Oxigen

working for a cleaner environment

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Office of Licensing and Guidance
Environmental Protection Agency
PO Box 3000
Johnstown Castle Estate
Co. Wexford.

10th February 2009

Ref: WO248-01

Dear sir/madam,

I refer to the above application for a Waste Licence in respect of Corranure Landfill at Lismagratty & Corranure Townlands, Cootehill Road, Cavan.

Cavan County Council is the current licence holder at this facility. In late 2008 issues arose at the facility which caused odour nuisance to the local community.

Oxigen Environmental, as the operator of the facility wish to advise the Agency of the remedial action taken to address these issues on site and to ensure that the operation of the facility going forward will ensure that there will be no further issues of this nature.

The odour problem arose due to historical inadequate gas management infrastructure in Cell 3A. This was remedied by covering the entire cell in a non-permeable membrane called Geo Hess as a temporary cap. An installation and completion report for this process is attached.

In addition to the capping of the cell with Geo Hess, 18 vertical de-gassing wells were drilled and a gas extraction system installed. A detailed report on this is also attached. In addition to this drilling equipment was purchased and is now on site enabling any further well drilling to be done in-house.

A new 1500 cu.m flare was installed giving additional flaring capacity for increased gas production and also backup in the event of problems with the existing flare.

A management review was undertaken by Oxigen and additional expertise was brought in to strengthen the management team on site. An experienced Landfill Director was brought in from overseas to assume responsibility for all activities on site and to provide additional experience to the team on site. A detailed management structure and duties and responsibilities of all site personnel is attached.

Oxigen have also retained the services of WMT a firm of German consultants to act as advisors for the ongoing operation and development of the Corranure facility. A profile of WMT is attached.

A detailed Operation plan and Filling plan for Cell 3B has been designed and is currently being implemented. This plan details all measures necessary in order to ensure that the facility is being operated to the highest standard. This plan is subject to continuous review and monthly review meetings involving consultants WMT. The calculations are constantly being adjusted depending on filling profile. A copy of the Operation and Filling plan is attached.

Oxigen is confident that the measures outlined above will ensure that this facility will henceforth be operated to the highest standard and the operation will not result in environmental nuisances.

Yours sincerely

Jim Dowdall
Oxigen Environmental Ltd.

THE TEMPORARY COVER ON CELL 3A

JANUARY 2009

OXIGEN ENVIRONMENTAL LTD.
WASTE LICENCE W077/02
CORRANURE LANDFILL
CAVAN

Temporary Cover of Cell 3A

The product used for temporary capping of Cell 3A is called 'Geo Multi- Cover Type 20'. This product is supplied by a company called Geo Hess.

The product Geo Multi-Cover Type 20 is made from high density polyethylene tapes, coated on two sides with low density polyethylene. The Geo Multi-cover is very strong with a puncture resistance off 2000 neutons, it is UV stabilised for minimum of 3 years and is 0.30 mm thick.

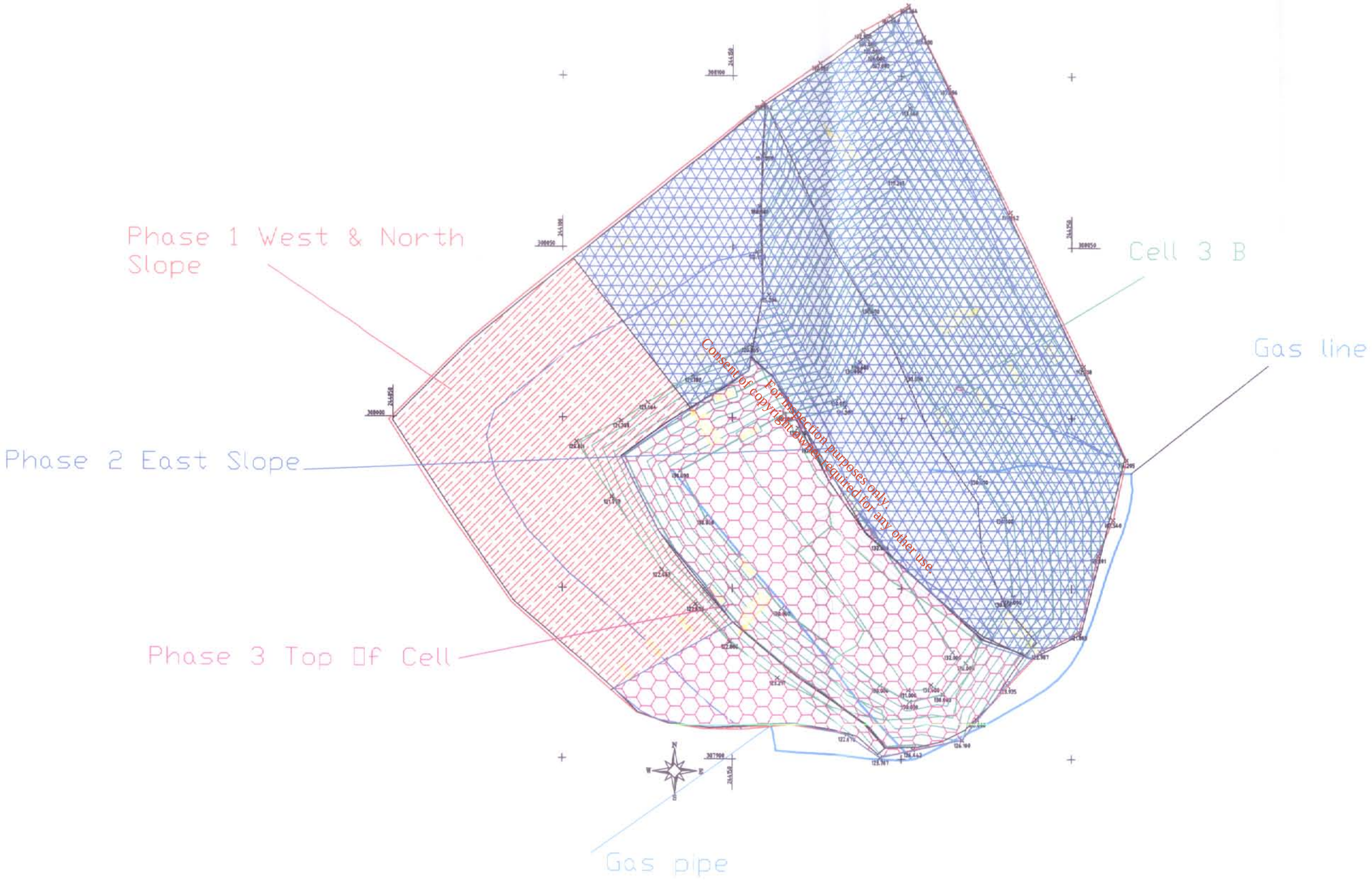
The Geo Multi-Cover Type 20 is covered with anchor mat/wind netting. The anchor mat is deployed directly upon Geo Multi-Cover Type 20. The anchor mat provides sound anchorage against potential wind damage; it also provides added durability and UV resistance, with anchor mat providing a UV block of 80% to the Geo Multi-Cover Type 20. The anchor mat is UV stabilised for a minimum of 5 years.

The Geo Multi-Cover Type 20 is stitched to create a gas proof seal. The sheets of the Geo Multi-Cover Type 20 are placed side by side then double folded and stitched together. This ensures a gas proof seal. The anchor mat is also stitched to provide a protective cover over the Geo Hess. The anchor mat cuts down the risk of wind disturbance, which can lead to damage or even failure of Geotextile.

Drawing No. 104 shows the areas that were Geo Hess (Phase 1) was placed on Cell 3A, the west and northern slopes. An anchor trench was dug at both the top and bottom of the slope. This was then back filled with soil. The anchor trench at the top was left with a 'tail' so that future phases could be stitched to it thus enclosing the cell.

The capping was completed in three phases, composed of the following quantities:
Phase I: 8200 Meter square of Geo Multi-Cover.
Phase II : 15100 Meter square
Phase III: 7100 Meter square

Oxigen have a reserve supply of materials on the site to include approx 1800 Meter square of Geo Multi-Cover Type 2 and 2200 Meter square of anchor mat.
This is to ensure that in the event of an emergency, any repair can be completed as soon as possible.



NOTES

OXIGEN ENVIRONMENTAL LIMITED

CORRANURE LANDFILL
AT CORRANURE CO. CAVAN
FOR OXIGEN ENVIRONMENTAL

TITLE
GEO HESS LAYOUT

DRAWN F.S	CHK	APP.
SCALE N.T.S.	NO. 104	
DATE NOV. 08		

THE GAS MANAGEMENT

WORKS ON CELL 3A

JANUARY 2009

OXIGEN ENVIRONMENTAL LTD.

WASTE LICENCE W077/02

CORRANURE LANDFILL

CAVAN

Landfill Gas Management

A 1500m^3/hr flare (Flare No.1) and a 500m^3/hr were operational on the site and with the increased capacity required for the flaring of gas from Cell 3A and potential for Cell3B,Oxigen contacted Biogas Technology for a new 2000m^3/hr to be installed on the site for all the gas from Cells 0,1,2, and 3. However this capacity of flare was not available at this time, so Oxigen proceeded with the immediate installation of an additional 1500m^3/hr flare (Flare No.2). Therefore the site capacity is now 3000m^3/hr which is surplus to the current site requirements and gives the option of dividing the gas between the two flares and also a backup if one flare malfunctions.

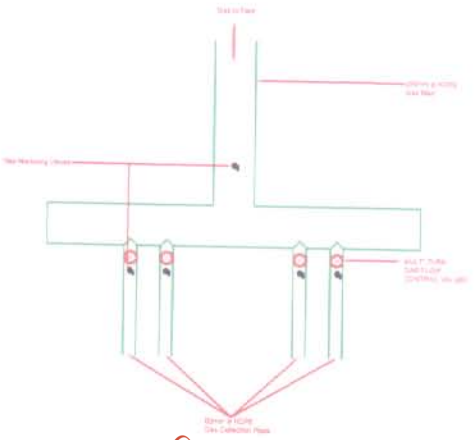
Both flares are currently on the SCADA System as per the requirements of the Waste Licence. Flare No.1 is fully operational for inlet and Outlet parameters as per Schedule D.7 Landfill Gas Combustion Plant. Flare No.2 has inlet parameters Carbon dioxide and Oxigen, however Methane levels are currently not recorded as we are awaiting a delivery of a new methane analyzer from Biogas Technology. The temperature and flow rate is recorded with Outlet parameters Carbon monoxide and Oxygen due for installation as soon as practicable. Calibration gases have arrived and they will be used to calibrate the flares, this will assure the accuracy in readings.

Cell 3A has been completed with the installation of 18 vertical wells. The sphere of influence from these wells (25m diameter) covers the whole area as shown by Drawing No.106. Drawing No.108 show the well numbers, locations and falls for the condensate. The main suction line (shown in red) is a 225OD pipe providing gas extraction from the wells L/G 86 to L/G77. Suction from wells L/G 60 to L/G 67 is via a 225 pipe. This pipe is placed at a higher level to the gas wells allowing any condensate to flow back into the wells, this allows for a number of these wells to act as 'drain legs'. A knock out pot is located close to Flare no. 2 and this is sufficient in reducing the level of condensate to this flare.

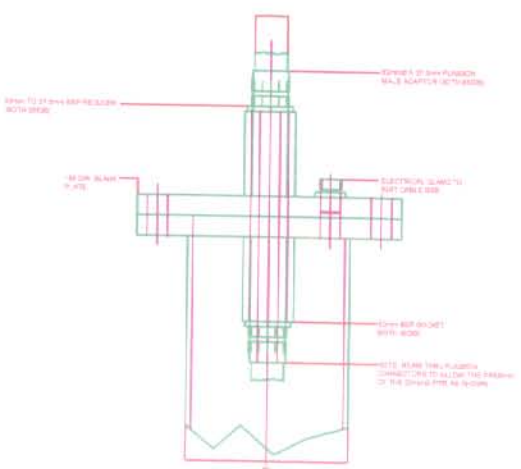
Please see attached Drawing No.106 Vertical Gas Well Location and Drawing No.108 Leachate and Gas Extraction System. The well heads are of a T-Mex design, 125mm OD of both combined gas and leachate with G.R.P ball valve. Suction is controlled via a butterfly valve on the 225OD line before it is connected into the main suction line. Extraction of gas from each well is controlled via a ball value and can be adjusted manually as necessary.

A sample port located on each well for gas monitoring. Additional sample ports have been ordered to enable sampling on both sides of the valve. A new gas monitor and flow meter has been ordered by Oxigen and delivery of each is expected in the coming weeks. Please see attached Drawing No.105 Well head details and Drawing No.107 for the Leachate and Gas Extraction System.

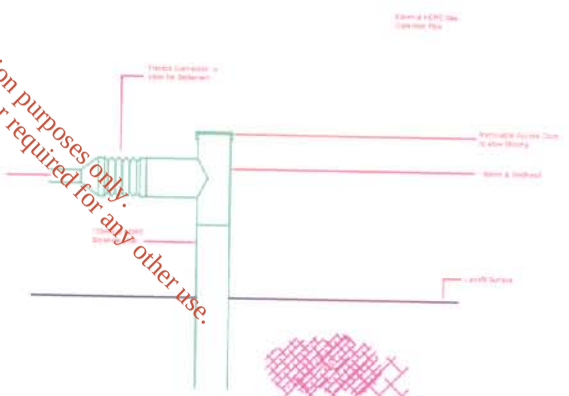
NOTES



PLAN - MANIFOLD - TYPICAL ARRANGEMENT



GAS WELL HEAD WORKS



ELEVATION - TYPICAL WELLHEAD

Oxigen

OXIGEN ENVIRONMENTAL LIMITED

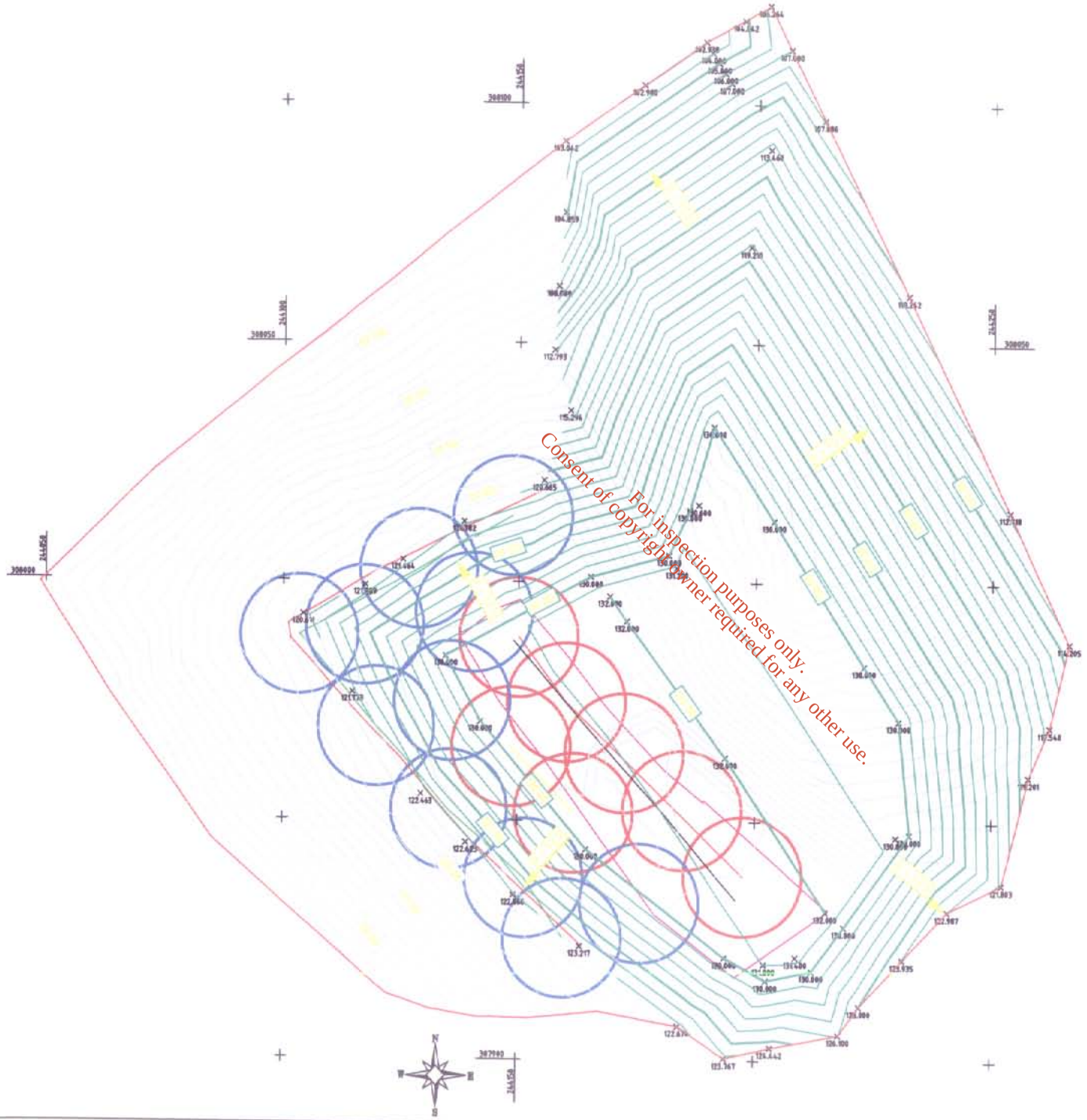
CORRANURE LANDFILL

AT CORRANCRE CO.CAVAN

FOR OXIGEN ENVIRONMENTAL

TITLE WELLHEAD DETAILS

DRAWN F.S.	CHK.	APP.
SCALE N.T.S	NO. 05	
DATE DEC. 08		



NOTES

- WELLS DRILLED BY DEMPSEY
- WELLS DRILLED BY OXIGEN

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OXIGEN ENVIRONMENTAL LIMITED

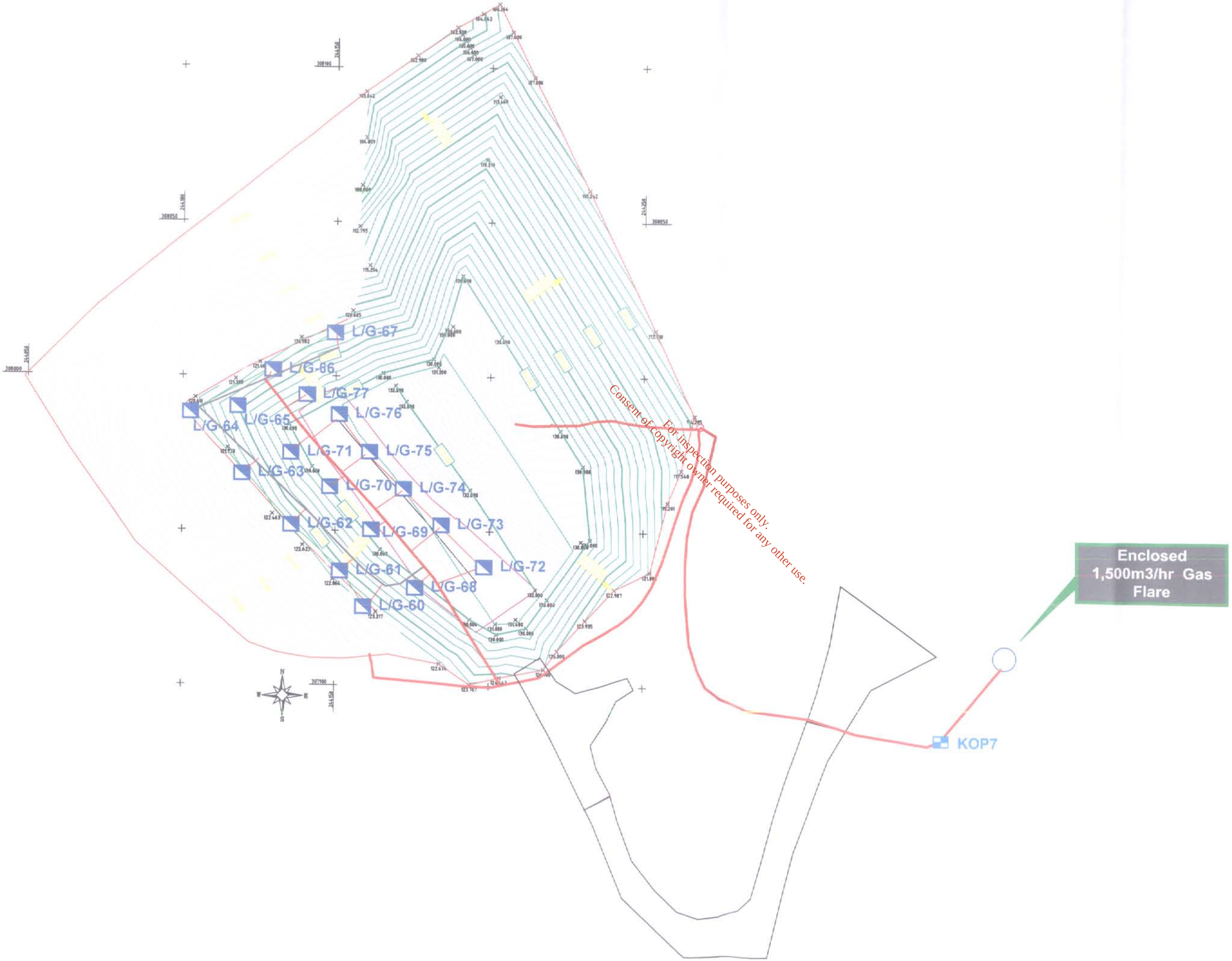
CORRANURE LANDFILL

AT CORRANURE CO. CAVAN

FOR OXIGEN ENVIRONMENTAL

TITLE VERTICAL GAS WELL LOCATIONS CELL 3 & 4

DRAWN F.S	CHK.	APP.
SCALE N.T.S	NO. 106	
DATE DEC 08		



NOTES

225 GAS PIPE

125mm GAS PIPE

KOP7

KOP (KNOCK OUT POT)

L/G-72

COMBINED GAS & LEACHATE EXTRACTION WELL

Oxigen

OXIGEN ENVIRONMENTAL LIMITED

CORRANURE LANDFILL

AT CORRANURE CO. CAVAN

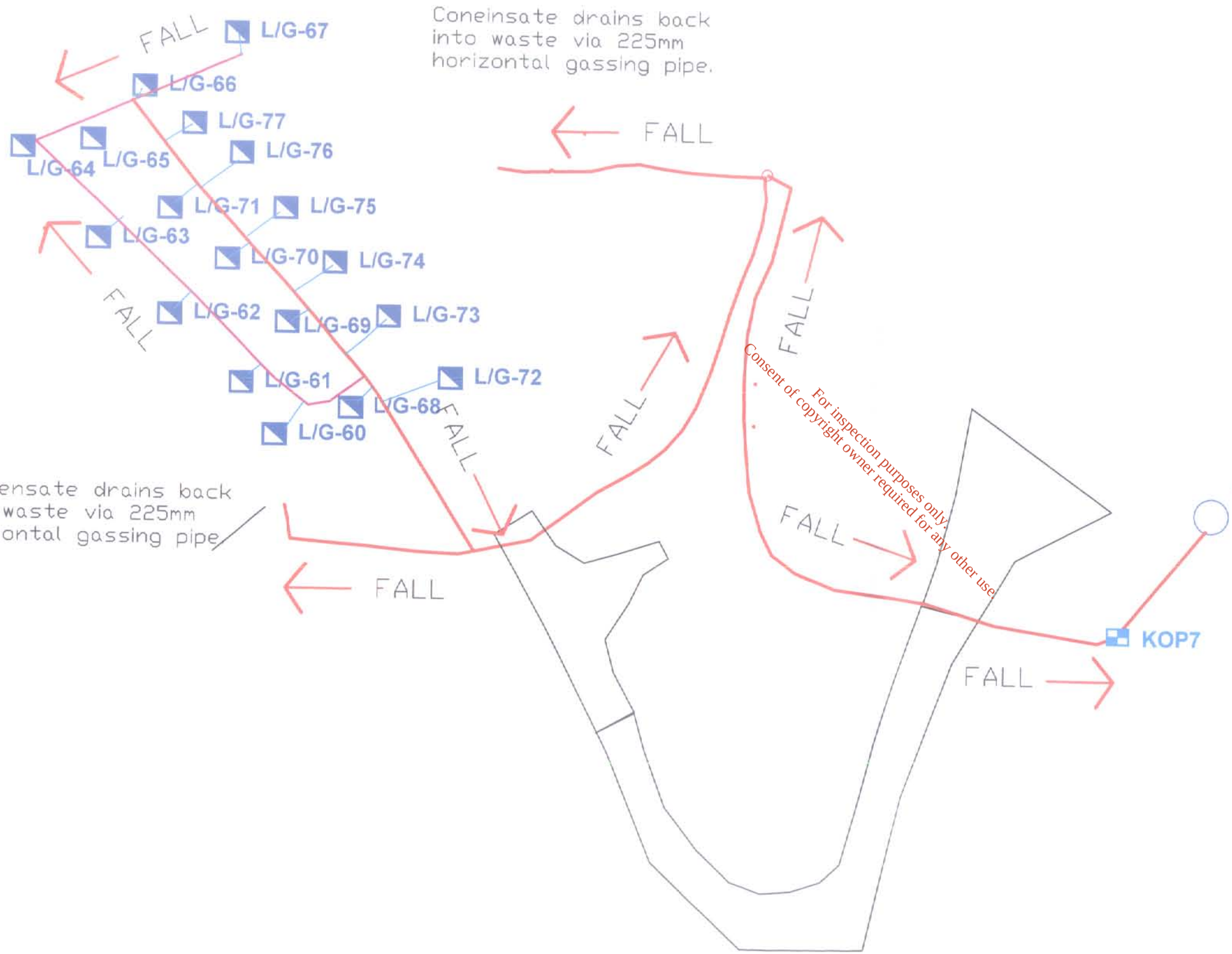
FOR OXIGEN ENVIRONMENTAL

TITLE

LEACHATE & GAS EXTRACTION SYSTEM

DRAWN F.S | CHK | APP.

SCALE N.T.S | NO. 107



NOTES

225 GAS PIPE

125mm GAS PIPE

63mm GAS PIPE

KOP7

KOP (KNOCK OUT POT)

L/G-72

COMBINED GAS & LEACHATE EXTRACTION WELL

Oxigen

OXIGEN ENVIRONMENTAL LIMITED

CORRANURE LANDFILL

AT CORRANURE CO. CAVAN

FOR OXIGEN ENVIRONMENTAL

TITLE LEACHATE & GAS EXTRACTION SYSTEM

DRAWN F.S | CHK. | APP.

SCALE N.T.S | No. 109

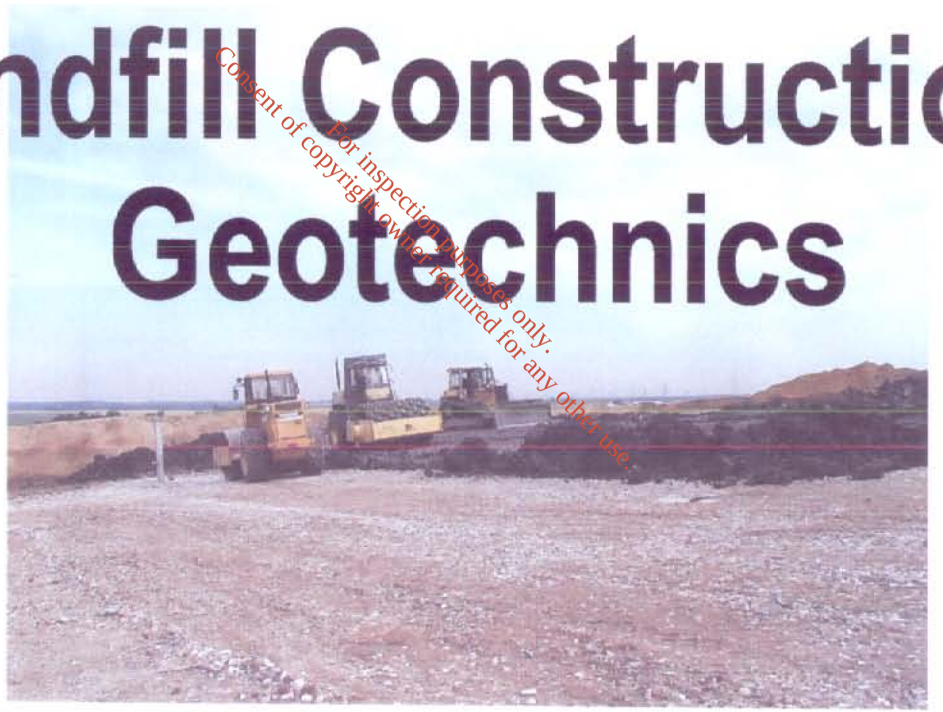
DATE JAN 09

WMT

WMT Waste Management Technology & Service GmbH
Landfill Construction / Geotechnics

WMT GmbH, Viersen

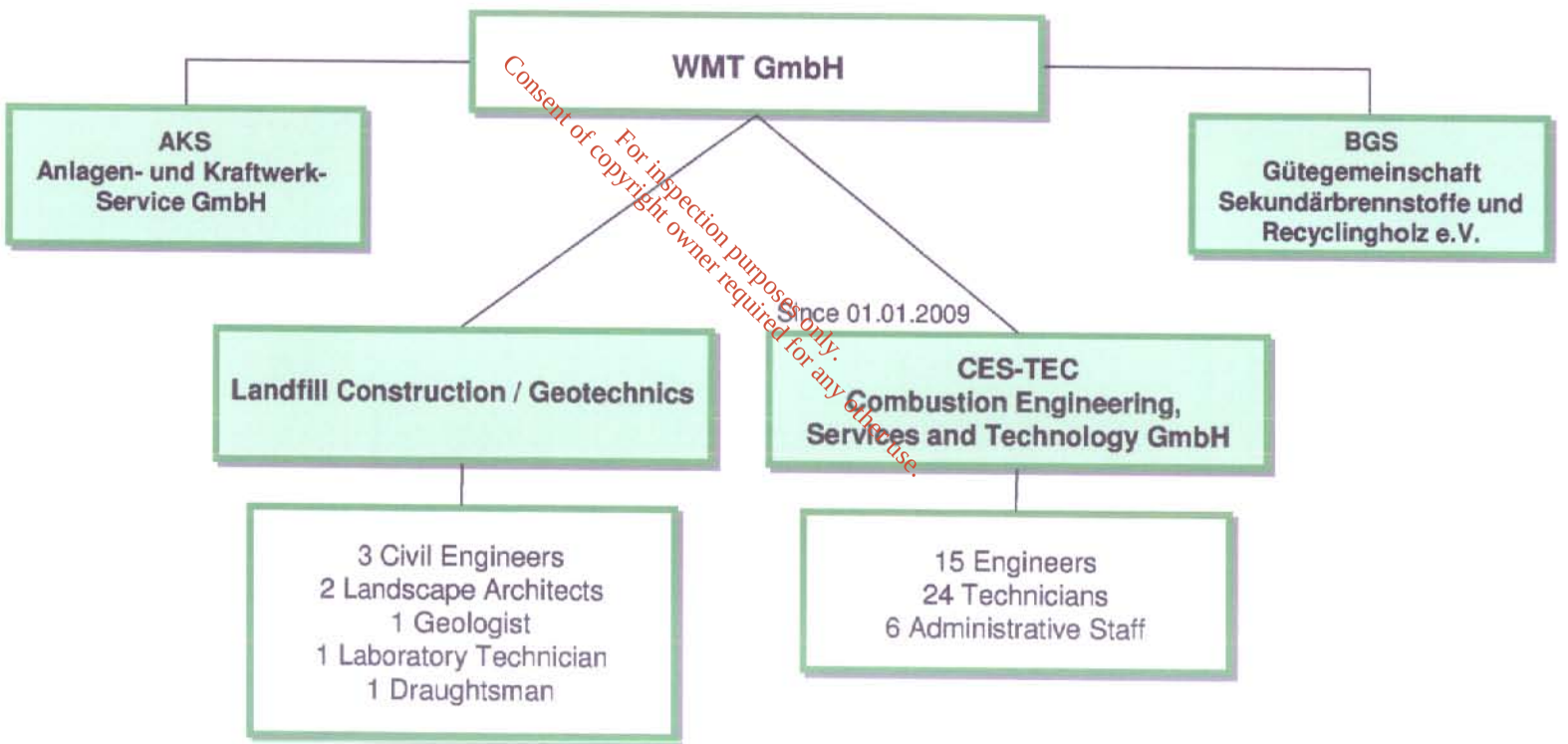
Landfill Construction / Geotechnics



WMT Waste Management Technology & Service GmbH

Landfill Construction / Geotechnics

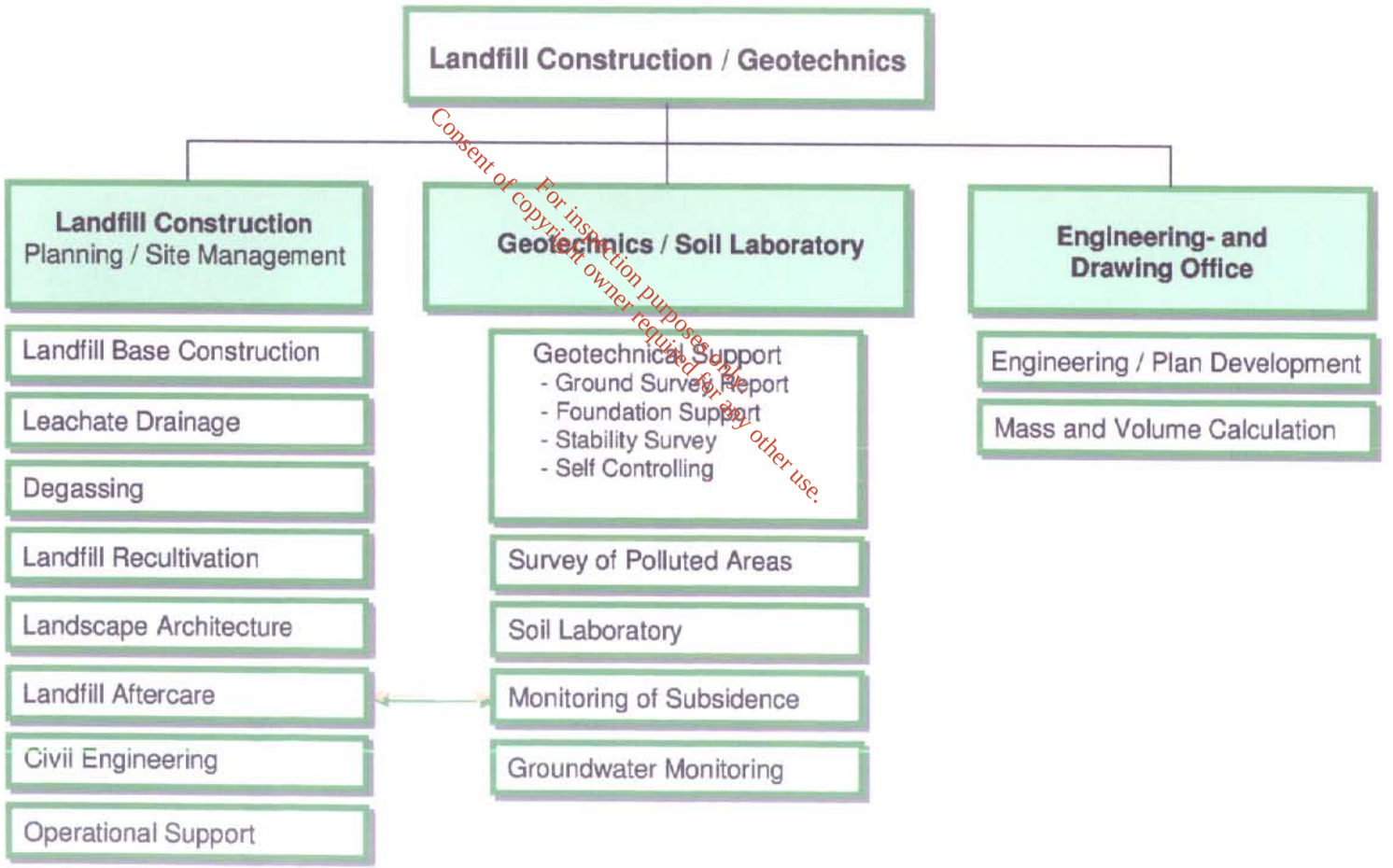
WMT GmbH, Viersen



WMT Waste Management Technology & Service GmbH

Landfill Construction / Geotechnics

WMT GmbH, Viersen



WMT Waste Management Technology & Service GmbH

Landfill Construction / Geotechnics

WMT GmbH, Viersen

Landfill Construction

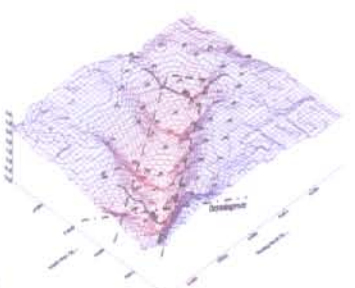
Site Selection
Licence Management
Landfill Construction
including Degassing
and Leachate Drainage
Landscape Architecture

Operational Support
- Filling Concepts
- Maintenance of Forestations

Civil Engineering
- Infrastructure
- Planning and Construction of Landfill Buildings (e.g. Shafts)

Recultivation
- Final Recultivation including Surface Sealing
- Planting
- Licence Management

Aftercare
- Monitoring
  - Subsidence (Landfill)
  - Groundwater
  - Leachate
  - Landfill Gas
- Maintenance
  - Landfill Constructions
  - Planting



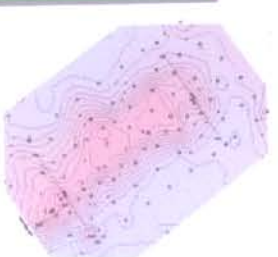
WMT Waste Management Technology & Service GmbH

Landfill Construction / Geotechnics

WMT GmbH, Viersen

Geotechnics

- Technical Calculation / Stability Survey
- Foundation Support / Ground Survey Report
- Onsite Quality Control during Engineering
- Quality Control Assessment of Suitability / Monitoring of Quality Soil Laboratory
- Monitoring of Subsidence and Groundwater
- Estimate of Risk Potential (Polluted Areas)



WMT Waste Management Technology & Service GmbH

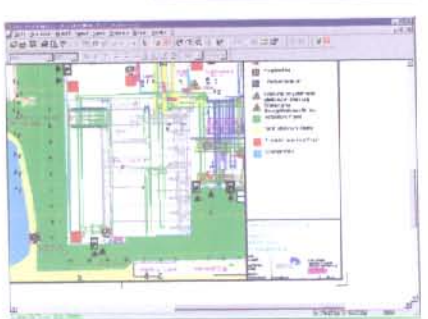
Landfill Construction / Geotechnics

WMT GmbH, Viersen

Engineering- and Drawing Office

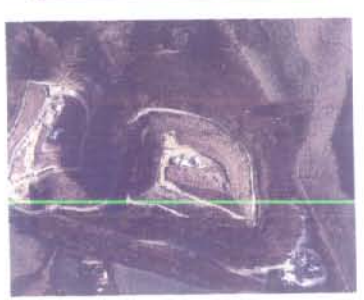
Engineering

- Plan Development for all Phases of Landfill Construction



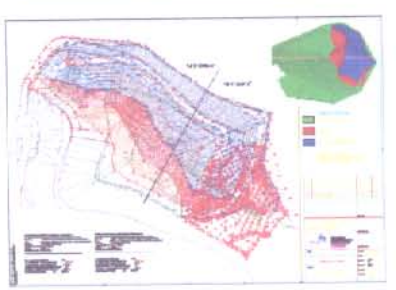
Mass and Volume Calculation

- Based on Photogrammetry or Surveying



Operational Support

- Filling Concepts



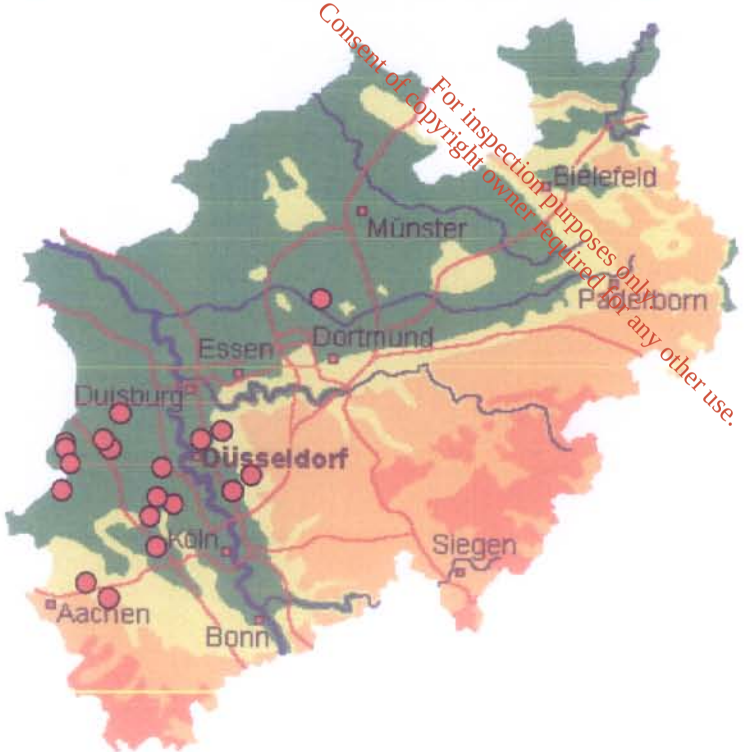
WMT

WMT Waste Management Technology & Service GmbH

Landfill Construction / Geotechnics

WMT GmbH, Viersen

Facility Locations in North Rhine Westphalia



- Brüggen I
- Brüggen II
- Frimmersdorf
- Gohr
- GV-Neuenhausen
- Haastert
- Haus Forst
- Horm
- Hubbelrath
- Immigrath
- Inden
- Lünen
- Neuss-Grefrath
- Radermühlenberg
- Rothenbach
- Schlibeck
- Solingen
- Viersen I
- Viersen II

WMT

WMT Waste Management Technology & Service GmbH

Landfill Construction / Geotechnics

WMT GmbH, Viersen

Other Facility Locations

Pritzwalk-Sommersberg, Brandenburg

Fresdorfer Heide, Brandenburg

Wipperoda, Thüringen

Mambong, Sarawak, Malaysia

WMT Waste Management Technology & Service GmbH

Landfill Construction / Geotechnics

WMT GmbH, Viersen

Facts and Numbers

⇨ Base Sealing including Artificially Established Geological Barrier	2.150.815 m²
⇨ Intermediate Sealing	181.400 m²
⇨ Main Leachate and Gas Collecting Pipes	16.130 m
⇨ Leachate Collecting Shafts	55 structures
⇨ Intermediate Covering	844.421 m²
⇨ Final Capping	1.125.657 m²
⇨ Ecological Compensation and Balancing Area	550.000 m²

⇨ Planning and Realisation

WMT

Landfill Construction / Geotechnics

Qualifications

Name:	Rainer Küsters-Cattelaens Dipl.-Ing.
Year of birth:	1960
Field:	Civil engineer
Professional education:	1. Apprenticeship as draftsman 2. RWTH Aachen, Faculty for civil engineering
Specialisations:	Design, aerial surveying, quantity surveying
Professional experience:	Since 1990 Consulting, draft, authorisation and construction planning for waste disposal sites and waste disposal facilities including establishing the infrastructure (roads, drainage facilities, supply and disposal facilities, shaft construction, buildings, etc.) - Draft, authorisation and construction planning for waste disposal sites (construction, degassing, leachate catchment, recultivation and maintenance) and general civil and underground engineering - Preparation and involvement in awarding contracts as well as on-site construction supervision for waste disposal site construction measures and establishing the infrastructure - Coordinating the photogrammetrical and/or terrestrial yearly waste disposal site surveys - Analysing the yearly surveys (volume and quantity surveys) for waste disposal sites - General consulting for the waste disposal site managers (Leachate minimisation, filling phases, etc.)

Member of the Chamber of Engineers in North Rhine - Westphalia

WMT

Deponiebau / Geotechnik

reference (extract)

Dipl.-Ing. Rainer Küsters-Cattelaens

periode of time	Measure
1997 / 1998	**Landfill Hubbelrath, City of Düsseldorf** approval design and construction planning, tendering and site managing for construction of leachate storage tanks
1999 / 2003	**Landfill Rothenbach, District of Heinsberg** construction planning, construction of section „BA F/2, E“
2001	**Landfill Pritzwalk-Sommersberg, District of Prignitz (Brandenburg)** construction planning of the intermediate surface sealing with „TRISOPLAST®“ incl. Surfacewatermanagement
2002 - 2004	**Landfill Mambong, Malaysia, Province Sarawak** project engineering, planning of landfill (construction of landfill sections, recultivation, mass calculation, leachate and gas management, surface water managemant)
2004 - 2005	**Landfill Neuss-Grefrath, Rhein District of Neuss** reworking / new calculation of surface dewatering
2003	**Landfill Haus Forst, Rhein-Erft-District** reworking / new calculation of surface dewatering (planning, tendering, site managing)
2003 - 2004	**Landfill Frimmersdorf, Rhein District of Neuss** dewatering of surface sealing (planning)
2004 - 2005	**Landfill Gohr, Rhein District of Neuss** dewatering of surface sealing und intermediate sealing (planning / calculation)
2003 - 2005	**Landfill Rothenbach, District of Heinsberg** reworking / new calculation of surface dewatering (approval design), planning of enlargement of degassion
2004 - 2005	**Landfill Viersen II, District of Viersen** planning and construction of a collecting point for privat deliveries
2006 - 2007	**block heating and generation plant, Altentreptow (Mecklenburg Vorpommern)** project leader, erection and put into operation
2007	**Landfill Haastert, Georg Fischer GmbH & Co. KG, Mettmann** basic engineering, dewatering and mass calculation

HEINZ POLTORACZYK

An den Roteichen 18 • D-41334 Nettetal • Telefon: +49 (0) 21 57 / 123 957

Mobil: +49(0)177 / 1 40 92 19 • e-mail: heinz.poltoraczyk@web.de

CURRICULUM VITAE

Personal Data

Date of birth 11.04.1952

merried, 2 children

Career / References

07 / 1978	Start at Siemens / KWU as engineer for construction and commissioning
11/79 - 08/81	Engineering-planning (for construction and assembling) in a nuclear power station in Switzerland and at the head office in Erlangen
09/81 - 05/83	site-management at the nuclear power station Grohnde
06/83 - 09/86	site-management at the nuclear power station Brokdorf
10/86 - 06/87	mangement of a retrofitting of a nuclear fuel assembly plant at Hanau
07/87 - 11/89	Sen. Site manager for the mechanical construction of a coal-fired power plant at Hannover
12/89 - 03/90	management of improvement-works at the nuclear power station Unterweser

04 / 1990	Start as project-engineer at UTG / Trienekens in Viersen
04/90 - 1998	project manager for several landfill-gas cogeneration plants and flare-systems including site-management and commissioning.
1999 - 2007	project manager for further plants in the waste sector, e.g. hazardous waste treatment, municipal waste treatment, treatment of cooling devices etc. At the same time consultant in the fields of energy-management, explosion-protection, immission-control
02/07 ongoing	freelance consultant special subjects: power plants, renewables, energy-efficiency, biogas and landfill-gas systems, cdm-projects, immissioncontrol etc. special references in the landfill sector: trouble shooting and commissioning of a degassing system and a flare system at the landfill-site Kuching/ Malaysia; training of the staff as part of the validation program for a cdm-project.

Education

05/72	„Abitur"-certificate, then army-member and industrial-trainee
09/74 - 04/78	study of process-engineering, diploma as process-engineer

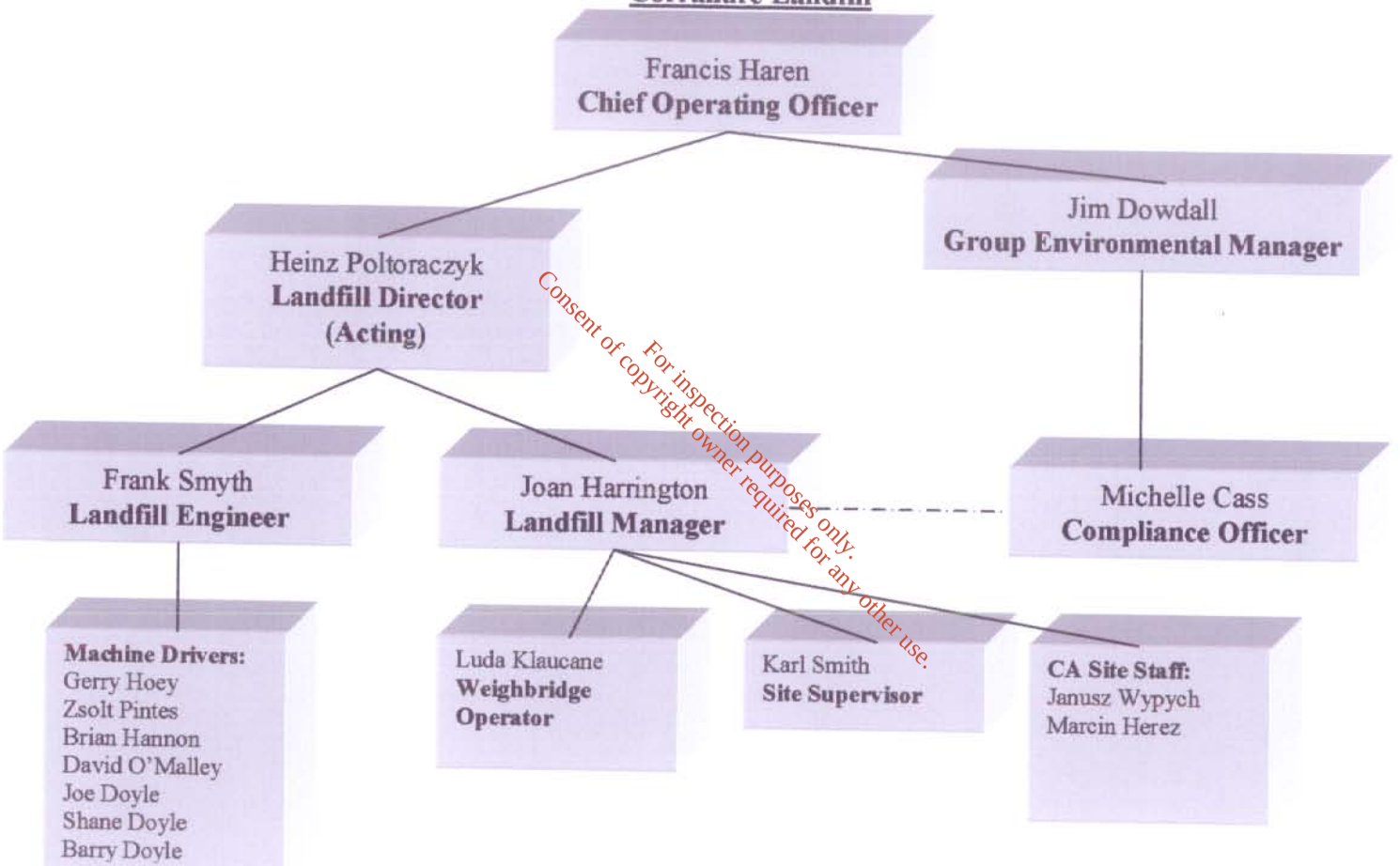
Further qualifications

	Certification of welding engineer, official representative for immissioncontrol
languages:	German, English, French, Spanish basics
PC-applications:	Microsoft Word, Excel, PowerPoint, Outlook, MS Project
Other Skills:	expert in landfill-gas since 1990

Heinz Poltoraczyk

December 2008

Management Structure
Corranure Landfill



CORRANURE LANDFILL COUNTY CAVAN – MANAGEMENT TEAM DUTIES AND RESPONSIBILITIES

Heinz Poltoraczyk Landfill Director (Acting) is responsible for the overall management of the Facility to include full License Compliance, ensuring that the Operational Plan is adhered to including filling plan, all site remediation work, management of all site utilities, planning of future development and all aspects of on-site maintenance. Heinz will also assist Oxigen in recruiting a permanent replacement for this position and will remain until a suitable overlap period has elapsed and the permanent Landfill Director is fully up to speed. Heinz reports directly to Francis Haren, the Chief Operating Officer of Oxigen Environmental Ltd.

Joan Harrington Landfill Manager is responsible for the management of the Facility in accordance with the conditions of the EPA license. This includes responsibility for the weighbridge, environmental performance of the site including site monitoring and reporting and SCADA, Civic Amenity Centre, and all communication with both the EPA and Cavan County Council. Joan is one of three people alerted in the event of a Scada alert.

Frank Smyth Landfill Engineer is responsible for the day to day operation of the landfill and to ensure that the operation of the site is in accordance with both the Operations Plan and Filling Plan that have been designed by consultants for this facility. Working closely with the Landfill Director, Frank will ensure that all materials and equipment are on site in advance of their requirement and that all work is carried out to the required standard. Frank is also responsible for producing reports detailing the technical aspect of all on site works. Frank is also on the call out list for Scada alerts. Frank is responsible for ensuring that the material acceptance criteria are adhered to and that the working face is maintained in a suitable condition. He is also responsible for ensuring that adequate daily cover is used.

Michelle Cass Compliance Officer is responsible for assisting the Facility Manager with maintaining environmental compliance by carrying out daily, weekly and monthly monitoring and inspections and reporting the results in a timely manner. Michelle will also be responsible for managing the gas and leachate systems on a day to day basis and advising the Landfill Manager on the daily status. Michelle will also carry out random environmental inspections and report these to either the Chief Operating officer or Group Environmental Manager to ensure that a level of independent checking is obtained.

Karl Smith Site Supervisor is responsible for carrying out all daily site inspections relating to the operating of the facility. These are odour patrols, litter inspections, site inspections, bird control and wheel-wash maintenance. Karl will report daily on all of these parameters and is responsible for taking remedial action in the case of litter, wheel-wash or birds. Karl is also

trained in the operation of the flare and is on call in the event of a flare alarm. He is also responsible for carrying out odour patrols outside Landfill operating hours.

Luda Klaucane Weighbridge Operator is responsible for the operation of the weighbridge and production of weighbridge reports. She is fully trained in the Genesys weighbridge system that is used to record waste movements and has also been trained in waste acceptance. Luda is also responsible for traffic management and materials control into the Civic Amenity Centre.

Janusz Wypych and Marcin Herez CA Site staff are responsible for the day to day running of the Civic Amenity Centre. This includes advising members of the public on the separation of recyclable materials and assisting in loading materials into receptacles. They are also responsible for waste segregation ensuring that any waste for disposal is treated accordingly. They are also responsible for ensuring that the overall appearance of the CA Centre is maintained in good order.

Machine Drivers are responsible for the operation of the active cell. This includes waste acceptance and they are required to report all possible non-conforming waste immediately to the Landfill Manager or Landfill Engineer. They are also required to ensure that the working face is maintained as small as possible and that this is covered appropriately on a daily basis. The machine operators are responsible for ensuring that maximum compaction is obtained and at the same time ensuring that vehicles delivering waste are not delayed on site for any longer than is necessary.

Jim Dowdall Group Environmental Manager has overall responsibility for the development of the Corranure facility including obtaining a new EPA license, obtaining planning permission under the Strategic Infrastructure regulations and obtaining Department of Agriculture approval for the MBT plant. He is also responsible for the evaluation of technology in respect of this project and site and facility design. Jim is currently the contact person for the contractor (Oxigen) with the Licensee (Cavan County Council) at a senior level. Jim is also responsible for maintaining an independent verification of compliance on site on behalf of the Oxigen senior management team as the Environmental Compliance Officer is a direct report.

Curriculum Vitae

Personal Details

Name: Michelle Cass

Address: South Circular Road, Dublin 8.

Date of Birth: 18th July 1982

Phone: 0879697141

Education:

2004- 2005: Higher Diploma in GIS and Remote Sensing at NUI Maynooth.

2000- 2004: Graduated a BA Mod. in Science specializing in Environmental Science at Trinity College Dublin, Ireland .

1994- 2000: Presentation Secondary School, Kilkenny, Ireland.

Academic Career:

I've completed a Higher Diploma in GIS and Remote Sensing. Modules within this course included ARC Map, ArcView 3.2, ArcGIS9, Arc Scene, ARC Catalog) and MapInfo. As part of the higher diploma, I've also gained experience and expertise in many new computer programs, including ERDAS Imagine and Idrisi, and have trained in satellite image interpretation and analysis as part of the remote sensing aspect of the course.

Within my science degree in Trinity College I specialized, in my senior sophister years, in Environmental Science. My thesis project was based on the use of the "Scope for Growth" index of mussels (*Mytilus edulis)* as an indication of the pollution status of Dublin Bay.

I have acquired a wide range of skills while in third level education, including mapping, information gathering and storing, interviewing, gathering and processing surveys, data analysis and computer skills (with a good working knowledge of Word, Excel, Powerpoint, Access), as well as working as part of a team on various projects.

During my college years, time management, problem solving, research and report writing were also skills that I developed and consistently improved upon throughout the course of my degree and higher diploma.

Note: In January 2007 I took an extended working holiday throughout South America, New Zealand and Australia and returned.

Relevant Work Experience.

Oxigen Environmental, Ballymount. (June to present)

GIS analyst/Route planner.

I was employed in June by Oxigen Environmental which is the leading recycler in Ireland. My main role was to introduce the new pay-by-weight system that is due to come into effect in the near future. I was also involved in route planning and improvement in the Green bin contract, GPS surveys, sole analyst on the drains and streets project, bin chip management, as well as database management. The core software packages I used in this role were ArcView 3.2 and 9, routeman, fugawi, mapinfo but also included access and excel.

Icon Group. (March 08 – June 08, May 06- Oct 06)

I returned to Icon from March till June this year during this time I mainly georectified and created a FCC pansharpened images from the captured 07-08 raw satellite imagery eventually to be used in the 2008 remote-sensing project dealing with the implementation of the European Union's area-based subsidies in Ireland. Main software used was Geomatica 10.1/ ER mapper.

2006 Project Supervisor/ GIS Analyst

The Icon Group Ltd. Dublin

GIS and remote-sensing project dealing with the implementation of the European Union's area-based subsidies in Ireland. Extra duties included the organisation project schedule, training of new staff, quality control, creation of the trainee manuals and also the production of relative informative maps for inspectors.

June 05-Sept 05 Icon Group.

GIS Analyst/Technical Assistant (June, 2005 to September 2005)

The Icon Group Ltd. Dublin, Ireland

Worked on GIS and remote-sensing projects dealing with the implementation of the European Union's area-based subsidies in Ireland. Analyzed remotely-sensed imagery for land use, crop verification and eligibility, and best management practices using MapInfo and in-house GIS software packages. Administrative tasks included the development of technical guides for staff analysts.

June04-Oct04 Central Fisheries Board, Glasnevin, Dublin.

I worked on a summer bursary which was extended till October with the Central Fisheries Board (CFB). I was involved in various CFB projects including a nationwide survey on Lamprey, river surveys and stock adjustments, among other things. This placement involved data entry and teamwork and plenty of field experience.

Personal Interests and Achievements:

I enjoy all equestrian sports and am personally involved in cross-country riding.

I achieved cúntóir status in Coláiste Sheoisimh Irish College, Galway.

I achieved a bronze medal in the Gaisce Presidents Awards.

I was an active member of the Climbing, Boxing, Swimming clubs and the Environmental society in Trinity College and maintain an interest in all of these areas.

Referees:

- Dr.Paul Gibson Senior Lecturer
  15 Rhetoric House, Maynooth.
  +353 1 708 3810, Paul.Gibson@nuim.ie
- Dr.Ronan Foley Lecturer
  12 Rhetoric House, Maynooth.
  +353 1 708 6024 , ronan.foley@nuim.ie
- Brendan McHugh Icon Group , 24 Ranelagh, Dublin 6.
  +353 1 607 2675. bren@icon.ie

Oxigen Environmental Ltd

Merrywell Industrial Estate

Ballymount Road Lower

Dublin 22

Operation Plan

Cell 3B

Corranure Landfill

Cavan

Waste Management Technology & Service GmbH

Landfill Construction / Geotechnics

Gladbacher Straße 106, 41747 Viersen

Germany

01.12.2008

1 REASON

In consultation with Oxigen Environmental Ltd, WMT have developed an Operation Plan for Cell 3b of Corranure Landfill. This Operation Plan is necessary to ensure the smooth operation of the landfill and to avoid the recurrence of odour problems and other management issues that have occurred in connection with the landfill.

The Operation Plan gives an overview of the measures that should be implemented during the filling period of Cell 3b. In conjunction with a detailed timetable this overview will help Oxigen landfill managers to optimize the management of installing the horizontal degassing system and capping of the open slopes of Cell 3b.

With this optimized management the risk of further odour emissions should be eliminated.

2 BASICS OF THE OPERATION PLAN

There a several basics needed for the development of the Operation Plan and the related timetable.

Waste Density

One of the most important basics is the density of the waste that is filled in Cell 3b. From this density the filling period can be calculated. The density was not known before, so the management determined the actual waste density. They found the density of waste dumped in the last month to be approximately 1.075 t/m³. This was a short period for the calculation of the waste density; therefore this value must be checked in the following months and adjusted as necessary. If there is a significant deviation the Operation Plan and the associated timetable must be adjusted accordingly.

Yearly / Monthly Waste Quantity

The yearly quantity of waste which can be accepted on the landfill is regulated by the EPA licence. At Corranure an annual quantity of 90.000 tonnes is the maximum permitted by the licence. In agreement with Oxigen the monthly quantity is fixed on 7,500 tonnes and will be managed by means of strict quotas. This ensures that there is a balancing of waste delivery. According to the density of the waste we have a filling volume of 6,977 m^3 per month.

Total remaining volume in Cell 3B

WMT has calculated the remaining volume in Cell 3b. The Volume calculation is based on the survey by Oxigen in October 2008. In consultation with Oxigen WMT designed a final filling contour of the landfill (enclosure 2). A surcharge of about 15 % to the permitted filling level (129.5 m) was considered. So the maximum level in Cell 3b is 132m. In total WMT calculated a remaining volume in Cell 3b of about 168,000 m^3.

3 OPERATION PLAN

At first WMT developed four filling phases. These phases were constructed in a way that the rate of open slopes was minimized and therefore the possibilities of odour emissions were small. With these four filling phases there are five stages which are expanded upon below.

After the construction of the filling phases and the calculation of the volume and the masses of each period, WMT designed a timetable. In this timetable the filling periods of each filling phase are shown. The construction periods for the horizontal degassing and the capping are also shown. These are meaningful periods where the construction should

be conducted and completed. The exact construction period depends on the waste quantity and its density. If the actual basics are different from those mentioned above the timetable must be revised.

3.1 STAGE 1 (ENCLOSURE 3)

In stage 1 the top of Cell 3a is in operation. The capping of the slopes of cell 3a was almost finished in September and October 2008. The volume of the filling Phase I is approximately 21,600 m³ and the filling period is estimated at 3 months.

3.1.1 Necessary works (Enclosure 7)

During the filling of Phase I, the horizontal degassing pipes of the first layer in cell 3b will be laid. Currently existing waste level of Cell 3b is about 4 meters above the base of Cell 3b. Therefore the installation of the first degassing layer will start in mid January 2009. In the timetable this construction period is marked as HD 1. This means that the horizontal degassing pipes of the first layer of Cell 3b will be installed at the beginning of the filling of Phase II. This will happen in January 2009 so the work should be ordered in 2008. The masses for the Pipes are listed in the timetable and also in the draft 71.96 010161100.006

WMT do not calculate the volume of the material for the gas drainage which is built around the slotted gas pipes. This depends on the regular planning of horizontal degassing lines made by Oxigen. WMT calculates above 0.6 – 0.8 m³ gas drainage material per meter slotted gas pipe. In a trench of about 1 m depth and 0.6 – 0.8 m width we fill in about 0.4 m gas extraction.
The pipe is placed in the middle of the trench and the rest of the trench is filled up to the top with the drainage material.

3.2 STAGE 2 (ENCLOSURE 4)

In stage 2 the filling of Cell 3b is started. The level of the second filling phase is limited to the top of the surrounding liner. The filling occurs only in the lower part of Cell 3b. The top of the working face is about 0.5 m beneath the top of the surrounding area. Therefore there is only one open slope in the northern part of Cell 3b. The other slopes of this Phase II are the base sealing of Cell 3 on the East side, the interface to Cell 2 on the South side and the slope to Cell 3a on the West side.

For the filling Phase II we have calculated a volume of approximately 23,850 m³ or 3.5 months. This means that this filling Phase II will be completed in the first half of 2009.

3.2.1 Necessary works (Enclosure 8)

Before starting the filling in Phase II parts of the clay capping and Geo Hess on the slope of Cell 3a must be removed. This could happen gradually according to the filling of this area.

At the end of the filling in Cell 3a (filling Phase I) the pipes of the second horizontal degassing layer were installed and connected with the main gas line, so that active degassing will start with the beginning of the operation in this area.

3.2.2 Possible works

After finishing the filling in Phase I the slopes of this area could be capped with clay. On the western and northern slope and the top of this area the capping with a geotextile could also be carried out (TCG 2). On the eastern slope of this area there is only a clay capping necessary (TCC 2). The landfill management needs about 1,900 m³ of clay for the capping of the slopes of phase I. The storage for this material can be carried out in the filling phase I.

To reduce the leachate forming in this filling phase, covering parts of the working face where no operation occurs with an LLDPE – layer is possible (TCL 2). Approximately

4,000m² of LLDPE-liner is needed to cover these areas. These liners have to be removed very easily so that the operation in this area is not hindered. This covering has the positive effect that the degassing system can work optimally and the risk of gas emissions is significantly reduced.

The drilling of the first gas wells on the top of Cell 3a (filling Phase I) is possible (GW 2). The filling in this phase is up to the maximum level of 132 m. The drilling could be carried out after capping the top of the phase I. The number of possible wells depends on the position plan of the gas wells created by the landfill management.

3.3 STAGE 3 (ENCLOSURE 5)

In stage 3 the filling Phase III is shown. For the filling of Phase III only half of the open area of Cell 3b is necessary. To reduce the open surfaces (slopes) in the filling phase III the filling begins in the South of Cell 3b at the slope to Cell 2. For the first time the access road to the working face could go over the East side of the area. After reaching a certain level the access road could lead over the Cell 2 / Cell 3a. There are only two open slopes in this filling Phase III and the working face is very small.
For the filling Phase III we have calculated a volume of about 65,050 m³. This means that the filling time is about 9.25 month. This means that the filling will end roughly in January 2010.

3.3.1 Necessary works (Enclosure 9)

Before starting the filling Phase III parts of the clay capping on the slope of Cell 3a must be removed. This could happen gradually according to the filling of this area. After reaching the corresponding level of about 113 m with filling the first part, the second degassing layer must be installed and connected with the degassing system (HD 3 – I). This ensures that the risk of gas emissions is kept small. The time when this could happen is shown in the timetable. Also shown is the approximate volume of waste which is necessary to bring the level of waste up to 113 m. The next degassing installation is

necessary at the level of about 122 m (HD 3-II). The pipes and the drainage material are to be ordered in sufficient time to install them when the level is reached.

3.3.2 Possible works

At the end of the filling Phase II the northern slope can be capped with clay and a geotextile (TCG 3). This is a very small area but this measure is needed to finish the capping on this slope. After this the pressure of the first horizontal degassing layer could be increased. Also the area of Cell 3b which is not in operation should be covered with a LLDPE liner (TCL 3). If the liner is already used during the filling of Phase II there are only 300 m² needed in addition. This liner reduces leachate formation. In addition the risk of gas emissions out of this area will be reduced.

3.4 STAGE 4 (ENCLOSURE 6)

In the filling Phase IV the rest of Cell 3b is filled. According to filling Phase III the access road could be on the eastern side of Cell 3 and could change with the progress of the filling. The working face is also very small. The Filling Volume for the filling phase IV was calculated with about 57,500 m³. This means that the filling in Cell 3 will be completed roughly in September / October 2010.

3.4.1 Necessary works (Enclosure 10)

Before starting the filling in Phase IV parts of the clay capping on the eastern slope of Cell 3a and the temporary LLDPE-liner on the surface of phase II must be removed. This could happen gradually according to the filling of this area. After reaching the corresponding level of about 112 m with filling, the second degassing layer must be extended (HD 4 – I). This ensures that the risk of gas emissions is kept small. As shown

in the timetable this could happen roughly in April 2010. Also shown is the approximate volume of waste which is necessary to bring the level of waste up to 112 m. The next degassing extension is necessary at the level of 121 m (HD 4-II).

3.4.2 Possible works

After finishing the filling in Phase III the slopes and the top of this area could be temporarily capped with clay and a geotextile (TCG 4).
The drilling of the gas wells on the top of Phase III is possible too. The filling in this Phase is up to the maximum level of 132 m. The number of possible wells depends on the position plan of the gas wells created by the landfill management.

3.5 STAGE 5 (ENCLOSURE 11)

After finishing the filling in Phase IV the temporary capping with clay and a geotextile can be carried out (TCG 5). With these works the whole surface of Cell 3 is capped with Clay and geotextile resulting in good conditions for an optimal active degassing system.

Also the drilling of vertical wells in Phase IV can occur. Here all wells on Cell 3 could be finished. The wells on the interface to Cell 4 could be installed later according to the decision of the landfill management as to how to install the wells in this northern slope.

3.6 ADDITIONAL REMARKS

There are no access roads included in the calculation of the filling volume of each filling phase. With the inclusion of access roads the filling volume will probably be different to the calculated volume. The timetable must be revised according to the inclusion of access roads.

In the timetable the volume of clay needed for capping the slopes is marked with a grey background. It is expedient to install an intermediate storage for the necessary clay. When there is such an intermediate storage the landfill management could carry out the capping as required to ensure regular efficient landfill operation. The volume for the clay storage which is noted in the timetable is calculated on the application of a 0.25m deep clay layer.

The points when the drilling of gas wells can start are marked in the timetable with a red background. We have only marked the possible starting point of this work. The real time for this installation depends on the decisions of the landfill management but it is helpful for good degassing to implement this drilling as fast as possible.

As an approximate calculation of the period of capping work WMT estimate a working effort of 200 m² capping with clay per day and about 800 m² covering with LLDPE per day. These assumptions should be revised when the first capping is made, but these potential changes have no influence to the timetable.

The preparations for the filling of Cell 4 are not listed. The preparatory works for this must be carried out in time that filling of Cell 4 can start in 2010.

The timetable is not a static instrument for the management. If the basics change or other daily events which influence or alter the timetable occur, the timetable must be revised. Therefore the points of pipe installation or capping can change. Here the landfill management is called upon to react accordingly to these events. This will be revised by means of weekly and monthly management meetings which will also involve consultants WMT.

4 LIST OF ENCLOSURES

Enclosure 1: Timetable for operation plan

Enclosure 2: Filling Plan Cell 3 - Final Filling 61.96 010161100.001

Enclosure 3: Filling Plan Cell 3 - Stage 1 61.96 010161100.005-A

Enclosure 4: Filling Plan Cell 3 - Stage 2 61.96 010161100.006-A

Enclosure 5: Filling Plan Cell 3 - Stage 3 61.96 010161100.007

Enclosure 6: Filling Plan Cell 3 - Stage 4 and 5 61.96 010161100.008-A

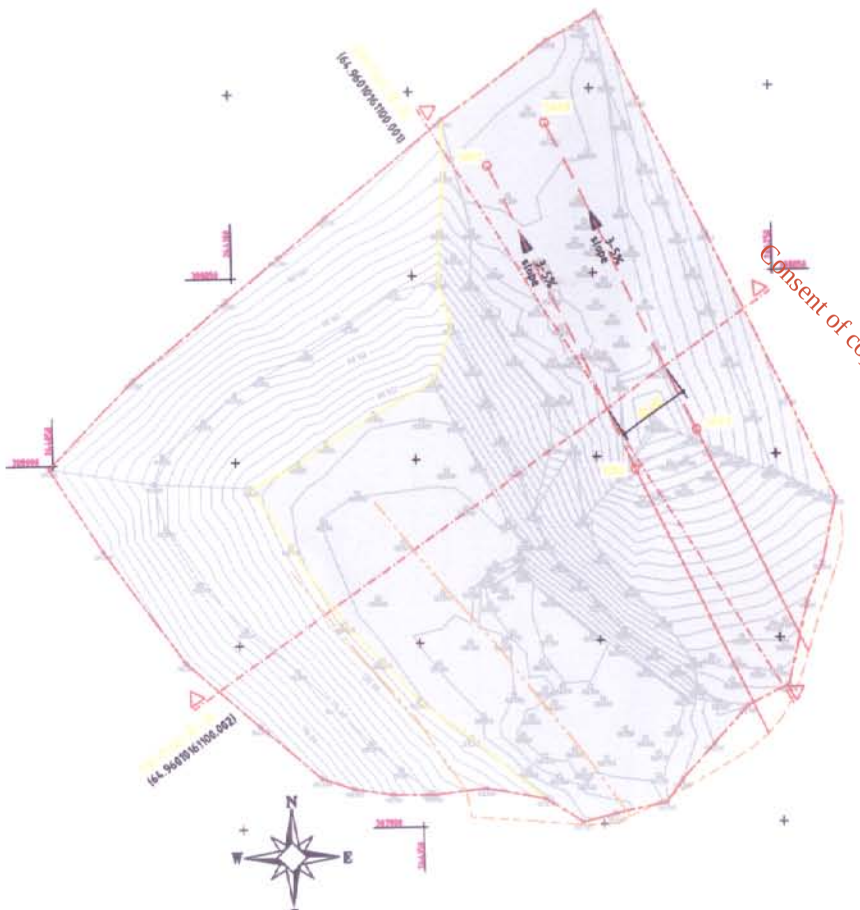
Enclosure 7: Mass Calculation Stage 1 71.96 010161100.006

Enclosure 8: Mass Calculation Stage 2 71.96 010161100.007

Enclosure 9: Mass Calculation Stage 3 71.96 010161100.008

Enclosure 10: Mass Calculation Stage 4 71.96 010161100.009

Enclosure 11: Mass Calculation Stage 5 71.96 010161100.010



point	East	North	top of gaspipe (m)
5000	244187.68	308090.88	104.66
5001	244171.23	308079.51	104.66
5002	244211.31	307996.48	105.58
5003	244228.22	308006.91	105.59

measurement from Oxigen

(All coordinates and levels referring to map "Cell 3 contour.dwg", Oxigen, October 2008)

Oxigen

OXIGEN ENVIRONMENTAL LIMITED

WMT

WMT Waste Management Technology & Service GmbH
Landfill Construction / Geotechnics

CORRANURE LANDFILL

AT

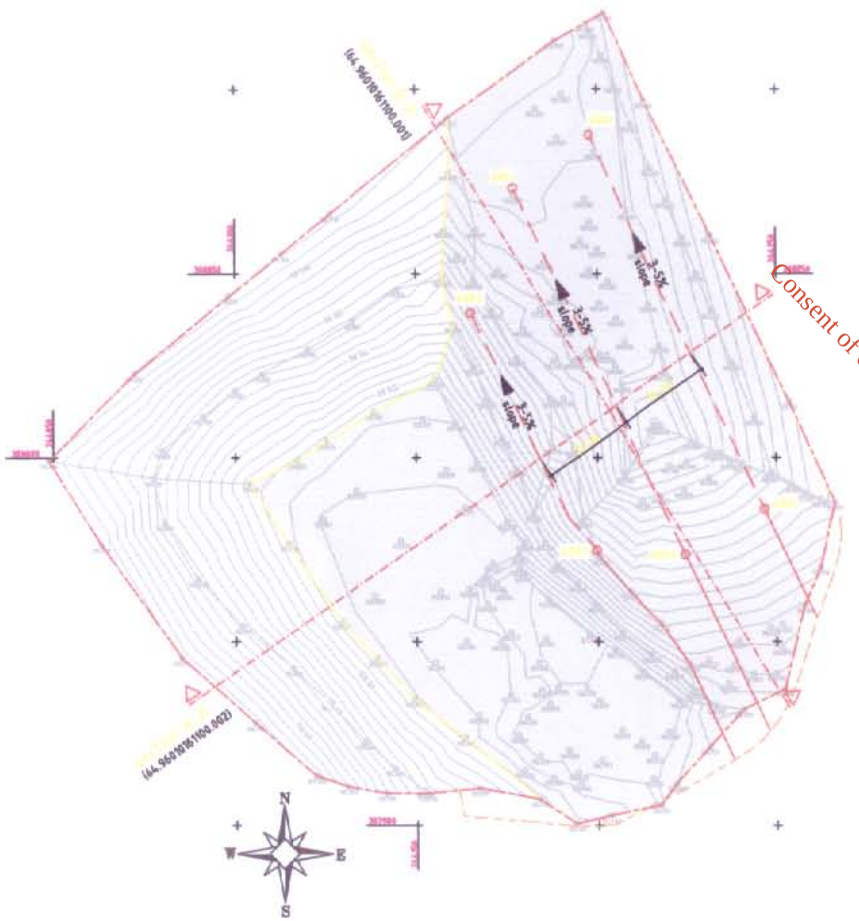
FOR

TITLE

DRAWN SL CHK. RS APP.

SCALE 1:1000 NO. REV

DATE 06.11.2008 61.26010.61120.002



point	East	North	top of gaspipe (m)
5000	244197.75	308087.57	112.74
5001	244176.86	308073.11	112.74
5002	244165.18	308039.32	112.96
5003	244199.72	307974.88	113.70
6004	244224.85	307973.69	113.85
6005	244246.74	307986.10	113.87

measurement from Oxigen

(All coordinates and levels referring to map "Cell 3 contour.dwg" , Oxigen, October 2008)

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CORRANURE LANDFILL

AT

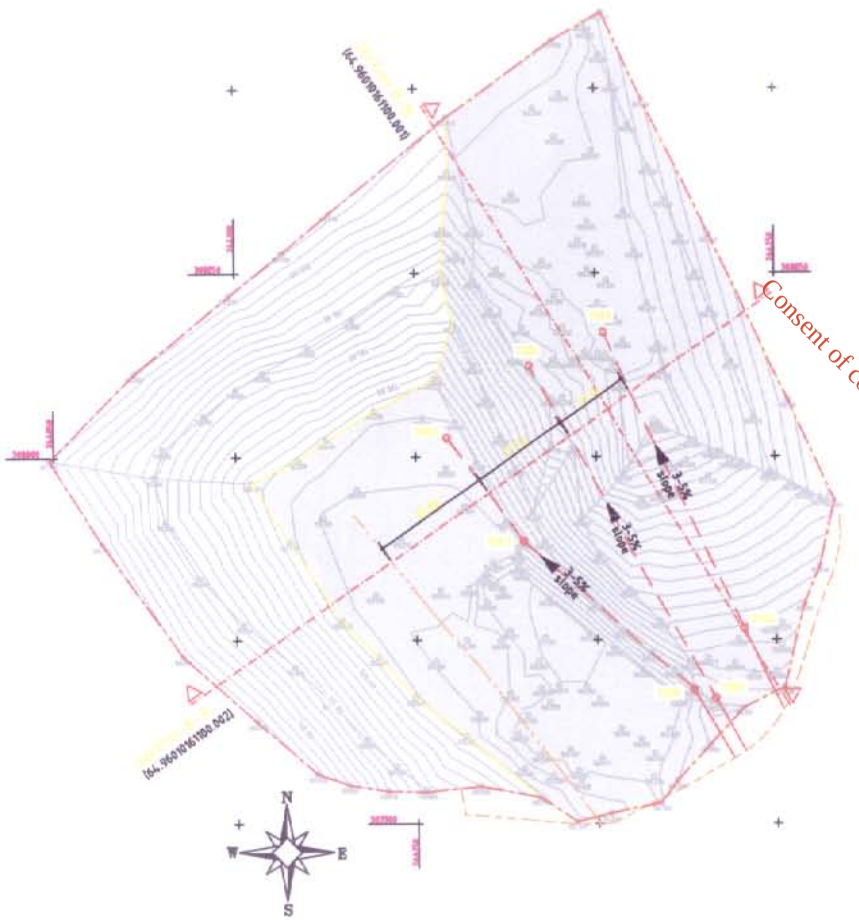
FOR

TITLE

DRAWN SL CHK. RK APP.

SCALE 1:1000 NO. REV.

DATE 06.11.2008 61.9601\161\100.003



point	East	North	top of gaspipe (m)
7000	244202.14	308033.81	121.22
7001	244181.72	308024.70	121.22
7002	244158.80	308005.06	121.22
7003	244179.96	307976.87	121.37
7004	244227.09	307936.50	122.20
7005	244233.03	307934.17	122.20
7006	244241.08	307953.18	122.12

LEGEND

measurement from Oxigen

(All coordinates and levels referring to map "Cell 3 contour.dwg" , Oxigen, October 2008)

A revision of 3. layer 27.11.2008

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CORRANURE LANDFILL

AT

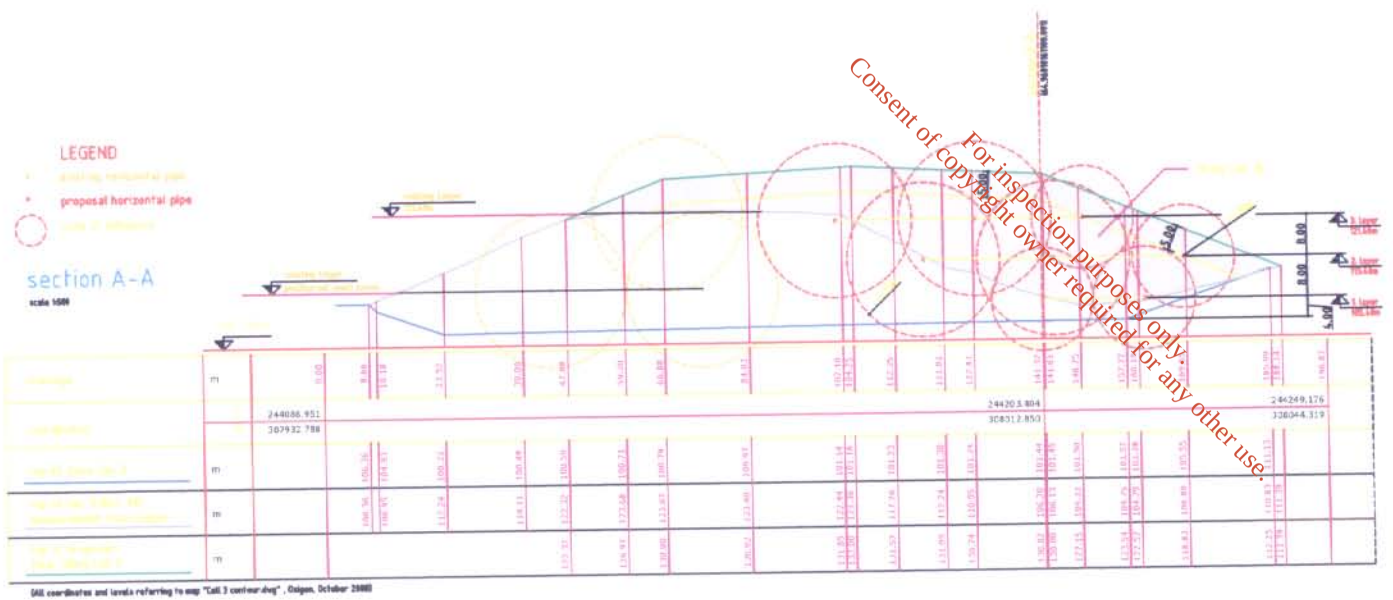
FOR

TITLE

DRAWN SI. CHK. RE APP.

SCALE 1:1000 NO. REV.

DATE 06.11.2008 51.60010.61100.004 A



A return of X layer 25.11.2008

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CORRANURE LANDFILL

AT

FOR

TITLE

DRAWN SL CHK EK APP

SCALE 1:500 NO REV

DATE 08.11.2008 5439010(0)-106.002 A

LEGEND

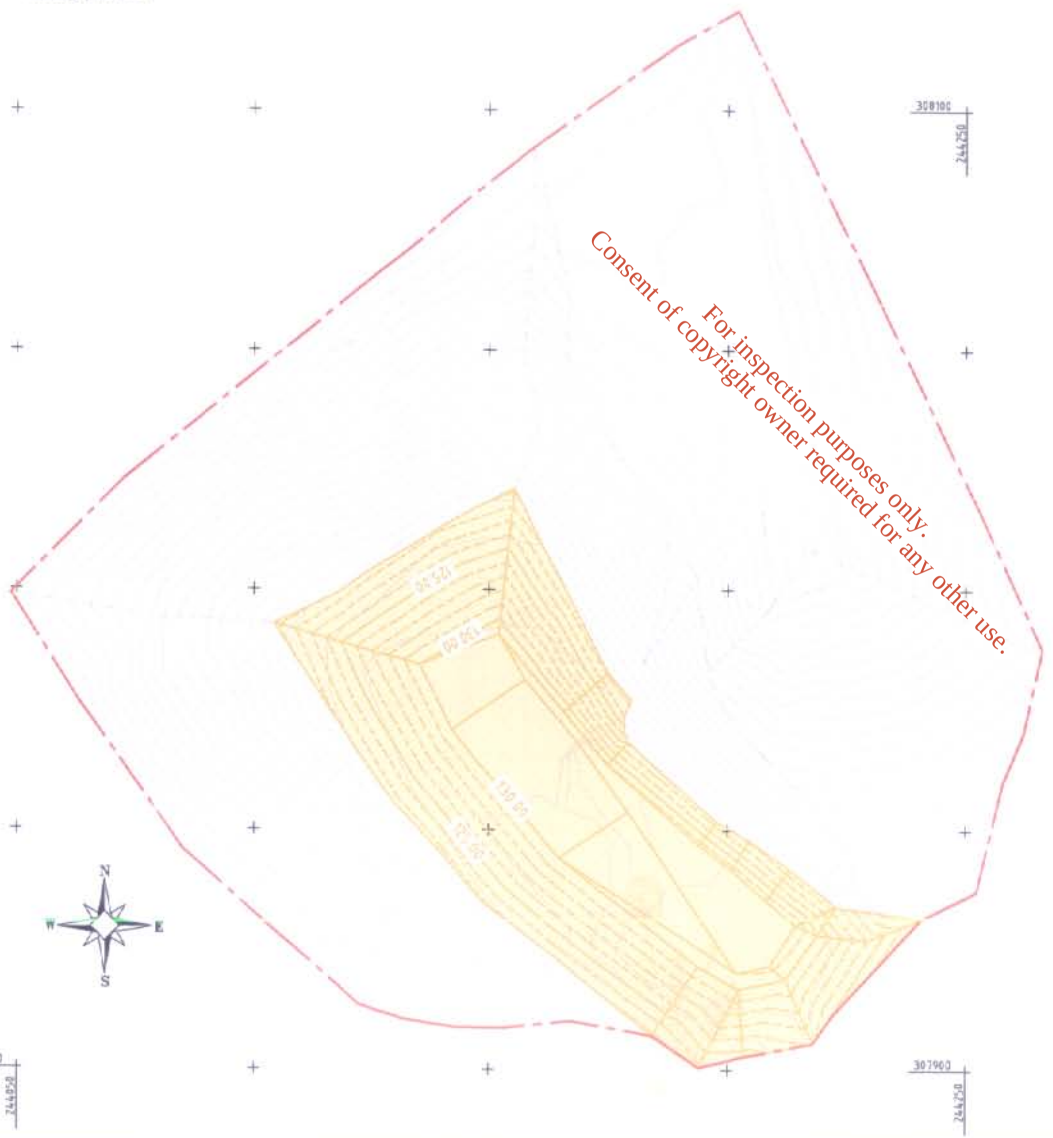
contour of Cell 3 (Oct. 08)
measurement from Oxigen

dutyline of Cell 3

filling phase I

STAGE 1:

- filling phase I
- installing horizontal pipes
  - 1. layer Cell 3b



A	Revisions in Phase I	RK-28.11.08

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CORRANURE LANDFILL

AT CORRANURE CO.CAVAN

FOR OXIGEN ENVIRONMENTAL

TITLE

FILLING PLAN CELL 3 STAGE 1

DRAWN SI.	CHK. RK	APP.
SCALE 1:1000	NO. 61.960101161100.005	REV. A
DATE 14.11.2008		

LEGEND

contour of Cell 3 (Oct. 08)
measurement from Oxigen

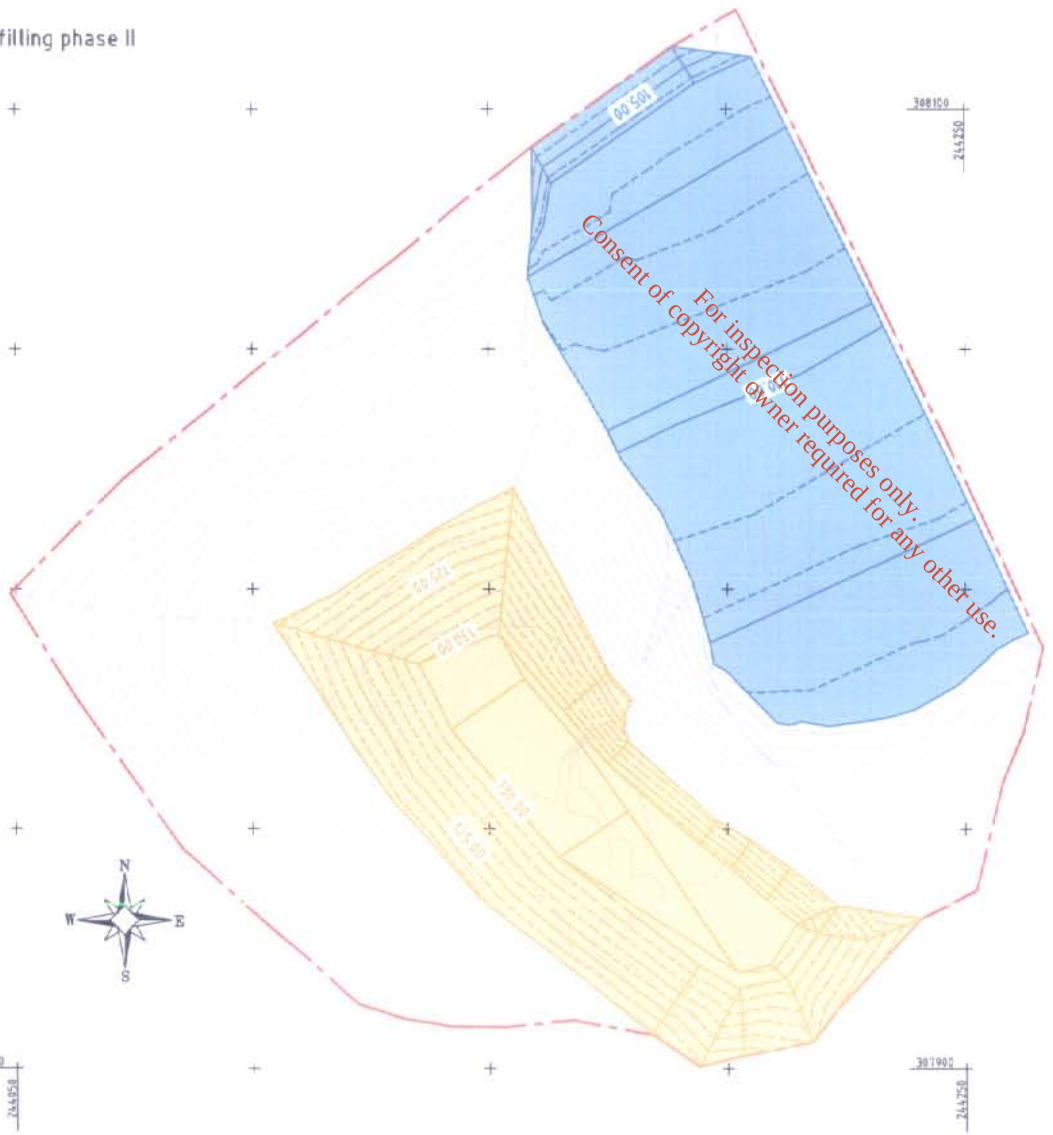
dutyline of Cell 3

filling phase I

filling phase II

STAGE 2:

- removing part of temporary capping on eastern of slope Cell 3a
- filling phase II
- temporary capping (clay and Geofress) nothern and western slope and top of phase I
- temporary capping (clay) eastern slope phase I
- installing vertical gas wells on top of phase I



A	Revisions in Phase II	RK-28.11.08

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CORRANURE LANDFILL

AT CORRANURE CO.CAVAN

FOR OXIGEN ENVIRONMENTAL

TITLE

FILLING PLAN CELL 3 STAGE 2

DRAWN SI.	CHK. RK	APP.
SCALE 1:1000	NO. 61.96010161100.006	REV. A
DATE 14.11.2008		

LEGEND

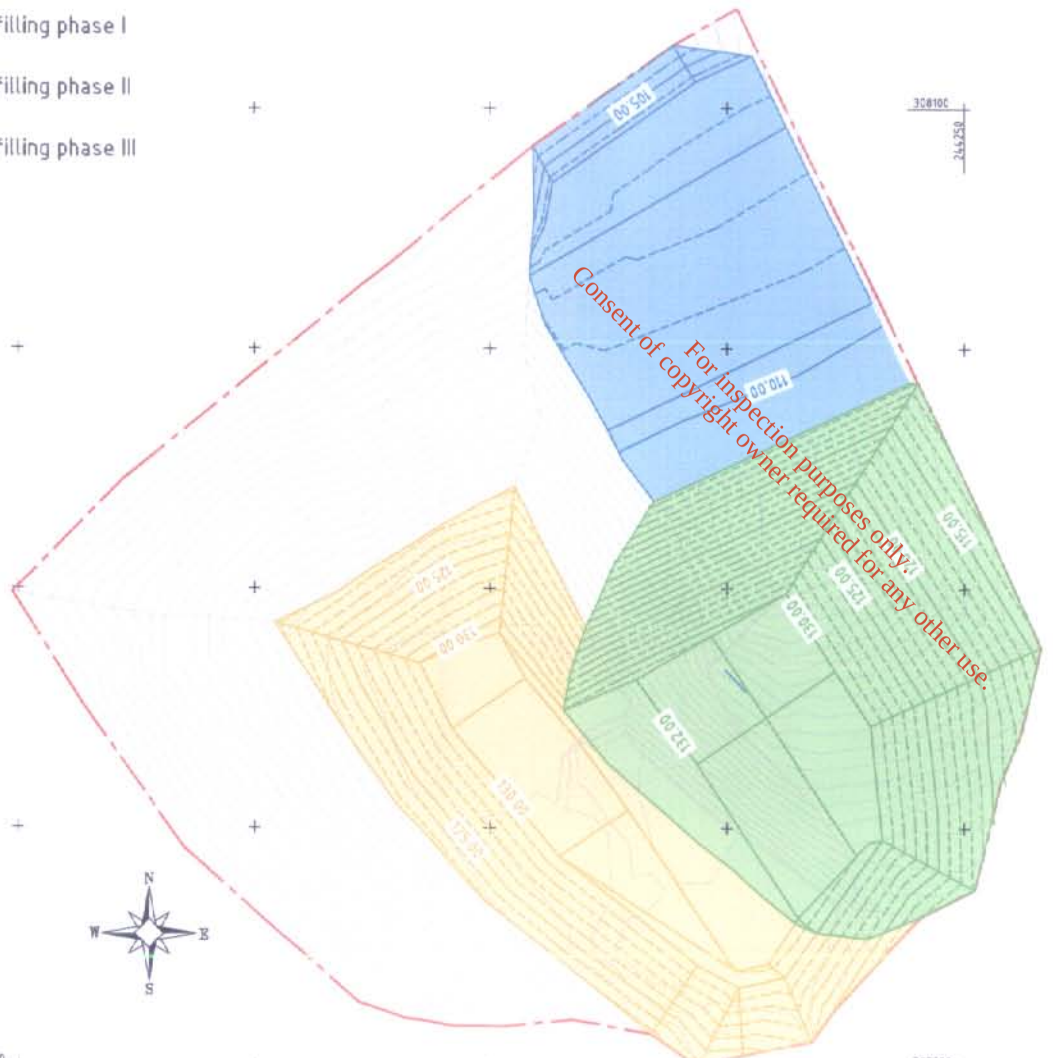
contour of Cell 3 (Oct. 08)
measurement from Oxigen

dutyline of Cell 3

filling phase I

filling phase II

filling phase III



STAGE 3:

- removing part of temporary capping on eastern slope of Cell 3a
- filling phase III
- installing horizontal pipes 2. and 3. layer in phase III
- temporary capping (clay and GeoHess) on nothern slope of phase II
- temporary capping (LLDPE-layer) on surface of phase II (leachate reduction)

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CORRANURE LANDFILL

AT CORRANURE CO.CAVAN

FOR OXIGEN ENVIRONMENTAL

TITLE

FILLING PLAN CELL 3
STAGE 3

DRAWN SI.	CHK. RK	APP.
SCALE 1:1000	NO. 61.96010161100.007	REV.
DATE 14.11.2008		

LEGEND

contour of Cell 3 (Oct. 08)
measurement from Oxigen

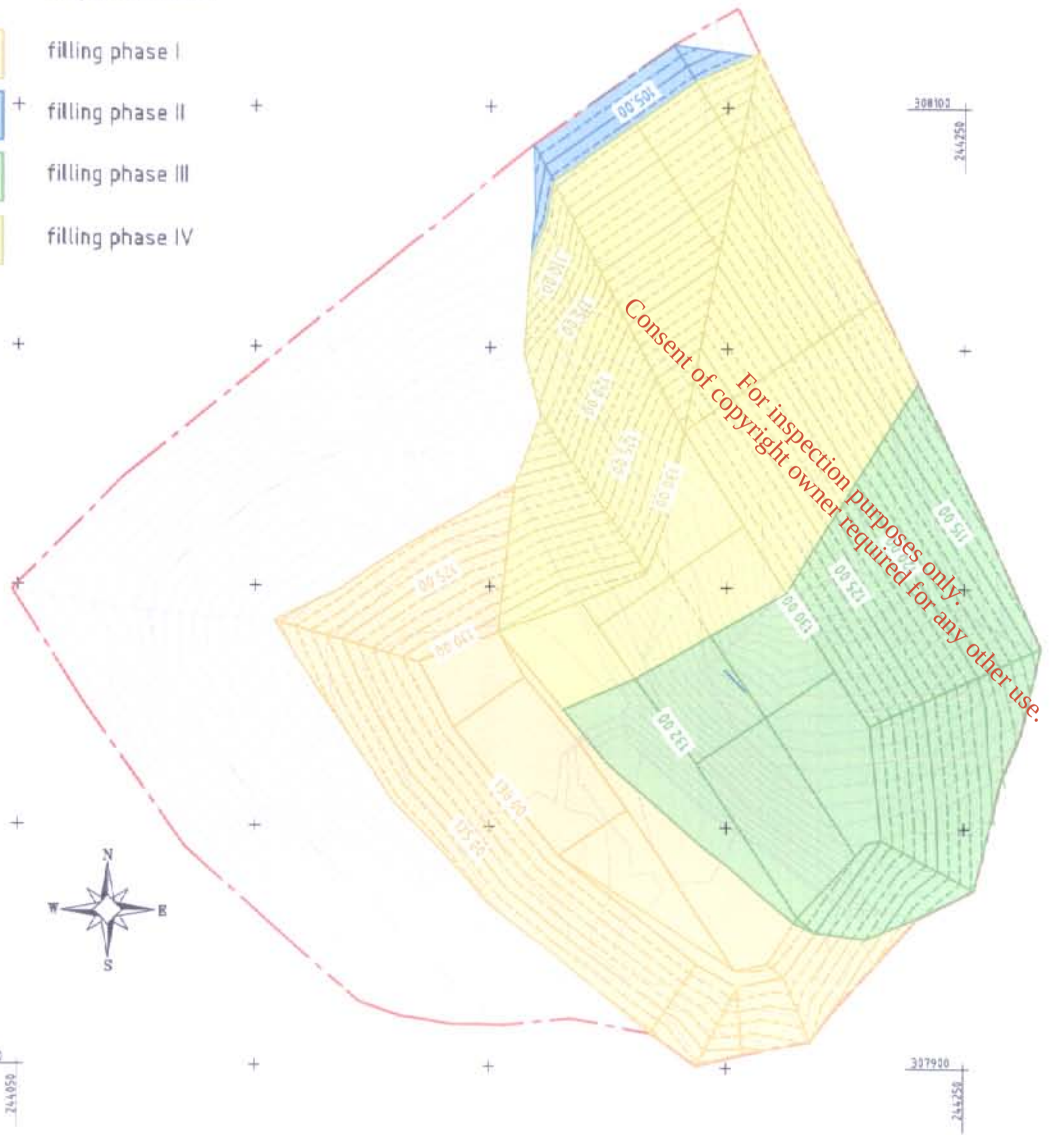
dutyline of Cell 3

filling phase I

filling phase II

filling phase III

filling phase IV



STAGE 4:

- removing part of temporary capping on eastern slope of Cell 3a
- removing temporary capping on surface of phase II
- filling phase IV
- temporary capping (clay and GeoHess) on eastern slope and top of phase III
- installing horizontal pipes in phase IV
  extention of pipes in 2. and 3. layer of phase III
- installing vertical gas wells in phase III

STAGE 5:

- temporary capping (clay and GeoHess) on eastern and northern slope and top of phase IV
- installing vertical gas wells in phase IV

A	Revisions in Phase IV	RK-28.11.08

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CORRANURE LANDFILL

AT CORRANURE CO.CAVAN

FOR OXIGEN ENVIRONMENTAL

TITLE

FILLING PLAN CELL 3
STAGE 4 and 5

DRAWN SI.	CHK. RK	APP.
SCALE 1:1000	NO. 61.96010161100.008	REV. A
DATE 14.11.2008		

Basics:

1) Measurement Oxigen - October 2008
2) Filling Plan and Volume Calculations - WMT GmbH - November 2008
3) Density of Waste 1.075 t/m³ (Email from F.Smyth - 24.11.2008)
4) Yearly Filling Quantity - 90,000 t --> 83,721 m³/a
5) Equal Filling per Month --> 7,500 t per month --> 6,977 m³ per month

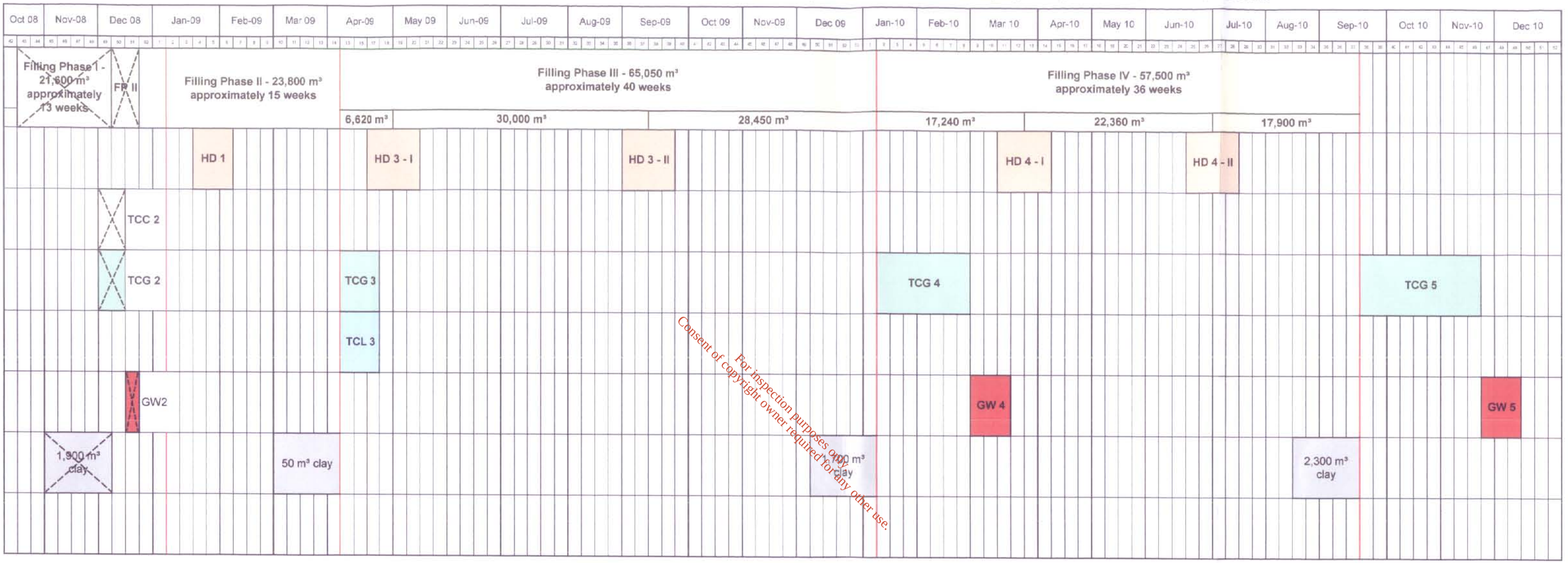
Notice
No access roads included
In accordance with Oxigen the filling goes up to the level 132 m

Phases	Volume m³	Volume m³ per month	Filling Period (calculated) mon	Filling Period (chosen) mon	Remarks
Filling Phase I	21,600	6,977	3.10	3.00	Top of Cell 3a - filling already started in Oktober 2008
Filling Phase II	23,850	6,977	3.42	3.50	Base of Cell 3b
Filling Phase III	65,050	6,977	9.32	9.25	First part of top of Cell 3b
Filling Phase IV	57,500	6,977	8.24	8.25	Second part of top of Cell 3b
Summe	**168,000**		**24**	**24**	

Stage	temporary capping with clay and geotextile m²	temporary capping with clay m²	temporary covering with LLDPE liner m²	solid HDPE-Pipes m	slotted HDPE-Pipes m	Remarks
Stage 1	-	-	-	160	190	Vertikal gas well could be drilled (Layer 1 - Cell 3b)
Stage 2	5,730	1,220	(4,110)	160	135	Probably covering with LLDPE-liner
Stage 3	115	-	4,420	65	230	Vertikal gas well could be drilled (parts of Layer 2 and 3 - Cell 3a and b)
Stage 4	6,160	-	-	0	155	Vertikal gas well could be drilled (parts of Layer 2 and 3 - Cell 3a and b)
Stage 5	8,180	-	-	0	55	
Summe	**20,185**	**1,220**	**4,420**	**385**	**765**	

Corranure Landfill - Timetable for Operation Plan

Filling quantity per month: 7.500 t ==> 6.977 m³ HD: Horizontal Degassing TCC: Temporary Capping with Clay TCG: Temporary Capping with Clay and Geotextile TCL: Temporary Covering with LLDPE-liner GW: Gas Wells



HD 1 (Stage 1)	slotted pipes	=	190	m
	solid pipes	=	160	m
HD 3 - I (Stage 3)	slotted pipes	=	135	m
	solid pipes	=	160	m
HD 3 - II (Stage 3)	slotted pipes	=	230	m
	solid pipes	=	65	m
HD 4 - I (Stage 4)	slotted pipes	=	155	m
	solid pipes	=	0	m
HD 4 - II (Stage 4)	slotted pipes	=	55	m
	solid pipes	=	0	m

TCC 2 (Stage 2): 2e = 1,220 m² ==> approx. 1 weeks

TCG 2 (Stage 2):	2a =	970 m²	==>	approx.	1 weeks
	2b =	2,260 m²	==>	approx.	2 weeks
	2c =	630 m²	==>	approx.	0.5 weeks
	2d =	1,870 m²	==>	approx.	1.5 weeks
TCG 3 (Stage 3)	3a =	115 m²	==>	approx.	0.25 weeks
TCG 4 (Stage 4)	4a =	2,490 m²	==>	approx.	2 weeks
	4b =	3,670 m²	==>	approx.	3 weeks
TCG 5 (Stage 5)	5a =	1,250 m²	==>	approx.	1 weeks
	5b =	3,030 m²	==>	approx.	2.5 weeks
	5c =	3,900 m²	==>	approx.	3.5 weeks

TCL 2 (Stage 2):	2f =	4,110 m²	==>	approx.	0.5 weeks
TCL 3 (Stage 3):	3b =	4,420 m²	==>	approx.	0.5 weeks

Notice
800 m² per day - temporary covering with LLDPE-liner
200 m² per day - clay capping / clay and geotextile

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Comment

To the filling concept of Cell 3

Corranure Landfill

Cavan County

Viersen, 19.11.2008

Waste Management Technology & Service GmbH
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1 COMMENTS TO THE FILLING PHASES OF CELL 3

For the development of an operation plan for the filling of Cell 3 on Corranure Landfill it is necessary to design a filling concept for this Cell. During the stay of WMT in Corranure Landfill we discussed a possible splitting of the filling of Cell 3 with the landfill management. These different filling phases are shown in the following drafts.

61.96 010161100.005 – Filling Plan Cell 3 – Stage 1
61.96 010161100.006 – Filling Plan Cell 3 – Stage 2
61.96 010161100.007 – Filling Plan Cell 3 – Stage 3
61.96 010161100.008 – Filling Plan Cell 3 – Stage 4 and 5

1.1 STAGE 1

In Stage 1 the filling on the top of Cell 3a is designed. In this phase I the top of Cell 3a is filled up to the level of 132 m. All slopes were continued with the same grade as the existing slopes.

1.1.1 Necessary works

During the filling of phase I the horizontal degassing pipes of the first layer in cell 3b can be laid. The now existing waste level of Cell 3b is about 4 meters above the base of Cell 3b. Therefore the installation of this first degassing layer must be finished before starting the filling in the filling phase II. Additional to the pipes of the first degassing layer in Cell 3b the pipe of the third degassing layer of Cell 3a probably may be installed.

1.1.2 Calculated volume

For the filling phase I we have calculate a volume of about 21,600 m³. This means that the filling was completed in this area roughly at the end of December 2008 if the monthly tonnage is about 7.500 m³ and the density is about 1 t/m³.

1.2 STAGE 2

In stage 2 the filling in Cell 3b is started. The level of the second filling phase is limited to the top of the surrounding area. The filling occurs only in the lower part of Cell 3b. The top of the working face is about 0.5 m beneath the top of the surrounding area. Therefore there is only one open slope in the northern part of Cell 3b. The other slopes of this phase II are the base sealing of Cell 3 on the East side, the interface to Cell 2 on the South side and the slope to Cell 3a on the West side.

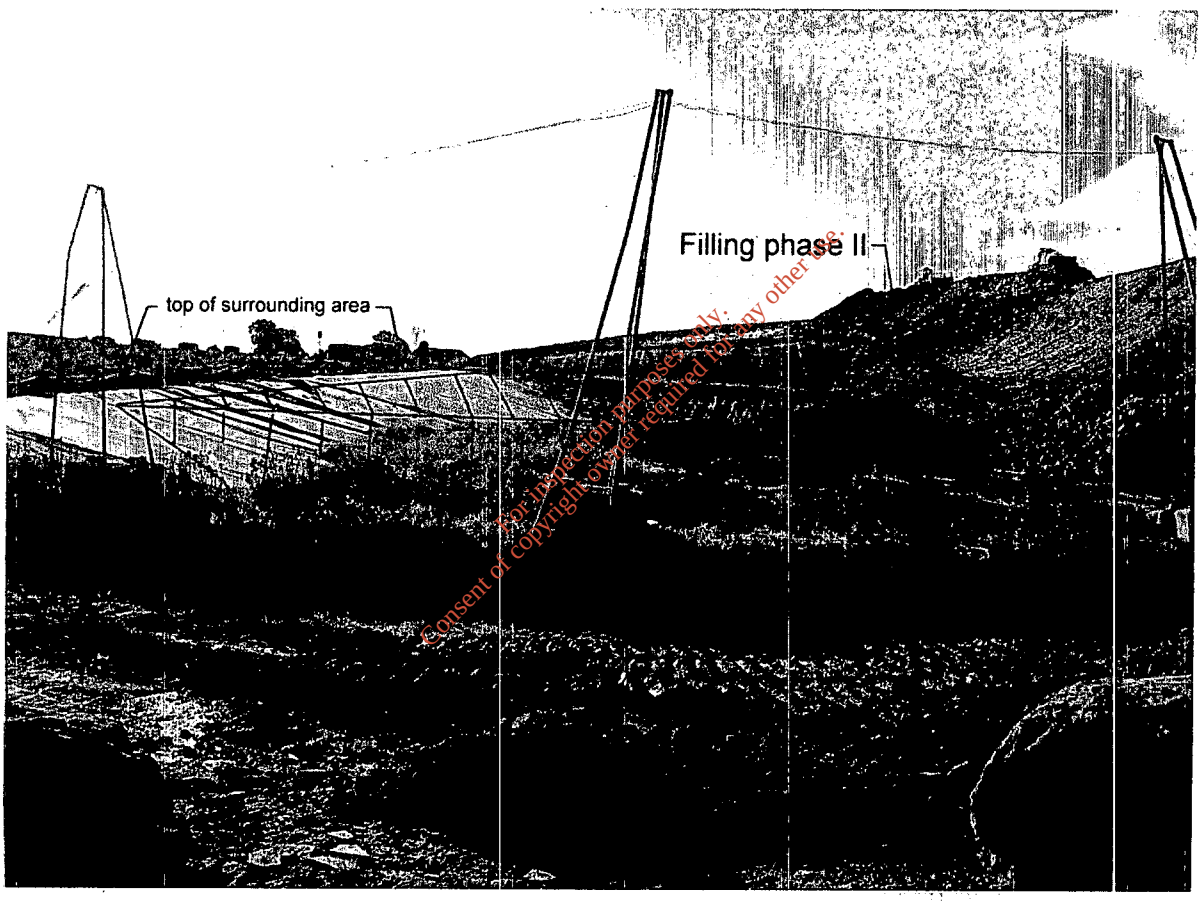

Fig. 1: Outline of the filling phase II in Cell 3b

1.2.1 Necessary works

Before starting the filling in phase II parts of the clay capping on the slope of Cell 3a must be removed. This could happen gradually according to the filling of this area.

At the end of the filling in Cell 3a (filling phase I) the pipes of the first horizontal degassing layer were installed and connected with the main gas line. So the active degassing could start with the beginning of the operation in this area.

1.2.2 Possible works

After finishing the filling in phase I the slopes of this area could be capped with clay. On the western and northern slope and the top of this area the capping with a geotextile could also be carried out. On the eastern slope of this area there is only a clay capping necessary.

The drilling of the first gas wells on the top of Cell 3a (filling phase I) is possible. The filling in this phase is up to the maximum level of 132 m. The number of possible wells depends on the position plan of the gas wells created by the landfill management.

To reduce the leachate forming in this filling phase the covering of parts of the working fence where no operation occurs with LLDPE – layer is possible. These layers have to be removed very easily so that the operation in this area was not hindered. This covering has the positive effect that the degassing system can work optimal and the risk of gas emissions is small.

1.2.3 Calculated volume

For the filling phase II we have calculate a volume of about 23,850 m³. This means that the filling was completed in this area roughly March / April 2009 if the monthly tonnage in 2009 is about 7.500 m³ and the density is about 1 t/m³.

1.3 STAGE 3

In stage 3 the filling phase III is shown. After reaching the maximum level of the filling phase II the first half of the rest filling beginns. To reduce the open surfaces in this filling phase III the filling begins at the slope to Cell 2. In the first time the access road to the working face could go over the East side of the area. After reaching a certain level the access road could lead over the Cell 2 / Cell 3a. There are only two open slopes in this filling phase III and the working face is very small.

1.3.1 Necessary works

Before starting the filling phase III parts of the clay capping on the slope of Cell 3a must be removed. This could happen gradually according to the filling of this area. After reaching the corresponding levels with the waste parts of the second respectively the third degassing layer must be installed and connected with the degassing system. This ensures that the risk of gas emissions keeps small.

At the end of the filling phase II the northern slope of the filling phase II can be capped with clay and a geotextile.

1.3.2 Possible works

The area of Cell 3b which is not in operation should be covered with a LLDPE-liner. This liner reduces the leachate formation. In addition the risk of gas emissions out of this area will be reduced.

1.3.3 Calculated volume

For the filling phase III we have calculate a volume of about 65,050 m³. This means that the filling time is about 8.5 month if the monthly tonnage in 2009 is about 7.500 m³ and the density is about 1 t/m³. This means that the filling ended roughly in December 2009.

1.4 STAGE 4 AND 5

In the filling phase IV the rest of Cell 3b is filled. According to filling phase III the access road could be on the eastern side of Cell 3 and could change with the progress of the filling. The working face is also very small.

1.4.1 Necessary works

Before starting the filling in phase IV parts of the clay capping on the slope of Cell 3a and the temporary LLDPE-liner on the surface of phase II must be removed. This could happen gradually according to the filling of this area. After reaching the corresponding levels with the waste the second respectively the third degassing layer must be extended. This ensures that the risk of gas emissions keeps small.

Stage 5:

After finishing the filling in phase IV the temporary capping with clay and a geotextile can be carried out. Also the drilling of possible vertical wells in phase IV can occur.

1.4.2 Possible works

After finishing the filling in phase III the slopes and the top of this area could be temporary capped with clay and a geotextile.

The drilling of the gas wells on the top of phase III is possible too. The filling in this phase is up to the maximum level of 132 m. The number of possible wells depends on the position plan of the gas wells created by the landfill management.

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1.4.3 Calculated volume

For the filling phase IV we have calculate a volume of about 57,500 m³. This means that the filling in Cell 3 is completed roughly in July / August 2010 if the monthly tonnage in 2010 is about 7.500 m³ and the density is about 1 t/m³.

Notice:

There are no access roads included for the calculation of the filling volume. The Volume calculation depends on the survey of Oxigen in October 2008 and the filling plan 61.96 010161100.001 from WMT.

The preparations for the filling in Cell 4 are not listed. The works for this must be in time that filling in Cell 4 can start in 2010.

Rainer Küsters-Cattelaens