Granary House
Rutland Street
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Licensing Unit,
Office of Climate, Licensing and Resource Use,
Environmental Protection Agency,
Headquarters P.O. Box 3000,
Johnstown Castle Estate,
Co. Wexford

19th April 2011

RE: Application for the Review of Waste Licence Reg. No. W0140-04
Panda Waste Services Ltd., Rathdrinagh, Navan, County. Meath

Dear Sir / Madam,

On behalf of Panda Waste Services Ltd, I enclose one original and two hard copies of the response to Agency's Notice issued under Article 14(2)(b)(ii) of the Waste Management Licensing Regulations for the above referenced facility. I also enclose two CD-ROM discs containing the response in searchable pdf format.

The application includes: -

- This cover letter,
- Response to Agency's Notice issued under Article 14(2)(b)(ii) of the Waste Management Licensing Regulations for the above referenced facility.

If you have any queries, please call me.

Yours sincerely,

Jim O' Callaghan

0913806/JOC/PS
Encs.
c.c. Mr. David Naughton, Panda Waste Services Ltd.

Article 14(2)(b)(ii) Further Information

Particulars and Evidence For

Nurendale Ltd

T/A PANDA WASTE SERVICES LTD

Waste Licence Review No. W0140-04

Article 12 Compliance

Prepared For: -

Nurendale Ltd T/a PANDA Waste Services.,
Rathdrinagh,
Beauparc,
Navan,
Co. Meath.

Prepared By: -

O' Callaghan Moran & Associates,
Granary House,
Rutland Street,
Cork.

19th April 2011

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1. INTRODUCTION

This is the response by Nurendale Ltd, trading as PANDA Waste Services (PANDA), Rathdrinagh, Beauparc, Navan, County Meath, to the Notice issued under Article 14(2)(b)(ii) of the Waste Management Licensing Regulations, dated 22nd February 2011, in relation to Application Register No. W0140-04 for the Materials Recovery Facility at Rathdrinagh, Beauparc, Navan, County. Meath.

Section 2 contains the responses to the Agency's requests. For ease of interpretation each of the requests are presented in italics followed by PANDA's response.

2. ARTICLE 12 COMPLIANCE REQUIREMENTS

1. *Provide confirmation from the local authority that and Environmental Impact Statement is not required for the proposed extension and biological treatment facility.*

Meath County Council have confirmed that an Environmental Impact Statement is not required for the proposed extension and biological treatment facility. The correspondence from the Council is included in Appendix 1.

2. *Complete air dispersion modelling for potential pollutants from all main emissions from the site (including RTO and CHP).*

Air dispersion modelling has been completed for pollutants with the potential to cause odours from all the proposed main emission points and the report on this was included with the application. Further dispersion modelling of the other pollutants from the CHP and RTO, which were listed in Tables 12 (1) k C and 12 (1) k D of the application, have been completed and the results are presented in the report in Appendix 2.

The modelling also took into consideration the proposal to change the RDF drier from a natural gas fuelled unit to a biomass fired furnace. The furnace will have a separate stack emission point (A2-6), whose location is shown on the revised Drawing No 3 RevB in Appendix 3.

3. *State the quantity and nature of waste(s) which will be processed, recovered or disposed of by reference to the relevant European Waste Catalogue (EWC) codes as presented by Commission Decision 2000/532/EC of 3 May 2000.*

a. Provide an overall total quantity for each EWC code which will be processed, recovered or disposed of at the facility and a breakdown specific to each individual process.

The relevant EWC codes are presented in Table 1 in Appendix 4. The estimated overall total quantities of the different types of waste (Household, C&I, C&D and Compostables) that will be processed are presented in the Table, although the actual quantities may vary depending on market conditions.

It is not possible to provide a precise quantity for each EWC code specific to each individual process, as these are also dependant on market conditions. However the quantity of each different code accepted at the facility will be provided in the Annual Environmental Report, as will the output from each process.

4. Provide an updated inventory of the processes in each building. Provide a description of the process inputs, the process flow, process outputs and the destination for each process output.

Process flow diagrams for Buildings 1, 2, 3 and 4, which show the inputs, flow, out puts and destination, are provided in Appendix 5.

Building 1 previously housed the initial stage of the 'black bin' recovery system and the timber shredder. The organic fraction was fed into the Wright Tunnels, and shredded timber sent to Building 2. The 'black bin' processing plant has been moved to Building 3 and currently only timber shredding is carried out in Building 1. In the future, and subject to market conditions, the Wright Tunnels will be used either as the initial stage of the composting process in Building 4 and/or off-site facilities, or to pre treat wastes prior to transfer to Building 3 for the manufacture of RDF.

At present, the shredded timber is sent off-site for recovery, but in future this may, depending on the quality either be used on site as a bulking agent in the compost process, which is shown on the process flow diagram, or possibly as fuel at off-site locations pre-approved by the Agency.

Building 2 houses the Construction & Demolition waste recovery process. The recovered timber is sent to Building 1. The remaining materials, crushed rubble and metal, will be sent off site either for use in construction projects, recovery at permitted sites or metal recycling.

Building 3 houses the source segregated recyclables and mixed MSW recovery activities, including the production of RDF. The source segregated materials will be bulked up and consigned to off-site recycling plants. The MSW fines will be sent to Building 4 for treatment. The RDF will be sent to off-site facilities, both in Ireland and overseas, for use as a fuel.

It was initially proposed to fuel the RDF drier using natural gas, and that this would eventually be replaced by heat from the CHP plant. However, further research has identified that heat from the CHP plant will not, on its own, be sufficient to achieve the required moisture content in the RDF. Of more significance is the fact that natural gas is a non-renewable energy source and its use contributes to greenhouse gas emissions.

As an alternative fuel source to the natural gas, PANDA has decided to install a biomass fuelled furnace for fuels such as green wood, willows, miscanthus, and other biomass fuels as they become available and approved by the Agency. An assessment of the impact of the emissions from the furnace has been completed and the results are presented in the Odour Monitoring Ireland Report in Appendix 2.

Building 4 will house the proposed biological treatment system comprising AD and Composting plant. The feedstock will comprise the MSW fines produced in Building 3 and source segregated organic waste collected from households and commercial premises. The biogas generated will be used in the on-site CHP plant to generate electricity for sale to the national grid and heat, which will be used in the RDF manufacture in Building 3.

The output from the MSW fines treatment process will meet the stabilisation criteria specified for use as landfill cover and will be sent to authorised landfills for this use. The finished product from the treatment of the source segregated organic waste will comply with the quality criteria that meet the end-of-waste status and will not be classified as a waste.

5. *Confirm the number and location of all underground and overground storage tanks on site. Confirm the source of all storm water and/or trade effluent entering each tank and outline whether the contents of each tank has a further use on site or is sent to Navan waste water treatment plant.*

The locations of all underground and overground tanks are shown on Drawing No 10-05-100 in Appendix 6. The drawing also details the source of the storm water and or trade effluent stored in each tank. The contents of groundwater storage tank, which will also take run-off from the roof of Building 4, is used for dust suppression, the road sweeper and the jet vac fleet. The groundwater storage tank is also replenished, as required, from water collected in the surface water holding tank.. The contents of all of the other tanks are sent off site for treatment.

6. Section 2 Article 12(1)(h) AD/Composting of the application states that the new facility involves the construction of two above ground steel and two concrete process water storage tanks. Confirm the location of these four tanks, whether they are to be used to store process water from Building 4 and the onward route that this waste water takes.

The location of the 4 tanks referred to (2 circular and 2 rectangular) are shown on Drawing No 2009-101-103 submitted with the application. They are to the south of Building 4 and will used as percolate tanks for the AD process inside this building. This bulk of the percolate will be recirculated in the AD process. Any percolate that will be surplus to requirements will be tankered off site for treatment at a pre-approved wastewater treatment plant.

7. Confirm the number and location of percolate storage tanks.

Refer to the response to request No 6.

8. Section 7 General Conclusions of the Odour Impact Assessment attached as Appendix 3 of the application states that 'The implementation of odour management, minimisation and mitigation techniques and technologies outlined in the overall facilities operation will achieve the specified odour impact criterion to prevent nuisance odours at nearest residential and business neighbours…' Confirm whether it is proposed to incorporate the odour management, minimisation and mitigation techniques and technologies outlined by Odour Monitoring Ireland into operational and maintenance practices/procedures at the facility.

All of the recommendations in the OMI report regarding odour management, minimisation and mitigation techniques and technologies will be incorporated into the facility operational procedures.

9. Composted waste produced in Building 1 is destined for landfill while compost from Building 4 has been proposed to be produced to meet a product standard. Outline how it is proposed to prevent cross contamination of compost from Building 1 and 4 in the period that both systems may be operational.

The materials passing through the Wright Tunnels will require further processing in either Building 3 and Building 4, or at off-site facilities. All materials sent to Building 4 will be handled in a similar manner to incoming untreated organic waste to ensure that the finished product is not contaminated. The access/egress route for Building 4, which is shown on Drawing 2009-101-103 submitted with the application, is to the north of and separate from the access to Building 1. This will ensure that the finished product consigned from Building 4 will not come near the processing area in Building 1.

10. Part of the licence review request was to amend condition 8.6 to allow C&D processing to take place in the lean-to beside building 2. Clarify whether this outdoor process will cause noise nuisance and dust emissions outside the site boundary and that mitigation measures are in place or proposed to prevent noise and dust emissions.

Drawing No 10-03-101-SK04 in Appendix 7, shows how the process area currently outside Building 2 will be enclosed. This will effectively mitigate dust emissions from the process. The routine noise monitoring conducted at the site has confirmed that the C&D processing at this location has not resulted in any exceedance of emission levels at noise sensitive locations. The proposed enclosure will further mitigate noise emissions from this process.

11. Provide a map confirming the location of all noise sensitive monitoring locations and both onsite wells.

The noise sensitive monitoring locations and the locations of the on-site wells are shown on Drawing PWS/002 in Appendix 8.

3. NON TECHNICAL SUMMARY

Introduction

Nurendale Ltd., trading as Panda Waste Services Ltd. (PANDA) is applying to the Environmental Protection Agency (Agency) for a review of the current Waste Licence (Reg. No. W0140-03) for its waste processing facility at Beauparc, Navan, County Meath. The objectives of the review are: -

- To extend the licence area to include a new building (Building 4), which will house a biological treatment system. The system, which is a combination of anaerobic digestion and composting, will treat organic waste to produce a compost. Gases produced during the digestion stage will be used as a fuel to generate electricity and heat, which will be used at the facility and sold to electricity supply companies;

- To allow the processing of household and commercial waste to recover materials, for example paper and plastic, that are can be used as a fuel, for example in cement manufacturing. These materials are called Refuse Derived Fuel (RDF);

- To amend Condition 1.5.3 of the current licence to allow the continuous operation of the biological treatment and RDF manufacturing systems;

- To amend Condition 8.6 to allow the continued operation of the construction and demolition waste processing plant in a dedicated open area.

Nature of the Facility

The facility only accepts non-hazardous wastes, which are processed to recover wastes that are suitable for recycling and to reduce the amount sent to landfill. At present there are two main buildings (Building 1 and Building 2) used for waste processing. A third building, Building 3, will accommodate the RDF system. It is proposed to construct a new building, Building 4, to accommodate the biological treatment system.

Classes of Activity

It is not proposed to change the type of waste activities, as defined in Third and Fourth Schedules of the Waste Management Acts 1996 – 2008, that are carried out. These are:-

Third Schedule – Waste Disposal Activities

Class 12

"Repackaging prior to submission to any activity referred to in the preceding paragraph of this Schedule".

Class 11

"Blending or mixture prior to submission to any activity referred to in a preceding paragraph of this Schedule".

Class 13

"Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced".

Fourth Schedule – Waste Recovery Activities

Class 2

"Recycling or reclamation of organic substances which are not used as solvents, (including composting and other biological processes)".

Class 3

"Recycling or reclamation of metals and metal compounds".

Class 4

"Recycling or reclamation of other inorganic materials".(p)

Class 11

"Use of waste obtained from any activity referred to in a preceding paragraph of this Schedule".

Class 13

"Storage of waste intended for submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where such waste is produced".

Quantity and Nature of the Waste to be Recovered or Disposed

There will be no change to the types and quantities of waste that are authorised by the current Licence. These are shown in Table 6.1.

Table 6.1 Waste Types and Quantities

WASTE TYPE	MAXIMUM (TONNES PER ANNUM) (Note 1)
Household waste	35,000
Commercial & Industrial	75,000
Construction and Demolition	120,000
Compostable	20,000
TOTAL	**250,000**

Note 1: The quantities of the different categories referred to in this table may be amended with the agreement of the Agency provided that the total quantity of waste specified is not exceeded.

Raw and Ancillary Materials, Substances, Preparations used on the Site

Diesel, lubricating oil and hydraulic oil are used in the waste processing equipment. Electricity is used to power some of the processing equipment and also in the offices and yard lighting. Drinking water is taken from the County Council mains. Groundwater from an on-site well, which is stored in a tank, is used to damp down the yards during dry weather so as to prevent dust.

Plant, Methods, Processes and Operating Procedures

The biological treatment system includes a series of fully enclosed tanks, called digesters, in which the wastes will be initially treated. At the start of the process, the oxygen in the air in the digesters will be used up by the microbes in the waste to produce anaerobic (no oxygen) conditions.

The microbes will break down the waste and, in the process, produce a number of different gases (biogas). The most common gas will be methane, which can be used as a fuel to generate electricity. The biogas will be cleaned (scrubbed) to remove contamination and fed into 3 gas powered electricity generators. The electricity from the generators will be supplied to the national electricity grid.

The digesters will reduce the amount of organic material in the wastes. The waste will then be moved to the composting area, where the wastes will be composted in fully enclosed containers called tunnels. Air will be supplied to the tunnels to ensure that oxygen levels are kept at the level needed to complete the composting.

When the composting process is complete, the material will pasteurised using a high heat to ensure that all the microbes have been killed. This stage is required to meet the conditions set by the Department of Agriculture Fisheries and Food for the treatment of wastes containing meat and fish. The final product may be sold to farmers, market gardeners and landscape contractors and the general public. PANDA will also investigate alternative uses for the product.

Unprocessed household and commercial wastes contain water, in some cases up to 40% by weight, which affects the quality of the materials for use as fuel. The most favourable moisture content is around 15%, and therefore it is necessary to dry the wastes. It is proposed to dry the processed wastes in an air direr in Building 3. The wastes will be placed inside a drying drum and the drum heated using a biomass fired furnace and heat from the on-site gas powered electricity generators.

Information Related to paragraphs (a) to (g) of Section 40 (4) of the Waste Management Acts 1996 2003.

The actual and potential emissions associated with the new waste activities include noise, dust, odour, trade effluent and rainwater run-off will not breach any applicable legal standard or emission limit. Trade effluent, which includes water from washing down the floors of the buildings, is collected and stored in a tank before being taken to the Council's Navan Sewage Treatment Plant.

The proposed site activities take into consideration the Best Available Technique (BAT) Guidance Note for the Waste Sector: Waste Transfer Activities published by the Agency and when carried out in accordance with the new Licence conditions, will not cause environmental pollution. It is not proposed to amend the current Management Team.

On 15th September 2009 Nuerndale Ltd. was convicted at Navan District Court of an offence under the Waste Management Act for a breach of its previous Licence (W0140-02) relating to taking in more waste than approved under the licence. The current Licence (W0140-03), which was granted in March 2009, allows the acceptance of 250,000 tonnes per annum.

Emissions

Surface Water

Rainwater run-off from the existing concrete yards is collected in an underground tank and stored before being sent off-site for treatment. PANDA already has approval to change the drainage system to channel the water to a new reed bed, which will be installed in 2011. Rainwater from the roof of Building 4 will be collected in a tank and used at the site for spraying the yards to keep dust down. This tank is topped up with rainwater run-off collected in an underground storage tank. Rainfall on the new concrete yards will be collected and passed through an oil interceptor and into a soakaway.

Sanitary Wastewater

Sanitary and canteen wastewater is collected and treated in an on-site sewerage treatment plant. The treated wastewater goes to a percolation area. There will be no new sources of sanitary wastewater and the treatment plant has the capacity to cope with the estimated 15 new people that will work in Buildings 3 and 4.

Process Wastewater

Floor washings from Buildings 1 and 2 and water from the truck wash is collected in an underground tank and sent to the Council's Navan treatment plant. Additional wastewater will be produced in the biological treatment process. Much of this can be reused in the process, but any surplus will be sent to the Navan treatment plant.

Groundwater

The only emissions to ground are the treated sanitary wastewater from the on-site treatment plant and rainwater run-off from the new concrete yards. The rainwater will pass through silt traps and an oil interceptor before it enters the soakaway.

Dust

The main source dust emissions with the potential to cause a nuisance are vehicle movements over the concrete yards in dry weather and the Construction and Demolition Waste processing area. The new waste activities are also sources of dust, but these will be carried out inside the buildings, which will effectively prevent dust causing a nuisance.

Odours

A number of the different household and commercial wastes processed at the facility contain materials (for example foodstuff) that are a source of strong odours. The biological treatment and the manufacture of RDF are also sources of malodours. All odorous wastes are handled inside the buildings and are not processed or stored in open areas.

The existing composting tunnels are provided with an odour control system, which draws air from the tunnels into what is called a biofilter, where the substances that form the odours are removed. Building 3 and Building 4 will be provided with separate odour management systems designed to ensure that odours from the buildings will not be a cause of nuisance.

Air

The electricity generators and the biomass furnace will be will be new emissions sources. The emissions will consist of combustion gases from the biogas and biomass fuels.

Noise

The noise sources include the Construction & Demolition waste processing, equipment operating inside the buildings and truck and car movements.

Assessment of the Effects of the Emissions

Surface Water

The proposed changes will not result in any new emissions from the site to adjoining or nearby streams. Rainfall on the concrete yards can become contaminated with silt and small quantities of oil that may leak from vehicle oil sumps. The rainwater run-off from the yards will pass through silt traps and interceptors, which will reduce the contamination to acceptable levels, before it enters either the new reed beds, or soakaway.

Sanitary Wastewater

The existing on-site sanitary wastewater treatment plant has the capacity to handle has the capacity to cope with the estimated 15 new people that will work in Buildings 3 and 4.

Process Wastewater

The biological treatment plant will produce a wastewater. Much of this will be reused in the process and any surplus will be collected and sent to the Navan sewage treatment plant.

Groundwater

There are no direct emissions to groundwater. Treated sanitary wastewater goes to a percolation area. The treatment plant is operating satisfactorily and has the capacity to handle the expected additional staff. Rainwater from the concrete yards will pass through silt traps and an oil interceptor before entering the on-site soakaway or reed beds. This will minimise the risk of groundwater contamination.

Dust

There are water mist sprays in Building 1 and 2 which effectively control dust emissions. The odour control systems that will be provided in Buildings 3 and 4 will also effectively control dust. The open yard areas are and will continue to be dampened down during dry weather. The dust monitoring carried out at the site has confirmed that current operations are not a source of dust nuisance.

Odours

The odour control system in Building 3 will involve the collection of air from inside the building and directing it to a biofilter. This system is broadly similar to the only that has successfully operated at the existing tunnels.

The control system in Building 4 will involve the collection of air inside the building and directing it to a Regenerative Thermal Oxidizer, where the air will be subjected to high temperatures to reduce the levels of the odorous substances. A computer model assessment of the odour impacts has confirmed that the emissions from Buildings 3 and 4 will not be a cause of odour nuisance.

Air

The emissions from the generators and the biomass furnace will comply with the conditions set in the Licence. A computer model assessment of the emissions has shown that they will not cause environmental pollution.

Noise

Noise monitoring at the facility has consistently shown noise emissions measured at the nearest noise sensitive locations below the emission limit specified in the existing licence.

Nuisances

Birds can be attracted to sites where there is available foodstuff. The wastes accepted at the site include some foodstuff. All wastes that have the potential to contain food stuff are and will be processed and stored inside the building. This has already been found to eliminate bird attraction.

Monitoring and Sampling Points

The construction on Building 4 means that one of the current noise monitoring and dust monitoring points along the eastern boundary will be lost. It is proposed to replace these with alternative monitoring points, which will be located further to the east.

Prevention and Recovery of Waste

The aim of the Licence Review is to increase PANDA's recycling rates and reduce the amounts of waste sent to landfill.

Off-site Treatment or Disposal of Solid or Liquid Wastes

The new waste activities will not result in any changes to the types or method of off-site disposal of solid and liquid wastes. The Refuse Derived Fuel will be sent to off-site facilities for use as a fuel and this is classified as a recovery activity. The materials from the composting tunnels in Building 1 may be sent off-site for further treatment

Emergency Procedures to Prevent Unexpected Emissions

PANDA has prepared an Emergency Response Procedure for the facility, which sets out the actions to be taken in an emergency.

Closure, Restoration and Aftercare of the Site

The proposed changes to the current Licence will not affect the measures for the closure, remediation and aftercare of the facility.

APPENDIX 1

Planning Authority Correspondence

Comhairle Chontae na Mí
Roinn Pleanáil,
Meallna Mainstreach, Bótharna Mainstreach
An Uaimh, Contae na Mí
Fón: 046 – 9097500/Fax:046 – 9097001
R-phost: info@meathcoco.ie Web: www.meath.ie

Meath County Council
Planning Dept.,
Abbey Mall, Abbey Road,
Navan, Co. Meath.
Tel: 046 – 9097500/Fax: 046 – 9097001
E-mail: info@meathcoco.ie Web: www.meath.ie

Jim O Callaghan
OMC
Granary House
Rutland street
Cork.

RECEIVED 01 APR 2011

31/03/2011

Dear Mr O Callaghan,

I refer to your request for confirmation that an EIS is not required for the application SA900875 Nurendale Ltd t/a as Panda Waste.

I have enclosed a copy of the planners report which I have highlighted explaining that an EIS is not required. Also enclosed is a copy of the Notification of Decision with the conditions.

If you need any further information please contact me at number above.

Yours Sincerely

Denise Murphy
Assistant Staff Officer.
Planning Department

(A)

Meath County Council
Planning Report

To:	Fergal O'Bric, Senior Executive Planner
From:	David Caffrey, Executive Planner
Applicant Name:	Nurendale Ltd
Dev Description:	Extension to our existing materials recovery facility and will comprise the construction of one building (12,183sqm), ridge height 10.72m, to house a waste anaerobic digestion and composting system and a technical services office , 2 no above ground 6m high steel process wastewater storage tanks (154sqm and 78.5sqm0 and 2 no above ground 6m high concrete process wastewater storage tanks (61.4sqm) located in a 2.5m high bunded area air treatment biofilter with 15m stack, an internal access road to existing materials recovery facility, paved yards, oil interceptor, surface water percolation area and landscaping. The development is an activity that will require a waste licence from the Environmental Protection Agency
Date:	14 September 2009
Ref:	SA/900875
Dev Address:	Rathdrinagh, Beauparc, Co. Meath
Decision Date:	21 September 2009

Introduction:
This report shall be read in conjunction with previous planning report on this application requesting further information. The following outlines the response to the request from the Planning Authority.

Site Description:
The application site is located within the townland of Rathdrinagh, south and east of Rathdrinagh Cross roads off the N2, approximately 4km south of Slane village. The subject site is directly behind an existing filling station known as "The Brink". Also fronting on to the N2 at this point is an existing transport café/restaurant. Part of the application site is currently in use as a waste transfer station with all activities being carried out within a large industrial structures granted PP under **P01/4304** and **SA/30347**

Planning History:

- **SA60656** permission was granted for for Materials processing building (c. 4320m2), a skip repair building (c. 416m2), a reed bed surface water treatment area, ancillary site works a their existing facility at Rathdrinagh, Beaupark, Navan. This application relates to a development, which compromises or is for the purpose of an activity, which requires a license from the Environmental Protection Agency under the Waste Management (Licensing and Amended) Regulations S.I No. 162 of 1998.
- **01/4304** Panda Waste Services Ltd were granted pp for new entrance, new waste transfer/recycling facility with single storey ancillary office/canteen and toilet areas; a separate single storey associated office, associated landscaping

and site development, including a weighbridge, 16 surface car parking spaces, 8 truck parking spaces, 49 skip parking spaces, a bio-cycle treatment system, and percolation area. This application relates to a development which comprises or is for the purposes of an activity which requires a licence from the environmental protection agency under the waste management (licensing and amended) regulations. S.I. No. 162 of 1998. This application will be accompanied by an environmental impact statement, this statement together with any further information provided in relation to the proposed development will be available at the offices of the Planning Authority: Meath County Council, County Hall, Navan, Co Meath. (39 conditions)

- **SA/20106** Panda Waste Services Ltd the complete demolition of existing dwelling (reg. ref. 01/4304)
- **SA/20249,** Panda Waste Services Ltd were granted pp for single storey E.S.B. substation (2 conditions)
- **SA/30347** Panda Waste Services Ltd were granted pp for a new recycling facility for dry packaging materials, relocated and enlarged single storey office block, relocated ESB sub-station and switchroom, new canteen, toilets, cloakroom, yard open bin storage, associated car parking and site works, new public recycling dry goods amenity center all at existing waste transfer/recycling facility (26 conditions attached)
- **SA/60294**, the applicants lodged an application for permission for a materials processing building (c.4320 m2), a reed-bed surface water treatment area, ancillary site works all at their existing facility .This was withdrawn.
- **UD06303** regarding non-compliance with condition no. 3 of SA/30347 and the use of an unauthorized entrance, this has since been closed up.

Local Planning Policy:
The site is located on unzoned lands. Chapter 4 of the County Development Plan details the criteria for waste management facilities and includes the following policies:

INF POL 74 To implement the provisions of the Waste Management Hierarchy and the Replacement NorthEast Regional Waste Management Plan. All prospective developments in the county will be expected to take account of the provisions of the Replacement Regional Waste Management Plan and adhere to those elements of it that relate to waste prevention and minimisation, waste recycling facilities, and the capacity for source segregation. Account will also be taken of the proximity principle and the inter regional movement of waste as provided for under the Section 60 Policy Direction by the Minster for the Environment, Heritage & Local Government (Circular WIR:04/05)

INF POL 75 To promote education and awareness on all issues associated with waste management, both at industry and community level. This will include the promotion of waste reduction by encouraging the minimisation, re-use, recycling and recovery of waste within the county.

INF POL 76 To ensure the provision of quality cost effective waste infrastructure and services, which reflect and meet the needs of the community and to ensure that the 'polluter pays' principle is adhered to in all waste management activities.

INF POL 77 To ensure that all waste disposed of by private companies shall be undertaken in compliance with the requirements of the EPA and the Waste Management Legislation.

INF POL 79 To support the development of recycling sites / waste disposal sites or transfer stations and associated developments in appropriate locations, subject to normal planning and environmental sustainability considerations. In assessing applications for these types of development, the Planning Authority will have regard to the Groundwater Protection Plan and appropriate response matrix.

EU Policy:
European Policy framework as set is guided by the "Proximity Principle" which outlines that member states "should establish a network enabling waste to be disposed of in one of the nearest appropriate installations, by means of the most appropriate methods and technologies to ensure a high level of protection for the environment and for public health".

National Policy:
The Irish National policy on waste management as set down in "Waste management-changing our ways" recognises the role of private sector companies, such as Panda waste in the provision of waste management infrastructure. In 2002 another National document "Preventing and Recycling Waste-Delivering Change" outlines constraints and the challenges that are ahead in terms of recycling in Ireland. One constraint that is highlighted is "the lack of available recycling and reprocessing facilities and lack of access to the facilities which do exist". One of the challenges that is ahead of us is "undertaking sorting and pre-treatment of separately collected wastes at appropriate facilities". At present only 10% of municipal waste is recycled, 90-95% of household waste is land filled and the majority of C & D waste is also land filled.

Regional Policy:
NE regional Waste Management Plan 2005-10
It is acknowledged that waste cannot simply be looked at in terms of an internal regional basis and that waste transfer on an inter-regional basis should be permitted given that the issue of waste does not end at a regional boundary. It is noted that the level of commercial recycling under the existing NE WMP has increased from 9% to 35% and that having consulted, reviewed and assessed the existing Plan the key policy objectives in the achievement of waste prevention and minimization and it is recognized that a more flexible approach should be taken with regard to the movement of waste across regional boundaries. It is also noted that "the capacity of waste facilities within the region should satisfy the needs of the region whilst not precluding inter regional movement of waste and allowing flexibility to cater for the development of required national infrastructure".

In 2002 another National document "Preventing and Recycling Waste-Delivering Change" outlines constraints and the challenges that are ahead in terms of recycling in Ireland. One constraint that is highlighted is "the lack of available recycling and reprocessing facilities and lack of access to the facilities which do exist". One of the challenges that is ahead of us is "undertaking sorting and pre-treatment of separately collected wastes at appropriate facilities". The proposed development could also be said to conform with the European Union (EU) objective of the "Proximity Principle"

whereby an appropriate Waste facility shall be proximal to significant centres of population.

PANDA/Nurendale are identified in the Plan as one of the main household collectors and the application site is identified as a Waste transfer Station.

The applicants are established on site and since July 2002 has been operating under an EPA license. They have achieved a high degree of re-cycling to date and the current proposals will strengthen their efforts to achieving a higher participation in the levels of re-cycling in the region and thereby reducing the amount of waste consigned to landfill.

The applicant has identified a processing system comprising of dry fermentation and composting that will treat the organic waste and divert it from land fill. The new processing plant cannot be accommodated in the existing buildings and therefore a new building of 12,183 square metres is required to facilitate this. A standing area of 3,350 sqm will be required also, as will the construction of 2 above ground steel process water storage tanks each 61.45sqm. The proposal will require a licence from the EPA.

Submissions/Prescribed Bodies:
No submissions have been received.

Referrals in relation to FI request:
Road Design – no objections
Environment – no objections subject to conditions
Water services – states the following:

This planning application shall comply with the following documentation –

'Greater Dublin Strategic Drainage Study (GDSDS) – March 2005'
'Greater Dublin Regional Code of Practice for Drainage Works, Version 6.0'
'Meath County Council Water Bye-Laws 2007'

Water Supply

In accordance with Meath County Council Water Bye-Laws 2007 Part 3 Water Conservation the applicant shall submit a Water Management and Conservation Plan for the approval of Meath County Council Water Services Section prior to commencement of development. Such plan shall set out details of how best practice in water conservation shall be applied in respect of the proposed development to include water mains and internal plumbing and how water usage, leaks or excessive consumption may be identified and remedied. Plumbing systems and all fittings used in the supply of water are to be of a type designed to achieve water conservation. The applicant shall demonstrate how the measures outlined in the said Water Management and Conservation Plan will reduce the potable water demand of the proposed development.

Prior to commencement of development, the applicant shall submit a Hydrogeological Report, prepared by a qualified, experienced and competent

Hydrogeologist, for the 2 no. existing on-site wells which the applicant is proposing to use to supplement the collected roof rainwater which will be used to supply the dust suppression system, the new composting process, the road sweeper and the jet vac fleet.
The Hydrogeological Report shall identify - the groundwater gradients, the vulnerability of the wells, the zones of contribution, the potential impact on nearby private wells, the extent and nature of the aquifer/water source and source protection plans for the wells. The source protection plans for the wells to be approved by Meath County Council Water Services Section prior to commencement of development.

The water supply requirements for fire fighting purposes to be agreed with Meath County Council Chief Fire Office prior to commencement of development.

Wastewater

In the Planning Application Form the applicant statesd that all sanitary wastewater and process wastewater from the proposed development will be collected and tankered off-site for treatment in an off-site wastewater treatment plant.
However, in the Further Information submission the applicant states that sanitary wastewater will continue to be treated in the on-site Biocycle waste water treatment system. The applicant further goes on to state that the system has ample capacity to treat the additional 15 staff members.

Prior to commencement of development the applicant shall provide details of the existing on-site proprietary waste water treatment system, the location and details of the percolation area together with copies of Service Inspection Reports provided by the maintenance company confirming that the existing on-site proprietary waste water treatment system is operating efficiently, not creating environmental problems and has the capacity to accommodate the additional wastewater loading from the proposed development. The applicant shall carry out any works that may be deemed necessary by Meath County Council Environment Section to ensure that the existing on-site proprietary waste water treatment system is not causing environmental problems.

Surface Water Management

The applicant is proposing to collect the roof rainwater in an above ground water storage tank and to use for dust suppression, in the new composting process and for supplying the road sweeper and Jet Vac fleet.
The applicant is proposing to direct the surface water runoff from paved yard areas to a percolation area via an oil interceptor. The applicant is proposing to design the percolation area to BRE 365.

The proposed soakaways to comply with BRE Digest 365, CIRIA C522.

All new developments must incorporate Sustainable Drainage Systems (SuDS). This application shall comply with the Greater Dublin Strategic Drainage Study (GDSDS) Technical Documents, Volume 2, New Development Policy.

The rate of surface water discharge from the proposed developed site shall not exceed the equivalent predevelopment 'greenfield' runoff rate.

Recommendation

We have no objections to the proposed development subject to compliance with the plans and documentation submitted with the planning application and as amended by the Further Information submission and also subject to compliance with the conditions highlighted above in ***'bold italics'***.

Key Planning Issues:
The current application was the subject of a Further Information request on a number of issues. The principle of developing the site was considered to be acceptable as per the original planners report. As such the key issues at this stage relate solely to the matters raised in the FI request.

Planning Assessment:
Further Information Response:
Item 1
Taking together with the permitted development on site, the planning authority notes that the total cumulative annual intake of waste may exceed 25,000 tonnes. The Planning Authority brings your attention to Schedule 5 Part 2 (11b) of the 2001 Planning and Development Regulations which states that an Environmental Impact Statement is required for projects within an annual intake of waste which exceeds 25,000 tonnes. Having regard to the foregoing and the likely effects the proposed development would have on the environment, the planning authority considers that an EIS should accompany the proposed development and you are requested to submit same. In this regard, you are invited to liaise with Meath County Council Planning Department re the scoping of the EIS.

Response:
As detailed in the applicants FI submission Schedule 5 Part 2 11(b) of the 2001 Planning and Development Regulations deals with ***"Installations for the acceptance of waste with an annual intake greater that 25,000 tonnes not included in Schedule 1 of this Schedule".*** *The requirement for an EIS in this respect relates to the proposed development of new waste facilities, or where it is proposed to increase the amount of waste accepted by more than 25%.*

The applicant has clarified the exact nature of the proposed development in this application whereby the proposed development will not result in any increase in the amount of wastes accepted at the overall facility and relates to the construction of a new building to accommodate a new biological processing system-Anaerobic Digestion and composting- to treat the biodegradable wastes that are already accepted at the facility. It is submitted that the proposed treatment system is crucial if PANDA/Nurendale is to meet its obligations under National and European Union waste management policies and regulations to divert biodegradable wastes from landfill. In conclusion therefore, as the construction of the building and the provision of a new biodegradable treatment system is not designed or intended to increase the volume of waste accepted, it is considered that the proposed development is not one to

which Schedule 5 Part 2 11(b) of the 2001 Planning and Development Regulations applies. Item 1 of the FI request has been addressed.

Item 2

The applicants are requested to submit more detailed information in relation to the full extent of activities to be carried out on site in terms of types of materials that will be accepted on site, quantities of materials, source of materials, destination of processed materials and details *of* stored materials at the proposed development.

Response:

In response to item 2 the applicant has indicated that the feedstock for the proposed biological treatment process will comprise the organic wastes already accepted at the facility including food and kitchen wastes, garden wastes and timber. The development will not alter the types or volumes of wastes accepted on site. It is submitted that the development will not result in any significant changes to the source of the wastes and the treated end product, which will be suitable for horticultural or agricultural use will be sold to on to various parties. Given that it is not intended to increase the quantity or type of materials accepted to the facility, I am satisfied that item 2 of the FI request has been addressed.

Item 3

The applicant has not submitted sufficient information in relation to both the existing and projected traffic movements to and from the site. Given the location of the site adjacent to a national primary route and the scale of the proposed development it is considered prudent to request a Traffic Impact Assessment. Please include details of current and projected traffic movements to the site within the Traffic Impact Assessment.

Response:

The applicant has provided clarification relating to traffic movements into and out of the site and has stated that there will be no increase outside of the additional staff required. No objections have been received from Road Design in relation to this and it is considered that a TIA is not necessary in this instance. The additional staff numbers will be minimal and will not be excessive in terms of traffic movements.

Item 4

The applicant has submitted insufficient information in relation to water, wastewater and surface water management to enable an assessment to be made on the impacts the proposed development will have on these issues. Please submit the following information

(a) **(i)** ***In accordance with Meath County Council Water Bye-Laws 2007 Part 3 Water Conservation the applicant shall submit a Water Management and Conservation Plan. Such a plan shall set out details of how best practice in water conservation shall be applied in respect of the proposed development to include water mains and internal plumbing and how water usage, leaks or excessive consumption may be identified and remedied. Plumbing systems and all fittings used in the supply of water are to be of a type designed to achieve water conservation. The applicant shall demonstrate how the***

measures outlined in the said Water Management and Conservation Plan will reduce the potable water demand of the proposed development.

(ii) The applicant shall also submit full details of the existing water supply and usage associated with the existing facility and full details of the increased water demand which will be brought about by the proposed facility, what the water will be used for on a daily basis and where the proposed additional water will be sourced from.

(iii) The applicant shall provide full details of the 2 existing on-site wells including locations, history, yield and Water Management & Source Protection Plans for the wells.

(b) Wastewater

In the Planning Application Form the applicant states that all sanitary wastewater and process wastewater from the proposed development will be collected and tankered off-site for treatment in an off-site wastewater treatment plant. Please submit the following information in relation to this

(i) Applicant to submit full details of the nature and estimated quantity of wastewater which will be produced at the proposed facility and where this wastewater will be processed off-site.

(c)Surface Water Management

The applicant is proposing to collect the roof rainwater for use at the existing facility for dust suppression and for supplying the road sweeper and Jet Vac fleet.
The applicant is proposing to direct the surface water runoff from paved yard areas to a percolation area via an oil interceptor. The applicant is proposing to design the percolation area to BRE 365.

(i) The applicant shall submit full details of the existing Surface Water Management Design for the existing developed landholding together with full details, including calculations, of the impact the proposed development will have on the site surface water management system.

(ii) For proposed soakway, applicant shall submit full details and calculations together with soil permeability test rates and depth measurement from bottom of proposed soakway to winter water table level.

(iii) Applicant shall submit full details of the existing drain along the Southern site boundary and confirmation of any discharges to this drain.

(iv) Applicant shall also to submit design together with calculations for dealing with a 1:100 year storm event and greater storm events on the proposed development site.

(v) Applicant to provide full details of the proposed Percolation Tanks together with details of their proposed use and operation.

Response:
Further to the report from Water Services, it is considered that the applicant has addressed all the issues raised within item 4 of the further information request. Relevant conditions will be attached to the decision notice in relation to the water services at the site.

Item 5
The applicant states that process consists of initial dry fermentation which will produce a bio-gas that will be used as a fuel in a combined heat and power plant (CHP). The electricity generated in the CHP plant will be fed into the national grid. There are no details submitted with the applications confirming the rated thermal input of the proposed plant. In this instance that the applicant shall be requested to confirm nominal heat output to be generated by the proposed CHP plant.

Response:
This request was an error on the previous report and does not require a response.

Item 6
Please submit details regarding number of employees within the proposed facility on this site once fully operational.

Response:
It is submitted that the proposed development will increase the number of staff employed by approximately 15 persons on a full time basis along with additional employment generated during the construction phase. I am satisfied that the numbers of staff intended will have a negligible impact in terms of additional traffic movements and I would contend that the additional employment creation will offset any concerns in this regard.

Item 7
The applicants are requested to submit an artists impression and/or photo montage provided whereby the impact of the proposed and existing development upon the landscape from the northern, southern, eastern and western perspectives shall be demonstrated. Please include mitigation measures where necessary

Response:
The applicant has submitted photomontages of the proposed development whereby the potential visual implications can be assessed. From inspection of same, it appears as though the visual prominence of the proposed building will be mitigated by the existing screening available on site and the views from the N2 will be intermittent by reason of the existing and permitted developments to the immediate west of the proposed building. I am satisfied that the visual impacts are negligible. Item 7 of the FI request has been addressed.

Item 8
You are requested to submit a detailed landscaping proposal for the whole of the application site given the site's prominent location adjacent to a National Primary route and residential properties.

Response:
A landscaping scheme has been submitted, which will serve to allay concerns in respect of the potential visual implications. It is appropriate to condition that planting take place in the first planting season following substantial completion of the development. It is also appropriate to condition that all existing trees and hedgerows be retained in any grant of permission. Item 8 of the Fi request has been addressed.

Item 9
The applicant shall submit details of projected noise generation from the proposed development given the close proximity of existing residential dwellings. Details of how the applicant proposes to mitigate against projected noise shall be provided as part of a noise assessment report.

Response:
Six noise sensitive location were identified with noise predictions ranging from less than 35dB(A) at operational stage (night) to 54.5dB(A) during construction phase. A 4m high acoustic berm constructed on the boundary of the site using topsoil will reduce the noise emission at house locations by circa 8dB(A). I am satisfied that the applicant has addressed item 10 of the FI request, however should permission be granted I would recommend that conditions relating to noise levels should be included.

Item 10
No details of existing habitats have been submitted within the report, this is considered prudent given the extent of the development and the rural location of the site. Please submit details of the existing biodiversity on site and mitigation methods if required.

Response:
There is a general absence of mammal species within the development site and it is stated that the impact upon any existing habitats in terms of hedgerows and trees will be minimal. It is therefore considered that the applicant has adequately addressed the issues raised in item 10 of the further information request.

Conclusion:
The proposed development in this application will not result in any increase in the amount of wastes accepted at the overall facility and relates to the construction of a new building to accommodate a new biological processing system-Anaerobic Digestion and composting- to treat the biodegradable wastes that are already accepted at the facility. The proposed treatment system is crucial if PANDA/Nurendale is to meet its obligations under National and European Union waste management policies and regulations to divert biodegradable wastes from landfill. In this regard it is my opinion that the proposed development is consistent with the policies of the Meath County development Plan 2007 and on foot of the FI response I am of the opinion that the proposed development is acceptable.

Development Contributions:
The proposed development involves the provision of a 12,183sq metre industrial building. Development levies should be applied to the total floor area as detailed below. The site is served by a private well and is not served by the public sewer. Contributions in respect of water and sewerage are therefore not applicable.

Industrial/Manufact./Warehousing(incl.Port) €28.45 per sq metre

Public water	**N/A**
Public sewerage	**N/A**
Roads	**€154,602**
Amenity	**€22,173**

Recommendation:
In consideration of the planning merits of this application and in terms of the information submitted, I am satisfied that the proposed development is in accordance with the proper planning and sustainable development of the area (including the preservation and improvement of the amenities thereof) and the provisions of the County Development Plan. I consider, therefore, that permission should be granted subject to the conditions set out in the attached schedule.

1. CE 1 10/06/09 & 25/08/09

2. The development shall be served by the existing entrance as indicated on approved plans.

3. The applicant shall ensure that tanks for fuel oil, waste oil and waste batteries and all other materials that pose a risk if spilled shall be stored in designated storage areas which shall be bunded to a volume of 110% of the capacity of the largest tank within the bunded area. Drainage from the bunded area shall be diverted for collection and safe disposal. The use of bunded pallets for storage of drums is acceptable.
Reason ; In the interest of public health.

4. The applicant shall ensure that during the construction surface water run off from open cut areas to any stream or watercourse shall be prevented. These waters shall be trapped and held in temporary settling ponds until such time as the suspended solids are deposited and the colour of the water dropped to a level that will not cause dis-colouration of the receiving waters. The settled waters shall be directed to oil interceptors prior to the discharge to surface water drains. The concentration of suspended solids in the surface water run off from the construction works for discharge to watercourses shall not exceed 30mg/litre.
Reason ; In the interest of public health.

5. The applicant shall ensure that activities on site shall not give rise to noise levels at noise sensitive locations which exceed the following sound pressure limits (Leq, 15 min):
   (i) 8am-6pm Monday to Saturday inclusive 55dB(A)
   (ii) any other time 45dB(A).

Neither shall there be any clearly audible tonal component or impulsive component in the noise emission from the site at ant noise sensitive location.
Reason: In the interest of residential amenities.

6. The planning authority require that during the construction phase, best available technology not entailing excessive cost shall be employed by the developer to minimise noise from the construction operations.
Reason: In the interest of residential amenities.

7. Uncontaminated surface water shall be separately collected and discharged to the storage tank. Details of storm water wetlands and proposals for use of same shall be subject to the written agreement of the infrastructural engineer prior to commencement of development.
Reason ; In the interest of public health.

8. All sludge arising from the interceptors shall be disposed of in a waste licensed or waste permitted facility in accordance with the Waste Management Act 1996 to 2008.
Reason ; In the interest of public health.

9. The applicant shall maintain a sludge register, which shall be submitted to the Licensing Authority within two months of the date of grant of this planning. The sludge register shall include the following:

(i) the name of the waste contractor used to dispose of sludge off site
(ii) the date sludge was taken off site
(iii) the quantity of sludge in tonnes (or litres) taken off site
(iv) the final destination of sludge taken off site
(v) the person and company responsible for sludge taken off site.

Reason ; In the interest of public health.

10. The development shall be so constructed and operated that there will be no emission of malodours, fumes, gas, dust or other deleterious materials, no industrial effluent and no noise vibration or electrical interference generated on the site such as would give reasonable cause for annoyance to any person in any residence or public place in the vicinity'
Reason: In the interest of residential amenities

11. The proposed treatment process shall comply with the Conditions for Approval and Operation of Bio-gas and Composting Plants Treating Animal By-Products issued by the Department of Agriculture Fisheries and Food (DAFF).
Reason ; In the interest of public health.

12. Prior to the commencement of development the developer shall submit proposals for the off-site disposal of waste excavation material, which shall only be disposed of to a site which has a current waste licence/permit in accordance with the waste Management Act 1996. These shall be submitted for the written agreement of the Planning Authority.
Reason: In the interest of proper planning and development

13. All service lines and cables servicing the proposed development shall be located underground except where otherwise agreed with the Planning Authority.
Reason: In the interest of orderly development and visual amenity.

14. Prior to the commencement of development, details of all external walls and roof finishes shall be submitted for written agreement of the Planning Authority.
Reason: In the interest of visual amenity.

15. No development, exempted or otherwise shall be constructed over the public sewer.
In the interest of public health.

16. In accordance with Meath County Council Water Bye-Laws 2007 Part 3 Water Conservation the applicant shall submit a Water Management and Conservation Plan for the approval of Meath County Council Water Services Section prior to commencement of development . Such plan shall set out details of how best practice in water conservation shall be applied in respect of the proposed development to include water mains and internal plumbing and how water usage, leaks or excessive consumption may be identified and remedied. Plumbing systems and all fittings used in the supply of water are to be of a type designed to achieve water conservation. The applicant shall demonstrate how the measures outlined in the said Water Management and Conservation Plan will reduce the potable water demand of the proposed development.
Reason: in the interest of public health

17. Prior to commencement of development, the applicant shall submit a Hydrogeological Report, prepared by a qualified, experienced and competent Hydrogeologist, for the 2 no. existing on-site wells which the applicant is proposing to use to supplement the collected roof rainwater which will be used to supply the dust suppression system, the new composting process, the road sweeper and the jet vac fleet.
The Hydrogeological Report shall identify - the groundwater gradients, the vulnerability of the wells, the zones of contribution, the potential impact on nearby private wells, the extent and nature of the aquifer/water source and source protection plans for the wells. The source protection plans for the wells to be approved by Meath County Council Water Services Section prior to commencement of development.
Reason: in the interest of public health

18. Prior to commencement of development the applicant shall provide details of the existing on-site proprietary waste water treatment system, the location and details of the percolation area together with copies of Service Inspection Reports provided by the maintenance company confirming that the existing on-site proprietary waste water treatment system is operating efficiently, not creating environmental problems and has the capacity to accommodate the additional wastewater loading from the proposed development. The applicant shall carry out any works that may be deemed necessary by Meath County

Council Environment Section to ensure that the existing on-site proprietary waste water treatment system is not causing environmental problems.
Reason: in the interest of public health

19. The proposed soakaways to comply with BRE Digest 365, CIRIA C522.
All new developments must incorporate Sustainable Drainage Systems (SuDS). This application shall comply with the Greater Dublin Strategic Drainage Study (GDSDS) Technical Documents, Volume 2, New Development Policy.
The rate of surface water discharge from the proposed developed site shall not exceed the equivalent predevelopment 'greenfield' runoff rate.
Reason: in the interest of public health

20. NRD 3 **€154,602**

21. NRD 4 **€22,173**

Sarah McDaniel
Executive Planner

17 September 2009

Fergal O'Bric
Senior Executive Planner

Fergal O Bric

18/9/09

RECEIVED
18 SEP 2009
Signed

APPENDIX 2

Air Dispersion Modelling Report

ODOUR & ENVIRONMENTAL ENGINEERING CONSULTANTS

Unit 32 De Granville Court, Dublin Rd, Trim, Co. Meath

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DISPERSION MODELLING ASSESSMENT OF EMISSIONS FROM PROPOSED EXHAUST EMISSION POINT OF REGENERATIVE THERMAL OXIDISER, BIOMASS BOILER AND THREE GAS UTILISATION ENGINES TO BE LOCATED IN PANDA WASTE , BAUPARC BUSINESS PARK, NAVAN, CO. MEATH.

PERFORMED BY ODOUR MONITORING IRELAND ON THE BEHALF OF PANDA WASTE LTD.

REPORT PREPARED BY:	Dr. Brian Sheridan
REPORT VERSION:	Document Ver.1
ATTENTION:	Mr Jim O Callaghan & Mr. David Naughton
DATE:	12th April 2011
REPORT NUMBER:	2011A133(1)
REVIEWERS:	

TABLE OF CONTENTS

Document Amendment Record

Client: ***Panda Waste Ltd***

Title: Dispersion modelling assessment of emissions from proposed exhaust emission point of regenerative thermal oxidiser, biomass boiler and three gas utilisation engines to be located in Panda Waste, Bauparc Business Park, Navan, Co. Meath.

Project Number: 2011A133(1)			**DOCUMENT REFERENCE:** Dispersion modelling assessment of emissions from proposed exhaust emission point of regenerative thermal oxidiser, biomass boiler and three gas utilisation engines to be located in Panda Waste, Bauparc Business Park, Navan, Co. Meath.		
2011A133(1)	Document for review	B.A.S.	JMC	B.A.S	12/04/2011
Revision	**Purpose/Description**	**Originated**	**Checked**	**Authorised**	**Date**

EXECUTIVE SUMMARY

Odour Monitoring Ireland was commissioned by Panda Waste to perform a dispersion modelling assessment of exhaust gas emissions from the operation of Regenerative thermal oxidiser, Biomass boiler and three gas utilisation engines to be located in Panda Waste, Beauparc Business Park, Navan, Co. Meath. Emission limit values of specific compounds namely Carbon monoxide, Oxides of nitrogen, Sulphur dioxide, Total particulates, Hydrogen chloride and Hydrogen fluoride and source characteristics were inputted into the dispersion modelling to allow for the assessment of air quality in the vicinity of the proposed emissions points when in operation.

Dispersion modelling assessment was performed utilising AERMOD Prime (09292) dispersion model. Five years of hourly sequential meteorological data from Dublin Airport (2002 to 2006 inclusive) was used within the dispersion model. The dispersion modelling assessment was performed in accordance with requirements contained in AG4 – Irish EPA Guidance for dispersion modelling. The total proposed mass limit emission rate of each pollutant was inputted with the source characteristics into the dispersion model in order to assess the maximum predicted ground level concentrations of each pollutant in the vicinity of the facility. This was then compared with statutory guideline limit values for such pollutants.

The following conclusions are drawn from the study:

1. The assessment was carried out to provide information in line with standard information to be provided to the EPA for license reviews for such projects.
2. Specific dispersion modelling was performed for Carbon monoxide, Oxides of nitrogen, Sulphur dioxide, Particulate matter, Hydrogen chloride and Hydrogen fluoride. The combined cumulative impact of odour for the facility has been dealt with in another document which has been submitted to the EPA.
3. With regards to Carbon monoxide, the maximum GLC+Baseline for CO from the operation of the facility is 3,070 $\mu g\ m^{-3}$ for the maximum 8-hour mean concentration at the 100th percentile. When combined predicted and baseline conditions are compared to the Irish guideline/limit values and EU Limit values set out in SI 271 of 2002 and Directive 2008/50/EC, this is 30.70% of the impact criterion. In addition, the predicted ground level concentration of Carbon monoxide at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*
4. With regards to Oxides of nitrogen, the maximum GLC+Baseline for NO_2 from the operation of the facility is 197 $\mu g\ m^{-3}$ for the maximum 1-hour mean concentration at the 99.79th percentile. When combined predicted and baseline conditions are compared to SI 271 of 2002 and Directive 2008/50/EC, this is 98.50% of the impact criterion. An annual average was also generated to allow comparison with values contained in SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 38 $\mu g/m^3$. When compared the annual average NO_2 air quality impact criterion is 95% of the impact criterion. In addition, the predicted ground level concentration of Oxides of nitrogen at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.
5. With regards to Sulphur dioxide, the maximum GLC+Baseline for SO_2 from the operation of the facility is 283 and 114 $\mu g\ m^{-3}$ for the maximum 1-hour and 24 hr mean concentration at the 99.73th and 99.18th percentile respectively. When combined predicted and baseline conditions are compared to SI 271 of 2002 and Directive 2008/50/EC, this is 80.86 and 91.20% of the set target limits established for the 1 hour and 24 hour assessment criteria. An annual average was also generated to allow comparison with SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 18 $\mu g/m^3$. When compared the annual average SO_2 air quality impact criterion is 90% of the impact criterion. In addition, the predicted ground level concentration of Sulphur

dioxide at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

6. With regards to Particulate matter, the maximum GLC+Baseline for Particulate matter 10μm from the operation of the facility is 43μg m^{-3} for the maximum 24-hour mean concentration at the 90.40th percentile. When combined predicted and baseline conditions are compared to Directive 2008/50/EC, this is 86% of the impact criterion. An annual average was also generated to allow comparison with the SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 30.28 μg/m^3. When compared, the annual average Particulate matter air quality impact is 75.70 % of the impact criterion. An annual average was also generated for $PM_{2.5}$ to allow comparison with Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 16.28 μg/m^3. When compared, the annual average $PM_{2.5}$ air quality impact is 65.12% of the impact criterion. In addition, the predicted ground level concentration of Particulate matter at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.
7. With regards to Hydrogen chloride, emissions at maximum operations equate to ambient HCl concentrations (including background concentrations) which are from 2.83 to 18.05% of the maximum impact criterion for both the 1 hr and annual average period. In addition, the predicted ground level concentration of Particulate matter at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.
8. With regards to Hydrogen fluoride emissions at maximum operations equate to ambient HF concentrations (including background concentrations) which are from 4.29% to 83.33% of the maximum impact criterion for both the 1 hr and annual average period. In addition, the predicted ground level concentration of Particulate matter at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.
9. The overall modelling indicates that the facility will not result in any significant impact on air quality in the surrounding area with all ground level concentrations of pollutants well within their respective ground level concentration limit values.

1. Introduction and scope

1.1 Introduction

Odour Monitoring Ireland was commissioned by Panda Waste Ltd to perform a dispersion modelling assessment of proposed emission limit values for a range of pollutants which could potentially be emitted from the proposed drying facility to be located in Panda Waste Ltd facility, Bauparc Business Park, Navan, Co. Meath.

The assessment allowed for the examination of proposed short and long term ground level concentrations (GLC's) of compounds as a result of the operation of proposed emission points – Regenerative Thermal Oxidiser (A2) biomass boiler (A6) and three gas utilisation engines (A3, A4 and A5).

Predicted dispersion modelling GLC's were compared to proposed regulatory / guideline ground level limit values for each pollutant.

The materials and methods, results, discussion of results and conclusions are presented within this document.

1.2 Scope of the work

The main aims of the study included:

- Air dispersion modelling assessment in accordance with AG4 guidance of proposed mass emission limits of specified pollutants to atmosphere from the facility to be located in Beauparc business Park, Navan, Co. Meath.
- Assessment whether the predicted ground level concentrations are in compliance with ground level concentration limit values as taken from SI 271 of 2002 – Air Quality Regulations, CAFÉ Directive 2008/50/EC, TaLuft, 2002 and Environment Agency H1 Guidance Environmental Assessment levels.

The approach adopted in this assessment is considered a worst-case investigation in respect of emissions to the atmosphere from proposed emission points A2 to A6. These predictions are therefore most likely to over estimate the GLC's that may actually occur for each modelled scenario. These assumptions are summarised and include:

- Emissions to the atmosphere from the emission points – A2 to A6 process operation were assumed to occur 24 hours each day / 7 days per week over a standard year at 100% output.
- Five years of hourly sequential meteorological data from Dublin Airport 2002 to 2006 inclusive was screened to assess worst case dispersion year which will provide statistical significant results in terms of the short and long term assessment. This is in keeping with current national and international recommendations. The worst case year Dublin 2004 for used for data presentation.
- Maximum GLC's + Background were compared with relevant air quality objects and limits;
- All emissions were assumed to occur at maximum potential emission concentration and mass emission rates for each scenario.
- AERMOD Prime (09292) dispersion modelling was utilised throughout the assessment in order to provide the most conservative dispersion estimates.
- Five years of hourly sequential meteorological data from Dublin 2002 to 2006 inclusive was used in the modelling screen which will provide statistical significant results in terms of the short and long term assessment. The worst case year for Dublin met station was 2004 and was used for contour plot presentation. This is in keeping with current national and international recommendations (EPA Guidance AG4 and EA Guidance H4). In addition, AERMOD incorporates a meteorological pre-processor AERMET PRO. The AERMET PRO meteorological preprocessor requires the input of surface characteristics, including surface roughness (z0), Bowen Ratio and Albedo by

sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. The values of Albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc) and vary with seasons and wind direction. The assessment of appropriate land-use type was carried out to a distance of 10km from the meteorological station for Bowen Ratio and Albedo and to a distance of 1km for surface roughness in line with USEPA recommendations.

- All building wake effects on all applicable emission points were assessed within the dispersion model using the building prime algorithm (e.g. all buildings / structures / tanks were included).

2. Materials and methods

This section describes the materials and methods used throughout the dispersion modelling assessment.

2.1 Dispersion modelling assessment

2.1.1 Atmospheric dispersion modelling of air quality: What is dispersion modelling?

Any material discharged into the atmosphere is carried along by the wind and diluted by wind turbulence, which is always present in the atmosphere. This process has the effect of producing a plume of air that is roughly cone shaped with the apex towards the source and can be mathematically described by the Gaussian equation. Atmospheric dispersion modelling has been applied to the assessment and control of emissions for many years, originally using Gaussian form ISCST 3. Once the compound emission rate from the source is known, (g s^{-1}), the impact on the vicinity can be estimated. These models can effectively be used in three different ways:

- Firstly, to assess the dispersion of compounds;
- Secondly, in a "reverse" mode, to estimate the maximum compound emissions which can be permitted from a site in order to prevent air quality impact occurring;
- And thirdly, to determine which process is contributing greatest to the compound impact and estimate the amount of required abatement to reduce this impact within acceptable levels (McIntyre et al. 2000).

In this latter mode, models have been employed for imposing emission limits on industrial processes, control systems and proposed facilities and processes (Sheridan et al., 2002).

Any dispersion modelling approach will exhibit variability between the predicted values and the measured or observed values due to the natural randomness of atmospheric environment. A model prediction can, at best, represent only the most likely outcome given the apparent environmental conditions at the time. Uncertainty depends on the completeness of the information used as input to the model as well as the knowledge of the atmospheric environment and the ability to represent that process mathematically. Good input information (emission rates, source parameters, meteorological data and land use characteristics) entered into a dispersion model that treats the atmospheric environment simplistically will produce equally uncertain results as poor information entered into a dispersion model that seeks to simulate the atmospheric environment in a robust manner. It is assumed in this discussion that pollutant emission rates are representative of maximum emission events, source parameters accurately define the point of release and surrounding structures, meteorological conditions define the local atmospheric environment and land use characteristics describe the surrounding natural environment. These conditions are employed within the dispersion modelling assessment therefore providing good confidence in the generated predicted exposure concentration values.

2.1.2 Atmospheric dispersion modelling of air quality: dispersion model selection

The AERMOD model was developed through a formal collaboration between the American Meteorological Society (AMS) and U.S. Environmental Protection Agency (U.S. EPA). AERMOD is a Gaussian plume model and replaced the ISC3 model in demonstrating compliance with the National Ambient Air Quality Standards (Porter et al., 2003) AERMIC (USEPA and AMS working group) is emphasizing development of a platform that includes air turbulence structure, scaling, and concepts; treatment of both surface and elevated sources; and simple and complex terrain. The modelling platform system has three main components: AERMOD, which is the air dispersion model; AERMET, a meteorological data pre-processor; and AERMAP, a terrain data pre-processor (Cora and Hung, 2003).

AERMOD is a Gaussian steady-state model which was developed with the main intention of superseding ISCST3 (NZME, 2002). The AERMOD modeling system is a significant departure from ISCST3 in that it is based on a theoretical understanding of the atmosphere rather than depend on empirical derived values. The dispersion environment is characterized by turbulence theory that defines convective (daytime) and stable (nocturnal) boundary layers instead of the stability categories in ISCST3. Dispersion coefficients derived from turbulence theories are not based on sampling data or a specific averaging period. AERMOD was especially designed to support the U.S. EPA's regulatory modeling programs (Porter at al., 2003)

Special features of AERMOD include its ability to treat the vertical in-homogeneity of the planetary boundary layer, special treatment of surface releases, irregularly-shaped area sources, a three plume model for the convective boundary layer, limitation of vertical mixing in the stable boundary layer, and fixing the reflecting surface at the stack base (Curran et al., 2006). A treatment of dispersion in the presence of intermediate and complex terrain is used that improves on that currently in use in ISCST3 and other models, yet without the complexity of the Complex Terrain Dispersion Model-Plus (CTDMPLUS) (Diosey et al., 2002).

Input data from stack emissions, and source characteristics will be used to construct the basis of the modelling scenarios.

2.2 Air quality impact assessment criteria

The predicted air quality impact from the operation of proposed emission point - RTO for each scenario is compared to relevant air quality objectives and limits. Air quality standards and guidelines referenced in this report include:

- SI 271 of 2002 – Air Quality Standards Regulations 2002.
- EU limit values laid out in the EU Daughter directives on Air Quality 99/30/EC and 2000/69/EC.
- Ta Luft of 2002 Air Quality Regulations,
- Horizontal guidance Note, IPRC H1, Environmental assessment and appraisal of BAT, UK Environment Agency.
- EH40 Notes, Occupational exposure limits (2002).

Air quality is judged relative to the relevant Air Quality Standards, which are concentrations of pollutants in the atmosphere, which achieve a certain standard of environmental quality. Air quality Standards are formulated on the basis of an assessment of the effects of the pollutant on public health and ecosystems.

In general terms, air quality standards have been framed in two categories, limit values and guideline values. Limit values are concentrations that cannot be exceeded and are based on WHO guidelines for the protection of human health. Guideline values have been established for long-term precautionary measures for the protection of human health and the environment. European legislation has also considered standard for the protection of vegetation and ecosystems.

Where ambient air quality criteria do not exist as in the case for some of the speciated substances of interest, it is usual to use

- 1/100th of the 8-hour time weighted average occupational exposure limit (OEL)-Long term EAL as an annual average.
- 1/500th of the 8 hour MEL time weighted average occupational exposure limit (OEL) - Long term EAL as an annual average.
- 1/10th of the 15-minute time weighted average occupational exposure limit (OEL)-Short term EAL as an hourly average.
- 1/50th of the 15 minute MEL time weighted average occupational exposure limit (OEL) –short term EAL as an hourly average.

Occupational exposure limits are published by the Occupational Safety and Heath Authority EH 40 notes and subsequent reviews.

The relevant air quality standards for proposed emission sources A2 to A6 are presented in *Tables 2.1 and 2.2*.

2.2.1 Air Quality Guidelines value for air pollutants

Table 2.1 illustrates the guideline and limit values for classical air quality pollutants in Ireland.

Table 2.1. EU and Irish Limit values laid out in the EU Daughter directive on Air Quality 99/30/EC, SI 271 of 2002 and CAFÉ directive 2008/50/EC

POLLUTANT	Objective				TO BE ACHIEVED BY[4]
	Concentration[2]	Maximum No. Of exceedences allowed[3]	Exceedence expressed as percentile[3]	Measured as	
Nitrogen dioxide and oxides of nitrogen	300 μg m^{-3} NO_2 200 μg m^{-3} NO_2 40 μg m^{-3} NO_2	18 times in a year 18 times in a year --	99.79th percentile 99.79th percentile –	1 hour mean 1 hour mean Annual mean	19 Jul 1999[4] 1 Jan 2010 1 Jan 2010
Particulates (PM_{10}) (2008/50/EC)	50 μg m^{-3} 40 μg m^{-3} 20 μg m^{-3}	35 times in a year None None	90.40th percentile –	24 hour mean Annual mean Annual mean	1 Jan 2010[6] 1 Jan 2005 1 Jan 2010[6]
Particulates ($PM_{2.5}$) (2008/50/EC)	25 μg m^{-3} – Stage 1 20 μg m^{-3} – Stage 2	None None	– –	Annual mean Annual mean	1 Jan 2015 1 Jan 2020
Carbon monoxide (CO)	10 mg m^{-3}	None	100th percentile	Running 8 hour mean	31st Dec 2003
Sulphur dioxide (SO_2)	350 μg m^{-3} 125 μg m^{-3} 20 μg m^{-3}	24 times in a year 3 times in a year --	99.73th percentile 99.18th percentile –	1 hour mean 24 hour mean Annual mean and winter mean (1st Oct to 31st March	1st Jan 2005 1st Jan 2005 19th Jul 2001[5]

Table 2.2 illustrates the guideline and limit values for specified pollutants as taken from specified reference document including TaLuft 2002 and H1 Part 2 – Environmental Risk Assessment, EPA 2002, etc. These values set out minimum ground level concentration requirements to be attained in the vicinity of the proposed facility for these pollutants.

Table 2.2. Guideline ground concentration limit values pollutant range from Panda Waste Ltd facility proposed emission points A2 to A6.

Pollutant	Objective				Source
	Concentration[2]	Maximum No. Of exceedence allowed[3]	Exceedence expressed as percentile[3]	Measured as	
HCL	≤100 μg m^{-3}	175 times in a year	98th percentile	1 hour mean	TaLuft 2002- Hourly limit for protection of human health
HCL	≤750 μg m^{-3}	0	100th percentile	1 hour mean	H1 Part 2 – Environmental Risk Assessment.
HCL	≤20 μg m^{-3}	-	-	Annual average	H1 Part 2 – Environmental Risk Assessment..
HF	≤3.0 μg m^{-3}	175 times in a year	98th percentile	1 hour mean	TaLuft 2002- Hourly limit for protection of human health
HF	≤0.30 μg m^{-3}	-	-	Annual average	TaLuft 2002- Gaseous fluoride (as HF) as an annual average for protection of vegetation
HF	≤160 μg m^{-3}	0	100th percentile	1 hour mean	H1 Part 2 – Environmental Risk Assessment.
Fluoride	≤1.0 μg m^{-3}	-	-	Annual average	H1 Part 2 – Environmental Risk Assessment.

Source: Horizontal guidance Note, IPPC H1 Part 2, Environmental assessment and appraisal of BAT, UK Environment Agency.

EH40 notes, National Authority for Occupational Safety and Health (2002).

Ta Luft 2002 – Technical instructions on air Quality Control.

2.3 Existing Baseline Air Quality

The EPA has been monitoring national Air quality from a number of sites around the country. This information is available from the EPA's website. The values presented for PM_{10}, SO_2, NO_2, and CO give an indication of expected rural imissions of the compounds listed in *Table 2.1 and 2.2*. *Table 2.3* illustrates the baseline data expected to be obtained from rural areas for classical air pollutants. Since the proposed facility is located in a rural area, it would be considered located in a Zone D area according to the EPA's classification of zones for air quality. Traffic and industrial related emissions would be medium.

The results of $PM_{2.5}$ monitoring at Station Road in Cork City in 2007 (EPA, 2007) indicated an average $PM_{2.5}/PM_{10}$ ratio of 0.53 while monitoring in Heatherton Park in 2008 (EPA, 2008) indicated an average $PM_{2.5}/PM_{10}$ ratio of 0.60. Based on this information, a conservative ratio of 0.60 was used to generate a background $PM_{2.5}$ concentration in 2008 of 9.0 µg/m^3 (*see Table 2.3*)

The monitoring of baseline levels of Hydrogen chloride and Hydrogen fluoride is limited to a number of sites in Ireland including Ringaskiddy, Co. Cork. Since this area is heavily industrialised, it would be reasonable to assume that the levels measured here would be considered worst case in this instance. *Table 2.4* presents the available baseline data for Hydrogen chloride and Hydrogen fluoride as measured over the period November 2006 to February 2007 and April 2008 to July 2008. All monitoring was performed in accordance with European and international standards.

Table 2.3. Baseline air quality data used to assess air quality impact criterion in a number of Zone D region - Navan.

Reference air quality data – Source identity	Sulphur dioxide-SO_2 ($\mu g\ m^{-3}$)	Nitrogen dioxide-NO_x as NO_2 ($\mu g\ m^{-3}$)	Particulate matter-PM_{10} ($\mu g\ m^{-3}$)	Carbon monoxide – CO ($mg\ m^{-3}$)	Details
Navan – annual mean (Zone D)	4.20	16.90	23	-	Measured 2008
Navan – 98%ile hourly value (Zone D)	10.40	56.70	-	-	Measured 2008
Navan – 98%ile & mean 24 hr value (Zone D)	9.60	-	23	-	Measured 2008
Navan – 8 hr max (Zone D)	-	-	-	1.04	Measured 2008
Zone B - Heatherton Park – Annual mean $PM_{2.5}$	-	-	9.0 ($PM_{2.5}$) (Heatherton Park)	-	Measured 2008[3]

Notes: [1] denotes taken from Air quality monitoring report 2008 - Navan: www.epa.ie.

Table 2.4. Baseline air quality data for Hydrogen chloride and Hydrogen fluoride.

Pollutant	Averaging Period	Maximum Measured conc	Notes
HCL ($\mu g\ m^{-3}$)	4 week average	2.70	Ref: Porter et al., 2008 – Air quality monitoring report Ringaskiddy Waste to Energy Facility
HF ($\mu g\ m^{-3}$)	4 week average	<0.050	Ref: Porter et al., 2008 – Air quality monitoring report Ringaskiddy Waste to Energy Facility

2.4 Meteorological data

Five years of hourly sequential meteorological data was chosen for the modelling exercise (i.e. Dublin airport 2002 to 2006 inclusive). A schematic wind rose and tabular cumulative wind speed and directions of all seven years are presented in *Section 7*. All five years of met data was screened to provide more statistical significant result output from the dispersion model. This is in keeping with national and international recommendations on quality assurance in operating dispersion models and will provide a worst case assessment of predicted ground level concentrations based on the input emission rate data. Surface roughness, Albedo and Bowen ratio were assessed and characterised around each met station for AERMET Pro processing.

2.5 Terrain data

Topography effects were not accounted for within the dispersion modelling assessment due to the absence of complex terrain in the immediate vicinity of the site and due to the fact that the stack heights are in excess of 22 metres. In order for terrain features to have an influence on the dispersion model output, the topographical feature would need to be in excess of the stack height and be in close proximity to the site in this instance. Individual sensitive receptors were inputted into the model at their specific height in order to take account of any effects of elevation on GLC's at there specific locations.

2.6 Building wake effects

Building wake effects are accounted for in modelling scenarios through the use of the Prime algorithm (i.e. all building features located within the facility) as this can have a significant effect on the compound plume dispersion at short distances from the source and can significantly increase GLC's in close proximity to the facility.

3. Results

This section describes the results obtained for the dispersion modelling exercise. All input data and source characteristics were developed in conjunction with engineering drawings for the development.

3.1. Dispersion model input data – Source characteristics

Table 3.1 illustrates the source characteristics utilised within the dispersion model. Grid reference location, stack height (A.G.L), maximum volume flow and temperature of the emission point are presented within this table for reference purposes.

Table 3.1. Source characteristics for proposed emission points A2 to A6.

Parameter	Emission point A2 – RTO[1]	Emission point A3–gas utilisation engine 1[2]	Emission point A4–gas utilisation engine 2[2]	Emission point A5–gas utilisation engine 3[2]	Emission point A6 – Biomass boiler[3]
X coordinate	297488.0	297499.9	297497.9	297494.6	297494.2
Y coordinate	269130.1	269148.4	269155.9	269164.3	269132.5
Elevation (A.O.D) (m)	56	56	56	56	56
Stack height (m)	21	21	21	21	22
Orientation	Vertical	Vertical	Vertical	Vertical	Vertical
Temperature (K)	393	473	473	473	493
Efflux velocity (m/s)	17.61	15.358	15.358	15.358	
Max volume flow (Nm^3/hr)	28,000	4,000	4,000	4,000	20,000
Stack tip diameter (m)	0.90	0.40	0.40	0.40	0.88
Max building height (m)	13	13	13	13	13
Max building ground level (m)	56	56	56	56	56

Notes: [1] denotes referencing conditions for emission point A2 are 273.15K, 101.3KPa, dry gas, 11% O_2.
[2]denotes referencing conditions for emission point A3 to A5 are 273.15K, 101.3KPa, dry gas, 5% O_2.
[3]denotes referencing conditions for emission point A6 are 273.15K, 101.3KPa, dry gas, 6% O_2.

3.2 Process emissions - Volume flow rate and flue gas concentrations

The input mass emission rate data used in the dispersion model for each emission point is presented in *Tables 3.2, 3.3, 3.4, 3.5 and 3.6* for each scenario. All source characteristics and location are reported in *Table 3.1*.

Table 3.2. Emission values from exhaust stack of the emission source A2.

Parameters – RTO exhaust stacks (A2)	Conc. Limit Values	Units	Volume flow (Nm^3/hr ref 11% O_2)	Mass emission rate (g/s)
Carbon monoxide (CO)	600	mg/Nm^3 11% O_2	28,000	4.67
Oxides of nitrogen (NOx as NO_2)	200	mg/Nm^3 11% O_2	28,000	1.56
Sulphur dioxide (SO_2)	150	mg/Nm^3 11% O_2	28,000	1.17
Total particulates	10	mg/Nm^3 11% O_2	28,000	0.078
Hydrogen chloride	10	mg/Nm^3 11% O_2	28,000	0.078
Hydrogen fluoride	3	mg/Nm^3 11% O_2	28,000	0.023

Table 3.3. Emission values from exhaust stack of the emission source A3.

Parameters – Gas engine 1 exhaust stacks (A3)	Conc. Limit Values	Units	Volume flow (Nm^3/hr ref 5% O_2)	Mass emission rate (g/s)
Carbon monoxide (CO)	1,400	mg/Nm^3 5% O_2	4,000	1.56
Oxides of nitrogen (NOx as NO_2)	500	mg/Nm^3 5% O_2	4,000	0.56
Sulphur dioxide (SO_2)	225	mg/Nm^3 5% O_2	4,000	0.25
Total particulates	130	mg/Nm^3 5% O_2	4,000	0.144
Hydrogen chloride	10	mg/Nm^3 5% O_2	4,000	0.011
Hydrogen fluoride	5	mg/Nm^3 5% O_2	4,000	0.0060

Table 3.4. Emission values from exhaust stack of the emission source A4.

Parameters – Gas engine 2 exhaust stacks (A4)	Conc. Limit Values	Units	Volume flow (Nm^3/hr ref 5% O_2)	Mass emission rate (g/s)
Carbon monoxide (CO)	1,400	mg/Nm^3 5% O_2	4,000	1.56
Oxides of nitrogen (NOx as NO_2)	500	mg/Nm^3 5% O_2	4,000	0.56
Sulphur dioxide (SO_2)	225	mg/Nm^3 5% O_2	4,000	0.25
Total particulates	130	mg/Nm^3 5% O_2	4,000	0.144
Hydrogen chloride	10	mg/Nm^3 5% O_2	4,000	0.011
Hydrogen fluoride	5	mg/Nm^3 5% O_2	4,000	0.0060

Table 3.5. Emission values from exhaust stack of the emission source A5.

Parameters – Gas engine 3 exhaust stacks (A5)	Conc. Limit Values	Units	Volume flow (Nm^3/hr ref 5% O_2)	Mass emission rate (g/s)
Carbon monoxide (CO)	1,400	mg/Nm^3 5% O_2	4,000	1.56
Oxides of nitrogen (NOx as NO_2)	500	mg/Nm^3 5% O_2	4,000	0.56
Sulphur dioxide (SO_2)	225	mg/Nm^3 5% O_2	4,000	0.25
Total particulates	130	mg/Nm^3 5% O_2	4,000	0.144
Hydrogen chloride	10	mg/Nm^3 5% O_2	4,000	0.011
Hydrogen fluoride	5	mg/Nm^3 5% O_2	4,000	0.0060

Table 3.6. Emission values from exhaust stack of the emission source A6.

Parameters – Biomass boiler exhaust stacks (A6)	Conc. Limit Values	Units	Volume flow (Nm^3/hr ref 6% O_2)	Mass emission rate (g/s)
Carbon monoxide (CO)	1,000	mg/Nm^3 6% O_2	20,000	5.56
Oxides of nitrogen (NOx as NO_2)	400	mg/Nm^3 6% O_2	20,000	2.22
Sulphur dioxide (SO_2)	38	mg/Nm^3 6% O_2	20,000	0.21
Total particulates	130	mg/Nm^3 6% O_2	20,000	0.722

3.3 Dispersion modelling assessment

AERMOD Prime (09292) was used to determine the overall ground level impact of proposed emission points A2 to A6 to be located in the Panda Waste, Bauparc Business Park, Navan, Co. Meath. These computations give the relevant GLC's at each 50-meter X Y Cartesian grid receptor location that is predicted to be exceeded for the specific air quality impact criteria. Individual receptor elevations were established at their specific height above ground and also included a 1.80 m normal breathing zone. A total Cartesian + individual receptors of 1,691 points was established giving a total grid coverage area of 4.0 square kilometres around the emission point.

Five years of hourly sequential meteorological data from Dublin Airport (Dublin Airport 2002 to 2006 inclusive) and source characteristics (*see Table 3.1*), including emission date contained in *Tables 3.2 to 3.6* were inputted into the dispersion model.

In order to obtain the predicted environmental concentration (PEC), background data was added to the process emissions. In relation to the annual averages, the ambient background concentration was added directly to the process concentration. However, in relation to the short-term peak concentrations, concentrations due to emissions from elevated sources cannot be combined in the same way. Guidance from the UK Environment Agency advises that an estimate of the maximum combined pollutant concentration can be obtained by adding the maximum short-term concentration due to emissions from the source to twice the annual mean background concentration.

3.4 Dispersion model Scenarios

AERMOD Prime (USEPA ver. 09292) was used to determine the overall air quality impact of the five combined emission points while in operation at 100% capacity for named air pollutants.

Impacts from the five stack emission points were assessed in accordance with the impact criterion contained in Directive 2008/50/EC, SI 271 of 2002, TaLuft 2002 and H1 Guidance.

Nine scenarios were assessed within the dispersion model examination for each of the classical air pollutants.

The dispersion modelling is carried out in line with the requirements of guidance document AG4- Dispersion modelling.

The output data was analysed to calculate the following:

Ref Scenario 1: Predicted cumulative ground level concentration of Carbon monoxide emission contribution of cumulative emissions for the 100th percentile of 8 hour averages for Dublin meteorological station year 2004 for an Carbon monoxide concentration of less than or equal to 500 µg/m^3 assuming 24 hr operation (*see Figure 6.2*).

Ref Scenario 2: Predicted cumulative ground level concentration of Oxides of nitrogen emission contribution of cumulative emissions for the 99.79th percentile of 1 hour averages for Dublin meteorological station year 2004 for an Oxides of nitrogen concentration of less than or equal to 135 µg/m^3 assuming 24 hr operation (*see Figure 6.3*).

Ref Scenario 3: Predicted cumulative ground level concentration of Oxides of nitrogen emission contribution of cumulative emissions for the Annual average for Dublin meteorological station year 2004 for an Oxides of nitrogen concentration of less than or equal to 21 µg/m^3 assuming 24 hr operation (*see Figure 6.4*).

Ref Scenario 4: Predicted cumulative ground level concentration of Sulphur dioxide emission contribution of cumulative emissions for the 99.73th percentile of 1 hour averages for Dublin meteorological station year 2004 for an Sulphur dioxide concentration of less than or equal to 150 µg/m^3 assuming 24 hr operation (*see Figure 6.5*).

Ref Scenario 5: Predicted cumulative ground level concentration of Sulphur dioxide emission contribution of cumulative emissions for the 99.18th percentile of 24 hour averages for Dublin meteorological station year 2004 for an Sulphur dioxide concentration of less than or equal to 75 µg/m^3 assuming 24 hr operation (*see Figure 6.6*).

Ref Scenario 6: Predicted cumulative ground level concentration of Sulphur dioxide emission contribution of cumulative emissions for the Annual average for Dublin meteorological station year 2004 for an Sulphur dioxide concentration of less than or equal to 9 µg/m^3 assuming 24 hr operation (*see Figure 6.7*).

Ref Scenario 7: Predicted cumulative ground level concentration of Total particulates as PM_{10} emission contribution of cumulative emissions for the 90.40th percentile of 24 hour averages for Dublin meteorological station year 2004 for an Total particulates as PM_{10} concentration of less than or equal to 15 µg/m^3 assuming 24 hr operation (*see Figure 6.8*).

Ref Scenario 8: Predicted cumulative ground level concentration of Total particulates as PM_{10} emission contribution of cumulative emissions for the Annual average for Dublin meteorological station year 2004 for an Total particulates as PM_{10} concentration of less than or equal to 5.0 µg/m^3 assuming 24 hr operation (*see Figure 6.9*).

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Ref Scenario 9: Predicted cumulative ground level concentration of Total particulates as $PM_{2.5}$ emission contribution of cumulative emissions for the Annual average for Dublin meteorological station year 2004 for an Total particulates as $PM_{2.5}$ concentration of less than or equal to 5.0 µg/m^3 assuming 24 hr operation (*see Figure 6.10*).

Ref Scenario 10: Predicted cumulative ground level concentration of Hydrogen chloride emission contribution of cumulative emissions for the 100th percentile of 1 hour averages for Dublin meteorological station year 2004 for an Hydrogen chloride concentration of less than or equal to 15 µg/m^3 assuming 24 hr operation (*see Figure 6.11*).

Ref Scenario 11: Predicted cumulative ground level concentration of Hydrogen chloride emission contribution of cumulative emissions for the 98th percentile of 1 hour averages for Dublin meteorological station year 2004 for an Hydrogen chloride concentration of less than or equal to 15 µg/m^3 assuming 24 hr operation (*see Figure 6.12*).

Ref Scenario 12: Predicted cumulative ground level concentration of Hydrogen chloride emission contribution of cumulative emissions for the Annual average for Dublin meteorological station year 2004 for an Hydrogen chloride concentration of less than or equal to 0.50 µg/m^3 assuming 24 hr operation (*see Figure 6.13*).

Ref Scenario 13: Predicted cumulative ground level concentration of Hydrogen fluoride emission contribution of cumulative emissions for the 100th percentile of 1 hour averages for Dublin meteorological station year 2004 for an

Hydrogen fluoride concentration of less than or equal to 5 µg/m^3 assuming 24 hr operation (*see Figure 6.14*).

Ref Scenario 14: Predicted cumulative ground level concentration of Hydrogen fluoride emission contribution of cumulative emissions for the 98th percentile of 1 hour averages for Dublin meteorological station year 2004 for an Hydrogen fluoride concentration of less than or equal to 2 µg/m^3 assuming 24 hr operation (*see Figure 6.15*).

Ref Scenario 15: Predicted cumulative ground level concentration of Hydrogen fluoride emission contribution of cumulative emissions for the Annual average for Dublin meteorological station year 2004 for an Hydrogen fluoride concentration of less than or equal to 0.20 µg/m^3 assuming 24 hr operation (*see Figure 6.16*).

4. Discussion of results

This section will present the results of the dispersion modelling.

AERMOD GIS Pro Prime (Ver. 09292) was used to determine the overall named air pollutant air quality impact of the proposed emission points A2 to A6 during operation.

Various averaging intervals were chosen to allow direct comparison of predicted GLC's with the relevant the relevant air quality assessment criteria as outline in *Section 2.2.1*. In particular, 1-hour, 24 hour and annual average GLC's of the specified pollutants were calculated at 50 metres distances from the site over a fine and coarse grid extent of 4.0 kilometres squared. Relevant percentiles of these GLC's were also computed for comparison with the relevant pollutant Air Quality Standards to include Directive 2008/50/EC.

In modelling air dispersion of NOx from combustion sources, the source term should be expressed as NO_2, e.g., NOx mass (expressed as NO_2). Some of the exhaust air is made up of NO while some is made up of NO_2. NO will be converted in the atmosphere to NO_2 but this will depend on a number of factors to include Ozone and VOC concentrations. In order to take account of this conversion the following screening can be performed.

Use the following phased approach for assessment:

Worse case scenario treatment

35% for short-term and 70% for long-term average concentration should be considered to assess compliance with the relevant air quality objective.

This is in accordance with recommendations from the Environmental Agency UK for the dispersion modelling of NO_2 emissions from combustion processes, www.environmentagency.gov.uk

Table 4.1 illustrates the tabular results obtained from the assessment for Dublin meteorological station for:

- Worse case scenario treatment as detailed above (for NO_x only).

Maximum predicted GLC's are presented within this table to allow for comparison with Directive 2008/50/EC and SI 271 of 2002. In addition, the predicted ground level concentrations at the selected residential receptors are presented in the Discussion of Results section of the document for all pollutants. A total of 10 individual sensitive receptors were included within the dispersion model and the location of same is presented in *Figure 6.1*. Illustrative contour plots for information purposes only are presented in *Section 6* of this report for each modelled scenario.

Table 4.1. Predicted ground level concentrations for various averaging periods for proposed emission points A2 to A6 for each pollutant beyond the boundary of the facility.

Averaging period	Maximum ground level conc (GLC)
Carbon monoxide - 8 hr maximum GLC (µg/m^3)	1,470
Oxides of nitrogen - 1 hr max 99.79th percentile (µg/m^3)	165
Oxides of nitrogen - Max Annual average (µg/m^3)	28.70
Sulphur dioxide - 1 hr Max 99.73th percentile (µg/m^3)	275
Sulphur dioxide - 24 hr Max 99.18th percentile (µg/m^3)	104
Sulphur dioxide – Max annual average (µg/m^3)	14
Total particulates - 24 hr Max 90.40th percentile (µg/m^3)	20
Total Particulates as PM_{10} - Max annual average (µg/m^3)	7.28
Total Particulates as $PM_{2.5}$ - Max annual average (µg/m^3)	7.28
Hydrogen chloride - 1 hr Max 100th percentile (µg/m^3)	18.50
Hydrogen chloride - 1 hr Max 98th percentile (µg/m^3)	7.0
Hydrogen chloride - Max annual average (µg/m^3)	0.91
Hydrogen fluoride - 1 hr Max 100th percentile (µg/m^3)	6.82
Hydrogen fluoride - 1 hr Max 98th percentile (µg/m^3)	2.45
Hydrogen fluoride - Max annual average (µg/m^3)	0.20

Table 4.2 presents the comparison between model predictions for air quality impacts, baseline air quality concentrations for the compounds and the percentage impact of the air quality impact criterion anywhere in the vicinity of the facility.

4.1 Assessment of air quality impacts for pollutants from proposed emission points A2 to A6

Predictive air dispersion modelling was used to ascertain the maximum ground level concentrations beyond the boundary of the facility of selected worst case pollutant concentration to allow for comparison with the ground level limit values contained in *Tables 2.1 and 2.2*. *Table 4.2* illustrates the results of the dispersion modelling assessment for each pollutant and comparison with the air quality guideline and limit values contained in *Tables 2.1 and 2.2*.

Table 4.2. Comparison between predicted GLC's + baseline national air quality data and limit values contained in *Tables 2.1 and 2.2*.

Identity	Predicted %ile GLC - (µg m^{-3})	Baseline concentration value (µg m^{-3})[1]	Baseline + Maximum predicted GLC (µg m^{-3})	Impact criterion (µg m^{-3})[2]	% of Criterion
Carbon monoxide - 8 hr maximum GLC (µg/m^3)	1,470	1,600	3,070.00	10,000	30.70
Oxides of nitrogen - 1 hr max 99.79th percentile (µg/m^3)	165	32 (Twice annual mean as per EA)	197.00	200	98.50
Oxides of nitrogen - Max Annual average (µg/m^3)	22	16	38.00	40	95.00
Sulphur dioxide - 1 hr Max 99.73th percentile (µg/m^3)	275	8.0 (Twice annual mean as per EA)	283.00	350	80.86
Sulphur dioxide - 24 hr Max 99.18th percentile (µg/m^3)	104	10	114.00	125	91.20
Sulphur dioxide – Max annual average (µg/m^3)	14	4.0	18.00	20	90.00
Total particulates - 24 hr Max 90.40th percentile (µg/m^3)	20	23	43.00	50	86.00
Total Particulates as PM_{10} - Max annual average (µg/m^3)	7.28	23	30.28	40	75.70
Total Particulates as $PM_{2.5}$ - Max annual average (µg/m^3)	7.28	9.0	16.28		65.12
Hydrogen chloride - 1 hr Max 100th percentile (µg/m^3)	18.50	2.70	21.20	750	2.83
Hydrogen chloride - 1 hr Max 98th percentile (µg/m^3)	7.0	2.70	9.70	100	9.70
Hydrogen chloride - Max annual average (µg/m^3)	0.91	2.70	3.61	20	18.05
Hydrogen fluoride - 1 hr Max 100th percentile (µg/m^3)	6.82	0.050	6.87	160	4.29
Hydrogen fluoride - 1 hr Max 98th percentile (µg/m^3)	2.45	0.050	2.50	3.0	83.33
Hydrogen fluoride - Max annual average (µg/m^3)	0.20	0.050	0.25	0.30	83.33

Notes: [1] denotes based on data presented in *Tables 3.1, 3.2, 3.3, 3.4, 3.5, 3.6 and 4.1,*
[2] denotes for impact criterion *see Tables 2.1 and 2.2*

As can be observed in *Table 4.2*, the predicted maximum averaging ground level concentration and baseline concentration are presented as a % of the impact criterion contained in *Tables 2.1 and 2.2*.

4.1.1 Carbon monoxide – Ref Scenario 1

The results for the potential air quality impact for dispersion modelling of CO based on the emission rates in *Tables 3.2 to 3.6* are presented in *Tables 4.1 and 4.2.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 4.1 and 4.2,* the maximum GLC+Baseline for CO from the operation of the facility is 3,070 μg m^{-3} for the maximum 8-hour mean concentration at the 100th percentile. When combined predicted and baseline conditions are compared to the Irish guideline/limit values and EU Limit values set out in SI 271 of 2002 and Directive 2008/50/EC, this is 30.70% of the impact criterion.

In addition, the predicted ground level concentration of Carbon monoxide at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

4.1.2 Oxides of nitrogen – Ref Scenario 2 and 3

The results for the potential air quality impact for dispersion modelling of NO_X as NO_2 based on the emission rates in *Tables 3.2 to 3.6* are presented in *Tables 4.1 and 4.2.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 4.1 and 4.2,* the maximum GLC+Baseline for NO_2 from the operation of the facility is 197 μg m^{-3} for the maximum 1-hour mean concentration at the 99.79th percentile. When combined predicted and baseline conditions are compared to SI 271 of 2002 and Directive 2008/50/EC, this is 98.50% of the impact criterion.

An annual average was also generated to allow comparison with values contained in SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 38 μg/m^3. When compared the annual average NO_2 air quality impact criterion is 95% of the impact criterion.

In addition, the predicted ground level concentration of Oxides of nitrogen at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

4.1.3 Sulphur dioxide – Ref Scenario 4, 5 and 6

The results for the potential air quality impact for dispersion modelling of SO_2 based on the emission rates in *Tables 3.2 to 3.6* are presented in *Tables 4.1 and 4.2.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 4.1 and 4.2,* the maximum GLC+Baseline for SO_2 from the operation of the facility is 283 and 114 μg m^{-3} for the maximum 1-hour and 24 hr mean concentration at the 99.73th and 99.18th percentile respectively. When combined predicted and baseline conditions are compared to SI 271 of 2002 and Directive 2008/50/EC, this is 80.86 and 91.20% of the set target limits established for the 1 hour and 24 hour assessment criteria.

An annual average was also generated to allow comparison with SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 18 μg/m^3. When compared the annual average SO_2 air quality impact criterion is 90% of the impact criterion.

In addition, the predicted ground level concentration of Sulphur dioxide at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

4.1.4 Particulate matter – Ref Scenario 7, 8 and 9

The results for the potential air quality impact for dispersion modelling of Particulate matter based on the emission rates in *Tables 3.2 to 3.6* are presented in *Tables 4.1 and 4.2.* Results are presented for the maximum predicted percentile emission regime. As can be observed in *Tables 4.1 and 4.2,* the maximum GLC+Baseline for Particulate matter 10μm from the operation of the facility is 43μg m^{-3} for the maximum 24-hour mean concentration at the 90.40th percentile. When combined predicted and baseline conditions are compared to Directive 2008/50/EC, this is 86% of the impact criterion.

An annual average was also generated to allow comparison with the SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 30.28 μg/m^3. When compared, the annual average Particulate matter air quality impact is 75.70 % of the impact criterion.

An annual average was also generated for $PM_{2.5}$ to allow comparison with Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 16.28 μg/m^3. When compared, the annual average $PM_{2.5}$ air quality impact is 65.12% of the impact criterion.

In addition, the predicted ground level concentration of Particulate matter at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

4.1.5 Hydrogen chloride – Ref Scenario 10, 11 and 12

The results for the potential air quality impact for dispersion modelling of HCL based on the emission rates in *Tables 3.2 to 3.6* are presented in *Tables 4.1 and 4.2*. HCl modelling results indicate that the ambient ground level concentrations are below the relevant air quality guideline for the protection of human health for HCl when the facility is in operation. Thus, no adverse impact on public health or the environment is envisaged to occur under these conditions at or beyond the facility boundary. Emissions at maximum operations equate to ambient HCl concentrations (including background concentrations) which are from 2.83 to 18.05% of the maximum impact criterion for both the 1 hr and annual average period.

In addition, the predicted ground level concentration of Hydrogen chloride at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

4.1.6 Hydrogen fluoride – Ref Scenario 13, 14 and 15

The results for the potential air quality impact for dispersion modelling of HF based on the emission rates in *Tables 3.2 to 3.6* are presented in *Tables 4.1 and 4.2*. HF modelling results indicate that the ambient ground level concentrations are below the relevant air quality guideline for the protection of human health for HF when the facility is in operation. Thus, no adverse impact on public health or the environment is envisaged to occur under these conditions at or beyond the facility boundary. Emissions at maximum operations equate to ambient HF concentrations (including background concentrations) which are from 4.29% to 83.33% of the maximum impact criterion for both the 1 hr and annual average period.

In addition, the predicted ground level concentration of Hydrogen fluoride at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

Table 4.3. Predicted ground level concentration (excluding baseline) of each pollutant at each identified sensitive receptor locations R1 to R10 for Scenarios 1 to 8 (*see Section 4 and Figure 6.1*).

Receptor identity	X coord (m)	Y coord (m)	Scen 1 - (µg/m^3)	Scen 2 - (µg/m^3)	Scen 3 - (µg/m^3)	Scen 4 - (µg/m^3)	Scen 5 - (µg/m^3)	Scen 6 - (µg/m^3)	Scen 7 - (µg/m^3)	Scen 8 -(µg/m^3)
R1	297498.3	269436.6	157.07	36.99	2.00	53.37	11.99	1.51	1.85	0.60
R2	297573.5	269493.2	180.06	34.47	2.25	52.36	16.02	1.69	2.19	0.68
R3	297654.7	269498.3	179.27	38.49	3.36	53.73	20.33	2.49	3.54	1.01
R4	297395.3	269510.8	134.86	33.84	2.28	47.52	15.50	1.69	1.94	0.68
R5	297355.4	269515	143.37	27.10	2.40	39.02	14.87	1.80	2.10	0.70
R7	297281.2	269519.7	153.16	25.19	2.64	39.71	14.09	2.04	2.65	0.77
R8	297299.3	269380.5	215.26	52.45	4.77	75.50	25.20	3.62	4.62	1.43
R9	297744.7	269499.2	209.70	36.45	4.10	52.04	21.19	3.01	3.78	1.24
R10	297629.6	268891.5	198.14	43.07	3.17	63.37	19.90	2.45	2.89	0.85

Table 4.3 continued. Predicted ground level concentration (excluding baseline) of each pollutant at each identified sensitive receptor locations R1 to R10 for Scenarios 9 to 15 (*see Section 4 and Figure 6.1*).

Receptor identity	X coord (m)	Y coord (m)	Scen 9 - (µg/m^3)	Scen 10 - (µg/m^3)	Scen 11 - (µg/m^3)	Scen 12 - (µg/m^3)	Scen 13 - (µg/m^3)	Scen 14 - (µg/m^3)	Scen 15 - (µg/m^3)
R1	297498.3	269436.6	0.60	3.93	0.91	0.06	1.53	0.38	0.02
R2	297573.5	269493.2	0.68	3.33	1.06	0.07	1.37	0.43	0.03
R3	297654.7	269498.3	1.01	4.57	1.33	0.10	1.81	0.52	0.04
R4	297395.3	269510.8	0.68	4.42	0.96	0.07	1.69	0.37	0.03
R5	297355.4	269515	0.70	2.66	0.98	0.07	0.80	0.38	0.03
R7	297281.2	269519.7	0.77	2.83	1.04	0.08	0.96	0.39	0.03
R8	297299.3	269380.5	1.43	4.51	1.59	0.14	1.94	0.62	0.06
R9	297744.7	269499.2	1.24	4.09	1.31	0.12	1.59	0.53	0.05
R10	297629.6	268891.5	0.85	4.30	1.56	0.10	1.33	0.54	0.04

5. Conclusions

Odour Monitoring Ireland was commissioned by Panda Waste to perform a dispersion modelling study in order to provide supporting information for a license review of new processes to be located in Bauparc Business Park, Navan, Co. Meath. Following a detailed impact and dispersion modelling assessment, it was demonstrated that no significant environmental impact will exist if the source characteristics and emission limit value in the waste gases are achieved.

The following conclusions are drawn from the study:

1. The assessment was carried out to provide information in line with standard information to be provided to the EPA for license reviews for such projects.

2. Specific dispersion modelling was performed for Carbon monoxide, Oxides of nitrogen, Sulphur dioxide, Particulate matter, Hydrogen chloride and Hydrogen fluoride. The combined cumulative impact of odour for the facility has been dealt with in another document which has been submitted to the EPA.

3. With regards to Carbon monoxide, the maximum GLC+Baseline for CO from the operation of the facility is 3,070 $\mu g\ m^{-3}$ for the maximum 8-hour mean concentration at the 100th percentile. When combined predicted and baseline conditions are compared to the Irish guideline/limit values and EU Limit values set out in SI 271 of 2002 and Directive 2008/50/EC, this is 30.70% of the impact criterion. In addition, the predicted ground level concentration of Carbon monoxide at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

4. With regards to Oxides of nitrogen, the maximum GLC+Baseline for NO_2 from the operation of the facility is 197 $\mu g\ m^{-3}$ for the maximum 1-hour mean concentration at the 99.79th percentile. When combined predicted and baseline conditions are compared to SI 271 of 2002 and Directive 2008/50/EC, this is 98.50% of the impact criterion. An annual average was also generated to allow comparison with values contained in SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 38 $\mu g/m^3$. When compared the annual average NO_2 air quality impact criterion is 95% of the impact criterion. In addition, the predicted ground level concentration of Oxides of nitrogen at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

5. With regards to Sulphur dioxide, the maximum GLC+Baseline for SO_2 from the operation of the facility is 283 and 114 $\mu g\ m^{-3}$ for the maximum 1-hour and 24 hr mean concentration at the 99.73th and 99.18th percentile respectively. When combined predicted and baseline conditions are compared to SI 271 of 2002 and Directive 2008/50/EC, this is 80.86 and 91.20% of the set target limits established for the 1 hour and 24 hour assessment criteria. An annual average was also generated to allow comparison with SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 18 $\mu g/m^3$. When compared the annual average SO_2 air quality impact criterion is 90% of the impact criterion. In addition, the predicted ground level concentration of Sulphur dioxide at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

6. With regards to Particulate matter, the maximum GLC+Baseline for Particulate matter 10μm from the operation of the facility is 43$\mu g\ m^{-3}$ for the maximum 24-hour mean concentration at the 90.40th percentile. When combined predicted and baseline conditions are compared to Directive 2008/50/EC, this is 86% of the impact criterion.

An annual average was also generated to allow comparison with the SI 271 of 2002 and Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 30.28 $\mu g/m^3$. When compared, the annual average Particulate matter air quality impact is 75.70 % of the impact criterion. An annual average was also generated for $PM_{2.5}$ to allow comparison with Directive 2008/50/EC. The maximum predicted annual average ground level concentration in the vicinity of the facility was 16.28 $\mu g/m^3$. When compared, the annual average $PM_{2.5}$ air quality impact is 65.12% of the impact criterion. In addition, the predicted ground level concentration of Particulate matter at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

7. With regards to Hydrogen chloride, emissions at maximum operations equate to ambient HCl concentrations (including background concentrations) which are from 2.83 to 18.05% of the maximum impact criterion for both the 1 hr and annual average period. In addition, the predicted ground level concentration of Particulate matter at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

8. With regards to Hydrogen fluoride emissions at maximum operations equate to ambient HF concentrations (including background concentrations) which are from 4.29% to 83.33% of the maximum impact criterion for both the 1 hr and annual average period. In addition, the predicted ground level concentration of Particulate matter at each of the 10 sensitive receptors is presented in *Table 4.3*. As can be observed, all predicted ground level concentrations are well within the ground level concentration limit values contained in *Tables 2.1 and 2.2*.

9. The overall modelling indicates that the facility will not result in any significant impact on air quality in the surrounding area with all ground level concentrations of pollutants well within their respective ground level concentration limit values.

6. *Appendix I* - Air dispersion modelling contour plots (Process contributions and illustrative purposes only).

These contour maps are for illustrative purposes only.

6.1 Site layout drawing and location of proposed emission points – A2 to A6

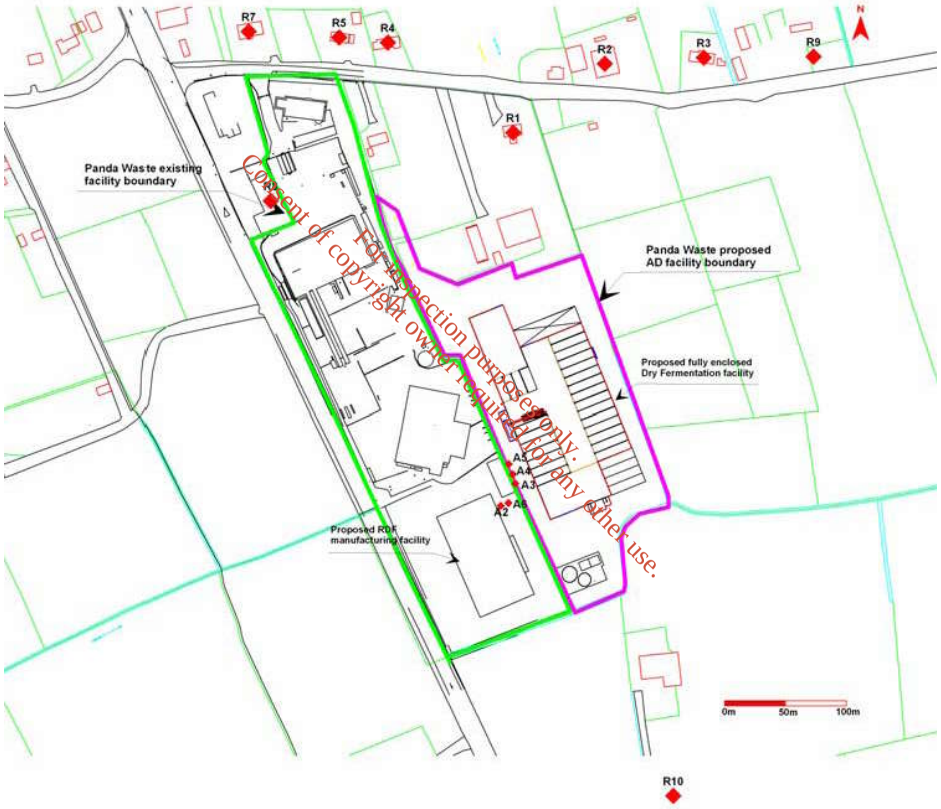


Figure 6.1. Plan view facility layout drawings for Panda Waste Ltd facility including specific location of proposed emission points A2 to A6 and nearest sensitive receptors R1 to R10.

6.2. Dispersion modelling contour plots for Scenarios 1 to 15 – Worst case meteorological year Dublin 2004

6.2.1 Scenario 1 - Carbon monoxide

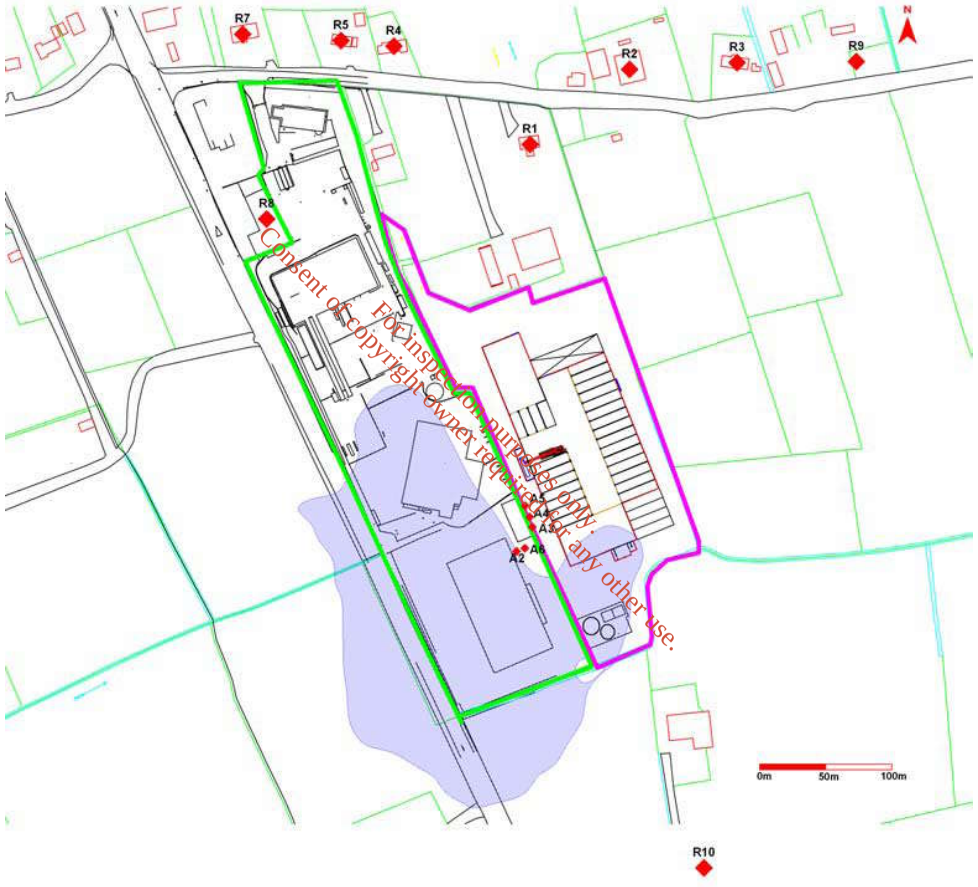


Figure 6.2. Predicted 8 hr average CO ground level concentration of 500 µg/m^3 ( ) for cumulative emissions from emission points A2 to A6 for Scenario 1 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

6.2.2 Scenario 2 and 3 - Oxides of nitrogen

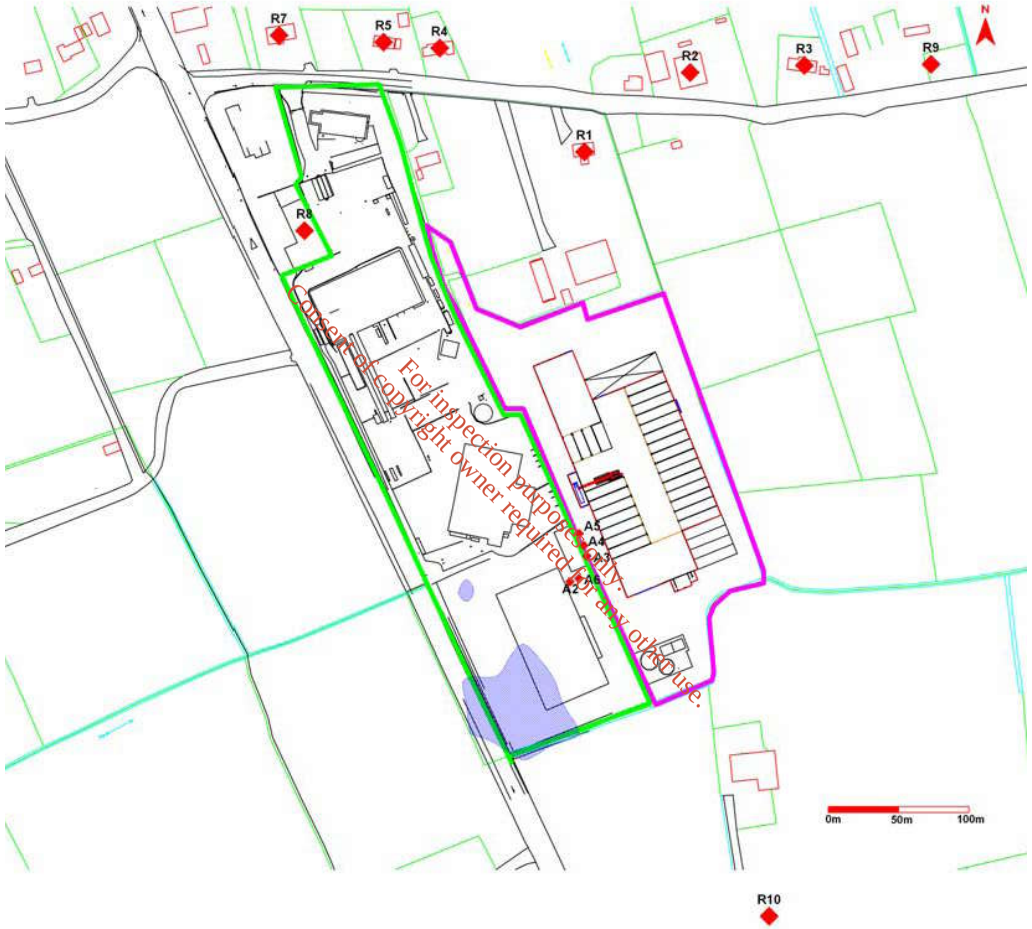


Figure 6.3. Predicted 99.79th percentile of 1 hr averages for NO_2 ground level concentration of 135 µg/m^3 (▬) for cumulative emission for Scenario 2 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

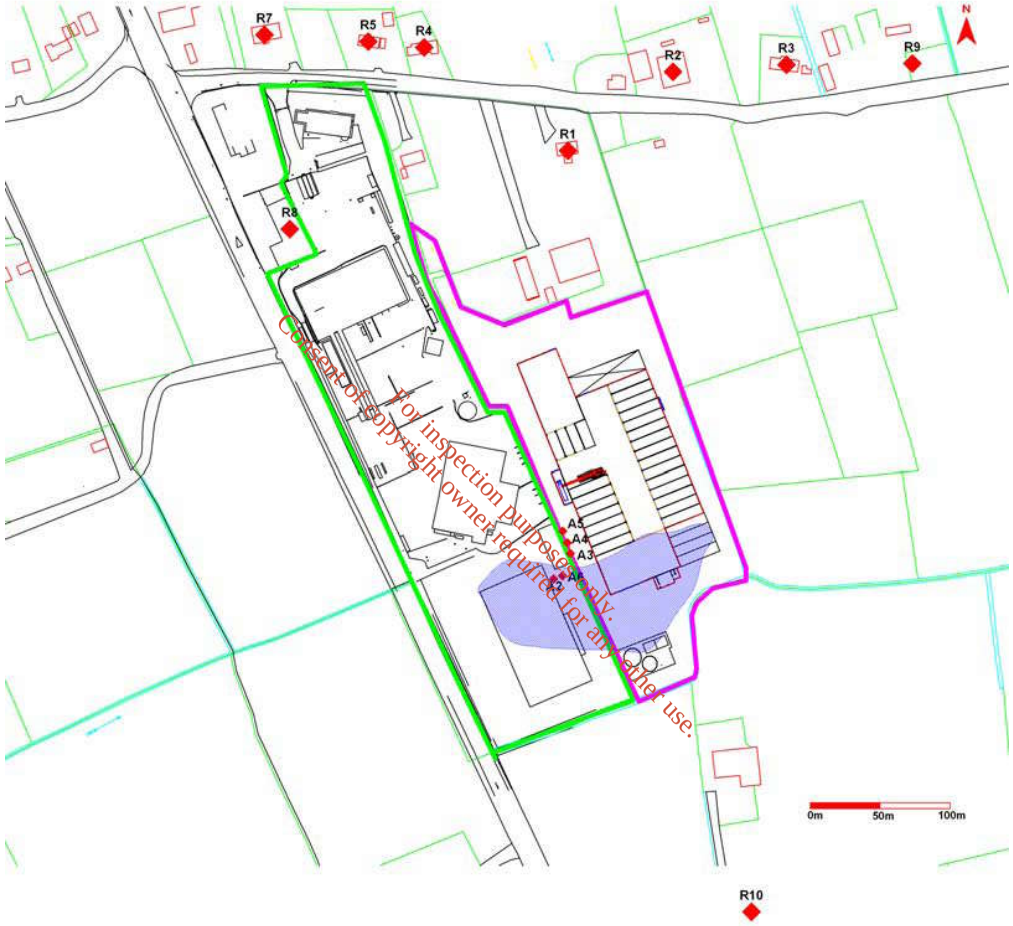


Figure 6.4. Predicted annual average NO_2 ground level concentration of 21 $\mu g/m^3$ (▬) for cumulative emissions for Scenario 3 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

6.2.3 Scenario 4, 5 and 6 - Sulphur dioxide

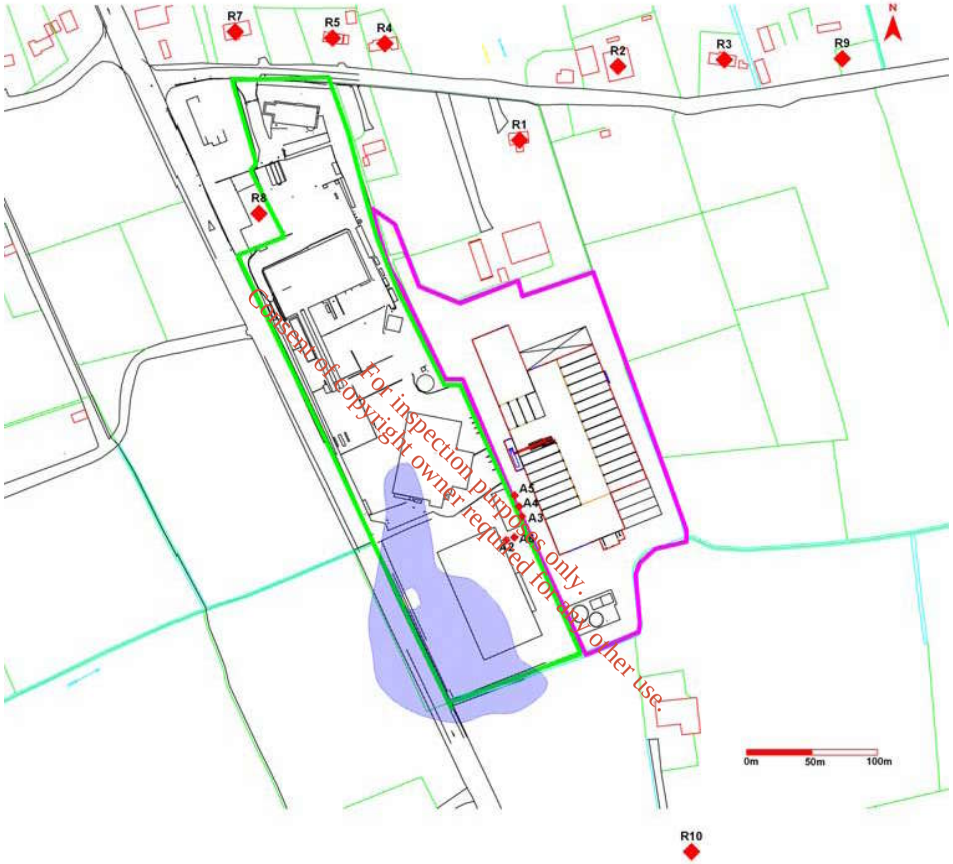


Figure 6.5. Predicted 99.73th percentile of 1 hr averages for SO_2 ground level concentration of 150 μg/m^3 (▬) for cumulative emission for Scenario 4 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

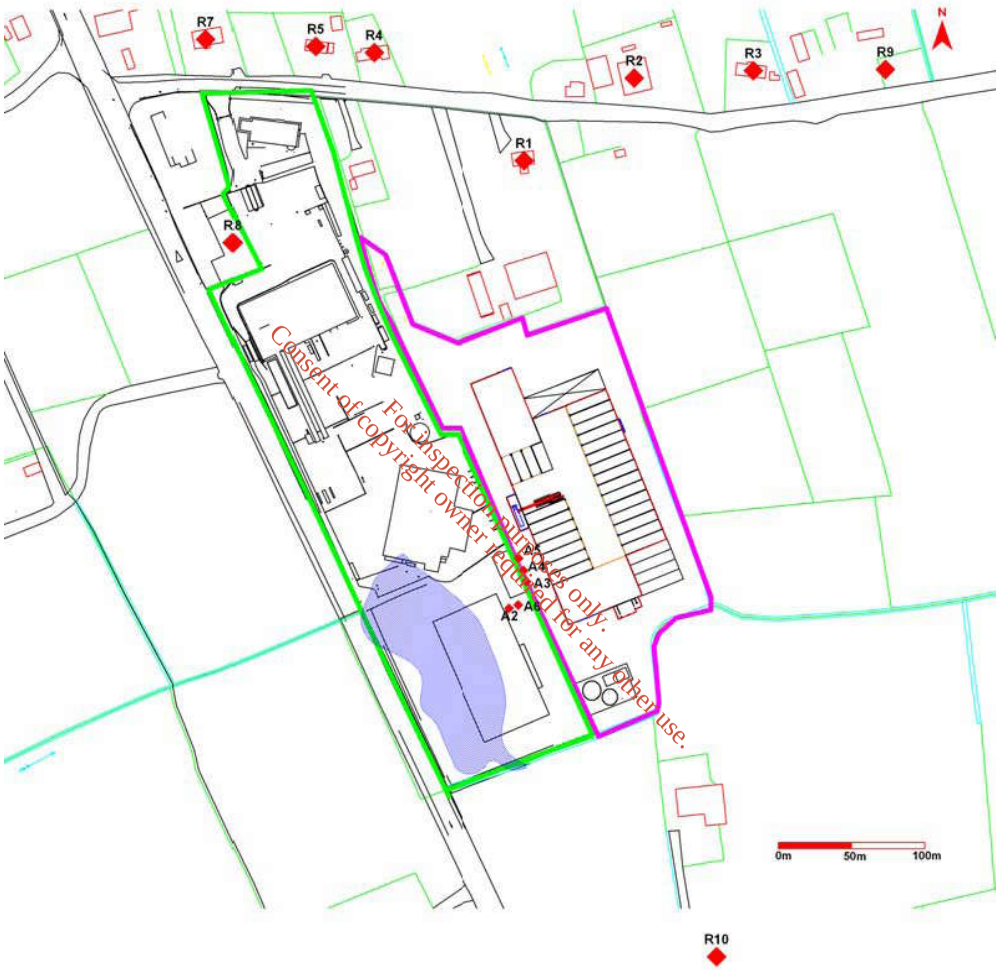


Figure 6.6. Predicted 99.18th percentile of 24 hr averages for SO_2 ground level concentration of 75 μg/m^3 (▬) for cumulative emission for Scenario 5 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

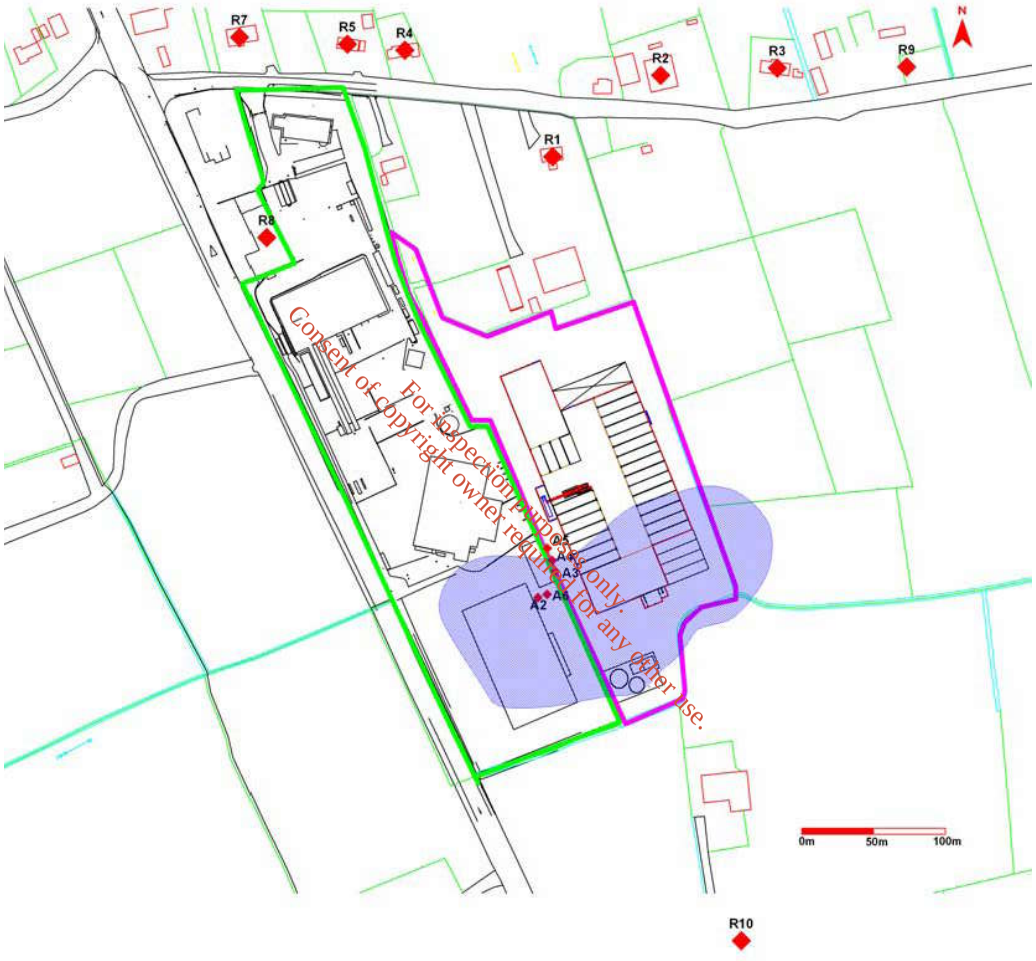


Figure 6.7. Predicted annual average SO_2 ground level concentration of 9 μg/m^3 (▬) for cumulative emissions for Scenario 6 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

6.2.4 Scenario 7, 8 and 9 - Total particulates

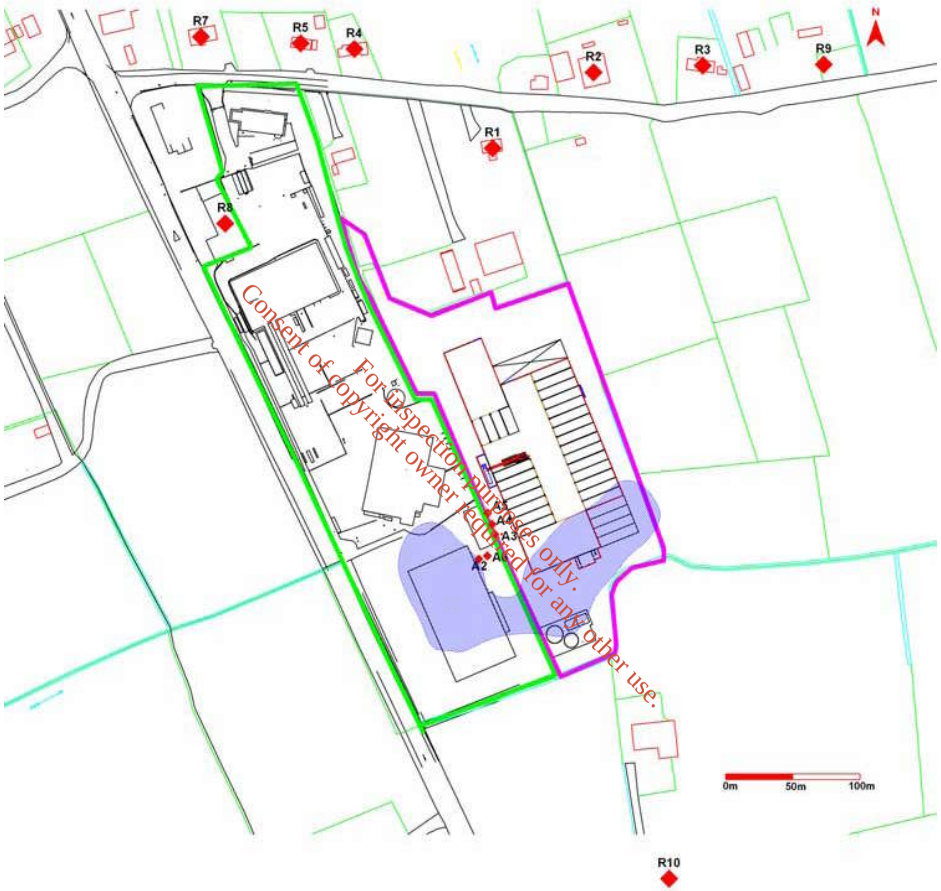


Figure 6.8. Predicted 90.40th percentile of 24 hr averages for Total particulates ground level concentration of 15 μg/m^3 (▬) for cumulative emission for Scenario 7 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

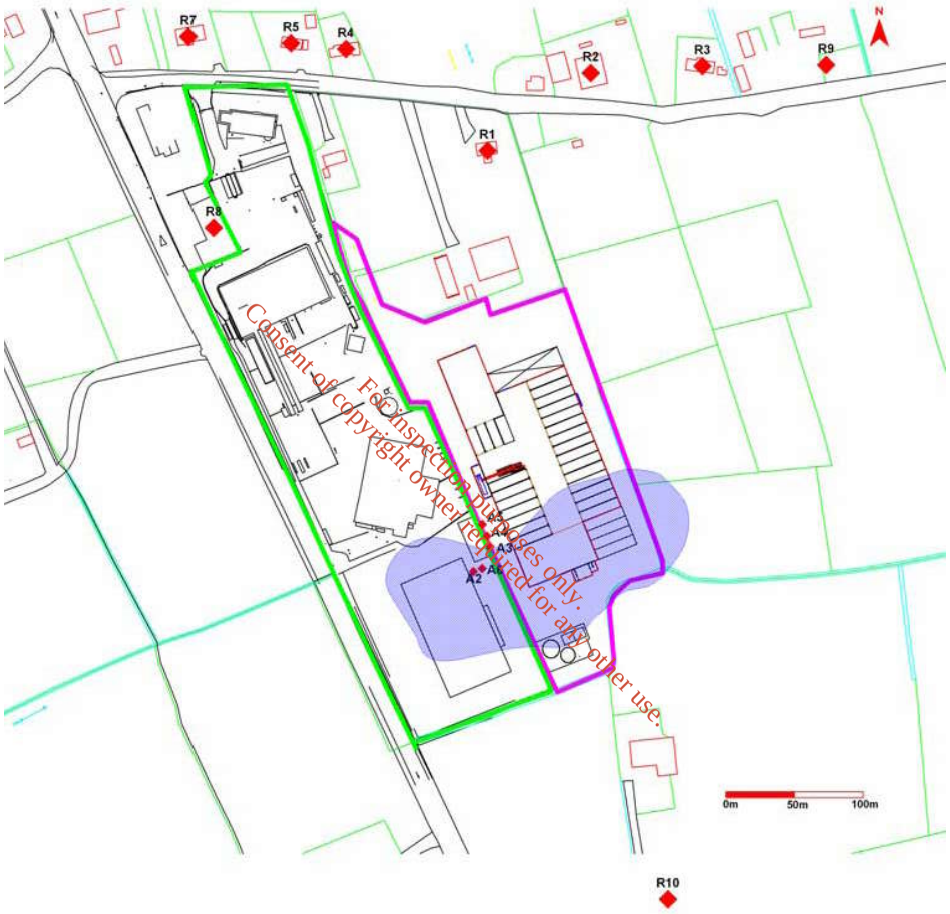


Figure 6.9. Predicted annual average Total particulates ground level concentration of 5.0 μg/m^3 (▬) for cumulative emissions for Scenario 8 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

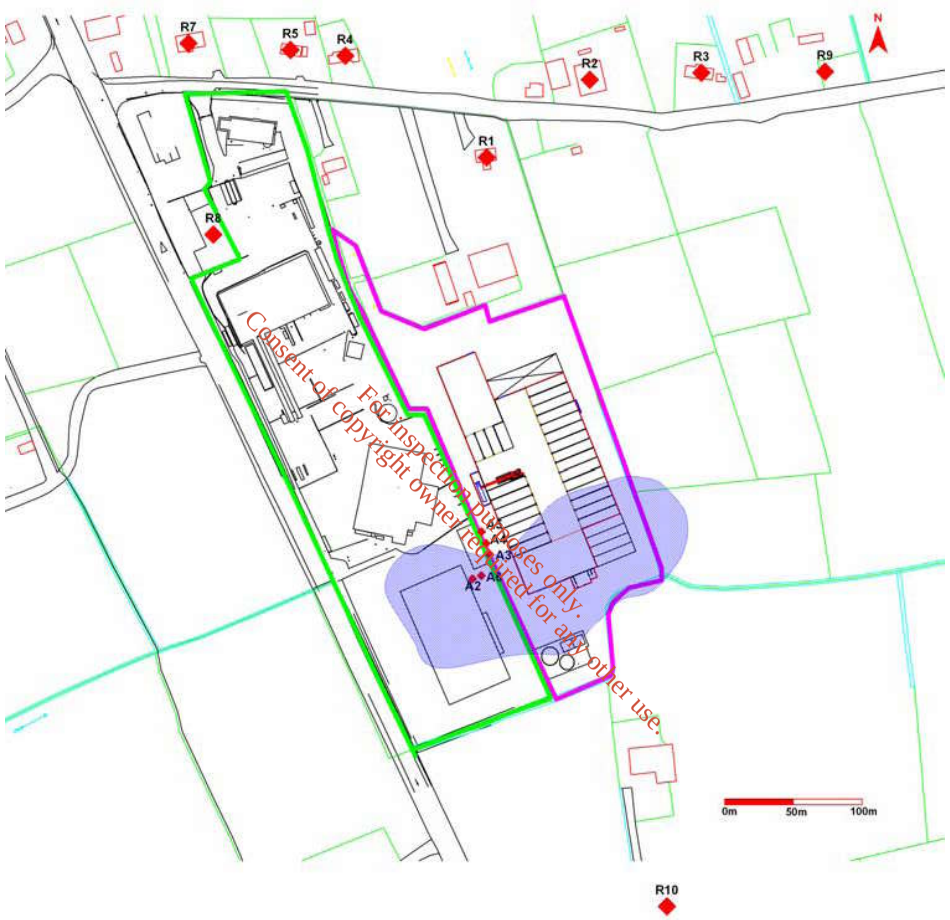


Figure 6.10. Predicted annual average Total particulates as $PM_{2.5}$ ground level concentration of 5.0 μg/m^3 (▬) for cumulative emissions for Scenario 9 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

6.2.5 Scenario 10, 11 and 12 – Hydrogen chloride

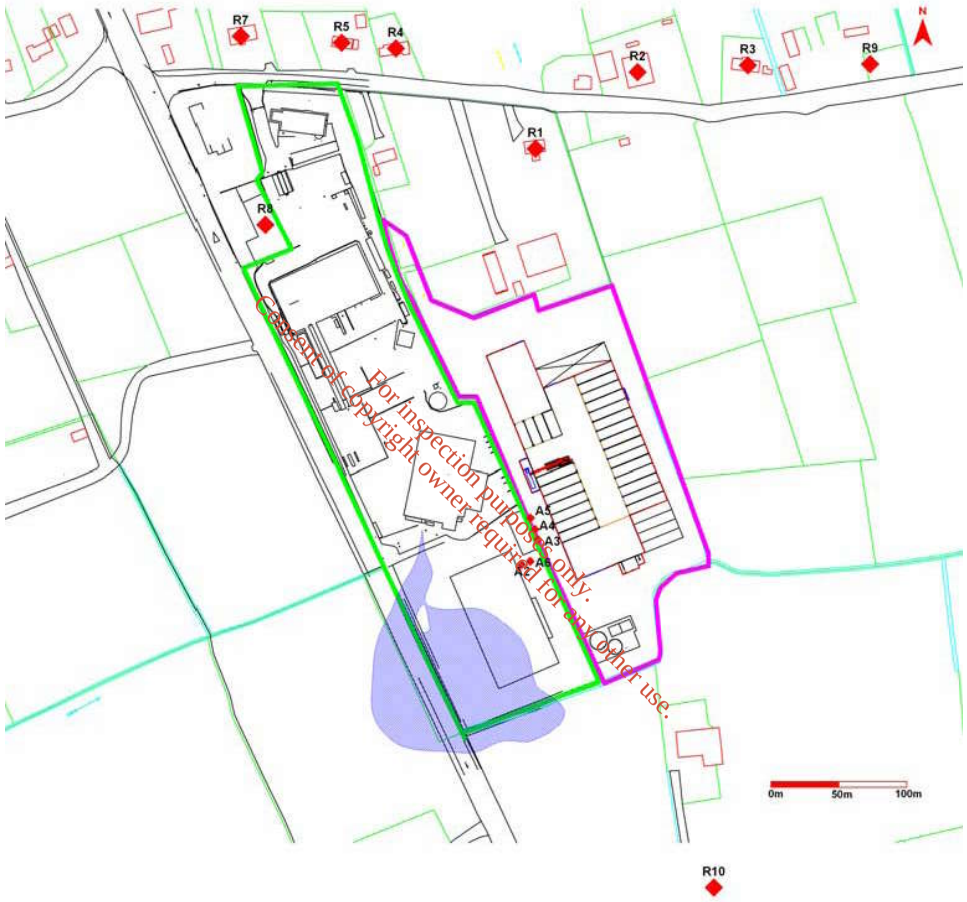


Figure 6.11. Predicted 100th percentile of 1 hr averages for Hydrogen chloride ground level concentration of 10 μg/m^3 (▬) for cumulative emission for Scenario 10 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

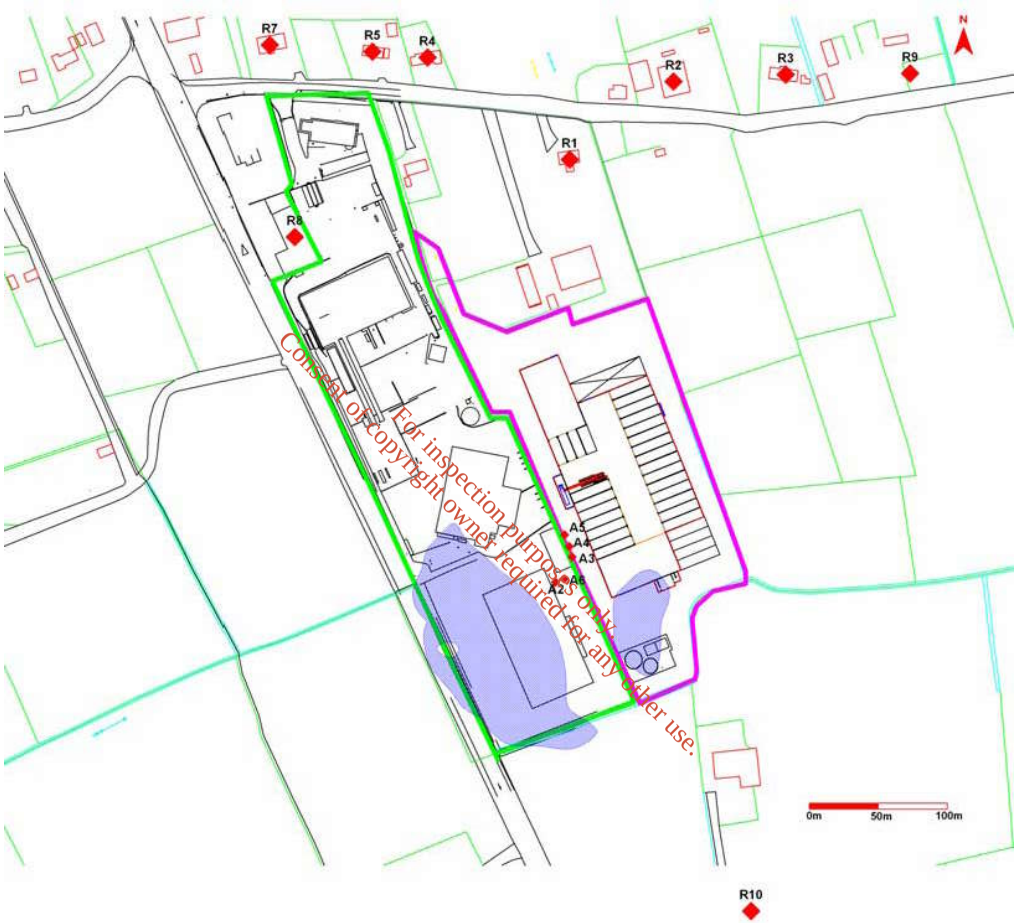


Figure 6.12. Predicted 98th percentile of 1 hr averages for Hydrogen chloride ground level concentration of 5 μg/m^3 ( ) for cumulative emission for Scenario 11 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

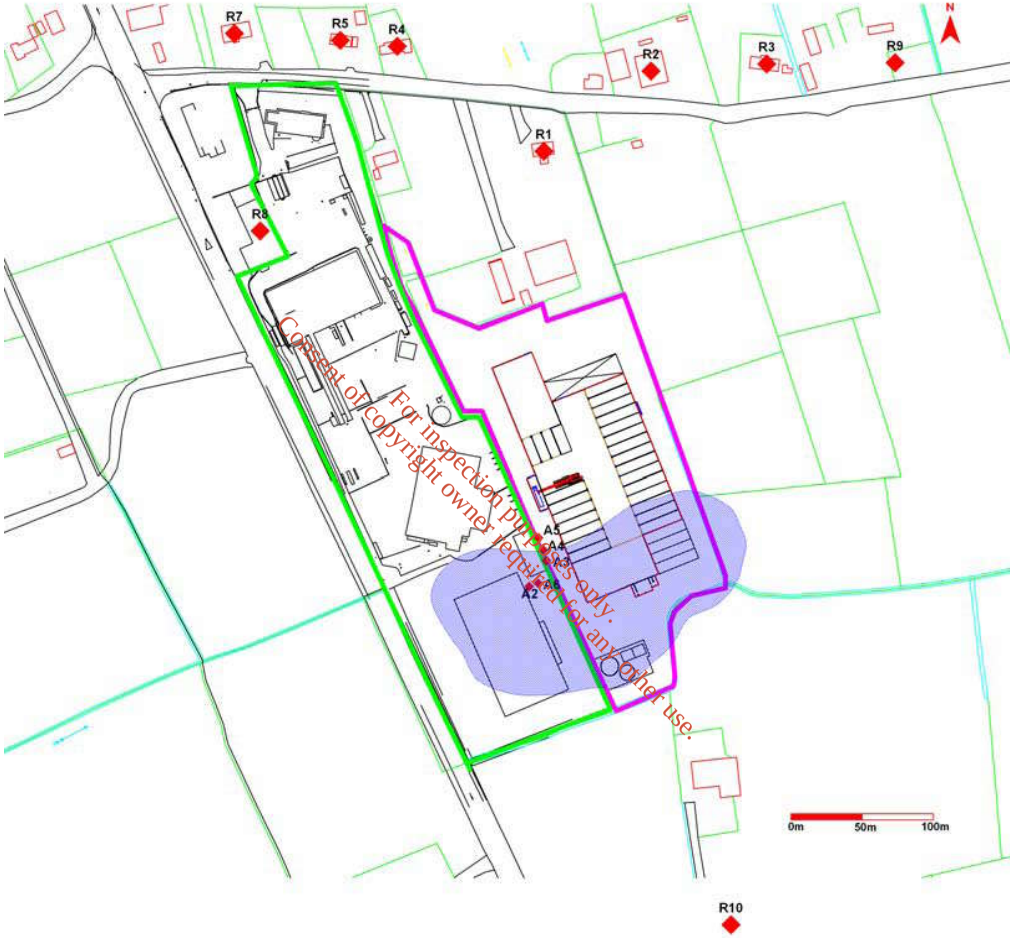


Figure 6.13. Predicted annual average Hydrogen chloride ground level concentration of 0.50 μg/m^3 (▬) for cumulative emissions for Scenario 12 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

6.2.6 Scenario 13, 14 and 15 – Hydrogen fluoride

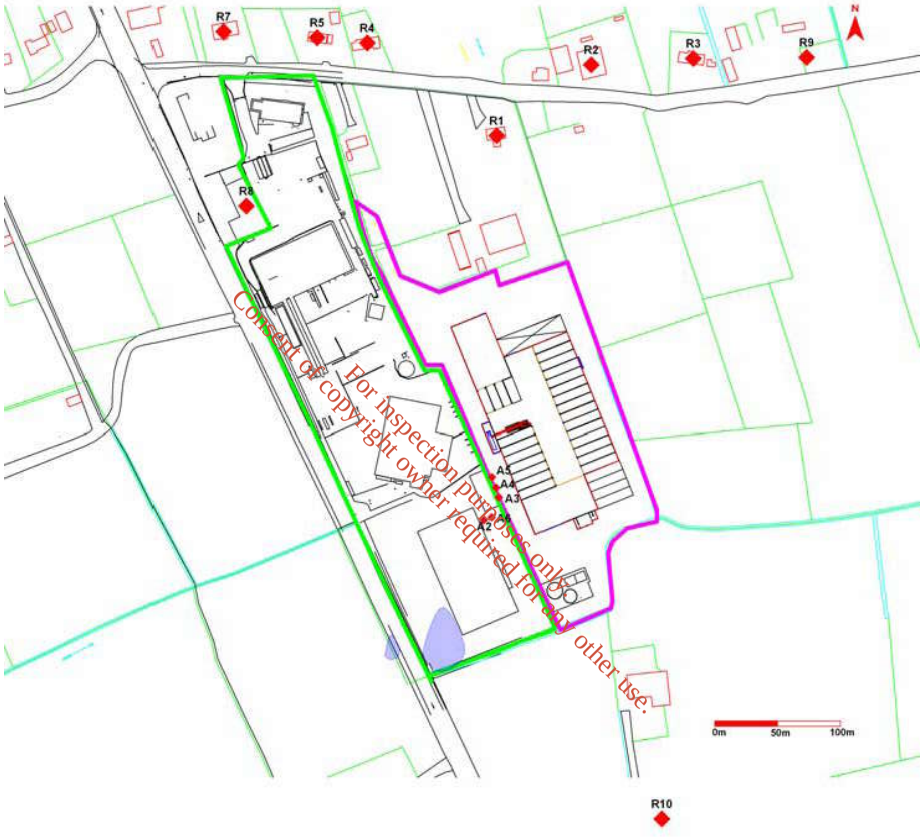


Figure 6.14. Predicted 100th percentile of 1 hr averages for Hydrogen fluoride ground level concentration of 5 μg/m^3 (▬) for cumulative emission for Scenario 13 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

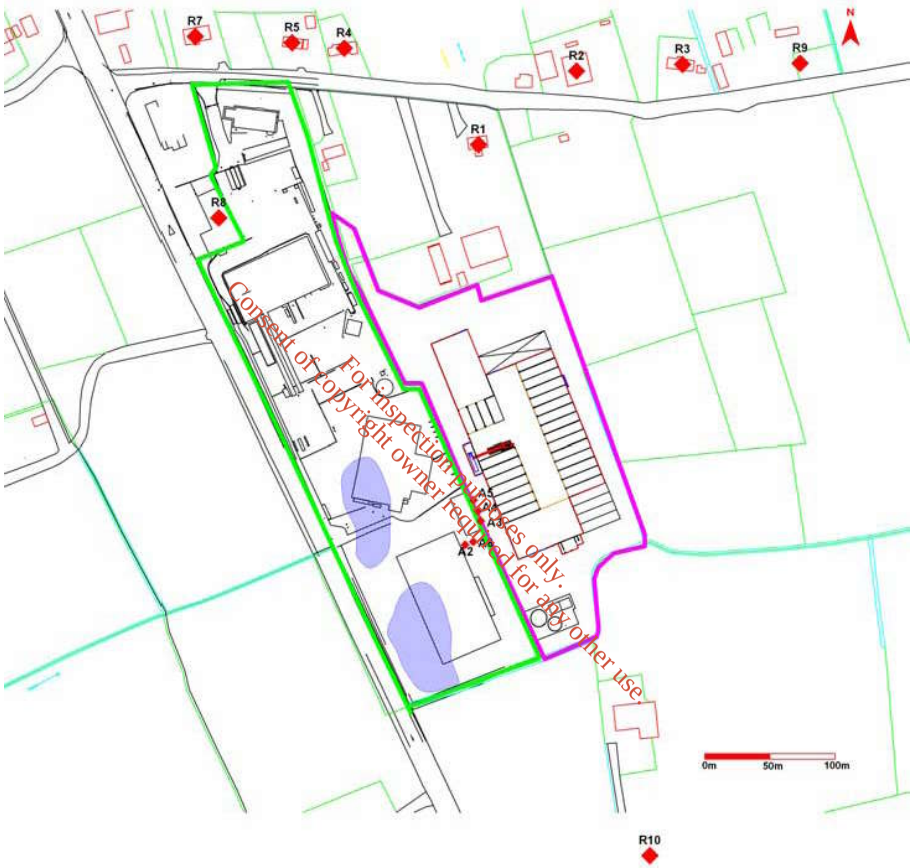


Figure 6.15. Predicted 98th percentile of 1 hr averages for Hydrogen fluoride ground level concentration of 2 μg/m^3 (▬) for cumulative emission for Scenario 14 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

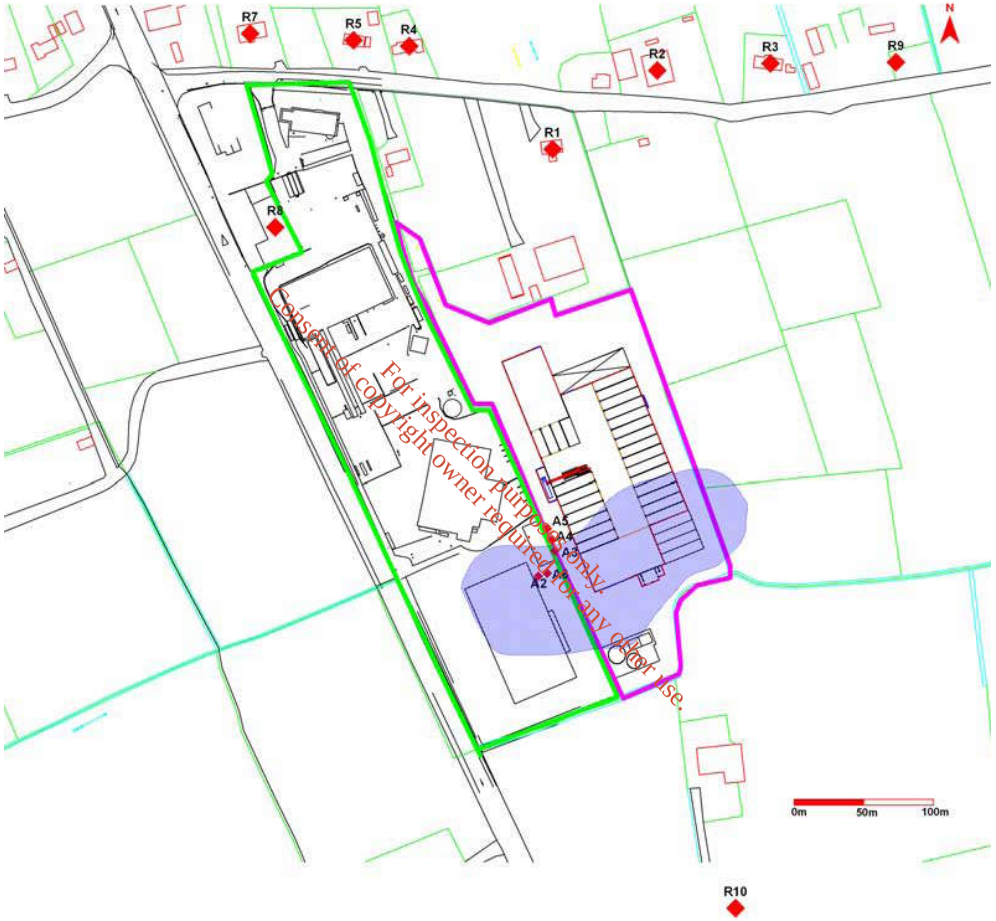


Figure 6.16. Predicted annual average Hydrogen fluoride ground level concentration of 0.20 μg/m^3 ( ) for cumulative emissions for Scenario 15 for Dublin Airport meteorological station (worst case year 2004) - 24 hr plant operation.

7. *Appendix II* - Meteorological data used within the Dispersion modelling study.

Meteorological file Dublin Airport 2000 to 2006 inclusive

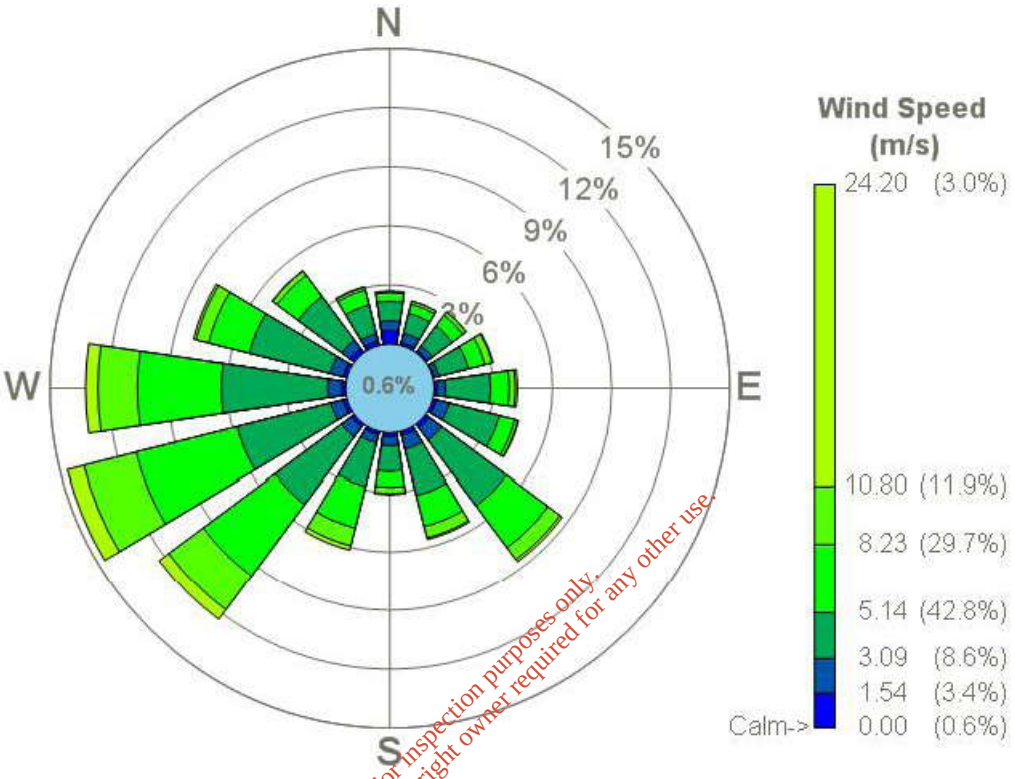


Figure 7.1. Schematic illustrating windrose for meteorological data used for atmospheric dispersion modelling, Dublin Airport 2000 to 2006 inclusive.

Table 7.1. Cumulative wind speed and direction for meteorological data used for atmospheric dispersion modelling Dublin Airport 2000 to 2006 inclusive.

Cumulative Wind Speed Categories							
Relative Direction	**> 1.54**	**>3.09**	**>5.14**	**>8.23**	**> 10.80**	**< 10.80**	**Total**
0	0.67	0.50	0.99	0.44	0.07	0.02	2.70
22.5	0.15	0.48	1.04	0.48	0.16	0.00	2.31
45	0.11	0.31	1.27	0.67	0.21	0.01	2.57
67.5	0.07	0.24	1.55	0.86	0.38	0.05	3.15
90	0.13	0.44	2.28	0.95	0.31	0.11	4.22
112.5	0.17	0.68	2.62	0.80	0.16	0.04	4.48
135	0.22	0.79	4.10	2.61	0.76	0.14	8.63
157.5	0.22	0.70	2.39	1.61	0.58	0.08	5.58
180	0.20	0.45	1.30	0.77	0.32	0.05	3.09
202.5	0.17	0.42	2.26	2.14	0.93	0.23	6.15
225	0.19	0.62	4.21	4.53	2.18	0.61	12.34
247.5	0.20	0.64	4.91	5.29	2.73	0.87	14.63
270	0.19	0.73	5.39	4.27	2.00	0.63	13.20
292.5	0.19	0.68	4.23	2.13	0.66	0.13	8.03
315	0.26	0.53	2.77	1.33	0.26	0.04	5.20
337.5	0.23	0.37	1.51	0.78	0.15	0.04	3.07
Total	**3.39**	**8.58**	**42.82**	**29.66**	**11.86**	**3.04**	**99.36**
Calms	--	-	-	-	-	-	**0.56**
Missing	-	-	-	-	-	-	**0.08**
Total	**-**	**-**	**-**	**-**	**-**	**-**	**100.00**

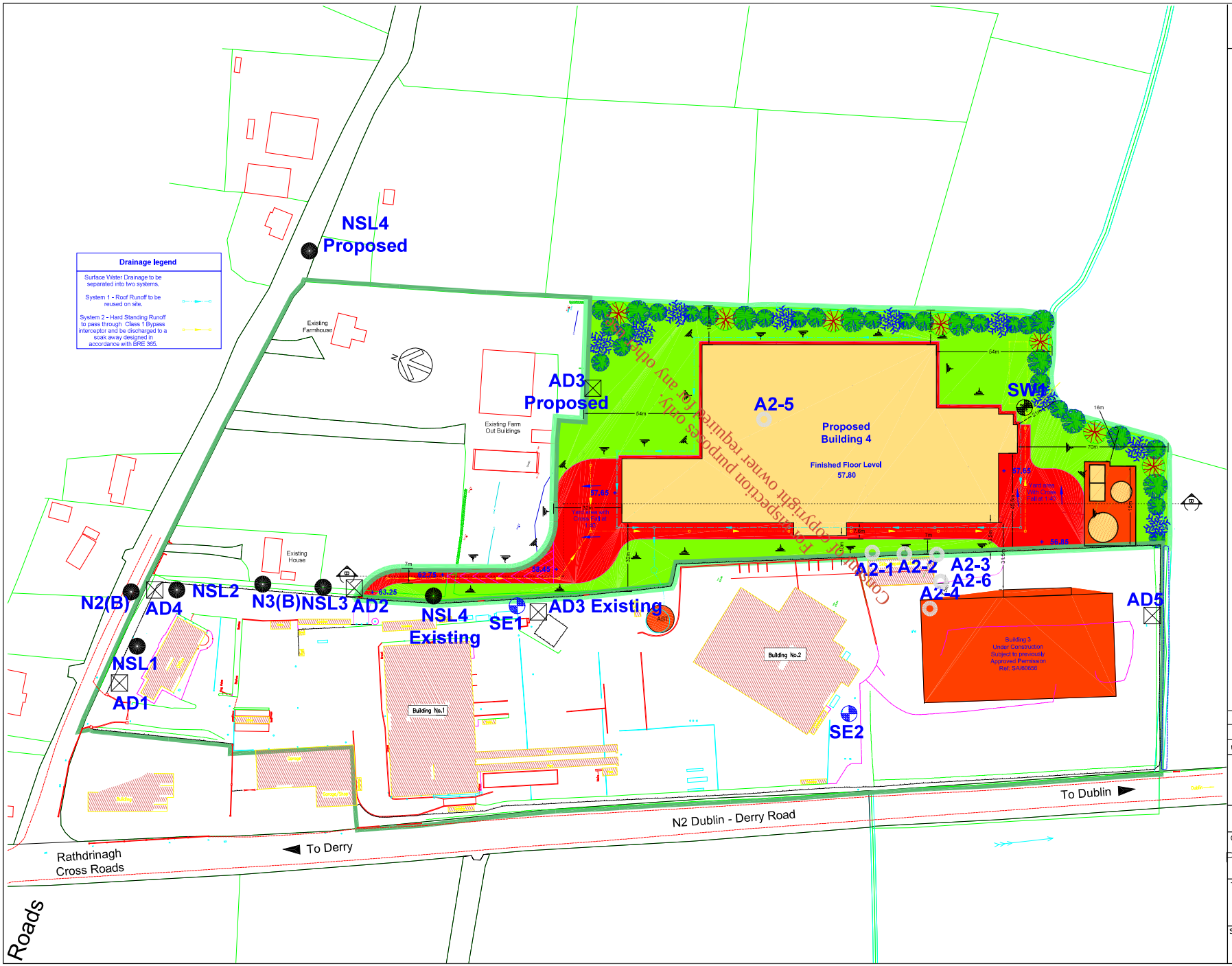
8. *Appendix III* - Checklist for EPA requirements for air dispersion modelling reporting

Table 8.1. EPA checklist as taken from their air dispersion modelling requirements report.

Item	Yes/No	Reason for omission/Notes
Location map	Section 6	-
Site plan	Section 6	-
List of pollutants modelled and relevant air quality guidelines	Yes	-
Details of modelled scenarios	Yes	-
Model description and justification	Yes	-
Special model treatments used	Yes	-
Table of emission parameters used	Yes	-
Details of modelled domain and receptors	Yes	-
Details of meteorological data used (including origin) and justification	Yes	-
Details of terrain treatment	Yes	-
Details of building treatment	Yes	-
Details of modelled wet/dry deposition	N/A	-
Sensitivity analysis	Yes	Five years of hourly sequential data screened from nearest valid met station-Dublin Airport 2002 to 2006. Due to the fact of simple terrain in the vicinity of the emission point no terrain effect required or accounted for within the model.
Assessment of impacts	Yes	Pollutant emissions assessment from process identified.
Model input files	No	DVD will be sent upon request. Files are a total of 2.2 GB in size.

APPENDIX 3

Emission Point Drawing



NOTES

LEGEND:

- Denotes Sewer Monitoring Location
- Denotes Surface Emission/Monitoring Location
- Denotes Noise Monitoring Locations
- Denotes Air Emission/Monitoring Point
- Denotes Dust Monitoring point

#	I.D.	EASTING	NORTHING
1	AD-1	297300	269480
2	AD-2	297374	269422
3	AD-3	297481	269324
4	AD-4	297352	269483
5	AD-5	297500	269028
6	NSL-1	297303	269484
7	NSL-2	297357	269479
8	NSL-3	297371	269430
9	NSL-4	297526	269481
10	N2(B)	297351	269487
11	N3(B)	297372	269437
12	SE-1	297406	269316
13	SE-2	297411	269151
14	SW-1	297585	269130
15	A2-1	297491	269163
16	A2-2	297498	269145
17	A2-3	297507	269126
18	A2-4	297481	269139
19	A2-5	297551	269250
20	A2-6	297489	269140

REV	DATE	DESCRIPTION	DRN	CHKD	APP
B	15/04/2011	ART 14	MW	JOC	
A	18/09/09	ISSUE	MW	JOC	••

O' Callaghan Moran & Associates.
Granary House, Rutland Street,
Cork, Ireland.
Tel. (021) 4321521 Fax. (021) 4321522
email : ocm@indigo.ie

CLIENT

PANDA WASTE SERVICES LTD

TITLE

PROPOSED
MONITORING & EMISSION
LOCATIONS

SCALE	DRAWING No.	REV.
1:600 A3	3	A

DOS Filename : *********

APPENDIX 4

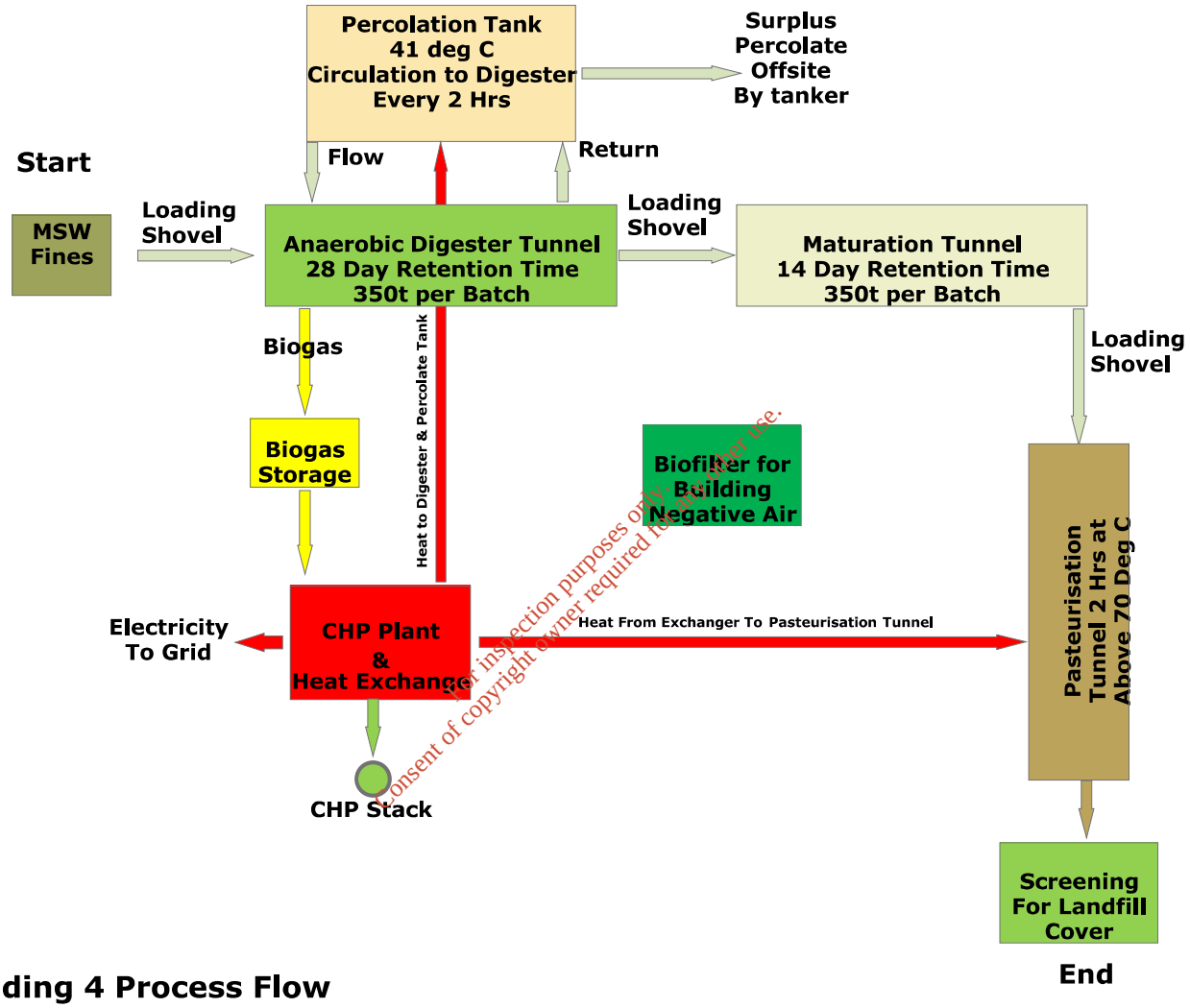
EWC Codes

EWC Codes

Household	C & I	C & D	Compostables
200101	010101	170101	200108
200102	010102	170102	200125
200108	010306	170103	200201
200110	010308	170107	190503
200111	010309	170201	160306
200125	010408	170202	190809
201034	010409	170203	
200136	010410	170302	
200138	010411	170401	
200139	010412	170402	
200140	010413	170403	
200141	020104	170404	
200201	020107	170405	
200202	020109	170406	
200203	020110	170407	
200301	020304	170411	
200302	020501	170504	
200303	020601	170506	
200307	030101	170508	
	030105	170604	
	030301	170802	
	030307	170904	
	030308		
	030310		
	120101		
	120102		
	120103		
	120104		
	120105		
	150101		
	150102		
	150103		
	150104		
	150105		
	150106		
	150107		
	150108		
	150109		
	160103		
	180104		
	180203		
	190501		
	190502		
	190503		
	190801		
	190802		
	190809		
	191001		
	191002		
	191004		
	191201		
	191202		
	191203		
	191204		
	191205		
	191207		
	191208		
	191209		
	191210		
	191212		
80,000 tonnes	**70,000 tonnes**	**70,000 tonnes**	**30,000 tonnes**

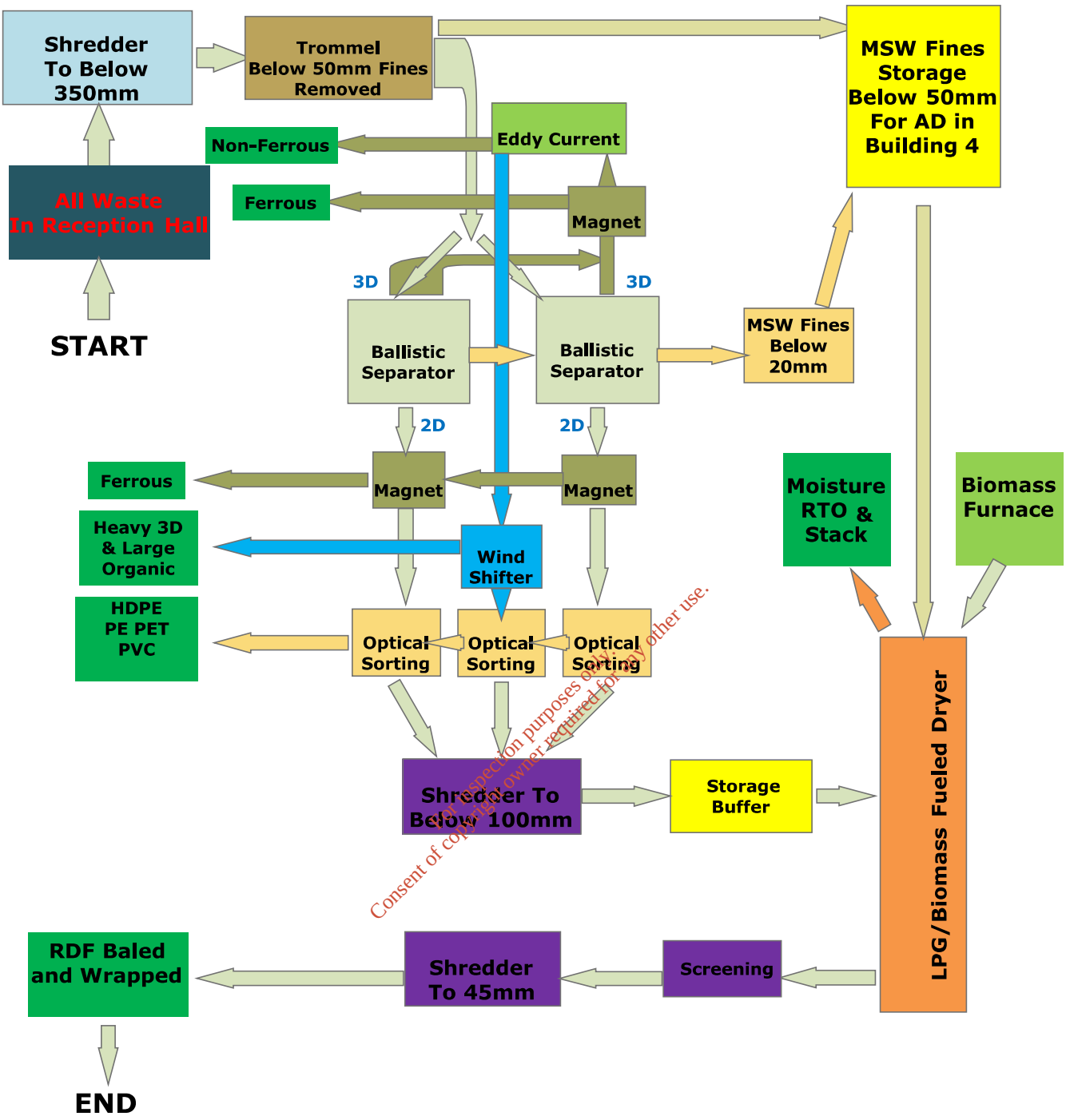
APPENDIX 5

Process Flow Diagrams



Building 4 Process Flow
Anaerobic Digestion Plant

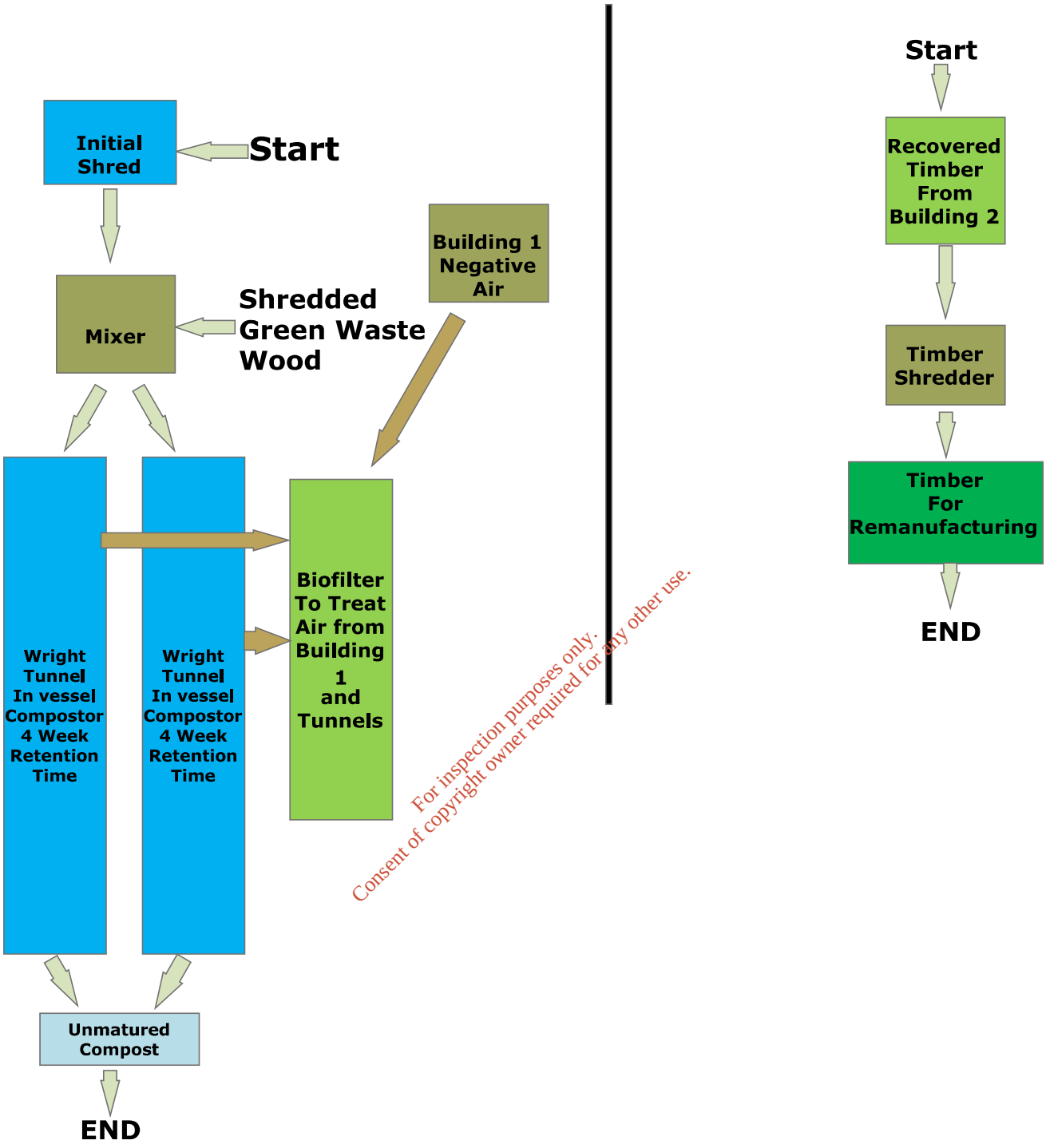
Panda
An Animal for Recycling



Building 3 Process Flow

Recovery of Metals, Plastics, Separation of Organic Fines and Production of RDF from MSW

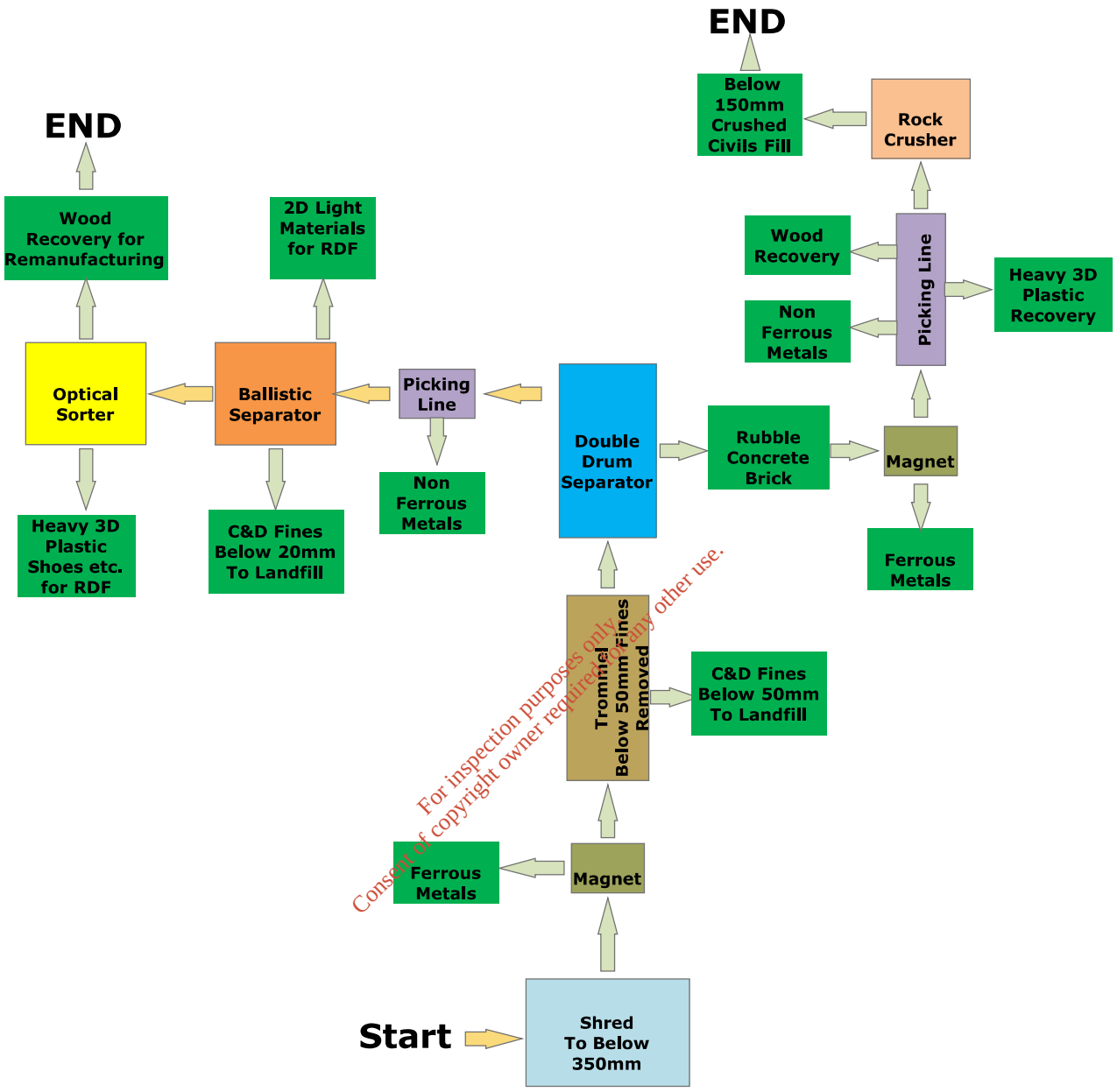
Panda
An Animal for Recycling



Building 1 Process Flow

Composting Source Segregated Material (Brown Bin Waste) & Shredding Wood From Building 2

Panda
An Animal for Recycling



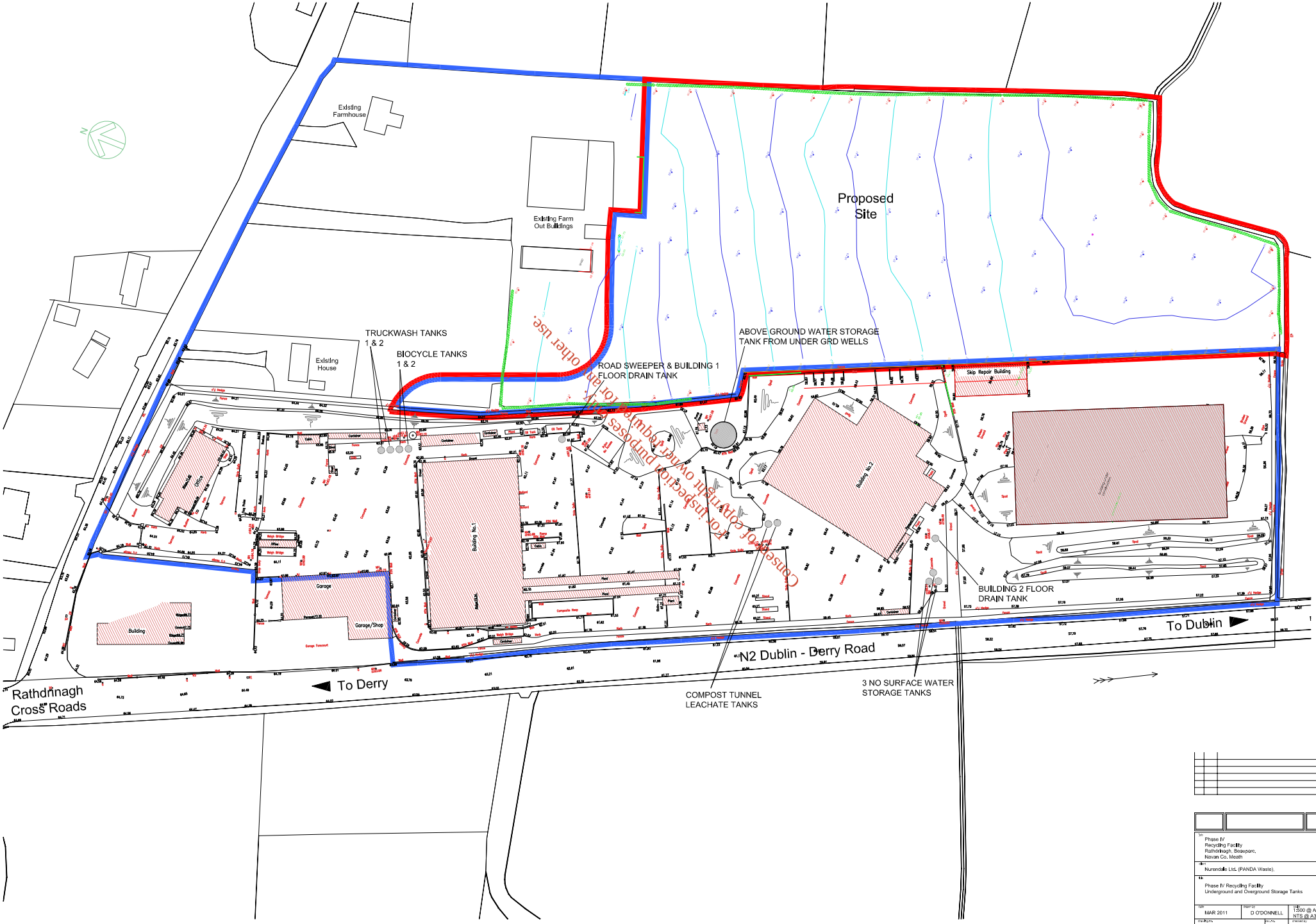
Building 2 Process Flow

C&D Processing

Panda
An Animal for Recycling

APPENDIX 6

Location of Storage Tanks



Phase IV
Recycling Facility
Rathdrinagh, Beaupare,
Navan Co. Meath

Nurendale Ltd. (PANDA Waste),

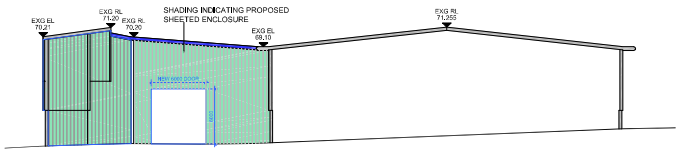
Phase IV Recycling Facility
Underground and Overground Storage Tanks

MAR 2011	D O'DONNELL	1:500 @ A0 NTS @ A3

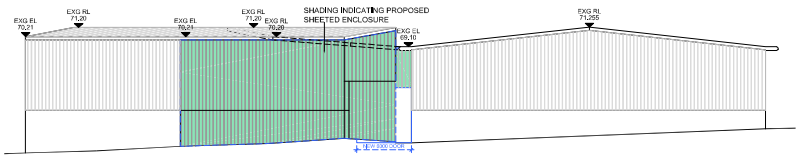
10-05-100 SITEPLAN

APPENDIX 7

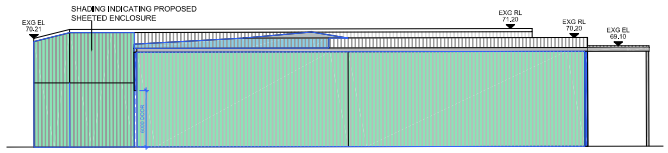
Enclosure of C&D Processing Area



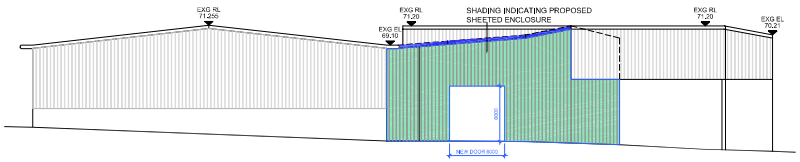
101 BUILDING 2 SECTION A-A
1:200



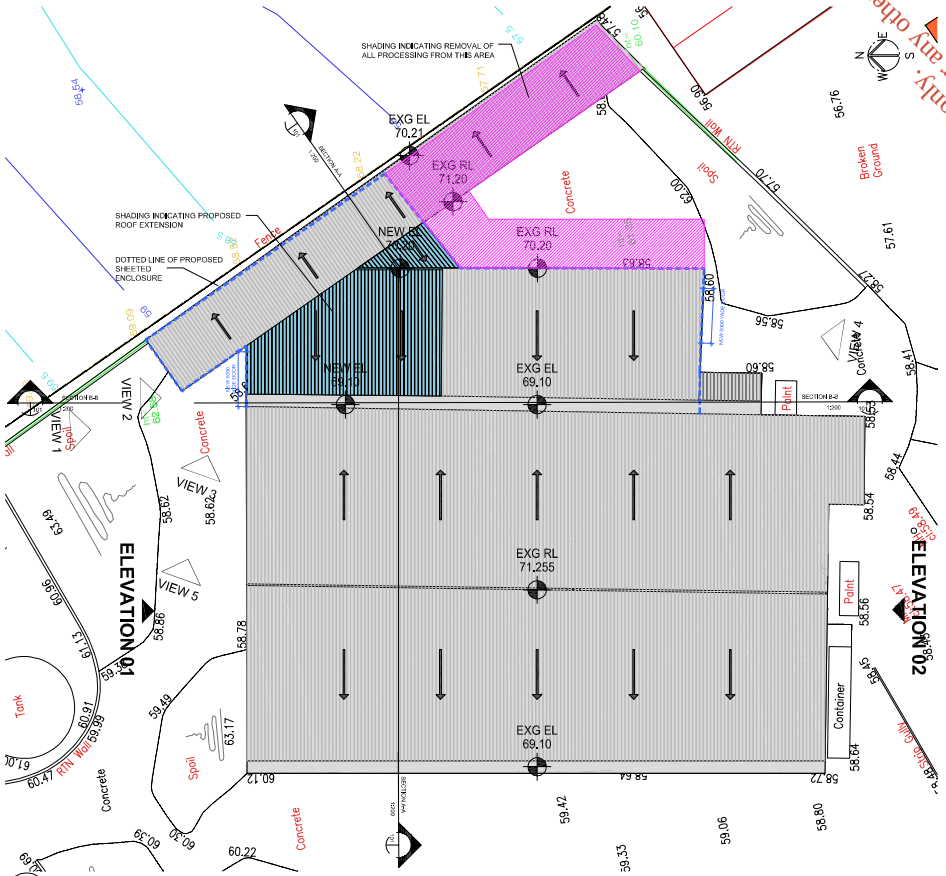
101 BUILDING 2 ELEVATION 01
1:200



101 BUILDING 2 SECTION B-B
1:200

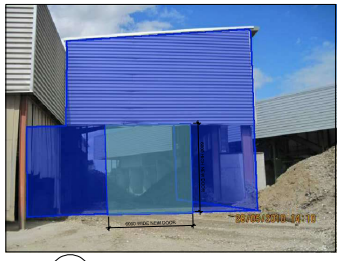


101 BUILDING 2 ELEVATION 02
1:200



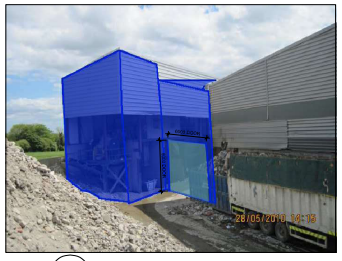
101 BUILDING 2 PROPOSED ROOF PLAN
1:200

101 VIEW 1
VIEW SOUTH OF BOTTOM OF SHED 2 SHOWING CORNER

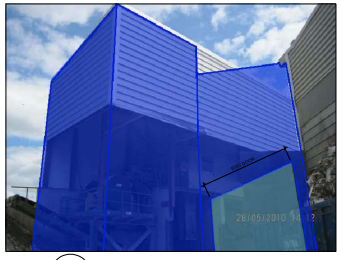


101 VIEW 4
VIEW NORTH FROM TOP OF SHED 2 SHOWING NEW DOOR

101 VIEW 2
VIEW SOUTH OF BOTTOM OF SHED 2 SHOWING CORNER



101 VIEW 5
VIEW EAST OF SHED 2 FROM END



101 VIEW 3
VIEW S/E OF MONO PITCH ROOF BUILDING

101 VIEW 6
VIEW OF PROPOSED DOOR WITH PVC CURTAIN

LEGEND

- LINE OF PROPOSED SHEETED ENCLOSURE
- SHADING INDICATING PROPOSED SHEETED ENCLOSURE
- SHADING INDICATING REMOVAL OF ALL PROCESSING FROM THIS AREA
- SHADING INDICATING PROPOSED ROOF EXTENSION

Phase IV
Recycling Facility
Rathdrinagh, Beauparc,
Navan Co. Meath

Nurendale Ltd. (PANDA Waste).

Building 2
Cladding & Roofing Proposals

date	drawn by	scale
May 2010	D O'DONNELL	1:200 @ A0

drawing no. 10-03-101-SK04 | rev. no. | checked by

APPENDIX 8

Noise Sensitive Locations and Groundwater Wells

Point	X/E	Y/N
D1	297300.553	269480.094
D2	297374.008	269422.605
D3	297408.059	269310.486
D4	297352.128	269483.782
D5	297466.486	269019.564
NSL1	297398.012	269490.612
NSL2	297516.781	269427.533
NSL3	297247.509	269289.321
NSL4	297513.776	268873.680
F1	297406.146	269316.354
F2	297411.338	269151.295
S1	297390.258	269134.057
S2	297410.420	269143.350
SW1	297506.384	269035.437
GW1	297342.250	269470.855
GW2	297426.366	269255.900
CENTRE	297370.455	269284.332

Station CoOrdinates			
	X/E	Y/N	Z
ST1	297375.841	269123.132	70.377
ST2	297388.844	269120.091	70.167
ST3	297395.707	269081.951	69.732

PROJECT TITLE
Topographical Survey of Lands on N2 for Panda Waste Services

CLIENT
Panda Waste Services Ltd.

DRAWING TITLE
Monitoring Locations
Site Layout Plan

	DRAWN BY	CHECKED BY	APPROVED BY
SCALE 1: 1250 (A2)	DATE 15 Sep 2010	DATE	DATE
DRAWING STATUS For Approval		PROJECT NUMBER	
DRAWING NUMBER PWS/002			REVISION