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8th February 2007
Our Ref: MT/JS

Mr. Pat Kinely,
Health and Safety Authority (HSA),
Unit 1A Irish Life Building,
South Mall,
Cork.

RE: Major Accident Hazard Assessment - Request for further information

Dear Mr. Kinely,

Please see below our response to the request from the Health and Safety Authority (HSA) of 4 October 2006 for further information on the Major Accident Hazard Assessment for the Dublin Waste to Energy facility.

We have revised the Major Accident Hazard Assessment report to include the additional information, and the assessment of the risk of aircraft impact, using the methodology specified by the HSA.

1. Include site layout showing the positions of the tanks containing the Dangerous Substances (Diesel, NH4OH).
The diesel oil storage tank is located inside in the building at approximately elevation 5.00 m OD Malin Head, between module line O-Q and 36-38 as shown on the enclosed drawing U/BF002a, Plan View. The NH_4OH storage tank is located inside in the building at approximately elevation 5.00 m OD Malin Head, between module line O-Q and 30-31, as shown on the enclosed drawing U/BF002a, Plan View.

2. Give details on bund and tank dimensions
The storage tank for diesel oil as well as the NH_4OH storage tanks will be located in a bunded area constructed in reinforced concrete with the capacity to hold back the full volume of the individual storage tank. The storage tanks will be of the vertical welded type, designed and constructed in accordance with BS2654, 'Specification for Manufacture of Vertical Steel Welded Non-refrigerated Storage Tanks with butt-welded Shells for the Petroleum Industry'. The tanks will be designed in steel, either stainless steel or "black" steel surface coated to prevent corrosion.

Storage tank	Volume $[m^3]$	Diameter $[m^3]$	Shell height [m]
Diesel oil	app. 100	4.50	7.00
NH_4OH	app. 100	4.50	7.00
NH_4OH	app. 80	4.50	7.00

The storage tanks steel bottom plates will be located on a layer of approximately 50 mm of bitumen asphalt to ensure proper support. The steel bottom plate of the storage tanks will have a minimum thickness of 6 mm.

3. Section 3.6.3 – Aircraft Impact – data based on Canvey. Rework using methodology in HSE Publication (CRR series) "The Calculation of Aircraft Crash Risk in the UK" 1997
We have revised the Major Accident Hazard Assessment to include the additional information and the assessment of the risk of aircraft impact, using the methodology specified by the HSA. Please refer to section 3.6 and appendix B of the revised report.

Contd/...

4. **Section 3.6.5 – Tide Level – 1 in 200 year flood will be 0.7m less than site level. What are the major accident implications of a flood?**
If the site should be flooded (which will only be a theoretical question since climate change and a 1 in 200 year flood event combined, would result in a predicted sea level of 0.7 m below the site level.), the first thing to happen would be that the waste bunker would fill with water. The waste bunker has a capacity of approximately 65,000 m^3. The facility will still be in operation and the partly wet waste with a low calorific value will be fed into the waste feed hoppers. At a certain time, as an example when a third of the waste bunker is filled with water, the operational manager will make the decision to shut down. The facility will then be shut safely down in accordance with the facility shut down procedures.

5. **A review of accident history in municipal waste incinerators should be given**

In the table below the personnel accident history of DONG Energy's municipal waste incinerators is displayed.

	2005	2004	2003	2002	2001
Odense	1	0	3	3	2
Måbjerg	2	0	5	4	4
Haderslev	0	0	0	1	0
Horsens	0	0	0	1	0
Frederikshavn	0	0	0	0	0
Vejen	0	0	2	0	0

Table 1 Reported personnel accidents pr year at DONG Energy's municipal waste incinerators

6. **Section 4.3.2 refers to "automatic shut-off valve" preventing tank overfilling. Please supply more details on the reliability of this valve**
The automatic shut-off valve is a normal motor driven valve, which automatically closes, when a fire alarm is released and/or a fire safety system is activated in the facility. In this way firewater is prevented from reaching the combined sewage and drainage system in Pigeon House Road.

7. **Section 5. In terms of Major Accidents identified, is an explosion in the boiler/grate a credible event?**
Only household, commercial and non-hazardous industrial waste will be treated at the Dublin Waste to Energy facility. Explosives will not be accepted and spot check procedures of the received waste will be performed at the facility to prevent explosives from entering the boiler.

In terms of Major Accidents an explosion in the boiler/grate leading to a rupture in the boiler walls is not a credible event based on the experience of DONG Energy.

8. **Section 5.2.3 – indicate the suitability of the "Aermod" software for purpose to which it is being applied. Provide the Authority with the source terms used and the results obtained**
Please find the rationale for use of AERMOD set out in Chapter 8 of the EIS and in Appendix 8 to the EIS.

The following is an extract from Chapter 8 of the EIS:

8.3.7. In the absence of detailed guidance from the Irish EPA, the selection of appropriate modelling methodology has followed the guidance from the USEPA which has issued detailed and comprehensive guidance on the selection and use of air quality models (13, 16-17).

8.3.8. Based on guidance from the USEPA, the most appropriate regulatory model for the current application is the AERMOD model (Version 04300). The model is applicable in both simple and complex terrain, urban or rural locations and for all averaging periods (12, 13). The terrain in the region of the Facility was obtained from Ordnance Survey Ireland and imported into the model using the AERMOD terrain pre-processor AERMAP (see Figure 8.3). An overview of the model is outlined in Annex 8.1 of Appendix 8.

8.3.9. The selection of the urban/rural classification is based on the land use procedure of Auer (18) as recommended by the USEPA (13). An examination of the land-use type around the Site indicated that the urban boundary layer was appropriate.

Contd/...

The references cited in the above extract are as follows:

(12) USEPA (2004) AERMOD Description of Model Formulation
(13) USEPA (2005) Guidelines on Air Quality Models, Appendix W to Part 51, 40 CFR Ch.1
(16) USEPA (2000) Estimating Exposure to Dioxin-Like Compounds Volume IV, Chapter 3 Evaluating Atmospheric Releases of Dioxin-Like Compounds from Combustion Sources (Draft)
(17) USEPA (1998) Human Health Risk Assessment Protocol, Chapter 3: Air Dispersion and Deposition Modelling, Region 6 Centre for Combustion Science and Engineering
(18) Auer Jr, (1978) Correlation of Land Use and Cover with Meteorological Anomalies, Journal of Applied Meteorology 17(5):636-643

The following information has been extracted from Appendix 8.1:

Abnormal operating emissions were pessimistically assumed to occur as outlined below:

Pollutant	Abnormal Concentration	Abnormal Emission Rate (g/s)	Duration of Abnormal Concentration	Frequency of Abnormal Concentration over a 5-year period
NOX	500 mg/m³	76.4	4 hours	10 times
Total Dust	4000 mg/m³	611	4 hours	5 times
TOC	10 mg/m³	1.53	4 hours	5 times
HCl	2000 mg/m³	306	4 hours	Once
SO2	600 mg/m³	91.7	4 hours	Once
HF	30 mg/m³	4.6	4 hours	Once
CO	50 mg/m³	7.6	4 hours	20 times
Dioxins & Furans	10 ng/m³	1.53 ng/s	48 hours	Once
PAHs	0.001 mg/m³	0.15µg/s	48 hours	20 times
Heavy Metals (other than Hg, Cd & Tl)	140 mg/m³	21.4	4 hours	5 times
Cd & Tl	6 mg/m³		4 hours	5 times
Hg	1.4 mg/m³	0.21	48 hours	Once

The emission source data is as follows:

Stack Reference	Stack Height (m)	Exit Diameter (m)	Cross-Sectional Area (m²)	Temp (K)	Volume Flow (Nm³/hr)(1)	Exit Velocity (m/sec actual) (2)
Stack 1	100	2.40	4.52	328	238,905	Average 17.6
					275,000	Maximum 20.3
Stack 2	100	2.40	4.52	328	238,905	Average 17.6
					275,000	Maximum 20.3

(1) Normalised to 11% O2, dry, 273K.
(2) Actual - 11%O2, dry, 373K

Contd/...

9. **Section 5.2.4 – "totally contained at ground level" – provide more detail on the actual retention capacity within the main process building**
"totally contained at ground level" refers to the floor in the main process building, which will be constructed of structural reinforced concrete. Therefore, there will be no risk of contamination of the soil or ground water below the bound floor structure, in the unlikely event of loss of FGT residues within the building.

10. **Section 5.2.5 – provide more detail on liquid retention**
The storage tank for diesel oil as well as the NH_4OH storage tank will be located in a bunded area constructed of reinforced concrete with the capacity to retain the full volume of the individual storage tank. The bund area will be arranged without drainage systems and in the unlikely event of a storage tank system leaking, the spillage would have to be collected manually.

11. **Section 5.2.7 – fire in waste bunker. Estimate the likelihood of a fire. Modelling should be carried out on the early stages of a fire to determine the potential ground level concentrations of any dangerous substances produced by a fire, in a variety of atmospheric conditions, including D10.**

The Major Accident Hazard Report has been revised to include a quantitative assessment of the likelihood and consequences of a fire in the waste bunker. The assessment is included in section 5.3.10 of the revised report. Based on the scenarios modelled, the risk posed to human health by dioxin inhalation from a fire in the waste bunker is deemed to be insignificant.

12. **Section 5.3.5 – in relation to thermal effects from diesel fire, model also to 4kw/m2 and 7kw/m2 heat fluxes. If the fire scenario is actually outside the building, examine also the effects in D10 conditions.**

The layout of the Major Accident Hazard Assessment report has now been revised. Please find the results of modelling the thermal effects from a diesel bund fire included in section 5.3.9 of the report.

13. **Table 14 – what is the distance to "dangerous dose"? (See also point 8)**
The layout of the Major Accident Hazard Assessment report has now been revised. Please find the relevant information included in section 5.3 of the report.

14. **Section 6.1.1 – provide more details on bund and tank dimensions, and on the building drainage system.**
Please find details on bund and tank dimensions for the diesel oil storage tank and the NH_4OH storage tank on the enclosed sketch 3.

Details of the building drainage system can be found on the enclosed drawing UZT/BE040a, Drainage and Sewage Plan and drawing GD/MQ001d, Water Flow Diagram. Please also find enclosed Sections 5.5.18 to 5.5.36 of the EIS with a description of the drainage and wastewater systems of the Dublin Waste to Energy project.

15. **Section 6.1.3 – how likely is a failure of the flu gas treatment system? What would be the consequences associated with such failure?**

Please find an assessment of the likely hood of failure of the individual parts of the flue gas cleaning system in Appendix 8.1 of the EIS. The scenario is modelled as 'abnormal operating conditions'. The consequences associated with such failure would be an emission to atmosphere above the specified emission limits.

Please refer to question 8's response.

16. **Section 6.1.5 – more details on tank and bund dimensions are required.**
Please refer to question 14's response.

17. **Section 6.2.6 – provide more detail on how the spilled material will be rendered safe.**
The layout of the Major Accident Hazard Assessment report has now been revised. Please find the relevant information included in section 6.2 of the report. Please refer to question 10's response also.

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18. Section 7 – demonstrate there is sufficient capacity on site to retain the projected amount of firewater required.

The layout of the Major Accident Hazard Assessment report has now been revised. Please find the relevant information included in section 7 of the report.

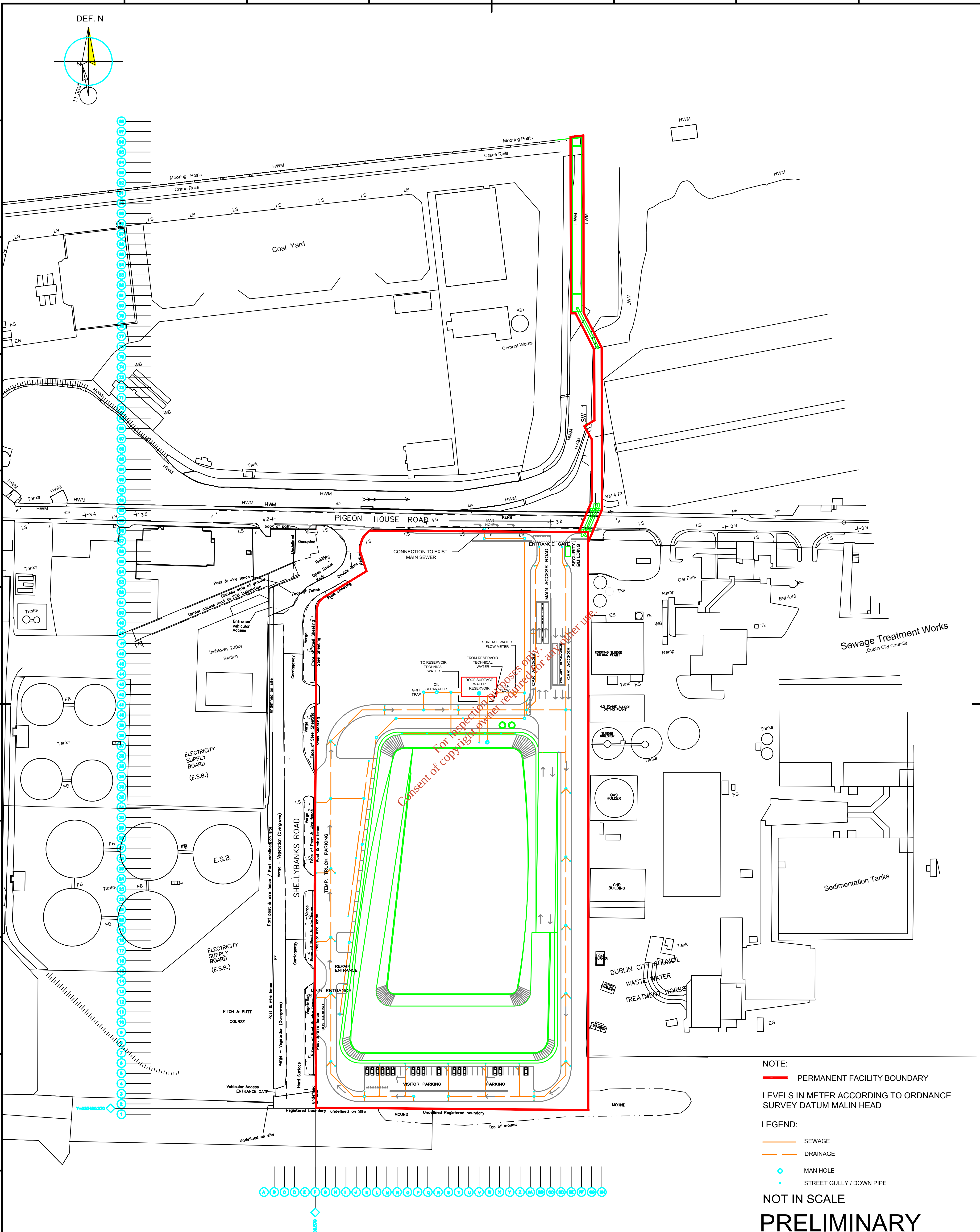
19. Section 8 – describe the emergency access and egress arrangements. Demonstrate the safety of any occupied building on the site. Consider toxic effects, as well as thermal radiations and overpressure events in the demonstration

The layout of the Major Accident Hazard Assessment report has now been revised. Please find the relevant information included in section 8 of the report.

Internal design of the building is not sufficiently advanced to assess internal escape routes, therefore only escape routes from the site are considered here.

Yours sincerely,

M. Twomey
Assistant City Manager



NOTE:

PERMANENT FACILITY BOUNDARY

LEVELS IN METER ACCORDING TO ORDNANCE SURVEY DATUM MALIN HEAD

LEGEND:

- SEWAGE
- DRAINAGE
- MAN HOLE
- STREET GULLY / DOWN PIPE

NOT IN SCALE

PRELIMINARY

Index	Date	Chck.	Appr.	Description

File name: UZT_BE040a	Format: A1	Draughtsman	19.05.2006	ISC
Distribute to	Scale 1:1000	Checked	30.05.2006	KAS
		Approved	30.05.2006	CLN

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EE13319

ELSAM A/S
DUBLIN WASTE TO ENERGY
LAYOUT
DRAINAGE AND SEWAGE SYSTEM

UZT /

BE040 a

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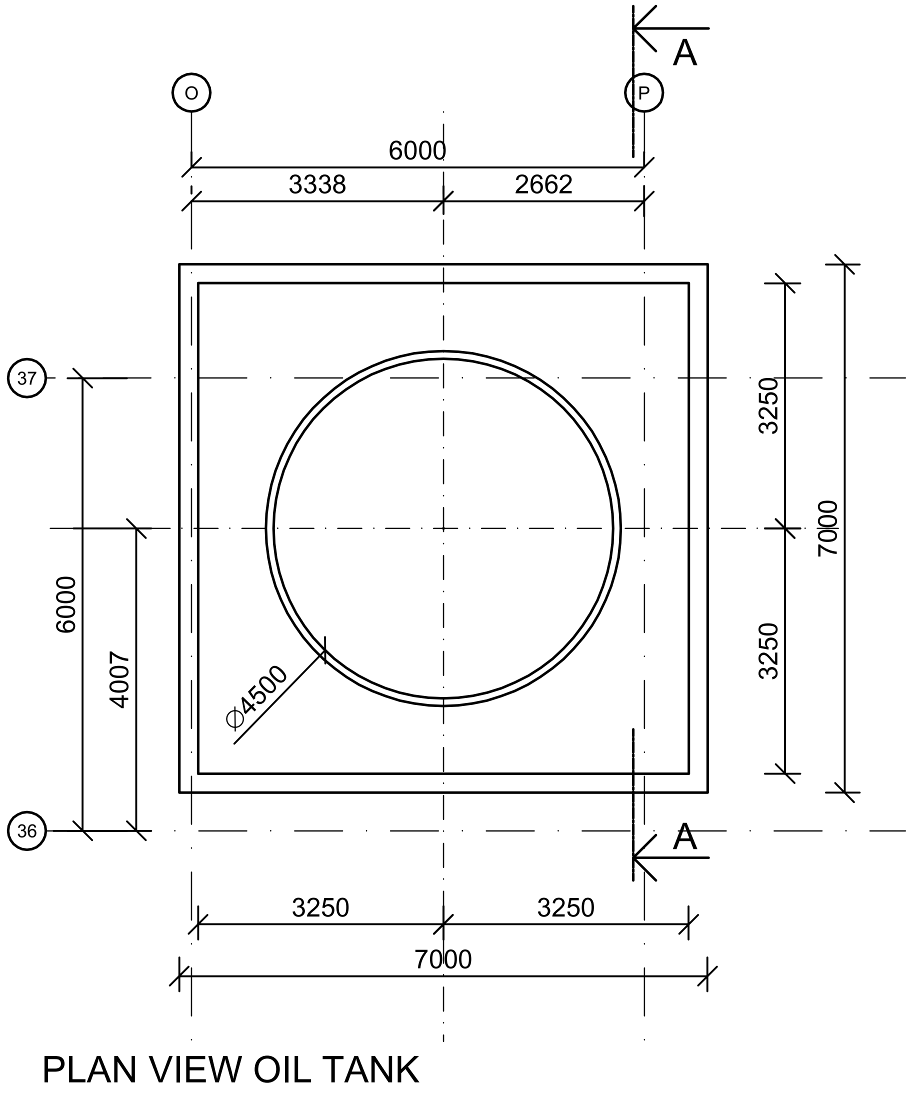

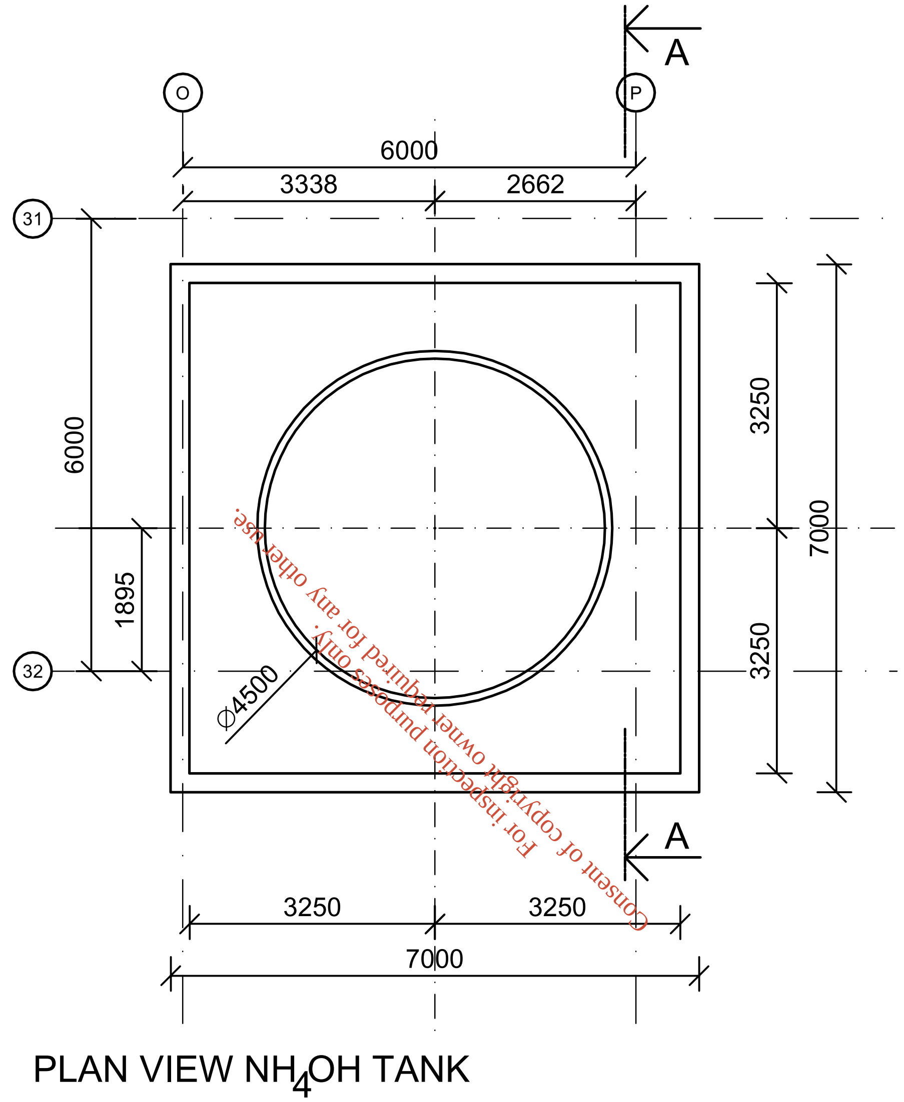

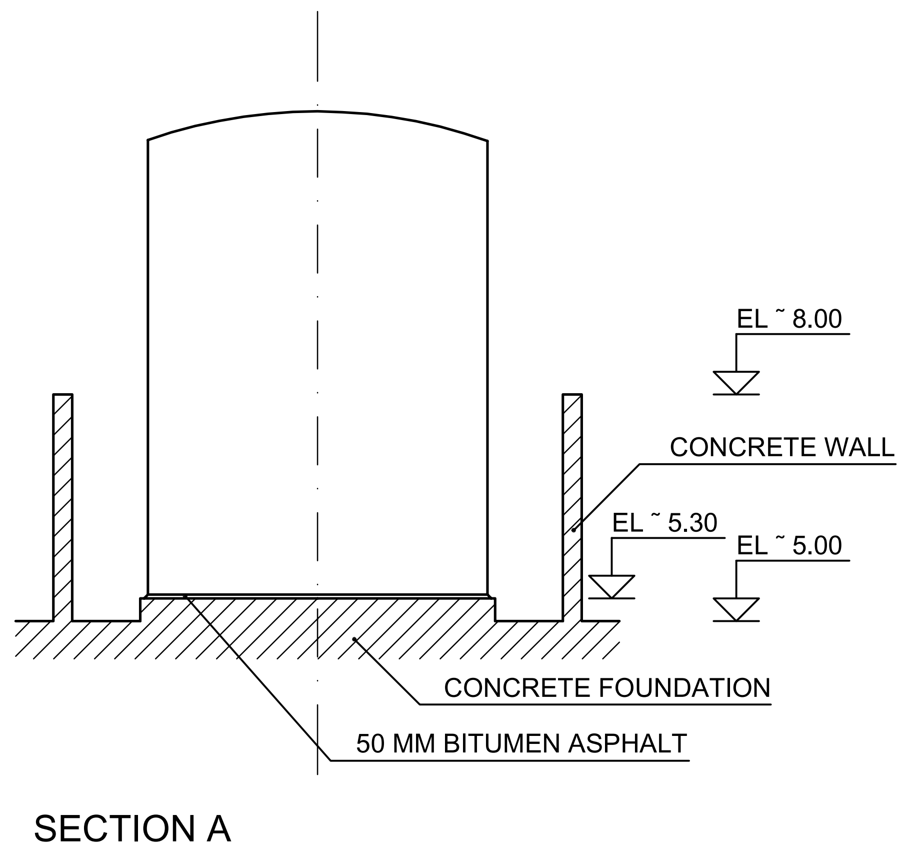

NOTES:

ALL MEASUREMENTS ARE IN MILIMETERS.
LEVELS ARE IN METERS.

PRELIMINARY

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File name:			

DONG energy

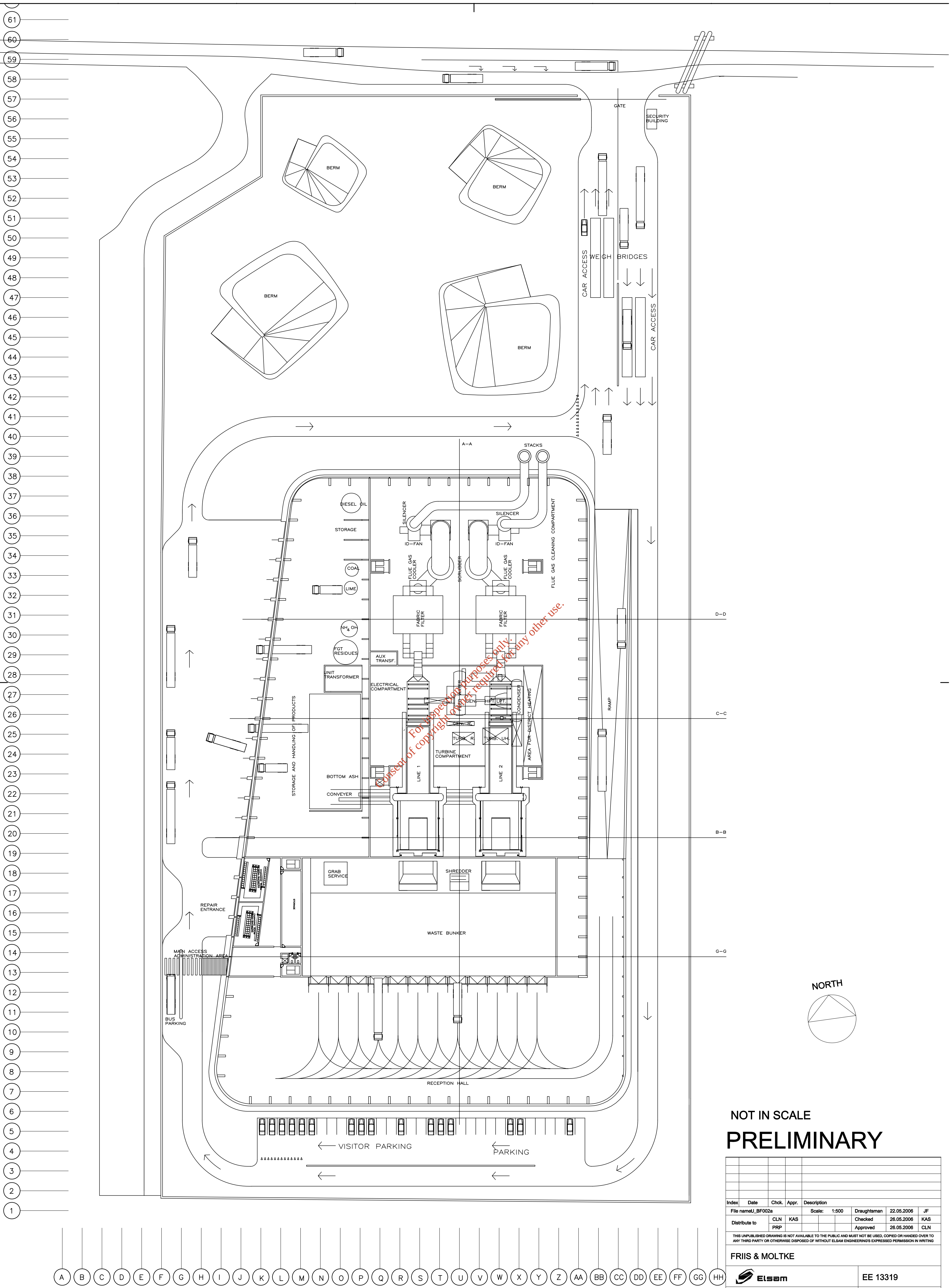
DUBLIN WASTE TO ENERGY
STORAGE TANK FOR DIESEL OIL
AND NH_4OH, 100 M^3

EE 13319

SKETCH

3

DONG Energy - Kraftværksvej 53 - 7000 Fredericia - Denmark - Tel. +45 7923 3333 - engineering@dongenergy.com - www.dongenergy.com



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Distribute to	CLN	KAS		Checked	26.05.2006	KAS
	PRP			Approved	26.05.2006	CLN

FRIIS & MOLTKE

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EE 13319

DUBLIN WASTE TO ENERGY
ARCHITECTURAL PROPOSAL
PLAN VIEW

U /

BF002a

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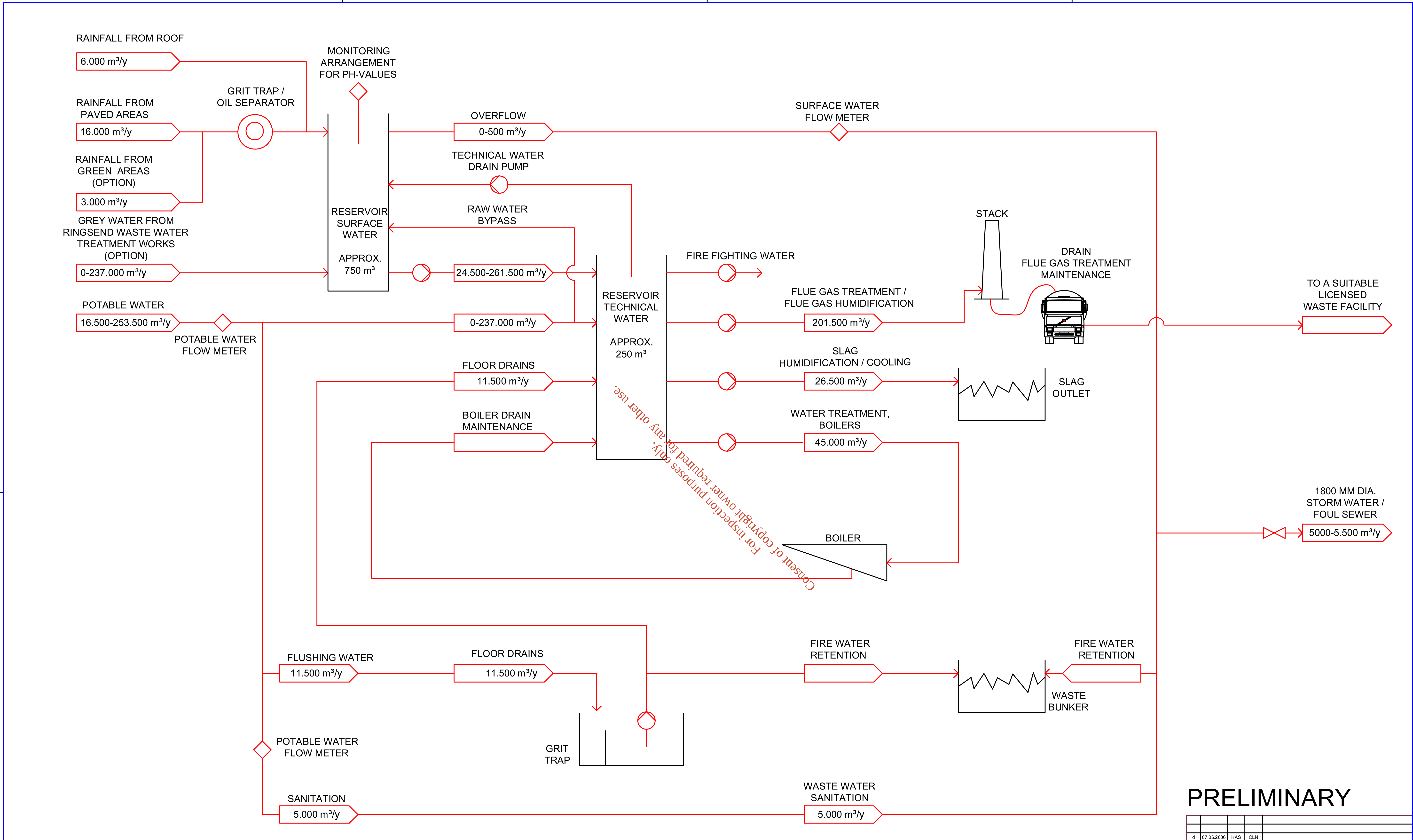

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c	29.05.2006	JO ISC		
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Distribute to	Scale -	Checked	02.02.2004 CLN
		Approved	02.02.2004 CLN

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ELSAM
DUBLIN WASTE TO ENERGY
WATER FLOW DIAGRAM

GD /

MQ001 d

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Car parking

5.5.17. Car parking will be provided on Site for staff and visitors as shown on drawing UZT/BE005.

Drainage and Wastewater

5.5.18. The Facility will be connected to the Ringsend Wastewater Treatment Works via a new main combined sewer connection to an existing manhole in the 1800mm diameter Storm Water and Foul Sewer, which runs along the northern Site boundary in the public road, Pigeon House Road.

5.5.19. Separate drainage systems will be provided in the facility for sanitary drainage and for storm water drainage from roofs, roads and parking areas.

5.5.20. Sanitary effluent from the Facility will be generated from the sanitary installations in the kitchens, toilets, floor drains and showers in the administration area and will be discharged to the existing main Storm Water and Foul Sewer in Pigeon House Road.

5.5.21. There will be no discharge of process waste water from the Facility. All process waste waters from the WtE Facility, such as boiler blow down, boiler water treatment reject water and scrubber water will be collected for recycling in the Flue Gas Treatment System or used for humidification/cooling of the bottom ash outlet. Wash water will be discharged to the floor drains in the boiler house, etc. will also be collected and used in the process water system.

5.5.22. A flow meter will be arranged on the potable water system in order to measure the sanitary effluent water, which is discharged to the new main combined sewer pipeline.

5.5.23. A volume of 5000m³ per year of wastewater consisting of sewage and surplus storm water is expected to be discharged to the main Storm Water and Foul Sewer in Pigeon House Road.

5.5.24. All the surface water run-off from the roofs of the buildings and from the roads, parking areas and capped landscape areas will be collected and stored in the rainwater storage tank in order to enable use of the collected rainwater in the facility process.

5.5.25. The construction of the new main combined sewer connection will include construction of an underground rainwater tank or reservoir with a volume at approximately 750m³. Runoff from roof areas will discharge directly to the underground rainwater tank. The runoff from paved areas will be discharged via a silt trap or grit trap and an oil separator, in order to separate oil, silt and other debris from the water, to the reservoir.

5.5.26. The design of the surface water drainage network for the Facility is based on a rainfall return period of more than 2 year with a maximum rainfall intensity of 7.8 mm/10min.

5.5.27. The design of the rainwater reservoir for the Facility is based on a rainfall return period of 1 year with a maximum rainfall intensity of 28.1 mm/12hr.

5.5.28. The rainwater tank will be provided with an overflow connection to the main combined sewer pipeline.

5.5.29. The reservoir surface water tank will be provided with a monitoring arrangement for measurement of continues pH-values for the restored water in the tank, in order to prevent discharge of overflow from the reservoir surface water tank with pH-values exceeding the permission.

5.5.30. There will be no emission to the ground or direct discharge to groundwater of rain water, sewage or process waste water from the Facility. Nevertheless, it is proposed to monitor the quality of groundwater under the Site annually.

5.5.31. Development of the Facility will involve major earthworks and the construction of substantial retaining walls. This work will alter the ground water regime under the Site. Ground water wells will be installed, at locations to be agreed with the Environmental Protection Agency (EPA), when the major Site works have been completed and the new ground water flow has become established. Monitoring wells will be installed upstream and down stream of the location of the main process activities on Site. Due to the present Site location, it is expected that four monitoring wells will be required.

5.5.32. References are made to drawing no. GD/MQ001, Water Flow Diagram and drawing no. UZT/BE040, Drainage and Sewage.

Process water flow

5.5.33. The process water system is shown in drawing GD/MQ001.

5.5.34. Water will be consumed in the process at the rate of approximately 32 m³ per hour in the flue gas treatment system, bottom ash humidification and cooling, and boiler makeup water. Approximately 0.55 m³ per hour will be required for non-process use. Effluent from the process will be reused and rainwater from roofs, roads and parking areas will be collected to minimize the consumption of main water.

5.5.35. The 30-year (1961-1990) average annual rainfall at Dublin City was 710 mm. Rainfall will be collected from roofs, roads and parking areas with an area of approximately 34,500 m². It is estimated that there will be approximately 22,000 m³ rainwater available per annum, which will leave a deficit of approximately 253,500 m³ per annum of water required from the water mains supply (based on 365 days per year of operation on Site).

'Grey' Water

5.5.36. It is proposed to establish a 'grey' water connection from the Ringsend Wastewater Treatment Works so that treated effluent which alternatively would have been discharged to Dublin Bay can be used in the process instead of potable water.

Grid connection

5.5.37. It is proposed to connect the Facility to the 110 kV switchyard located approx. 500 m due west of the Site, subject however to the grid connection offer from ESB Networks. It is proposed that the underground cable will follow the extension of South Bank Road running east west immediate south of the Synergen plant. The 110 kV connection will be the main facility connection for the supply of electricity to the grid. The connection will also be used for a power supply to the Facility.

5.5.38. A 10 kV service line is proposed from the existing power cable in either Pigeon House Road or Shellybanks Road. This is subject to determination from ESB Networks. The 10 kV line will be established for the construction phase to supply power to the construction Site. The service line is expected to be maintained throughout the operational period of the Facility to ensure continuous power supply in the event of maintanence to the 110 kV equipment.

Sludge Pipeline

5.5.39. In the event that land spreading of sludge will no longer be an option due to environmental constraints, it will be possible to pump the sludge directly to the proposed WtE Facility for thermal treatment. It is intended to provide a sludge pipeline from the Ringsend Wastewater Treatment Works. The sludge would be pumped from the Ringsend Wastewater Treatment Works and injected into the waste feed hoppers.