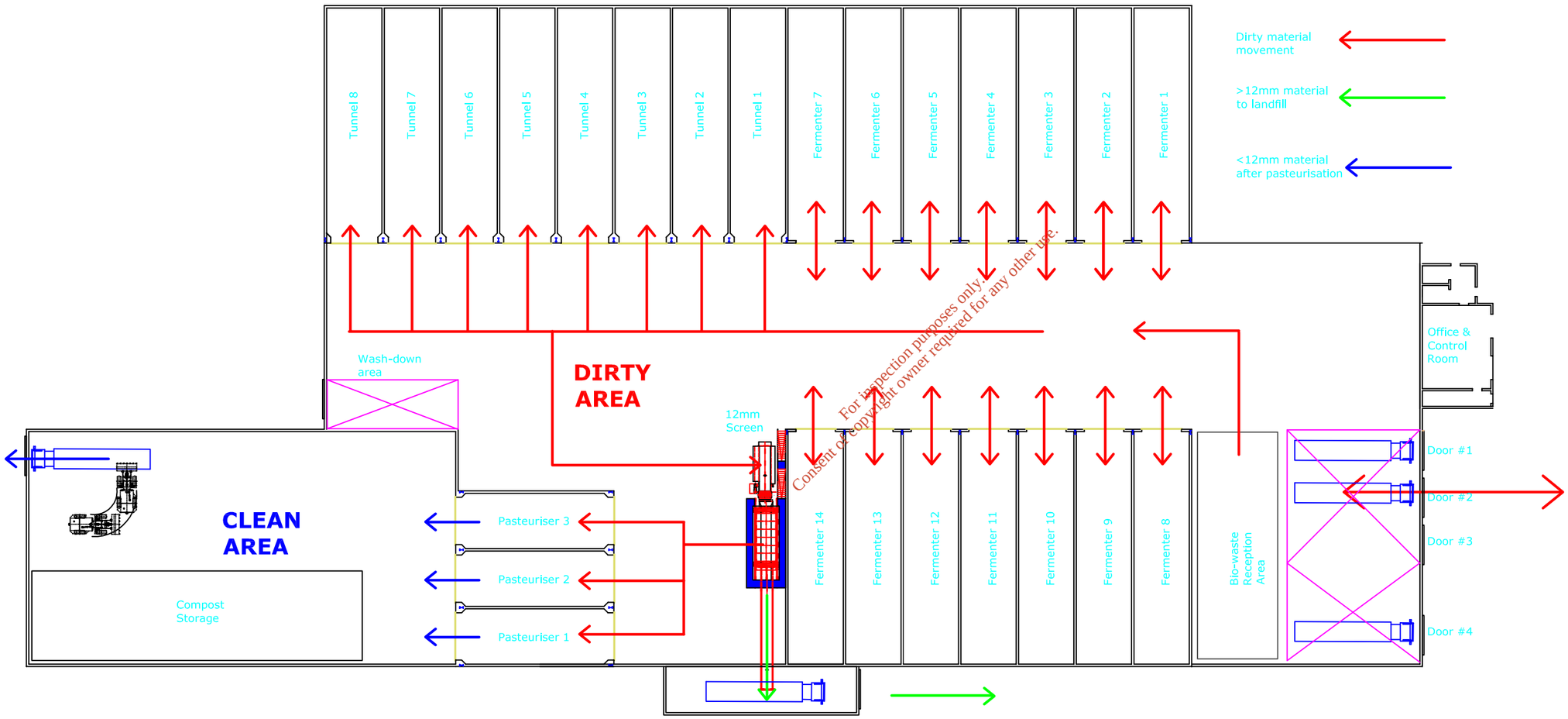

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Name of Client: Panda Waste

Name of Job: Bio-Waste Facility

Title of Drawing: Internal Vehicle Logistics

Scales Used: NTS

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Composting Tunnels x 8

Dry Fermentation Chambers x 14

12mm Screen

Compost Quarantine & Storage Building

Pasteurisation Chambers

Material Reception Area

Compost output

Conveyor

>12mm oversize loading building

Waste output

Waste input

Gate

9m

Weigh bridge (out)

Weigh bridge (in)

Gate

ss Roads

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Name of Client
Panda Waste

Name of Job
Bio-Waste Facility

Title of Drawing
Facility Logistics

Scales Used
NTS

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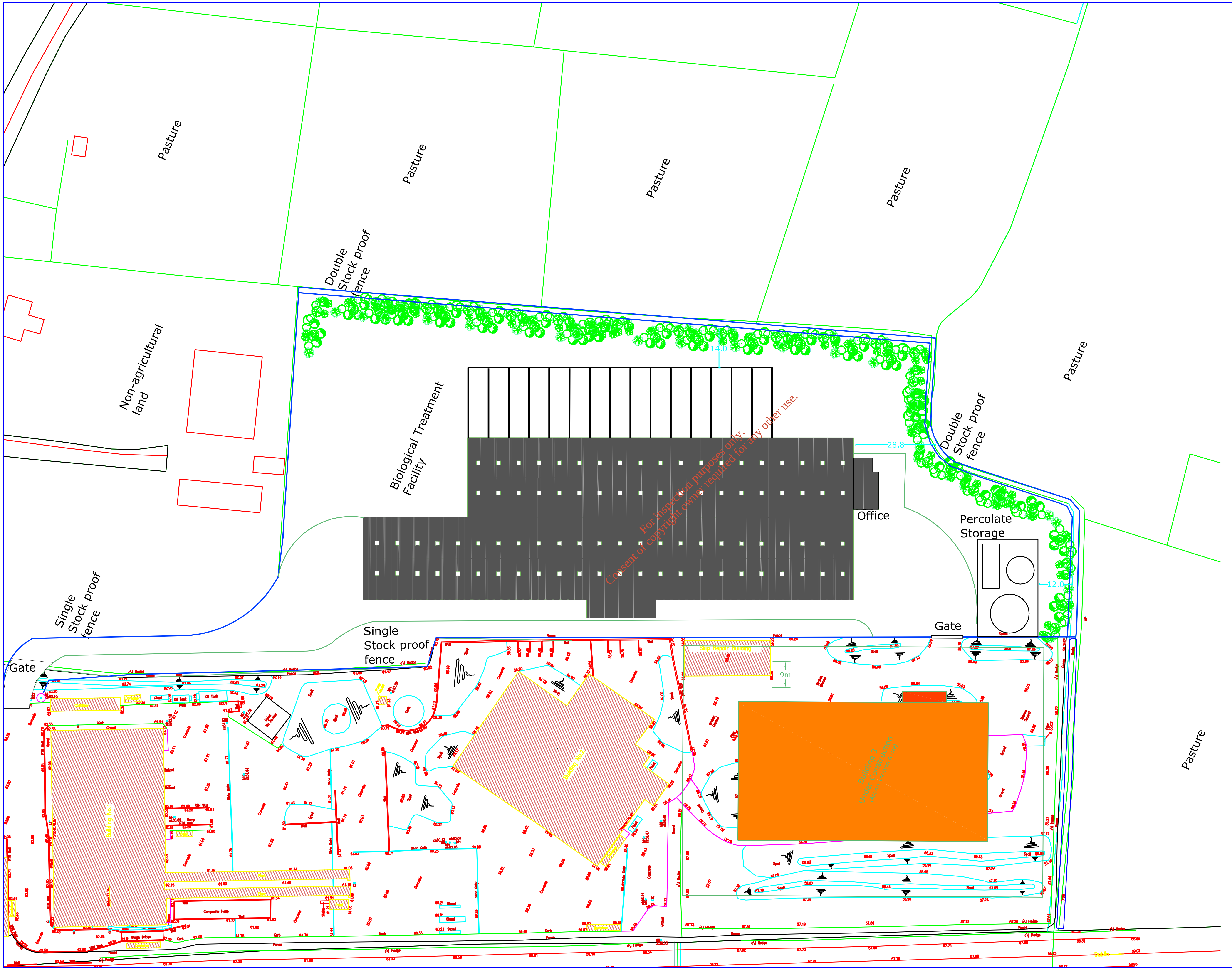

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Name of Client
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Name of Job
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Title of Drawing
Fencing and Surrounding Land Use

Scales Used
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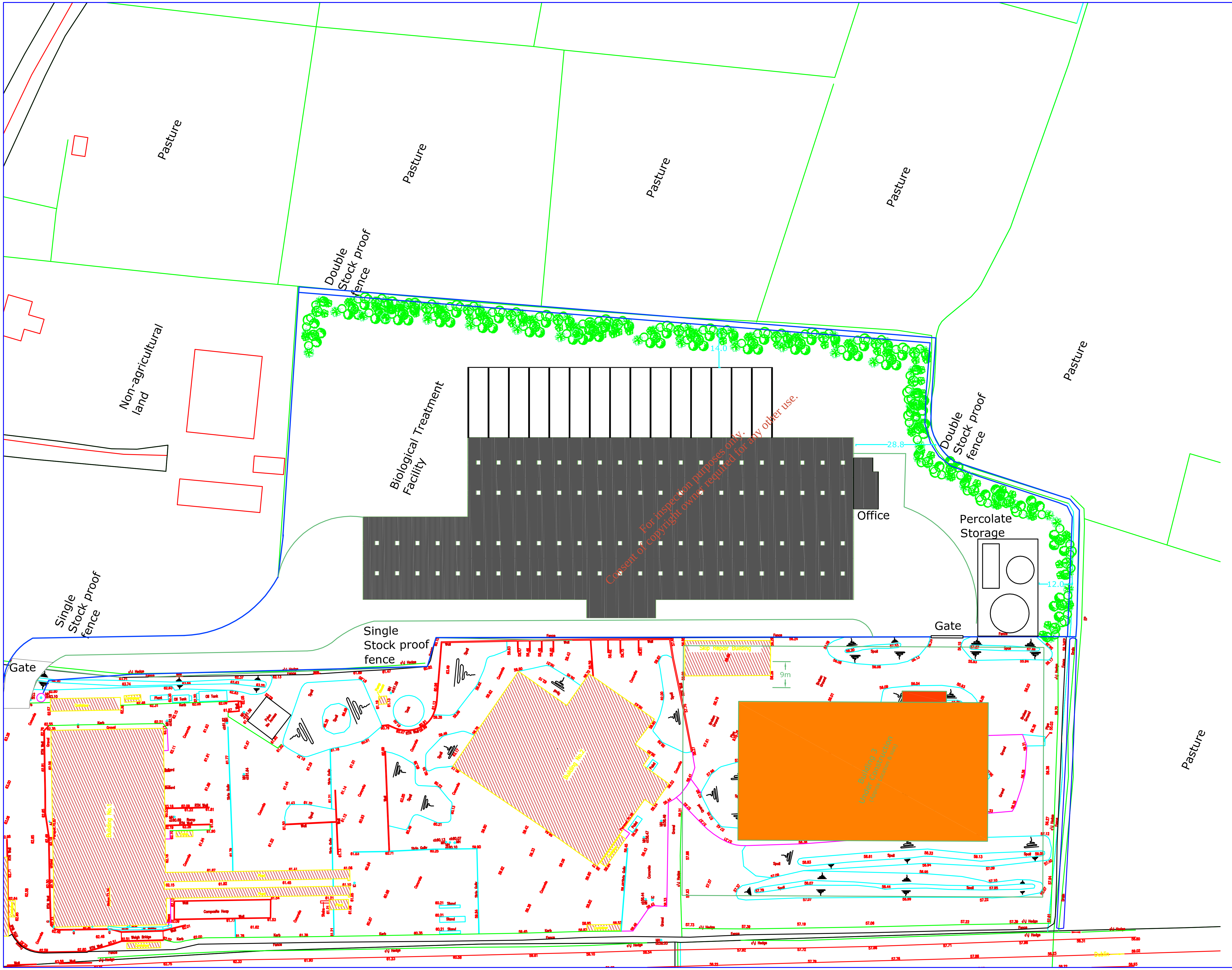

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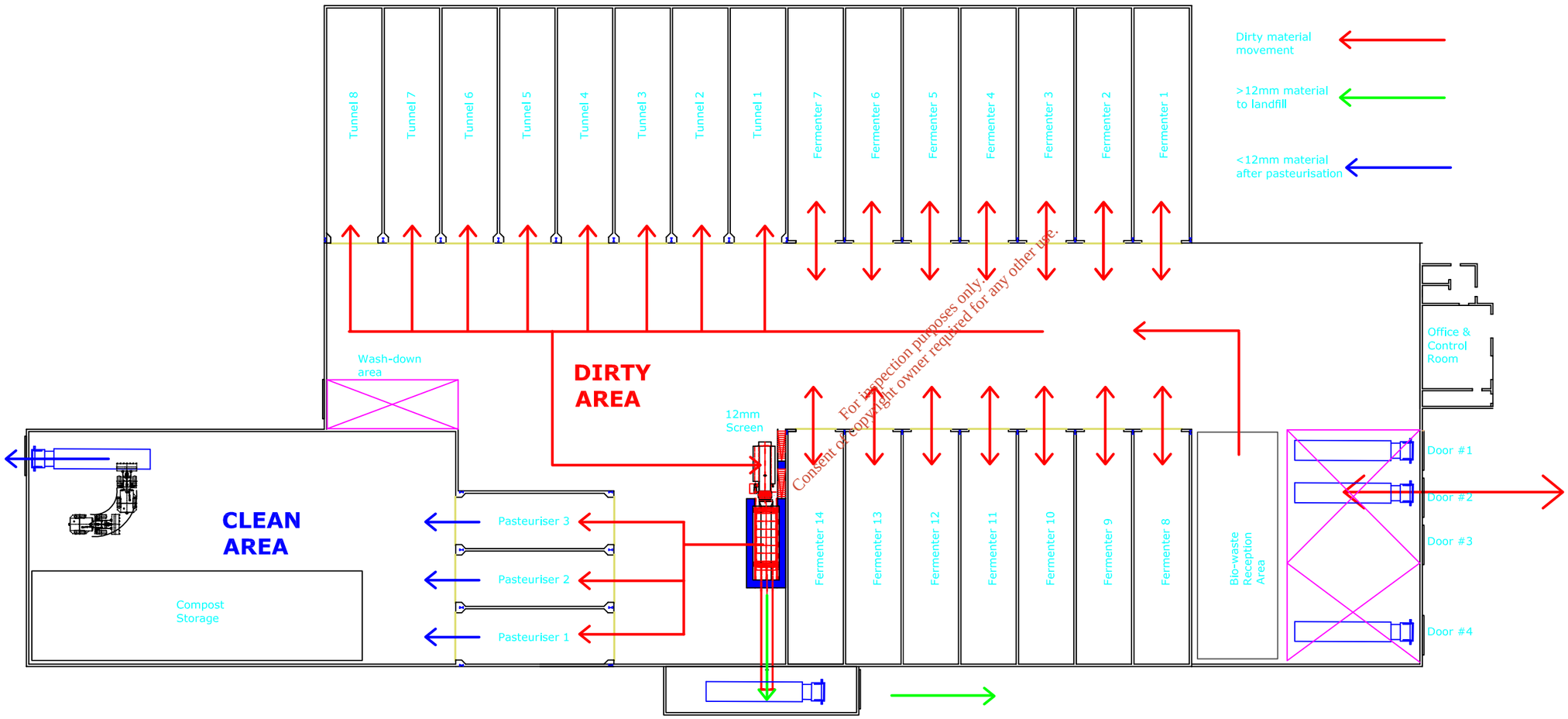

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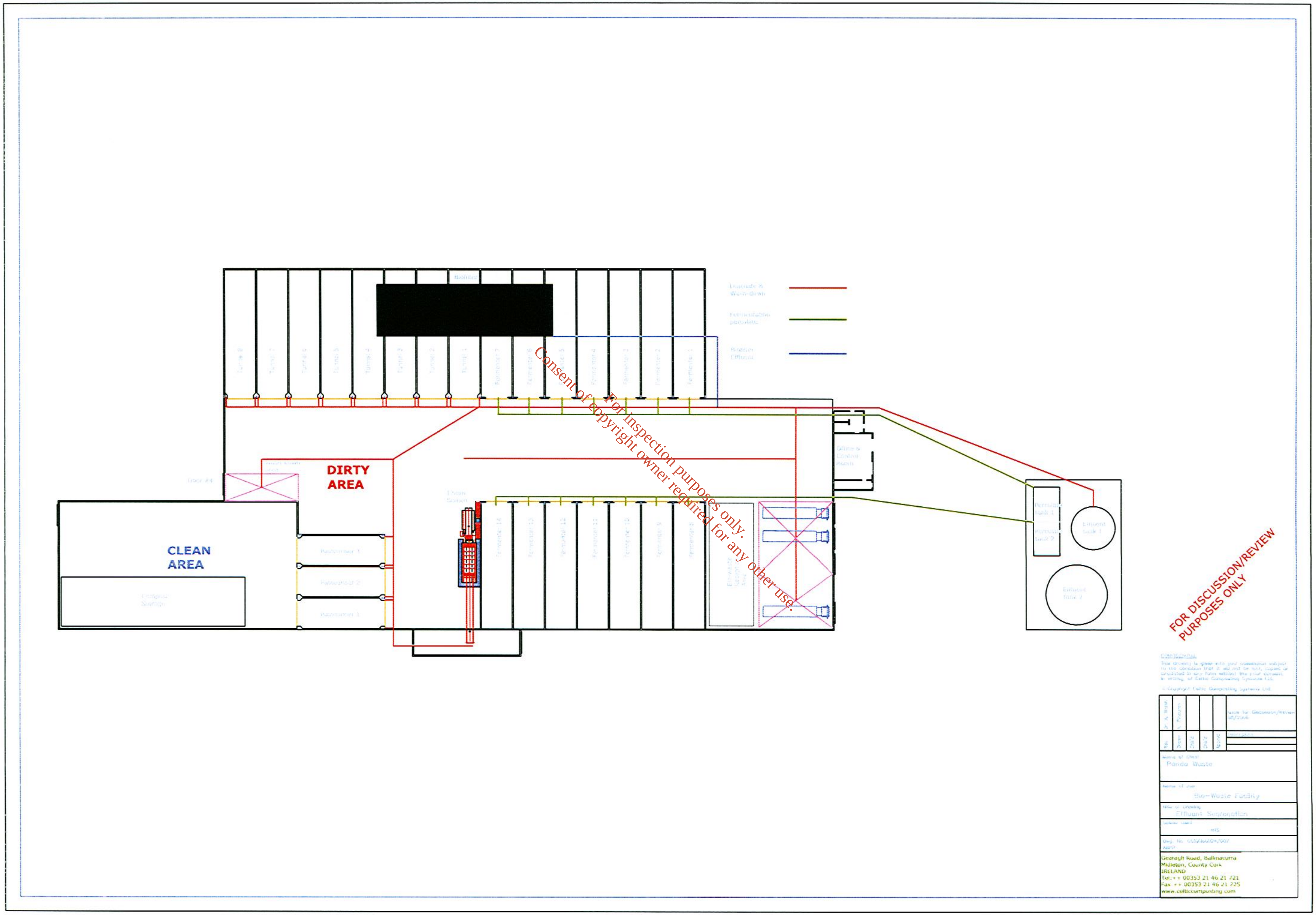

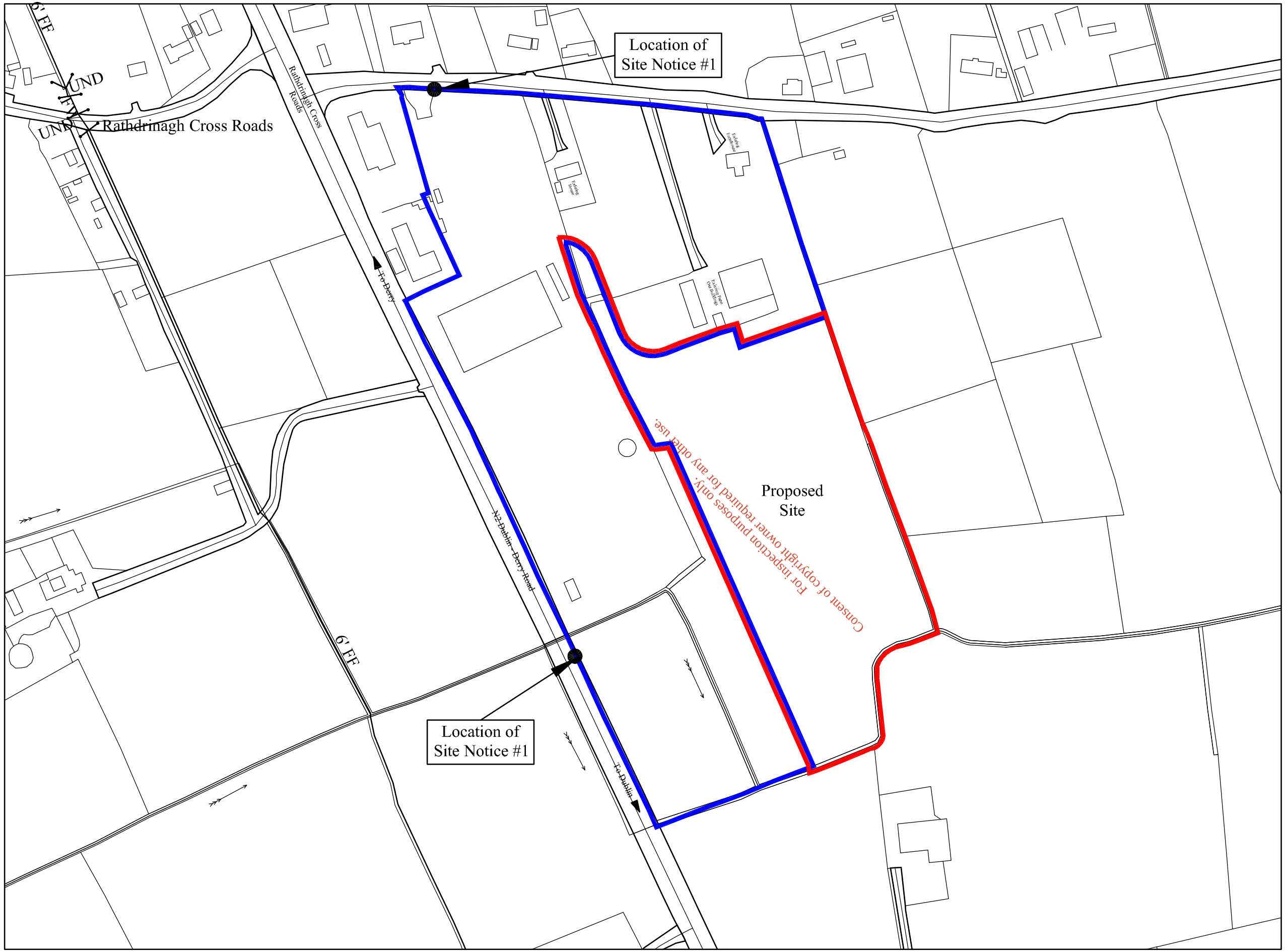

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