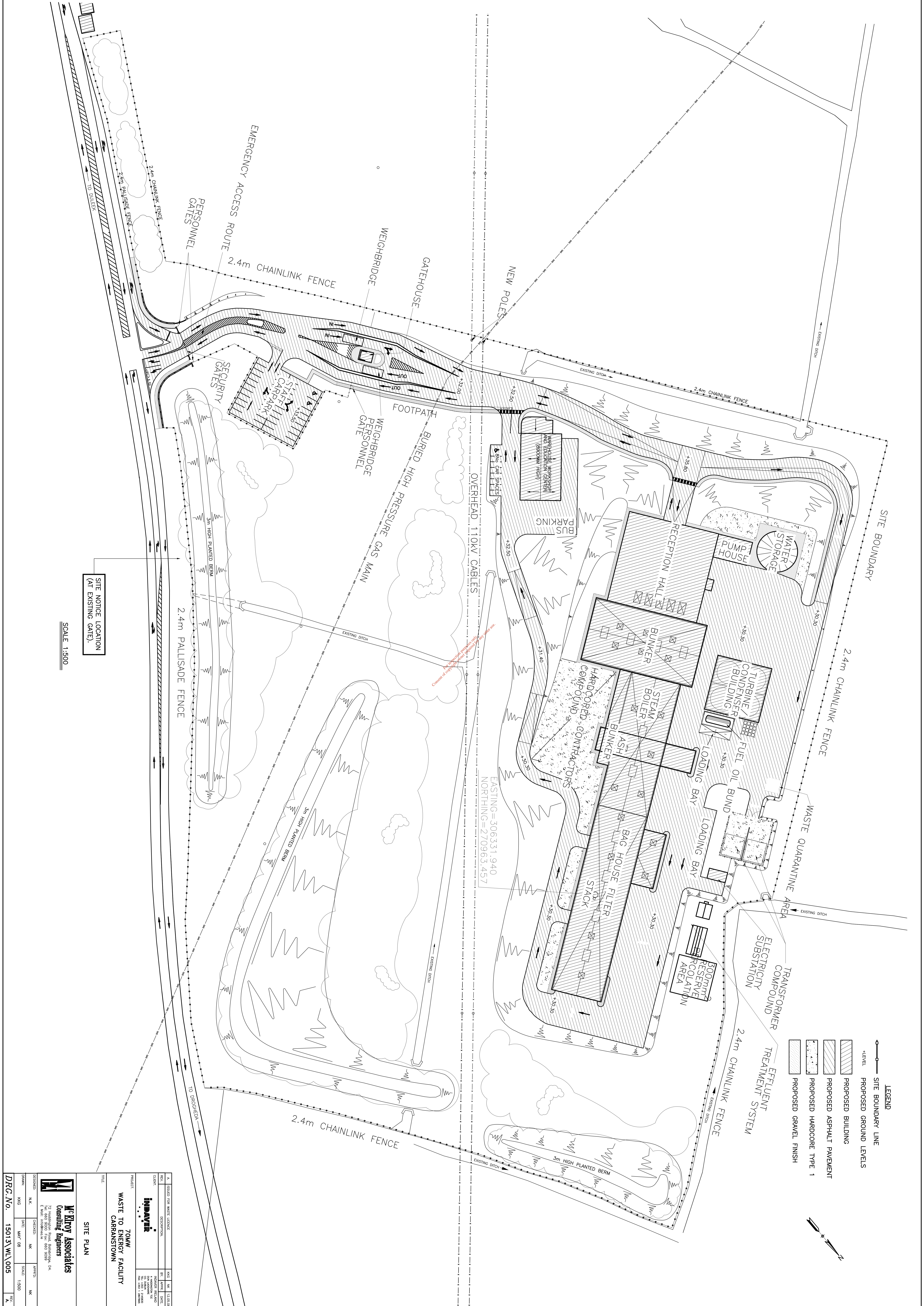


Appendix D1: Site Layout

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- LEGEND**
- SITE BOUNDARY LINE
 - +LEVEL PROPOSED GROUND LEVELS
 - ▨ PROPOSED BUILDING
 - ▨ PROPOSED ASPHALT PAVEMENT
 - ▨ PROPOSED HARDCORE TYPE 1
 - ▨ PROPOSED GRAVEL FINISH

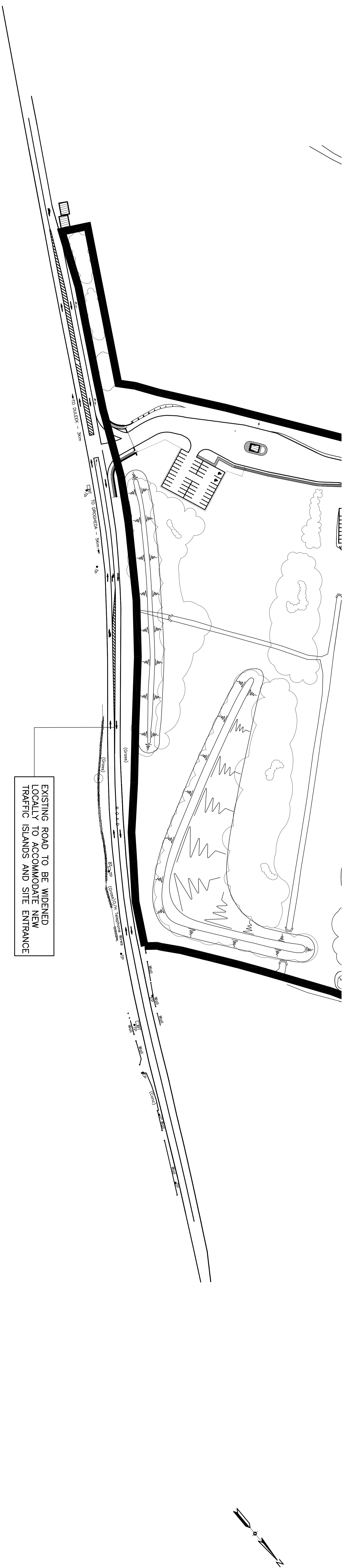
SITE NOTICE LOCATION
(AT EXISTING GATE)

SCALE 1:500

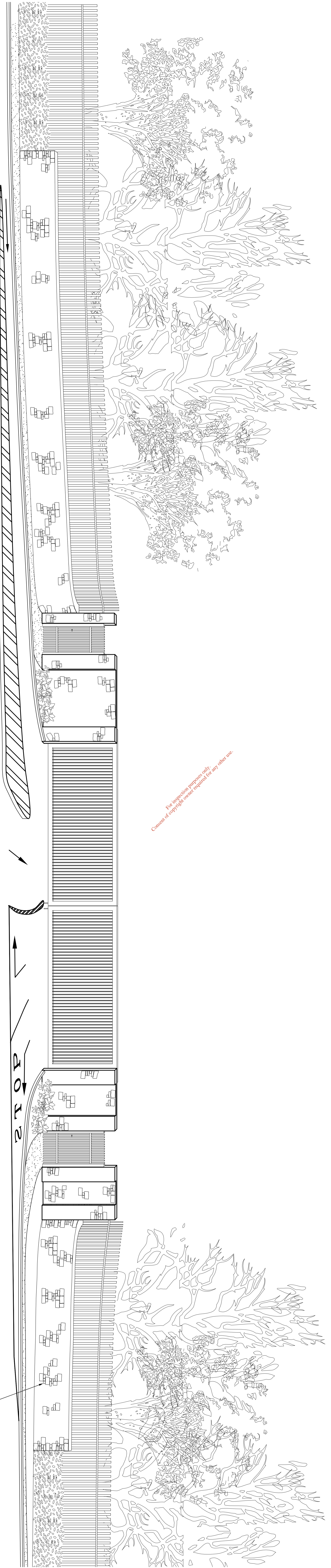
A. ISSUED FOR MADE LICENSE		KOD	NK	12/05/08
REV	DESCRIPTION	BY	DATE	
1	ISSUED FOR MADE LICENSE	NK	12/05/08	
McElroy Associates Consulting Engineers 72 Westfield Road, Carranstown, Co. DU E: info@mc-elroy.com W: www.mc-elroy.com P: 01 453 6000 F: 01 453 6001				
INDAVIAK Carranstown Carranstown, Co. DU E: info@indaviak.com W: www.indaviak.com P: 01 453 6000 F: 01 453 6001		PROJECT: 70MW WASTE TO ENERGY FACILITY CARRANSTOWN TITLE: SITE PLAN DRAWN: KKG DATE: MAY 08 SCALE: 1:500 CHECKED: NK APPROVED: NK DRG. No. 15013/WL/005		

Appendix D2: Site Entrance Drawing

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PLAN SHOWING R152 ALTERATIONS SCALE 1:1000



SITE ENTRANCE ELEVATION SCALE 1:50

For all proposed new works, please refer to the original design drawings for any other works.

A. ISSUED FOR MADE LICENCE		KKG	NK	15/10/18
REV.	DESCRIPTION	BY	APP'D	DATE
1		KKG	NK	15/10/18
CLIENT:		MORRIS RILEY 2000-2001 15013\WL\007		
PROJECT:		70MW WASTE TO ENERGY FACILITY CARRANSTOWN		
TITLE:		SITE ENTRANCE DETAILS WITH PROPOSED R152 ROAD REALIGNMENT DETAILS		
DRAWN:		KKG		
CHECKED:		NK		
DATE:		15/10/18		
SCALE:		AS SHOWN		

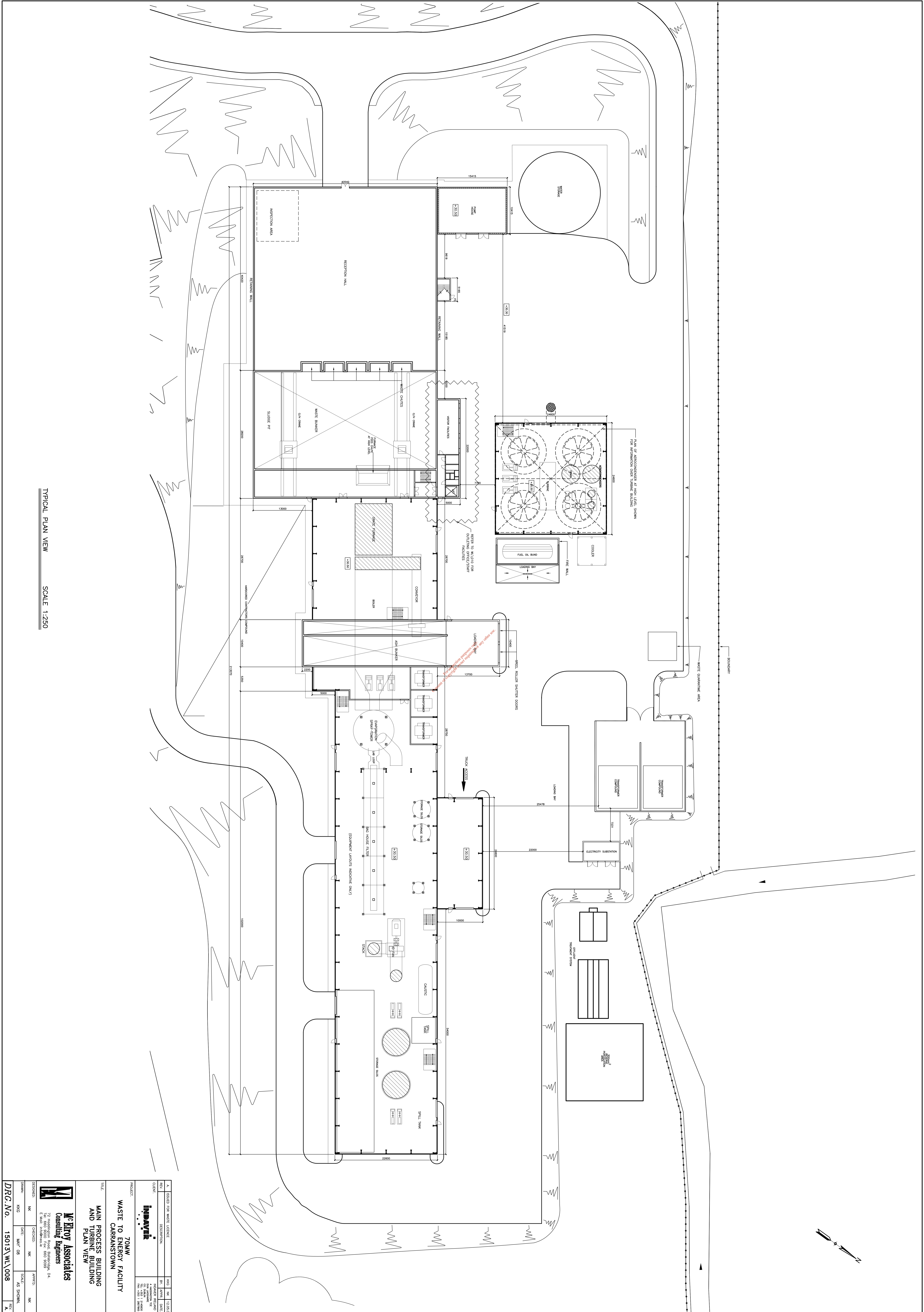
McElroy Associates
Consulting Engineers

15013\WL\007
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15013\WL\007

DRG. No. 15013\WL\007

Appendix D3: Plant Layout

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TYPICAL PLAN VIEW SCALE 1:250

REV	A	ISSUED FOR WASTE LICENSE	KKG	NK	12/05/08
REV	B	REVISIONS	KKG	NK	12/05/08
CLIENT	INDAVIA		BR	INDIA	DATE
PROJECT	70MW WASTE TO ENERGY FACILITY CARRANSTOWN		DR	INDIA	DATE
TITLE	MAIN PROCESS BUILDING AND TURBINE BUILDING PLAN VIEW		SCALE	AS SHOWN	REV

McElroy Associates
Consulting Engineers

747 ROAD 1000, PO BOX 6007099, OX
E. MARI, INDIANAPOLIS, IN 46260-0999
TEL: 317.251.1144 FAX: 317.251.1145

INDAVIA
INDIA

DATE: MAY' 08 SCALE: AS SHOWN

DRG. No. 15013/WL/008

Appendix D4: Puraflo Brochure

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Peat Bio-Filter



Bord na Móna's Peat Bio-Filter is designed to provide effective, cost efficient, low maintenance, secondary and/or tertiary wastewater treatment. The company's extensive experience with the Peat Bio-Filter and long-term research on the performance of the system shows extremely high treatment efficiency with significant reductions in the BOD and TSS content of wastewater and similarly, high reductions in faecal coliform and bacterial numbers.

The Peat Bio-Filter Process

The treatment process is based on simple bio filtration principles. The bio-fibrous peat media in the system is home to a complex and diverse ecological population, ranging from large numbers of aerobic and facultatively aerobic micro organisms to a wide variety of protozoans, rotifers and higher life forms.

These organisms biologically degrade and assimilate the organic material in the wastewater.

Effluent is dispersed evenly onto the surface of the peat fibre and percolates through the media. Treatment of the wastewater within the system is achieved by a combination of unique physical, chemical and

biological interactions between the wastewater and the fibrous media. Considerable BOD, SS and NH3-N reductions are achieved and the system is also very effective at eliminating enteric bacteria contained in the waste. The Peat Bio-Filter is a 'low maintenance' system and requires no desludging or backwashing.

The modular nature of the system provides maximum design flexibility for secondary and tertiary treatment, across a range of applications. The peat media can also be housed in site constructed retaining structures dependant on requirements.

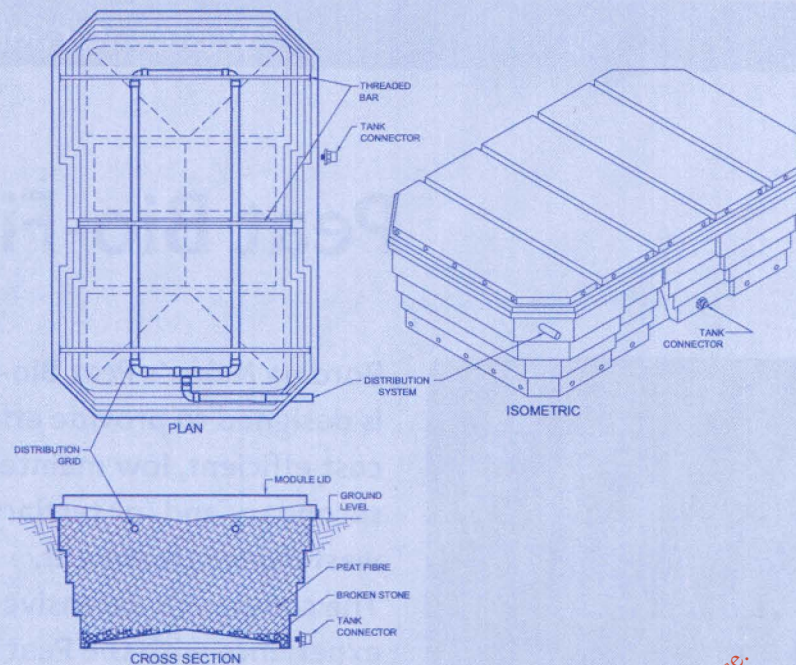
Performance

PARAMETER	INFLUENT	EFFLUENT	% REDUCTION
B.O.D. (mg/l)	296	Less than 10	96 +
T.S.S. (mg/l)	195	Less than 10	95 +
NH3-N (mg/l)	47	Less than 5	90 +
Tot. Coliforms*	2.8×10^6	3.3×10^2	99.9 +
E. coli*	1.1×10^3	1.8×10^2	99.9 +
Pathogenic Bacteria**	Present	Absent	-

* CFU's per 100ml ** Including Salmonella, Staphylococcus and Shigella species, Pseudomonas aeruginosa and Sulphide reducing Clostridia.

Intermittent and Seasonal Use of the Peat Bio-Filter System

The Bord na Móna Peat Bio-Filter system is proven effective in situations of intermittent or seasonal loading. Due to the water binding properties of the peat, the media and consequently the microbial film does not dry out upon reduction or complete cessation of wastewater supply. This unique property combined with the physical and chemical processes which take place in the peat ensure that a high level of treatment is maintained under variable loading conditions.



Why Choose the Peat Bio-Filter System?

- Simplicity of design, installation and operation.
- Secondary and/or tertiary treatment.
- High effluent quality.
- Low capital and operating costs.
- No desludging or backwashing required.
- Flexible, modular design.
- Seasonal or intermittent use.
- Retrofits existing plants to improve effluent quality.

Puraflo Modules

Population Equivalent	Average Daily Flow	Applied Organic Load	No. of Modules	Associated Septic Tank	Tertiary Treatment No. of Modules
P.E.	m ³ /d	kg/d BOD ₅	Nr.	m ³	Nr.
20	3.6	1.2	8	5.4	12
50	9	3	18	13.5	30
100	18	6	36	27	60
150	27	9	54	40.5	90
200	36	12	72	54	120
250	45	15	90	67.5	150
300	54	18	108	81	180
350	63	21	126	94.5	210
400	72	24	144	108	240
450	81	27	162	121.5	270

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www.bnm-us.com

**IRISH
AGRÉMENT
BOARD**



BUILDING PRODUCT CERTIFICATION

CERTIFICATE No. 99/0060

Bord na Móna, Environmental Division,
Newbridge, Co. Kildare, Ireland.
Tel: 045-431201 Fax: 045-431647

PURAFLO LIQUID EFFLUENT TREATMENT SYSTEM

Systèmes de traitement des eaux résiduaires
Abwasseraufbereitung

The Irish Agrément Board is designated by Government to issue European Technical Approvals.

Irish Agrément Board Certificates establish proof that the certified products are 'proper materials' suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997**.

The Irish Agrément Board operates in association with
the **National Standards Authority of Ireland (NSAI)** as the National Member of UEAtc.



PRODUCT DESCRIPTION:

This Certificate relates to Puraflo™ Liquid Effluent Treatment System.

USE:

For the treatment of septic tank effluent from single dwellings.

MANUFACTURING AND MARKETING:

The system is manufactured and marketed by:
Bord na Móna Environmental Division,
Newbridge, Co. Kildare, Ireland.

PART

1

CERTIFICATION

1.1 ASSESSMENT

In the opinion of the Irish Agrément Board (IAB), the Puraflo™ Liquid Effluent Treatment system is satisfactory for the purpose defined above, and meets the requirements of the Building Regulations 1997 as indicated in Section 1.2 of this Certificate.

1.2 BUILDING REGULATIONS 1997

Requirements:

Part D – Materials and Workmanship.

The Puraflo™ Liquid Effluent Treatment System is made of acceptable materials as indicated in Part 4 of this Certificate.

Part H – Drainage and Waste Disposal

H1 – Drainage Systems:

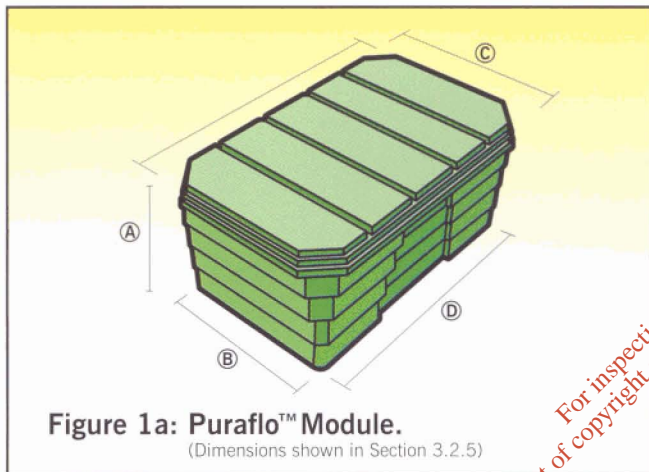
The Puraflo™ Liquid Effluent Treatment System is easily integrated with new and existing septic tanks constructed to meet Building Regulations requirements.

H2 – Septic Tanks:

The Puraflo™ Liquid Effluent Treatment System is an aerobic system and is used in addition to a septic tank fitted with an outlet filter system. The Puraflo™ Liquid Effluent Treatment System can be used where septic tank systems and their percolation areas are not acceptable, or where sites do not comply with the recommendations of S.R.6.: 1991 *Septic Tank Systems Recommendations for Domestic Effluent Treatment and Disposal from a Single Dwelling House* and/or where septic tank percolation systems have failed.

2.1 DESCRIPTION

This Certificate relates to the Puraflo™ Liquid Effluent Treatment System. The system consists of a filter system fitted to the outlet of the connected septic tank, an effluent collecting chamber (sump), a pump and a number of biofibrous media containing modules. The Puraflo™ modules (Figs. 1a and 1b) are manufactured from polyethylene. Each module utilises approx. 2.5 cubic metres of biofibrous media which is compacted into 2 cubic metres. The effluent from the septic tank is evenly distributed over the surface of the biofibrous media and percolates through the media before emerging as a treated liquid at the base of the unit. The treatment of the waste within the system is achieved by a combination of physical, chemical and biological interactions between the pollutants and the biofibrous media. The system is designed to treat the waste water from single dwellings with a total population of up to 15 persons using 2, 4 or 6 modules as required.

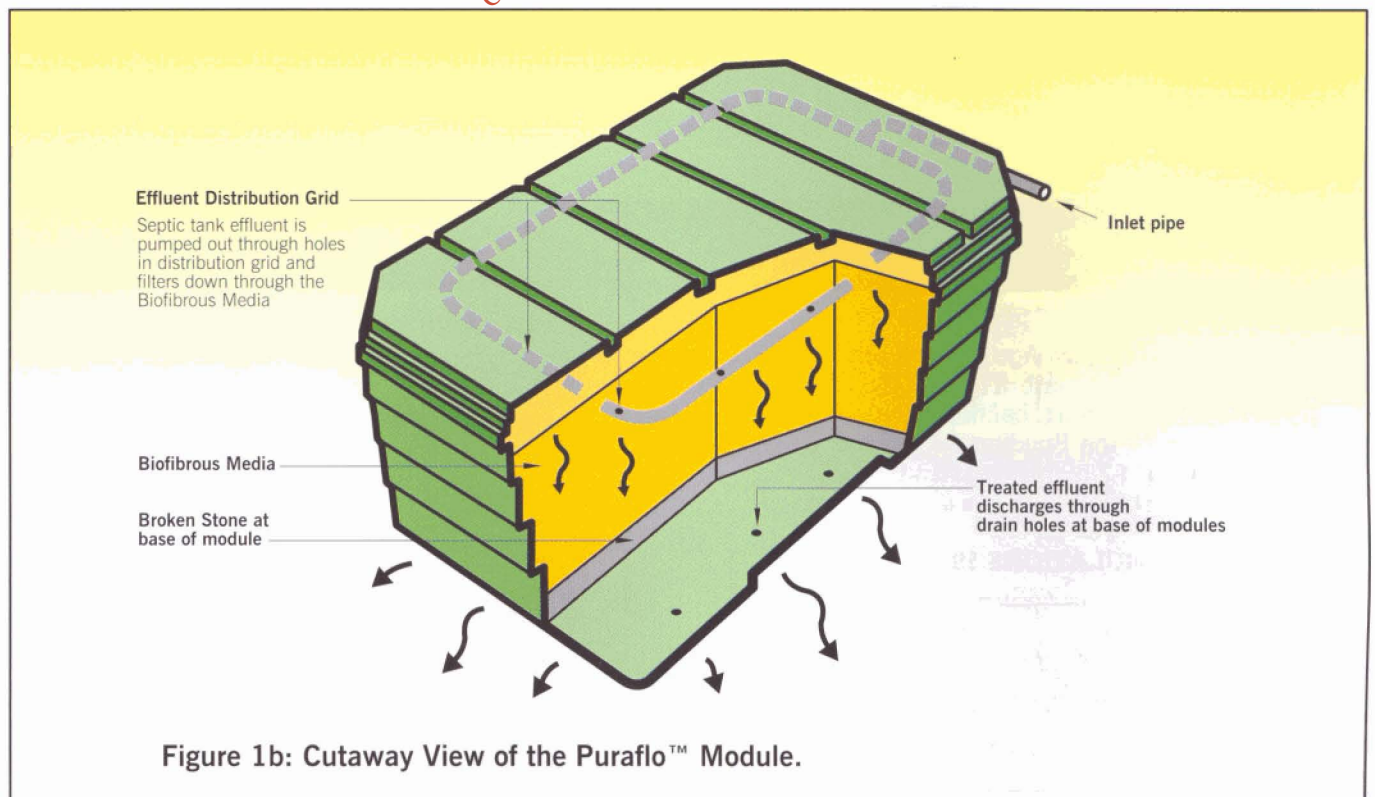


Septic Tank Outlet Filter

A special baffle filter similar to that illustrated in Fig. 2 is fitted on the outlet pipe from the septic tank to retain solids.

Pump Sump & Pump Unit

The pump sump consists of a concrete or corrosion free polyethylene sump (Figs. 3, 4, 5) fitted with a submersible pump (0.30 kW rating, single phase) with thermal overload protection. Effluent from the septic tank flows by gravity to the sump from where it is pumped via a 40–50mm (1.5–2 in.) pump line to the modules containing the biofibrous media. The standard pump can cater for a head of up to 6 metres. An alarm float is installed in the sump and a visual/audible warning unit is located in the dwelling served by the system to alert the owner to pump malfunctions.



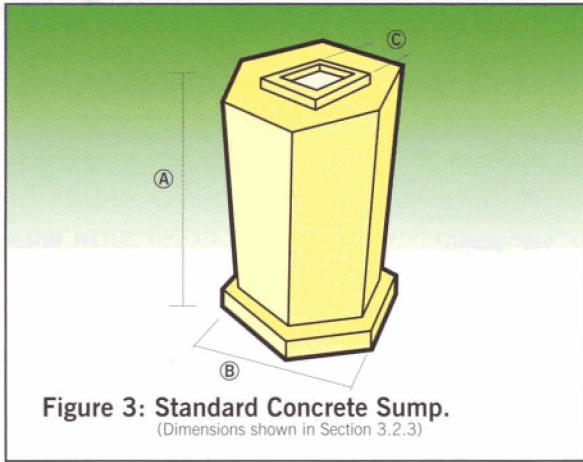


Figure 3: Standard Concrete Sump.
(Dimensions shown in Section 3.2.3)

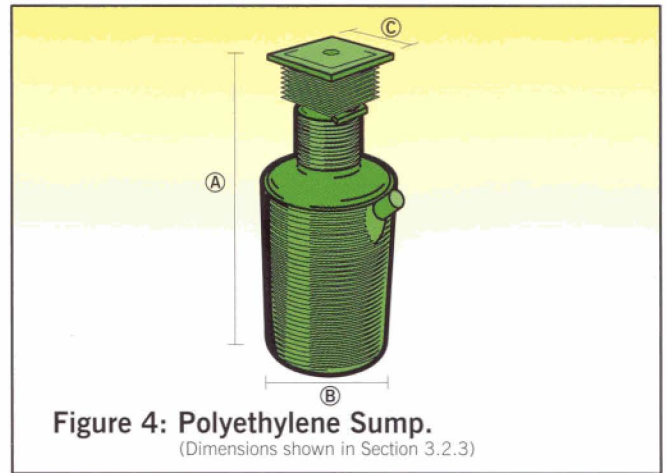


Figure 4: Polyethylene Sump.
(Dimensions shown in Section 3.2.3)

Puraflo™ Modules

Biofibrous media is filled in layers into Puraflo™ modules approx. 0.76m deep x 2.5m² with a contained volume of approximately 2m³ of compacted biofibrous media.

Product Range

The Puraflo™ Liquid Effluent Treatment System is supplied in combinations of Puraflo™ modules to suit the following applications:

- Single house unit using two modules of total area 5m² to serve a population of up to 6 persons.
- Single house unit using 3 modules of total area 7.5m² to serve a population of up to 9 persons.
- Single house unit using 4 modules of total area 10m² to serve a population of up to 11 persons.
- Single house unit using 5 modules of total area 12.5m² to serve a population of up to 13 persons.
- Single house unit using 6 modules of total area 15m² to serve a population of up to 15 persons.

2.2 PIPEWORK/ASSEMBLY

Pipework used for the manifold and distribution system is in accordance with BS 6805: 1986 *Specification for unplasticised polyvinyl chloride (PVC-U) pressure pipes for cold potable water* and relevant parts of BS 4346: *Joints and fittings for use with unplasticised PVC pressure pipes*. A pump, a sampling chamber (Fig. 6) and a PVC distribution manifold complete the pipework assembly. All electrical connections are completed on site.

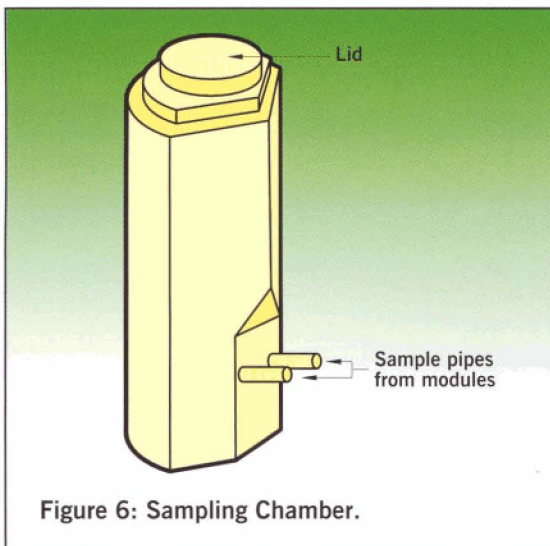


Figure 6: Sampling Chamber.

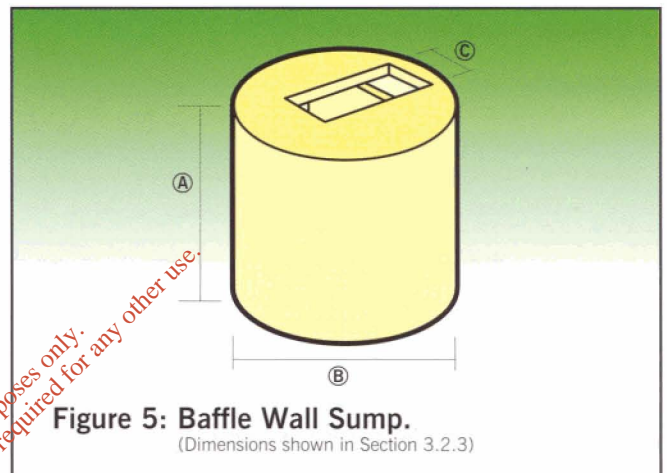


Figure 5: Baffle Wall Sump.
(Dimensions shown in Section 3.2.3)

2.3 DELIVERY, STORAGE AND MARKING

The Puraflo™ modules are completed ready for delivery at the manufacturer's works. Off-loading of each individual module must be carefully supervised using chains, steel cables or lifting bars with SWL of 800kg and should conform with the requirements of the Safety, Health and Welfare at work Act, 1989. The manufacturer's instructions must be followed to avoid damage to the modules during off-loading and placing in the excavation. Suitable lifting equipment must be employed.

The modules are labelled on the outside to indicate the IAB identification Mark incorporating the number of this Certificate.

2.4 INSTALLATION PROCEDURE

2.4.1 GENERAL

The Puraflo™ modules can be installed above or at ground level depending on the height of the local watertable or vertical separation requirements.

- (i) For connection to a septic tank meeting the requirements of the Building Regulations 1997, and permitting the fitting of an outlet baffle filter, a concrete (or polyethylene) sump is installed adjacent to the septic tank as illustrated in Fig. 7.

- (ii) For connection to septic tanks not permitting the fitting of an outlet baffle filter, a special concrete sump is installed as illustrated in Fig. 8. This sump is comprised of 2 chambers with the first chamber designed to accommodate the outlet filter and to provide for desludging.

Installation and the sequence of steps are detailed in the manufacturer's instruction manual, must be followed exactly.

2.4.2 SITE PREPARATION

Site Preparation is as follows:

(i) Septic Tank

For installations where a new septic tank is required excavations to the necessary depth are made to receive a septic tank conforming to the requirements of the Building Regulations 1997 including all necessary blinding of the base to ensure a uniform bearing support.

(ii) Pump Sump

A suitable excavation is prepared downstream of the septic tank to receive the concrete or polyethylene pump sump.

(iii) Puraflo™ Modules

An area is prepared and levelled to create an even surface on which to place concrete blocks and lintels to support the modules.

Broken stone approx. 25–50mm is filled level with the top of the concrete blocks and lintels over this area to a depth of 200mm approx.

Depending on site conditions, various design lengths of stone filled drain may be required extending from the stone base under the modules.

A pipe trench 450mm deep (minimum) x 150mm wide is excavated from the sump to the modules.

(iv) Electrical Supply

A trench 450mm deep (minimum) x 150mm wide is excavated from power source to the sump for an armoured cable electrical supply to the pump.

(v) Disposal of Treated Effluent

The disposal route for the treated effluent will depend on local conditions. Normally the treated effluent is disposed of by soil percolation. The materials in percolation areas are chosen and laid as described in Section 2.4.8 of this Certificate.

2.4.3 PLACING AND LEVELLING OF MODULES

- (i) Using a lifting frame, the modules are positioned carefully on the lintels. Each module is checked for level when fitted.
- (ii) Effluent inlet pipes are checked for proper orientation for connecting to the pump line.

2.4.4 INSTALLATION OF SUMP AND ASSOCIATED PIPEWORK

- (i) The sump is fitted at least 0.5m from a new septic tank or at least 1m from an existing septic tank.
- (ii) The septic tank outlet is connected to the sump using a 110mm dia. pipe at a gradient of 1 in 100.

- (iii) Backfilling is compacted around the sump below the outlet pipe and the cable entry ensuring that the material used for backfilling is free of stones and material which could damage the sump.
- (iv) A pump line 40–50mm dia. is laid from the sump to the modules.
- (v) The pump line is connected to the outlet from the pump.
- (vi) The pump line is connected to the manifold at the modules.
- (vii) The manifold is placed in position and connected by 40mm dia. plastic flexible pipes to the effluent distribution grids in the modules.

2.4.5 CONNECTION OF ELECTRICAL SUPPLY

- (i) The armoured cable from the power source to the sump is placed unstretched in the bottom of the cable trench. A 5 core 5mm PVC SWA cable is used.
- (ii) The armoured cable is connected to the terminal box provided in the sump.
- (iii) The control panel is installed. The power supply to the control panel is taken from an independent MCB to avoid nuisance tripping to existing circuits. The control panel has an ELCB fitted to protect the pump and control system.
- (iv) The cable from the sump is connected to the control panel.

2.4.6 COMMISSIONING

- (i) The alarm float is suspended approximately 150mm above the submersible pump.
- (ii) The pump MCB is switched off at the Puraflo™ panel.
- (iii) The sump is filled with clean water until the alarm float lifts; under these conditions the alarm should indicate a fault.
- (iv) The pump MCB is switched on to restore the power supply to the pump. With the pump operating properly the alarm will switch off when the water level in the sump drops below the level specified in (i) above.
- (v) All pipe connections in the sump and at the modules are checked for leaks.

2.4.7 LOCATION

The septic tank should not be closer than 7 m from the dwelling served and should not be nearer than 20 m from the nearest point of any other dwelling.

The Puraflo™ Liquid Effluent Treatment System and septic tank should not be located in any area where vehicles could traverse or damage them and provision should be made for access for a tank emptying vehicle and its equipment.

The separation distance from wells should be not less than 20 m except in the case of very sandy soils or gravels, where a minimum distance of 40 m should be maintained. In all cases the percolation area should be located down gradient of any nearby well. Where it is not possible to locate the percolation area down gradient of any nearby well a separation distance of at least 100 m, depending on percolation conditions, must be maintained. If necessary a mound of top soil (of appropriate characteristics) may be constructed to

achieve the required 0.5 m minimum vertical separation between the base of the Puraflo™ unit and the seasonally high water table. Typical setback distances for the Puraflo™ system are shown in Table 1 below.

Feature	Minimum Setback Distances (m)	
	Treatment Modules	Percolation Area
Dwelling served	7	5
Adjacent dwelling	10	5
Site boundaries	3	1
Watercourse	3	3
Roads	3	1
Walls	3	1
Drinking Water Sources	20	20-100

Table 1: Recommended setback distances for various elements of the Puraflo™ Liquid Effluent Treatment System.

2.4.8 TREATED WASTE WATER DISPOSAL

Treated waste water may be disposed of by either of the following means:

(a) *Sub-Surface Disposal:*

The treated effluent from the base of the Puraflo™ Liquid Effluent Treatment System passes downwards into a prepared area filled with 25–50mm approx. broken stone to a depth of 250mm. The extent of the percolation area will be determined by the population served and the subsoil type at the site in accordance with the recommendations in Tables 2a, 2b and 2c. Percolation drains are constructed (see Fig. 9) adjacent to the Puraflo™ modules to make up the required percolation area. Percolation drains, 400mm wide x 400mm deep (approx.) depending on site conditions shall be filled to a depth of 250mm with 25–50mm (approx.) broken stone and covered with geotextile or other protective material being backfilling (to prevent the entry of silt). A typical subsurface disposal field is illustrated in Fig. 9.

(b) Alternatively the treated effluent can be collected and pumped to irrigation in which case a site specific engineered design will be prepared.

(c) *Surface Water Disposal*

Treated effluent from the base of the Puraflo™ Liquid Effluent Treatment System can be discharged directly or via a stone filled drain to receiving waters (ditch or drain). If this option is selected a licence to discharge to waters, (on a case by case basis) will be required from the local authority to comply with the Water Pollution Acts (1977–1990 incl. amendments).

2.4.8.1 GENERAL GUIDANCE FOR THE SIZING OF PERCOLATION AREA

The required percolation areas for treated effluent are derived from consideration of the effluent quality (e.g. 95% reduction in BOD and 99% reduction in faecal bacteria) and the soil percolation characteristics.

Table 2a refers only to percolation characteristics. Table 2a should be regarded as guidance only so that water logging of sites does not occur. For each site a test shall be carried out in accordance with approved percolation test procedures in order to confirm the suitability of the percolation system (see section 2.4.8.2).

Different configurations of percolation areas are acceptable. This also applies to sites where split percolation areas are needed to obtain the recommended total area.

Soil Group	Soil Classification Description	Percolation Rate
1	Sand, gravels, loam sand	Very good
2	Sandy loam, loam, sandy clay loam	Good
3	Silty loam, clay loam, silty clay loam	Moderate
4	Sandy clay, silty clay, clay	Poor

Table 2a: Identification of soil groupings

2.4.8.2 PERCOLATION TEST PROCEDURES

A standard "T" test (or other approved soil percolation test) is carried out by the developer/owner to identify the soil group and measured percolation rate. The size of the soil disposal area required is based on the results of this test used in conjunction with the physical properties of the soil and the level of effluent treatment achieved. The depth within the soil profile where this test should be conducted will reflect the invert level at which the effluent will be introduced to the soil. In the majority of instances this will be within 30cm of the surface.

2.4.8.3 SOIL PERCOLATION AREA

	Percolation area (m ²)			
	Soil Group			
Population served	Group 1	Group 2	Group 3	Group 4
4 to 6	10	20	45	65
6–11	15	30	60	95
11–15	20	40	80	120

Table 2b: Soil percolation area with Puraflo™ system in various soil classification groupings.

2.4.8.4

The relationship between the 'percolation area', reported in Table 2b and the 'linear pipe (m)' length of percolation trench required is 1:1. In Table 2b the figures can be expressed as m² percolation area or linear m of percolation trench. An actual length of 10m is allowed within the prepared area beneath and surrounding the Puraflo™ modules. Additional length of percolation trench is installed by inserting drains of up to 20m in length and a minimum of 2m apart.

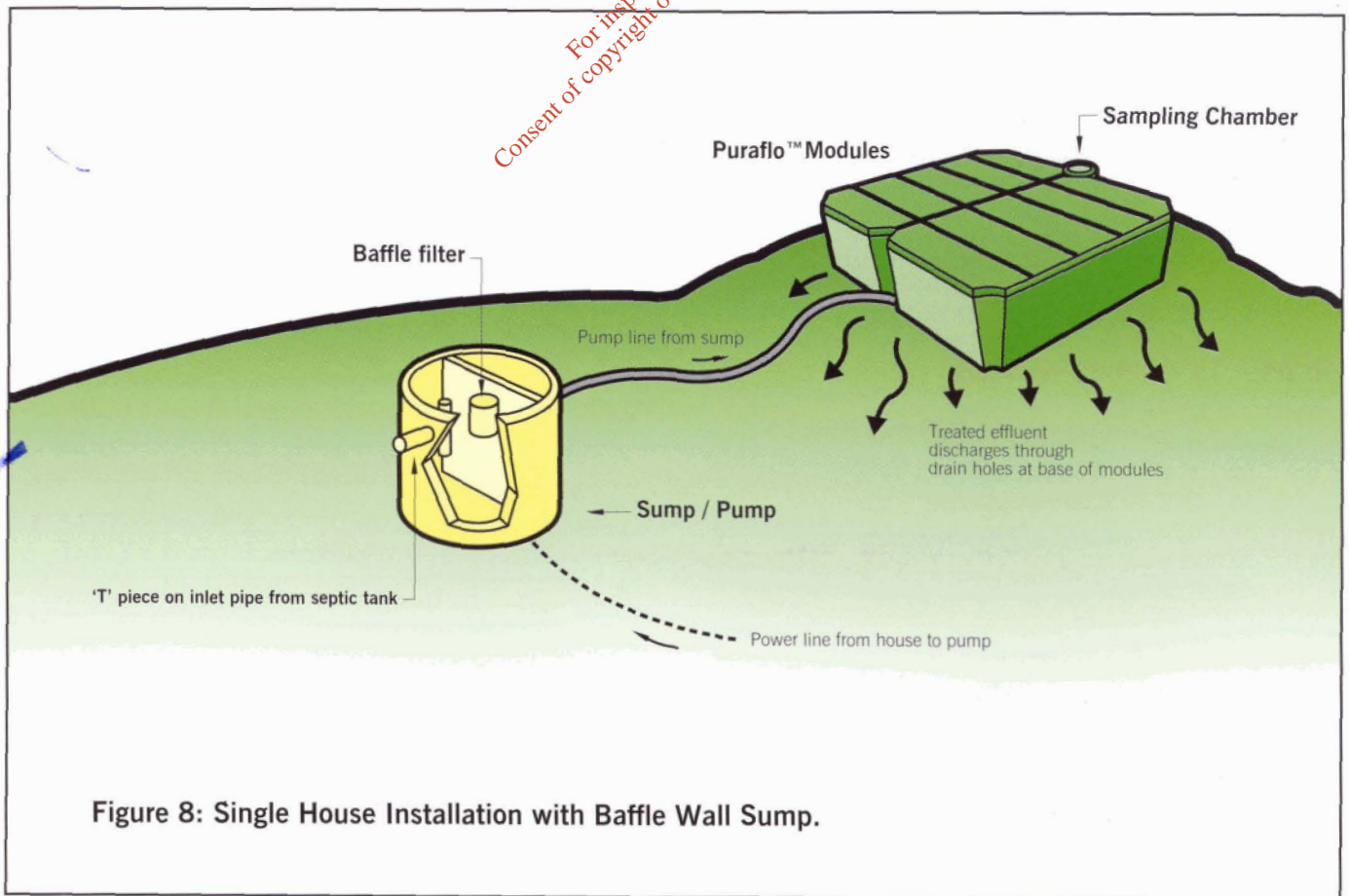
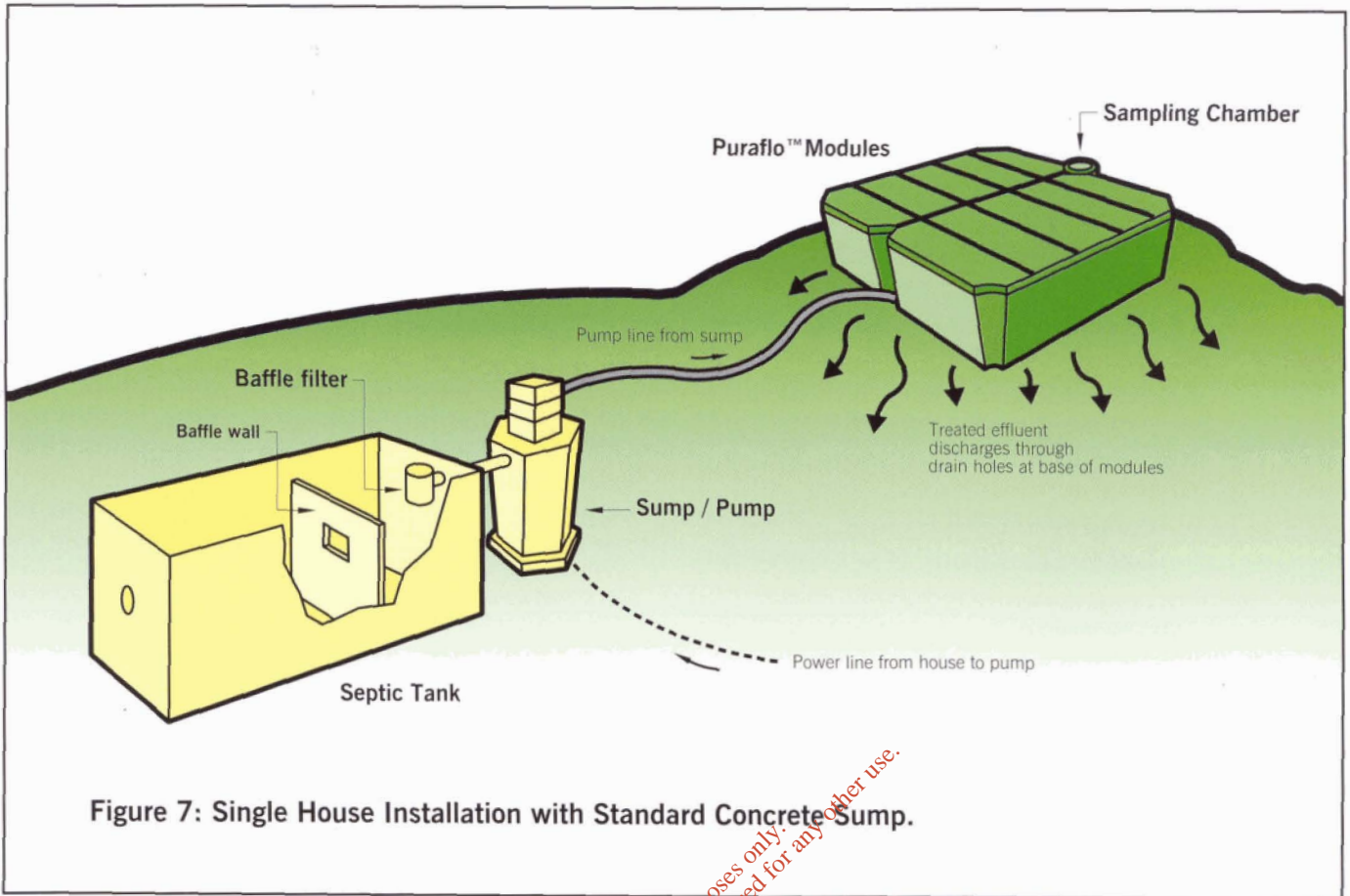
2.4.8.5 MAXIMUM 'LONG TERM' HYDRAULIC LOADINGS

Maximum hydraulic loading l/m ² /d			
Soil Group			
Group 1	Group 2	Group 3	Group 4
135	68	34	23

Table 2c: Maximum 'long term' hydraulic loadings applied to the soil percolation areas in each soil group.

2.5 COMMISSIONING

Commissioning will be carried out by Bord na Móna Environmental Division personnel or their appointed agents after installation is completed and all services are connected.



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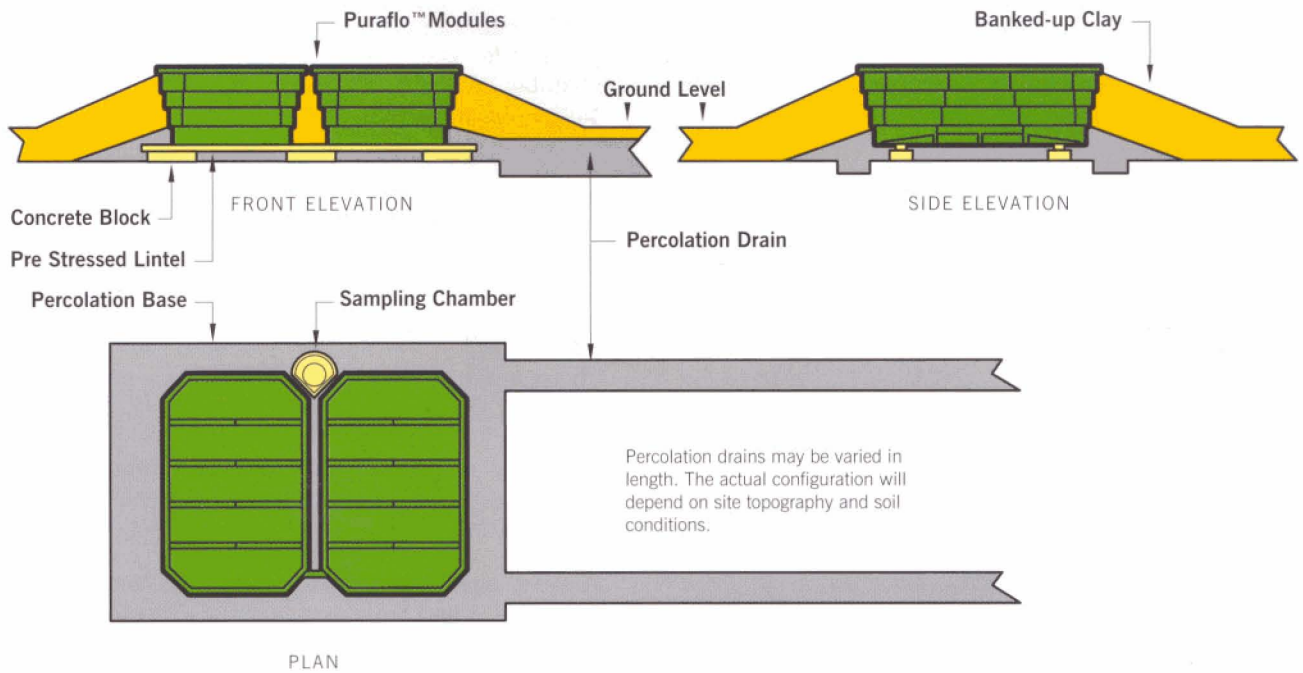


Figure 9: Typical Sub-Surface Disposal Field. (Drawing not to scale)

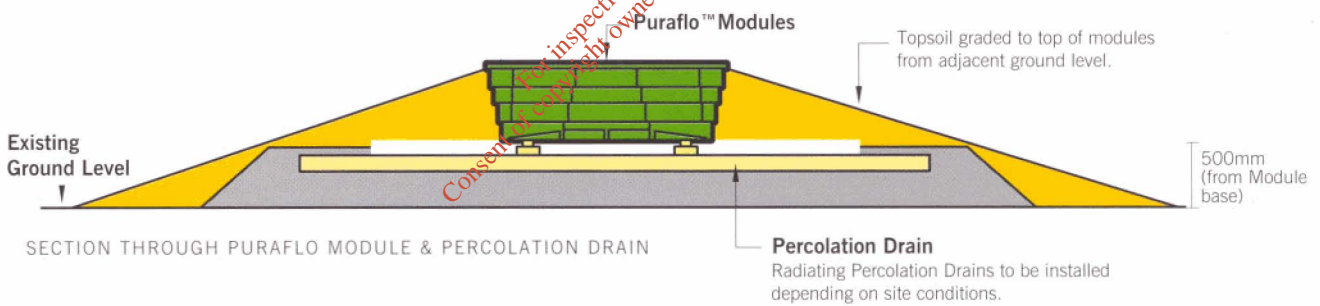


Figure 10: Disposal for Site with High Water Table. (Drawing not to scale)

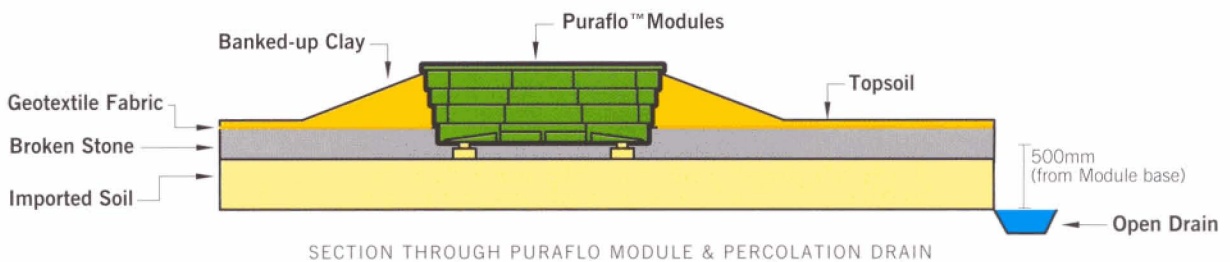


Figure 11: Disposal for Site with Poor Percolating Soil and Receiving Water. (Drawing not to scale)

3.1 GENERAL

The Puraflo™ Liquid Effluent Treatment System has been designed to treat domestic waste water from up to 15 persons. It is suitable for installation at sites where a septic tank and percolation system does not afford an environmentally safe and acceptable means of disposing of domestic waste water. Such sites include those where the water table is high and where soil types do not afford good percolation. To ensure optimum efficiency the drainage of the premises served must be checked to ensure that storm water from roofs and paved surfaces does not discharge into the system.

The system is designed and installed in accordance with the Puraflo™ Liquid Effluent Treatment System Specifications. Due to the high quality effluent treatment achieved (see Table 4, Section 3.2.10) the Puraflo™ Liquid Effluent Treatment System may be installed close to habitable buildings, as indicated in Section 2.4.7 subject to any special requirements of the particular site.

The Puraflo™ Liquid Effluent Treatment System is supplied with an alarm which will alert the owner to a pump malfunction and this will enable corrective action to be taken before overflow occurs. Details of corrective actions are contained in the Puraflo™ maintenance manual supplied with the unit.

3.2 DESIGN BASIS

The Puraflo™ liquid effluent treatment system is supplied in a modularised configuration. Daily waste water loadings of up to 3.0m³/d (equivalent to a population of 15 persons) can be treated. Table 3 details the range of populations served, the associated hydraulic generation and the modular arrangement used in each case.

Max. Population Served	Daily Flow m ³ d ⁻¹ (max)	Puraflo™ area required (m ²)	No of Modules
6	1.2	5	2
9	1.8	7.5	3
11	2.2	10	4
13	2.6	12.5	5
15	3.0	15	6

Table 3: Modular configuration

DESIGN CRITERIA

Assumptions:

Hydraulic loadings	200 l/p/d*
Organic Loadings	60g BOD ₅ /p/d
Solid Loadings	40g TSS/p/d

Max. Application rates (to the biofilter after primary settlement)

Hydraulic loadings	240 l/m ² /d
Organic loadings	average 72g BOD/m ² /d
Solid Loadings	average 24g TSS/m ² /d

3.2.1 SEPTIC TANK

The Septic tank should meet the requirements of the Building Regulations 1997. The septic tank should allow for the fitting of an outlet baffle filter; otherwise the

baffle wall sump shown in Fig. 5 will be installed to provide for the fitting of the baffle filter in the first chamber of this sump, while the second chamber acts as the pump sump.

3.2.2 FILTER

An outlet baffle filter (see Fig. 2) is installed upstream of the pump sump to retain solids.

3.2.3 SUMP

The sump used may be single chamber concrete, single chamber polyethylene (Figs. 3 and 4) or a concrete sump with baffle wall and baffle filter (Fig. 5) as described in Section 2.4.1. Where the concrete sump with a baffle wall is employed access via a manhole is provided to facilitate desludging.

Pump sump dimensions are shown below with reference to Figs. 3, 4 and 5.

Sump type	DIMENSIONS (mm)		
	A	B	C
Polyethylene	1840	720	480
Concrete (standard)	1480	880	500
Baffle wall sump	1300	1440	380

3.2.4 Pump Unit and Electrical Installation

The irrigation pump used is of a standard submersible type which can vary in size depending on site conditions. It delivers a discharge volume of 0.2 to 2.0 l/s. against a discharge head of 1 to 6m. All models are single phase 220–240 volt 50-Hz motor with enclosures to IP 68. Effluent from the tank flows by gravity to the sump from where it is pumped via a 40–50mm diameter pumping main to the biofilter modules containing the biofibrous media. A visual/audible warning unit is installed to alert the owner to pump malfunctions.

The design and installation of the pump and electrics are in compliance with 'The National Rules For Electrical Installations' (ETCI), published by the 'Electro-Technical Council of Ireland'. (Document no. ET101/1991: A1/1997)

3.2.5 MODULES and MEDIA

The Puraflo™ modules (see Fig. 1) are manufactured from high density polyethylene. A minimum of two Biofilter modules shall be installed with dimensions as shown below.

- (i) Biofilter Module Dimensions, mm, are shown below and illustrated in Fig. 1.

Biofilter Module	DIMENSIONS (mm)				
	A	B	C	D	E
	760	1185	1400	2150	1935

- (ii) *Fibre*
The peat fibres consist of root residues of eriophorum (cottongrass) plants extracted from bog peats.

Specifications of Fibres

Moisture content 50–70% by weight
Fines content (<5mm) 30% max.

- (iii) *Typical Physical Characteristics of Fibre Media*

Loose density (range @50% m/c) 110–140 kg/m³
Organic matter content >95% w/w
(anhydrous basis)

- (iv) *Typical Botanical Composition of Fibre Media*

Fibre (eriophorum) 50% (v/v)
Humic materials 40% (v/v)
Sphagnum materials 10% (v/v)

- (v) *Typical Design Specification for Puraflo™ single house system.*

PARAMETER	SPECIFICATION
Media Type	100% fibre (Biofibre)
Compaction	50%
Depth of compacted media	0.7m
Distribution of septic tank effluent over modules	Rectangular pipe grid
Minimum Number of modules per installation	2 modules
Total Hydraulic load (max.)	3.0m/day (6 modules)
Total Organic loading (max.)	0.900 kg/day (septic tank and Puraflo™ System) 0.630 kg/day (Biofilter alone) (6 modules)
Sample Chamber	In all installations

3.2.6. BROKEN STONE

The stone filter under the Puraflo™ modules and in the drainage trenches is composed of 25–50mm approx. broken stone.

3.2.7 LIQUID EFFLUENT ANALYSIS

The pH, BOD and suspended solids (T.S.S.) concentrations demonstrated in Table 4 will be attained within a few weeks of commissioning. It is predicted that the stipulated nitrate (NO₃) and ammonia (NH₃) values will be consistently achieved over the lifetime of the biofibrous media, currently estimated to be at least 10 years.

3.2.8 MONITORING SYSTEM ALARM

The installed electrical warning system will signal an alarm to indicate impending flooding or failure of the pump unit.

3.2.9 COMMISSIONING

Commissioning of the unit must include testing of the alarm system and the completion of all safety checks.

3.2.10 MAINTENANCE SYSTEM

During desludging of the septic tank the sump unit must also be de-sludged. Following removal of the sludge the pump should be hosed down and the resulting sludge removed from the sump.

The units should not be opened or the media disturbed. Any such disruption of the media may result in channelling of the effluent or over-compaction leading to flooding.

Table 4: Treated Waste Water Quality

PARAMETER	CONCENTRATION
pH (pH units)	5–8
B.O.D. (mg/l)	< 15
T.S.S. (mg/l)	< 15
NH ₃ -N (mg/l)	< 5
Nitrate-N (mg/l)	20
Total Coliforms elimination	> 99.9%
Faecal Coliforms elimination	> 99.9%
*Pathogenic Bacteria	Absent

*Including *Salmonella spp*, *Shigella spp*, *Sulphide reducing Clostridia*, *Staphylococcus spp* and *Pseudomonas aeruginosa*

4.1 ENVIRONMENTAL ASSESSMENT

The treated waste water from a number of working installations has been comprehensively monitored for 18 months. The test results show that values stated for the parameters listed in Table 4 are consistently achievable over a range of operating conditions.

4.2 STRENGTH

The design and testing of the plant has been assessed as satisfactory. The modules and sumps have adequate resistance to handling stresses, the loads applied by ground pressure and internal liquid loads.

4.3 WATER PENETRATION

The plant and modules with its pipe connections when correctly installed will not allow seepage either into or from the surrounding soil.

4.4 DURABILITY

The biofibrous media when installed, used and maintained in accordance with the requirements of this Certificate will have a life of at least 10 years. The mechanical components of the system excepting pumps will have a life in excess of 20 years.

Spent treatment media should be disposed of in accordance with National Waste Regulations.

4.5 CLEANING AND MAINTENANCE

All Puraflo™ units are inspected by Bord na Móna personnel for their performance after one year approx. of operation and the effluent analysed. As part of routine maintenance the owner must keep the inlet and outlet from the septic tank free from blockages and desludge the septic tank. The septic tank and the first chamber of the two chamber sump (where this option is used) should be desludged at least once per annum.

4.6 SAFETY

4.6.1 SAFETY OF PERSONNEL

The Puraflo™ Liquid Effluent Treatment System is generally installed above ground level. All pump sump covers are securely fixed, to prevent unauthorised access.

The treatment system should be positioned, or marked, or protected to prevent superimposed loading or accidental impact by vehicles and underground electric cables should be marked with warning tape.

4.6.2 SAFETY OF SYSTEM

The Puraflo™ Liquid Effluent Treatment System has a visual/audible warning device connected to the pump/sump unit to alert the owner to malfunctions of the pump.

4.7 TESTS AND ASSESSMENTS WERE CARRIED OUT TO DETERMINE

- Watertightness
- Strength of covers, modules & sumps
- Resistance of units to hydrostatic pressure
- Quality of treated effluent

4.8 OTHER INVESTIGATIONS

- (i) Existing data on the history of use of previous installations was assessed.
- (ii) The manufacturing process was examined including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.
- (iii) Site visits were conducted to assess the practicability of installation.
- (iv) A user survey and visits to established sites were conducted to evaluate performance in use.
- (v) No failures of the product in use have been reported to the IAB.

5.1 CONDITIONS OF CERTIFICATION

The National Standards Authority of Ireland ("NSAI") following consultation with the Irish Agrément Board ("IAB") has assessed the performance and method of installation of the product/process and the quality of the materials used in its manufacture and certifies the product/process to be fit for the use for which it is certified provided that it is manufactured, installed, used and maintained in accordance with the descriptions and specifications set out in this certificate and in accordance with the manufacturer's instructions and usual trade practice. This certificate shall remain valid so long as:

- (a) the specification of the product is unchanged;
- (b) the Building Regulations, 1997 and any other regulation or standard applicable to the product/process, its use or installation remain unchanged;
- (c) the product continues to be assessed for the quality of its manufacture and marking by NSAI;
- (d) no new information becomes available, which in the opinion of the NSAI would preclude the granting of the certificate;
- (e) the product or process continues to be manufactured, installed, used and maintained in accordance with the description, specifications and safety recommendations set out in this certificate.

5.2 The IAB mark and certification number may only be used on or in relation to products/processes in respect of which a valid certificate exists. If the certificate becomes invalid, the certificate holder must not use the IAB mark and certification number and must remove them from products already marked.

5.3 In granting this certificate, the NSAI makes no representation as to:

- (a) the presence or absence of patent rights subsisting in the product/process; or
- (b) the legal right of the certificate holder to market, install or maintain the product/process; or
- (c) whether individual products have been manufactured or installed by the certificate holder in accordance with the descriptions and specifications set out in this certificate.

5.4 This certificate does not comprise all installation instructions and does not replace the manufacturer's directions or any professional or trade advice relating to use and installation which may be appropriate.

5.5 Any recommendations contained in this certificate relating to the safe use of the certified product or process are preconditions to the validity of the certificate. However, the NSAI does not certify that the manufacture or installation of the certified product or process in accordance with the descriptions and specifications set out in this certificate will satisfy the requirements of the Safety, Health and Welfare at Work Act, 1989 or of any other current or future statute or current or future common law duty of care owed by the manufacturer or by the certificate holder.

The NSAI is not responsible to any person or body for loss or damage, including personal injury, arising as a direct or indirect result of the use of this product or process.

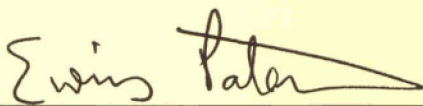
5.7 Where reference is made in this certificate to any Act of the Oireachtas, regulation made thereunder, statutory instrument, code of practice, national standards, manufacturer's instructions or similar publication, it shall be construed as reference to such publication in the form in which it is in force at the date of this certification.

THE IRISH AGRÉMENT BOARD

This Certificate No. 99/0060 is accordingly granted to Bord na Móna on behalf of the Irish Agrément Board.

Date of Issue: 02 June 1995

Signed: _____



Director of Standards, NSAI

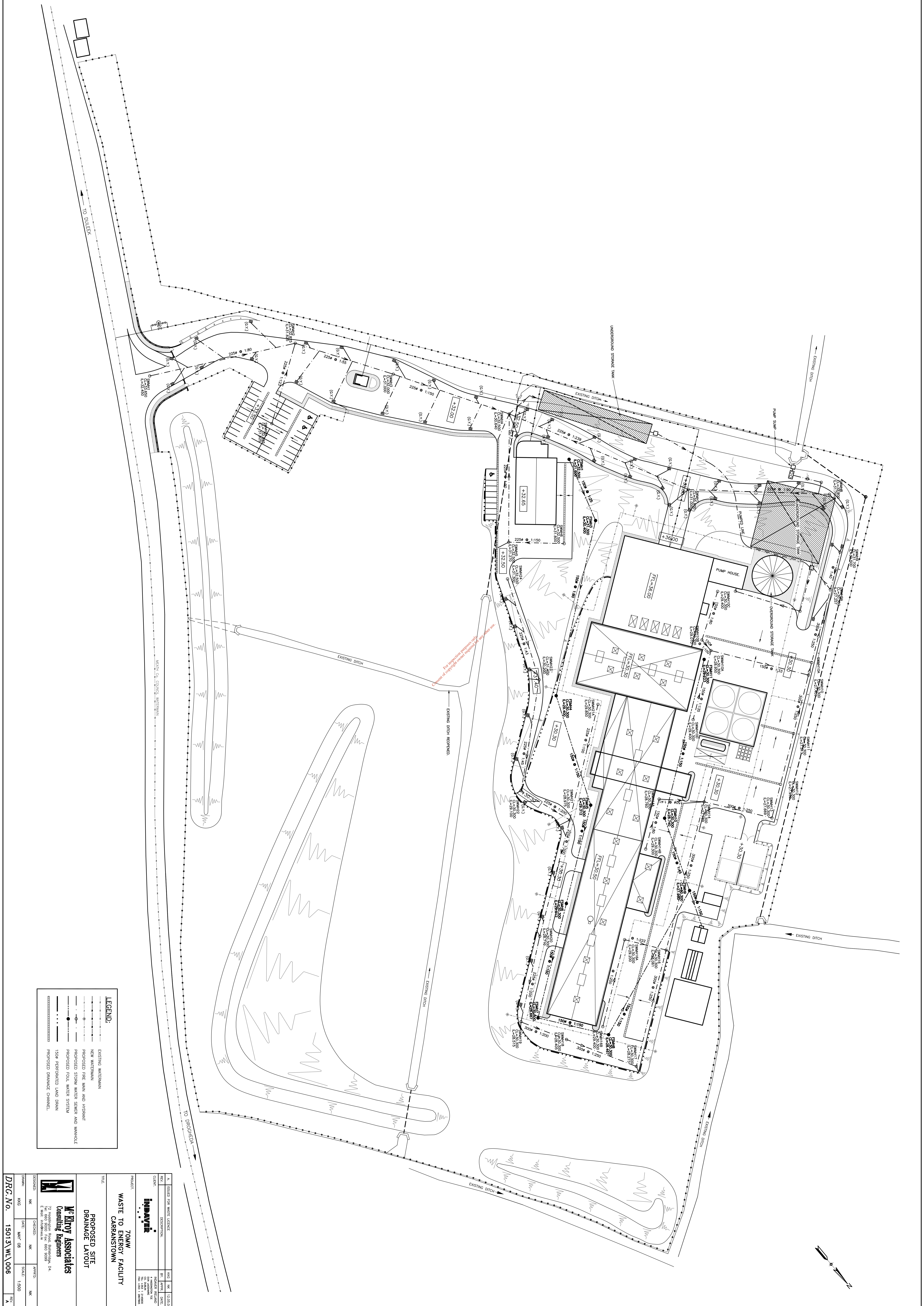
Readers may check that the status of this Certificate has not changed by contacting the

Irish Agrément Board,
NSAI, Glasnevin, Dublin 9. Ireland.

Telephone: (01) 807 3800.
Telex: 32501.
Telefax: (01) 807 3838.

Appendix D5: Site Drainage Plan

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LEGEND:

	EXISTING WATERMAIN
	NEW WATERMAIN
	PROPOSED FIRE MAIN AND HYDRANT
	PROPOSED STORM WATER SEWER AND MANHOLE
	150mm PERFORATED LAND DRAIN
	PROPOSED DRAINAGE CHANNEL

DESIGNED BY	CHKD BY	DATE	SCALE
MMG	NK	MAY 08	1:500

REV	DESCRIPTION	DATE
1	ISSUED FOR MADE LICENSE	12.06.08
2	REVISED	12.06.08

CLIENT	PROJECT
INDAVITE	70MW WASTE TO ENERGY FACILITY CARRANSTOWN

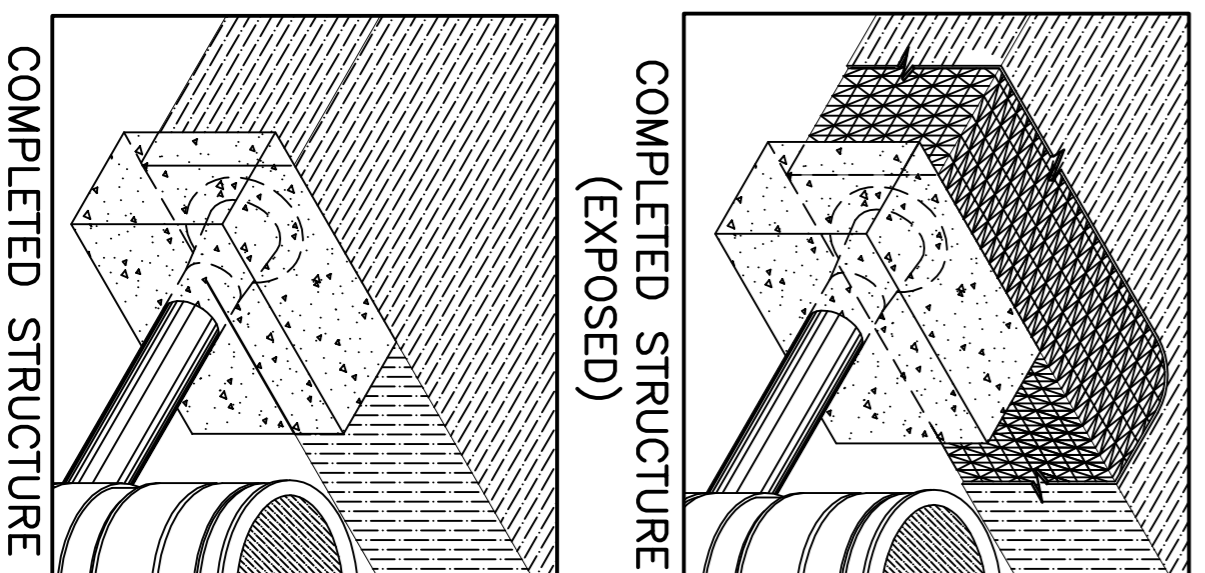
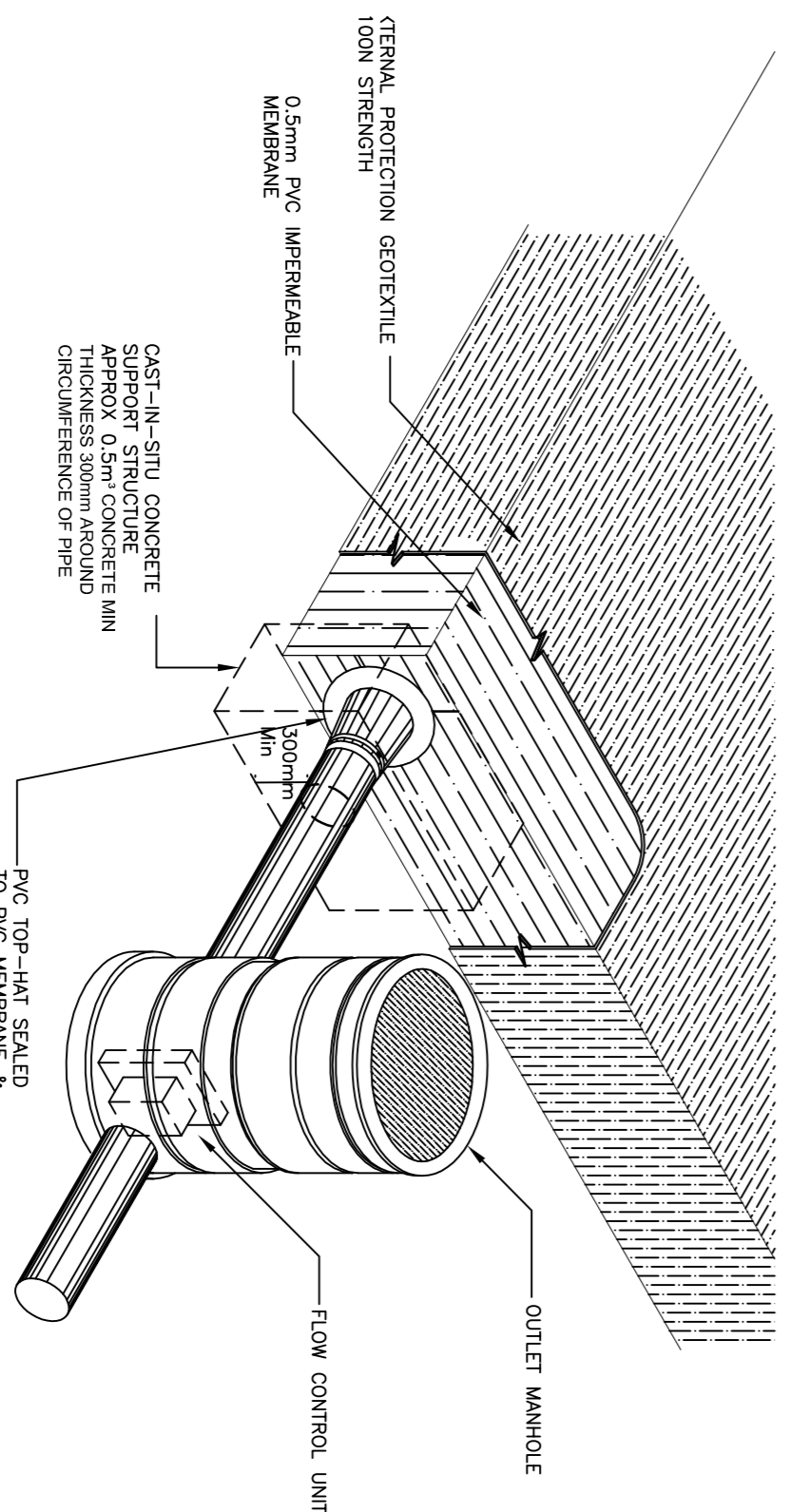
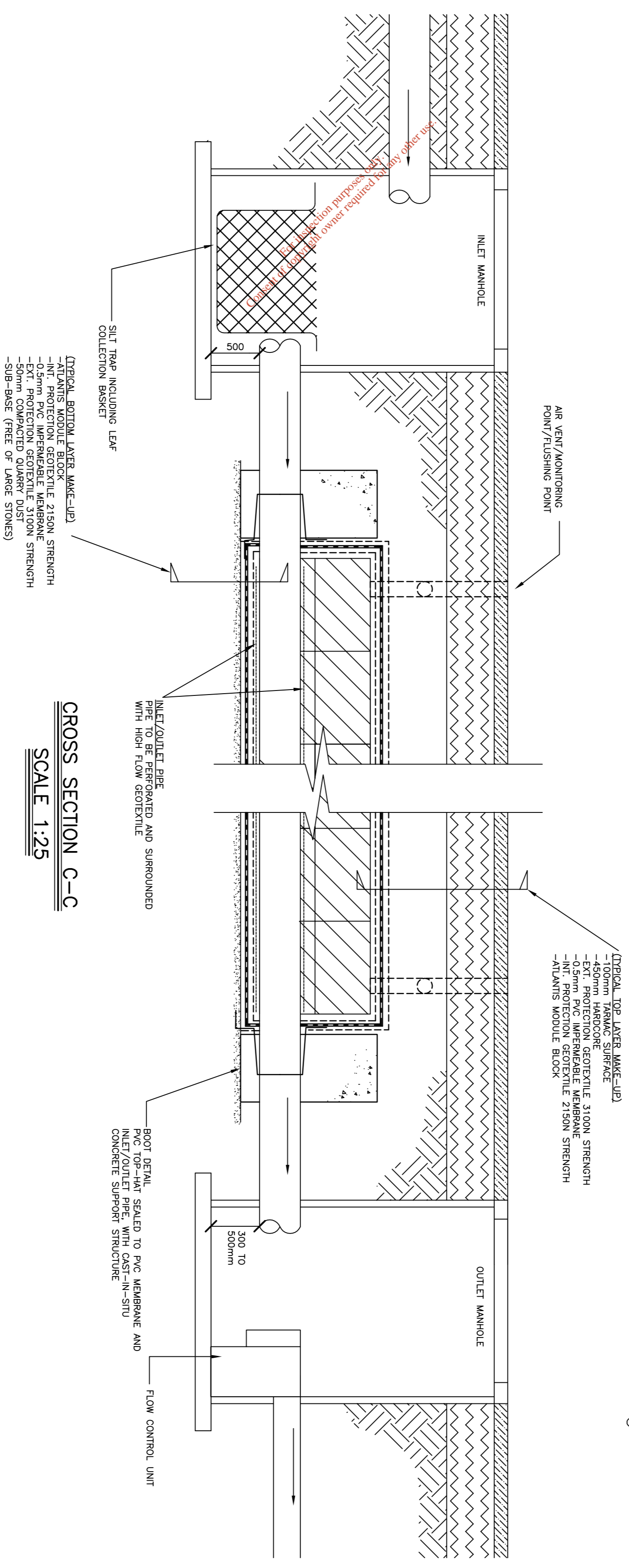
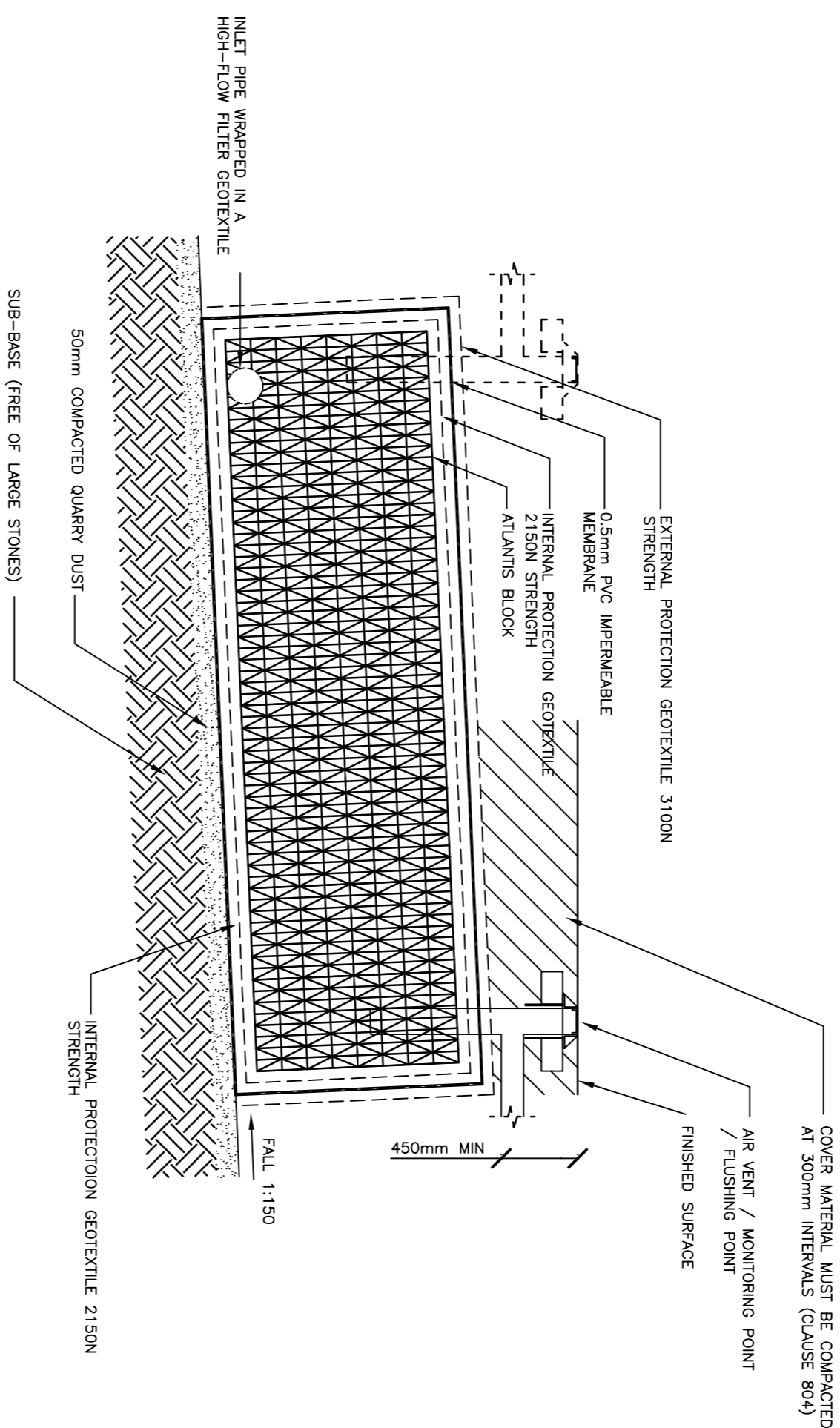
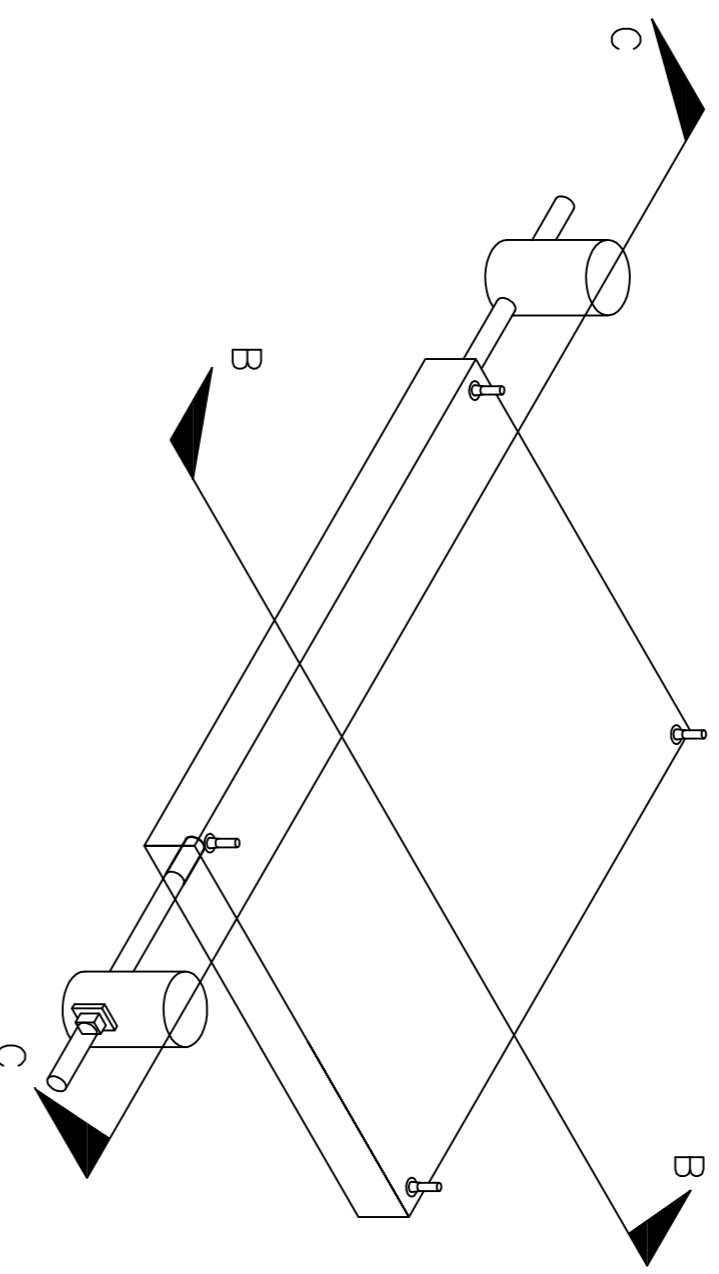
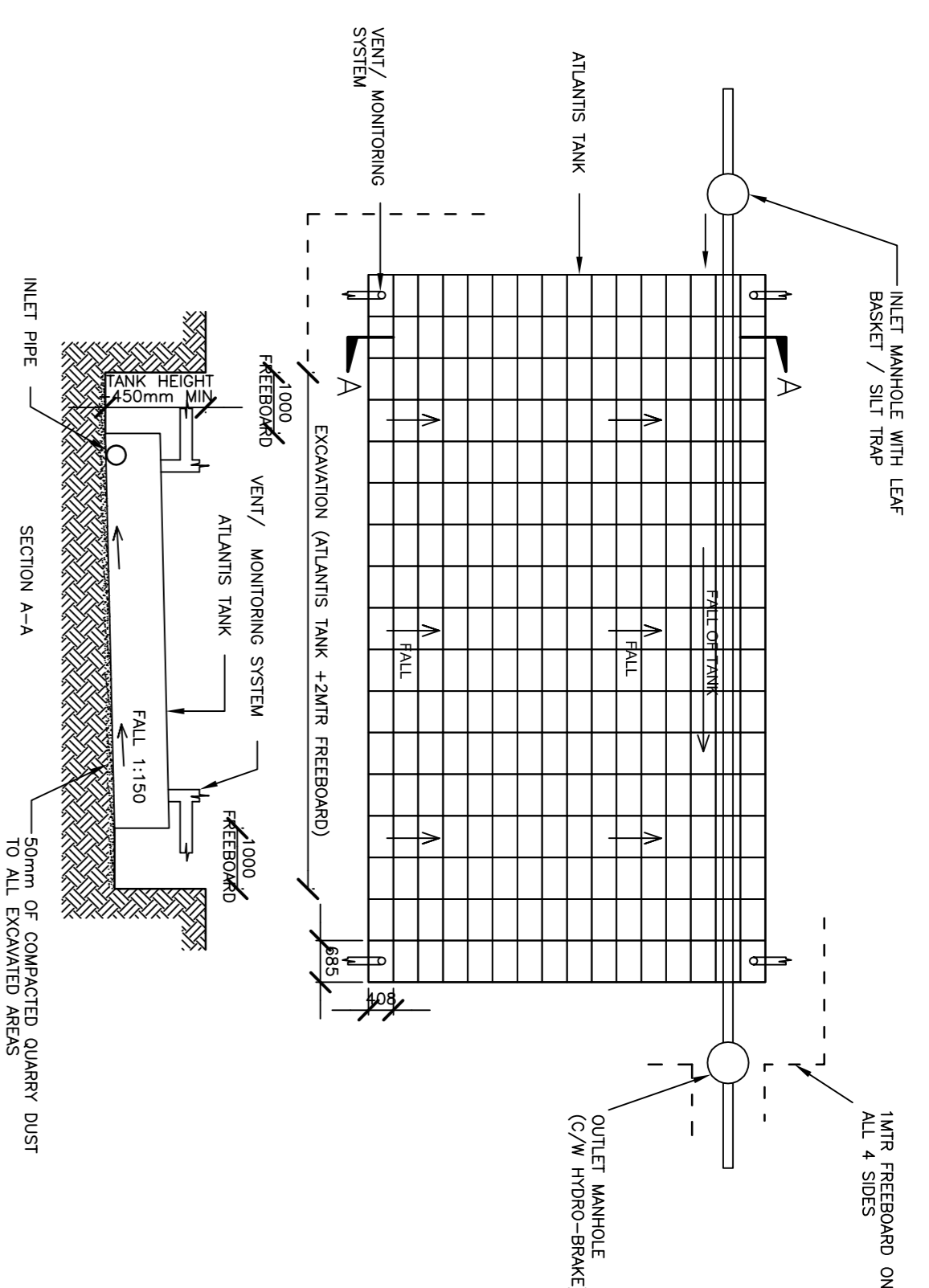
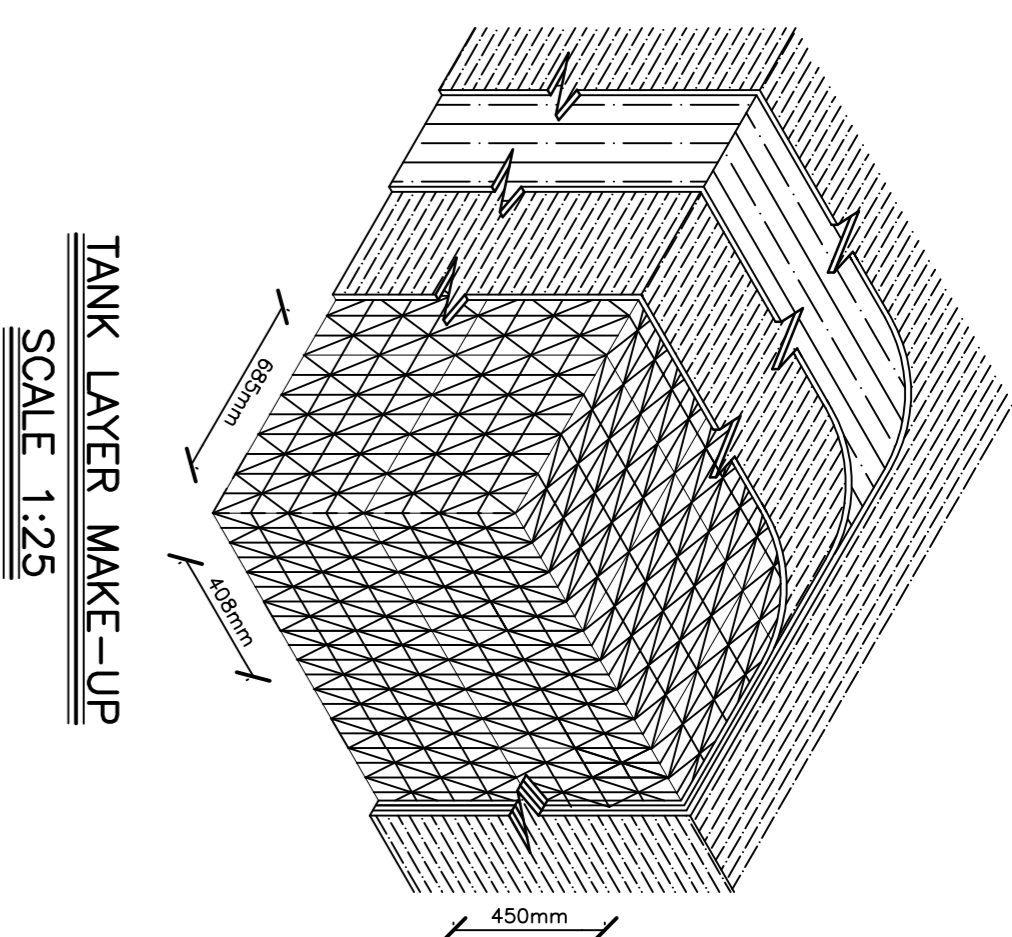
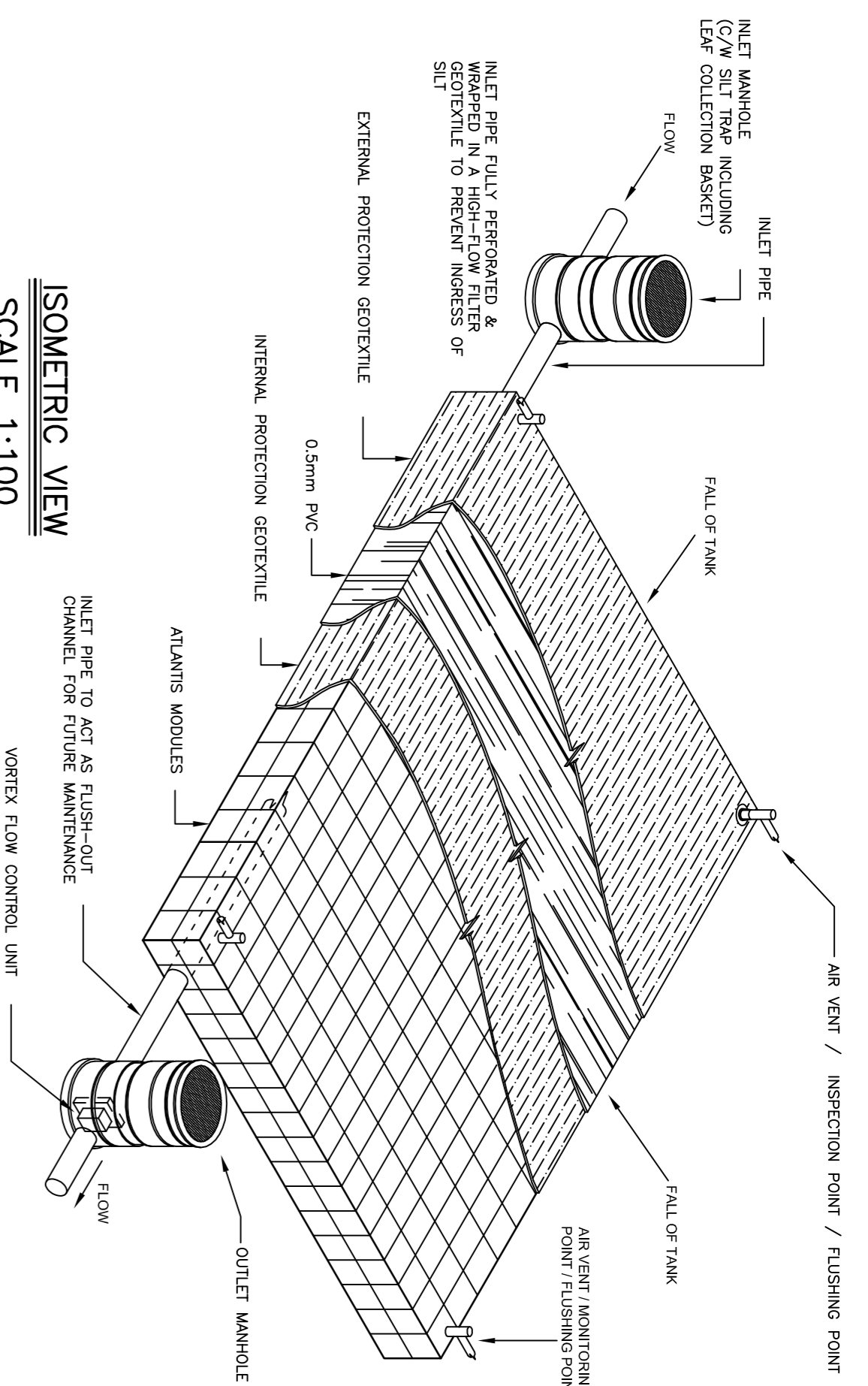
McPhoy Associates
 Consulting Engineers
 74 Redmond Street, 5th Floor, Dublin 1, Ireland
 E: info@mcphoy.ie
 T: +353 1 504 1100

Appendix D6: Diagram of Hydrocells

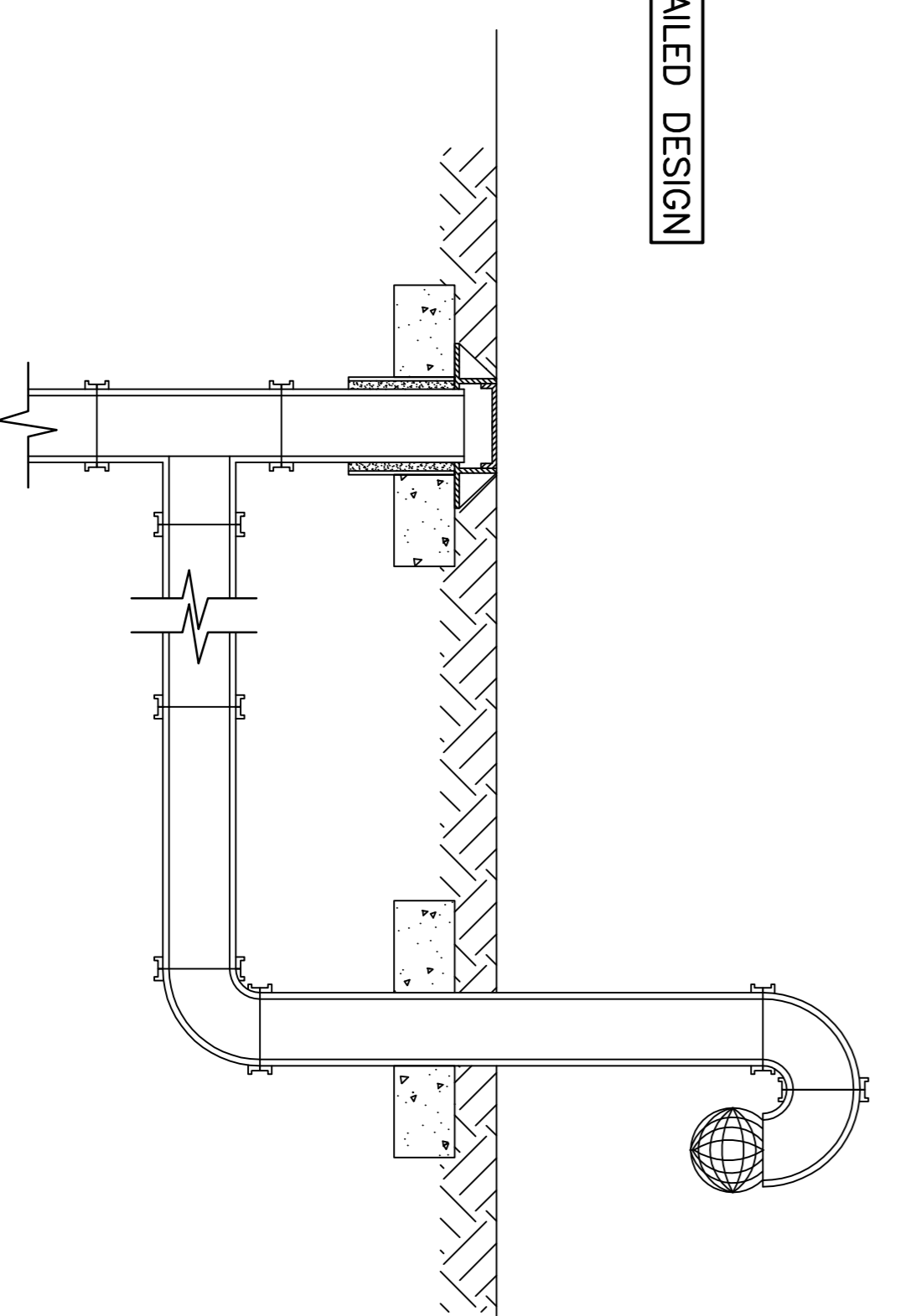
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NOTES.

1. FOR STANDARD NOTES REFER TO DRAWING NO. SW-000.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL, SERVICES & M.E.A. DRAWINGS.
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED. LEVELS ARE STRUCTURAL LEVELS IN METRES TO ORDNANCE DATUM. THIS DRAWING MUST NOT BE SCALED.
4. EXACT LOCATION OF ALL EXISTING SERVICE LINES TO BE IDENTIFIED BY CAREFULLY HAND EXCAVATION.



FINAL DETAILS SUBJECT TO DETAILED DESIGN



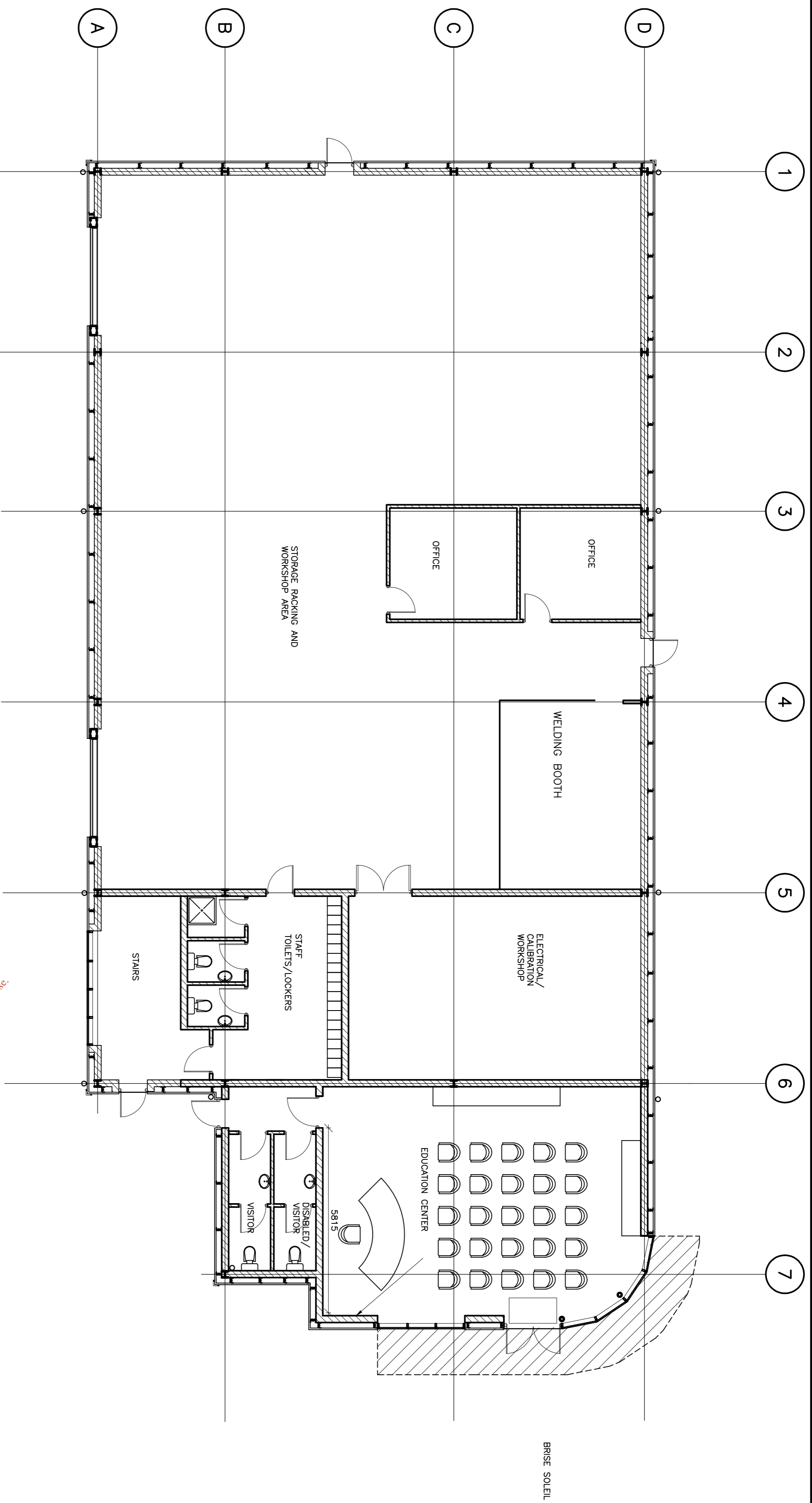
REV.	ISSUED FOR PRICING	CHK.	CHK.	DATE
A				08.05.08

CLIENT:	INDAVAR	INDAVAR BE/AND 4 HERBERTS TCE 60A LAURENCE TEL: 533 1 214840 FAX: 533 1 280968
PROJECT:	WASTE TO ENERGY ENABLING WORKS	
TITLE:	SITE WORKS PROPOSED STORM WATER ATTENUATION TANK 1	
DESIGNED:	C.M.	APPR'D: C.M.
CHECKED:	C.M.	SCALE: AS SHOWN
DATE:	MAY' 08	DRG. No. 16058 \ SW \ 004

Mc Elroy Associates
Consulting Engineers
72 Heddington Road, Balleridge, D.A.
Tel: 660 9000 Fax: 660 9099
E Mail: info@mcrae.com

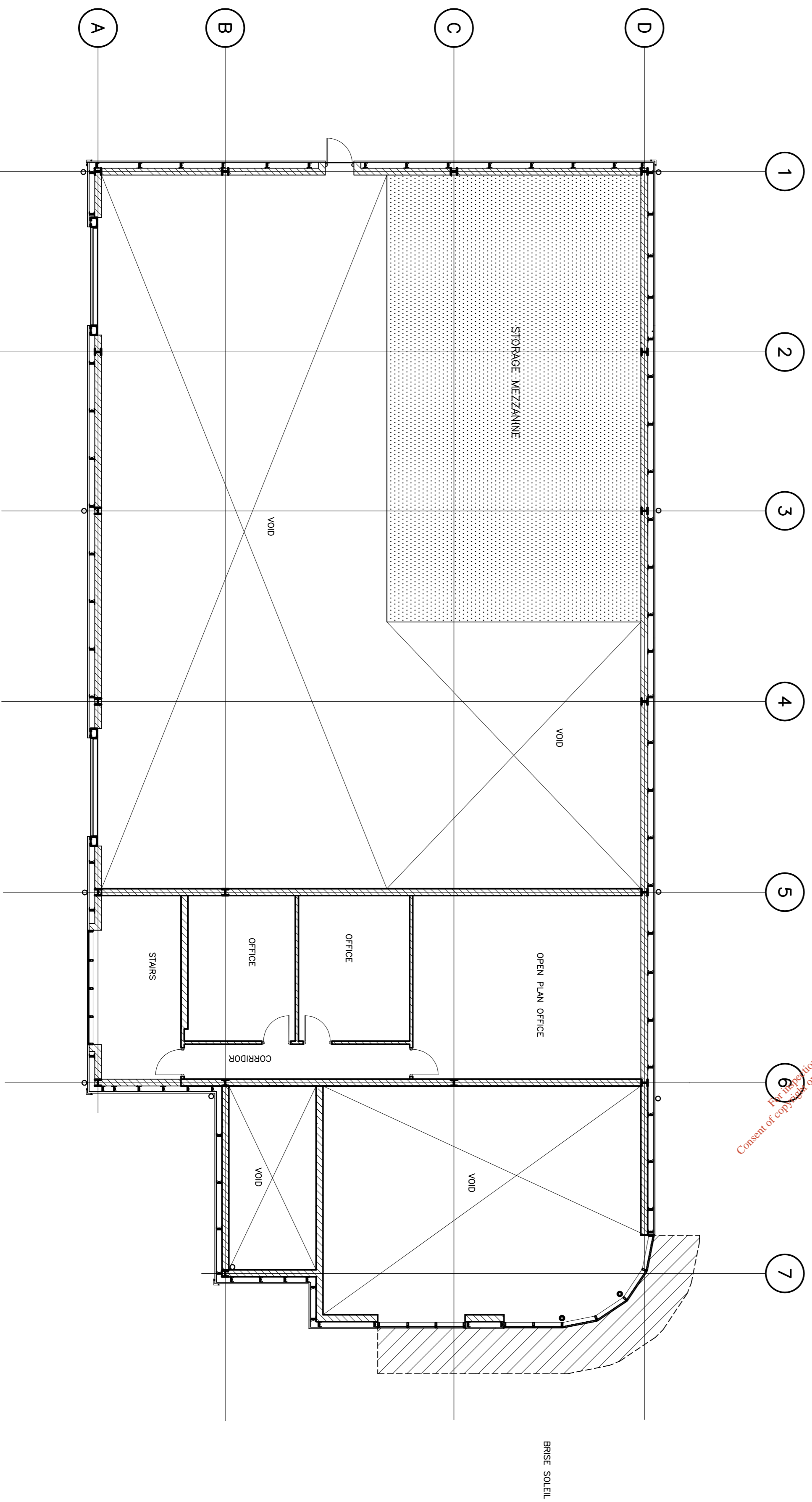
Appendix D7: Warehouse Layout

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GROUND FLOOR GENERAL ARRANGEMENT SCALE 1:100

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FIRST FLOOR GENERAL ARRANGEMENT SCALE 1:100

REV.	ISSUED FOR WASTE LICENCE	KKG	NK	12.05.08
A.	DESCRIPTION:	BY:	APPR:	DATE:
CLIENT:	INDAVIER IRELAND 4 MADONNIN TCE DOV LINDENHALL TCE TEL: +353 1 244530 FAX: +353 1 267082			

PROJECT:
70MW WASTE TO ENERGY FACILITY CARRANSTOWN

TITLE:
EDUCATION CENTER/ WAREHOUSE/WORKSHOP. FLOOR PLANS

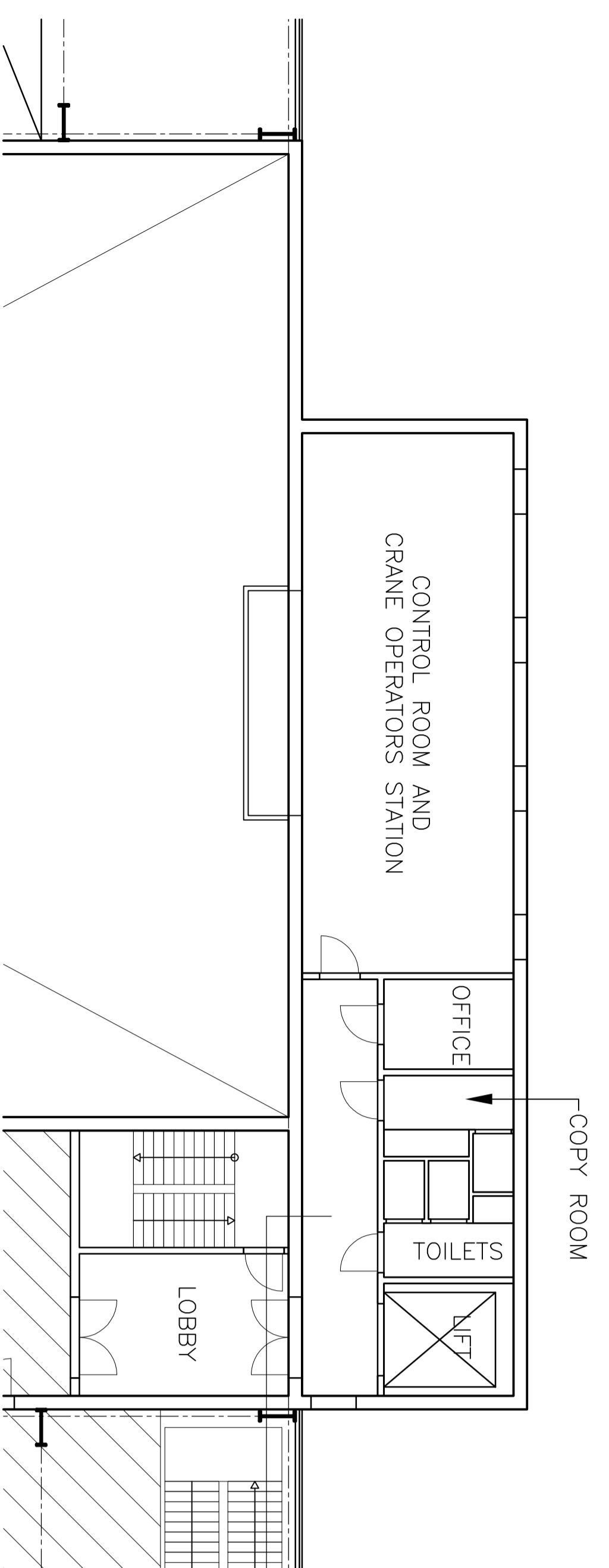
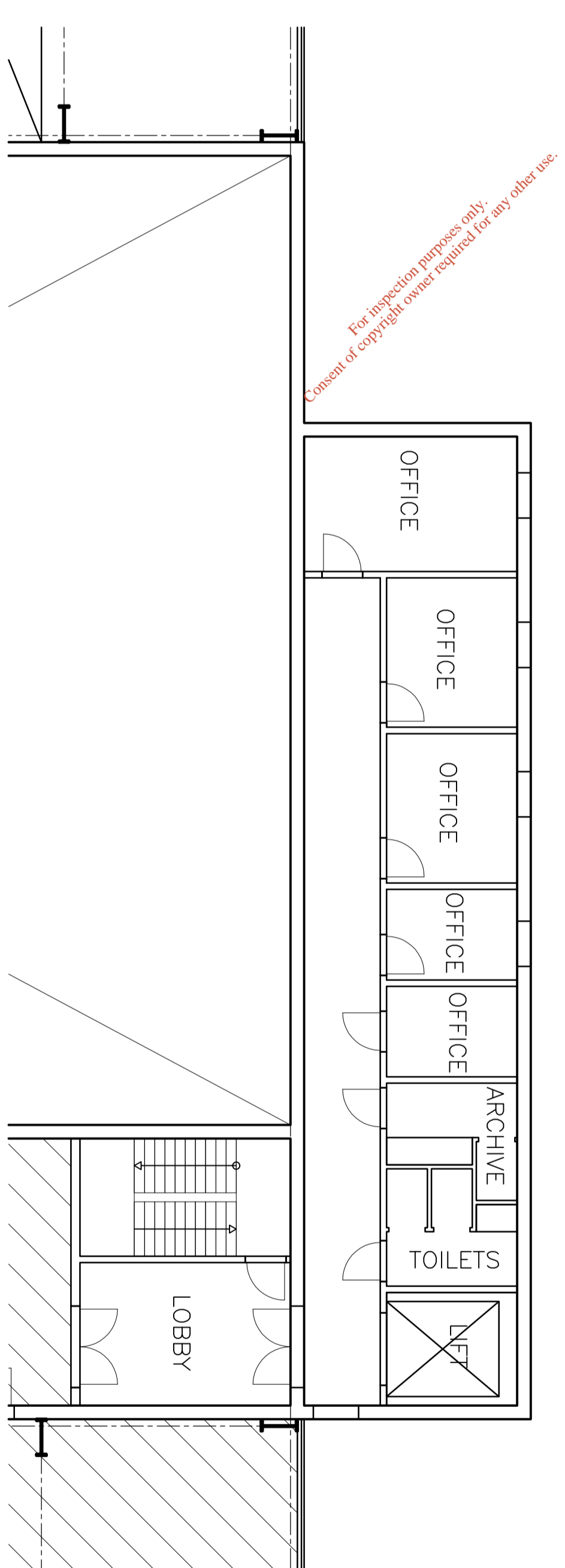
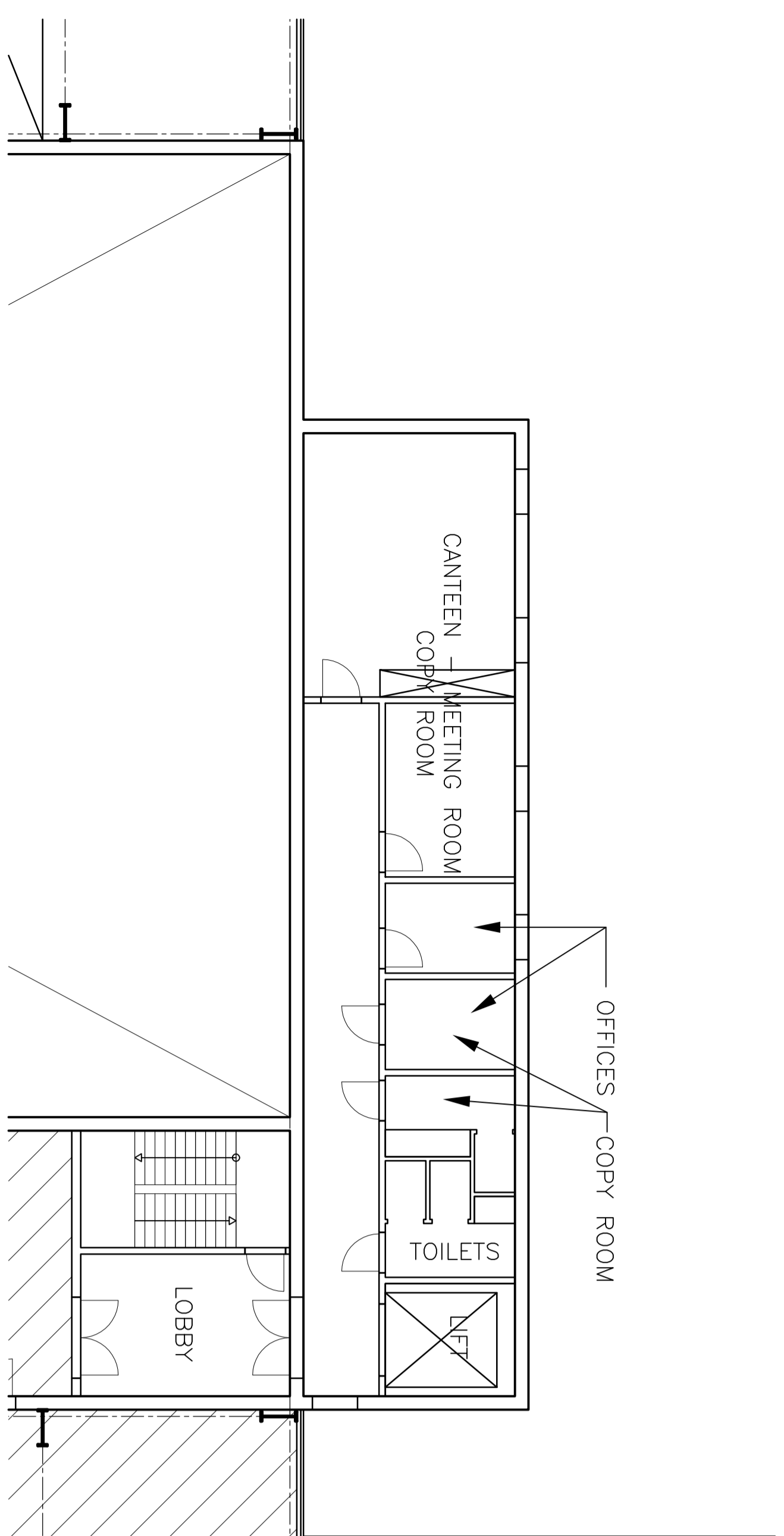
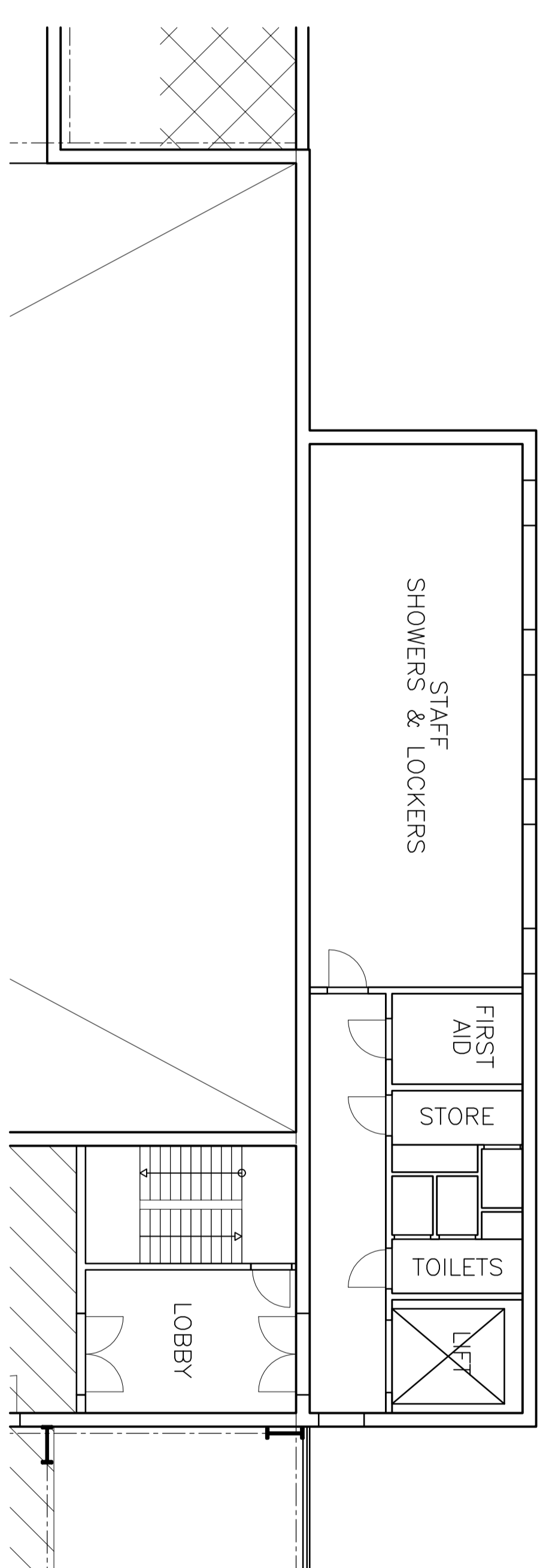
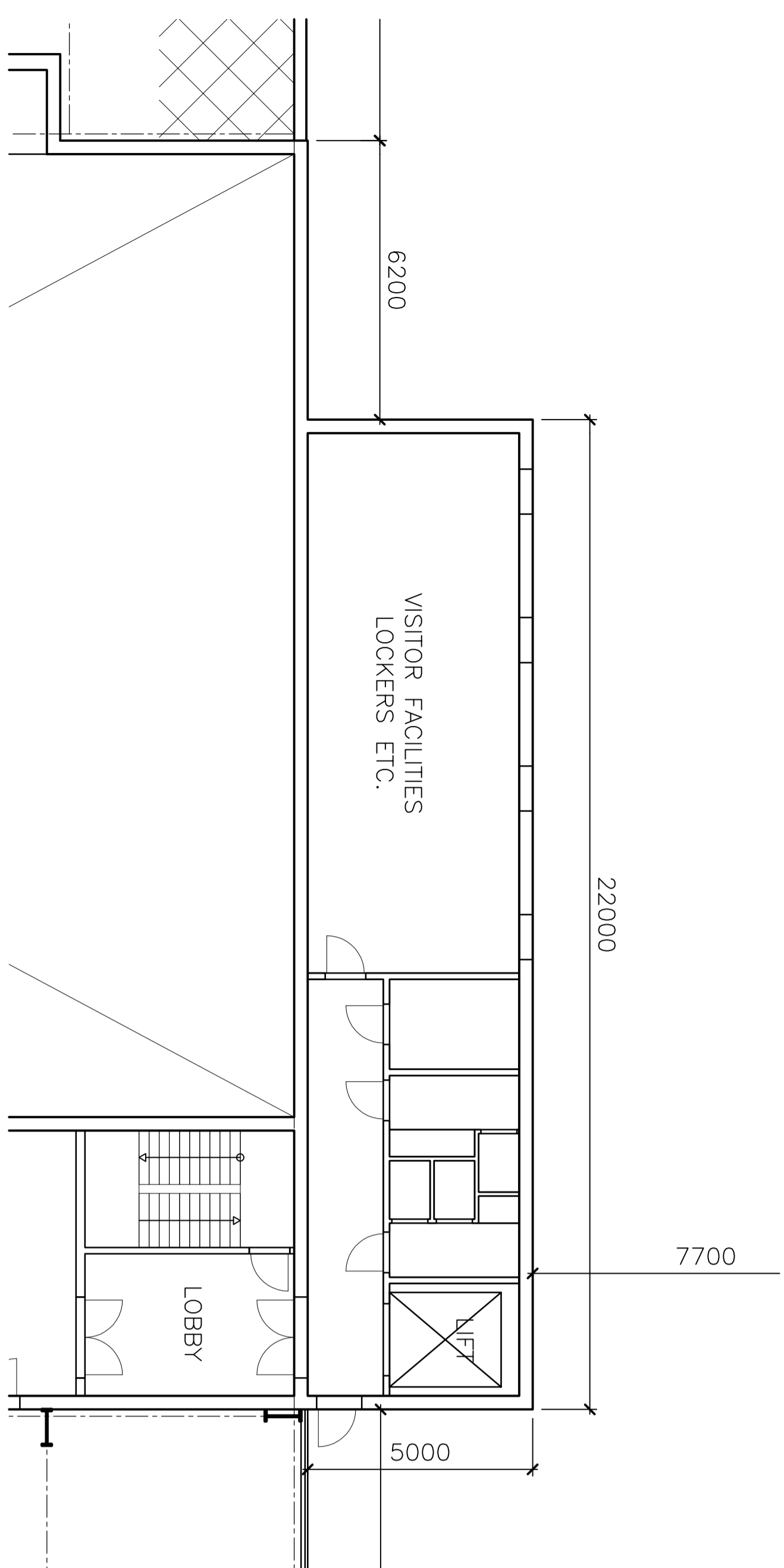

McElroy Associates
 Consulting Engineers
 72 Haddington Road, Ballsbridge, D4.
 Tel: 660 9000 Fax: 660 9099
 E-Mail: info@mcels.ie

DESIGNED:	CHKD:	APPR'D:	DATE:	SCALE:
NK	NK	NK	MAY' 08	AS SHOWN.
DRAWN:	DATE:	SCALE:	REV.	
KKG	MAY' 08	AS SHOWN.		

DRG.No. 15013\W\011

Appendix D8: Site Accommodation

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DESIGNED	NK	CHECKED	NK	APPROVED	NK	DATE	12.05.08
DRAWN	KKG	DATE	MAY 08	SCALE	AS SHOWN	REV	A
McElroy Associates Consulting Engineers 7-8, Pearse Street, Dublin 2, D02 T809, Ireland E: info@mc-elroy.com I: +353 1 504 2000							
INDAVIA Environmental 10, Pearse Street, Dublin 2, D02 T809, Ireland E: info@indavia.com I: +353 1 504 2000							
PROJECT: 70MW WASTE TO ENERGY FACILITY CARRANSTOWN TITLE: MAIN PROCESS BUILDING OFFICE/STAFF FACILITIES							
ISSUED FOR MAJOR LICENCE CLIENT: INDAVIA BR: INDIA DATE: 12.05.08							
DRG. No. 15013\W\012							

Appendix D9: Plant Layout From End Showing Turbine Building

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Appendix D10: Waste Incineration Directive

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DIRECTIVE 2000/76/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 4 December 2000
on the incineration of waste

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 175(1) thereof,

Having regard to the proposal from the Commission ⁽¹⁾,

Having regard to the Opinion of the Economic and Social Committee ⁽²⁾,

Having regard to the Opinion of the Committee of the Regions ⁽³⁾,

Acting in accordance with the procedure laid down in Article 251 of the Treaty ⁽⁴⁾, and in the light of the joint text approved by the Conciliation Committee on 11 October 2000,

Whereas:

- (1) The fifth Environment Action Programme: Towards sustainability — A European Community programme of policy and action in relation to the environment and sustainable development, supplemented by Decision No 2179/98/EC on its review ⁽⁵⁾, sets as an objective that critical loads and levels of certain pollutants, such as nitrogen oxides (NO_x), sulphur dioxide (SO₂), heavy metals and dioxins should not be exceeded, while in terms of air quality the objective is that all people should be effectively protected against recognised health risks from air pollution. That Programme further sets as an objective a 90 % reduction of dioxin emissions of identified sources by 2005 (1985 level) and at least 70 % reduction from all pathways of cadmium (Cd), mercury (Hg) and lead (Pb) emissions in 1995.
- (2) The Protocol on persistent organic pollutants signed by the Community within the framework of the United Nations Economic Commission for Europe (UN-ECE) Convention on long-range transboundary air pollution sets legally binding limit values for the emission of dioxins and furans of 0,1 ng/m; TE (Toxicity Equivalents) for installations burning more than 3 tonnes per hour of municipal solid waste, 0,5 ng/m; TE for installations burning more than 1 tonne per hour of medical

waste, and 0,2 ng/m; TE for installations burning more than 1 tonne per hour of hazardous waste.

- (3) The Protocol on Heavy Metals signed by the Community within the framework of the UN-ECE Convention on long-range transboundary air pollution sets legally binding limit values for the emission of particulate of 10 mg/m³ for hazardous and medical waste incineration and for the emission of mercury of 0,05 mg/m³ for hazardous waste incineration and 0,08 mg/m³ for municipal waste incineration.
- (4) The International Agency for Research on Cancer and the World Health Organisation indicate that some polycyclic aromatic hydrocarbons (PAHs) are carcinogenic. Therefore Member States may set emission limit values for PAHs among other pollutants.
- (5) In accordance with the principles of subsidiarity and proportionality as set out in Article 5 of the Treaty, there is a need to take action at the level of the Community. The precautionary principle provides the basis for further measures. This Directive confines itself to minimum requirements for incineration and co-incineration plants.
- (6) Further, Article 174 provides that Community policy on the environment is to contribute to protecting human health.
- (7) Therefore, a high level of environmental protection and human health protection requires the setting and maintaining of stringent operational conditions, technical requirements and emission limit values for plants incinerating or co-incinerating waste within the Community. The limit values set should prevent or limit as far as practicable negative effects on the environment and the resulting risks to human health.
- (8) The Communication from the Commission on the review of the Community Strategy for waste management assigns prevention of waste the first priority, followed by reuse and recovery and finally by safe disposal of waste; in its Resolution of 24 February 1997 on a Community Strategy for waste management ⁽⁶⁾, the Council reiterated its conviction that waste prevention should be the first priority of any rational waste policy in relation to minimising waste production and the hazardous properties of waste.

⁽¹⁾ OJ C 13, 17.1.1998, p. 6 and OJ C 372, 2.12.1998, p. 11.

⁽²⁾ OJ C 116, 28.4.1999, p. 40.

⁽³⁾ OJ C 198, 14.7.1999, p. 37.

⁽⁴⁾ Opinion of the European Parliament of 14 April 1999 (OJ C 219, 30.7.1999, p. 249), Council Common Position of 25 November 1999 (OJ C 25, 28.1.2000, p. 17) and Decision of the European Parliament of 15 March 2000 (not yet published in the Official Journal). Decision of the European Parliament of 16 November 2000 and Decision of the Council of 20 November 2000.

⁽⁵⁾ OJ C 138, 17.5.1993, p. 1 and OJ L 275, 10.10.1998, p. 1.

⁽⁶⁾ OJ C 76, 11.3.1997, p. 1.

- (9) In its Resolution of 24 February 1997 the Council also underlines the importance of Community criteria concerning the use of waste, the need for appropriate emission standards to apply to incineration facilities, the need for monitoring measures to be envisaged for existing incineration plants, and the need for the Commission to consider amending Community legislation in relation to the incineration of waste with energy recovery in order to avoid large-scale movements of waste for incineration or co-incineration in the Community.
- (10) It is necessary to set strict rules for all plants incinerating or co-incinerating waste in order to avoid transboundary movements to plants operating at lower costs due to less stringent environmental standards.
- (11) The Communication from the Commission/energy for the future: renewable sources of energy/White paper for a Community strategy and action plan takes into consideration in particular the use of biomass for energy purposes.
- (12) Council Directive 96/61/EC⁽¹⁾ sets out an integrated approach to pollution prevention and control in which all the aspects of an installations environmental performance are considered in an integrated manner. Installations for the incineration of municipal waste with a capacity exceeding 3 tonnes per hour and installations for the disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day are included within the scope of the said Directive.
- (13) Compliance with the emission limit values laid down by this Directive should be regarded as a necessary but not sufficient condition for compliance with the requirements of Directive 96/61/EC. Such compliance may involve more stringent emissions limit values for the pollutants envisaged by this Directive, emission limit values for other substances and other media, and other appropriate conditions.
- (14) Industrial experience in the implementation of techniques for the reduction of polluting emissions from incineration plants has been acquired over a period of ten years.
- (15) Council Directives 89/369/EEC⁽²⁾ and 89/429/EEC⁽³⁾ on the prevention and reduction of air pollution from municipal waste incineration plants have contributed to the reduction and control of atmospheric emissions from incineration plants. More stringent rules should now be adopted and those Directives should accordingly be repealed.
- (16) The distinction between hazardous and non-hazardous waste is based principally on the properties of waste prior to incineration or co-incineration but not on differences in emissions. The same emission limit values should apply to the incineration or co-incineration of hazardous and non-hazardous waste but different techniques and conditions of incineration or co-incineration and different monitoring measures upon reception of waste should be retained.
- (17) Member States should take into account Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air⁽⁴⁾ when implementing this Directive.
- (18) The incineration of hazardous waste with a content of more than 1 % of halogenated organic substances, expressed as chlorine, has to comply with certain operational conditions in order to destroy as many organic pollutants such as dioxins as possible.
- (19) The incineration of waste which contains chlorine generates toxic gas residues. Such residues should be managed in a way that minimises their amount and harmfulness.
- (20) There may be grounds to provide for specified exemptions to the emission limit values for some pollutants during a specified time limit and subject to specific conditions.
- (21) Criteria for certain sorted combustible fraction of non-hazardous waste not suitable for recycling, should be developed in order to allow the authorisation of the reduction of the frequency of periodical measurements.
- (22) A single text on the incineration of waste will improve legal clarity and enforceability. There should be a single directive for the incineration and co-incineration of hazardous and non-hazardous waste taking fully into account the substance and structure of Council Directive 94/67/EC of 16 December 1994 on the incineration of hazardous waste⁽⁵⁾. Therefore Directive 94/67/EC should also be repealed.
- (23) Article 4 of Council Directive 75/442/EEC of 15 July 1975 on waste⁽⁶⁾ requires Member States to take the necessary measures to ensure that waste is recovered or disposed of without endangering human health and without harming the environment. To this end, Articles 9 and 10 of that Directive provide that any plant or undertaking treating waste must obtain a permit from the competent authorities relating, *inter alia*, to the precautions to be taken.

⁽¹⁾ OJ L 257, 10.10.1996, p. 26.

⁽²⁾ OJ L 163, 14.6.1989, p. 32. Directive as last amended by the Accession Act of 1994.

⁽³⁾ OJ L 203, 15.7.1989, p. 50. Directive as last amended by the Accession Act of 1994.

⁽⁴⁾ OJ L 163, 29.6.1999, p. 41.

⁽⁵⁾ OJ L 365, 31.12.1994, p. 34.

⁽⁶⁾ OJ L 194, 25.7.1975, p. 39. Directive as last amended by Commission Decision 350/96/EC (OJ L 135, 6.6.1996, p. 32).

- (24) The requirements for recovering the heat generated by the incineration or co-incineration process and for minimising and recycling residues resulting from the operation of incineration or co-incineration plants will assist in meeting the objectives of Article 3 on the waste hierarchy of Directive 75/442/EEC.
- (25) Incineration and co-incineration plants treating only animal waste regulated by Directive 90/667/EEC ⁽¹⁾ are excluded from the scope of this Directive. The Commission intends to propose a revision to the requirements of Directive 90/667 with a view to providing for high environmental standards for the incineration and co-incineration of animal waste.
- (26) The permit for an incineration or co-incineration plant shall also comply with any applicable requirements laid down in Directives 91/271/EEC ⁽²⁾, 96/61/EC, 96/62/EC ⁽³⁾, 76/464/EEC ⁽⁴⁾, and 1999/31/EC ⁽⁵⁾.
- (27) The co-incineration of waste in plants not primarily intended to incinerate waste should not be allowed to cause higher emissions of polluting substances in that part of the exhaust gas volume resulting from such co-incineration than those permitted for dedicated incineration plants and should therefore be subject to appropriate limitations.
- (28) High-standard measurement techniques are required to monitor emissions to ensure compliance with the emission limit values for the pollutants.
- (29) The introduction of emission limit values for the discharge of waste water from the cleaning of exhaust gases from incineration and co-incineration plants will limit a transfer of pollutants from the air into water.
- (30) Provisions should be laid down for cases where the emission limit values are exceeded as well as for technically unavoidable stoppages, disturbances or failures of the purification devices or the measurement devices.
- (31) In order to ensure transparency of the permitting process throughout the Community the public should have access to information with a view to allowing it to be involved in decisions to be taken following applications for new permits and their subsequent updates. The

public should have access to reports on the functioning and monitoring of the plants burning more than three tonnes per hour in order to be informed of their potential effects on the environment and human health.

- (32) The Commission should present a report both to the European Parliament and the Council based on the experience of applying this Directive, the new scientific knowledge gained, the development of the state of technology, the progress achieved in emission control techniques, and on the experience made in waste management and operation of the plants and on the development of environmental requirements, with a view to proposing, as appropriate, to adapt the related provisions of this Directive.
- (33) The measures necessary for the implementation of this Directive are to be adopted in accordance with Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission ⁽⁶⁾.
- (34) Member States should lay down rules on penalties applicable to infringements of the provisions of this Directive and ensure that they are implemented; those penalties should be effective, proportionate and dissuasive,

HAVE ADOPTED THIS DIRECTIVE:

Article 1

Objectives

The aim of this Directive is to prevent or to limit as far as practicable negative effects on the environment, in particular pollution by emissions into air, soil, surface water and groundwater, and the resulting risks to human health, from the incineration and co-incineration of waste.

This aim shall be met by means of stringent operational conditions and technical requirements, through setting emission limit values for waste incineration and co-incineration plants within the Community and also through meeting the requirements of Directive 75/442/EEC.

Article 2

Scope

1. This Directive covers incineration and co-incineration plants.

⁽¹⁾ Council Directive 90/667/EEC of 27 November 1990, laying down the veterinary rules for the disposal and processing of animal waste, for its placing on the market and for the prevention of pathogens in feedstuffs of animal or fish origin and amending Directive 90/425/EEC (OJ L 363, 27.12.1990, p. 51). Directive as last amended by the Accession Act of 1994.

⁽²⁾ Council Directive 91/271/EEC of 21 May 1991 concerning urban waste-water treatment (OJ L 135, 30.5.1991, p. 40). Directive as amended by Directive 98/15/EC (OJ L 67, 7.3.1998, p. 29).

⁽³⁾ Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management (OJ L 296, 21.11.1996, p. 55).

⁽⁴⁾ Council Directive 76/464/EEC of 4 May 1976 on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (OJ L 129, 18.5.1976, p. 23). Directive as last amended by the Accession Act of 1994.

⁽⁵⁾ Directive 1999/31/EC of 26 April 1999 on the landfill of waste (OJ L 182, 16.7.1999, p. 1).

⁽⁶⁾ OJ L 184, 17.7.1999, p. 23.

2. The following plants shall however be excluded from the scope of this Directive:

(a) Plants treating only the following wastes:

- (i) vegetable waste from agriculture and forestry,
- (ii) vegetable waste from the food processing industry, if the heat generated is recovered,
- (iii) fibrous vegetable waste from virgin pulp production and from production of paper from pulp, if it is co-incinerated at the place of production and the heat generated is recovered,
- (iv) wood waste with the exception of wood waste which may contain halogenated organic compounds or heavy metals as a result of treatment with wood-preserved or coating, and which includes in particular such wood waste originating from construction and demolition waste,
- (v) cork waste,
- (vi) radioactive waste,
- (vii) animal carcasses as regulated by Directive 90/667/EEC without prejudice to its future amendments,
- (viii) waste resulting from the exploration for, and the exploitation of, oil and gas resources from off-shore installations and incinerated on board the installation;

(b) Experimental plants used for research, development and testing in order to improve the incineration process and which treat less than 50 tonnes of waste per year.

(i) the mass content of polychlorinated aromatic hydrocarbons, e.g. polychlorinated biphenyls (PCB) or pentachlorinated phenol (PCP) amounts to concentrations not higher than those set out in the relevant Community legislation;

(ii) these wastes are not rendered hazardous by virtue of containing other constituents listed in Annex II to Directive 91/689/EEC in quantities or in concentrations which are inconsistent with the achievement of the objectives set out in Article 4 of Directive 75/442/EEC; and

(iii) the net calorific value amounts to at least 30 MJ per kilogramme,

(b) any combustible liquid wastes which cannot cause, in the flue gas directly resulting from their combustion, emissions other than those from gasoil as defined in Article 1(1) of Directive 93/12/EEC⁽³⁾ or a higher concentration of emissions than those resulting from the combustion of gasoil as so defined;

3. 'mixed municipal waste' means waste from households as well as commercial, industrial and institutional waste, which because of its nature and composition is similar to waste from households, but excluding fractions indicated in the Annex to Decision 94/3/EC⁽⁴⁾ under heading 20 01 that are collected separately at source and excluding the other wastes indicated under heading 20 02 of that Annex;

4. 'incineration plant' means any stationary or mobile technical unit and equipment dedicated to the thermal treatment of wastes with or without recovery of the combustion heat generated. This includes the incineration by oxidation of waste as well as other thermal treatment processes such as pyrolysis, gasification or plasma processes in so far as the substances resulting from the treatment are subsequently incinerated.

This definition covers the site and the entire incineration plant including all incineration lines, waste reception, storage, on site pretreatment facilities, waste-fuel and air-supply systems, boiler, facilities for the treatment of exhaust gases, on-site facilities for treatment or storage of residues and waste water, stack, devices and systems for controlling incineration operations, recording and monitoring incineration conditions;

5. 'co-incineration plant' means any stationary or mobile plant whose main purpose is the generation of energy or production of material products and:

- which uses wastes as a regular or additional fuel; or
- in which waste is thermally treated for the purpose of disposal.

Article 3

Definitions

For the purposes of this Directive:

1. 'waste' means any solid or liquid waste as defined in Article 1(a) of Directive 75/442/EEC;
2. 'hazardous waste' means any solid or liquid waste as defined in Article 1(4) of Council Directive 91/689/EEC of 12 December 1991 on hazardous waste⁽¹⁾.

For the following hazardous wastes, the specific requirements for hazardous waste in this Directive shall not apply:

- (a) combustible liquid wastes including waste oils as defined in Article 1 of Council Directive 75/439/EEC of 16 June 1975 on the disposal of waste oils⁽²⁾ provided that they meet the following criteria:

⁽¹⁾ OJ L 377, 31.12.1991, p. 20. Directive as amended by Directive 94/31/EC. (OJ L 168, 2.7.1994, p. 28).

⁽²⁾ OJ L 194, 25.7.1975, p. 23. Directive as last amended by the Accession Act of 1994.

⁽³⁾ Council Directive 93/12/EEC of 23 March 1993 relating to the sulphur content of certain liquid fuels (OJ L 74, 27.3.1993, p. 81). Directive as last amended by Directive 1999/32/EC (OJ L 121, 11.5.1999, p. 13).

⁽⁴⁾ Commission Decision 94/3/EC of 20 December 1993 establishing a list of wastes pursuant to Article 1a of Council Directive 75/442/EEC on waste (OJ L 5, 7.1.1994, p. 15).

If co-incineration takes place in such a way that the main purpose of the plant is not the generation of energy or production of material products but rather the thermal treatment of waste, the plant shall be regarded as an incineration plant within the meaning of point 4.

This definition covers the site and the entire plant including all co-incineration lines, waste reception, storage, on site pretreatment facilities, waste-, fuel- and air-supply systems, boiler, facilities for the treatment of exhaust gases, on-site facilities for treatment or storage of residues and waste water, stack devices and systems for controlling incineration operations, recording and monitoring incineration conditions;

6. 'existing co-incineration or co-incineration plant' means an incineration or co-incineration plant:

- (a) which is in operation and has a permit in accordance with existing Community legislation before 28 December 2002, or,
- (b) which is authorised or registered for incineration or co-incineration and has a permit issued before 28 December 2002 in accordance with existing Community legislation, provided that the plant is put into operation not later than 28 December 2003, or
- (c) which, in the view of the competent authority, is the subject of a full request for a permit, before 28 December 2002, provided that the plant is put into operation not later than 28 December 2004;

7. 'nominal capacity' means the sum of the incineration capacities of the furnaces of which an incineration plant is composed, as specified by the constructor and confirmed by the operator, with due account being taken, in particular, of the calorific value of the waste, expressed as the quantity of waste incinerated per hour;

8. 'emission' means the direct or indirect release of substances, vibrations, heat or noise from individual or diffuse sources in the plant into the air, water or soil;

9. 'emission limit values' means the mass, expressed in terms of certain specific parameters, concentration and/or level of an emission, which may not be exceeded during one or more periods of time;

10. 'dioxins and furans' means all polychlorinated dibenzo-p-dioxins and dibenzofurans listed in Annex I;

11. 'operator' means any natural or legal person who operates or controls the plant or, where this is provided for in national legislation, to whom decisive economic power over the technical functioning of the plant has been delegated;

12. 'permit' means a written decision (or several such decisions) delivered by the competent authority granting authorisation to operate a plant, subject to certain conditions which guarantee that the plant complies with all the

requirements of this Directive. A permit may cover one or more plants or parts of a plant on the same site operated by the same operator;

13. 'residue' means any liquid or solid material (including bottom ash and slag, fly ash and boiler dust, solid reaction products from gas treatment, sewage sludge from the treatment of waste waters, spent catalysts and spent activated carbon) defined as waste in Article 1(a) of Directive 75/442/EEC, which is generated by the incineration or co-incineration process, the exhaust gas or waste water treatment or other processes within the incineration or co-incineration plant.

Article 4

Application and permit

1. Without prejudice to Article 11 of Directive 75/442/EEC or to Article 3 of Directive 91/689/EEC, no incineration or co-incineration plant shall operate without a permit to carry out these activities.

2. Without prejudice to Directive 96/61/EC, the application for a permit for an incineration or co-incineration plant to the competent authority shall include a description of the measures which are envisaged to guarantee that:

- (a) the plant is designed, equipped and will be operated in such a manner that the requirements of this Directive are taking into account the categories of waste to be incinerated;
- (b) the heat generated during the incineration and co-incineration process is recovered as far as practicable e.g. through combined heat and power, the generating of process steam or district heating;
- (c) the residues will be minimised in their amount and harmfulness and recycled where appropriate;
- (d) the disposal of the residues which cannot be prevented, reduced or recycled will be carried out in conformity with national and Community legislation.

3. The permit shall be granted only if the application shows that the proposed measurement techniques for emissions into the air comply with Annex III and, as regards water, comply with Annex III paragraphs 1 and 2.

4. The permit granted by the competent authority for an incineration or co-incineration plant shall, in addition to complying with any applicable requirement laid down in Directives 91/271/EEC, 96/61/EC, 96/62/EC, 76/464/EEC and 1999/31/EC:

- (a) list explicitly the categories of waste which may be treated. The list shall use at least the categories of waste set up in the European Waste Catalogue (EWC), if possible, and contain information on the quantity of waste, where appropriate;

(b) include the total waste incinerating or co-incinerating capacity of the plant;

(c) specify the sampling and measurement procedures used to satisfy the obligations imposed for periodic measurements of each air and water pollutants.

5. The permit granted by the competent authority to an incineration or co-incineration plant using hazardous waste shall in addition to paragraph 4:

(a) list the quantities of the different categories of hazardous waste which may be treated;

(b) specify the minimum and maximum mass flows of those hazardous wastes, their lowest and maximum calorific values and their maximum contents of pollutants, e.g. PCB, PCP, chlorine, fluorine, sulphur, heavy metals.

6. Without prejudice to the provisions of the Treaty, Member States may list the categories of waste to be mentioned in the permit which can be co-incinerated in defined categories of co-incineration plants.

7. Without prejudice to Directive 96/61/EC, the competent authority shall periodically reconsider and, where necessary, update permit conditions.

8. Where the operator of an incineration or co-incineration plant for non-hazardous waste is envisaging a change of operation which would involve the incineration or co-incineration of hazardous waste, this shall be regarded as a substantial change within the meaning of Article 2(10)(b) of Directive 96/61/EC and Article 12(2) of that Directive shall apply.

9. If an incineration or co-incineration plant does not comply with the conditions of the permit, in particular with the emission limit values for air and water, the competent authority shall take action to enforce compliance.

Article 5

Delivery and reception of waste

1. The operator of the incineration or co-incineration plant shall take all necessary precautions concerning the delivery and reception of waste in order to prevent or to limit as far as practicable negative effects on the environment, in particular the pollution of air, soil, surface water and groundwater as well as odours and noise, and direct risks to human health. These

measures shall meet at least the requirements set out in paragraphs 3 and 4.

2. The operator shall determine the mass of each category of waste, if possible according to the EWC, prior to accepting the waste at the incineration or co-incineration plant.

3. Prior to accepting hazardous waste at the incineration or co-incineration plant, the operator shall have available information about the waste for the purpose of verifying, *inter alia*, compliance with the permit requirements specified in Article 4(5). This information shall cover:

(a) all the administrative information on the generating process contained in the documents mentioned in paragraph 4(a);

(b) the physical, and as far as practicable, chemical composition of the waste and all other information necessary to evaluate its suitability for the intended incineration process;

(c) the hazardous characteristics of the waste, the substances with which it cannot be mixed, and the precautions to be taken in handling the waste.

4. Prior to accepting hazardous waste at the incineration or co-incineration plant, at least the following reception procedures shall be carried out by the operator:

(a) the checking of those documents required by Directive 91/689/EEC and, where applicable, those required by Council Regulation (EEC) No 259/93 of 1 February 1993 on the supervision, and control of shipments of waste within, into and out of the European Community ⁽¹⁾ and by dangerous-goods transport regulations;

(b) the taking of representative samples, unless inappropriate, e.g. for infectious clinical waste, as far as possible before unloading, to verify conformity with the information provided for in paragraph 3 by carrying out controls and to enable the competent authorities to identify the nature of the wastes treated. These samples shall be kept for at least one month after the incineration.

5. The competent authorities may grant exemptions from paragraphs 2, 3 and 4 for industrial plants and undertakings incinerating or co-incinerating only their own waste at the place of generation of the waste provided that the requirements of this Directive are met.

Article 6

Operating conditions

1. Incineration plants shall be operated in order to achieve a level of incineration such that the slag and bottom ashes Total Organic Carbon (TOC) content is less than 3 % or their loss on ignition is less than 5 % of the dry weight of the material. If necessary appropriate techniques of waste pretreatment shall be used.

⁽¹⁾ OJ L 30, 6.2.1993, p. 1. Regulation as last amended by Commission Regulation (EC) No 2408/98 (OJ L 298, 7.11.1998, p. 19).

Incineration plants shall be designed, equipped, built and operated in such a way that the gas resulting from the process is raised, after the last injection of combustion air, in a controlled and homogeneous fashion and even under the most unfavourable conditions, to a temperature of 850 °C, as measured near the inner wall or at another representative point of the combustion chamber as authorised by the competent authority, for two seconds. If hazardous wastes with a content of more than 1 % of halogenated organic substances, expressed as chlorine, are incinerated, the temperature has to be raised to 1 100 °C for at least two seconds.

Each line of the incineration plant shall be equipped with at least one auxiliary burner. This burner must be switched on automatically when the temperature of the combustion gases after the last injection of combustion air falls below 850 °C or 1 100 °C as the case may be. It shall also be used during plant start-up and shut-down operations in order to ensure that the temperature of 850 °C or 1 100 °C as the case may be is maintained at all times during these operations and as long as unburned waste is in the combustion chamber.

During start-up and shut-down or when the temperature of the combustion gas falls below 850 °C or 1 100 °C as the case may be, the auxiliary burner shall not be fed with fuels which can cause higher emissions than those resulting from the burning of gasoil as defined in Article 1(1) of Council Directive 75/716/EEC, liquefied gas or natural gas.

2. Co-incineration plants shall be designed, equipped, built and operated in such a way that the gas resulting from the co-incineration of waste is raised in a controlled and homogeneous fashion and even under the most unfavourable conditions, to a temperature of 850 °C for two seconds. If hazardous wastes with a content of more than 1 % of halogenated organic substances, expressed as chlorine, are co-incinerated, the temperature has to be raised to 1 100 °C.

3. Incineration and co-incineration plants shall have and operate an automatic system to prevent waste feed:

- (a) at start-up, until the temperature of 850 °C or 1 100 °C as the case may be or the temperature specified according to paragraph 4 has been reached;
- (b) whenever the temperature of 850 °C or 1 100 °C as the case may be or the temperature specified according to paragraph 4 is not maintained;
- (c) whenever the continuous measurements required by this Directive show that any emission limit value is exceeded due to disturbances or failures of the purification devices.

4. Conditions different from those laid down in paragraph 1 and, as regards the temperature, paragraph 3 and specified in the permit for certain categories of waste or for certain thermal processes may be authorised by the competent authority,

provided the requirements of this Directive are met. Member States may lay down rules governing these authorisations. The change of the operational conditions shall not cause more residues or residues with a higher content of organic pollutants compared to those residues which could be expected under the conditions laid down in paragraph 1.

Conditions different from those laid down in paragraph 2 and, as regards the temperature, paragraph 3 and specified in the permit for certain categories of waste or for certain thermal processes may be authorised by the competent authority, provided the requirements of this Directive are met. Member States may lay down rules governing these authorisations. Such authorisation shall be conditional upon at least the provisions for emission limit values set out in Annex V for total organic carbon and CO being complied with.

In the case of co-incineration of their own waste at the place of its production in existing bark boilers within the pulp and paper industry, such authorisation shall be conditional upon at least the provisions for emission limit values set out in Annex V for total organic carbon being complied with.

All operating conditions determined under this paragraph and the results of verifications made shall be communicated by the Member State to the Commission as part of the information provided in accordance with the reporting requirements.

5. Incineration and co-incineration plants shall be designed, equipped, built and operated in such a way as to prevent emissions into the air giving rise to significant ground-level air pollution; in particular, exhaust gases shall be discharged in a controlled fashion and in conformity with relevant Community air quality standards by means of a stack the height of which is calculated in such a way as to safeguard human health and the environment.

6. Any heat generated by the incineration or the co-incineration process shall be recovered as far as practicable.

7. Infectious clinical waste should be placed straight in the furnace, without first being mixed with other categories of waste and without direct handling.

8. The management of the incineration or the co-incineration plant shall be in the hands of a natural person who is competent to manage the plant.

Article 7

Air emission limit values

1. Incineration plants shall be designed, equipped, built and operated in such a way that the emission limit values set out in Annex V are not exceeded in the exhaust gas.

2. Co-incineration plants shall be designed, equipped, built and operated in such a way that the emission limit values determined according to or set out in Annex II are not exceeded in the exhaust gas.

If in a co-incineration plant more than 40 % of the resulting heat release comes from hazardous waste, the emission limit values set out in Annex V shall apply.

3. The results of the measurements made to verify compliance with the emission limit values shall be standardised with respect to the conditions laid down in Article 11.

4. In the case of co-incineration of untreated mixed municipal waste, the limit values will be determined according to Annex V, and Annex II will not apply.

5. Without prejudice to the provisions of the Treaty, Member States may set emission limit values for polycyclic aromatic hydrocarbons or other pollutants.

Article 8

Water discharges from the cleaning of exhaust gases

1. Waste water from the cleaning of exhaust gases discharged from an incineration or co-incineration plant shall be subject to a permit granted by the competent authorities.

2. Discharges to the aquatic environment of waste water resulting from the cleaning of exhaust gases shall be limited as far as practicable, at least in accordance with the emission limit values set in Annex IV.

3. Subject to a specific provision in the permit, the waste water from the cleaning of exhaust gases may be discharged to the aquatic environment after separate treatment on condition that:

- (a) the requirements of relevant Community, national and local provisions are complied with in the form of emission limit values; and
- (b) the mass concentrations of the polluting substances referred to in Annex IV do not exceed the emission limit values laid down therein.

4. The emission limit values shall apply at the point where waste waters from the cleaning of exhaust gases containing the polluting substances referred to in Annex IV are discharged from the incineration or co-incineration plant.

Where the waste water from the cleaning of exhaust gases is treated on site collectively with other on-site sources of waste water, the operator shall take the measurements referred to in Article 11:

- (a) on the waste water stream from the exhaust gas cleaning processes prior to its input into the collective waste water treatment plant;

- (b) on the other waste water stream or streams prior to its or their input into the collective waste water treatment plant;

- (c) at the point of final waste water discharge, after the treatment, from the incineration plant or co-incineration plant.

The operator shall take appropriate mass balance calculations in order to determine the emission levels in the final waste water discharge that can be attributed to the waste water arising from the cleaning of exhaust gases in order to check compliance with the emission limit values set out in Annex IV for the waste water stream from the exhaust gas cleaning process.

Under no circumstances shall dilution of waste water take place for the purpose of complying with the emission limit values set in Annex IV.

5. When waste waters from the cleaning of exhaust gases containing the polluting substances referred to in Annex IV are treated outside the incineration or co-incineration plant at a treatment plant intended only for the treatment of this sort of waste water, the emission limit values of Annex IV are to be applied at the point where the waste waters leave the treatment plant. If this off-site treatment plant is not only dedicated to treat waste water from incineration, the operator shall take the appropriate mass balance calculations, as provided for under paragraph 4(a), (b) and (c), in order to determine the emission levels in the final waste water discharge that can be attributed to the waste water arising from the cleaning of exhaust gases in order to check compliance with the emission limit values set out in Annex IV for the waste water stream from the exhaust gas cleaning process.

Under no circumstances shall dilution of waste water take place for the purpose of complying with the emission limit values set in Annex IV.

6. The permit shall:

- (a) establish emission limit values for the polluting substances referred to in Annex IV, in accordance with paragraph 2 and in order to meet the requirements referred to in paragraph 3(a);
- (b) set operational control parameters for waste water at least for pH, temperature and flow.

7. Incineration and co-incineration plant sites, including associated storage areas for wastes, shall be designed and in such a way as to prevent the unauthorised and accidental release of any polluting substances into soil, surface water and groundwater in accordance with the provisions provided for in relevant Community legislation. Moreover, storage capacity shall be provided for contaminated rainwater run-off from the incineration or co-incineration plant site or for contaminated water arising from spillage or fire-fighting operations.

The storage capacity shall be adequate to ensure that such waters can be tested and treated before discharge where necessary.

8. Without prejudice to the provisions of the Treaty, Member States may set emission limit values for polycyclic aromatic hydrocarbons or other pollutants.

Article 9

Residues

Residues resulting from the operation of the incineration or co-incineration plant shall be minimised in their amount and harmfulness. Residues shall be recycled, where appropriate, directly in the plant or outside in accordance with relevant Community legislation.

Transport and intermediate storage of dry residues in the form of dust, such as boiler dust and dry residues from the treatment of combustion gases, shall take place in such a way as to prevent dispersal in the environment e.g. in closed containers.

Prior to determining the routes for the disposal or recycling of the residues from incineration and co-incineration plants, appropriate tests shall be carried out to establish the physical and chemical characteristics and the polluting potential of the different incineration residues. The analysis shall concern the total soluble fraction and heavy metals soluble fraction.

Article 10

Control and monitoring

1. Measurement equipment shall be installed and techniques used in order to monitor the parameters, conditions and mass concentrations relevant to the incineration or co-incineration process.

2. The measurement requirements shall be laid down in the permit or in the conditions attached to the permit issued by the competent authority.

3. The appropriate installation and the functioning of the automated monitoring equipment for emissions into air and water shall be subject to control and to an annual surveillance test. Calibration has to be done by means of parallel measurements with the reference methods at least every three years.

4. The location of the sampling or measurement points shall be laid down by the competent authority.

5. Periodic measurements of the emissions into the air and water shall be carried out in accordance with Annex III, points 1 and 2.

Article 11

Measurement requirements

1. Member States shall, either by specification in the conditions of the permit or by general binding rules, ensure that paragraphs 2 to 12 and 17, as regards air, and paragraphs 9 and 14 to 17, as regards water, are complied with.

2. The following measurements of air pollutants shall be carried out in accordance with Annex III at the incineration and co-incineration plant:

(a) continuous measurements of the following substances: NO_x , provided that emission limit values are set, CO, total dust, TOC, HCl, HF, SO_2 ;

(b) continuous measurements of the following process operation parameters: temperature near the inner wall or at another representative point of the combustion chamber as authorised by the competent authority, concentration of oxygen, pressure, temperature and water vapour content of the exhaust gas;

(c) at least two measurements per year of heavy metals, dioxins and furans; one measurement at least every three months shall however be carried out for the first 12 months of operation. Member States may fix measurement periods where they have set emission limit values for polycyclic aromatic hydrocarbons or other pollutants.

3. The residence time as well as the minimum temperature and the oxygen content of the exhaust gases shall be subject to appropriate verification, at least once when the incineration or co-incineration plant is brought into service and under the most unfavourable operating conditions anticipated.

4. The continuous measurement of HF may be omitted if treatment stages for HCl are used which ensure that the emission limit value for HCl is not being exceeded. In this case the emissions of HF shall be subject to periodic measurements as laid down in paragraph 2(c).

5. The continuous measurement of the water vapour content shall not be required if the sampled exhaust gas is dried before the emissions are analysed.

6. Periodic measurements as laid down in paragraph 2(c) of HCl, HF and SO_2 instead of continuous measuring may be authorised in the permit by the competent authority in incineration or co-incineration plants, if the operator can prove that the emissions of those pollutants can under no circumstances be higher than the prescribed emission limit values.

7. The reduction of the frequency of the periodic measurements for heavy metals from twice a year to once every two years and for dioxins and furans from twice a year to once every year may be authorised in the permit by the competent authority provided that the emissions resulting from co-incineration or incineration are below 50 % of the emission limit values determined according to Annex II or Annex V respectively and provided that criteria for the requirements to be met, developed in accordance with the procedure laid down in Article 17, are available. These criteria shall at least be based on the provisions of the second subparagraph, points (a) and (d).

Until 1 January 2005 the reduction of the frequency may be authorised even if no such criteria are available provided that:

- (a) the waste to be co-incinerated or incinerated consists only of certain sorted combustible fractions of non-hazardous waste not suitable for recycling and presenting certain characteristics, and which is further specified on the basis of the assessment referred to in subparagraph (d);
- (b) national quality criteria, which have been reported to the Commission, are available for these wastes;
- (c) co-incineration and incineration of these wastes is in line with the relevant waste management plans referred to in Article 7 of Directive 75/442/EEC;
- (d) the operator can prove to the competent authority that the emissions are under all circumstances significantly below the emission limit values set out in Annex II or Annex V for heavy metals, dioxins and furans; this assessment shall be based on information on the quality of the waste concerned and measurements of the emissions of the said pollutants;
- (e) the quality criteria and the new period for the periodic measurements are specified in the permit; and
- (f) all decisions on the frequency of measurements referred to in this paragraph, supplemented with information on the amount and quality of the waste concerned, shall be communicated on a yearly basis to the Commission.

8. The results of the measurements made to verify compliance with the emission limit values shall be standardised at the following conditions and for oxygen according to the formula as referred to in Annex VI:

- (a) Temperature 273 K, pressure 101,3 kPa, 11 % oxygen, dry gas, in exhaust gas of incineration plants;
- (b) Temperature 273 K, pressure 101,3 kPa, 3 % oxygen, dry gas, in exhaust gas of incineration of waste oil as defined in Directive 75/439/EEC;
- (c) when the wastes are incinerated or co-incinerated in an oxygen-enriched atmosphere, the results of the measurements can be standardised at an oxygen content laid down by the competent authority reflecting the special circumstances of the individual case;
- (d) in the case of co-incineration, the results of the measurements shall be standardised at a total oxygen content as calculated in Annex II.

When the emissions of pollutants are reduced by exhaust gas treatment in an incineration or co-incineration plant treating hazardous waste, the standardisation with respect to the oxygen contents provided for in the first subparagraph shall be done only if the oxygen content measured over the same period as for the pollutant concerned exceeds the relevant standard oxygen content.

9. All measurement results shall be recorded, processed and presented in an appropriate fashion in order to enable the competent authorities to verify compliance with the permitted operating conditions and emission limit values laid down in this Directive in accordance with procedures to be decided upon by those authorities.

10. The emission limit values for air shall be regarded as being complied with if:

- (a) — none of the daily average values exceeds any of the emission limit values set out in Annex V(a) or Annex II; — 97 % of the daily average value over the year does not exceed the emission limit value set out in Annex V(e) first indent;
- (b) either none of the half-hourly average values exceeds any of the emission limit values set out in Annex V(b), column A or, where relevant, 97 % of the half-hourly average values over the year do not exceed any of the emission limit values set out in Annex V(b), column B;
- (c) none of the average values over the sample period set out for heavy metals and dioxins and furans exceeds the emission limit values set out in Annex V(c) and (d) or Annex II;
- (d) the provisions of Annex V(e), second indent or Annex II, are met.

11. The half-hourly average values and the 10-minute averages shall be determined within the effective operating time (excluding the start-up and shut-off periods if no waste is being incinerated) from the measured values after having subtracted the value of the confidence interval specified in point 3 of Annex III. The daily average values shall be determined from those validated average values.

To obtain a valid daily average value no more than five half-hourly average values in any day shall be discarded due to malfunction or maintenance of the continuous measurement system. No more than ten daily average values per year shall be discarded due to malfunction or maintenance of the continuous measurement system.

12. The average values over the sample period and the average values in the case of periodical measurements of HF, HCl and SO₂ shall be determined in accordance with the requirements of Article 10(2) and (4) and Annex III.

13. The Commission, acting in accordance with the procedure laid down in Article 17, shall decide, as soon as appropriate measurement techniques are available within the Community, the date from which continuous measurements of the air emission limit values for heavy metals, dioxins and furans shall be carried out in accordance with Annex III.

14. The following measurements shall be carried out at the point of waste water discharge:

- (a) continuous measurements of the parameters referred to in Article 8(6)(b);
- (b) spot sample daily measurements of total suspended solids; Member States may alternatively provide for measurements of a flow proportional representative sample over a period of 24 hours;
- (c) at least monthly measurements of a flow proportional representative sample of the discharge over a period of 24 hours of the polluting substances referred to in Article 8(3) with respect to items 2 to 10 in Annex IV;

(d) at least every six months measurements of dioxins and furans; however one measurement at least every three months shall be carried out for the first 12 months of operation. Member States may fix measurement periods where they have set emission limit values for polycyclic aromatic hydrocarbons or other pollutants.

15. The monitoring of the mass of pollutants in the treated waste water shall be done in conformity with Community legislation and laid down in the permit as well as the frequency of the measurements.

16. The emission limit values for water shall be regarded as being complied with if:

- (a) for total suspended solids (polluting substance number 1), 95 % and 100 % of the measured values do not exceed the respective emission limit values as set out in Annex IV;
- (b) for heavy metals (polluting substances number 2 to 10) no more than one measurement per year exceeds the emission limit values set out in Annex IV; or, if the Member State provides for more than 20 samples per year, no more than 5 % of these samples exceed the emission limit values set out in Annex IV;
- (c) for dioxins and furans (polluting substance 11), the twice-yearly measurements do not exceed the emission limit value set out in Annex IV.

17. Should the measurements taken show that the emission limit values for air or water laid down in this Directive have been exceeded, the competent authorities shall be informed without delay.

Article 12

Access to information and public participation

1. Without prejudice to Council Directive 90/313/EEC⁽¹⁾ and Directive 96/61/EC, applications for new permits for incineration and co-incineration plants shall be made available at one or more locations accessible to the public, such as local authority offices, for an appropriate period to enable it to comment on them before the competent authority reaches a decision. That decision, including at least a copy of the permit, and any subsequent updates, shall also be made available to the public.

2. For incineration or co-incineration plants with a nominal capacity of two tonnes or more per hour and notwithstanding Article 15(2) of Directive 96/61/EC, an annual report to be provided by the operator to the competent authority on the functioning and monitoring of the plant shall be made available to the public. This report shall, as a minimum requirement, give an account of the running of the process and the emissions into air and water compared with the emission standards in this Directive. A list of incineration or co-incineration plants with a nominal capacity of less than two tonnes per

hour shall be drawn up by the competent authority and shall be made available to the public.

Article 13

Abnormal operating conditions

1. The competent authority shall lay down in the permit the maximum permissible period of any technically unavoidable stoppages, disturbances, or failures of the purification devices or the measurement devices, during which the concentrations in the discharges into the air and the purified waste water of the regulated substances may exceed the prescribed emission limit values.

2. In the case of a breakdown, the operator shall reduce or close down operations as soon as practicable until normal operations can be restored.

3. Without prejudice to Article 6(3)(c), the incineration plant or co-incineration plant or incineration line shall under no circumstances continue to incinerate waste for a period of more than four hours uninterrupted where emission limit values are exceeded; moreover, the cumulative duration of operation in such conditions over one year shall be less than 60 hours. The 60-hour duration applies to those lines of the entire plant which are linked to one single flue gas cleaning device.

4. The total dust content of the emissions into the air of an incineration plant shall under no circumstances exceed 150 mg/m³ expressed as a half-hourly average; moreover the air emission limit values for CO and TOC shall not be exceeded. All other conditions referred to in Article 6 shall be complied with.

Article 14

Review clause

Without prejudice to Directive 96/61/EC, the Commission shall submit a report to the European Parliament and the Council before 31 December 2008 based on experience of the application of this Directive, in particular for new plants, and on the progress achieved in emission control techniques and experience in waste management. Furthermore, the report shall be based on the development of the state of technology, of experience in the operation of the plants, of environmental requirements. This report will include a specific section on the application of Annex II.1.1. and in particular on the economic and technical feasibility for existing cement kilns as referred to in the footnote to Annex II.1.1. of respecting the NO_x emission limit value for new cement kilns set out in that Annex. The report shall, as appropriate, be accompanied by proposals for revision of the related provisions of this Directive. However, the Commission shall, if appropriate, propose an amendment for Annex II.3 before the said report, if major waste streams are directed to types of co-incineration plants other than those dealt with in Annex II.1 and II.2.

⁽¹⁾ Council Directive 90/313/EEC of 7 June 1990 on the freedom of access to information on the environment (OJ L 158, 23.6.1990, p. 56). Directive as last amended by the Accession Act of 1994.

*Article 15***Reporting**

The reports on the implementation of this Directive shall be established in accordance with the procedure laid down in Article 5 of Council Directive 91/692/EEC. The first report shall cover at least the first full three-year period after 28 December 2002 and comply with the periods referred to in Article 17 of Directive 94/67/EC and in Article 16(3) of Directive 96/61/EC. To this effect, the Commission shall elaborate the appropriate questionnaire in due time.

*Article 16***Future adaptation of the directive**

The Commission shall, in accordance with the procedure laid down in Article 17(2), amend Articles 10, 11 and 13 and Annexes I and III in order to adapt them to technical progress or new findings concerning the health benefits of emission reductions.

*Article 17***Regulatory committee**

1. The Commission shall be assisted by a regulatory committee.

2. Where reference is made to this paragraph, Articles 5 and 7 of Decision 1999/468/EC shall apply, having regard to the provisions of Article 8 thereof.

The period laid down in Article 5(6) of Decision 1999/468/EC shall be set at three months.

3. The committee shall adopt its own rules of procedure.

*Article 18***Repeal**

The following shall be repealed as from 28 December 2005:

- (a) Article 8(1) and the Annex to Directive 75/439/EEC;
- (b) Directive 89/369/EEC;
- (c) Directive 89/429/EEC;
- (d) Directive 94/67/EC.

*Article 19***Penalties**

The Member States shall determine penalties applicable to breaches of the national provisions adopted pursuant to this Directive. The penalties thus provided for shall be effective, proportionate and dissuasive. The Member States shall notify those provisions to the Commission by 28 December 2002 at the latest and shall notify it without delay of any subsequent amendment affecting them.

*Article 20***Transitional provisions**

1. Without prejudice to the specific transitional provisions provided for in the Annexes to this Directive, the provisions of this Directive shall apply to existing plants as from 28 December 2005.

2. For new plants, i.e. plants not falling under the definition of 'existing incineration or co-incineration plant' in Article 3(6) or paragraph 3 of this Article, this Directive, instead of the Directives mentioned in Article 18, shall apply as from 28 December 2002.

3. Stationary or mobile plants whose purpose is the generation of energy or production of material products and which are in operation and have a permit in accordance with existing Community legislation where required and which start co-incinerating waste not later than 28 December 2004 are to be regarded as existing co-incineration plants.

*Article 21***Implementation**

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive not later than 28 December 2002. They shall forthwith inform the Commission thereof.

When Member States adopt those measures, they shall contain a reference to this Directive or be accompanied by such reference on the occasion of their official publication. The methods of making such reference shall be laid down by the Member States.

2. Member States shall communicate to the Commission the text of the provisions of domestic law which they adopt in the field governed by this Directive.

*Article 22***Entry into force**

This Directive shall enter into force on the day of its publication in the *Official Journal of the European Communities*.

*Article 23***Addressees**

This Directive is addressed to the Member States.

Done at Brussels, 4 December 2000.

For the European Parliament

The President

N. FONTAINE

For the Council

The President

F. VÉDRINE

ANNEX I

Equivalence factors for dibenzo-p-dioxins and dibenzofurans

For the determination of the total concentration (TE) of dioxins and furans, the mass concentrations of the following dibenzo-p-dioxins and dibenzofurans shall be multiplied by the following equivalence factors before summing:

		Toxic equivalence factor
2,3,7,8	— Tetrachlorodibenzodioxin (TCDD)	1
1,2,3,7,8	— Pentachlorodibenzodioxin (PeCDD)	0,5
1,2,3,4,7,8	— Hexachlorodibenzodioxin (HxCDD)	0,1
1,2,3,6,7,8	— Hexachlorodibenzodioxin (HxCDD)	0,1
1,2,3,7,8,9	— Hexachlorodibenzodioxin (HxCDD)	0,1
1,2,3,4,6,7,8	— Heptachlorodibenzodioxin (HpCDD)	0,01
	— Octachlorodibenzodioxin (OCDD)	0,001
2,3,7,8	— Tetrachlorodibenzofuran (TCDF)	0,1
2,3,4,7,8	— Pentachlorodibenzofuran (PeCDF)	0,5
1,2,3,7,8	— Pentachlorodibenzofuran (PeCDF)	0,05
1,2,3,4,7,8	— Hexachlorodibenzofuran (HxCDF)	0,1
1,2,3,6,7,8	— Hexachlorodibenzofuran (HxCDF)	0,1
1,2,3,7,8,9	— Hexachlorodibenzofuran (HxCDF)	0,1
2,3,4,6,7,8	— Hexachlorodibenzofuran (HxCDF)	0,1
1,2,3,4,6,7,8	— Heptachlorodibenzofuran (HpCDF)	0,01
1,2,3,4,7,8,9	— Heptachlorodibenzofuran (HpCDF)	0,01
	— Octachlorodibenzofuran (OCDF)	0,001

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ANNEX II

DETERMINATION OF AIR EMISSION LIMIT VALUES FOR THE CO-INCINERATION OF WASTE

The following formula (mixing rule) is to be applied whenever a specific total emission limit value 'C' has not been set out in a table in this Annex.

The limit value for each relevant pollutant and carbon monoxide in the exhaust gas resulting from the co-incineration of waste shall be calculated as follows:

$$\frac{V_{\text{waste}} \times C_{\text{waste}} + V_{\text{proc}} \times C_{\text{proc}}}{V_{\text{waste}} + V_{\text{proc}}} = C$$

V_{waste} : exhaust gas volume resulting from the incineration of waste only determined from the waste with the lowest calorific value specified in the permit and standardised at the conditions given by this Directive.

If the resulting heat release from the incineration of hazardous waste amounts to less than 10 % of the total heat released in the plant, V_{waste} must be calculated from a (notional) quantity of waste that, being incinerated, would equal 10 % heat release, the total heat release being fixed.

C_{waste} : emission limit values set for incineration plants in Annex V for the relevant pollutants and carbon monoxide.

V_{proc} : exhaust gas volume resulting from the plant process including the combustion of the authorised fuels normally used in the plant (wastes excluded) determined on the basis of oxygen contents at which the emissions must be standardised as laid down in Community or national regulations. In the absence of regulations for this kind of plant, the real oxygen content in the exhaust gas without being thinned by addition of air unnecessary for the process must be used. The standardisation at the other conditions is given in this Directive.

C_{proc} : emission limit values as laid down in the tables of this annex for certain industrial sectors or in case of the absence of such a table or such values, emission limit values of the relevant pollutants and carbon monoxide in the flue gas of plants which comply with the national laws, regulations and administrative provisions for such plants while burning the normally authorised fuels (wastes excluded). In the absence of these measures the emission limit values laid down in the permit are used. In the absence of such permit values the real mass concentrations are used.

C: total emission limit values and oxygen content as laid down in the tables of this annex for certain industrial sectors and certain pollutants or in case of the absence of such a table or such values total emission limit values for CO and the relevant pollutants replacing the emission limit values as laid down in specific Annexes of this Directive. The total oxygen content to replace the oxygen content for the standardisation is calculated on the basis of the content above respecting the partial volumes.

Member States may lay down rules governing the exemptions provided for in this Annex.

II.1. Special provisions for cement kilns co-incinerating waste

Daily average values (for continuous measurements) Sample periods and other measurement requirements as in Article 7. All values in mg/m³ (Dioxins and furans ng/m³). Half-hourly average values shall only be needed in view of calculating the daily average values.

The results of the measurements made to verify compliance with the emission limit values shall be standardised at the following conditions: Temperature 273 K, pressure 101,3 kPa, 10 % oxygen, dry gas.

II.1.1. C — total emission limit values

Pollutant	C
Total dust	30
HCl	10
HF	1
NO _x for existing plants	800
NO _x for new plants	500 (1)

Pollutant	C
Cd + Tl	0,05
Hg	0,05
Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V	0,5
Dioxins and furans	0,1

(¹) For the implementation of the NO_x emission limit values, cement kilns which are in operation and have a permit in accordance with existing Community legislation and which start co-incinerating waste after the date mentioned in Article 20(3) are not to be regarded as new plants.

Until 1 January 2008, exemptions for NO_x may be authorised by the competent authorities for existing wet process cement kilns or cement kilns which burn less than three tonnes of waste per hour, provided that the permit foresees a total emission limit value for NO_x of not more than 1200 mg/m³.

Until 1 January 2008, exemptions for dust may be authorised by the competent authority for cement kilns which burn less than three tonnes of waste per hour, provided that the permit foresees a total emission limit value of not more than 50 mg/m³.

II.1.2. C — total emission limit values for SO₂ and TOC

Pollutant	C
SO ₂	50
TOC	10

Exemptions may be authorised by the competent authority in cases where TOC and SO₂ do not result from the incineration of waste.

II.1.3. Emission limit value for CO

Emission limit values for CO can be set by the competent authority.

II.2. Special provisions for combustion plants co-incinerating waste

II.2.1. Daily average values

Without prejudice to Directive 88/609/EEC and in the case where, for large combustion plants, more stringent emission limit values are set according to future Community legislation, the latter shall replace, for the plants and pollutants concerned, the emission limit values as laid down in the following tables (C_{proc}). In that case, the following tables shall be adapted to these more stringent emission limit values in accordance with the procedure laid down in Article 17 without delay.

Half-hourly average values shall only be needed in view of calculating the daily average values.

C_{proc}:

C_{proc} for solid fuels expressed in mg/Nm³ (O₂ content 6 %):

Pollutants	< 50 MWth	50-100 MWth	100 to 300 MWth	> 300 MWth
SO ₂ general case		850	850 to 200 (linear decrease from 100 to 300 MWth)	200
indigenous fuels		or rate of desulphurisation ≥90 %	or rate of desulphurisation ≥92 %	or rate of desulphurisation ≥95 %
NO _x		400	300	200
Dust	50	50	30	30

Until 1 January 2007 and without prejudice to relevant Community legislation, the emission limit value for NO_x does not apply to plants only co-incinerating hazardous waste.

Until 1 January 2008, exemptions for NO_x and SO_2 may be authorised by the competent authorities for existing co-incineration plants between 100 and 300 MWth using fluidised bed technology and burning solid fuels provided that the permit foresees a C_{proc} value of not more than 350 mg/Nm³ for NO_x and not more than 850 to 400 mg/Nm³ (linear decrease from 100 to 300 MWth) for SO_2 .

C_{proc} for biomass expressed in mg/Nm³ (O_2 content 6 %):

'Biomass' means: products consisting of any whole or part of a vegetable matter from agriculture or forestry, which can be used for the purpose of recovering its energy content as well as wastes listed in Article 2(2)(a)(i) to (v).

Pollutants	< 50 MWth	50 to 100 MWth	100 to 300 MWth	> 300 MWth
SO_2		200	200	200
NO_x		350	300	300
Dust	50	50	30	30

Until 1 January 2008, exemptions for NO_x may be authorised by the competent authorities for existing co-incineration plants between 100 and 300 MWth using fluidised bed technology and burning biomass provided that the permit foresees a C_{proc} value of not more than 350 mg/Nm³.

C_{proc} for liquid fuels expressed in mg/Nm³ (O_2 content 3 %):

Pollutants	< 50 MWth	50 to 100 MWth	100 to 300 MWth	> 300 MWth
SO_2		850	850 to 200 (linear decrease from 100 to 300 MWth)	200
NO_x		400	300	200
Dust	50	50	30	30

II.2.2. C — total emission limit values

C expressed in mg/Nm³ (O_2 content 6 %). All average values over the sample period of a minimum of 30 minutes and a maximum of 8 hours:

Pollutant	C
Cd + Tl	0,05
Hg	0,05
Sb + As + Pb + Cr + Co + Cu + Mn + Ni + V	0,5

C expressed in ng/Nm³ (O_2 content 6 %). All average values measured over the sample period of a minimum of 6 hours and a maximum of 8 hours:

Pollutant	C
Dioxins and furans	0,1

II.3. Special provisions for industrial sectors not covered under II.1 or II.2 co-incinerating waste

II.3.1. C — total emission limit values:

C expressed in ng/Nm³. All average values measured over the sample period of a minimum of 6 hours and a maximum of 8 hours:

Pollutant	C
Dioxins and furans	0,1

C expressed in mg/Nm³. All average values over the sample period of a minimum of 30 minutes and a maximum of 8 hours:

Pollutant	C
Cd + Tl	0,05
Hg	0,05

ANNEX III

Measurement techniques

1. Measurements for the determination of concentrations of air and water polluting substances have to be carried out representatively.
2. Sampling and analysis of all pollutants including dioxins and furans as well as reference measurement methods to calibrate automated measurement systems shall be carried out as given by CEN-standards. If CEN standards are not available, ISO standards, national or international standards which will ensure the provision of data of an equivalent scientific quality shall apply.
3. At the daily emission limit value level, the values of the 95 % confidence intervals of a single measured result shall not exceed the following percentages of the emission limit values:

Carbon monoxide:	10 %
Sulphur dioxide:	20 %
Nitrogen dioxide:	20 %
Total dust:	30 %
Total organic carbon:	30 %
Hydrogen chloride:	40 %
Hydrogen fluoride:	40 %.

ANNEX IV

Emission limit values for discharges of waste water from the cleaning of exhaust gases

Polluting substances	Emission limit values expressed in mass concentrations for unfiltered samples	
	95 % 30 mg/l	100 % 45 mg/l
1. Total suspended solids as defined by Directive 91/271/EEC		
2. Mercury and its compounds, expressed as mercury (Hg)	0,03 mg/l	
3. Cadmium and its compounds, expressed as cadmium (Cd)	0,05 mg/l	
4. Thallium and its compounds, expressed as thallium (Tl)	0,05 mg/l	
5. Arsenic and its compounds, expressed as arsenic (As)	0,15 mg/l	
6. Lead and its compounds, expressed as lead (Pb)	0,2 mg/l	
7. Chromium and its compounds, expressed as chromium (Cr)	0,5 mg/l	
8. Copper and its compounds, expressed as copper (Cu)	0,5 mg/l	
9. Nickel and its compounds, expressed as nickel (Ni)	0,5 mg/l	
10. Zinc and its compounds, expressed as zinc (Zn)	1,5 mg/l	
11. Dioxins and furans, defined as the sum of the individual dioxins and furans evaluated in accordance with Annex I	0,3 mg/l	

Until 1 January 2008, exemptions for total suspended solids may be authorised by the competent authority for existing incineration plants provided the permit foresees that 90 % of the measured values do not exceed 30 mg/l and none of them exceed 45 mg/l.

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ANNEX V

AIR EMISSION LIMIT VALUES

(a) Daily average values

Total dust	10 mg/m ³
Gaseous and vaporous organic substances, expressed as total organic carbon	10 mg/m ³
Hydrogen chloride (HCl)	10 mg/m ³
Hydrogen fluoride (HF)	1 mg/m ³
Sulphur dioxide (SO ₂)	50 mg/m ³
Nitrogen monoxide (NO) and nitrogen dioxide (NO ₂) expressed as nitrogen dioxide for existing incineration plants with a nominal capacity exceeding 6 tonnes per hour or new incineration plants	200 mg/m ³ (*)
Nitrogen monoxide (NO) and nitrogen dioxide (NO ₂), expressed as nitrogen dioxide for existing incineration plants with a nominal capacity of 6 tonnes per hour or less	400 mg/m ³ (*)

(*) Until 1 January 2007 and without prejudice to relevant (Community) legislation the emission limit value for NO_x does not apply to plants only incinerating hazardous waste.

Exemptions for NO_x may be authorised by the competent authority for existing incineration plants:

- with a nominal capacity of 6 tonnes per hour, provided that the permit foresees the daily average values do not exceed 500 mg/m³ and this until 1 January 2008,
- with a nominal capacity of >6 tonnes per hour but equal or less than 16 tonnes per hour, provided the permit foresees the daily average values do not exceed 400 mg/m³ and this until 1 January 2010,
- with a nominal capacity of >16 tonnes per hour but <25 tonnes per hour and which do not produce water discharges, provided that the permit foresees the daily average values do not exceed 400 mg/m³ and this until 1 January 2008.

Until 1 January 2008, exemptions for dust may be authorised by the competent authority for existing incinerating plants, provided that the permit foresees the daily average values do not exceed 20 mg/m³.

(b) Half-hourly average values

	(100 %) A	(97 %) B
Total dust	30 mg/m ³	10 mg/m ³
Gaseous and vaporous organic substances, expressed as total organic carbon	20 mg/m ³	10 mg/m ³
Hydrogen chloride (HCl)	60 mg/m ³	10 mg/m ³
Hydrogen fluoride (HF)	4 mg/m ³	2 mg/m ³
Sulphur dioxide (SO ₂)	200 mg/m ³	50 mg/m ³
Nitrogen monoxide (NO) and nitrogen dioxide (NO ₂), expressed as nitrogen dioxide for existing incineration plants with a nominal capacity exceeding 6 tonnes per hour or new incineration plants	400 mg/m ³ (*)	200 mg/m ³ (*)

(*) Until 1 January 2007 and without prejudice to relevant Community legislation the emission limit value for NO_x does not apply to plants only incinerating hazardous waste.

Until 1 January 2010, exemptions for NO_x may be authorised by the competent authority for existing incineration plants with a nominal capacity between 6 and 16 tonnes per hour, provided the half-hourly average value does not exceed 600 mg/m^3 for column A or 400 mg/m^3 for column B.

(c) **All average values over the sample period of a minimum of 30 minutes and a maximum of 8 hours**

Cadmium and its compounds, expressed as cadmium (Cd)	total $0,05 \text{ mg/m}^3$	total $0,1 \text{ mg/m}^3$ (*)
Thallium and its compounds, expressed as thallium (Tl)		
Mercury and its compounds, expressed as mercury (Hg)	$0,05 \text{ mg/m}^3$	$0,1 \text{ mg/m}^3$ (*)
Antimony and its compounds, expressed as antimony (Sb)	total $0,5 \text{ mg/m}^3$	total 1 mg/m^3 (*)
Arsenic and its compounds, expressed as arsenic (As)		
Lead and its compounds, expressed as lead (Pb)		
Chromium and its compounds, expressed as chromium (Cr)		
Cobalt and its compounds, expressed as cobalt (Co)		
Copper and its compounds, expressed as copper (Cu)		
Manganese and its compounds, expressed as manganese (Mn)		
Nickel and its compounds, expressed as nickel (Ni)		
Vanadium and its compounds, expressed as vanadium (V)		

(*) Until 1 January 2007 average values for existing plants for which the permit to operate has been granted before 31 December 1996, and which incinerate hazardous waste only.

These average values cover also gaseous and the vapour forms of the relevant heavy metal emissions as well as their compounds.

(d) **Average values shall be measured over a sample period of a minimum of 6 hours and a maximum of 8 hours. The emission limit value refers to the total concentration of dioxins and furans calculated using the concept of toxic equivalence in accordance with Annex I.**

Dioxins and furans	$0,1 \text{ ng/m}^3$
--------------------	----------------------

(e) **The following emission limit values of carbon monoxide (CO) concentrations shall not be exceeded in the combustion gases (excluding the start-up and shut-down phase):**

- $50 \text{ milligrams/m}^3$ of combustion gas determined as daily average value;
- $150 \text{ milligrams/m}^3$ of combustion gas of at least 95 % of all measurements determined as 10-minute average values or 100 mg/m^3 of combustion gas of all measurements determined as half-hourly average values taken in any 24-hour period.

Exemptions may be authorised by the competent authority for incineration plants using fluidised bed technology, provided that the permit foresees an emission limit value for carbon monoxide (CO) of not more than 100 mg/m^3 as an hourly average value.

(f) **Member States may lay down rules governing the exemptions provided for in this Annex.**

ANNEX VI

Formula to calculate the emission concentration at the standard percentage oxygen concentration

$$E_s = \frac{21 - O_s}{21 - O_M} \times E_M$$

E_s = calculated emission concentration at the standard percentage oxygen concentration

E_M = measured emission concentration

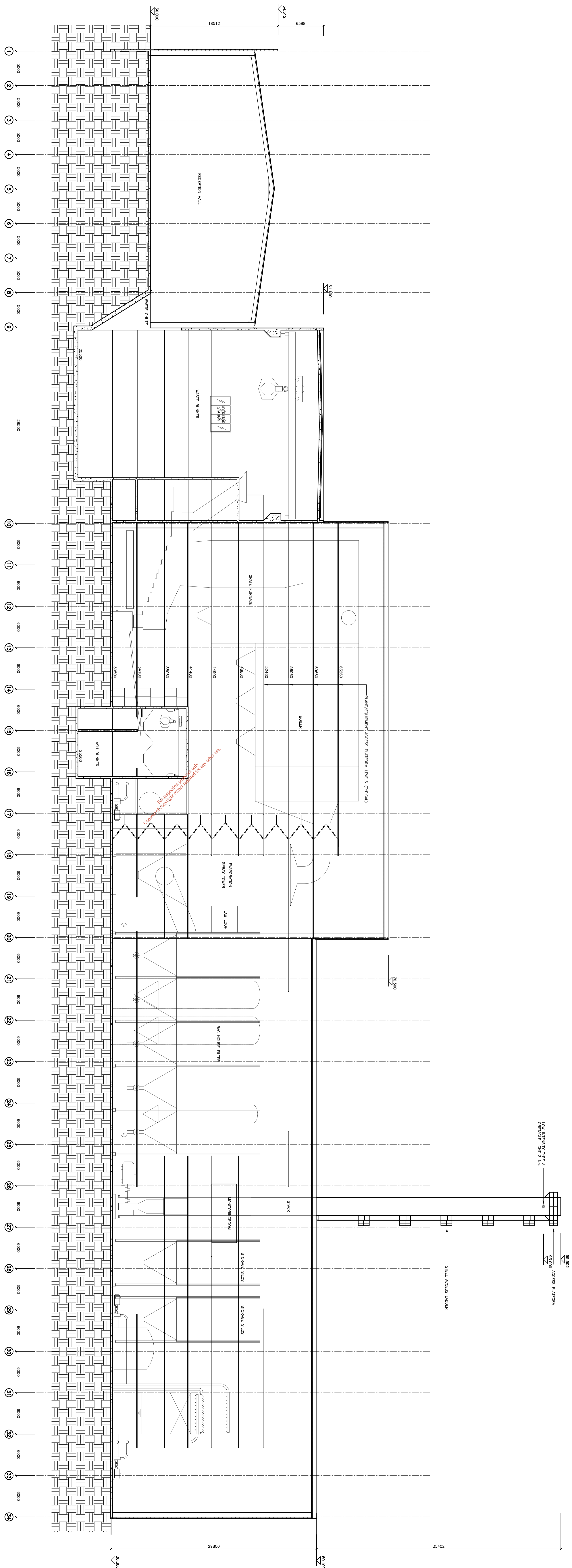
O_s = standard oxygen concentration

O_M = measured oxygen concentration

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Appendix D11: Plant Layout From Side

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TYPICAL SECTION SCALE 1:200

REV	DATE	BY	CHKD	APPD	SCALE
A	12.05.08	NK	NK	NK	AS SHOWN
McElroy Associates Consulting Engineers 7-8, 8000 100th Ave. S.W. Edmonds, WA 98149 Tel: +1 206 361 1344 Fax: +1 206 361 1345					
INDAVIA 10000 100th Ave. S.W. Edmonds, WA 98149 Tel: +1 206 361 1344 Fax: +1 206 361 1345					
PROJECT: 70MW WASTE TO ENERGY FACILITY CARRANSTOWN TITLE: MAIN PROCESS BUILDING AND TURBINE BUILDING SECTION A-A					
DESIGNED	CHKD	DATE	APPD	SCALE	REV
NK	NK	MAY 08	NK	AS SHOWN	A
DRAWN	DATE	CHKD	APPD	SCALE	REV
KKG	MAY 08	NK	NK	AS SHOWN	A

DRG. No. 15013/W/009